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EPIC UPSC Classes

CURRENT AFFAIRS

DECEMBER 2025

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FOREWORD

The **January Edition of EPIC UPSC Current Affairs**, covers **key developments from December** and continues our conscious shift **away from routine news compilation towards exam-oriented understanding**.

Each topic in this edition has been **carefully curated and mapped to the UPSC syllabus**, enabling aspirants to clearly understand **what happened, why it matters, and how it connects to both Prelims and Mains perspectives**. Our focus remains on relevance, linkage, and clarity—ensuring that every page adds tangible value to your preparation.

This edition reflects our sustained effort to **simplify complexity**, **prioritise high-yield issues**, and **distil current affairs into concept-driven insights**. The content is designed not merely to inform, but to **strengthen conceptual clarity**, **sharpen analytical thinking**, and encourage aspirants to approach issues with the mindset of **future administrators—marked by precision, balance, and purpose**.

Note from the Team

To ensure faster loading and seamless offline access, visual elements have been intentionally kept minimal in this edition. The **colour scheme has been standardized across subjects to reflect our brand identity**, a practice that will be consistently followed in upcoming editions as well.

Our Continuing Vision

At **Educasium IAS Academy**, our vision remains unwavering—to **empower every serious UPSC aspirant with structured, reliable, and meaningful guidance**.

Under the direction and mentorship of **Purushoth Sir**, we remain committed to delivering **innovative, value-driven learning experiences** that nurture **academic excellence, resilience, and a deep sense of purpose**.

On behalf of the **EPIC UPSC Team**, we reaffirm our pledge to uphold **consistency, academic integrity, and thoughtful innovation**, ensuring that every edition of this magazine remains a **trusted, substantive companion** in your civil services journey.

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Team EDUCASIUM

EPIC UPSC Classes – Educasium IAS Academy

Disclaimer: While every effort has been made to ensure accuracy, occasional errors may occur. Any such inaccuracies will be acknowledged and corrected in subsequent editions.

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1. Parliamentary Functioning in India

In **Lok Sabha**, only **29%**, and in **Rajya Sabha**, **34%** of scheduled time was utilised in the **Monsoon Session 2025**.

- **Severe disruptions: Declining sittings:** Average annual sittings fell from **121 days (1952–70)** to **~68 days since 2000**.
- **Question Hour erosion:** Functioned just **23% in Lok Sabha** and **6% in Rajya Sabha** (Monsoon 2025), weakening executive accountability.
- **Committee scrutiny down:** Only **~20% of Bills** were referred to Parliamentary Committees in the **16th & 17th Lok Sabhas**, compared to **~60% earlier**.
- **Institutional gaps: No Deputy Speaker** elected in the **17th Lok Sabha** and none yet in the **18th**, undermining constitutional balance.

Constitutional & Procedural Context

- **Summoning power:** Under **Article 85(1)**, the **President** summons each House.
- **Session gap limit: No more than six months** between two sessions.
- **Flexibility:** Lok Sabha and Rajya Sabha **need not meet simultaneously**.
- **No fixed calendar:** Parliament lacks a statutory sitting calendar; conventionally holds **Budget, Monsoon, and Winter sessions** annually.

Bottom line: Reduced sittings, frequent disruptions, weakened Question Hour, and limited committee scrutiny signal a **decline in Parliament's deliberative and accountability role**.

2. Private Member's Bill on Free Voting by MPs

A **private member's bill** was introduced in the **Lok Sabha** to allow **independent voting by MPs** on most legislative business.

- **Limited disqualification:** An MP faces disqualification **only** if they vote/abstain **against party directions on motions affecting government stability** (e.g., confidence/no-confidence).
- **Free voting:** MPs may vote **freely on all other bills and motions**, guided by judgment and constituency interests.
- **Whip clarity:** The **Speaker/Chairman** must **explicitly announce** when a party whip applies to stability-related motions.
- **Appeal process:** A disqualified member may **appeal within 15 days**; the **Presiding Officer** must decide **within 60 days**.
- **Adjudication reform:** Defection disputes to be handled by **independent tribunals — Supreme Court of India Division Benches** for Parliament and **High Court Division Benches** for State Legislatures.

Rationale

- **Close loopholes:** Addresses **group defections** that destabilise governments despite the anti-defection law.
- **Voter accountability:** Shifts MP accountability from **party leadership to constituents**.
- **Better scrutiny:** Reducing routine whips encourages **bill scrutiny and substantive amendments**.

3. SC limits contempt powers, says judges not shielded from criticism

The **Supreme Court** has set aside a **Bombay High Court order** that punished a woman for *criminal contempt*, holding that the **power of contempt is not a "personal armour" for judges**.

The Court clarified that **contempt jurisdiction must NOT be used to silence criticism**, and that **sincere remorse and apology** can be accepted even after a finding of guilt under the **Contempt of Courts Act, 1971**.

Key Takeaways from the Supreme Court Ruling

Contempt not "personal armour": Contempt power is to **protect the justice system**, not the ego of an individual judge. It **cannot be used to suppress criticism** of judges or judicial functioning.

Bona fide apology (Section 12, Contempt of Courts Act, 1971): The Court emphasised that **genuine remorse** may be accepted **even after guilt is recorded**. The purpose is **course-correction, not vengeance**.

Judicial restraint: Contempt power must be exercised with **great caution, restraint and proportionality**, especially in matters involving free speech.

Mercy & forgiveness: Forgiveness is part of judicial conscience; where the contemnor shows **true contrition**, courts should lean towards **mercy**, consistent with the dignity and authority of the institution.

About Contempt of Court in India

: Purpose: To **protect the authority and independence of the judiciary**, maintain **public confidence**, and ensure **unobstructed administration of justice**.

Constitutional basis:

Article 129: Supreme Court as a **"Court of Record"** with power to punish for its contempt.

Article 215: High Courts as **Courts of Record** with similar inherent powers.

Article 19(2): Permits **"contempt of court"** as a **reasonable restriction** on freedom of speech and expression.

Statutory framework – Contempt of Courts Act, 1971 : Enacted following **H.N. Sanyal Committee** recommendations.

Civil Contempt – Section 2(b): *Wilful disobedience* of any **judgment, decree, direction, order, writ or other process of a court**, or **wilful breach of an undertaking** to a court.

Criminal Contempt – Section 2(c): Publication or act which:

Scandalises or tends to scandalise the authority of any court;

Prejudices or interferes with any judicial proceeding; or

Obstructs or tends to obstruct the administration of justice in any manner.

2006 Amendment – "Substantial interference" requirement:

Contempt of Courts (Amendment) Act, 2006 clarified that punishment can be imposed **only if** the act **"substantially interferes" or is likely to interfere** with the administration of justice. This narrows the scope and harmonises contempt with **free speech** and fair criticism.

4. Electoral funding reform key to curb money power in Indian politics

After the **Supreme Court (2024) struck down anonymous Electoral Bonds** and reaffirmed voters' **"Right to Know" sources of political funding under Article 19(1)(a)**, funding has shifted heavily to **Electoral Trusts**, with the ruling party reportedly receiving **~82% of total disbursements**. This has renewed debate on **level playing field, transparency, and corporate influence** in elections.

What is Electoral Funding?

- Resources raised by **political parties and candidates** for:
  - Campaign expenses,
  - Party organisation,
  - Voter outreach & media.
- The SC has held that **voters' Right to Know the source of political funding** is essential for **informed electoral choice** (Article 19(1)(a) read with 19(2)).

Key Funding Mechanisms in India

- **Individual Donations:**
  - **RPA 1951 – Sections 29B & 29C:**
    - Allow parties to accept donations and require **annual disclosure** of contributions **> ₹20,000**.
- **Tax Provisions (Section 13A, IT Act 1961):**
  - Parties get **income-tax exemption** if:
    - Maintain **audited accounts**, and
    - Accept donations **above ₹2,000 only via traceable banking channels** (cheque, draft, electronic).
- **Corporate Contributions:**
  - **Companies Act, 2013** permits corporate donations subject to conditions (Board approval, disclosure).
  - Post-2024 SC ruling on bonds, channels have shifted more to **declared corporate and Electoral Trust routes**.
- **Electoral Trusts:**
  - **Non-profit entities** that receive donations and must distribute **95% of receipts** to political parties.
  - Required to **disclose aggregate receipts and distributions** to the Election Commission, but not always **donor-to-party granularity** for the public.
- **State / Public Support (Indirect):**
  - **Tax exemptions** for parties,
  - **Subsidised land/buildings** for party offices,
  - **Free/discounted airtime on Prasar Bharati** during elections.
- **Foreign-linked Funding (FCRA route):**
  - **FCRA amendment 2018** allows donations from Indian companies with **majority foreign shareholding**, raising debate over **indirect foreign influence**.

5. Parliament extends new Water Pollution law to Manipur under President's Rule

The **Rajya Sabha has adopted a statutory resolution** to extend the **Water (Prevention and Control of Pollution) Amendment Act, 2024** to **Manipur**, which is currently under **President's Rule (Article 356)**.

Under **Article 357(1)(a)**, when a State is under President's Rule, **both Houses of Parliament must pass a statutory resolution** for a Central law on a State subject (like water) to be applied to that State.

Constitutional / Federal Angle

- **President's Rule – Art. 356:**
  - Invoked when constitutional machinery in a State fails; President assumes functions of State government, Parliament can exercise State Legislature powers.
- **Article 357(1)(a):**
  - Allows Parliament to **confer on itself the powers of the State Legislature** during President's Rule **via statutory resolution passed by both Houses**.
  - Used here to **extend a Central amendment on a State List subject (water)** to Manipur.

Water (Prevention and Control of Pollution) Amendment Act, 2024

- **Background:**
  - Amends the **Water (Prevention and Control of Pollution) Act, 1974**, which created **CPCB and SPCBs** to prevent and control water pollution.
  - Because **water is in State List**, the 2024 Amendment initially applied only to **Himachal Pradesh, Rajasthan and all UTs**; other States must **opt-in** via Assembly resolution.
  - So far **Punjab, Bihar and West Bengal** have adopted it; now **Manipur** joins through the Article 357 route.
- **Key Provisions:**
  - **Penalty shift:**
    - For **minor violations**, earlier punishable with imprisonment, now replaced by **monetary penalties from ₹10,000 to ₹15 lakh**.
  - **Adjudicating Officer:**
    - Centre may appoint **Adjudicating Officers** to impose penalties.
    - Must be at least **Joint Secretary to GoI** or **Secretary to a State Government**.
    - **Appeals** lie to the **National Green Tribunal (NGT)**.
  - **SPCB leadership control:**
    - Central Government may prescribe the **nomination process and service terms** for **State Pollution Control Board (SPCB) Chairpersons**, standardising criteria.
  - **Exemptions – White Category industries:**
    - In consultation with **CPCB**, the Centre may **exempt certain industries from prior consent** to establish/operate.
    - Targets **"White Category"** non-polluting units like **PV cells, AC assembly, fly-ash brick units, wind power plants**, etc.

6. 'Jan Vishwas' push aims to shift regulation from control to trust

The proposed **'Jan Vishwas' framework**, building on the **Jan Vishwas (Amendment of Provisions) Act, 2023** and a forthcoming **2025 Bill**, seeks to move India from **control-oriented, permission-heavy regulation** to **trust-based governance**. The aim is to **promote entrepreneurship, formalisation and mass employment** by rationalising compliances and decriminalising minor offences.

Background – Structural Constraints in India's Regulatory Regime

Prior approvals & License Raj legacy: Multiple **discretionary licences, NOCs, inspections** → scope for **corruption, delays and policy uncertainty**, especially for MSMEs.

Instrument proliferation: Beyond Acts & Rules, businesses face **circulars, SOPs, FAQs, office orders**, making the real "rulebook" complex and shifting.

Cumulative compliance blind spot: India had **~69,000 compliances (2025)**; experiences under **labour codes** show **up to 75%** can be rationalised without harming protections.

Over-enforcement vs weak capacity: Ambitious regulation + limited state capacity → **selective enforcement and rent-seeking**.

Process as punishment: Criminalisation of **minor technical lapses** (e.g., documentation errors, cheque bounce) clogs courts—cheque-bounce alone ≈ **10% of pendency**.

Information fragmentation: No **single, authoritative compliance database**; firms struggle to know what rules apply → **compliance anxiety** and informality.

Reform Area	Key Provision	Core Idea (Condensed)
Trust-Based Regulation	Presumption of permission unless expressly prohibited	Shift from licence-raj to freedom-to-operate
	Self-registration & self-certification	Minimal state intervention, with HS&E and security exceptions
Systematic Decriminalisation	Replace jail terms with civil/monetary penalties	Reduce criminalisation of minor, non-malafide offences
	Retain criminal sanctions for serious offences	Fraud, safety, environmental and security violations remain criminal
Predictable, Law-Backed Rules	Mandatory consultation & impact assessment	Ensure stability and predictability in regulation
	Limit non-statutory obligations	End compliance through FAQs/circulars without legislative backing
Digital Compliance & Single Source	End-to-end digital compliance	Online registration, filing, renewal, inspection
	Unified business identity	PAN/CIN-based single identity across departments
	Centralised legal repository	One searchable portal for all applicable laws and rules
Regulatory Review & Accountability	Annual Regulatory Impact Assessment (RIA)	Track compliances, penalties, prosecutions, outcomes
	Identification of redundant rules	Periodic repeal of obsolete regulations
	Legislative & public scrutiny	Assess proportionality of punishment vs benefit

7. PM flags urgent police reforms at 60th DGP–IG conference

At the **60th All India Conference of Director Generals/Inspector Generals of Police in Raipur**, held on the theme **"Viksit Bharat: Security Dimensions"**, the Prime Minister emphasised the **urgent need for comprehensive police reforms**. The discussion spotlighted long-pending structural, human-resource and accountability deficits in Indian policing, despite multiple commissions and Supreme Court directives.

Why Police Reforms Are Needed

- **Colonial design & political control :** Many States still rely on frameworks derived from the **Police Act, 1861**, encouraging a **"ruler's police"** mindset rather than democratic, citizen-centric policing.
- **Capacity & workforce crisis :** Average workday ≈ **14 hours**, with irregular weekly rest → fatigue and poor quality of investigation & public interface. **Promotion stagnation:** Constables form ~**86%** of the force; many retire after **just one promotion** in 30 years → low morale.
- **Diversity & trust deficit: Gender gap:** Women ≈ **12%** of the force versus **33% policy target** → weak gender-sensitive response to crimes against women and children.
- **Human rights & infrastructure issues : Custodial violence:** India signed **UNCAT (1997)** but has **no anti-torture law**; "third-degree" persists.

Major Reform Recommendations (Commissions & SC)

Committee / Body (Year)	Main Recommendations (Simple Terms)	Core Purpose
National Police Commission (1977–81)	• State Security Commission in every State • Fixed minimum tenure for DGP, SP, etc. • Reduce political interference	Professional and autonomous police
Ribeiro Committee (1998)	• Police Establishment Board for transfers and promotions • Replace Police Act, 1861 • Independent recruitment for constables	Transparent personnel management
Padmanabhaiah Committee (2000)	• Separate investigation from law & order • Police training councils at Centre & States • Retrain constables; compulsory retirement if standards not met	Better investigation & skills
Malimath Committee (2002–03)	• Reform entire criminal justice system • National agency for serious crimes • Protect victims and witnesses	Speedy and fair justice
Model Police Act Committee (2005–06)	• New rights-based Police Act • State Police Boards for oversight • Minimum 2-year tenure; regulated transfers	Modern policing framework
National Human Rights Commission (2021)	• Police to explain custodial deaths/injuries • CCTV in all police stations • Community policing; follow SC directives	Human rights protection
Supreme Court – *Prakash Singh* case (2006)	• 2-year fixed tenure for senior officers • Police Establishment Boards for transfers • Police Complaints Authorities • Separate investigation from law & order	Insulation from politics & accountability

8. ED Moves to Fast-Track PMLA Cases

The **Enforcement Directorate (ED)** has begun steps to **reduce its backlog of money-laundering investigations**, amid scrutiny that **actual conviction rates under PMLA are far below the 94% figure cited by the agency**.

About the Enforcement Directorate (ED)

- A **multi-disciplinary agency** investigating **financial crimes** and enforcing **economic laws**.
- Established in **1956** (as an Enforcement Unit), renamed in **1957**, and placed under the **Department of Revenue, Ministry of Finance (1960)**.
- Headed by a **Director of Enforcement**, headquartered in **New Delhi**, with **regional, zonal, and sub-zonal offices** nationwide.

Prevention of Money Laundering Act (PMLA), 2002

- India's principal law to **combat money laundering** and **confiscate proceeds of crime**.
- Enacted to meet obligations under the **Vienna & Palermo Conventions** and **Financial Action Task Force (FATF)** standards.

Key Provisions

- **Section 3:** Defines money laundering as dealing with **proceeds of crime** and projecting them as untainted.
- **Section 4:** Prescribes **imprisonment and fines**, with **enhanced penalties** for NDPS-linked offences.
- **Section 24: Reverses burden of proof** once the offence is established.
- **Section 12:** Mandates **KYC, record-keeping, and suspicious transaction reporting** by banks/financial institutions.
- **Section 43:** Establishes **Special Courts** for PMLA cases.

9. Marital Rape Exception Debate

A **Private Member's Bill** in the **Lok Sabha** seeks removal of the **marital rape exception under Section 63 of the Bharatiya Nyaya Sanhita (BNS), 2023**.

Ground reality: NFHS-5 reports ~**30% of married women** have faced spousal violence, yet **marital rape remains legally exempt**.

Current Legal Position

- **Exception retained:** Non-consensual sex by a husband with his **adult wife** is **not rape**; the exception from **IPC Section 375** continues in **BNS Section 63**, except when the wife is **below 18 years**.
- **Existing remedy:** Relief under the **Protection of Women from Domestic Violence Act, 2005** is **civil**, not criminal prosecution for rape.

Why the Exception Is Seen as a Colonial Relic

- **Colonial roots:** Based on British common law and the **Doctrine of Coverture**, treating wives as husbands' property.
- **Implied consent fallacy:** Assumes **permanent consent through marriage**, rejected in modern democracies.
- **Constitutional conflict:** Inconsistent with **Article 14 (equality)** and **Article 21 (dignity, bodily autonomy)** as interpreted by the **Supreme Court of India**.
- **Global rejection:** The **UK abolished** the marital rape exception in **1991**.
- **Expert advice ignored: Justice Verma Committee (2013)** recommended **removal**, calling the exception **legally indefensible**.

10. Live-in Relationships & State Protection

The **Allahabad High Court** held that **unmarried status cannot be grounds to deny state protection** to couples in live-in relationships.

Core principles:

- **Constitutional morality** prevails over social norms.
- **Adult choice** of partner and residence is protected.
- **Article 21** obligates the State to protect **life and personal liberty**.

Legal Status in India

- **Recognition:** Live-in relationships are **judicially recognised** but **not codified** by a single statute.
- **Supreme Court view:** Adult cohabitation is protected under **Article 21**; **consensual live-in** is **not a crime**.
- **Domestic Violence Act, 2005:** Recognises relationships **"in the nature of marriage"**; provides **protection orders, residence rights, maintenance**.
- **Evidence law: Bharatiya Sakshya Adhiniyam** presumes **long-term cohabitation as marriage**, unless rebutted.
- **Maintenance: Section 125, Bharatiya Nagarik Suraksha Sanhita** has been interpreted to cover **women in long-term live-in relationships**.

Children & Inheritance

- **Legitimacy:** Children from long-term live-ins are treated as **legitimate**.
- **Property:** Such children can inherit **parents' self-acquired property**.
- **Partners: No automatic inheritance rights** without a will/joint ownership.

Judicial Test (Marriage-like Relationship)

- **Case: Indra Sarma v. V.K.V. Sarma**.
- **Indicators:** Long duration, shared household, financial interdependence, domestic sharing, sexual relationship, etc.
- **Exclusion:** Does **not** protect a woman who **knowingly** enters a relationship with an **already married man**.

11. Assam GoM Recommends ST Status

A **Group of Ministers (GoM)** in **Assam** submitted an interim report recommending **Scheduled Tribe (ST) status** for **six communities**: **Ahom, Chutia, Moran, Matak, Koch-Rajbongshi, and Tea Tribes**.

To protect existing tribal rights, the report proposes a **new three-tier ST classification**.

Three-Tier ST Framework (Assam)

- **Categories: ST (Plains)**, **ST (Hills)**, and **new ST (Valley)**.
- **ST (Valley) inclusion: Tai Ahom, Chutia, Tea Tribes, Koch-Rajbongshi** *(excluding Koch-Rajbongshi of undivided Goalpara)*.
- **Quota protection: Existing ST (Plains) & ST (Hills) quotas remain unchanged**.
- **Separate roster: Independent quota, roster, and vacancy register** for **ST (Valley)** in state jobs and admissions.
- **Central benefits:** All notified STs compete in a **single common ST pool** for **Central Government** reservations.

Procedure to Include a Community in the ST List

1. **State/UT proposal** to **Ministry of Tribal Affairs (MoTA)**.
2. **MoTA review** of evidence.
3. **RGI examination** (ethnographic assessment) by **Registrar General of India**.
4. **NCST scrutiny** by **National Commission for Scheduled Tribes**.
5. **Union Cabinet approval**.
6. **Parliamentary amendment** passed by simple majority in **Parliament of India**.
7. **Presidential notification** updating the ST list.

12. Supreme Court Query on New Entry Order vs Assam Accord

The **Supreme Court of India** asked the Centre whether its **new order allowing persecuted minorities to enter India** violates the **Assam Accord's 25 March 1971 cut-off**.

Assam Accord (1985) – Essentials

- **Purpose:** Ended the **Assam Movement** against illegal immigration from Bangladesh and set **citizenship cut-offs** with safeguards for **Assamese identity**.
- **Cut-off framework:**
    1. **Before 1 Jan 1966:** Recognised as **Indian citizens** with full rights (including voting).
    2. **1 Jan 1966–24 Mar 1971:** Treated as **foreigners**, removed from electoral rolls for **10 years**, then granted citizenship.
    3. **On/after 25 Mar 1971: Illegal foreigners**—liable to detection, disenfranchisement, and **expulsion under the Foreigners Act, 1946**.
- **Safeguards: Clause 6** mandates constitutional, legislative, and administrative measures to protect **Assamese cultural, social, and linguistic heritage**.
- **Legal backing:** Implemented via **Section 6A of the Citizenship Act, 1955** (1985 amendment), anchoring the **25 March 1971** cut-off.

Core issue before the Court

- Whether **post-1971 entry relaxations** for persecuted minorities **override or dilute** the Accord's binding cut-off and protections.

13. Cabinet clears renaming MGNREGA, raising job guarantee to 125 days

The **Union Cabinet** has approved a bill to **rename MGNREGA as "Poojya Bapu Grameen Rozgar Yojana"** and **increase the guaranteed employment from 100 to 125 days per year**.
This comes at a time when **average employment is barely 50 days/household**, unmet demand is high and wage delays persist, raising questions about the **gap between legal entitlements and actual implementation**.

Status of MGNREGA in FY 2024–25

- Person-days: Declined from **308 crore** (2023–24) to **290.6 crore**.

- **Average days of work:** Only **50.24 days per household**, far below the statutory **100-day guarantee** (now proposed 125).
- **Women's participation: 58.15% of person-days** – highest in a decade → strong role in **women's employment & income support**.
- **Budget:** Outlay unchanged at **₹86,000 crore**, despite higher notified employment days.
- **Coverage & unmet demand:**
  - **~5.54 crore households** actually got work.
  - **60–70 lakh demanding households** reportedly remained unmet → implementation bottlenecks.
  - **Wage delays:** Arrears of about **₹974 crore** due to late release of central funds.

About MGNREGA / Poojya Bapu Grameen Rozgar Yojana (core features)

Legal basis:

Enacted as **National Rural Employment Guarantee Act, 2005**; renamed **Mahatma Gandhi NREGA in 2009**; now proposed to be renamed again by amendment.

Rights-based & demand-driven:

Section 3(1): Legal guarantee of at least **100 days of unskilled wage employment** per rural household (Cabinet now proposes **125 days**).

States may provide **beyond 100 days at their own cost**.

Entitlement can go up to **150 days** in **drought/natural calamity** areas and for **ST households under Forest Rights Act**.

- **Eligibility:**
  - **Citizen, 18+ years, rural resident**, willing to do **unskilled manual work**.
  - At least **one-third beneficiaries must be women**.
- **Time-bound guarantee:**
  - Work must be provided **within 15 days** of demand, failing which **unemployment allowance** is payable.

Governance & Funding Framework

Nodal ministry: Ministry of Rural Development.

Gram Panchayat: Receives applications, issues **Job Cards**, plans and approves works.

Must execute at least **50% of works (by cost)**.

Monitoring: Central & State **Employment Guarantee Councils**.

Social audits by Gram Sabha mandatory under **Section 17**.

Funding pattern: Centre bears **100% unskilled wage cost** and **75% of material cost**.

Work Conditions & Payments

Work ideally within **5 km**; else **10% extra wage** if farther.

Permissible works: Focus on **natural resource management (NRM)** and **durable rural infrastructure**.

Prohibitions: No **contractors** or **labour-displacing heavy machinery**; maintain **60:40 wage:material ratio** at district level.

Payments & records:

Job Cards for all registered households.

Wages via **DBT** to bank/post office accounts.

Wages revised annually, linked to **CPI-AL (Agricultural Labour)**.

14. PM Surya Ghar Muft Bijli Yojana

PM Surya Ghar Muft Bijli Yojana (launched **2024**), the **world's largest domestic rooftop solar** programme.

- **Coverage achieved: 23,96,497 households** with functional rooftop solar — ~**23.96%** of the **1 crore** target (by **3 Dec 2025**).
- **Pipeline: 53,54,099 applications** received; **19,17,698 installations** completed nationwide.
- **Current-year target: 35 lakh households** in **FY 2025–26**.

About the Scheme

- **Objective:** Rapid scale-up of **residential rooftop solar** to support India's clean-energy goals.
- **Target & tenure: 1 crore households** by **FY 2026–27**; implemented **FY 2023–24 to FY 2026–27**.
- **Implementation: Ministry of New and Renewable Energy** via **state DISCOMs**.
- **Eligibility:** Indian citizen; owns a house with a suitable roof; valid electricity connection; **no prior rooftop solar subsidy** availed.

15. UPSC Guarantees Preferred Exam Centres for PwBD Candidates

The **Union Public Service Commission** will **guarantee the examination centre of choice** for **Persons with Benchmark Disabilities (PwBD)**.

- **How it works:**
  - Exam centres will fill capacity **for all candidates** as usual.
  - Once full, centres **close for non-PwBD applicants** but **remain available to PwBD candidates**.
- **Rationale:** UPSC found that **high-demand centres** (e.g., **Delhi, Cuttack, Patna**) fill early, often forcing PwBD candidates to **inconvenient or distant locations**.
- **Impact:** Ensures **accessibility, equity, and convenience** for PwBD candidates, aligning examination logistics with inclusion goals.

16. DoT Mandates SIM-Binding for Messaging Apps

The **Department of Telecommunications** notified **Telecommunication Cybersecurity Amendment Rules, 2025**, requiring **SIM-binding** for all app-based communication platforms.

- **Timeline:** Platforms must **comply within 90 days** and **submit compliance reports within 4 months**.
- **What SIM-binding means:** Messaging apps must function **only when the registered SIM is physically present and active** in the device; access must be **blocked if the SIM is removed, replaced, or inactive**.

Why SIM-Binding Is Needed

- **Cyber-frauds: 1.1 lakh+ cases in 2024**; ~70% **linked to messaging apps**.
- **Fake KYC SIMs: 6.3 lakh+ fraudulent SIMs** detected (2023–24) via **Sanchar Saathi**.
- **SIM-less misuse:** ~45% of scam-linked accounts operated **without the original SIM** (DoT audit).
- **Cross-border networks: ₹850+ crore** frauds (2023–25) traced to handlers abroad using unbound accounts.
- **Identifier risk: 12+ major apps** using mobile numbers (TIUEs) lacked SIM–device verification.

User Impact

- **Travelers:** Users changing SIMs abroad **lose access** unless the original Indian SIM stays active in-device.
- **Workflows: 6-hour logout** on web clients (e.g., WhatsApp Web) can disrupt office use.
- **Compliance friction: More frequent re-verification** and tighter **account–SIM synchronization**.

17. DoT Withdraws Mandatory Pre-Installation of Sanchar Saathi App

The **Department of Telecommunications** has **withdrawn the mandate** requiring compulsory pre-installation of the **Sanchar Saathi** app on all new smartphones sold in India.

Earlier stance: Smartphone manufacturers/importers were earlier instructed to pre-install the app, though the Ministry of Communications had clarified it would remain **voluntary and deletable**.

Key Concerns That Drove the Withdrawal

- **Privacy risks:** Broad permissions (call logs, location) raised fears of **mass surveillance** without judicial oversight.
- **Manufactured consent:** Mandatory pre-install exploited user inertia, undermining the **right to privacy**.
- **Opt-in dilution:** Bypassed the standard opt-in model, effectively turning a public service into **bloatware**.
- **Security exposure:** System-level integration created a **single point of failure** if compromised.
- **Proportionality:** Compulsion was excessive given **less intrusive alternatives** (web portal, SMS checks).
- **Oversight gap:** Lack of an independent **data protection regulator** limited accountability.

About Sanchar Saathi (Voluntary Use Continues)

- **Operator/Developer:** Run by DoT under the Ministry of Communications; developed by **Centre for Development of Telematics**.
- **Access:** Available via **mobile app and web portal**.
- **Core tools:**
    - **CEIR:** Block/track lost or stolen phones using IMEI.
    - **TAFCOP:** Check SIMs issued in one's name.
    - **Chakshu:** Report scam calls/SMS/links.
    - **KYM:** Verify handset authenticity via IMEI scan.

18. Major Telecom Security Reforms Announced

The **Department of Telecommunications** announced reforms implemented by the **National Centre for Communication Security** to strengthen telecom security, ease compliance, and support *Atmanirbhar Bharat* and *Design in India*.

Pro Tem Security Certification (Extended):

- The Pro Tem scheme for OEMs is **extended by 2 years beyond 1 Jan 2026**.
- Introduced in 2024 to **avoid business disruption** by allowing temporary clearance during full security testing.
- Operates within the **MTCTE** framework, which mandates certification before sale/import/use under the **Telecommunications (Framework to Notify Standards, Conformity Assessment and Certification) Rules, 2025**.

Lower Testing Lab Fees:

- **>50% fee reduction** for designation of **Telecom Security Testing Laboratories (TSTLs)**.
- **90% fee cut** for Indian startups, MSEs, and women-owned enterprises; **full waiver** for Central/State labs, IITs, and autonomous institutions.
- TSTLs test equipment against **ITSAR** and **TSTP** standards to ensure national security and user privacy.

Simplified Certification for ONT Devices:

- **Grouped testing allowed** for Optical Network Terminator (ONT) devices sharing identical software under a **single ITSAR certification**.
- ONTs convert optical signals to electrical signals for **FTTH connectivity**.

19. Right to Disconnect Bill, 2025

A **Private Member's Bill** introduced in the **Lok Sabha** to legally protect employees' right to ignore work communications after office hours without penalties. Promote **work–life balance** and prevent unpaid overtime and digital overreach.

Key Provisions

- Legal right to **disconnect** from calls, emails, and messages outside official hours.
- Creation of an **Employees' Welfare Authority** for enforcement.
- **Penalties:** 1% penalty on employers for violations; provision for **overtime pay**.
- **Well-being Measures:** Counselling services and **digital detox centres**.

Why It's Needed

- **Legal Gap:** No statutory protection for off-hours disengagement in India.
- **Constitutional Basis:** Aligns with **Article 21** (health, rest, sleep), **Article 39(e)**, and **Article 42**.
- **Health Impact:** "Telepressure" drives burnout; **49%** of Indian workers report work-related mental stress (ADP).
- **Work Hours:** Indians average **47.7 hours/week**; over half exceed **49 hours**, harming productivity and well-being.

Global Precedents

- **France (2017):** First to codify the right to disconnect (El Khomri law).
- **Portugal (2021):** Fines for after-hours contact except emergencies.
- **Australia (2024):** Enforceable right to refuse unreasonable after-hours contact.

Note: Private Member's Bills are not government bills; they spotlight issues and test policy ideas.

20. National Testing Agency (NTA) — Issue & Reform Context

- **Background:** NTA is an autonomous body under the **Ministry of Education**, created to conduct transparent, scientific, and standardised national-level entrance exams.
- **Exams Conducted:** JEE Main, NEET-UG, CUET-UG/PG, CMAT, GPAT, UGC-NET, covering engineering, medical, management, and fellowships.
- **Current Concern:** Repeated **paper leaks, answer-key errors, postponed exams, and delayed results** have triggered the formation of a **high-level reform panel**.

Key Reasons Behind NTA's Failures

- **Design–Function Mismatch:** NTA was envisaged for **computer-based testing**, but high-stakes exams like **NEET-UG and UGC-NET** were conducted in **pen-and-paper mode**, increasing leak vulnerability.
- **Manpower Deficit:** Only ~**25 sanctioned staff** to manage **20+ national exams** involving crores of candidates.
- **Excessive Outsourcing:** Core functions—IT systems, cybersecurity, logistics, and paper handling—are outsourced, weakening accountability.
- **Operational Errors:** Frequent answer-key mistakes and result delays have eroded credibility (e.g., **multiple questions withdrawn in JEE Main 2025**).
- **Governance Ambiguity:** Registered as a **society**, but governed by Union Government appointees, leading to unclear accountability and liability.

21. India's Road Crash Fatalities — 2024

- Scale of the Crisis: India recorded **1,77,177 road deaths in 2024**, a **2.5% rise** from 2023, averaging ~**485 deaths per day**.

- Global Comparison: Fatality rate stands at **11.89 per lakh population** (China: 4.3; USA: 12.76 — World Road Statistics 2024).

- Care Deficit: Only **5,480 survivors** accessed support from the **Motor Vehicle Accident Fund**, indicating weak post-crash response.

- International Commitment: India is a signatory to the **Stockholm Declaration (2020)**, committing to **50% reduction in road deaths by 2030**—current trends diverge sharply.

Why Fatalities Persist

- Speeding: Responsible for **>70% of highway deaths**; point-based CCTV causes only short-term compliance.

- Unsafe Engineering: 45–60% of fatal crashes occur where highways cut through settlements **without pedestrian crossings** (CRRI).

- Motorisation vs Safety Gap: Vehicle ownership grew ~**8% annually (2018–24)**, outpacing safety infrastructure.

- Execution Failures: Despite **40 km/day NH construction**, audits show **1 in 3 stretches** lack mandated safety features.

- Weak Enforcement: Absence of **sectional speed monitoring** allows drivers to slow only at checkpoints/toll plazas.

22. Goa Nightclub Fire

A major fire at *Birch by Romeo Lane*, a nightclub in Goa, killed ~**25 people**, highlighting chronic fire-safety lapses in high-occupancy venues.

Fire Safety Legal Framework

- **NBC 2016 (Part 4):** Sets national guidelines for fire prevention, building design, safe exits, and firefighting systems.
- **Enforceability Gap:** NBC is **recommendatory**; states/ULBs must adopt it via bye-laws to make it binding.
- **Fire NOC:** Most states require Fire Department clearance for high-risk occupancies (clubs, hotels, assembly halls, basements).

Why Fires Recur

- **Weak Enforcement:** Irregular inspections and NOC renewals allow unsafe operations to continue.
- **Hazardous Storage:** Illegal storage of flammable materials due to poor monitoring.
- **Electrical Failures:** Overloaded circuits and poor maintenance are frequent ignition sources.
- **Unsafe Egress:** Blocked stairwells, narrow corridors, and poor ventilation cause fatal smoke entrapment.
- **Regulatory Adoption Lag:** Only ~**22–24 states** had fully adopted NBC 2016 fire provisions by **2024** (MoHUA).

Bottom Line: The tragedy underscores the urgent need for **mandatory NBC adoption**, **regular audits**, and **strict enforcement** in high-risk public venues.

23. High Trade Margins on Non-Scheduled Drugs — Parliamentary Panel Flags Concern

A Parliamentary Standing Committee has urged the **National Pharmaceutical Pricing Authority (NPPA)** to curb excessive trade margins on non-scheduled medicines, which remain outside price control and burden patients.

Key Points

- **Non-scheduled drugs:** Not listed under the **National List of Essential Medicines (NLEM)**; NPPA cannot set ceiling prices, enabling high launch prices and margins.
- **Margin levels:** Reported margins up to **953% (cetirizine)**, **920% (pantoprazole)**, and **600–1800%** for commonly used medicines.
- **Regulatory gap:** Under **DPCO 2013**, price ceilings apply only to **scheduled (NLEM) drugs**; non-scheduled drugs are excluded.
- **Committee's ask: Trade-margin rationalisation** and **real-time price data capture** across manufacturers, hospitals, and distributors.
- **Evidence of impact:** Earlier **margin caps** on **42 anti-cancer drugs** and select devices (including during COVID-19) delivered ~**₹1,000 crore** in patient savings.

24. AWBI issues SOP for managing stray dogs on institutional premises

Acting on a recent **Supreme Court directive** to frame guidelines for stray dogs on public institutional premises, the **Animal Welfare Board of India (AWBI)** has issued a **Standard Operating Procedure (SOP)** for municipal authorities. The SOP lays down **humane capture, sterilisation, shelter and response norms** to address safety concerns without violating animal-welfare principles.

Key SOP Provisions – Shelter & Care

Sterilisation & vaccination: All captured stray dogs must be **sterilised and vaccinated** *before* permanent relocation to **municipal or NGO shelters**.

Minimum shelter dimensions: To prevent overcrowding, the SOP prescribes **minimum area norms**, e.g. **70×40 feet for every 100 dogs**.

Facility norms: Adequate **staffing, veterinary care, isolation wards**, **CCTV monitoring** and **six-foot boundary fencing** are mandatory.

Feeding standards: Adult dogs must be fed **2–3 times a day**, with **weight-based** portions — e.g. **100–150 g for 5 kg dogs**, **400–600 g for 20 kg dogs**.

Operational Standards & Urban Governance Link

Institutional shelters: Institutions with **>2 acres land** and at least **6,000 sq ft free space** may set up **on-premise shelters at their own cost**, instead of simply pushing dogs back to streets.

24×7 helpline & response time: A **round-the-clock helpline** must be operational, with a norm to **capture reported dogs within four hours**, improving citizen grievance redressal.

Waste management: Urban local bodies must create **closed waste pits** for street vendors and maintain **helplines for waste clearance** so food waste does not attract and concentrate stray dogs.

About Animal Welfare Board of India (AWBI)

Nature & mandate: A **statutory advisory body** to promote compliance with **animal-welfare laws** and prevent **unnecessary pain or suffering** to animals.

Legal basis & ministry: Set up in **1962** under **Section 4, Prevention of Cruelty to Animals Act, 1960**; functions under the **Ministry of Fisheries, Animal Husbandry & Dairying**.

Powers & structure: Can **authorise inspections** and **seizure** of animals where cruelty is suspected. Comprises **28 members**, each with a **three-year term**; HQ at **Ballabhgarh, Haryana**. First Chairperson: **Smt. Rukmini Devi Arundale**.

25. SHANTI Bill opens nuclear sector to private players, overhauls liability

The Centre has introduced the **Sustainable Harnessing and Advancement of Nuclear Energy for Transforming India (SHANTI) Bill, 2025** in the Lok Sabha to **replace the Atomic Energy Act, 1962 and the CLND Act, 2010** and has since passed it in both Houses.

The Bill aims to **open India's civil nuclear power sector to private players**, mobilise large-scale investment, and help achieve **100 GW nuclear capacity by 2047** and **Net Zero by 2070**.

A. Context & India's Nuclear Energy Landscape

- **Present status:**
  - **25 reactors** at **7 nuclear power stations** with **8,880 MW** installed capacity.
  - Nuclear power contributes only **~3% of India's electricity generation** (FY 2024–25).
  - Targets: **22.5 GW by 2031–32** and **100 GW by 2047**.
- **Legal regime till now:**
  - **Atomic Energy Act, 1962** → central monopoly over nuclear power (generation only by Union govt/PSUs like **NPCIL**).
  - **Civil Liability for Nuclear Damage (CLND) Act, 2010** → liability framework, with controversial **right of recourse against suppliers**, which deterred many foreign vendors.

B. Key Features of the SHANTI Bill

1. Legislative & Institutional Overhaul

- **Unified law:** Repeals **1962 Act** and **CLND Act, 2010** and replaces them with a single **SHANTI Act**, simplifying regulation & liability.
- **AERB as statutory regulator:**
  - Grants **statutory status** to the **Atomic Energy Regulatory Board (AERB)** and makes it **answerable to Parliament**, strengthening its legal footing.
- **Dispute resolution:**
  - **APTEL** (Appellate Tribunal for Electricity) designated to hear nuclear sector appeals.
  - **Nuclear Damage Claims Commission** to adjudicate **compensation claims** for severe nuclear damage.

2. Private Sector & FDI Participation

- **Ends NPCIL monopoly:**
  - Allows **Indian private companies** (and JVs) to **build, own, operate and decommission nuclear power plants** under a licensing regime.
- **FDI cap:**
  - Permits **up to 49% FDI** in nuclear power projects; majority control remains with Indian entities.

3. Liability & Compensation Architecture

- **Tiered operator liability:**
  - Links operator liability to **plant size**, e.g.:
    - **₹100 crore** for plants **<150 MW**,
    - up to **₹3,000 crore** for large plants **>3.6 GW** (exact slabs to be notified).
- **Supplier immunity:**
  - **Removes supplier liability** and **operator's right of recourse** against suppliers, making **operators solely liable** → aligns more closely with international nuclear liability norms (e.g. CSC).
- **Penalty & fund:**
  - Caps **maximum financial penalty** for violations at **₹1 crore**.
  - Sets up a **central liability fund** to pay compensation **beyond operator caps**.

4. Technology, Innovation & Strategic Control

- **Patent regime:**
  - Amends **Section 4 of the Patents Act, 1970** to allow **patenting of peaceful nuclear energy inventions**, encouraging private R&D.
- **Bharat SMRs & Nuclear Energy Mission:**
  - Institutionalises a **₹20,000 crore "Nuclear Energy Mission"** to deploy indigenous **220 MW Small Modular Reactors (BSMRs)** for grid and industrial use.
- **Strategic activities retained by State:**
  - Government retains **exclusive control** over **uranium enrichment, spent fuel reprocessing and heavy water production**.

C. Objectives & Significance

- **Capital mobilisation & energy security:**
  - Target to mobilise **₹15–20 lakh crore** private investment and scale nuclear capacity to **100 GW by 2047**.
- **Clean baseload & Net Zero:**
  - Treats nuclear as **clean baseload** to stabilise a **renewable-heavy grid**, reduce coal dependence and support **Net Zero 2070**.
- **Industrial decarbonisation:**
  - **SMRs** can supply reliable low-carbon power/steam to **industry & data centres**, helping firms **bypass future carbon taxes/CBAM-like measures**.
- **Technology access:**
  - By clarifying and reducing liability, India hopes to **unlock advanced reactor technology transfers** and global partnerships that were stalled under CLND.

26. Raj Kumar Goyal Sworn in as Chief Information Commissioner

Raj Kumar Goyal has been sworn in as the **Chief Information Commissioner (CIC)**, succeeding **Heeralal Samariya**, with the appointment of eight Information Commissioners restoring the Central Information Commission to full strength after nine years.

New CIC: Raj Kumar Goyal, former IAS officer and ex-Secretary, Department of Justice, Ministry of Law and Justice.

Outgoing CIC: Heeralal Samariya.

Full Strength Restored: Appointment of **8 Information Commissioners** ends a prolonged vacancy phase, expected to reduce RTI backlogs and improve disposal rates.

About the Chief Information Commissioner (CIC)

- **Role:** Heads and administers the Central Information Commission; allocates work and oversees functioning.
- **Appointment:** By the President on the recommendation of a committee comprising the Prime Minister, the Leader of Opposition (Lok Sabha), and a Union Cabinet Minister nominated by the PM.
- **Eligibility:** Person of eminence with experience in law, social service, management, journalism, or public administration; must not hold legislative office.
- **Tenure:** As prescribed by the Central Government under the **RTI (Amendment) Act, 2019**, or up to **65 years of age**.
- **Removal:** By the President for proven misbehaviour or incapacity, only after a **Supreme Court** inquiry.

About the Central Information Commission

- **Status:** Statutory body under the **Right to Information Act, 2005**.
- **Composition:** One CIC + up to **10 Information Commissioners**.
- **Powers & Functions:**
  - Final appellate authority for RTI appeals against Central Public Authorities.
  - Civil court–like powers during inquiries.
  - Can impose penalties on officials for non-compliance.

27. *President releases Santhali Constitution on Ol Chiki script centenary*

The **President of India** released the **Santhali-language translation of the Constitution of India** to mark the **100th anniversary of the Ol Chiki script**, underscoring linguistic inclusion and constitutional outreach.

Key Facts (Santhali Language & Ol Chiki)

Language Family: Austroasiatic (Munda subgroup); language of the Santhal tribe; **UNESCO status: Vulnerable**.

Geographic Spread: Primarily **Jharkhand**; also **West Bengal, Odisha, Bihar, Assam, Tripura, Mizoram, Chhattisgarh**.

Constitutional Status: Added to the **Eighth Schedule** by the **92nd Constitutional Amendment Act, 2003**; additional official language in **Jharkhand** and **West Bengal**.

Ol Chiki Script: Created in **1925** by **Pandit Raghunath Murmu** as a dedicated script for Santhali.

Script Features: Alphabetic (not syllabic); **30 letters** inspired by natural and everyday shapes; replaced reliance on borrowed scripts (e.g., Bengali, Odia).

Significance: Enhances access to constitutional knowledge for Santhali speakers and celebrates a century of an indigenous script central to tribal cultural identity.

28. Renaming Raj Bhavans to Lok Bhavans

The **Union Home Ministry** has proposed renaming **Raj Bhavans** as **Lok Bhavans** and **Raj Niwas** as **Lok Niwas** to remove colonial symbolism. **West Bengal** and **Ladakh** have accepted and implemented the change.

Purpose: Replace colonial-era terminology ("Raj") with people-centric nomenclature ("Lok").

Adoption: West Bengal and Ladakh have already renamed their Governor/LG residences accordingly.

About Raj Bhavan / Raj Niwas

Function: Official residence and office of the **Governor** (States) and **Lieutenant Governor/Administrator** (UTs).

Constitutional Basis: Article 153: Office of the Governor.

Article 158: Entitles the Governor to a rent-free official residence; if one Governor serves multiple States, one Raj Bhavan is designated as the principal residence.

Protocol Role: Hosts oath ceremonies, official meetings, and visiting dignitaries; comparable in protocol to **Rashtrapati Bhavan** at the Union level.

Colonial Legacy: Most Raj Bhavans originated as British-era Government Houses (e.g., **Kolkata Raj Bhavan**, built in **1803**).

Symbolism: Shift from authority-centric colonial imagery to **people-first governance**.

DECEMBER 2025

INTERNATIONAL AFFAIRS

1. India Re-elected to IMO Council Category B with Highest Votes (2026–27)

India has been re-elected to the **International Maritime Organisation Council** in **Category B** for the **2026–27 biennium**, securing the **highest number of votes (154 out of 169)** — marking the **second consecutive term** as top-voted member in this category.

About IMO:

- The **International Maritime Organisation (IMO)** is the **UN's specialised agency** for maritime safety, security, and environmental performance of international shipping.
- **Founded:** 1948 (Inter-Governmental Maritime Consultative Organisation, renamed IMO in 1982; came into force in 1959).
- **Headquarters:** London, United Kingdom.
- **Membership:** 176 Member States + 3 Associate Members; **India joined in 1959.**

IMO Council:

- Acts as the **executive organ** between Assembly sessions. Majority of regulatory work is shaped here.
- **Composition:** 40 elected members divided into:
  - **Category A:** 10 countries with the largest interest in providing international shipping services
  - **Category B:** 10 countries with the **largest interest in international seaborne trade** (India's category)
  - **Category C:** 20 countries representing other regions/special interest groups.

Latest Elections (34th IMO Assembly — London):

- Held during the IMO Assembly session.
- India secured **154/169 valid votes**, the **highest tally in Category B** — reflecting strong international confidence.
- This marks the **second consecutive biennium** India tops Category B.

Significance:

- Reinforces India's role in **global maritime governance** — safety, security, trade facilitation, decarbonisation, environmental protection.
- Aligns with India's **Amrit Kaal Maritime Vision 2047** and global outreach initiatives like **Vision MAHASAGAR**.
- India's engagement included strategic diplomatic dialogues and cooperation with IMO officials and member delegations.

Key IMO Conventions/Frameworks:

- **SOLAS (1974):** Safety standards for ships.
- **MARPOL (1973/78):** Prevention of pollution from ships.
- **STCW (1978):** Training & certification standards for seafarers.
- **Ballast Water Management (2004):** Addresses invasive species.
- **IMO GHG Strategy (2023):** Net-zero emissions aim by ~2050.

2. India Re-elected to Key Global Governance Bodies (2025)

- **UNESCO Executive Board (2025–29):** India has been re-elected to UNESCO's **58-member Executive Board**, strengthening its role in shaping global policies on **education (SDG-4), science, culture, World Heritage, Intangible Cultural Heritage**, and flagship programmes like **Man and the Biosphere (MAB)**. UNESCO, founded in **1945** and headquartered in **Paris**, has **194 member states**; India is a **founding member**.
- **ICAO Council (December 2025):** India was re-elected to the **International Civil Aviation Organization (ICAO) Council** with one of the **highest mandates**, reinforcing its influence over **global aviation safety, standards, and capacity building**. India actively supports ICAO's **No Country Left Behind (NCLB)** initiative through technical assistance and promotes global adoption of **Standards and Recommended Practices (SARPs)**.

3. India Assumes Chairship of International IDEA (2026)

- **Event:** On **3 December 2025**, Chief Election Commissioner **Gyanesh Kumar** assumed the chairship of the **Council of Member States of International IDEA**, marking **India's election as Chair for 2026**.
- **Significance:** India, a **founding member (one of 14)**, reaffirmed its commitment to strengthening **global democratic institutions**.
- **Ceremony:** Formal takeover held in **Stockholm**, attended by India's Ambassador to Sweden, **Anurag Bhushan**.
- **India's Democratic Scale:** Over **900 million registered electors** across **28 States and 8 UTs**.
- **Electoral Legacy:** Since **1947**, India has conducted **18 Lok Sabha elections** and **400+ State Assembly elections**.

4. India at 11th UNAOC Forum (Riyadh)

- **Event:** At the **11th United Nations Alliance of Civilizations (UNAOC) Forum** in **Riyadh**, India reaffirmed its commitment to **Vasudhaiva Kutumbakam** (the world as one family) and **interfaith harmony**.
- **UNAOC Background:** Established in **2005** by former UN Secretary-General **Kofi Annan**, co-sponsored by **Spain and Türkiye**, UNAOC functions as a UN **soft-power platform** for conflict prevention.
- **Mandate:** It promotes **intercultural and interreligious dialogue** to counter polarisation, extremism, and intolerance.
- **Structure & Focus:** Led by a **High Representative of the UN Secretary-General**, headquartered in **New York**, with priority areas including **youth, education, media, migration, and women**.

5. UNSC Resolution 2803 on Gaza Reconstruction

- The **UN Security Council** adopted **Resolution 2803**, endorsing a **Comprehensive Post-Conflict Reconstruction Plan for Gaza**, including **new urban development and a Special Economic Zone**.
- The resolution calls for **full implementation of the ceasefire** and Gaza's rehabilitation, and creates a **Board of Peace (BoP)**—a transitional body with **international legal personality**—to oversee reconstruction and interim governance.
- It authorises an **International Stabilisation Force** to secure borders, support **demilitarisation**, protect civilians, and enable humanitarian assistance under BoP oversight.
- The resolution affirms a **conditional pathway to Palestinian self-determination**, linked to **Palestinian Authority reforms**, without immediate recognition of statehood.

6. Capture of Pokrovsk

- Russia claims full control of **Pokrovsk, a major industrial and logistics hub** in eastern **Ukraine's Donetsk region**, after a prolonged campaign.
- Pokrovsk is a **critical road–rail junction**, serving as a **primary supply artery** for Ukrainian forces on the eastern front.
- The city hosts **Ukraine's only coking coal mine**, vital for the national **steel industry**.
- Strategically, it functioned as a **buffer shielding Dnipropetrovsk region** and as a **gateway to northern Donetsk**, including **Kramatorsk and Sloviansk**.

7. Russia–China Plan for a Lunar Nuclear Power Plant

- **Project & Timeline:** Russia and China have agreed to build an **automated nuclear power plant on the Moon** around **2035–2036** to support sustained lunar operations.
- **Framework:** The reactor is part of the **International Lunar Research Station (ILRS)**—a joint architecture that includes an **orbital station** and a **surface base near the lunar south pole**.
- **Why Nuclear Power?**
  - The Moon experiences a **~14-day lunar night**, during which **solar panels cannot generate electricity**.
  - A **compact fission reactor** provides **continuous, reliable power** for habitats, instruments, mining, and communications.
- **Global Context:**
  - The United States is pursuing a parallel effort—the **Fission Surface Power Project**—with a target to deploy a **lunar reactor by 2030**.
- **Legal Position:**
  - The **Outer Space Treaty prohibits nuclear weapons** in space but **allows peaceful nuclear energy** for exploration and scientific purposes.

8. India–Russia 23rd Annual Summit Strengthens Strategic Partnership on 25-Year Milestone

The **23rd India-Russia Annual Summit** was held in **New Delhi on 4–5 December 2025**, marking **25 years** of the India-Russia Strategic Partnership declared in **October 2000**. The summit reaffirmed bilateral cooperation across trade, defence, energy, connectivity, climate, and human ties, and set a new **USD 100 billion trade target by 2030**.

KEY OUTCOMES

1) Trade & Economy

- New **USD 100 billion bilateral trade target by 2030** (from ~USD 68 billion in 2024-25).
- Adoption of **"Programme 2030"** to diversify trade beyond energy and defence.
- Progress on **Free Trade Agreement (FTA)** negotiations with **Eurasian Economic Union (EAEU)**.
- Russian market opened to Indian **potatoes, pomegranates, processed foods**.
- **Rupee-Ruble settlement system** strengthened; ~96% trade in national currencies.
- **Customs protocol** for exchanging pre-arrival data for faster border clearance.
- Long-term **fertiliser supply** commitments and joint **urea plant** plans.

2) Defence & Security

- **Reciprocal Logistics Support (RELOS)** agreement for mutual port access.
- Joint ventures in India to build **spare parts** for Russian origin platforms.
- Talks on **S-400 delivery** and future cooperation on **S-500 systems**.
- Agreement on **combating irregular migration** and ensuring maritime safety.
- Reaffirmed **zero tolerance on cross-border terrorism financing/networks**.

3) Energy & Nuclear Cooperation

- Assurance of **uninterrupted crude oil & LNG supplies**.
- Agreement on **six new and second Russian-designed nuclear units** in India.
- Exploration of **Small Modular Reactors (SMRs)** & **floating nuclear plants**.

4) Connectivity & Arctic

- Push to operationalise **Chennai-Vladivostok Maritime Corridor**.
- Development of **Northern Sea Route (NSR)** as alternative trade route.
- MoU for **polar operations training** for Indian seafarers.
- Removing bottlenecks in **International North-South Transport Corridor (INSTC)**.

5) Climate & Global Governance

- Joint Working Group on **climate change & low-carbon development**.
- Russia **reaffirmed support** for India's bid for a **permanent UNSC seat**.
- Russia adopting the **Framework for India-led International Big Cat Alliance**.

6) People-to-People & Institutional Cooperation

- India to offer **30-day free e-tourist visa** to Russian citizens.
- Facilitation of **temporary skilled labour** movement to Russia.
- **ISRO-Roscosmos** cooperation in human spaceflight, navigation, planetary science.

Agreements in **healthcare, medical education, infectious disease surveillance**.

9. Peace plan of Ukraine – 20 point peace plan

Ukrainian President **Volodymyr Zelenskyy** has unveiled a **20-point peace plan**, formulated **in consensus with the United States**, aimed at bringing the **Russia–Ukraine war** to an end.

Core Pillars of the Plan

1. **Security Guarantees**
   - Ukraine seeks **legally binding security guarantees** equivalent to **NATO Article 5**, backed by the U.S., NATO members, and European partners.
   - This would obligate guarantor states to respond collectively to any future aggression against Ukraine.
2. **European Integration**
   - A **clear, time-bound pathway to European Union membership**.
   - Until accession, Ukraine would receive **preferential access to EU markets**, aiding post-war economic recovery.
3. **Military Posture**
   - Ukraine would **retain a strong peacetime armed force of ~800,000 personnel**.
   - The plan explicitly **rejects large-scale demilitarisation**, reflecting lessons from past security failures.
4. **Non-Aggression Pact**
   - A **comprehensive, legally binding non-aggression treaty** with Russia.
   - Russia would be required to **embed these commitments into its domestic legal framework**, increasing enforceability.
5. **Donbas Resolution Mechanism**
   - Establishment of **demilitarised and free economic zones in the Donbas region**.
   - Designed to unlock the territorial stalemate while promoting reconstruction, investment, and civilian normalcy.

Strategic Significance

- The plan blends **hard security guarantees** with **economic integration and reconstruction**, signalling Ukraine's insistence on sovereignty, deterrence, and irreversible anchoring in the Euro-Atlantic order.
- It marks a shift from ceasefire-centric approaches to a **post-war security architecture** aimed at preventing future conflict.

10. Ukraine–NATO Trade-off Proposal

Ukrainian President **Volodymyr Zelenskyy** has indicated readiness to **drop Ukraine's demand for NATO membership** if the country receives **legally binding security guarantees equivalent to NATO's Article 5** from Western nations, including the **United States**. The move directly addresses **Russia's stated justification** for the war and could open space for **credible peace negotiations**.

Core Elements

- **Conditional Offer:** Ukraine forgoes **NATO** membership **only** if it gets Article-5-like guarantees.
- **Guarantee Standard:** Commitments must be **legally binding** and collective, not political assurances.
- **Negotiation Impact:** Removes a key Russian objection, potentially enabling substantive talks without compromising Ukraine's security.

About NATO (Context)

- **Founded:** 1949 (Washington Treaty); **32 members** (Finland joined in 2024).
- **Purpose:** Collective defence and political coordination.
- **Article 5:** An attack on one member is treated as an attack on all.
- **HQ:** Brussels (political); Mons, Belgium (military command).

11. India–Jordan Relations: PM's Landmark Visit

Five MoUs signed covering renewable energy, water resources, cultural exchange (2025–29), digital public infrastructure, and a **heritage twinning** between **Petra** and **Ellora**.

- **Strategic dialogue**: **Narendra Modi** held talks with **King Abdullah II** on trade, defence, energy, fertilisers, agriculture, digital tech, critical minerals, infrastructure, health, tourism and people-to-people ties.
- **Trade & digital push**: Target to raise bilateral trade to **USD 5 billion in 5 years**; proposal to link Jordan's digital payments with India's **Unified Payments Interface**.
- **Economic ties**: India is **Jordan's 3rd-largest trading partner**; Jordan supplies **phosphates and potash** vital for India's agriculture.
- **Industrial cooperation**: **Jordan India Fertiliser Company (IFFCO–Jordan Phosphate Mines JV)** is a key phosphoric acid supplier to India.
- **Indian footprint**: **15+ Indian-owned garment units** in Jordan's QIZs; **~17,500 Indians employed** across textiles, construction, manufacturing and healthcare.
- **Diplomatic milestone**: Visit marked **75 years of India–Jordan relations**; PM departed for **Ethiopia** for the second leg of his tour.

12. PM Modi's Oman Visit — (Final Leg of Three-Nation Tour)

- **Milestone Visit: Narendra Modi** visited **Oman** marking **70 years of India–Oman diplomatic relations**; Oman is an absolute monarchy at the southeastern tip of the Arabian Peninsula, bordering the UAE, Saudi Arabia and Yemen, with coasts along the Arabian Sea, Gulf of Oman and the Strait of Hormuz.
- **CEPA Signed:** The **Comprehensive Economic Partnership Agreement** grants **zero-duty access to 99% of India's exports (by value)**, allows **100% FDI** for Indian firms in Omani services, extends **stay for Indian contractual service suppliers to 2 years**, excludes sensitive Indian products (dairy, gold, silver, tea, coffee), and makes **Oman the first country to recognise AYUSH trade**.
- **Sectoral Cooperation:** Adoption of a **Joint Vision on Maritime Cooperation** (regional security, blue economy); framework pact on **agricultural science, animal husbandry and irrigation**; executive programme on **millet cultivation**; MoU on **maritime heritage museums and artefact exchange**.
- **Honour:** PM Modi was conferred the **First Class of the Order of Oman**, the country's highest civilian award.

13. UAE Withdraws Troops After Saudi Strike on Mukalla Port, Yemen

What happened in Mukalla?

- **Airstrike: Saudi Arabia** bombed **Mukalla port** in southern **Yemen** after a shipment arrived from **Fujairah** (UAE), alleging it carried weapons for southern separatists.
- **Denial: United Arab Emirates** rejected the claim, stating the cargo comprised vehicles for its own forces.

Actors and alignments in southern Yemen

- **Southern Transitional Council (STC):** A UAE-backed separatist group seeking southern Yemen's sovereignty since 2017; it has recently expanded influence in Hadramout and Mahra.
- **Yemeni Military Bloc / Hadramout Tribal Alliance:** Opposes the STC and is supported by Saudi Arabia, reflecting diverging priorities within the anti-Houthi camp.

Why this matters

- **Anti-Houthi rift:** Tensions between Saudi-backed and UAE-backed actors complicate coordination against the Houthis and weaken prospects for a unified political settlement.
- **Regional implications:** Disagreements over southern Yemen risk prolonging fragmentation even as diplomatic efforts seek de-escalation.

14. Israel Declares 'Yellow Line' as De Facto Defensive Boundary in Gaza

What is the Yellow Line?

The **Yellow Line** is a **temporary military demarcation** created under the **US-brokered ceasefire** in Gaza.

- It separates **Israeli-controlled eastern Gaza** from **Palestinian-administered humanitarian zones** in the west.

Why is it called the "Yellow Line"?

- The name is **informal**, derived from **yellow concrete blocks and poles** placed by Israeli forces along the line.
- It is **not an internationally recognised border** or treaty-defined boundary.

How is it being treated?

- **Israel**
  - Describes the Yellow Line as a **forward defensive line** and treats it as a **de facto new border** during the ceasefire.
  - Enforces **strict movement restrictions** east of the line, with reports of **shoot-without-warning** policies.
- **United Nations** & Palestinians
  - View the line as **non-permanent**, **contested**, and a **violation of Gaza's territorial integrity**.
  - Stress that Gaza remains a **single territorial unit** under international law.

Territorial impact

- **More than half of Gaza**, lying **east of the Yellow Line**, remains under Israeli military control.
- Civilian movement across the line is **severely restricted**, complicating humanitarian access and reconstruction.

Broader context

- Gaza is internationally recognised as a **single occupied territory**; no state has legal authority to redraw its borders unilaterally.

The Yellow Line echoes past conflicts where **temporary security lines evolved into long-term fault lines**, making political settlements harder.

15. Israel Recognises Somaliland as Independent State

- **Historic Move:** On **26 December 2025**, **Israel** became the **first country to formally recognise** the self-declared **Somaliland** as an **independent and sovereign state**; Somaliland has functioned as a de facto entity since **1991** without prior international recognition.
- **Bilateral Cooperation:** Israel announced **immediate cooperation** with Somaliland in **agriculture, health, technology, and economic development**, signalling rapid diplomatic and economic engagement.
- **Geopolitical Impact:** The move has **major regional implications**, directly challenging **Somalia**'s claim over Somaliland and raising concerns over **territorial integrity** in the Horn of Africa.
- **Diplomatic Context:** The recognition aligns with Israel's recent **normalisation-driven diplomacy**, consistent with the momentum generated by the **Abraham Accords (2020)**, under which Israel established formal ties with several Arab states.

16. India–Africa Economic Engagement (2025)

- **Trade & Investment:** Bilateral trade stood at **$83.4 bn (2023–24)** — exports **$45.38 bn**, imports **$38.02 bn**; Indian investments in Africa total ~**$75 bn** across pharma, IT, autos, banking, and mining.
- **Export–Import Mix:** India's exports led by **mineral fuels/oils (~$15.31 bn)** and **pharmaceuticals (~$3.94 bn)**; imports dominated by **mineral fuels/oils (~$15.45 bn)** and **gems & jewellery (~$9.7 bn)**.
- **Market Diversification:** Africa absorbed ~**10.4%** of India's exports in 2023–24, reducing reliance on Western demand.
- **Energy Security:** Africa supplied ~**$15.45 bn** of India's fuel imports in 2023–24.
- **Demand Upside:** Africa's household consumption is growing ~**3.9% annually**, projected at ~**$2.5 tn by 2030**.
- **Scale & Integration:** The **African Continental Free Trade Area** targets a ~**1.4 bn**-person market with ~**$3.4 tn GDP**, enhancing scale advantages.
- **Diplomatic Momentum:** The **African Union** joined the **G20** during India's 2023 presidency, strengthening political-economic alignment.

17. India–Liberia Pharmacopoeia Cooperation

- **MoU Signed: India** and **Liberia** signed an MoU to **strengthen cooperation in pharmacopoeia**, promoting **shared drug-quality standards**.
- **Public Health Impact:** Aims to **improve access to safe, affordable medicines** across **West Africa**.
- **Capacity Building:** Provides **knowledge exchange and training** for **Liberian regulatory staff**.
- **Strategic Significance:** Reinforces India's **universal health coverage** commitment and deepens **India–Africa ties**.
- **Liberia Snapshot:** West African nation; **first independent African republic**; borders **Sierra Leone, Guinea, Côte d'Ivoire**, and the **Atlantic Ocean**; exports include **rubber, iron ore, diamonds, timber**.

18. PM Modi's Visit to Ethiopia

- **Visit & Honours:** Prime Minister **Narendra Modi** visited **Ethiopia** (second leg after Jordan) and received the **Great Honour Nishan of Ethiopia**, the highest civilian award for foreign leaders.
- **Strategic Upgrade:** India and Ethiopia **elevated ties to a Strategic Partnership**.
- **Agreements Signed:**
  - **Debt restructuring MoU** under the **G20 Common Framework**.
  - **Mutual Assistance in Customs Matters** to ease trade.
  - **UN Peacekeeping Training cooperation** arrangement.
  - **Data Centre** to be set up at Ethiopia's Ministry of Foreign Affairs.
- **Economic Ties:** Bilateral trade **$550 mn (2024–25)**; Indian exports **$476 mn**. India is Ethiopia's **2nd-largest trading partner** and a major investor.
- **Development Support:** Ethiopia is **India's largest LoC recipient in Africa** with **$1 bn** sanctioned.
- **Ethiopia Snapshot:** Landlocked Horn of Africa state; **never formally colonised**; features the **Simien Mountains** ("Roof of Africa") and the **Danakil Depression** (≈125 m below sea level).

19. Failed Coup Attempt in Cotonou

- **Incident:** A **failed coup attempt** by a group of soldiers was reported in **Cotonou**, the **administrative and economic hub** of **Benin**.
- **Political Geography:** Benin's **capital is Porto-Novo**; Cotonou hosts key government institutions.
- **Borders:** Nigeria (E), Niger (NE), Burkina Faso (NW), Togo (W).
- **Languages: French** (official); widely spoken **Fon, Yoruba, Bariba, Dendi**.
- **Historical Context:** Former **Kingdom of Dahomey** (17th–19th c.); later **French Dahomey** until independence.
- **Physical Features: Bight of Benin** coastline (south), **Barre Country** plateaus (central), **Atakora Mountains** (NW; **Mont Sokbaro** highest).
- **Rivers: Ouémé, Mono, Couffo**.

20. US–Rwanda Health Agreement (Dec 2025)

- **Agreement Signed: United States** and **Rwanda** signed a **five-year, $228 million** health-sector cooperation pact.
- **Policy Framework:** Second deal under the **America First Global Health Strategy**, following a similar agreement with **Kenya**.
- **Funding Split:** U.S. support of **up to $158 million**; Rwanda to **increase domestic health spending by $70 million** over time.
- **Focus Areas:** Strengthening national health systems, **HIV/AIDS and malaria control**, infectious disease management, **disease surveillance**, and **outbreak response**.
- **Strategic Objective:** Promote **health-sector self-reliance** while contributing to **global health security**, as U.S. funding tapers and local financing rises.

21. India–France Defence Manufacturing Agreement

- **Agreement: India** and **France** signed a pact to **enable production in India** of the **SIGMA 30N** inertial navigation system and the **CM3-MR** firing sight system.
- **SIGMA 30N (INS):**
  - Digital **Ring Laser Gyro (RLG)**–based inertial navigation.
  - **GPS-independent**, autonomous positioning and pointing.
  - **Very short alignment time**, enabling **"shoot-and-scoot"** operations.
  - Deployed on **artillery, air defence, missile systems, and mobile radars** to improve accuracy.
- **CM3-MR (Direct Firing Sight):**
  - **Multi-sensor** targeting: day optics, **thermal imaging** (night), **eye-safe laser rangefinder**.
  - **All-weather precision** line-of-sight targeting.
  - Used on **artillery guns, anti-drone systems, and remote weapon stations (RWS)**.
- **Significance:** Boosts **Make in India**, enhances **defence indigenisation**, and strengthens **India–France strategic defence cooperation**.

22. DRC–Rwanda Washington Accords (Dec 2025)

Agreement: Democratic Republic of the Congo and **Rwanda** signed the **Washington Accords for Peace and Prosperity** in Washington on **4 December 2025**, brokered by the **United States**.

- **Security Commitments:** Reaffirms the **27 June 2025** pact—**Rwanda** to withdraw troops from eastern DRC; **DRC** to end support for armed groups hostile to Rwanda.
- **Economic Pillar:** Incorporates a **Regional Economic Integration Framework** for joint development of **energy, infrastructure, and critical minerals**, with **US private investment** participation.
- **Monitoring Mechanism:** A **Joint Oversight Committee**—including DRC, Rwanda, the US, Qatar, and the **African Union**—to track troop withdrawals, disarmament, and timelines.
- **Objective:** Stabilise eastern DRC while coupling peace with **cross-border economic cooperation**.

23. Thailand's BRICS Interest

- **Request: Thailand** has expressed interest in **joining BRICS** and sought **India**'s support ahead of India's **BRICS chairmanship in 2026**.
- **Bilateral Context: India–Thailand ties** were elevated to a **Strategic Partnership (2024)**, strengthening cooperation in trade, connectivity, security, and regional platforms.

About BRICS

- **Nature: An informal grouping** of major emerging economies; launched as **BRIC (2009)**, became **BRICS** with South Africa's entry in **2011**.
- **Members: Brazil, Russia, India, China, South Africa**; **2024 expansion** added **UAE, Egypt, Ethiopia, Iran**; **Indonesia joined in 2025**.
- **Governance: No permanent HQ**; **rotating chairmanship** and annual summits.
- **Focus:** Global governance reform, **multipolarity**, and **South–South cooperation**.
- **Finance Arm: New Development Bank (NDB)** (est. 2015), HQ **Shanghai**, funds infrastructure and sustainable development.
- **Global Weight: ~40% of world population** and **~37–40% of global GDP (PPP)**; often viewed as an alternative pole to the G7.

24. India summons Bangladesh envoy over threats to mission in Dhaka

On **17 December 2025**, India summoned Bangladesh's High Commissioner **Md. Riaz Hamidullah** in New Delhi to protest a *"deteriorating security environment"* for its High Commission in Dhaka.

The move followed:

A radical coalition **"July Oikya" (July Unity)** announcing a march towards the Indian High Commission in Dhaka's Gulshan area, and

A speech by **National Citizen Party (NCP)** **leader Hasnat Abdullah** threatening to *"isolate the Seven Sisters"* (India's Northeastern states) and shelter separatists if Bangladesh is "destabilised".

- On **19 June 2025**, China hosted the **first China–Pakistan–Bangladesh trilateral meeting** at Kunming, at vice foreign minister/foreign secretary level, setting up a joint working group on connectivity, economic and security cooperation.
- Commentators see this as a **China-led sub-regional alignment** on India's eastern flank, complementing the China–Pakistan–Afghanistan format.

1. Defence rapprochement: Dhaka–Islamabad

- In **October 2025**, Pakistan's Joint Chiefs of Staff Chairman **Gen. Sahir Shamshad Mirza** visited Dhaka and met Muhammad Yunus, signalling intent to deepen **defence cooperation** and strategic ties—reversing decades of estrangement rooted in 1971.

2. China in Teesta River Management Project

- China has long offered nearly **US$1 billion** for the **Teesta River Comprehensive Management and Restoration Project** inside Bangladesh.
- After earlier signalling preference for India, Dhaka's renewed tilt towards a **China-backed Teesta plan** near the **Siliguri Corridor** raises:
  - Concerns of **"debt-trap"/strategic leverage**, and
  - Implications for **Teesta water-sharing** and riverine infrastructure close to India's vulnerable "Chicken's Neck."

3. Extradition of Sheikh Hasina

- Dhaka's demand for Hasina's extradition puts India between:
  - **Treaty obligations** and rule-of-law rhetoric, and
  - Concerns about **fair-trial standards**, political character of charges, and domestic political optics in India (especially in the Northeast and West Bengal).

25. India–New Zealand Free Trade Agreement (FTA)

- **India** and **New Zealand** concluded negotiations for a **bilateral FTA**, targeting **doubling trade within 5 years**.
- **Market Access:** India gets **100% duty-free access** for all exports to New Zealand; ~**95%** of New Zealand exports by value get **eliminated/reduced tariffs** in India.
- **Exclusions: Sensitive dairy and select farm items** (e.g., onions, sugar) excluded.
- **Mobility & Education:**
  - **5,000** three-year **temporary employment visas** for skilled Indians.
  - **No cap** for Indian students; **20 hrs/week** work rights.
  - **Post-study work: 3 years** (STEM/Master's), **4 years** (Doctorates).
  - **Working Holiday Scheme: 1,000 visas/year** (ages 18–30).
- **Investment:** New Zealand to invest **$20 bn** in India over **15 years**.
- **Agri & Services Cooperation: Centres of Excellence** (apples, kiwifruit, honey) in India; **AYUSH trade recognised**.
- **Preferential Access:** India grants preferential access for **Mānuka honey** and **duty-free quotas** for **kiwifruit and apples**.

26. Australia's Nationwide Social Media Ban for Under-16s

- **Global First: Australia** became the **first country** to enforce a **nationwide ban** on social media access for users **below 16** (effective **10 Dec 2025**), covering major platforms such as Facebook and X.
- **Legal Basis:** Implemented under the **Online Safety Amendment (Social Media Minimum Age) Bill**, which sets **16** as the minimum age for specified platforms.
- **No Parental Consent: Parental override is prohibited**; consent cannot be used to bypass the age bar.
- **Rationale:** Government cites risks to **children's mental health**, including **cyberbullying**, exposure to **harmful content**, and **online predation**.
- **Enforcement & Penalties:** Platforms must take **"reasonable steps"** to block underage users or face fines up to **AUD 49.5 million (USD 33 million)**.

27. India–Australia ECTA: Full Tariff Elimination on Indian Exports

- **Tariff Milestone:** From **1 January 2026**, **Australia** will provide **100% tariff-free access** to **India**'s exports under the **India-Australia Economic Cooperation and Trade Agreement (ECTA)**.

About ECTA (in force since Dec 2022)

- **Nature:** Early-harvest trade pact.
- **Export Access:** Australia initially offered duty-free access to **96.4%** of Indian exports by value; now expanded to **100%**.
- **Import Access:** India granted duty-free access to **85%+** of Australian goods, rising to **90% by Jan 2026**.
- **Sectoral Gains:** Boosts **labour-intensive sectors**—textiles, apparel, leather, footwear, gems & jewellery, processed foods.
- **Services:** National treatment for Indian providers in **120+ subsectors** (IT, health, education).
- **Resources:** Cheaper access to Australian **coal, metallic ores, critical minerals** (nickel, copper).
- **Mobility & Tax:** Extended **post-study work visas** (up to 4 years for PhD holders); **offshore income of Indian IT firms exempt** from Australian tax.

Bilateral Trade Snapshot (FY 2024)

- **Total trade: $24.1 bn**; **Indian exports: $8.5 bn** (+8%).
- **Trade deficit:** Narrowed **42%** to **$7 bn**.
- **Key exports:** Petroleum products, engineering goods, pharmaceuticals, gems & jewellery.
- **Key imports:** Coal, gold, raw materials.
- **Target: AUD 100 bn** bilateral trade by **2030**.

28. 18th BRICS Presidency to India for the year 2026

Brazil formally handed over the **18th BRICS Presidency** to **India** for the year **2026**. Prime Minister **Narendra Modi** outlined a people-centric, *"humanity-first"* vision for India's chairship.

About BRICS

- **Nature:** Informal grouping of major emerging economies.
- **Origin:** Term **"BRIC"** coined by economist **Jim O'Neill (2001)**; first summit held in **2009**.
- **Expansion:**
  - **2010:** South Africa joined → BRICS
  - **2024:** Egypt, Ethiopia, Iran, UAE
  - **2025:** Indonesia became the **10th full member**
- **Chairmanship:** Rotates **annually** among members in **alphabetical order**.
- **Core Objective:** Promote a **more equitable, multipolar world order** and strengthen **Global South** cooperation.

Key BRICS Initiatives

- **New Development Bank (NDB):** Infrastructure and sustainable development financing.
- **Contingent Reserve Arrangement (CRA):** Liquidity support during balance-of-payments stress.
- **BRICS PAY:** Blockchain-based local-currency payment mechanism.

UPSC Relevance

- **GS-II (International Relations):** Global groupings; South-South cooperation; multipolar world order.
- **GS-III (Economy):** Development finance, alternative financial architecture, de-dollarisation debates.
- **Essay:** Global South leadership; people-centric multilateralism.

29. India's FTA web with RCEP members minus China

India and New Zealand **concluded a Free Trade Agreement (FTA) in December 2025**, giving Indian exports 100% duty-free access to the New Zealand market and substantial investment commitments from Wellington.

With this, India now has **bilateral FTAs with all RCEP members except China**, while still remaining outside the Regional Comprehensive Economic Partnership (RCEP).

(A) About RCEP

Nature & size:

Mega FTA among **10 ASEAN states + China, Japan, South Korea, Australia, New Zealand**.

Covers ~**30% of world GDP and population**, making it the world's largest trade bloc.

Timeline:

Signed: **15 November 2020** (virtual ASEAN Summit).

Entered into force: **1 January 2022** for first 10 ratifying members; later for others.

Key provisions:

Elimination of about **90% of tariffs over 20 years**.

Common rules of origin to encourage regional value chains.

Chapters on **goods, services, investment, IP, e-commerce, competition policy** etc.

India's status:

Participated in negotiations but **opted out in 2019**; invitation to join remains open.

(B) Why India did not join RCEP

1. **China-related concerns**

   Fear of **import surges from China**, including via ASEAN "backdoor" using flexible rules of origin.

2. **Widening trade deficit**

   India already ran **large trade deficits with 11 of 15 RCEP members** and saw limited market access gains in services (its strength).

3. **Agriculture & dairy protection**

   Strong pushback from **dairy cooperatives** (esp. Gujarat, Karnataka) and small farmers fearing cheap imports from **New Zealand and Australia** in dairy and plantation crops.

4. **Safeguard & policy-space issues**

   India's demand for an **Automatic Trigger Safeguard Mechanism (ATSM)** to raise tariffs when imports cross a threshold was not accepted.

   Concerns about **ratchet and standstill clauses** that would lock future tariff cuts and restrict policy flexibility

   Disagreement over using **2014 as base year for tariff cuts**, which implied sharper reductions from higher bound rates.

5. **Services, e-commerce and data**

   India sought stronger commitments on **services and movement of professionals (Mode 4)**, and space for **data localisation and digital regulation**—these demands were only partially accommodated.

(C) India's alternative strategy: Bilateral FTAs with RCEP members

India has **pursued parallel FTAs** with all RCEP members to secure market access without joining the mega-bloc:

1. **ASEAN – AITIGA (in force since 2010)**
2. **India–Japan CEPA (operational since 2011)**
3. **India–Korea CEPA (in force from 2010)**
4. **India–Australia ECTA (in force from Dec 2022)**
5. **India–New Zealand FTA (concluded Dec 2025 – *not yet in force*)**

Net effect: India gains **preferential access to all RCEP markets except China**, preserving **strategic autonomy and protection for vulnerable sectors** while avoiding automatic, bloc-wide tariff cuts.

30. Pax Silica Initiative

- The **Pax Silica Initiative** is a **US-led, nine-nation framework** to secure the **end-to-end silicon and AI supply chain**, covering critical minerals, energy inputs, semiconductors, manufacturing, and logistics.
- **Objective:** Reduce coercive dependencies, protect AI-critical materials and capabilities, and enable **trusted partners** to scale advanced technologies securely.
- **Members: United States**, **Japan**, **South Korea**, **Singapore**, **Netherlands**, **United Kingdom**, **Israel**, **United Arab Emirates**, **Australia**.
- **Notable Exclusion: India** is **not included**, despite its growing semiconductor and digital manufacturing ambitions.

31. Mexico's Import Tariff Hike (Effective 1 January 2026)

- **Policy Change: Mexico** will raise import tariffs on goods from **countries without Free Trade Agreements (FTAs)**.
- **Coverage:** Over **1,400 product lines** affected.
- **Tariff Range: 5%–50%**, depending on sector sensitivity.
- **Peak Rate: 50%** on sensitive sectors such as **steel and automobiles**.
- **Standard Rate:** Most other goods will face tariffs of around **35%**.
- **Most Affected Countries: China** and **India**, followed by South Korea, Thailand, Indonesia, Vietnam, and Brazil.
- **Rationale:**
  - Protect domestic industries and jobs from low-cost imports.
  - Raise ~**$3.76 billion** to reduce the fiscal deficit.
  - Promote industrial self-reliance through import substitution.
  - Address **U.S. concerns** over Chinese goods routing through Mexico to bypass U.S. tariffs.

32. Sydney Bondi Beach Shooting

A recent mass shooting at **Bondi Beach** involved an attacker identified as an **Indian citizen from Hyderabad**, drawing international attention.

- **Location:** Bondi Beach lies on Australia's east coast, ~7 km east of **Sydney**'s CBD.
- **Geography:** Crescent-shaped sandy beach facing the **Tasman Sea**.
- **Etymology:** "Bondi" comes from the Dharawal word **"Boondi"**, meaning *water breaking over rocks*.
- **Indigenous Heritage:** Traditionally inhabited by the **Bidjigal**, **Birrabirragal**, and **Gadigal** Aboriginal peoples.

33. China's $1 trillion trade surplus and its implications for India

China's goods trade surplus reached about **$1.08 trillion in January–November 2025**, the highest ever recorded by any country for such a period, driven by strong exports and anaemic imports.

This has sharpened global concerns over **market distortions, protectionist responses, and trade imbalances**, with particular implications for emerging competitors like India

(A) Snapshot: China's record surplus

- **Scale & structure :** Goods trade (Jan–Nov 2025): **Total trade** ≈ ¥41.21 trillion; **exports** ¥24.46 trillion (+6.2% YoY); **imports** ¥16.75 trillion (+0.2% YoY).

  Goods surplus ≈ **$1.08 trillion**, already above previous full-year records.

- **Drivers of surplus**
  - **High-value manufacturing:** Strong exports of **autos, EVs, batteries, electronics and other electro-mechanical products**, which now account for around **60% of exports** and are growing faster than overall shipments.
  - **Weak domestic demand:** Imports are nearly flat (+0.2%), reflecting deflation, property slump and subdued consumption, so external demand bears the burden of growth.
  - **Currency & industrial policy:** China maintains a **competitive renminbi** and extensive subsidies/industrial policy to support large-scale manufacturing, even as it has recently allowed some controlled appreciation.
  - **Market diversification:** Exports to the **U.S. have fallen sharply (around −25–30% YoY)**, but shipments to **Europe, ASEAN, Africa and Latin America** have risen, offsetting U.S. tariffs.

Key concept – Trade surplus:
When a country's **exports of goods/services exceed its imports** (X > M), creating a positive balance in the trade account and contributing to a current account surplus.

(B) Global concerns & responses

- **Market distortion & overcapacity :** Chinese firms, especially in **solar PV, EVs and batteries**, are accused of **dumping** products at prices well below competitors, sometimes more than **60% cheaper than U.S./EU output** due to overcapacity.
- **Rising protectionism :**
  - **United States:** In 2024, Washington imposed steep tariffs (e.g. **100% on Chinese EVs, 25–50% on batteries, solar cells and semiconductors**) on about **$18 billion** of Chinese "strategic" imports.
  - **European Union:** Anti-subsidy investigation on **Chinese battery-electric vehicles (BEVs)** has led to additional countervailing tariffs (often 17–35% on top of the standard 10% duty).
- **Supply chain re-orientation (China-Plus-One) :** Large firms are **diversifying production to ASEAN and India**. Apple, for instance, is shifting a rising share of iPhone production to **India and Vietnam**, and India has become the **top smartphone exporter to the U.S.**

34. Trump threatens tariffs over alleged "dumping" of Indian rice

In December 2025, US President Donald Trump alleged that India is "dumping" rice into the American market and indicated the possibility of **additional tariffs on Indian rice imports**.

India has **rejected the dumping charge**, noting that the US mainly imports **premium basmati rice** from India and that **no formal anti-dumping investigation** has been initiated by the US so far.

(A) India–US rice trade: the facts

- **Production profile:** India is the **2nd-largest rice producer** globally (around 150 million tonnes in 2024–25), while the US is a relatively small producer (about 7 million tonnes).
- **Net exporter vs niche importer:**
  - The **US is a net rice exporter** – exporting ~3 million tonnes and importing ~1.6 million tonnes in 2024–25.
  - Imports are mainly **high-value specialty rice** (Indian basmati, Thai jasmine), not cheap bulk rice.
- **Trade share:**
  - The US accounts for only **around 3–5% of India's total rice export value**.
  - India supplies **about 26% of total US rice imports**, making it the **second-largest supplier after Thailand**.
  - In key basmati tariff lines, India's share of US imports is as high as **80–90%**.
- **Existing US tariffs:** Recent US action has already **raised import duty on Indian basmati rice to about 50%** (from 10%), sharply increasing landed prices for American buyers.

Implication: The US market is **small but premium** for India; any additional tariff will hurt niche exporters and US consumers more than India's overall rice export earnings.

(B) What is "dumping"? – Concept recap

- **Dumping (WTO sense):**
  Exporting a product at a **price lower than its "normal value"** (usually domestic price or cost of production plus reasonable profit). It is a form of **international price discrimination** aimed at gaining an unfair edge in the importing market.
- **Effects:**
  - Short-term: lower prices for consumers.
  - Long-term: potential **injury to domestic producers**, market exit of local firms, and higher concentration.

In this case, India argues that **its basmati exports to the US are premium-priced**, not "cut-price" dumping.

(C) Anti-dumping measures & WTO framework

- **Anti-Dumping Duty (ADD):**
  A **tariff equal to the "margin of dumping"**, imposed to bring import prices closer to fair value and protect the domestic industry.
- **Price undertakings:**
  Exporters or exporting countries may **voluntarily raise export prices or limit quantities** so that ADD is not imposed.

35. Trump's Gold Card offers $1 million fast-track US residency

In **December 2025**, the US began accepting applications for President Trump's new **"Gold Card"** visa programme, which offers **expedited US permanent residency** in exchange for a large "gift" to the US government.

The scheme follows a **September 19, 2025 Executive Order** that created the Gold Card and authorised using financial contributions as evidence for eligibility under existing **EB-1 and EB-2** employment-based Green Card categories.

(A) What is the Gold Card programme?

- **Pay-to-play model:**
  - Individuals pay a **non-refundable US$15,000 DHS processing fee** and, after vetting, make a **US$1 million "gift"** to the US government for accelerated lawful permanent residence (Green Card-equivalent).
  - Corporates can sponsor key employees via a **US$2 million gift per employee**, plus the same US$15,000 fee.
  - Gifts are pooled in a dedicated Treasury fund and used to promote US commerce and industry.
- **Visa classification (important nuance):**
  - **No new visa category** is created. The Gold Card **uses existing EB-1A (extraordinary ability) and EB-2 NIW** (national-interest waiver) immigrant categories.
  - The Executive Order directs agencies to **treat the financial gift as evidence** that the applicant substantially benefits the US and qualifies under EB-1A / EB-2 NIW.
  - However, **visa numbers still come from the same EB-1 / EB-2 annual quotas and per-country caps**, so backlogs for high-demand countries (like India) are not fully removed.
- **Dependents:** Spouse and unmarried children under 21 can be included, **but each dependent also requires its own US$15,000 fee and US$1 million gift**, sharply raising family cost.
- **Status & tax:** Successful applicants receive **US lawful permanent resident (LPR) status**, with rights similar to Green Card holders.
  - As LPRs, they are generally **tax resident in the US and taxed on worldwide income**, like other Green Card holders. (This flows from US tax law, not a Gold-Card-specific rule.)
- **Naturalisation:** Standard rules apply: **eligible for US citizenship after 5 years** of LPR status (or **3 years if married to a US citizen**).

(B) Relation to EB-5 investor visa

- **Official framing:**
  - Trump has repeatedly presented the Gold Card as **replacing or supplanting the EB-5 investor visa**, which required investment in job-creating projects (often via regional centres).
- **Key differences (for UPSC):**
  - **Nature of payment:**
    - **EB-5:** capital *investment* in commercial projects; funds can, in principle, be returned.
    - **Gold Card: non-refundable "gift" / donation** directly to the US government.
  - **Job-creation requirement:**
    - **EB-5:** minimum investment (US$800,000+) tied to creation/preservation of at least **10 US jobs**.
    - **Gold Card: no job-creation requirement**; the financial gift itself is treated as the "benefit" to the US.
  - **Legal basis:**
    - **EB-5** is written into statute;
    - **Gold Card** is created by **Executive Order** and could be changed or revoked by a future administration.

(C) Financial tiers & proposed "Platinum Card"

- **Current tiers:**
  - **Individual Gold Card:** US$1m gift + US$15k fee.
  - **Corporate Gold Card:** US$2m gift + fee per sponsored employee, plus **1% annual maintenance** and **5% transfer fee** if the corporation reassigns the card to another employee.
- **Proposed future tier:**
  - A conceptual **"Platinum Card"** at **US$5m** has been floated, allowing long stays (up to ~270 days) with lighter US tax exposure, but this would require **Congressional approval** and is not yet law.

(D) Key implications / criticisms (exam-relevant)

- **"Selling" immigration status:** Critics argue the scheme **openly monetises US immigration**, privileging ultra-rich applicants over merit-based or refugee pathways and deepening inequality.
- **Limited relief for Indians:** Analyses highlight that **Indians still face long EB-1/EB-2 backlogs**, since Gold Card applications are counted within existing quotas; the programme mostly benefits those from countries without heavy backlogs.
- **Corporate use:** Allows US firms to **bypass H-1B lottery caps** by taking employees directly to LPR status through the corporate Gold Card, but **does *not* abolish overall immigrant-visa caps**, so it only partially eases Green Card queues.

36. IMF Emergency Support to Sri Lanka

- **Approval:** The **International Monetary Fund** approved **USD 206 million** for **Sri Lanka** under the **Rapid Financing Instrument (RFI)**.
- **Purpose:** To meet **immediate balance-of-payments gaps** and **humanitarian needs** amid acute economic stress.

About IMF

- **Founded:** 1944 (Bretton Woods); operational since 1945; **India is a founder member**.
- **Status:** UN specialised agency; **HQ: Washington, D.C.**

Key IMF Facilities (Quick Compare)

- **Rapid Financing Instrument (RFI):**
  - **Emergency, quick-disbursing, low conditionality** support.
  - Used for **shocks** (disasters, pandemics, post-conflict).
  - **No full programme review** required.
- **Extended Fund Facility (EFF):**
  - **Medium–long term** (3–4 years) financing.
  - For **structural BoP problems**; **phased disbursement** tied to reforms.
- **Stand-By Arrangement (SBA):**
  - **Short-term stabilisation** (12–24 months); macro-adjustment conditionality.
- **Extended Credit Facility (ECF):**
  - **Concessional, long-term** support for **low-income countries**.
- **Standby Credit Facility (SCF):**
  - **Concessional, short-term/precautionary** support for LICs.
- **Rapid Credit Facility (RCF):**
  - **Fast, concessional emergency** finance for LICs with minimal conditionality.

37. China's Virtual Coupling Breakthrough in Heavy-Haul Railways

- **Achievement:** China successfully operated **seven heavy-haul freight trains as one coordinated unit** without physical coupling, using a **domestically developed wireless virtual-coupling system**.
- **Technology:** The system employs **two-dimensional control**—combining **relative speed control** with **absolute distance monitoring**—and enables **real-time train-to-train and train-to-ground communication** for synchronised acceleration and braking.
- **Working:** Separate freight units function as a **single "group train"**, maintaining close, safe spacing without mechanical couplers.
- **Significance:**
  - **>50% increase in freight capacity** without new tracks.
  - **Higher efficiency and lower energy use** in heavy-haul operations.
  - Positions China as a **global leader** offering a scalable solution for rail-capacity constraints, especially in developing regions.

38. Bioterrorism No Longer Distant: India Flags Gaps in Global Biosecurity

At a conference marking **50 years of the Biological Weapons Convention (BWC)**, India's External Affairs Minister warned that **bioterrorism is an immediate and evolving threat**, urging stronger global governance, verification, and compliance mechanisms to prevent misuse of biological agents by non-state actors.

What is Bioterrorism?

- **Definition:** Deliberate release or misuse of **biological agents** (bacteria, viruses, toxins, or engineered pathogens) to cause **mass illness, death, economic disruption, or fear**.
- **Threat Vector:** Non-state actors exploiting dual-use research, synthetic biology, and weak oversight.

About the Biological Weapons Convention (BWC)

- **Nature:** Global treaty prohibiting **development, production, stockpiling and transfer** of biological and toxin weapons.
- **Timeline:** Negotiated **1969–71**, opened **1972**, in force **1975**.
- **Significance:** First multilateral treaty to eliminate an **entire WMD category**.
- **Complementarity:** Builds on the **1925 Geneva Protocol** (which banned use, not possession).
- **Membership: 188 States Parties** (India ratified **1974**).
    - **Signatories yet to ratify:** Egypt, Haiti, Somalia, Syria.
    - **Neither signed nor acceded:** Israel, Chad, Djibouti, Eritrea, Kiribati.
- **Governance: Review Conferences every 5 years**.

Why Bioterrorism Is a Serious Concern

- **Low Barrier Tech:** CRISPR kits available **under ₹50,000**, lowering entry barriers.
- **Terror Interest: 35+ terror groups** attempted to acquire biological agents (UNSC, 2024).
- **Pandemic Lessons: 191 countries** reported surveillance gaps during **2020–22**.
- **Dual-Use Risk: 42% of high-risk labs** lack robust oversight (WHO).
- **Synthetic Biology Boom:** Market projected **$30–35 bn by 2030**, raising weaponisation risks.

Structural Weaknesses in the BWC

- **No Verification Regime:** No inspections or independent compliance monitoring.
- **No Standing Scientific Body:** Lacks a permanent mechanism to track emerging bio-risks.
- **Weak Transparency:** No mandatory research logs or lab inventories.
- **Limited Enforcement:** Only ~**19%** of states regularly submit confidence-building measures.

India's Core Message

- **Strengthen global bio-governance** with verification and compliance tools.
- **Modernise the BWC** to address dual-use research and synthetic biology.
- **Prevent non-state actor misuse** through better surveillance, reporting, and oversight.

39. Interpol Issues Blue Corner Notice After Goa Nightclub Fire

After the **Goa nightclub fire** that killed **25 people**, **Interpol** issued a **Blue Corner Notice within 48 hours** to help trace the **missing owners of the Birch by Romeo Lane** establishment.

What is Interpol?

- **Nature:** World's largest international police organisation facilitating cross-border law-enforcement cooperation.
- **Founded:** 1923
- **Headquarters:** Lyon, France
- **Membership:** 196 countries (including India)
- **Leadership:** Headed by a Secretary-General appointed by the General Assembly.

Interpol Blue Corner Notice

- **Purpose:** To **collect information** on a person's **identity or whereabouts** linked to a criminal investigation.
- **Who issues it:** Interpol's **General Secretariat**, on request from a member country's **National Central Bureau (NCB)**.
- **Legal effect: Non-arrest** notice—used for intelligence gathering, not detention.

Other Interpol Notices (Quick Guide)

- **Red Notice:** Locate and provisionally **arrest** wanted persons.
- **Yellow Notice:** Trace **missing persons**, especially children.
- **Black Notice:** Identify **unidentified bodies**.
- **Green Notice:** Warn about **habitual offenders** posing threats.
- **Orange Notice:** Warn of **dangerous persons, objects, or events**.
- **Purple Notice:** Share **crime methods, tools, and concealment techniques**.
- **Silver Notice (Pilot):** Trace **assets** linked to criminal activity.

Why This Matters

- **Speed:** Issuing a Blue Notice within 48 hours signals urgent international coordination.
- **Scope:** Helps law enforcement **locate suspects across borders** without invoking arrest powers.
- **Next Steps:** Intelligence gathered can inform domestic legal action, including escalation to a **Red Notice** if warranted.

UPSC Angle: GS-II (International institutions, global policing cooperation) | GS-III (Internal security, transnational crime).

40. Russia Ratifies India–Russia RELOS Agreement

- **What happened:** **Russia** has ratified the **Reciprocal Exchange of Logistic Support (RELOS)** agreement with **India**.
- **Agreement:** RELOS is a **military logistics-sharing pact**, signed in **February 2025**.
- **Core provision:** Allows both militaries to **use each other's bases, ports, and facilities** for **fuel, supplies, maintenance, and repairs**.
- **Operational scope:** Applicable to **joint exercises, training missions, humanitarian assistance, disaster relief**, and other **mutually agreed activities**.
- **Strategic significance:**
    - Enhances **interoperability and operational flexibility** between India and Russia.
    - Extends **India's reach into the Arctic** through access to **Russian Arctic and Far East ports**.

41. India's NDRF Assistance to Sri Lanka under Operation Sagar Bandhu

- **What happened:** On **28 November 2025**, **National Disaster Response Force** deployed specialised rescue teams and humanitarian aid to **Sri Lanka** under **Operation Sagar Bandhu** after **Cyclone Ditwah**.
- **Rescue deployment: Two NDRF teams (80 rescuers) with four canines** were airlifted from Hindon Airbase aboard an **IAF IL-76**, equipped for evacuation, search and rescue.
- **Capabilities:** Teams carried **inflatable boats, hydraulic cutting/breaching tools, advanced communications, medical kits**, and essential supplies.
- **Humanitarian aid:** An **IAF C-130J** delivered **~12 tonnes** of relief material (tents, tarpaulins, blankets, hygiene kits, ready-to-eat food) to **Colombo**.
- **Earlier support:** India had already sent **4.5 tonnes of dry rations**, **2 tonnes of fresh rations**, and essentials via **INS Vikrant** and **INS Udaygiri**.

42. U.S. National Security Strategy (NSS) 2025

Overall Strategic Shift

- **Doctrine:** Codifies *"America First"* as **Sovereign Realism**.
- **Alliances:** Treated as **transactional**, conditional on burden-sharing and mutual benefit.
- **Economy & Security:** Prioritises **re-industrialisation** and **decoupling critical supply chains from China**.
- **Geographic Priority: Western Hemisphere** placed above all other regions.

India-Related Provisions

- **Core Status:** India elevated to the **"Core 5 (C5)"** powers with the U.S., China, Russia, and Japan.
- **China Balance:** India positioned as the **primary counterweight to China** in South Asia and the Indian Ocean.
- **Maritime Role:** Encourages **expanded Indian naval operations** across the Indo-Pacific.
- **Quad:** Retained for **surveillance and logistics**, not a NATO-style defence alliance.
- **Supply Chains:** India designated a **priority partner for "friend-shoring"** to reduce China dependence.

India–U.S. Partnership Reset

- **Nature:** Shift from a **values-based alliance** to a **transactional partnership**.
- **Status:** Recognises India as an **independent pole in a multipolar order**, beyond the "Major Defence Partner" label.

43. US seizure of Venezuelan tanker tests maritime law norms

On **10 December 2025**, US forces seized the Venezuelan oil tanker **Skipper** in **international waters** off the Venezuelan coast as part of **Operation Southern Spear**, a new US naval "quarantine" on sanctioned tankers carrying Venezuelan crude.

The move has sharply escalated **US–Venezuela–Cuba tensions** and triggered global debate on **freedom of navigation, unilateral sanctions and great-power use of force**.

Background & recent developments

- **US–Venezuela hostility:** Since the Chávez–Maduro era, ties have been marked by **sanctions, diplomatic isolation and regime-change rhetoric**. Disputed **2024 elections**, widely criticised as fraudulent by international observers, deepened US claims that Maduro lacks democratic legitimacy.
- **Oil–Cuba linkage:**
  - Venezuela has long supplied **subsidised oil to Cuba** in exchange for Cuban doctors and security personnel ("oil-for-doctors" arrangement).
  - Cuba currently receives roughly **30% of its oil from Venezuela**, making such shipments a critical lifeline.
- **The Skipper seizure (Dec 2025):**
  - Skipper loaded about **1.8 million barrels of Venezuelan crude at Puerto José**, offloaded part of it to another ship (**Neptune 6**) bound for Cuba near Curaçao, and then sailed into international waters between **Grenada and Trinidad**, where it was boarded by US Coast Guard, Marines and special forces launched from a US carrier.
  - The vessel was allegedly part of the **"dark fleet"** moving sanctioned Venezuelan and Iranian oil, had falsified AIS data, and was **flying Guyana's flag without valid registration**, effectively making it a **stateless vessel** under international law.
  - A sealed **US court seizure warrant** cited sanctions violations linked to Iran's IRGC-QF and Hizbollah; there were no casualties during the boarding.
- **Operation Southern Spear & blockade:**
  - On **17 December 2025**, the US announced a **naval quarantine/blockade of all sanctioned oil tankers** entering or leaving Venezuela, under Operation *Southern Spear*. A second tanker, **Centuries**, was seized on 20 December; a third, **Bella 1**, was pursued across the Atlantic.
  - UN human-rights experts condemned the **"armed blockade"** as a violation of fundamental rules of international law and called for investigation of rights impacts.

44. China's Yarlung Tsangpo Mega Hydropower Project — Why India & Bangladesh Are Concerned

About the Yarlung Tsangpo Project

- **Location & Scale:** Planned at the **Great Bend** of the Yarlung Tsangpo (upper Brahmaputra) in Tibet; **~60 GW** projected capacity—potentially the **world's largest hydropower system**.
- **Design: Multi-dam cascade**, **tunnel diversion**, and **underground powerhouses** in a **seismically active Himalayan zone**.
- **Chinese Framing:** Positioned as a **clean-energy** and **national security** project—supporting energy security, Tibet integration, and long-term control over critical resources.

Implications for India

- **Water Security:** Possible changes in **seasonal flow timing**, **lean-season availability**, and **sediment transport** affecting **Arunachal Pradesh** and **Assam**.
- **Flood Risk:** Concerns over sudden releases or mismanagement during monsoon extremes—often described as a potential **"water bomb"** scenario.
- **Ecology & Livelihoods:** Risks to **riverine biodiversity**, fisheries, wetlands, and floodplain agriculture dependent on natural sediment cycles.
- **Strategic Leverage:** Large upstream infrastructure near a **disputed border** adds a geopolitical pressure point, intertwining water management with border security.
- **Dam-Building Spiral:** Could accelerate India's own Brahmaputra projects, **compounding cumulative environmental and social impacts**.

Implications for Bangladesh

- **Downstream Vulnerability:** Any upstream alteration magnifies effects in the delta—**flow variability**, **sediment starvation**, and **salinity intrusion** risks for agriculture and fisheries.
- **Flood Management Complexity:** Coordinated flood forecasting becomes harder without robust, real-time data sharing.

Key Transboundary Rivers Between China and India

- **Brahmaputra (Yarlung Tsangpo):** Tibet → Arunachal Pradesh & Assam → Bangladesh.
- **Sutlej (Langqên Zangbo):** Tibet → Himachal Pradesh & Punjab (seasonal hydrological data shared).
- **Indus (Sênggê Zangbo):** Tibet (near Mt. Kailash) → Ladakh → Pakistan.
- **Karnali/Ghaghara (Mapcha Tsangpo):** Tibet → Nepal → India (no trilateral treaty).
- **Manas (Drangme Chhu):** Tibet → Bhutan → Assam (indirect China linkage).
- **Subansiri (Chayul Chu):** Tibet → Arunachal Pradesh (hydropower & flood concerns).

DECEMBER 2025

INTERNAL SECURITY

1. Akash-NG Missile System
2. Pinaka LRGR-120 Test Success
3. K-4 SLBM Test Arighaat
4. India–Russia S-500 System
5. DHRUV-NG Civil Helicopter
6. India's Indigenous Aviation Drive
7. Heron Mk-II UAV Procurement
8. DRDO Escape System Rocket-Sled Test
9. INS Taragiri Inducted Project-17A
10. President's Submarine Sortie Vaghsheer
11. INS Anjadip Coastal ASW Boost
12. ICG Pollution Control Vessel Samudra Pratap
13. Bureau of Port Security
14. Indian Navy Day 2025
15. C-130J MRO Facility Bengaluru
16. Army Inducts Apache AH-64E
17. INAS-335 Seahawk Commissioned
18. BRO Shyok Tunnel Inaugurated
19. Dok-La Cho-La Battlefield Tourism
20. India–Maldives Exercise EKUVERIN
21. India–Nepal Exercise SURYAKIRAN
22. India–Maldives Maritime Exercise Ekatha
23. India–UAE Exercise Desert Cyclone-II
24. Army Social Media Guidelines Revised
25. DAC Clears ₹79,000-Cr Procurement
26. India's First Counter-Terror Policy
27. National Anti-Terror Conference Concludes
28. Synthetic Drugs Seizures Surge
29. Karbi Anglong Civil Unrest
30. Army Showcases Indigenous Tech
31. India–Malaysia Exercise Harimau Shakti

1. Akash-NG Missile

The **Defence Research and Development Organisation** has successfully completed user trials of the **Akash Next Generation (Akash-NG)** surface-to-air missile system.

- **System Type:** Indigenous Surface-to-Air Missile (SAM); successor to the Akash system (IAF since 2014; Army since 2015).
- **Performance Upgrade: ~30 km range, ~20 km altitude; lighter (~350 kg)** than earlier Akash.
- **Propulsion & Guidance: Dual-pulse solid rocket motor** for higher speed and manoeuvrability; **indigenous active radar seeker**; **low RCS** engagement.
- **Configurations: Mobile and fixed** deployments.
- **Combat Capability: Simultaneous engagement of up to 10 targets**, including **high-speed**, **low-altitude**, and **long-range high-altitude** threats with improved precision.

2. Pinaka LRGR-120 — Maiden Flight Test Successful

The **Defence Research and Development Organisation** has successfully conducted the **maiden flight test of the Pinaka Long Range Guided Rocket (LRGR-120)**, marking a major upgrade to India's indigenous rocket artillery capability.

About Pinaka LRGR-120

- **System Type:** Advanced **guided** variant of the indigenous **Pinaka Multi-Rocket Launch System (MRLS)**.
- **Range Upgrade: 120 km**, significantly enhancing deep-strike precision.
- **Guidance & Control:** Equipped with an **advanced guidance and control kit** enabling high accuracy and **in-flight manoeuvrability**.
- **Launcher Compatibility: Seamless integration** with existing Pinaka launchers—**no new infrastructure required**.
- **Procurement Status:** The **Defence Acquisition Council (DAC)** has accorded **preliminary clearance** to a **₹2,500 crore** proposal for induction by the **Indian Army**.

Strategic Significance

- **Precision Artillery:** Transforms Pinaka from area saturation to **precision strike** at extended ranges.
- **Force Multiplier:** Enhances deterrence and rapid response along contested frontiers.
- **Export Momentum:** Builds on Pinaka MRLS exports to **Armenia**; **France, Saudi Arabia, Vietnam, and Indonesia** have shown interest.

3. Kalam-4 (K-4) SLBM Test from INS *Arighaat*

India has successfully conducted **test-fires of the Intermediate-Range Ballistic Missile (IRBM) Kalam-4 (K-4)** from the nuclear-powered submarine **INS *Arighaat*** in the Bay of Bengal—marking a major milestone for the country's sea-based deterrent.

About K-4 Missile

- **Type:** Nuclear-capable **Submarine-Launched Ballistic Missile (SLBM)**
- **Range:** ~**3,500 km**
- **Developer: Defence Research and Development Organisation**
- **Dimensions & Mass:** ~**12 m** long; **1.3 m** diameter; **17–20 tonnes**
- **Propulsion: Two-stage solid-fuel** rocket motor
- **Payload:** Up to **2 tonnes** (nuclear or conventional)
- **Launch Mode: Cold-launch** (ejected from submarine; motor ignites after surfacing)
- **Guidance:** Advanced **Inertial Navigation System** aided by **NavIC** and **GPS**
- **Platform: Arihant-class SSBNs**

Strategic Significance

- **Credible Sea-Based Second Strike:** Extends deterrence reach from the ocean depths, central to India's **No First Use (NFU)** doctrine.
- **Triad Maturity:** Strengthens the **nuclear triad** (land, air, sea) with longer-range SLBM capability.
- **Survivability & Stealth:** Submarine deployment enhances survivability against first-strike threats.
- **Technological Leap:** Validates cold-launch, long-range guidance, and manoeuvring accuracy from SSBNs.

Bottom line: The K-4 tests from **INS *Arighaat*** underscore India's advancing SSBN operations and a more assured, survivable nuclear deterrent at sea.

4. India–Russia S-500 Prometheus

- **Context:** Ahead of President Vladimir Putin's visit, India is exploring **procurement and possible co-production** of Russia's **S-500 Prometheus** next-generation air and missile defence system.
- **Developer:** Designed by **Almaz-Antey**.

About S-500 Prometheus

- **Role:** National-level, next-gen air and missile defence system.
- **Threats Countered:** Stealth aircraft, UAVs, ballistic missiles, **hypersonic glide vehicles**, and select **Low-Earth-Orbit (LEO)** objects.
- **Engagement Envelope: 180–200 km altitude** (near-space / exo-atmospheric) and **500–600 km range** (missile-dependent).
- **Intercept Method: Kinetic kill** (77N6-N / 77N6-N1 interceptors), destroying targets by direct impact.

Parameter	S-500 (Prometey)	S-400 (Triumf)
Engagement Altitude	Near-space interception (~180–200 km)	Lower atmosphere (~30 km)
Threat Spectrum	Hypersonic weapons, ICBMs, LEO satellites	Aircraft, cruise missiles, limited ballistic missiles
Reaction Time	~3–4 seconds	Slower than S-500
Operational Role	Strategic / national missile defence shield	Tactical / battlefield air defence

Bottom line: S-500 would mark a step from advanced air defence to **near-space missile defence**, significantly expanding India's strategic interception capability if pursued.

5. DHRUV-NG Civil Helicopter

- **Launch:** Union Civil Aviation Minister inaugurated **DHRUV-NG**, India's next-generation **civil helicopter**, at **Hindustan Aeronautics Limited (HAL), Bengaluru.
- **Platform:** Civil variant of HAL's indigenous **Advanced Light Helicopter (ALH)** showcased at **Aero India 2025**.
- **Configuration: 5.5-tonne**, light **twin-engine**, multi-role helicopter tailored for India's **high-altitude, hot-and-humid, and remote terrains**.
- **Powerplant: Twin Shakti 1H1C engines** with higher power rating; **fully maintainable within India**, enhancing self-reliance.
- **Avionics: Civil-certified glass cockpit**, **AS4-compliant**, with a modern avionics suite for enhanced situational awareness.
- **Ride Quality: Advanced vibration-control systems** deliver smoother, more comfortable operations.
- **Use Cases:** Designed for **VIP transport**, **emergency medical services (EMS)**, and **utility roles**, strengthening India's indigenous civil aviation ecosystem.

6. India's Indigenous Aviation Push

- **Launch:** Union Minister for Science & Technology unveiled the **production version of Hansa-3 (NG)** at **CSIR–National Aerospace Laboratories (NAL), Bengaluru**.
- **Hansa-3 (NG):** India's **first all-composite, two-seat pilot trainer**; a **₹150-crore** new facility in **Andhra Pradesh** will manufacture **up to 100 aircraft/year**, supporting pilot training demand and **reducing imports**.
- **SARAS Mk-2:** Ongoing development of a **19-seater light transport aircraft** for civil and defence roles with **pressurised cabin, digital avionics, and glass cockpit**.
- **Iron Bird Facility:** Inaugurated **full-system integration platform** to improve **flight safety** and **accelerate SARAS Mk-2 testing**.
- **High-Altitude Platforms (HAPs):** New facility to develop **solar-powered unmanned aircraft** operating **above 20 km**; **first full-scale flight planned for 2027**.
- **Aviation Weather Systems: NAviMet** launched at **HAL Airport**; CSIR-NAL has **175+ aviation weather systems** deployed nationwide.

7. Heron Mk II UAV Procurement

- **Trigger:** Post–Operation Sindoor lessons, India is acquiring additional **Heron Mk II MALE UAVs** from Israel under **emergency procurement** to plug surveillance and intelligence gaps.
- **Capabilities:** 24+ hour endurance; **SATCOM-enabled beyond-line-of-sight control**; **ELINT & COMINT** for radar and communications interception; **SAR** for all-weather, day-night imaging; **ATOL** for safer operations; **~500 kg payload** capacity.
- **Operational Value:** Enables **persistent border surveillance** (LAC/desert sectors), enhances **electronic intelligence dominance**, supports **precision targeting**, and complements **logistics drones** for high-altitude resupply.

8. DRDO's High-Speed Rocket-Sled Test of Fighter Aircraft Escape System

The **Defence Research and Development Organisation (DRDO)** successfully conducted a **high-speed rocket-sled test** to validate an **indigenous fighter aircraft escape system** meant for **safe aircrew ejection and recovery** during emergencies.

What is a Rocket-Sled Test?

- A **rocket-sled test** uses a **rocket-propelled sled** running on a **precision-aligned rail track** to recreate extreme flight conditions (high speed, acceleration, vibration) in a **controlled ground environment**.
- It allows **repeatable, instrumented testing** without the risks of airborne trials.

Key Test Details

- **Objective:** Assess **performance, reliability, and safety** of the escape (ejection) system.
- **Mechanism:** A **Light Combat Aircraft (LCA)** test article mounted on a sled, accelerated to **precisely controlled high velocities** using **solid-propellant rocket motors**.
- **Location: Rail Track Rocket Sled (RTRS)** facility, **Terminal Ballistics Research Laboratory (TBRL)**, Chandigarh.
- **Collaboration:** Conducted jointly by **DRDO**, **Aeronautical Development Agency (ADA)**, and **Hindustan Aeronautics Limited (HAL)**.

Why is this Important?

- **Aircrew Safety:** Validates life-critical systems under near-real combat conditions.
- **Indigenisation Milestone:** Demonstrates **in-house capability** for designing, testing, and certifying escape systems—reducing dependence on imports.
- **Elite Capability:** Places India among a **small group of nations** with **domestic rocket-sled testing infrastructure** for advanced military aviation.
- **Programme Support:** Strengthens safety validation for platforms like **LCA Tejas** and future indigenous fighters.

9. Indian Navy Inducts INS Taragiri – Project 17A Stealth Frigate

On **28 November 2025**, the **Indian Navy** formally received **INS Taragiri**, the **fourth Nilgiri-class (Project 17A)** stealth frigate, from **Mazagon Dock Shipbuilders Limited (MDL)**, Mumbai—marking a significant milestone in India's indigenous warship construction programme under *Aatmanirbhar Bharat*.

Key Highlights

- **Ship Identity:** INS Taragiri (Yard **12653**); **third Project 17A frigate built by MDL**.
- **Legacy:** Named after the earlier **INS Taragiri** (Leander-class), which served the Navy for **33 years (1980–2013)**.
- **Design Authority:** Conceived by the **Warship Design Bureau**; construction overseen by the Navy's **Warship Overseeing Team (Mumbai)**.

Build Methodology: Integrated Construction (modular/block approach) enabling faster timelines, improved quality control, and cost efficiency.

What Makes Project 17A a Generational Upgrade

- **Stealth:** Advanced hull and superstructure shaping to reduce radar cross-section.
- **Automation:** Higher levels of platform and combat-system automation, lowering crew workload.
- **Survivability:** Enhanced damage-control architecture and redundancy for combat resilience.
- **Indigenisation:** Extensive use of indigenous sensors, weapons, and systems—boosting domestic supply chains.

10. President's Submarine Sortie – INS Vaghsheer

- **Event:** President **Droupadi Murmu** undertook a submarine sortie onboard **INS Vaghsheer** from **Karwar Naval Base**.
- **Precedent:** She is the **second Indian President** to do so; the first was **A. P. J. Abdul Kalam** in 2006.
- **Submarine Sortie:** An operational deployment where a submarine sails from base to conduct missions at sea.

About INS Vaghsheer (Project-75)

- **Class & Status: Sixth and final Kalvari (Scorpene)-class** submarine, **inducted in 2025**.
- **Indigenisation:** Built in India under **Project-75** with technology transfer from **Naval Group** (France).
- **Propulsion: Diesel-electric** attack submarine; among the **quietest conventional submarines** globally.
- **Roles:** Anti-surface & anti-submarine warfare, intelligence, surveillance, and special operations.
- **Armament:** Wire-guided torpedoes, anti-ship missiles, mine-laying capability.
- **Stealth:** Low radiated noise, refined hydrodynamic design.
- **Upgrade Path:** Planned **Air Independent Propulsion (AIP)** integration to extend submerged endurance.

Fleet Context

- **Kalvari-class boats:** INS Kalvari, Khanderi, Karanj, Vela, Vagir, **Vaghsheer**.

11. INS Anjadip Commissioned – Boost to India's Coastal ASW Shield

On **22 December 2025**, the **Indian Navy** received **INS Anjadip**, the **third of eight Anti-Submarine Warfare Shallow Water Crafts (ASW SWC)**—a key step in strengthening littoral and harbour defence.

Key Highlights

- **Indigenous Build:** Designed and built in India by **Garden Reach Shipbuilders and Engineers (GRSE)**; delivery took place at **Chennai**.
- **PPP Execution:** Constructed under a **public-private partnership** between GRSE and **Larsen & Toubro Shipyard**, complying with **Indian Register of Shipping** rules.
- **Largest Waterjet Warship:** ~**77 m** long, **INS Anjadip** is the **largest Indian naval warship propelled by waterjets**, enabling high manoeuvrability in shallow waters.

Combat & Operational Capabilities

- **ASW Suite:** Lightweight torpedoes, **indigenously developed anti-submarine rockets**, and **shallow-water sonar** for detection and engagement.
- **Mission Set:** Enhances **anti-submarine warfare**, **coastal surveillance**, and **mine-laying**, critical for ports, chokepoints and near-shore approaches.

Legacy & Name

- **Namesake: Anjadip Island**, off **Karwar**, Karnataka.
- **Heritage:** Continues the legacy of the erstwhile **INS Anjadip** (Petya-class corvette), decommissioned in **2003**.

Why it matters: ASW SWCs plug a crucial gap in **shallow-water defence**, countering submarine and underwater threats close to the coast while advancing **Aatmanirbhar Bharat** through high indigenous content and PPP-led shipbuilding.

12. ICG Inducts First Indigenous Pollution Control Vessel – *Samudra Pratap*

The **Indian Coast Guard (ICG)** has inducted **Samudra Pratap**, India's **first indigenously designed and built Pollution Control Vessel (PCV)**, under the **02 PCV Project**—a major step in strengthening India's marine environmental protection capabilities.

Key Features & Capabilities

- **Oil Spill Detection:** Equipped with **specially designed radar systems** to detect oil spills at sea.
- **Containment-in-Motion: Side-sweeping arms** enable oil spill containment **while the ship is underway**, improving response speed.
- **Recovery & Storage: High-capacity tanks** for storing recovered oil, enabling sustained clean-up operations.
- **Indigenous Content: ~72% indigenous**, marking the **first PCV fully designed and built in India**.

Project & Fleet Details

- **Project:** 02 PCV Project for the ICG.
- **Sister Ship: Samudra Prachet**, launched in **July 2025**.
- **Role:** Dedicated **marine pollution response**, compliance with **MARPOL** obligations, and protection of India's **EEZ and coastal waters**.

Why It Matters

- **Environmental Security:** Rapid response to oil spills safeguards coastal ecosystems, fisheries, and livelihoods.
- **Aatmanirbhar Bharat:** Demonstrates indigenous ship design and complex systems integration.
- **Operational Readiness:** Enhances ICG's ability to respond to maritime accidents amid rising shipping traffic.

Bottom line: *Samudra Pratap* elevates India's capacity to **detect, contain, and recover oil spills swiftly**, while showcasing indigenous maritime engineering.

13. Bureau of Port Security (BPS)

- **Decision & Date:** On **19 December 2025**, the Union Home Minister chaired a high-level meeting to initiate a **dedicated Bureau of Port Security (BPS)** for India's ports and maritime assets.
- **Legal Status:** To be constituted as a **statutory body under Section 13 of the Merchant Shipping Act, 2025**, giving it a clear legal mandate.
- **Administrative Control:** Will function under the **Ministry of Ports, Shipping and Waterways**.
- **Mandate:** Regulation, coordination, and enforcement of **port and ship security** nationwide, including **intelligence collection, analysis, and sharing**, with emphasis on **cyber threats**.
- **Security Approach:** **Graded, risk-based implementation** based on vulnerabilities, trade volume, geography, and strategic factors.
- **Leadership:** Headed by a **Director General (IPS, Pay Level-15)**; **DG Shipping** to act as DG during a **one-year transition**.
- **Model:** Structured on the lines of the **Bureau of Civil Aviation Security (BCAS)** to ensure a future-ready security architecture.

14. Indian Navy Day 2025

- **Observed on:** 4 December; PM Narendra Modi extended greetings to Indian Navy personnel.
- **Significance:** Commemorates **Operation Trident (1971)**, when the Indian Navy decisively struck Pakistani naval assets and Karachi fuel facilities **without Indian casualties**.
- **Theme 2025:** *"Combat Ready, Cohesive, Credible, and Aatmanirbhar Force."*
- **Celebrations:** Major **Operational Demonstration** held at **Shangumugham Beach, Thiruvananthapuram (Kerala)**.
- **Strategic Message:** Showcases India as the **"Preferred Security Partner"** in the Indian Ocean Region under the **MAHASAGAR vision**.

15. C-130J MRO Facility in Bengaluru

- **Project:** Tata Advanced Systems and Lockheed Martin have begun building a **Maintenance, Repair and Overhaul (MRO)** facility in **Bengaluru** to support the **C-130J Super Hercules** fleet.
- **Aircraft Profile:** Four-engine turboprop tactical airlifter with modern digital avionics; **STOL** capability; minimal crew (2 pilots + 1 loadmaster); ~**19-tonne payload**, **6,850 km** ferry range (no payload), and up to **20 hours** endurance.
- **Indian Operations:** The **Indian Air Force** operates **12 C-130Js** for special operations, disaster relief, high-altitude logistics (incl. Ladakh), and humanitarian missions.
- **Significance:** Local MRO boosts availability, reduces turnaround time and costs, and strengthens India's aerospace sustainment ecosystem.

16. AH-64E Apache Induction — Indian Army (Jodhpur)

- **Induction Completed:** The Indian Army has fully inducted **AH-64E Apache** attack helicopters into the **451 Army Aviation Squadron** at **Jodhpur, Rajasthan**, strengthening strike capability along the western sector.
- **Platform: AH-64E Apache** (Apache Guardian), the latest variant developed by **Boeing**, optimised for reconnaissance, precision strike and close air support.
- **Performance:** Top speed ~**300 km/h**, combat range ~**500 km**; strong thrust–lift and **IR/laser-based precision targeting** enable rapid response.
- **Avionics & Networking:** Open-systems architecture for **network-centric warfare**, advanced night/thermal sensors for all-weather, day-night operations.
- **Armament: 30 mm M230 chain gun**, **Hellfire** anti-armour missiles (fire-and-forget/laser-guided), **70 mm Hydra** rockets for area targets, and **Stinger** IR-guided missiles for air defence.
- **Operational Impact:** Enhances the Army's **deep strike, armour-kill, and CAS** capability with high survivability and precision.

17. INAS 335 Commissioning — MH-60R Seahawk (Indian Navy)

- **Commissioning:** The Indian Navy will commission **INAS 335**, its **second MH-60R squadron**, at **INS Hansa**, strengthening embarked maritime aviation.
- **Platform: MH-60R Seahawk**—a US-origin, multi-role maritime helicopter (naval Black Hawk variant) replacing legacy **Sea King 42/42A**.
- **Roles: ASW, ASuW, SAR, MEDEVAC, and VERTREP**, fully compatible with frontline ships and aircraft carriers.
- **Systems & Integration:** Advanced sensors, weapons, and avionics; validated for fleet operations under **Indian Reference Atmosphere (IRA)** conditions.
- **Procurement Status: $2.4 bn (2020)** contract for **24** helicopters; **15 delivered** to date.
- **Context:** First squadron **INAS 334** commissioned in **March 2024** at **INS Garuda, Kochi**, boosting blue-water capability in the **Indian Ocean Region**.

18. BRO Projects Inauguration – Shyok Tunnel (Ladakh)

- **Inauguration:** The Union Defence Minister inaugurated **125 new projects** of the **Border Roads Organisation (BRO)** to strengthen border connectivity.
- **Shyok Tunnel:** A **920-metre road tunnel** built on the **Darbuk–Shyok–Daulat Beg Oldi Road** in eastern Ladakh.
- **Connectivity Gain:** Ensures **all-weather surface access from Leh** to forward areas, including **Daulat Beg Oldi**, India's northernmost military base near the **Line of Actual Control**.
- **Strategic Impact:** Enables **faster troop mobilisation and logistics**, and **reduces reliance on air maintenance** in a high-altitude, snow-prone sector.

19. Sikkim Opens Dok La & Cho La Passes for Battlefield Tourism

Sikkim has opened **Dok La** and **Cho La** mountain passes to tourists under the **Bharat Ranbhoomi Darshan** battlefield tourism initiative and **Vibrant Villages Programme-II**, blending strategic awareness with border-area development.

About Dok La & Cho La Passes

- **Dok La Pass**
  - Altitude: ~13,780 ft
  - Location: India–China border in East Sikkim
  - Strategic Context: Connects Sikkim to the **Doklam Plateau**, site of the **2017 India–China standoff**.
  - Significance: Lies close to the **India–Bhutan–China tri-junction**, making it crucial for India's border security calculus.
- **Cho La Pass**
  - Altitude: ~17,780 ft
  - Connectivity: Links East Sikkim with Tibet (China).
  - Historical Importance: Associated with the **1967 India–China military clash**, one of the earliest firm Indian responses along the Himalayan frontier.
- **Dongkya Range**
  - Both passes are part of the **Dongkya Range** of the Eastern Himalayas, running along the India–China–Bhutan tri-junction and shaping regional topography and defence lines.

Why This Matters

- **Battlefield Tourism:** Through **Bharat Ranbhoomi Darshan**, visitors gain curated access to historically significant military locations, fostering national awareness and remembrance.
- **Border Area Development:** Under **Vibrant Villages Programme-II**, controlled tourism supports livelihoods, infrastructure, and population retention in frontier villages.
- **Strategic Signalling:** Opening these sites underscores India's administrative presence and confidence along sensitive borders while maintaining regulated access.

In essence: The move combines heritage, security consciousness, and last-mile development—turning historic frontlines into platforms for people-centric border growth without diluting strategic vigilance.

20. India–Maldives Military Exercise EKUVERIN (14th Edition)

- **Event & Venue:** The **14th edition of Exercise EKUVERIN** will be held in **Kerala (Thiruvananthapuram)** from **2–15 December 2025**.
- **Participants:** Conducted between the **Indian Army** and the **Maldives National Defence Force (MNDF)**.
- **Background:** Initiated in **2009**, EKUVERIN (meaning *"Friends"* in Dhivehi) is an **annual bilateral exercise**, hosted alternately by **India** and **Maldives**.
- **Focus Areas:** Enhances **interoperability** for **counter-insurgency and counter-terrorism** across **semi-urban, jungle, and coastal terrains**, with growing use of **niche technologies**.
- **Related Exercises:** India and Maldives also engage in **Exercise Ekatha** (naval) and **Exercise Dosti** (trilateral coast guard exercise with Sri Lanka).

21. India–Nepal Joint Military Exercise SURYAKIRAN

- **Event & Venue:** The **19th edition (2025)** of **Exercise SURYAKIRAN** concluded at **Pithoragarh, Uttarakhand**, hosted by **India** with participation from **Nepal**.
- **Background:** Initiated in **2011**, SURYAKIRAN is an **annual bilateral Army exercise**, conducted alternately in India and Nepal.
- **Training Focus:** Enhances interoperability in **sub-conventional operations**, **UN Chapter VII counter-terrorism**, **Humanitarian Assistance and Disaster Relief (HADR)**, and **battalion-level jungle and mountain warfare drills**.
- **Technology Integration:** Employs **Unmanned Aerial Systems**, **drone-based ISR**, **AI-enabled tools**, and **unmanned logistics platforms** to strengthen joint operational capability.

22. India–Maldives Maritime Cooperation: Exercise Ekatha 2025

- **Visit Context:** The Deputy Chief of the Naval Staff (DCNS) of the **Indian Navy** is visiting the **Maldives** to attend the **closing ceremony of Exercise Ekatha 2025**, underscoring close maritime cooperation between the two nations.

About Exercise Ekatha

- **Nature:** Annual **bilateral maritime exercise** between the **Indian Navy** and the **Maldives National Defence Force (MNDF)**.
- **Inception:** Established in **2017**.
- **Hosting:** Conducted **alternately** by India and the Maldives.
- **Objective:** Enhance **naval interoperability**, **maritime domain awareness**, **coordinated patrols**, and **operational cooperation** across the Indian Ocean Region.

Other India–Maldives Defence Exercises

- **Exercise DOSTI: Biennial trilateral** maritime exercise involving **India, Maldives, and Sri Lanka**, focused on **coast guard cooperation** and maritime security.
- **Exercise EKUVERIN: Annual bilateral Army exercise** centered on **counter-insurgency, counter-terrorism, and disaster response**; the **14th edition** recently concluded in **Thiruvananthapuram**.

Significance: Ekatha 2025 reinforces India–Maldives maritime partnership, capacity-building, and collective security in the Indian Ocean, aligning with India's role as a preferred security partner in the region.

23. India–UAE Joint Military Exercise: Desert Cyclone II

- **Event: The 2nd edition of Exercise Desert Cyclone** will be held in **Abu Dhabi** from **18–30 December 2025** between the **Indian Army** and the **United Arab Emirates Land Forces**.
- **Nature: Annual bilateral joint military exercise** between **India** and the **United Arab Emirates**.
- **Focus Areas:** Urban sub-conventional operations under a **UN peacekeeping mandate**, including **built-up area combat**, **heliborne operations**, and **Unmanned Aerial Systems (UAS) integration**.
- **Previous Edition: The 1st edition (January 2024)** was conducted at **Mahajan Field Firing Ranges, Rajasthan**, focusing on **counter-terrorism and peacekeeping** in desert and semi-desert terrain.

24. Indian Army Revises Social Media Usage Guidelines

- **Policy Shift: The Indian Army** has relaxed its earlier blanket ban, allowing **limited passive use** of select social media platforms by personnel.
- **Background: In 2020**, all ranks were ordered to delete social media accounts and **89 mobile apps** (largely Chinese-linked) due to security concerns.
- **What's Allowed (View-Only):** Instagram, YouTube, X (Twitter) and Quora **— no posting, commenting, or interaction**.
- **Messaging Apps:** Skype, Telegram, WhatsApp and Signal permitted **only for unclassified, general information** and **only with known contacts**.
- **Cyber Hygiene: Personnel** are advised to avoid generic websites and exercise caution with **cloud-based data storage platforms**.

25. DAC Grants AoN for ₹79,000 Crore Defence Procurement Boost

The Defence Acquisition Council (DAC), chaired by Defence Minister Rajnath Singh, accorded Acceptance of Necessity (AoN) for capital acquisition proposals worth about **₹79,000 crore**, marking the start of procurement of key defence systems to strengthen capabilities of the Army, Navy, and Air Force.

What is AoN?

- **Acceptance of Necessity (AoN)** is the *formal approval* for a defence procurement proposal and represents the **first procedural step** before tendering and contracts.
- After AoN, the proposal advances through feasibility, financial sanctioning, and Cabinet Committee on Security (CCS) approval for final contract award.

About the DAC

- **Established:** 2001 post-Kargil War, on Group of Ministers (GoM) recommendations.
- **Purpose:** Fast-track procurement while optimising the defence budget and aligning with 'Atmanirbhar Bharat' (self-reliant defence production).
- **Composition:** Defence Minister (Chair), CDS, three Service Chiefs, Defence Secretary & senior MoD officials.
- **Key function:** Accord AoN and decide procurement route — *Buy (Indian-IDDM)*, *Buy & Make*, *Make*.

Key Approvals in the ₹79,000 crore package

Indian Army

- Loiter Munition Systems (precision strike)
- Low-Level Lightweight Radars (track low-fly UAVs)
- Long-Range Guided Rocket Ammunition for *Pinaka* MLRS
- Integrated Drone Detection & Interdiction Systems Mk-II

Indian Navy

- Bollard Pull Tugs
- HF Software Defined Radios (HF SDR)
- Lease of HALE RPAS (High Altitude Long Endurance drones)

Indian Air Force

- Automatic Take-Off & Landing Recording Systems
- *Astra* Mk-II Missiles
- Full Mission Simulators
- *SPICE-1000* Long-Range Guidance Kits

Significance

- **Modernisation:** Bolsters strike, surveillance, counter-drone, and communication capabilities across services.
- **Strategic deterrence:** Enhances readiness against evolving threats in land, maritime, and air fronts.
- **Indigenisation:** Many systems align with domestic industry and *Atmanirbhar Bharat* goals.

Procurement pipeline: AoN doesn't guarantee immediate contracts but clears the path for *RFP / contract signing* and eventual induction.

26. Union Home Ministry to Roll Out India's First National Counter-Terrorism Policy

The **Union Home Ministry** is set to introduce **India's first comprehensive National Counter Terrorism Policy and Strategy** to unify and modernise counter-terror responses across states and federal agencies in response to evolving terror threats domestically and digitally.

Why a New Policy?

- **Jurisdictional gaps** between local police and federal agencies delay action in critical "Golden Hours" after attacks, reducing conviction rates under UAPA at the state level (≈20–30%) compared to ~95% under NIA.
- **Border vulnerabilities**, especially **open borders (e.g., Indo-Nepal)**, enable cross-border infiltration.
- **Technological shifts**: Rise in drone use, encrypted apps, and cyber-mediated radicalisation outpace traditional policing capacity.
- **Digital and social media risks** necessitate counter-radicalisation online strategies.

Key Pillars of the New Policy

1. **Unified Standard Operating Procedure (SOP):** A common framework for all states to ensure **uniform response** to terror incidents.
2. **Online Radicalisation:** Measures to counter **digital recruitment and extremist narratives** on social and encrypted platforms.
3. **Border Misuse Controls:** Focus on exploitation of **open borders** like Indo-Nepal routes by terrorists entering India.
4. **Data Integration:** Expanded use of **National Intelligence Grid (NATGRID)** linking multiple databases for early threat detection and analysis.
5. **Countering Terror Financing:** Targets **foreign-funded conversion networks, Aadhaar spoofing, narcotics financing**, and other illicit finance channels.
6. **Information Sharing Culture:** Move from "need-to-know" to "**duty-to-share**" across law enforcement and intelligence units.

Existing Counter-Terror Framework

Legislative Instruments

- **Unlawful Activities (Prevention) Act, 1967 (UAPA):** Allows designation of terrorists, asset seizure, and expanded detention.
- **National Investigation Agency (NIA) Act, 2008:** Federal agency with nationwide jurisdiction for terror offences.
- **National Security Act, 1980:** Allows preventive detention for threats to national security.
- **Bharatiya Nyaya Sanhita, 2024:** Provides updated definition of "terrorist act", aligning police and federal operations.

27. 5th National Anti-Terrorism Conference Concludes in New Delhi

The **5th annual Anti-Terrorism Conference**, organised by the **National Investigation Agency (NIA)**, has concluded in New Delhi, focusing on strengthening India's counter-terror and organised crime architecture.

Key Outcomes & Announcements

- **Impenetrable Anti-Terror Grid:** The Union Home Minister called for a **national-level, integrated anti-terror grid** and a **uniform Anti-Terror Squad (ATS) structure** across all States and Union Territories.
- **"360-Degree Strike" Strategy:** A comprehensive approach targeting **terrorism–organised crime–narco networks** was announced, recognising their growing convergence.
- **Intel-Sharing Shift:** Emphasis on moving from a **"Need to Know"** to a **"Duty to Share"** culture among intelligence and law-enforcement agencies to plug coordination gaps.
- **Tech-Enabled Policing:** Mandatory and expanded use of platforms such as **National Intelligence Grid (NATGRID)** and **National Integrated Database on Arrested Narco-offenders (NIDAAN)** was encouraged for real-time intelligence and investigation support.
- **New Tools Launched:**
  - Updated **NIA Crime Manual**
  - **Organised Crime Network Database**
  - **National database for lost and looted weapons**

Why It Matters (UPSC Lens)

- **Internal Security:** Addresses evolving threats from **hybrid terror–crime ecosystems**.
- **Governance & Federalism:** Push for **standardised ATS frameworks** improves inter-state coordination.
- **Technology in Policing:** Institutionalises **data-driven investigations** and intelligence fusion.
- **Policy Direction:** Signals a shift toward **preventive, network-centric counter-terrorism**.

GS Paper Mapping:

- **GS-III:** Internal Security – Terrorism, organised crime, role of intelligence agencies.

28. India Sees 55% Surge in Drug Seizures as Synthetic Trafficking Rises

The **Union Home Ministry** reported a **55% increase in narcotics seizures** in 2024 — drugs worth over **₹25,000 crore** — reflecting a sharp escalation in synthetic drug production, trafficking, and abuse, posing a multifaceted security and public health risk.

Reasons for Rising Drug Abuse

1. **Synthetic Shift:** Synthetic drugs such as **methamphetamine, fentanyl, nitazenes** are easier to manufacture and conceal than plant-based drugs. In 2024, methamphetamine seizures more than doubled, indicating expanded synthetic supply networks.
2. **Geographic Vulnerability:** India's strategic location between the **Golden Crescent and Golden Triangle** makes it a key transit and destination hub for narcotics. Maritime and coastal seizures — e.g., thousands of kg off the Gujarat coast — highlight evolving smuggling routes.
3. **Tech-Enabled Trafficking: Dark web markets, encrypted messaging, and cryptocurrency payments** enable anonymous procurement and distribution, complicating law enforcement detection.
4. **Cartel Penetration:** Transnational cartels are exploiting India's chemical and pharmaceutical sectors to produce synthetic drugs. Incidents like meth lab busts linked to Mexican cartels in urban industrial zones point to cartel expansion.
5. **Social Vulnerability:** Youth unemployment, stress, peer influence, and lack of awareness fuel demand, contributing to rising addiction and dependence.

India's Actions Against Drug Abuse

1. **Legal Framework — NDPS Act (1985):**
   The **Narcotic Drugs and Psychotropic Substances Act** criminalises production, possession, sale, transport, and consumption of narcotics and psychotropic substances, and underpins enforcement actions and seizures.
2. **Narcotics Enforcement and NCB:**
   The **Narcotics Control Bureau (NCB)**, strengthened in recent years, leads multi-agency coordinated crackdowns across states under a *zero-tolerance policy*, enhancing seizures, arrests, and network disruptions.
3. **Border Surveillance and Tech Tools:**
   Use of **drones, sensors, and maritime patrols** to intercept cross-border smuggling; increasing focus on identifying smuggling via drones and unconventional routes.
4. **Narco-Coordination Centre (NCORD):**
   An inter-agency intelligence platform that integrates central and state data on trafficking, enabling joint operations and information sharing.

29. Civil Unrest in Karbi Anglong, Assam

The **Karbi Anglong** and **West Karbi Anglong** districts of Assam have witnessed **escalating civil unrest**, resulting in civilian deaths and **internet shutdowns**, bringing renewed focus on **Sixth Schedule governance, land rights, and ethnic tensions** in Assam's hill districts.

What Triggered the Unrest?

- **Immediate Trigger:** A hunger strike by indigenous tribal activists demanding **eviction of long-settled non-tribal communities**.
- **Core Argument of Protesters:**
  - The **Sixth Schedule** vests **land ownership and control** with indigenous tribal communities.
  - Non-tribal settlement is alleged to be **illegal**, especially on **protected grazing lands (PGRs)**.
- **Escalation:** Protests turned violent, leading to **law-and-order breakdown**, deaths, and **preventive internet shutdowns** by the state.

About Karbi Anglong

- **Geography:**
  - Largest district of Assam, located on the **Karbi Plateau**, an extension of the **Indian Peninsular Block**.
  - Divided into **East Karbi Anglong (Diphu)** and **West Karbi Anglong (Hamren)**, separated by the **Kopili River** and parts of Nagaon district.
- **Administrative Status:**
  - Governed by the **Karbi Anglong Autonomous Council (KAAC)** under the **Sixth Schedule** of the Constitution.

Ethnic Composition

- **Major Indigenous Tribe: Karbis** (historically called *Mikirs*).
- **Other Scheduled Tribes:** Dimasas, Bodos, Kukis, Hmars, Tiwas, Garos, Tai groups, Rengma Nagas.
- **Non-Tribal Communities :** Gorkhas, Bengalis, and Hindi-speaking groups.

Sixth Schedule & Land Rights (Why the Conflict?)

- The Sixth Schedule empowers Autonomous Councils to:
  - Regulate **land allotment and use**.
  - Protect tribal customs and resources.
- **Grey Area:** Long-settled non-tribal populations vs. **tribal land protection**.

Peace Accord Context

- **Karbi Anglong Peace Accord, 2021:**
  - Tripartite agreement between the **Centre, Assam Government, and five Karbi insurgent groups**. Ended decades of insurgency.
  - Promised **enhanced legislative, executive, and administrative powers** to KAAC **within the Sixth Schedule framework**.
- **Persisting Issue:**
  - Implementation gaps and unresolved **land governance tensions**.

Long-Standing Political Demand

- **Article 244(A):** Allows creation of an **"Autonomous State" within Assam** for certain tribal areas.

30. Indian Army Showcases Indigenous Tech on Vijay Diwas 2025

On the eve of **Vijay Diwas 2025**, the **Indian Army** showcased **home-grown, battlefield-ready technologies**, underlining India's push for **self-reliance, secure AI, resilient communications, and green energy** for operations in remote and extreme terrains.

Key Technologies Displayed

- **AI-in-a-Box:** Portable, offline AI system for on-site data analysis and decision support in disconnected/remote areas.
- **Ekam AI:** Indigenous, secure AI platform for sensitive environments; no foreign software or external cloud dependence.
- **Project SAMBHAV:** Secure, deployable mobile communication ecosystem for soldiers and civilians in remote or disaster-hit zones.
- **Green Hydrogen Project (Ladakh):** Clean energy initiative to power forward posts sustainably in high-altitude regions.

About Vijay Diwas (16 December)

- Commemorates **India's decisive victory in the 1971 Indo-Pakistan War**, leading to the creation of **Bangladesh**.
- The integrated campaign of the Army, Navy, and Air Force was led by **Sam Manekshaw**.
- **Key naval operations:** Operation Trident and Operation Python (severely damaged Karachi harbour).
- **Outcome:** Pakistan's Lt Gen A.A.K. Niazi surrendered ~93,000 troops on **16 December 1971**—the largest military surrender since WWII.
- Observed as **Bijoy Dibos** in Bangladesh; symbolises valour, sacrifice, and India–Bangladesh friendship.

31. India–Malaysia Exercise Harimau Shakti (5th Edition)

India and Malaysia commenced the 5th edition of the bilateral Army exercise *Harimau Shakti* at the Mahajan Field Firing Range, Rajasthan (5–18 December 2025) to enhance interoperability in sub-conventional operations under a UN Chapter VII mandate. The exercise focuses on counter-terrorism drills such as cordon-and-search, search-and-destroy, and heliborne operations, alongside combat conditioning through martial arts, reflex shooting and yoga. It also includes joint rehearsals for helipad security and casualty evacuation in hostile terrain, strengthening coordinated response, safety and battlefield readiness—relevant for UN peacekeeping and joint operations.

DECEMBER 2025

INDIA & WORLD ECONOMY

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1. Indian economy 2025: reforms push growth amid severe trade shock

Year-end data for 2025 show India retaining its tag as the fastest-growing major economy with RBI projecting 7.3% real GDP growth in FY 2025-26, even as record-low CPI inflation, rupee depreciation, and a sharp US tariff hike created serious external headwinds.

The year also saw big-ticket reforms – GST 2.0, the SHANTI nuclear Bill, new FTAs, and nationwide implementation of the four Labour Codes – with important implications for growth, employment and external trade.

- **Growth–Inflation Picture**
  - RBI raised FY 2025-26 real GDP growth projection to **7.3%**, supported by strong domestic demand, GST/tax rationalisation and capex.
  - **CPI inflation** fell to an unprecedented **0.25% in Oct 2025**, mainly due to food price deflation and GST cuts, raising concerns of disinflation below the 4±2% target band.
  - **IIP** growth (~4% YoY in Sept 2025) indicates a manufacturing-led recovery, relevant for questions on real sector indicators.
- **Key Domestic Reforms**
  - **GST 2.0**: Rationalises multiple slabs into **5% and 18%**, lowering rates on cement, auto parts, appliances etc., aimed at boosting consumption, compliance, and ease of doing business.
  - **SHANTI Bill, 2025 (Nuclear Reform)**: Opens nuclear power generation and equipment manufacturing to **regulated private participation**, amending legacy atomic laws; projected to help achieve ~100 GW nuclear capacity by 2047 and support clean energy targets.
  - **Four Labour Codes implemented (21 Nov 2025)**: Replace **29 central labour laws**, unify wage, social security, industrial relations and OSH provisions, and extend social security to gig/platform workers – key for labour reforms and worker welfare.
  - **Direct tax tweaks**: Higher standard deduction and revised slabs seek to push **private final consumption expenditure (PFCE)** – link with topics like fiscal policy & inclusive growth.

5. **UPSC Relevance: GS-III (Economy):** Growth–inflation dynamics, external sector vulnerability, BoP, rupee, IIP, CPI, GST reform.

6. **Mains Practice Question:**
"In 2025, India combined major domestic reforms (GST 2.0, Labour Codes, SHANTI Bill, new FTAs) with efforts to manage an external shock from steep US tariffs. To what extent can such structural reforms insulate India's growth from global headwinds? Discuss."

2. IMF 'C' grade sparks debate on India's 8.2% growth

India has recently recorded **8.2% real GDP growth**, driven mainly by manufacturing and services. At the same time, the **IMF has rated India's national accounts "Grade C"**, citing weaknesses in GDP methodology and data gaps, especially the outdated 2011–12 base year and lack of a Producer Price Index (PPI). This has triggered a policy debate on whether India's current high growth is **sustainable and credible**.

- **Context: GDP vs GVA, PFCE**
  - **GDP** measures national income from the **expenditure side** (consumption + investment + government spending + net exports).
  - **GVA** measures it from the **production side** (value added in each sector); linked as: **GDP = GVA + taxes – subsidies**.
  - **PFCE** (Private Final Consumption Expenditure) is the **largest component of GDP**, and its trend is a key indicator of demand.
- **Evidence suggesting growth is sustainable**
  - **Broad-based sectoral momentum:** Manufacturing (~9.1%) and services (~9.2%; with financial services in double digits) point to strong formal-sector activity.
  - **Demand strength:** PFCE growth of around 7.9% shows resilient household consumption and urban demand.
  - **Real value addition:** Real **GVA rising from ~₹82.9 lakh crore to ₹89.4 lakh crore** suggests genuine increase in output, not just price effects.
  - **Low inflation gap:** Nominal GDP (8.8%) is close to real GDP (8.2%), indicating that growth is not purely inflation-driven.
  - **Exports & investment:** Rising exports from SEZs and higher investment (gross capital formation) support capacity creation and job prospects.

5. UPSC Relevance:

- **GS-III (Indian Economy):** GDP vs GVA; PFCE; sustainable growth; structural transformation; export competitiveness.

6. Mains Practice Question:

India's GDP growth of 8.2% has coincided with an IMF 'C' grade for national accounts and persistent structural weaknesses in employment and exports. To what extent can India's present growth be considered sustainable in the medium term? Discuss.

3. India becomes world's 4th largest economy, overtakes Japan

India has officially overtaken Japan to become the **4th largest economy in the world by nominal GDP**, with an output of about **US$4.18 trillion**, behind only the US, China and Germany. This milestone comes in a year of relatively high growth (8.2% real GDP in Q2 FY25) and low inflation, even as **per capita income and development indicators** still lag far behind advanced economies.

- **Nominal GDP vs PPP & India's Rank**
  - **Nominal GDP:** ~US$4.18 trillion; **Rank: 4th** (after US, China, Germany; ahead of Japan).
  - **GDP (PPP):** ~US$17.6 trillion; **Rank: 3rd in the world**.
  - **Nominal vs PPP:**
    - *Nominal GDP* uses current market exchange rates (important for debt, trade, financial power).
    - *PPP GDP* adjusts for price level differences (better for comparing **living standards and real output**).
- **Size vs Per Capita Reality**
  - **Per capita nominal GDP:** ~US$2,800–2,900; **rank ~136th globally**, showing India is a *large but still relatively poor* economy.
  - World Bank classifies India as a **lower-middle-income economy**; high-income economies require **GNI per capita > US$13,935 (2024 threshold)**.
  - To reach *Viksit Bharat 2047* (developed-country status), India must **sustain high growth** and significantly raise per capita GNI over the next two decades.
- **Growth Pattern & Structure**
  - **Growth drivers:** Robust domestic demand, steady PFCE (private consumption) and a **services-led model** (IT, financial, business & digital services).
  - **Sectoral mix (approx.)**: Services ~55%, Industry ~27–28%, Agriculture ~17–18% of GDP – a typical structure for a modernising economy but with **large workforce still in low-productivity agriculture**.
  - Projections suggest India could **overtake Germany by around 2027** and approach **US$7+ trillion GDP by 2030**, if growth momentum is sustained.
- **Macroeconomic Buffers & Vulnerabilities**
  - **Forex reserves:** ~US$686–693 billion (Nov–Dec 2025), giving **~11 months of import cover** and ranking **4th globally** in reserves.
  - **External debt:** About **US$747.2 billion** at June-end 2025; **external debt–GDP ratio ~18.9%**, considered moderate compared to many emerging peers.
  - **Unemployment:** Official series shows unemployment below 5% in 2025, but **informality, underemployment and low female LFPR** remain major concerns.

4. Growth convergence: poorer Indian states begin catching up

Recent state-level data for FY24–FY25 indicate that several **low per-capita-income states** (Bihar, Assam, Odisha, eastern UP) are growing **faster than the national average**, reversing the earlier trend of widening regional gaps that prevailed between roughly 2013–2019. This points to an emerging **subnational growth rebalancing** with implications for regional inequality and federal policy.

Key Trends in Subnational Growth

- **Growth convergence:** States such as **Bihar (~9%+) and Assam (~12%)** are outpacing India's real GDP growth (~8.2%), suggesting early convergence with richer southern and western states.
- **Spread of growth beyond South/West:** High nominal growth is now visible in **Odisha (~11%+) and Assam (~12%)**, on the back of infrastructure, mining, and services expansion.
- **Formalisation via EPFO:** Net **EPFO payroll additions** are increasingly from UP, Bihar and other low-income states, indicating growth in **formal jobs** rather than only informal casual work.
- **Women's labour participation:** Rural female Labour Force Participation Rate (LFPR) has risen sharply in some catch-up states (e.g., Bihar), aligning with national surveys that show a steady increase in **female LFPR since 2017–18**.
- **Tier-2/3 urbanisation:** A rising share of **e-commerce, fintech, and service jobs** is shifting toward **Tier-2 and Tier-3 cities**, which now account for the majority of new online shoppers and digital payments users.

- **Factors Driving Growth Convergence**
  - **Higher public capex in laggard states**
  - **Fiscal incentives & Finance Commissions**
  - **Digital leap via India Stack**
  - **Energy-transition–led industrialisation**
  - **Wage and cost advantage**

5. UPSC Relevance:

- **GS-III (Economy):** Regional inequality, inclusive growth, subnational convergence, public investment, employment formalisation, digital public infrastructure.

6. Mains Practice Question:

"Recent data suggest that low-income Indian states are now growing faster than richer ones, indicating the beginning of regional growth convergence. Analyse the drivers of this shift and discuss the policy measures required to sustain and deepen this convergence."

5. GDP booms while private investment and net FDI remain weak

Despite India posting strong GDP growth in recent years, **private corporate investment has been stuck around 11–12% of GDP for over a decade**, and its share in total Gross Fixed Capital Formation (GFCF) fell to **34.4% in 2023-24**, the lowest since 2011-12.

Trend Snapshot – Private Investment and FDI

- **Private corporate investment ≈ 34.4% of GFCF** in FY 2023-24 (down from ~37% in 2021-22
- **Corporate capex by listed firms** touched about **₹9.4 trillion in FY25**, up 11% YoY.
- **Gross FDI inflows**: ~US$81.04 bn in FY 2024-25 (historically high), but **net FDI** is almost zero due to heavy profit repatriation and higher outward FDI by Indian companies.

Why Private Investment Remains Weak

- **Demand-side issues:**
- **Supply-side / balance-sheet issues: Capacity utilisation** in many industries still below the 75–80% comfort level, reducing the urgency for greenfield projects.
- **Cost & regulatory risks:**
- **Innovation and skills gap:**

Government Measures to Revive Private Investment

- **Production-Linked Incentive (PLI) Schemes**
- **Corporate tax cuts (2019)**
- **Startup and risk-capital ecosystem:**
  - **Fund of Funds for Startups (FFS)** – ₹10,000-crore corpus, routed via SEBI-registered AIFs managed by SIDBI.
  - **Angel Tax abolished** for all classes of investors from FY 2025-26 (Budget 2024-25) to ease equity infusion into startups and unlisted companies.
- **Credit and approvals:**
  - **CGTMSE/CGSS** provide collateral-free guarantees for MSME and startup loans, now extended up to around **₹5–10 crore** depending on scheme design, reducing banks' risk.
  - **National Single Window System (NSWS)** integrates clearances from dozens of central ministries and many states to cut approval time and lower regulatory friction.

UPSC Relevance: GS-III (Economy): Capital formation, GFCF, crowding-in vs crowding-out, role of private investment in potential growth, determinants of FDI and net FDI.

Mains Practice Question:

"India's recent growth revival has been driven largely by public investment and consumption while private corporate investment and net FDI remain subdued. Examine the structural factors behind this trend and critically evaluate the effectiveness of recent policy measures such as PLI, corporate tax cuts and ANRF in crowding-in private investment."

6. RBI rate cut, OMOs and FX swaps to stabilise economy

The Reserve Bank of India (RBI), acting through its **Monetary Policy Committee (MPC)** and liquidity operations, has **cut the repo rate to 5.25%** and simultaneously announced **large Open Market Operations (OMO) and a USD/INR forex swap** to support growth, anchor inflation near target and ease tight liquidity conditions.

Repo Rate Cut & "Goldilocks" Outlook

Repo rate: Policy rate at which RBI lends short-term funds to banks against government securities. A **25 bps cut to 5.25%** reduces banks' cost of funds and typically lowers lending rates and EMIs.

Transmission: Cheaper credit → higher consumption & investment; if liquidity is adequate, call-money and short-term market rates move closer to repo.

Goldilocks projections: RBI has raised **FY26 GDP growth forecast to 7.3%** and lowered **CPI inflation to around 2%**, signalling confidence in **high growth with very low inflation** (a "Goldilocks economy"). This supports risk-on sentiment in equities and softens bond yields.

Open Market Operations (OMO) – ₹1 lakh crore G-sec Purchase

What are OMOs? RBI's **purchase and sale of government securities** in the open market to **manage liquidity and interest rates**.

Current move: RBI will **buy G-secs worth ~₹1 lakh crore**, injecting "durable" liquidity (long-term) into the banking system and helping keep bond yields stable.

USD/INR Buy–Sell Forex Swap – US$5 billion, 3-year Tenor

Mechanism: RBI conducts a **buy–sell swap** – it **buys US dollars now and provides rupees** to banks; after three years, it **sells back dollars** and absorbs rupee liquidity, at a pre-decided swap premium.

Objective:

Inject **rupee liquidity** without permanently altering RBI's securities portfolio;

Smooth **FX market volatility** and forward premia;

Complement OMOs in keeping system liquidity around RBI's desired level.

- **Significance vs OMO:**
  - OMOs **change RBI's G-sec holdings permanently**;
  - FX swaps are **reversible** – liquidity injection today is automatically unwound at maturity, giving RBI more fine-tuned control.

6. Mains Practice Question:

"RBI has recently combined a policy rate cut with large Open Market Operations and long-tenor USD/INR buy–sell swaps. Discuss how this policy mix aims to achieve a 'Goldilocks' combination of high growth and low inflation, and critically examine the risks such as asset price inflation and external vulnerability."

7. ₹2000 Banknote Withdrawal

- **98.39% returned:** Of the ₹2000 notes in circulation as of May 2023, **98.39% have been returned** to the banking system.
- **Value trend:** At the time of withdrawal announcement (19 May 2023), ₹2000 notes totalled **₹3.56 lakh crore**; as of **29 November 2025**, only **₹5,743 crore** remain in circulation.
- **Exchange status:** Public exchange at banks ended on **7 October 2023**; exchange/deposit is now permitted **only at 19 RBI Issue Offices**, including **account credit via India Post**.
- **Legal status:** ₹2000 notes **remain legal tender**, but are being **phased out of active circulation**.
- **Background:** Introduced in **2016** post-demonetisation to meet replacement needs; **printing stopped in 2018–19** after lower-denomination supply stabilised.

8. India's Smartphone Exports Surge (US Market Focus)

- **October spike:** Exports to the **United States more than tripled YoY to $1.47 billion**, underscoring competitiveness despite U.S. tariffs and supporting **Make in India**.
- **Scale & momentum:** Smartphone exports grew **127-fold over a decade**, reaching **$24.1 billion in FY 2024–25**; **global exports hit $15.95 billion (Apr–Oct 2025)**, up **49.35% YoY**.
- **Market concentration:** The **US absorbed ~70%** of India's smartphone exports in **H1 FY 2025–26**; other key destinations include **UAE, Austria, Netherlands, and the UK**.
- **Growth drivers: PLI-led scale-up**, **China-plus-one diversification**, **domestic demand saturation enabling export surplus**, and **policy support** (100% FDI, duty exemptions) strengthened India's manufacturing and export capacity in **India**.

9. RBI unveils NSFI 2025–30 with 'Panch-Jyoti' inclusion goals

The Governor of RBI has released the **National Strategy for Financial Inclusion (NSFI) 2025–2030**, India's new five-year roadmap to deepen access, usage and quality of formal financial services. The strategy, approved by the **FSDC Sub-Committee**, is built around **five pillars called 'Panch-Jyoti'**, with **47 time-bound action points** to push women-led, technology-enabled and secure financial inclusion.

Context & Evolution

- NSFI 2025–30 **succeeds NSFI 2019–24**, which focused on opening bank accounts and basic access (PMJDY, UPI, JAM).
- New strategy shifts from **"access only" → "access + usage + resilience + protection"**, reflecting rapid digitalisation and new risks (fraud, data misuse).
- India's **Financial Inclusion Index (FI-Index)** has risen to about **67 in 2025**, up ~24% since 2021, but gaps remain for women, rural and vulnerable groups.

Institutional Framework

- Prepared by **Technical Group on Financial Inclusion & Financial Literacy (TGFIFL)** under the **FSDC Sub-Committee**, with inputs from GoI, RBI, SEBI, IRDAI, PFRDA, NABARD, NPCI and banks.
- NSFI is a **national strategy**, not just an RBI document – aims for convergence of regulators, ministries, livelihood missions and skilling initiatives.

'Panch-Jyoti' – Five Strategic Objectives

- **Equitable Financial Services**
  - Universal, affordable **"bouquet" of services** – savings, credit, payments, insurance, pensions, grievance redressal – for households and micro-enterprises.
- **Women-Led Inclusion (Gender-Intentional)**
  - Higher **women Business Correspondents (BCs)** (target ~30%), gender-sensitive products, focus on asset ownership and resilience of women and vulnerable groups.
- **Finance–Livelihood–Skill Integration**
  - Align credit, insurance and payments with **NRLM, agriculture, MSMEs, skilling and self-employment programmes**.
- **Financial Education & Capability**
  - Stronger **digital and financial literacy**, especially for rural, low-income, elderly and differently-abled, to ensure safe usage of digital finance.
- **Customer Protection & Grievance Redressal**
  - Better disclosure norms, faster and integrated grievance systems, stronger safeguards against **fraud, mis-selling, cyber risks**.

10. Securities Markets Code Bill seeks single law for capital markets

The Union Government has introduced the **Securities Markets Code Bill, 2025** in the Lok Sabha to **consolidate India's fragmentary securities law framework**—currently spread across the SEBI Act 1992, Depositories Act 1996, and Securities Contracts (Regulation) Act 1956—into **one principle-based code**.

The Bill aims to modernise regulation in line with India's expanding capital markets, improve investor protection, and reduce compliance complexity for issuers and intermediaries. The Bill is still **in the process of parliamentary consideration**

Context & Background : Presently, Indian securities markets are governed mainly by:

SEBI Act, 1992 – establishes SEBI, powers, regulatory framework.

Securities Contracts (Regulation) Act, 1956 (SCRA) – regulates stock exchanges and contracts in securities.

Depositories Act, 1996 – provides for dematerialisation and depositories.

Multiple Acts and scattered amendments often create **overlaps, gaps and complexity** for intermediaries, listed entities and courts.

Objectives of the Securities Markets Code Bill

Legal consolidation: Replace the three core Acts with **one unified securities code**.

Investor protection: Strengthen grievance redressal (ombudsperson, time-bound adjudication) and transparency.

Capital mobilisation: Facilitate easier issuance/listing, broaden participation (retail + institutions), support India's growth financing needs.

Regulatory efficiency:

Move to **principle-based regulation** (broad principles + detailed regulations),

Simplify compliance and enable faster response to innovation (fintech, new products).

KEY PROVISIONS : SEBI Governance & Accountability

Board expansion: SEBI Board size increased from 9 to **up to 15 members** – Chairperson, 2 Central Government nominees, 1 RBI nominee (ex-officio) and up to 11 other members (with **minimum five whole-time members**).

Conflict-of-interest disclosures mandatory for Board members.

Consultative rule-making: Statutory requirement for **public consultation** before subordinate legislation – aligns with global best practice (e.g., notice-and-comment).

Unified Enforcement & Investor Redressal

Single adjudication framework for all securities-law violations with clear **timelines for investigation**, interim orders, and disposal—reduces forum shopping and legal ambiguity.

Investor Ombudsperson: Dedicated mechanism to handle investor grievances beyond existing SCORES / exchange mechanisms.

Decriminalisation structure: *Category I:* Minor contraventions – only civil penalties for fraudulent/unfair practices of lower gravity.

Category II: Serious market abuse – both civil and criminal penalties where **market integrity / public interest** is at stake.

11. Sabka Bima Sabki Raksha Bill liberalises FDI, reforms insurance laws

The Union Government introduced the **Sabka Bima Sabki Raksha (Amendment of Insurance Laws) Bill, 2025** to modernise India's insurance framework in line with the **"Insurance for All by 2047"** vision. The Bill amends the **Insurance Act 1938, LIC Act 1956 and IRDAI Act 1999**.

Size vs Low Penetration

- India is about the **10th largest insurance market** globally by premium volume; life insurance is also around 10th, with **LIC** ranked among the **strongest global insurance brands** in recent Brand Finance reports.
- Reinsurance is heavily concentrated in **GIC Re**, raising systemic and concentration risk.

Key Provisions (Substantive Changes)

- **Capital & Ownership Reforms**
  - **FDI cap raised from 74% to 100%** in insurance companies to draw global insurers and long-term funds.
  - **Reinsurer entry norms eased:** Net Owned Funds requirement cut from **₹5,000 crore → ₹1,000 crore** for foreign reinsurers, encouraging more players and better risk pricing.
  - **Equity flexibility:** IRDAI approval threshold for share transfer raised from **1% to 5%**, reducing minor transaction friction and improving ease of doing business.
- **Institutional & Regulatory Changes**
  - **LIC autonomy:** LIC allowed to open zonal offices, restructure overseas operations and take some business decisions without prior government approvals—aligning LIC with global peers while retaining public-sector character.
  - **IRDAI empowerment:**
    - Power to impose **disgorgement** (forcing entities to return unlawful gains),
    - Higher penalties,
    - **One-time registration** framework to simplify licensing and reduce repetitive approvals.
  - **Disgorgement (definition):** An enforcement tool requiring return of ill-gotten profits; aims to prevent unjust enrichment and create strong deterrence.
- **What the Bill Does *Not* Address (Key Critiques)**
  - **Composite licensing absent:** No unified licence for life + non-life.
  - **High entry barriers retained:**Minimum paid-up capital of **₹100 crore** for life/general, **₹200 crore** for reinsurers unchanged
  - **Limited product / distribution innovation:** No explicit push for **bundled insurance products**
  - **No captive insurance framework.**

12. PFRDA eases NPS withdrawal norms for non-government subscribers

In 2025, the **Pension Fund Regulatory and Development Authority (PFRDA)** revised **National Pension System (NPS)** rules to give **non-government subscribers** more flexibility at exit. The changes allow a **higher lump-sum withdrawal (up to 80%)**, revamped **corpus-based slabs**, and longer **deferment options** for both lump sum and annuity, marking a major design shift in India's voluntary pension scheme.

- **NPS – Basic Features (for static linkage)**
  - Launched **2004** for new Central Govt employees (except defence); opened to **all citizens in 2009** as a **voluntary, defined-contribution, market-linked** pension scheme.
  - Covers **Central/State Govt employees, corporate employees & individual citizens**, regulated by **PFRDA (statutory body under PFRDA Act, 2013; HQ: New Delhi)**.
  - Contributions are invested by **Pension Fund Managers (PFMs)** in **equity, corporate debt, government securities**, as per chosen scheme.

Key 2025 Changes – Exit & Withdrawal

a) Higher Lump-Sum for Non-Govt Subscribers

- Earlier rule (standard): **60% lump sum + minimum 40% annuity** at exit.
- New rule (non-government subscribers): **Up to 80% lump-sum withdrawal** allowed; **minimum 20%** to be used for annuity/structured withdrawal.
- Government subscribers: Existing rule **(60% lump sum + 40% annuity)** unchanged.

b) Corpus-Based Withdrawal Slabs

- **Corpus ≤ ₹5 lakh:** 100% lump-sum withdrawal permitted (no compulsory annuity).
- **Corpus ≤ ₹8 lakh (at superannuation):** Full 100% withdrawal allowed.
- **Corpus ₹8–12 lakh:** Fixed **₹6 lakh lump sum**, balance to annuity / structured withdrawal.
- **Corpus > ₹12 lakh:**
  - **Non-Govt:** Up to **80% lump sum**, at least **20%** to annuity.
  - **Govt:** Up to **60% lump sum**, at least **40%** to annuity.

c) Exit, Deferment & Premature Exit

- **Normal exit:** After **15 years of subscription** or on attaining **60 years**, whichever is earlier.
- **Deferment:** Subscriber may defer **lump sum and/or annuity purchase up to age 85**, giving flexibility to manage tax and income profile.
- **Premature exit:** Before normal exit, at least **80% of corpus must be annuitised**, except when total corpus **≤ ₹5 lakh**, where full withdrawal is allowed.

- **Special Situations**
  - **Death of subscriber:** Entire accumulated corpus paid to **nominee/legal heir** (no annuity compulsion).
  - **Missing subscriber:**
    - Up to **20% interim relief** to nominees;
    - Balance released after legal presumption of death under **Bharatiya Sakshya Adhiniyam, 2023**.
  - **Renunciation of citizenship:** Full lump-sum withdrawal permitted after closure of NPS account.
  - **Disability:** For **≥75% disability**, exit allowed on the basis of medical certification from a Government doctor.

13. Centre plans new cess, excise to replace GST compensation levy

The Union Government has proposed **two Bills in 2025** – a new **'Health Security se National Security Cess' on pan masala and other sin goods**, and the **Central Excise (Amendment) Bill, 2025** – to **replace the expiring GST compensation cess** on demerit goods, especially **tobacco**, while keeping the overall tax burden broadly unchanged and creating additional fiscal space for health and security spending.

- **Background: GST Compensation Cess – Quick Recap**
  - Provided under **GST (Compensation to States) Act, 2017** to offset states' revenue loss after GST rollout.
  - Guaranteed **14% annual growth in protected state revenue**, with any shortfall funded by a **compensation cess** on luxury and sin goods (e.g. luxury cars, aerated drinks, coal, tobacco).
  - Cess period: **July 2017 – June 2022**, later extended to **31 March 2026** only to repay the Centre's pandemic-related borrowings used for compensation.
  - Post **56th GST Council meeting (Sept 2025)**, the cess is largely **phased out and absorbed into new GST rates**, **except on tobacco**, where it continues until loans are fully repaid.
- **Health Security se National Security Cess – Features**
  - **Nature:** A new **Union cess** on specified "sin goods" (starting with **pan masala**; may later include other notified products).
  - **Tax neutrality:** Designed so that **overall tax incidence on demerit goods remains broadly unchanged** once the GST compensation cess expires.
  - **Twin objectives:** Mobilise resources for **public health programmes** (e.g. NCD control, tobacco/alcohol de-addiction, health infrastructure).
    - Support **national security-related expenditure** (defence modernisation, internal security).
  - **Levy method:** Calculated on **installed production capacity** of gutkha/pan masala manufacturing machines (similar to capacity-based levies used earlier), **not on actual output volume** – meant to curb under-reporting.
  - **Pooling of proceeds:** Credited to the **Consolidated Fund of India**; being a Union cess, **not shareable with states** (unlike divisible pool of taxes).
  - **Implications:** Centre gains **independent revenue** post-compensation period; states may object as they do not share this cess despite health costs largely being **state subjects**.
- **Central Excise (Amendment) Bill, 2025 – Tobacco Focus**
  - **Purpose:** Convert the expiring **GST compensation cess on tobacco** into a **permanent central excise duty**, preserving the **very high tax burden** recommended by WHO / public health experts to reduce consumption.
  - **Product coverage: Cigarettes, cigars, cheroots, chewing tobacco, hookah tobacco, zarda, scented/flavoured tobacco, pipe mixtures**, etc.
  - **Tax structure:** Tobacco continues under a **high GST slab (around 40%)**, while the **revised central excise duty** compensates for the phased-out cess to keep total tax incidence roughly unchanged.
  - **Union fiscal flexibility:** Empowers the Centre to **revise excise duty on tobacco without requiring GST Council approval**, unlike GST rates/cess which need Council recommendation.
  - **Public-health logic:** Sustains a **price-based deterrent** on tobacco use, while generating sizeable non-buoyant but stable revenue.

14. Crypto trades up, tax mop-up and enforcement tighten in India

The **Ministry of Finance**, in a reply in the **Rajya Sabha (2024-25)**, shared data on **cryptocurrency / Virtual Digital Asset (VDA) transactions**, TDS collections, and action against undisclosed income and money laundering. This gives a quantitative picture of how the post-Budget 2022 **VDA tax regime (30% tax + 1% TDS)** is working on the ground.

Snapshot of 2024-25 Crypto Activity

- **Transaction value:** Crypto transactions worth **₹51,000 crore** in 2024-25 (41% rise).
- **TDS collection: ₹511.8 crore** collected as **TDS on VDAs**.
- **Undisclosed income:** Income Tax Department detected **₹888.82 crore** of undisclosed income linked to VDAs.
- **ED action:** ED attached **>₹4,000 crore** as "proceeds of crime" in VDA-related cases under **PMLA, 2002**.
- **VDA definition:** Finance Act 2022 inserted **"Virtual Digital Asset"** in the Income-tax Act to cover **cryptocurrencies, NFTs and similar digital assets**.

Tax Treatment of Crypto / VDAs in India

- **Income-tax provisions (from FY 2022-23 onwards)**
  - **Flat 30% tax** on income from transfer of VDAs (plus surcharge & 4% cess).
  - **Applies uniformly** to all taxpayers (no benefit of slab rates for this income).
  - **Deductions:** Only **cost of acquisition** is deductible; **no deduction** for mining costs, interest, transaction charges, salary, etc.
  - **Loss set-off & carry-forward:**
    - Loss from one VDA **cannot be set off** against gain from another VDA or any other income.
    - Such losses **cannot be carried forward** to subsequent years.
  - **TDS – Section 194S:**
    - **1% TDS** on consideration paid for transfer of VDAs.
    - Threshold: **₹50,000** (specified persons) or **₹10,000** (others) in a financial year.
- **GST & gifts / disclosure**
  - VDAs are generally treated as **goods/services** for GST **on platform/services**, not as "money"; typically **18% GST on exchange/platform service fees**, not on the asset itself as currency.
  - **Gift tax:**
    - Crypto received as **gift** is taxable as **"Income from other sources"** if the aggregate fair market value exceeds **₹50,000**, at **normal slab rates**.
    - Exemption for gifts from **specified relatives** (spouse, siblings, parents, lineal ascendants/descendants, etc.).
  - **Reporting:**
    - Crypto / VDA gains must be reported in **Schedule VDA** of the Income Tax Return (ITR).

15. India's new FTA push: market access, strategy and hidden risks

India has accelerated negotiations and signings of **Free Trade Agreements (FTAs)**/comprehensive economic agreements with partners such as **UAE (CEPA), Australia (ECTA), EFTA (TEPA), UK, and EU**, signalling a strategic shift from earlier FTA scepticism. This "FTA pivot" is driven by the twin needs of **export-led growth and geopolitical hedging** in a more fragmented, China-centric global order.

- **What is an FTA? (for Prelims clarity)**
  - A **legally binding pact** between two or more countries/economic blocs to **reduce or eliminate tariffs, quotas and other trade barriers** on goods and/or services.
  - Advanced FTAs often include **investment, intellectual property, digital trade, labour, environment and dispute settlement** chapters.
- **Why India is Pushing FTAs Now (with examples)**
  - **Market Access & Exports**
    - Duty cuts in FTAs give **preferential access** to partner markets, boosting **labour-intensive exports** (textiles, gems & jewellery, engineering, agro-products).
    - Example: **India–UAE CEPA** grants near **duty-free access on ~90% of India's exports**, contributing to a double-digit rise in bilateral exports in the first year.
  - **Investment & Value Chains**
    - FTAs provide **predictable rules**, attracting **FDI** and integrating India into **global value chains**.
    - Example: **India–EFTA TEPA** includes a commitment of **US$100 billion investment over 15 years**, linked to job creation.
  - **Competitiveness via Cheaper Inputs**
    - Lower tariffs on **raw materials & intermediates** reduce costs for Indian industry.
    - Under **India–ASEAN FTA (AITIGA)**, tariff cuts helped Indian **textile & apparel exports** to ASEAN rise, though overall deficits widened.
  - **Services & Mobility**
    - Services-centric FTAs (e.g., with **UK, EU, EFTA**) aim to secure **mode 4 access** for Indian professionals in **IT, finance, healthcare, education**, etc.
  - **Geopolitics & Strategic Alignment**
    - FTAs with **QUAD and EU members** strengthen strategic partnerships, diversify away from over-dependence on any one bloc, and support India's **Indo-Pacific** and **China+1** goals.
  - **Technology & Energy Transition**
    - Pacts like **India–Australia ECTA** can facilitate access to **critical minerals, renewable technologies, education and R&D collaborations**, supporting India's net-zero and green growth targets.

16. Global Value Chain Report 2025: India enters top-10 value adders

The **fifth biennial Global Value Chain Development Report 2025**, titled "*Rewiring GVCs in a Changing Global Economy*", has been released jointly by WTO, ADB, WEF and partner institutions. It highlights a mild decline in the share of **GVC trade**, a shift from pure cost-efficiency to **resilience and security**, and notes that **India now contributes about 2.8% of global value-added in exports**, placing it among the **top 10 value-adding economies**.

- **About the Report**
  - **Global Value Chain Development Report 2025 – "Rewiring GVCs in a Changing Global Economy"**.
  - 5th in a **biennial series**, produced by WTO, ADB, WEF, IDE-JETRO, UIBE, etc.
  - Analyses how global production networks are changing post-pandemic amid geopolitical tensions, climate pressures and digitalisation.
- **Key Global Findings (what UPSC can ask)**
  - **GVC share of trade:** Fell slightly from ~48% (2022) to **46.3% (2024)** – GVCs are *reorganising*, not collapsing.
  - **Model shift:** Firms and governments moving from **cost-only offshoring** to **security & resilience** (friend-shoring, near-shoring, stock-piling critical inputs).
  - **Role of services:** Services (design, R&D, logistics, digital) now account for **more than one-third of value added in manufacturing exports**, showing "servicification" of manufacturing.
  - **Localisation trend:** Firms increasingly **produce closer to end-markets** to cut logistics risk and tariff uncertainty (regionalisation).
  - **Three "Ds" – Drivers of GVC change:**
    Digitalisation (AI, automation, cloud),**Diversification** (multi-sourcing, friend-shoring), **Decarbonisation** (carbon pricing, green standards reshaping supply chains).
- **India-Specific Findings**
  - **Value-added rank:** India is now in the **top 10 value-adding economies**, contributing **~2.8% of global Domestic Value Added (DVA) in exports (2024)** – up since the pandemic, reflecting a rising role in GVCs.
  - **Services strength:**
    - India, along with the Philippines and some African economies, has **strengthened its position in business-process management and digital services exports**, riding the IT/BPM wave.
    - India's share in global services exports has risen to about **4.3% in 2023**.
  - **Beyond outsourcing – capability centres:**
    - India is emerging as a hub for **Global Capability Centres (GCCs)** carrying out R&D, design, analytics and engineering for MNCs – moving up from call-centres to **innovation and design hubs**.
  - **Tariff and logistics constraints:**
    - Report flags **high tariffs on imported intermediates** and other trade costs as a constraint on using India as a **final assembly and export hub**, despite large market and talent pool.

17. RBI state data show rising regional concentration in India's exports

The **Handbook of Statistics on Indian States 2024-25** highlights that India's strong export performance is increasingly driven by a **small set of States**, raising concerns about **regional imbalance and inclusive growth**.
Export activity is becoming more concentrated in a few coastal and southern States, while many northern and eastern States remain weakly integrated with global markets.

Pattern of Export Concentration

- **Top-heavy share:** Maharashtra, Gujarat, Tamil Nadu, Karnataka and Uttar Pradesh together now account for **~70% of India's exports** (up from ~65% five years ago).
- **Core–periphery divide:**
  - **Core:** Coastal western & southern States = major hubs plugged into global value chains (GVCs).
  - **Periphery:** Large parts of northern & eastern India have **low export intensity** and weaker GVC linkages.
- **Rising concentration (HHI):**
  - The **Herfindahl–Hirschman Index (HHI)** for state-wise exports has **increased**, signalling rising spatial dominance of a few States.
  - **HHI concept:** Sum of squared export shares; **higher HHI = more concentration**, **lower HHI = more even spread**.

Structural Drivers of Concentration

- **Value over volume:** Global merchandise trade growth has slowed (~0.5–3%), so capital chases **high-complexity, high-value clusters** instead of low-skill regions.
- **Global concentration:** Top 10 global exporters control ~55% of world merchandise trade; similarly, India's exports are dominated by a few States with strong infrastructure, skills and ecosystems.
- **Capital deepening without broad jobs:**
  - Fixed capital formation (ASI 2022-23) rose faster than factory employment (10.6% vs 7.4%), raising **capital per worker to ~₹23.6 lakh**.
  - Manufacturing's share in total employment remains stuck around **11.6–12%**, showing limited labour absorption even in export-oriented growth.
- **Financial asymmetry & capital flight:**
  - High-export States show **credit–deposit (CD) ratios >90%** (local deposits are largely lent locally).
  - In States like **Bihar and eastern UP**, CD ratios **<50%** indicate local savings being redeployed elsewhere → **regional credit squeeze**.
  - **CD ratio:** Loans / deposits; higher ratio = more local use of deposits for investment.

18. Net FDI turns negative amid record repatriations, rupee under stress

In **September and October 2025**, India recorded **net FDI outflows**, including about **–US$1.55 billion in October**, as **foreign profit repatriations and outward FDI by Indian firms exceeded fresh inflows**. This is unusual for India, where FDI has been a key, stable source of BoP financing.

- **FDI – Concept & Measurement**
  - **FDI:** Long-term, *non-debt* capital where a foreign investor acquires an ownership stake and often participates in management, bringing capital, tech and know-how.
  - **Net FDI = Gross FDI inflows – (Repatriations by foreign firms + Outward FDI by Indian firms).**
  - Different from **FPI**, which is short-term portfolio capital in equity/debt markets.
- **Drivers of Net FDI Outflow (Oct 2025)**
  - **Large profit repatriation:**
    - Foreign companies repatriated **just under US$5 billion** in October 2025, reflecting **profit-booking and portfolio rebalancing** as global uncertainty and high interest rates made advanced economies more attractive.
  - **Surge in outward FDI:**
    - Indian companies invested about **US$3.09 billion abroad** in October, raising outward FDI plus repatriations to **US$8.08 billion** for the second straight month – an unprecedented scale of net capital moving out.
    - Nearly **90% of outward FDI** went into **financial, insurance and business services**, not domestic manufacturing or infrastructure.
  - **Global interest-rate cycle:**
    - Persistently **high policy rates in advanced economies** reduced India's relative return advantage, encouraging **capital relocation** and higher repatriation.
- **Macro Implications for India**
  - **Rupee pressure & BoP sensitivity:**
    - With lower **stable FDI dollars**, the **rupee weakened past ₹90/US$** before RBI intervention stabilised it.
    - A net FDI outflow despite **US$6.54 billion gross inflow** means **repatriation + outward flows can dominate**, forcing heavier reliance on **more volatile FPI and debt flows** to finance the **current account deficit**.
  - **Investor confidence signal:**
    - Gross inflows remaining positive suggests India is still attractive, but **repeated net outflows** signal weaker **reinvestment and long-term commitment** by existing foreign investors.
  - **Domestic vs overseas capital formation:**
    - Outward FDI helps Indian firms **access markets, technology and supply chains** (often via hubs such as **Singapore, USA, UAE**), but may **temporarily slow domestic investment and job creation** if not matched by strong domestic capex.

19. Anti-Dumping Duty on Cold-Rolled Steel (India–China)

- **Measure:** India imposed **anti-dumping duties for five years** on **cold-rolled steel imports from China**.
- **Rationale:** Investigations found **dumping**—exports priced **below normal value/production cost**, causing **injury to Indian steel producers** through lower capacity utilisation, price suppression, and reduced profitability.
- **Strategic concern:** Steel is a **core input** for infrastructure, automobiles, defence, and capital goods; protection is vital for industrial resilience.
- **Trade law basis:** Anti-dumping duties are **WTO-consistent** under **GATT Article VI**, allowed **only after** establishing **dumping, injury, and a causal link**, as per rules of the World Trade Organization.

20. Finland–India Circular Economy Engagement | WCEF 2026

- **Update:** Finland will conduct **circular economy roadshows across Indian cities** ahead of India hosting the **World Circular Economy Forum (WCEF)** in **October 2026**.
- **Circular economy:** An economic model that **designs out waste**, **extends product life**, and **closes material loops** via reuse, repair, remanufacturing, and recycling, supported by design innovation, material recovery, and **extended producer responsibility**.
- **Economic potential:** United Nations Development Programme estimates a **$4.5 trillion global opportunity by 2030**; **India's potential** is about **$2 trillion and 10 million jobs by 2050**, currently led by waste management and recycling.
- **Priority sectors: Textiles, electronics, construction, mobility, packaging**, and **clean energy value chains** (including batteries).
- **WCEF:** A **global annual forum** launched in **2017** by **SITRA** that showcases circular solutions, policies, and industrial models through high-level dialogue and cross-sector collaboration.

21. Electronics boom turns India into major women blue-collar hub

The Union IT Minister highlighted that **India's fast-growing electronics manufacturing sector** is now a major source of **blue-collar jobs, especially for women**, driven by rising mobile and IT hardware production, exports and incentive schemes. The sector is central to targets of a **$500 billion electronics ecosystem by 2030–31** and rising electronics exports.

Blue-collar Jobs – Context

- Blue-collar workers perform **manual / factory / shop-floor work** in sectors like **manufacturing, construction, logistics and warehousing**.
- They account for **~80% of India's non-agricultural workforce (~300 million workers)**.
- Wages in 2025 are rising about **5–6% annually**, often topped up with **performance-linked incentives** to tackle high attrition in large factories and warehouses.

Electronics Sector – Scale and Employment

- **Production:** Domestic electronics output reached **₹11.32 lakh crore in FY 2024–25**, around **6× growth over a decade**.
- **Exports:** Electronics has become India's **3rd-largest export category**, with exports **>US$40 billion**, led by mobile phones & components.
- **Mobile phones:** India is the **2nd-largest mobile phone manufacturer**; mobile exports have touched about **₹2 lakh crore** after a decade of rapid expansion.
- **Employment:**
  - Sector employs roughly **25 lakh workers**, many in large factories (mobiles, consumer electronics, EMS units).
  - It is now **India's largest employer of women in organised manufacturing**, especially in mobile and electronics clusters in **Tamil Nadu, Karnataka, UP, Andhra Pradesh**.
- **Targets:**
  - **$500 billion electronics manufacturing ecosystem by 2030–31**,
  - **$120 billion electronics exports by 2025–26**—key for GVC integration and jobs.

Government Schemes Driving Jobs & Capacity

- **PLI Scheme 2.0 (IT hardware & mobiles):**
- **ECMS 2025 & SPECS:**
- **DLI Scheme (Design Linked Incentive):**
- **EMC 2.0 – Clusters:**
- **Skilling – 'Chip-in' programme:**

22. New shipbuilding schemes launched to boost India's maritime capacity

The Ministry of Ports, Shipping and Waterways (MoPSW) has notified operational guidelines for two major schemes—the **Shipbuilding Financial Assistance Scheme (SBFAS)** and the **Shipbuilding Development Scheme (SbDS)**—to expand domestic shipbuilding.

These initiatives support the **Maritime Amrit Kaal Vision 2047** target of placing India among the **top five shipbuilding nations by 2047** and strengthening strategic maritime capabilities.

Context: Why Shipbuilding Matters

- India currently accounts for a **very small share of global shipbuilding** compared to China, South Korea and Japan, but has major **coastline, trade volume and Navy requirements**.
- Shipbuilding is **capital intensive, cyclical and strategic** (merchant fleet + Navy/coast guard), with strong linkages to **steel, engineering, ports, logistics and employment** in coastal States.

Shipbuilding Financial Assistance Scheme (SBFAS)

- **Aim:** Support construction of **small, large and specialised vessels** in Indian yards through direct financial assistance.
- **Assistance:**
  - **15–25% per vessel**, depending on vessel category; disbursed in **stages linked to milestones** and backed by security instruments.
- **National Shipbuilding Mission:**
  - Coordinates planning and implementation across ministries, PSUs, private yards and financiers.
- **Shipbreaking Credit Notes (key innovation):**
  - Shipowners scrapping vessels at **Indian shipbreaking yards** get **40% of scrap value as credit**.
  - This credit can be **offset against the cost of new vessels built in India**, incentivising both **green recycling** and **domestic newbuilding**.

Shipbuilding Development Scheme (SbDS)

- **Scope:** Supports **greenfield shipbuilding clusters**, **brownfield modernisation**, and creation of an **India Ship Technology Centre** under Indian Maritime University.
- **Greenfield clusters:** Up to **100% capital support** via a **50:50 Centre–State SPV**, focusing on integrated yards with docks, fabrication, housing and logistics.
- **Brownfield yards:** Existing shipyards eligible for **25% capital assistance** for **dry-docks, shiplifts, fabrication shops, automation and digitisation upgrades**.
- **Implementation mechanism: Milestone-based disbursement**, monitored by independent agencies to ensure time-bound completion and proper use of funds.
- **Credit Risk Coverage Framework (key feature):** Government-backed **risk coverage / insurance** against commercial and project risks, making banks and investors more willing to finance shipbuilding projects.

23. Sugar output surges 43% amid pricing and policy challenges

India's sugar production rose **43% to 4.11 million tonnes** in the first two months (Oct–Nov) of the **2025–26 marketing year**, driven mainly by higher recovery and strong output from Maharashtra.
This early-season surge comes as the government has **raised the sugarcane FRP** and allowed limited sugar exports, while mills seek a higher **Minimum Selling Price (MSP)** and better ethanol pricing.

- **Sugar Industry – Structure & Importance**
  - **Agro-based backbone:** Supports ~**50 million cane farmers** and around **5 lakh workers** in mills and allied activities.
  - **Global position:** Largest **consumer** and **2nd-largest producer** of sugar, contributing ~**19% of global production**.
  - **Marketing year:** Sugar year runs **October–September**; 2025–26 output is projected around **30.9–31 Mt**, above domestic demand (~29 Mt), creating a **surplus**.
- **Regional Production Pattern**
  - **Northern belt:** Uttar Pradesh (largest producer), Punjab, Haryana, Bihar.
  - **Southern/tropical belt:** Maharashtra (major producer in current season), Karnataka, Tamil Nadu, Andhra Pradesh – benefits from **longer growing season & higher sucrose**.
- **Key Policies & Recent Numbers (Exam-Focused)**
  - **FRP (Fair and Remunerative Price):**
  - **Sugar MSP (Minimum Selling Price):**
  - **Ethanol Blending Programme (EBP):**
  - **Export Regulation:**
  - **By-products: Bagasse** (cogeneration power), **molasses** (ethanol, spirits), **press mud** (manure) add income streams, key for bioenergy and circular economy.
- **Issues & Significance**
  - **Farmer–mill stress:** Rising **FRP/SAP** vs stagnant sugar MSP squeezes mills' margins, risking **cane arrears**.
  - **Price & surplus management:** 43% early output jump plus projected surplus demands careful use of **exports + ethanol diversion** to avoid price crashes and protect farmer incomes.
  - **Climate & water concerns:** Cane is **water-intensive**; concentration in drought-prone regions (Maharashtra, Karnataka) raises sustainability questions.

24. Increase in Rabi Crop Area – India

- **Extent of rise:** The **total rabi sown area** increased by **8.11 lakh hectares** to **580.70 lakh hectares** in the current winter season, as reported by the **Ministry of Agriculture and Farmers Welfare**.
- **Crops benefiting: Wheat**, **pulses** (urad, masur, moong), **millets** (jowar, bajra, ragi), and **oilseeds** (rapeseed–mustard) recorded higher acreage.
- **Key drivers: Good monsoon rainfall** and the **Cabinet Committee on Economic Affairs** decision to **raise MSP for all mandated rabi crops for 2026–27** encouraged expansion.
- **Rabi context:** Sown **Oct–Dec** and harvested **Mar–Apr**, rabi crops rely more on **irrigation and western disturbances**, face **lower pest pressure** than kharif, and are crucial for **wheat and mustard output**, **buffer stocks**, and **food price stability** in **India**.

25. Agmarknet & e-NAM: Digital Price Discovery for Farmers

- **Government focus:** The **Union Government** highlighted **Agmarknet** and **e-NAM** as key platforms providing **real-time mandi price information** and improving market transparency for farmers.
- **Agmarknet (2000):** An e-governance portal of the **Ministry of Agriculture and Farmers Welfare**, implemented by **National Informatics Centre**, offering **daily arrival and price data** for **300+ commodities and 2,000 varieties** across **4,367 mandis**; upgraded to **Agmarknet 2.0 (Nov 2025)** with a mobile app; operates under **MRIN** of the Integrated Scheme for Agricultural Marketing.
- **e-NAM (2016):** A **pan-India electronic trading platform** implemented by **Small Farmers Agribusiness Consortium**; as of 2025, **1,520+ mandis** onboarded, enabling trade in **247 commodities** with **online bidding, quality assaying, price discovery, and direct e-payments**.
- **How they work together: Agmarknet supplies price/arrival data**, while **e-NAM uses this data to enable online trading and payments**, strengthening a unified national agricultural market.

26. World's Largest Grain Storage Plan in Cooperative Sector

- **Overview:** A **Ministry of Cooperation** initiative (launched as a **2023 pilot**) to **bridge India's foodgrain storage gap** through **decentralised infrastructure** at the **PACS** level (godowns, processing units).
- **Implementation & oversight:** Implemented by **National Cooperative Development Corporation**; overseen by an **Inter-Ministerial Committee**, with support from **National Bank for Agriculture and Rural Development**, **Food Corporation of India**, and others.
- **Scheme convergence:** Integrates **eight flagship schemes**, notably the **Agriculture Infrastructure Fund** and **Agricultural Marketing Infrastructure Scheme**.
- **Financing:** PACS receive **AMI capital subsidy**, **AIF interest subvention**, and **NABARD refinance**, lowering **effective loan interest to ~1%**.
- **Significance:** Cuts **post-harvest losses**, strengthens **food security**, and promotes **cooperative-led rural growth**, aligning with **Sahakar-se-Samriddhi** and **Atmanirbhar Bharat**.

27. National Digital Livestock Mission (NDLM)

- **Launch & objective:** NDLM is a **Government of India** initiative of the **Department of Animal Husbandry and Dairying** to build a **national digital database of livestock** and related services.
- **Digital platforms:** **Bharat Pashudhan** serves as the core tech platform (Android app + web), used by field workers to record livestock activities; the **1962 Livestock Owner App** (which **replaces e-Gopala**) enables owners to access animal records and scheme details.
- **Unique identification:** Livestock are tagged with **12-digit Pashu Aadhaar** via bar-coded ear tags to capture **breeding, vaccination, disease, and ownership** data.
- **Coverage & integration:** Implemented **nationwide**, integrated with schemes like **Rashtriya Gokul Mission**; covers **~9.5 crore livestock owners** and **~35.96 crore animals**.
- **Background app: e-Gopala** (launched in **2020** by the same department) earlier provided animal health and scheme information, now subsumed by the 1962 app.

28. Kerala's rubber producer societies weaken, raising smallholder distress

Recent assessments by the **Rubber Board** and state agencies show a sharp **institutional decline of Rubber Producer Societies (RPSs)** in Kerala, with a significant share defunct or dysfunctional.
This threatens a key **cooperative mechanism** created in 1986 to counter middlemen, aggregate smallholders, and stabilise prices in India's strategic **natural rubber** sector.

- **Context: Rubber & RPS Model**
  - India accounts for about **5–6% of global natural rubber output**, largely from **smallholders (~1.3 million growers, avg. 0.57 ha)**, with **Kerala as the dominant producer**, followed by TN, Karnataka and NE states.
  - RPSs were launched by the **Rubber Board in 1986** as **grower collectives** to:
    - pool infrastructure & services,
    - improve bargaining power, and
    - undertake **joint procurement/marketing** of rubber.
- **Nature & Scale of the Crisis**
  - Around **20% of RPSs are defunct** and **~35% dysfunctional**; approvals withdrawn from **336 (2020–21), 111 (2021–22) and 89 (2022–23)** societies.
  - In surveys, **<50% of RPSs** in Kerala are actively procuring/selling rubber; many operate merely on paper.
  - Only **~11%** have basic processing infrastructure (rollers, smoke houses) → **weak value addition**, continued dependence on traders.
  - **Financial fragility:**
    - Average annual revenue ≈ **₹2.5 lakh**,
    - ~27% dependent on **grants/loans/subsidies**,
    - limited capacity to invest in processing, storage, or digital platforms.
  - **Governance & participation issues:**
    - Active member participation <50%,
    - Leadership heavily skewed to **older office-bearers (~72% above 50 years)**,
    - Low youth/women representation → poor innovation & digitisation.
- **Why It Matters**
  - Rubber is a **strategic input** for tyres, defence, medical & industrial goods; weakening cooperatives increases **market power of middlemen and large buyers**.
  - RPS decline undermines the original cooperative promise of **better price realisation, collective bargaining and risk sharing** for small growers.
  - At a time of **price volatility, climate shocks and import competition**, weak RPSs can push smallholders out of rubber cultivation or into distress diversification.

29. Timber deficit and illegal imports strain India's wood economy

Recent data show that **India meets only 35–40% of its timber demand domestically**, importing **USD 8–9 billion** of wood and wood products annually. At the same time, global studies flag India as a **high-risk market for illegal timber**, raising concerns over **trade deficit, forest sustainability and traceability** in the timber value chain.

- **Context: India's Timber Economy & Climate Role**
  - Timber & wood-based industries (construction, furniture, plywood, paper, packaging) form a market of about **₹1.3–1.5 lakh crore** and support ~**45 million livelihoods**, mostly in MSMEs and informal clusters.
  - India's forests and tree cover store an estimated **7.2 billion tonnes of CO_2 equivalent carbon stock** (ISFR 2021), making **sustainable timber plantations** important for climate mitigation.
- **Current Timber Status & Imbalance**
  - **Demand–supply gap:** Domestic forests and agro-forestry meet only **35–40%** of requirement; the rest is imported from **Malaysia, Myanmar, Vietnam, African & Latin American countries**.
  - **Imports & trade deficit:** Timber and wood product imports of **USD 8–9 billion (~₹65,000–70,000 crore)** annually add to the merchandise trade deficit.
- **Key Challenges**
  - **Illegal timber inflows:**
    - Global estimates: **10–30%** of international timber trade is illegal; India has been ranked among the **top importers of illegally logged wood (~10% of global illegal trade)**.
    - Weak customs scrutiny and complex supply chains allow laundering of illegal wood into formal markets.
  - **Low domestic productivity:**
    - Average forest productivity ~**1–2 m³/ha/year**, vs **5–10 m³/ha/year** in well-managed plantation forestry globally, limiting domestic supply even when area expands.
  - **Traceability & certification gap:**
    - **<15% of timber traded in India is certified**, hampering sustainable sourcing and access to high-value "green" markets.
  - **Regulatory & governance issues:**
    - Despite **National Agroforestry Policy 2014** and MoEFCC guidelines to ease felling and transit of trees on private/farm land, implementation is uneven; small growers still face paperwork and local restrictions.

30. Multi-Lane Free Flow (MLFF) Tolling – India

- **Announcement:** Nationwide rollout of **MLFF** by **end-2026**, announced by the Union Minister for Road Transport & Highways in **India**.
- **What it is:** A **barrier-free electronic tolling system** enabling **non-stop toll collection**—no slowing or stopping of vehicles.
- **How it works:** Combines **RFID (FASTag)** reading with **ANPR cameras** to capture **vehicle registration numbers**; **physical toll booths and boom barriers are eliminated**.
- **Implementers:** **National Highways Authority of India** and its subsidiary **Indian Highways Management Company Limited**.
- **Future-ready:** Designed for **GNSS-based satellite tolling** to enable **distance-based, pay-as-you-use** charging.
- **Benefits:** Cuts **congestion, fuel use, and emissions**; supports the **National Logistics Policy** goal of **single-digit logistics costs**.
- **Pilots:** First barrier-free plaza on **NH-48 (Gujarat)**; followed by **NH-44 (Haryana)** in **2025**.

31. GeM & Public Asset Disposal

- **Outcome:** **Government E-Marketplace (GeM)** enabled government entities to **raise ₹2,200+ crore in four years** through **public asset disposal**.
- **GeM (2016):** India's **national digital procurement platform** for buying/selling goods and services; set up as a **Section 8 (non-profit) company** under the **Ministry of Commerce and Industry** and **mandatory for ministries since 2017**.
- **Key features:** Vendor onboarding, **direct purchase & reverse auctions**, online contracts, and **paperless payments linked to PFMS**.
- **Scale & inclusion:** **GMV ~₹4.58 lakh crore**; **MSMEs and women-led businesses** secured **₹7.44 lakh crore+** in orders.
- **PFMS:** The **Public Financial Management System**, developed by **Controller General of Accounts** under the **Ministry of Finance**, enables **real-time fund tracking**, **DBT**, **unspent balance monitoring**, and **utilisation certificates** for Central (and linked State) schemes.

32. New tunnel safety guidelines aim to cut collapse risk on highways

The **Ministry of Road Transport and Highways (MoRTH)** has issued **national guidelines for planning and building road tunnels** to reduce the risk of collapses and improve rescue preparedness.
The norms cover **risk allocation, geotechnical reporting, escape provisions and emergency response**, and are crucial as India rapidly expands its **mountain and urban road tunnel network**.

- **What the New Guidelines Require**
  - **Risk ownership:** All key risks must be **assigned contractually** to the party best able to manage them (client, contractor, designer, etc.).
  - **Stakeholder coordination:** Mandatory **early consultation** with Forest, PWD, Railways, Disaster Management and other agencies during planning.
  - **DPR discipline:** Each **Detailed Project Report (DPR)** must include:
    - a **Geotechnical Baseline Report (GBR)** – contractual reference for expected ground conditions;
    - a **live Risk Register** – listing hazards with site-specific mitigation.
  - **Use of scientific inputs:**
    - **Portal siting** must use **Landslide Susceptibility Maps** of the Geological Survey of India to avoid unstable slopes.
  - **Rescue & safety features:**
    - In high-risk zones, a **0.9 m NP-4 rescue/escape pipe** in the tunnel invert (floor).
    - **Rescue containers**: at least **1 mobile rescue container per 12 workers**, stationed **150–300 m behind the tunnel face**; must provide **24 hours of oxygen, water and communication**.
    - **Pedestrian cross-passages** at **300 m intervals** for evacuation in longer tunnels.
  - **Emergency response & oversight:**
    - **Emergency Response Plans (ERP)** to be updated **weekly** and **verified fortnightly** by an authorised safety officer.
    - Tunnels **>1.5 km** require intimation to the **MoRTH "Tunnel Zone"** for early central oversight.
    - **Independent expert panel** must review DPR and construction methodology before execution (quality assurance).
- **Important Existing Road Tunnels**
  - **Dr. Syama Prasad Mookerjee Tunnel (Chenani–Nashri):**
    - India's **longest operational road tunnel – 9.28 km** on NH-44 (J&K).
  - **Atal Tunnel (Rohtang):**
    - **9.02 km**, world's longest highway tunnel **above 10,000 ft**, beneath Rohtang Pass (Eastern Pir Panjal, HP).
  - **Sela Tunnel:**
    - About **2.5 km twin-lane** tunnel above **13,000 ft**, connecting Tezpur (Assam) with Tawang (Arunachal Pradesh) via Sela Pass—critical for border logistics.

33. IndiGo hit as stricter DGCA FDTL rules trigger crew crunch

India's largest airline, **IndiGo**, has seen **widespread flight cancellations and delays** after the **new Flight Duty Time Limitation (FDTL) rules** came into full force on **1 November 2025**.

The revised rules, issued by the **DGCA**, sharply tighten limits on **pilot duty hours, night operations and rest periods** to address fatigue-related safety risks, but have exposed inadequate crew planning across airlines.

Flight Duty Time Limitations (FDTL) – Concept & Legal Basis

- FDTL are **mandatory safety norms** that cap how long pilots and cabin crew can be on **flight duty** and prescribe **minimum rest**, to prevent fatigue.
- Issued by **DGCA** as **Civil Aviation Requirements (CAR)** under the **Bharatiya Vayuyan Adhiniyam, 2024** and the **Aircraft Rules, 1937**.
- Non-compliance can attract regulatory action, including **penalties and grounding** of airline operations.

- **Key Provisions of Revised FDTL (2025)**

a) Flight Time & Rest Limits

- **Weekly rest:** Minimum **48 continuous hours**, including **two full nights at home base**.
- **Cumulative flight time caps:**
  - 8 hours **per day**,
  - 35 hours **per week**,
  - 100 hours in **28 days**,
  - 1,000 hours **per year**.
- **Mandatory rest:** At least **10 hours rest in any rolling 24-hour period** for crew.

b) Duty Extensions & Fatigue Management

- Any **duty extension (overtime)** must be compensated with **extra rest = 2× overtime duration**.
- **Split duty:**
  - Break of **3–10 hours** can extend the Flight Duty Period (FDP) by **only half** of the break duration.
  - Break **>10 hours** is treated as a **full rest period** (duty must restart, not extended).
- **FRMS (Fatigue Risk Management System):**
  - Airlines must implement **data-driven FRMS** to continuously monitor and mitigate fatigue, not just rely on fixed hour limits.

c) Night-Related Restrictions

- **Window of Circadian Low (WOCL):** Expanded to **00:00–06:00** (earlier narrower band) to reflect circadian science.
- **Night duties:**
  - Maximum **two consecutive night duties** permitted.
  - **Night operations:** Max **two night landings per week** per pilot.
  - **Night limits:** Night flight time **≤8 hours**; night duty time **≤10 hours**.

- **Why Stricter FDTL Rules Were Introduced**
  - **On-duty pilot deaths:**
  - **Safety evidence:** ICAO studies show **15–20% of fatal accidents** have crew fatigue
  - **Circadian science:** Reduced alertness between **02:00–06:00**;
  - **Global alignment:**India earlier allowed up to **125 flight hours/month**,

34. India's Civil Aviation Stress Points

- **Trigger:** Mass flight cancellations by **IndiGo** highlighted **structural and regulatory gaps** in India's aviation ecosystem.
- **Regulatory weakness:** The **Directorate General of Civil Aviation** remains under ministerial control despite a **2006 audit by the International Civil Aviation Organization** recommending an **independent regulator**.
- **Market concentration:** A **duopoly**—IndiGo (~60%) and the **Tata Group (~20%)**—creates **systemic vulnerability** to disruptions.
- **Cost pressures:** **Aviation Turbine Fuel** (outside GST, high state taxes) accounts for **40–50% of operating costs**; **dollar-denominated expenses** amplify losses when the rupee weakens.
- **Operational constraints:** Closure of **100+ UDAN routes** post-subsidy, **pilot shortages** affecting duty-time compliance, **ATCO shortages** limiting peak-hour safety capacity, and a **domestic MRO deficit** forcing reliance on overseas maintenance.

35. IATA on India's Revised FDTL Norms

- **Assessment:** The **International Air Transport Association (IATA)** stated that **India's revised Flight Duty Time Limitations (FDTL)** are **more restrictive than global standards**.
- **Impact:** Phased implementation led to **operational disruptions**, including **large-scale flight cancellations by IndiGo** and a **10% reduction in its winter schedule** to stabilise operations.
- **About IATA:** Founded in **1945** (successor to the 1919 International Air Traffic Association); **HQ: Montreal**, executive office in **Geneva**; represents **317+ airlines from 120+ countries**, covering **~82% of global air traffic**.
- **Mandate & role:** Advocates **harmonised global aviation regulations**, cost efficiency, and safety; organises the annual **World Air Transport Summit (WATS)** focusing on **SAF, connectivity, decarbonisation, and green aviation financing**.

36.. Parliament panel flags crude import risks, seeks deeper energy diplomacy

A Parliamentary Committee has recommended **closer coordination between the Ministry of Petroleum & Natural Gas (MoPNG) and the Ministry of External Affairs (MEA)** to **diversify India's crude oil sources**.

This follows concerns that India's crude import dependence (**≈89% of requirements**) and concentration of supplies and routes expose the economy to **geopolitical, fiscal and supply-chain shocks**.

- India imports **~89% of crude** used in refining, making it the **world's 3rd largest oil importer**.
- Oil imports form **~30% of total imports**, heavily influencing the **current account deficit (CAD)** and **inflation** through fuel prices.
- Around **60% of imports pass via the Strait of Hormuz**, a major geopolitical chokepoint.

- **Why Diversification Is Critical**
  - **Energy security resilience:**
    - Over-reliance on a few suppliers leaves India vulnerable to **supply and price shocks** (e.g. **Russia–Ukraine war** pushing Brent above **US$120/barrel in 2022**).
  - **Fiscal & macro stability:**
    - Oil price spikes widen CAD, push up **fuel subsidies**, and transmit into **CPI/WPI inflation**.
  - **Strategic autonomy:**
    - Sanctions on countries like **Iran and Russia** create payment, insurance and logistics hurdles, constraining foreign policy options.
  - **Route security:**
    - Chokepoint exposure (Hormuz, Bab-el-Mandeb, Malacca) means regional tensions can disrupt flows and insurance costs.
- **Challenges in Diversifying Crude Sources**
  - **Declining domestic output & ageing fields:**
    - Crude production has fallen from **34.2 MMT (2018–19)** to **~28.7 MMT (2024–25)** despite higher upstream capex → weaker bargaining power and greater import dependence.
  - **Price volatility:**
    - Brent has swung between **US$70–120/bbl (2021–24)**, complicating long-term contracts and investment planning.
  - **Capex inefficiency:**
    - Upstream PSU capex rose from **₹1.33 lakh crore (2020–21)** to **₹1.70 lakh crore (2024–25)** with limited production gains → questions over project selection, technology, and regulatory bottlenecks.
  - **Regulatory risk abroad:**
    - Host-country tax hikes, contract renegotiations and political instability in regions like **Africa & Latin America** reduce returns on overseas assets and deter Indian investment (as highlighted by think-tank studies such as ICRIER).

37. RBI flags surge in small digital payments, cash use receding

An RBI report on payment systems shows that **small-value digital payments are growing far faster than overall value**, with **volumes up 35%** and average ticket size falling, led by UPI-based transactions. At the same time, **ATM usage is flattening/declining**, and the report flags **new AI-related risks and microfinance stress**, important for financial stability debates.

- **Digital Payments – Key Trends**
  - **Value vs volume:**
    - Digital payments value grew **17.9%**, now accounting for **97.6% of total payment value**, while cheques fell to **2.4%**.
    - Volumes grew **35%**, much faster than value, driven by **small-ticket transactions**.
  - **Falling average ticket size:**
    - Average retail digital transaction declined from **₹4,382 → ₹3,830**, indicating **everyday use** for micro-spends (kirana, transport, utilities).
  - **UPI & RTGS dominance:**
    - **UPI** handles the **largest share of transaction volume** and ~85% of all digital payment volumes (2025), used widely for P2P and merchant QR payments.
    - **RTGS** continues to dominate **high-value** wholesale and interbank payments.
  - **Cards & others:**
    - **Debit card usage** is declining (UPI cannibalisation), while **credit card transactions** (especially online) continue to rise.
- **ATM Usage & Infrastructure**
  - Digital payments have slowed **cash withdrawals**; total **ATMs declined moderately** in 2024–25.
  - **Off-site ATMs** are falling; **on-site ATMs** at branches are still growing modestly.
  - **Public sector banks** hold the largest ATM share, with more even rural/semi-urban distribution.
  - **Types of ATMs:**
    - *On-site*: inside bank branches.
    - *Off-site*: standalone locations.
    - *White-label*: owned by **non-bank** entities (≈80% in rural/semi-urban).
    - *Brown-label*: infra by service provider, operations by a bank.
- **Why Small-Value Digital Payments Are Rising**
  - **UPI convenience & ubiquity:**
  - **Device & internet access:**
  - **Policy & ecosystem:**

38. India's creator economy shifts toward structured, regulated digital commerce

India's **creator economy grew ~25% in 2025 to ~₹4,500 crore**, with around **2–2.5 million monetised creators** and a rapidly formalising ecosystem of contracts, platform tools and brand deals.

By **2026**, the space is expected to enter a phase of **consolidation and regulatory maturity**, as policymakers, platforms and industry bodies respond to concerns around **income volatility, opaque algorithms, AI use and consumer protection**

- **Current Snapshot – Scale & Economic Influence**
  - Market size ~₹4,500 crore (2025), expanding beyond basic brand endorsements to **affiliate sales, subscriptions, digital goods, live commerce and IP licensing**.
  - India has **2–2.5 million monetised creators**, making it one of the world's largest creator ecosystems by volume.
  - Creator content influences an estimated **$350–400 billion of annual consumer spending**, projected to exceed **$1 trillion by 2030**, reflecting deep impact on **e-commerce, fashion, beauty, gaming, ed-tech, travel and finance**.
- **Drivers of the Creator Economy**
  - **Digital consumption shift:** Over **60% of internet users** regularly watch creator content on short-video, livestream and social platforms, reducing the dominance of traditional TV/print ads.
  - **Trust-based commerce:** Nearly **30% of consumers** trace purchases to recommendations by creators they follow, often yielding higher conversion than mass-media advertising.
  - **Vernacular boom:** Majority of new internet users are **regional-language users**, boosting demand for **niche, local and regional creators** (Tier-2/3 India).
  - **Platform monetisation tools:** Affiliate links, revenue share, tipping, subscriptions, "close-friend" paywalls and in-app shops are diversifying creator incomes.
  - **Low entry barriers:** Cheap data, widespread smartphones and easy onboarding enable **content-based self-employment** with minimal capital.
- **Government & Ecosystem Support**
  - **AVGC Promotion Task Force:** Focus on **Animation, VFX, Gaming and Comics**, including skilling, incubation and export promotion – directly relevant for gaming streamers, 3D artists, XR creators.
  - **Digital India + DPI stack:** UPI, Aadhaar, e-KYC, ONDC and broadband expansion make **micro-payments, small-ticket subscriptions, and social commerce** viable at scale.
  - **Skill India Digital:** Courses in **digital marketing, editing, scripting, branding** strengthen creator professionalism and employability.
  - **IPR facilitation:** Copyright and trademark awareness schemes help creators **protect content, logos, and personal brands**, crucial for long-term monetisation.

39. Quick-commerce strike highlights precarity of India's gig delivery workers

Gig worker unions have called a **nationwide strike against ultra-fast delivery models** in the quick-commerce sector, demanding **removal of 10–15 minute delivery guarantees** and restoration of **earlier payout structures**.
The protest underlines deep concerns over **falling earnings, road safety risks and mental health stress** among India's ~12 million gig workers.

- **Gig Economy – Basics (Static)**
  - **Gig economy:** Labour market dominated by **short-term contracts / freelance work**, rather than regular, permanent employment.
  - **Gig worker:** Person earning income from platform-based or on-demand work **outside traditional employer–employee relationships** (e.g., delivery partners, ride-hailing drivers, online freelancers).
  - In India, about **12 million workers (2024–25)** are engaged in gig work; **~47% are medium-skilled**, with low- and high-skilled categories growing.
- **Quick-Commerce Model & Worker Challenges**
  - **Market pressure & risk transfer:**
    - Ultra-fast (10–20 minute) delivery underpins a **US$3.34 billion quick-commerce market**, but **business risks (traffic, delays, penalties, fuel costs)** are largely pushed onto workers.
  - **Road safety:**
    - Two-wheelers account for **~45% of India's road fatalities**; compressed delivery timelines incentivise speeding, lane-cutting and phone use on the move, worsening accident risk.
  - **Income erosion:**
    - Per-order payouts in quick commerce **fell by up to 40% between 2024 and 2025**, due to lower base rates, higher distance thresholds and shrinking incentives.
  - **Mental health strain:**
    - Surveys show **~98.5% of workers** report anxiety, stress and burnout linked to opaque rating systems, dynamic incentives, and constant fear of deactivation.
- **Systemic Issues in Gig Work (Link to broader syllabus)**
  - **Lack of social security & bargaining power:**
    - Most delivery partners are treated as **"independent contractors"**, excluding them from formal benefits (PF, ESI, paid leave).
  - **Algorithmic management:**
    - Work allocation, pay and penalties are governed by **opaque algorithms**, limiting worker voice and predictability.
  - **Legal grey zone:**
    - The **Code on Social Security, 2020** formally recognises *gig* and *platform* workers, but **national schemes and contributions are yet to be fully operationalised**, leading to a gap between law and practice.

40. India's First PPP-Model Medical Colleges – Madhya Pradesh

- **Launch:** The Union Minister for Health & Family Welfare laid the foundation for **India's first PPP-model medical colleges** in **Madhya Pradesh**.
- **Locations: Dhar (Western MP)** and **Betul (Central MP)**—both **tribal districts**; **Katni (Eastern MP)** and **Panna (Northern MP)** are planned next.
- **Hospital linkage:** Associated **district hospitals will be upgraded** to meet **National Medical Commission** norms.
- **PPP framework:** Government–private partnership to **build, operate, and maintain** medical education infrastructure with **risk-sharing** and **performance-linked outcomes**.

DECEMBER 2025

ENVIRONMENT

1. UN ESCAP Disaster Report 2025
2. CAQM Directive on Stubble Burning
3. India's 2035 NDC Proposal
4. EU Climate Target 2040
5. EARTH Summit 2025 Initiatives
6. UNEA-7 and UNEP Strategy
7. Urban Air Quality Crisis India
8. Secondary Aerosols Worsen Delhi Smog
9. Delhi Tightens GRAP Measures
10. GRAP-IV Bans Non-BS-VI Vehicles
11. CPCB Chemical Dust Suppressants
12. Fluorosis Crisis in Mayurbhanj
13. Inhalable Microplastics Air Threat
14. Bioremediation for Toxic Sites
15. Freshwater Sponges as Bioindicators
16. Ashtamudi Short-Neck Clam Recovery
17. Bamboo Shrimp Rediscovered India
18. Horn-Eyed Ghost Crab
19. New Jumping Spiders Meghalaya
20. New Himalayan Micro-Moths
21. New Snakehead Fish Meghalaya
22. Triassic Reptile Hatchling Fossil
23. New Springtail Species Sikkim
24. Rock Eagle-Owl Nest Protection
25. Rainbow Water Snake Recorded UP
26. Striated Grassbird Range Extended
27. Himalayan Red Fox Pangong
28. First Dhole Sighting Kheoni
29. Capuchins Imported Bannerghatta
30. Cyclone Senyar Orangutan Threat
31. African Forest Elephant Reassessment
32. Human–Wildlife Conflict India
33. Wildlife Survey Buxa Reserve
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36. Vulture Soft Release Assam
37. Project Cheetah and Awareness Day
38. Supreme Court on Aravallis
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40. Raccoon Roundworm Spread Europe
41. Operation Thunder 2025 Wildlife Crime
42. Bioenergy Expansion India
43. Ethanol Blending 20% Impacts
44. Renewable Surge Energy Security Risks
45. India Adds Ramsar Sites
46. Sujalam Bharat App Launched
47. SilverLine vs Bairabi Rail
48. Exocyst Complex Autophagy Link
49. CITES at 50 Years
50. CeNS Water-Splitting Breakthrough
51. World's Largest Spider Web
52. Sarahan Pheasantry Western Tragopan

1. UN ESCAP Asia-Pacific Disaster Report 2025 – Heat Stress & Agriculture

- **Risk warning:** The **UN Economic and Social Commission for Asia and the Pacific (UN ESCAP)** flags **India** among the **top five highest-risk countries** where **agriculture faces severe, persistent heat stress**, threatening food security (alongside Afghanistan, Pakistan, Nepal, Bangladesh).
- **Climate outlook:** High heat stress persists under **both low-emission (SSP1-2.6)** and **high-emission (SSP5-8.5)** scenarios.
- **Economic impact: Agriculture bore ~25% of global climate-disaster losses (2008–2018)**; **farm labour productivity may fall by up to 27%**, risking rural livelihoods.
- **Key recommendations: Heat-aware cropping calendars**, **micro-climate heat alerts**, **climate-smart practices** (heat-tolerant seeds, mulching, micro-irrigation, shade-nets), and **labour safety protocols** (water–shade–rest cycles, safe work hours).

SSP stands for **Shared Socioeconomic Pathways**.

What do the numbers mean?

- **SSP1** → Sustainability-focused world
- **SSP5** → Fossil-fuel–driven growth world

The second number (2.6, 8.5) refers to **radiative forcing** in 2100 (in W/m²), i.e., **how much heat is trapped in the atmosphere**.

Scenario	Meaning
SSP1-2.6	Low emissions, strong climate action
SSP5-8.5	Very high emissions, fossil fuel intensive

2. CAQM Directive on Rabi Stubble Burning

- **Action ordered:** The **Commission for Air Quality Management (CAQM)** directed **Punjab and Haryana** to **prevent wheat stubble burning in April–May** and submit a **crop-cycle action plan by 2026**, extending oversight beyond the paddy season.
- **Evidence base: Indian Agricultural Research Institute's CREAMS satellite** detected **10,207 rabi fire events in Punjab (Apr–May 2025)**—higher than kharif counts in several districts.
- **Scale:** About **60,000 rabi-season fire events** were recorded **across Punjab, Haryana, UP, MP and Delhi** in Apr–May 2025—the **highest rabi total** on record.
- **Contrast:** Despite **record-low Oct–Nov 2025 paddy fires**, CAQM flagged **continued rabi fires due to enforcement gaps**.
- **Air-quality impact: Wheat-residue burning adds to PM load**, worsening **Delhi-NCR winter air quality** that frequently reaches **AQI 400+ (Severe)**.
- **About CAQM:** Statutory body under the **CAQM Act, 2021** with jurisdiction over **Delhi, Haryana, Punjab, Rajasthan, UP**; empowered to issue **binding directions**, coordinate inter-state action, and enforce compliance with participation from CPCB, ISRO and NITI Aayog.

3. India mulls 2035 NDC with deeper intensity cuts, green investment push

India is preparing to submit its **next Nationally Determined Contribution (NDC)** under the Paris Agreement, extending climate commitments **up to 2035**. Experts propose a **seven-pillar roadmap** to align high economic growth (projected ~7.6% annually) with a credible **decarbonisation pathway**, peaking emissions around **2035** and keeping India on track for **net-zero by 2070**.

Background – India's Existing NDC / Panchamrit (COP26)

- **500 GW** non-fossil electricity capacity by **2030**.
- **50%** of total energy requirements from renewables by **2030**.
- **1 billion tonnes** reduction in cumulative projected emissions (2021–2030).
- **45% reduction** in emissions intensity of GDP from **2005 levels by 2030**.
- **Net-zero GHG** emissions by **2070**.

Proposed Seven-Pillar Roadmap for 2035 NDC

- **Deeper Emission-Intensity Target**
  - New NDC to target **65% reduction in emissions intensity of GDP (vs 2005) by 2035**.
  - This gives India a **clear "peaking window" around 2035**, signalling seriousness and boosting credibility in climate negotiations.
- **Massive Renewable Energy Expansion**
  - Raise **non-fossil capacity share to ~80%** of total power capacity by **2035**.
  - Target **1,200 GW solar + wind**, supported by **170 GW energy storage** (batteries, pumped hydro, green hydrogen-based storage).
  - Implies steep ramp-up from the COP26 target of 500 GW by 2030.
- **Managed Coal Transition**
  - **No new unabated coal plants** to be commissioned **after 2030**.
  - Gradual reduction in coal capacity thereafter, combined with:
    - **Just transition plans** for coal-mining States (Jharkhand, Odisha, Chhattisgarh, etc.) – reskilling, alternative jobs, local diversification.
- **Transport Electrification**
  - **Railways:** rail traction to be **near-100% electric**.
  - **Urban buses:** aim for **50% of city bus fleets as EVs** by 2035.
  - **Three-wheelers:** push for **near full conversion to EVs**, leveraging existing policy momentum (FAME, state EV policies).
- **Carbon Credit Trading System (CCTS)**
  - Operationalise **Carbon Credit Trading Scheme (CCTS)** from **April 2026**, moving beyond PAT/REC-type schemes.
  - Gradually expand coverage from early sectors to:
    - **Power**, and
    - **Medium-scale industries**, creating a **domestic carbon market** to price emissions and incentivise efficiency.

4. EU Climate Target 2040

- **Decision (10 Dec 2025):** The **European Union** agreed on a **legally binding 90% cut in GHG emissions by 2040** from **1990 levels**, following a compromise between EU member states and the **European Parliament**.
- **Break-up of cuts: 85% domestic reductions** within the EU; **5% via international carbon credits** (from developing countries).
- **Carbon credits rationale:** Allows the EU to **finance mitigation in developing nations** while partially offsetting its own reductions.
- **Global positioning:** More ambitious than most major economies' pledges (including **China**), but **below EU climate science advisers' recommendations** and the Commission's initial proposal.
- **Political compromise:** Resistance from **Poland, Slovakia, Hungary** (industrial costs, global competition); push from **Netherlands, Spain, Sweden** (extreme weather risks, green-tech leadership).
- **Future flexibility:** Scope to consider **an additional 5% international credits post-2040**, potentially easing domestic cuts.
- **Net-zero alignment:** Keeps the EU on track for **2050 net-zero**.
- **Carbon pricing:** Launch of the **new fuel carbon price deferred to 2028** (one-year delay) to secure consensus.

5. EARTH Summit 2025 & 'Sahakar Sarathi'

Event & launch: On **5 December 2025**, the Union Home & Cooperation Minister inaugurated **EARTH Summit 2025** in **Gandhinagar**, unveiling **13+ digital and cooperative services** under **'Sahakar Sarathi'** to drive cooperative-sector reform.

- **Key initiatives rolled out: Digi KCC, Campaign Sarathi, Website Sarathi, Cooperative Governance Index, ePACS, World's Largest Grain Storage Application, Shiksha Sarathi**, and the **Sarathi Technology Forum**.
- **Policy trajectory:** The **EARTH Summit** series has **three editions** focused on strengthening the **rural economy**; the **third meeting in Delhi (2026)** is expected to **finalise a comprehensive policy framework**.
- **Strategic goals:** Establish a **cooperative institution in every Panchayat**, expand **cooperative membership beyond 50 crore**, and **significantly increase the cooperative sector's share in GDP** under the **Ministry of Cooperation**.

6. UNEA-7 & UNEP Medium-Term Strategy

- **Context:** The **Seventh United Nations Environment Assembly (UNEA-7)** opened amid differences among member states over the **United Nations Environment Programme's draft Medium-Term Strategy**.
- **Medium-Term Strategy:** A **five-year plan** approved by UNEA that defines **UNEP's priorities, targets, and funding framework**.
- **About UNEA:** Established in **2012 at Rio+20** as the world's **highest environmental decision-making body** with **universal membership (193 UN states)**; it serves as UNEP's governing body, approving its **Programme of Work and Budget** and setting global environmental mandates.
- **Functioning: Biennial meetings in Nairobi, Kenya**; resolutions are **non-binding** but shape **global environmental governance and norms**; coordinated by a **Bureau** (President + **8 Vice-Presidents**) elected for **two years**.

About the United Nations Environment Assembly (UNEA)

- UNEA is the **highest environmental decision-making body**, established in **2012** at the Rio+20.
- It is the governing body of the **United Nations Environment Programme (UNEP),** comprising **all UN Member States**.
- It holds its **biennial sessions** in **Nairobi, Kenya**, adopting **non-binding resolutions** that influence global environmental governance, norms, and cooperation.
- It is managed by a **Bureau of 10 members** (including the Rapporteur), elected for a **two-year term**.

Global Environment Outlook

- The **7th edition** of the **Global Environment Outlook** (GEO-7) was released at the **7th United Nations Environment Assembly (UNEA)**, in **Nairobi**.

- **The Global Environment Outlook is the flagship environmental assessment by the United Nations Environment Programme (UNEP).**
- **The UNEA is the top global environmental decision-making body with universal membership that governs UNEP.**

- Tamil Nadu IAS officer **Supriya Sahu** won the **UN's Champions of the Earth 2025** award for large-scale sustainable cooling and ecosystem restoration initiatives impacting millions.

About Champions of the Earth Award

- The Champions of the Earth award, created in **2005** by UNEP, is the **UN's highest environmental honour** recognising exceptional global environmental leadership.

7. CPCB data reveal decade-long urban air quality crisis in India

Analysis of **CPCB (2015–2025)** air quality data for 11 major cities shows that **no Indian city achieved 'good' (AQI 0–50) air quality even for annual averages**, with **northern Indo-Gangetic cities persistently more polluted** than southern and western urban centres. Delhi, in particular, remained among the **most polluted cities**, while Bengaluru and coastal cities fared relatively better but still outside the "safe" zone.

About CPCB & AQI (Static)

- **CPCB:** Apex pollution-control body under **MoEFCC**, created in 1974; sets and monitors **air & water quality standards**, advises governments, coordinates with State Boards.
- **AQI categories:** 0–50 (Good), 51–100 (Satisfactory), 101–200 (Moderate), 201–300 (Poor), 301–400 (Very Poor), 401–500 (Severe).

Key Findings from 2015–2025 Data

- **No 'Good' annual AQI:** None of the 11 cities achieved "Good" annual AQI at any point in the decade.
- **Most polluted:**
  - **Delhi** recorded **annual mean AQI often >250**, with peak years (e.g. 2016) in the **"Poor–Very Poor"** range for most days.
- **Least polluted (relatively):**
  - **Bengaluru** showed annual AQI mostly **65–90** (Satisfactory–Moderate), cleaner than northern cities but still **above 'Good' levels**.
- **Regional pattern:**
  - **Northern/IGP cities** – Delhi, Lucknow, Varanasi, Ahmedabad – sustained **higher and more persistent AQI**.
  - **Southern / western coastal cities** – Chennai, Mumbai, Visakhapatnam – saw lower AQI (roughly 80–140) thanks to better dispersion, but still not "Good".

Why are Northern Cities Worse? – Regional Disparity Drivers

(A) Geographical & Meteorological Factors

- Indo-Gangetic Plain & landlocked geography
- Winter temperature inversion
- Coastal dispersion advantage
- Seasonal winds

(B) Anthropogenic & Regional Sources

- Stubble burning:
- Industrial & thermal power concentration:
- City-level source mix (Delhi example):

8. Secondary aerosols drive Delhi's PM2.5 and seasonal smog severity

A new analysis by the **Centre for Research on Energy and Clean Air (CREA)** shows that a **large share of Delhi's fine particulate (PM2.5) pollution is secondary in nature**, especially **secondary ammonium sulfate**, which forms via atmospheric chemical reactions instead of being emitted directly. This finding reframes Delhi's air pollution challenge from only "local dust + tailpipe emissions" to a **regional, chemistry-driven problem** linked to coal power and agriculture.

- **Key Findings of the CREA Study (India & Delhi)**
  - **Dominant secondary component – ammonium sulfate**
    - **Secondary ammonium sulfate** accounts for ~**one-third of Delhi's annual PM2.5** load.
    - Its share **peaks at ~49% post-monsoon** and ~**41% in winter**, but falls to ~**21% in summer/monsoon**, explaining why smog is worst in cooler, stagnant months.
  - **High secondary share nationwide**
    - Up to ~**42% of India's PM2.5 burden** consists of **secondary particulate matter** formed in the atmosphere, not emitted directly.
  - **SO_2 dominance & coal link**
    - India is the **largest global emitter of SO_2**, with **coal-fired power plants contributing ~60% of national SO_2 emissions**. This SO_2 is a major precursor for **secondary sulfate** and thus PM2.5.
  - **Regulatory gap – FGD exemptions**
    - Around **78% of coal-based thermal power plants** are **exempted/delayed** from installing **Flue Gas Desulphurisation (FGD)** units, severely weakening SO_2 control at source.
  - **State-level hotspots**
    - Highest **annual ammonium sulfate share in PM2.5**:
      - **Chhattisgarh – ~42%,**
      - **Odisha – ~41%,**
      - both with dense coal power clusters.
    - Across states, ammonium sulfate contributes ~**17–42%** of PM2.5 mass, with most in **30–40% range**, indicating a **national-scale phenomenon**, not just Delhi-centric.
- **What is Secondary Ammonium Sulfate? (Concept for exam)**
  - **Nature:** A **secondary inorganic aerosol – not directly emitted** from any stack/vehicle.
  - **Formation process: SO_2** from coal plants, industries, and other combustion sources is oxidised in air to **sulfate (SO_4^{2-})**.
  - This sulfate reacts with **ammonia (NH_3)** – largely from **agriculture (fertilisers, livestock)** – to form **$(NH_4)_2SO_4$ (ammonium sulfate)** particles in the **PM2.5 size range**.
  - **Weather sensitivity:** High humidity, cool temperatures, and low wind speeds (typical of **post-monsoon and winter in North India**) accelerate formation and accumulation.
  - **Health impact:** Being **PM2.5**, it penetrates deep into lungs, linked to **respiratory and cardiovascular diseases**, premature deaths, and reduced visibility.

9. Delhi tightens GRAP curbs to tackle severe vehicular air pollution

Delhi's air quality has remained in the **'Severe' category**, prompting the city government to tighten **vehicular restrictions under the Graded Response Action Plan (GRAP)**. Measures include a ban on older and more polluting vehicles, stricter PUC enforcement and curbs on truck entry to reduce **transport-related PM2.5 and NOx emissions** across Delhi–NCR.

- **India's Vehicular Pollution Landscape (Static + Data)**
  - **PM2.5 share:** Tailpipe emissions contribute roughly **17–30%** of **urban PM2.5**
  - **Carbon emissions:** Road transport accounts for about **12% of India's energy-related CO_2 emissions**.
  - **HCV dominance: Heavy Commercial Vehicles (HCVs)** contribute nearly **70% of total vehicular NOx & PM** pollution despite being a small share of fleet.
  - **Ageing fleet:** Over **2 crore 'End-of-Life' vehicles** emit **10–30× more** pollutants than BS-VI compliant vehicles.
- **Recent Vehicular Measures by Delhi Government**
  - **Vehicle prohibitions:**
    - **BS-III petrol** and **BS-IV diesel** cars banned from operation in Delhi–NCR during severe episodes.
    - **Diesel vehicles >10 years** and **petrol vehicles >15 years** liable for **impounding**.
  - **Fuel & PUC enforcement:**
    - Fuel stations instructed to **deny petrol/diesel** to vehicles without a valid **Pollution Under Control (PUC)** certificate.
    - **AI-based ANPR cameras** scan number plates at pumps to auto-verify registration and PUC status.
  - **Traffic management & truck controls:**
    - Use of **real-time traffic data (e.g., Google Maps)** for signal optimisation to cut idling and congestion.
    - **Complete ban on trucks carrying construction materials**, including BS-VI trucks, during severe episodes.
  - **Shared mobility push:**
    - Launch of a **government-backed car-pooling app** to reduce the number of private cars.
- **GRAP IV Restrictions (Severe & Severe-Plus)**
  - **Framework:**
    - **Graded Response Action Plan (GRAP)** prescribes **escalating measures** as AQI crosses thresholds.
    - Implemented by the **Commission for Air Quality Management (CAQM)** under the **CAQM Act, 2021**, originally approved by the **Supreme Court in M.C. Mehta (2016)**.
    - Now uses **3-day AQI forecasts** to trigger early action.
  - **Stage-wise actions (updated):**
    - **Poor (AQI 201–300):** dust control, uninterrupted power supply, ban on waste burning.
    - **Very Poor (AQI 301–400):** prohibit coal/firewood in eateries, increase parking fees.
    - **Severe (AQI 401–450):** restrict **BS-III petrol & BS-IV diesel cars**, halt non-essential construction, enhance public transport.
    - **Severe Plus / Emergency (AQI >450):**
      - Ban on **non-essential trucks**,
      - Ban on **non-BS-VI diesel HGVs**,
      - In Delhi: **50% work-from-home** for govt/private offices, and **entry allowed only to BS-VI, CNG and EVs** from other states.

10. Delhi bars non-BS VI vehicles as GRAP Stage IV triggers

With Delhi's Air Quality Index entering the **"Severe Plus" (Emergency) category under GRAP Stage IV**, the Delhi government has **restricted entry of all private and commercial vehicles registered outside Delhi that are not BS-VI compliant**.

The move aims to curb **vehicular emissions**, a significant contributor to urban PM2.5 and NOx, by leveraging India's latest emission norms – **Bharat Stage VI and BS-VI Stage II**.

Bharat Stage VI – Basics & Emission Cuts

- **What is BS-VI?**
  - India's **current vehicular emission standard**, broadly aligned with **Euro 6** norms.
  - India skipped **BS-V** and directly adopted **BS-VI for all new vehicles from 1 April 2020**.
- **Key emission reductions vs BS-IV:**
  - **Sulphur in fuel:** BS-IV: 50 ppm → **BS-VI: 10 ppm** (≈80% reduction).
  - **NOx limits (light vehicles):** Petrol: **60 mg/km**, Diesel: **80 mg/km**.
  - **Particulate Matter (diesel):** PM capped at **4.5 mg/km**, requiring advanced after-treatment.
- **Mandatory BS-VI Technologies (Exam angle)**
  - **SCR (Selective Catalytic Reduction):**
    - Uses **aqueous urea (AdBlue)** to convert NOx in diesel exhaust to **nitrogen + water**.
  - **DPF (Diesel Particulate Filter):**
    - Captures soot/PM and periodically oxidises it (regeneration) to drastically cut particulate emissions.
  - **OBD-II systems:**
    - **On-Board Diagnostics** continuously monitor emission-critical components and warn of malfunctions.
  - **Electronic Fuel Injection (EFI):**
    - Mandatory in two-wheelers for precise fuel delivery, better combustion and lower emissions.
- **BS-VI Stage II – "Real Driving" Era (from April 2023)**
  - **Stricter compliance for all new vehicles:**
    - **RDE (Real Driving Emissions) testing:** Vehicles must meet limits **on actual roads**, not only in lab test cycles.
  - **PEMS (Portable Emissions Measurement Systems):**
    - Mounted on vehicles to measure **tailpipe emissions under real-world driving** conditions.
  - **OBD-II(B):**
    - Enhanced diagnostics for **real-time emission monitoring**, quicker detection of failures (e.g. DPF clogging, SCR faults).
  - **E20 compatibility:**
    - All new petrol vehicles must be compatible with **E20 (20% ethanol-blended petrol)** under the Ethanol Blending Programme, linking air-quality goals with energy transition.

11. CPCB study backs chemical dust suppressants over water spraying

A CPCB-commissioned study has found that **chemical dust suppressants** are **far more effective and economical** than traditional **water sprinkling** in controlling road and construction dust — a major source of **PM10 and PM2.5** pollution in Indian cities. This is significant for implementation of **NCAP** and city action plans which currently rely heavily on tanker-based water spraying.

- **What are Chemical Dust Suppressants?**
  - Specialised **chemical agents applied to exposed surfaces** (roads, construction sites, stockpiles) to reduce **airborne dust emissions**.
  - They **bind loose particles** or **increase their weight**, so particles are less likely to become airborne under wind or traffic movement.
- **Types & Mechanisms (for Prelims)**
  - **Calcium & magnesium chloride:**
    - *Hygroscopic* – absorb moisture from air, keeping surfaces **consistently damp**.
  - **Acrylic / vinyl-acetate polymers:**
    - Form **thin adhesive films** on the surface, locking dust particles in place.
  - **Lignosulfonates (from wood pulp):**
    - Act as **organic binders**, gluing soil particles together.
  - **Anionic surfactants:**
    - Reduce **water surface tension**, helping water spread better and coat fine particles.
  - **Petroleum / bituminous emulsions:**
    - Harden into a **surface crust**, preventing dust from lifting off.
- **Advantages over Plain Water**
  - **Higher efficacy:**
    - Chemical suppressants achieve about **50–60% dust reduction**, versus ~**25–30%** with water alone.
  - **Longer duration:**
    - Effective for **several hours** after application; water typically works only **10–15 minutes** before evaporating.
  - **Better for fine particles:**
    - More effective in controlling **PM10 & PM2.5**, whereas water's effect fades quickly as the surface dries.
  - **Lower operational cost:**
    - Approx. **₹100** for a 6-hour treatment vs **₹2,160** worth of repeated water spraying for the same duration → important from **municipal budget** and **NCAP** perspective.

12. Endemic fluoride in Mayurbhanj groundwater triggers widespread fluorosis

Groundwater surveys in several villages of **Mayurbhanj district, Odisha** have reported **fluoride levels as high as 8.2 mg/L**, far above national and WHO limits. This has led to **rising cases of dental and skeletal fluorosis**, especially among children and long-term groundwater users, highlighting gaps in safe drinking water access and rural health surveillance.

Fluoride – Basics & Safe Limits

- Fluoride is a **naturally occurring mineral** found in **soil, rocks, groundwater, plants and living organisms**; in **trace amounts**, it helps prevent dental caries.
- **Excess intake → Fluorosis.**
- **Standards:**
  - **WHO guideline:** 1.5 mg/L in drinking water.
  - **BIS (IS 10500):** desirable limit **1.0 mg/L**, maximum permissible **1.5 mg/L**.
- **Geogenic source:**
  - High levels arise from **dissolution of fluoride-bearing minerals** like **fluorspar, cryolite, fluorapatite, granite** into groundwater, especially in hard-rock and semi-arid areas.

Health Impacts of Excess Fluoride

- **Dental fluorosis:**
  - Occurs mainly in **children <8 years** during tooth development.
  - Symptoms: **white streaks**, mottling, yellow–brown stains, pitting of enamel.
- **Skeletal fluorosis:**
  - Results from **chronic high exposure**, affecting **bones & joints** → pain, stiffness, restricted movement, spinal deformities, possible permanent disability.
- **Neurological / cognitive effects:**
  - Studies from endemic regions show association of **high fluoride exposure** with **lower IQ and impaired cognitive development** in children.

India's Fluoride Burden

- Fluoride above permissible limits found in parts of **469 districts across 27 States**, making it one of India's **major geogenic contamination issues** (alongside arsenic).
- Highly affected States: **Rajasthan** (largest burden), **Haryana, Karnataka, Telangana, Gujarat, Andhra Pradesh**, and parts of **Odisha**.

Government & Technical Measures

- **NPPCF (National Programme for Prevention and Control of Fluorosis)**
- **Jal Jeevan Mission (JJM), 2019:**
- **Defluoridation technologies:**
  - **Nalgonda technique:**
    - Community-level process adding **aluminium salts (alum), lime and bleaching powder** to precipitate fluoride.
  - **Activated alumina filters:**
    - Adsorb fluoride ions; suited for **household/plant-scale** treatment.
  - Other methods: **reverse osmosis**, blending high-fluoride water with safe sources, and promoting **rainwater harvesting**.

13. Inhalable microplastics emerge as a new urban air pollution threat

Recent Indian studies show that **inhalable microplastics (≤10 µm)** have become a **significant yet hidden component of urban air pollution**, especially in winter. They add to the existing **PM2.5 crisis** by acting as carriers of **toxic chemicals, heavy metals, fungi and antibiotic-resistance genes**, raising serious long-term public health concerns.

- **What are Inhalable Microplastics?**
  - Microscopic plastic particles **≤10 µm** that are small enough to **penetrate deep into the lungs**, bypassing normal respiratory defences (nose hair, upper-airway filtering).
  - Subset of **microplastics** (plastic fragments **<5 mm**), which are of two types:
    - **Primary microplastics:** intentionally manufactured small (e.g. microbeads in cosmetics, fibres from textiles).
    - **Secondary microplastics:** generated by **breakdown of larger plastics** (bags, bottles, tyres, paints) under sunlight, friction, abrasion.
- **Why They're a Serious Concern in India**
  - **High urban exposure:**
    - A multi-city **IISER Kolkata** study estimated average inhalable microplastic concentration around **8.8 µg/m³**, implying an Indian adult may inhale roughly **132 µg per day**, adding a non-biological, persistent particle load to lungs.
  - **Winter amplification:**
    - Winter evening levels were **~74% higher** (≈32.7 particles/m³ vs 18.8 in non-winter seasons), mirroring patterns seen with PM2.5 in smog episodes.
  - **City disparities:**
    - Cities like **Delhi (~14.18 µg/m³)** and **Kolkata (~14.23 µg/m³)** show much higher inhalable microplastic concentrations than other urban centres.
  - **"Trojan-horse" toxicity:**
    - Microplastics can **adsorb heavy metals** (e.g. lead, cadmium) and **endocrine-disrupting chemicals** such as diethyl phthalates, acting as carriers into the human respiratory system.
  - **Disease-vector potential:**
    - Particles have been found carrying **fungi (e.g. *Aspergillus fumigatus*)** and **antibiotic-resistance genes**, raising risks of **infections and treatment failure**.
  - **Occupational vulnerability:**
    - **Traffic police, delivery workers, construction labour, street vendors** face higher exposure from:
      - **Tyre-wear microplastics**,
      - Construction dust mixed with plastic fragments,
      - Roadside burning of mixed waste.
- **Measures Taken by India to Curb Microplastic Pollution**
  - **Single-Use Plastic (SUP) Ban, 2022:**
  - **Plastic Waste Management (PWM) Rules & EPR:**
  - **Microbead prohibition:**
  - **National Action Plan for Marine Litter:**

14. Bioremediation emerges as low-cost option for India's toxic sites

With **conventional clean-up methods proving too costly and slow** for India's massive loads of contaminated rivers, soils and landfills, policymakers and scientists are increasingly turning to **bioremediation** as a scalable, nature-based solution. Recent CPCB and CSIR findings show both **huge potential and serious implementation gaps** in India's bioremediation efforts.

- **What is Bioremediation?**
  - Use of **microorganisms, algae, fungi or plants** to **degrade, transform, or immobilise pollutants** in soil, water or air.
  - Pollutants are treated as **"food"** and converted into relatively harmless by-products like **CO_2, water, organic acids** or less toxic metal forms.
  - **Types:**
    - **In-situ:** treatment at the contaminated site (e.g. bio-venting, bio-sparging, biobarriers in groundwater, in-situ bioreactors).
    - **Ex-situ:** contaminated soil/sludge is excavated/pumped out and treated in **bioreactors, windrows, lagoons** etc.
- **Why India Needs Bioremediation (Problem Scale)**
  - **Toxic rivers:** CPCB (2024) classifies **~72% of river stretches as polluted**, mainly due to untreated sewage and industrial effluents.
  - **Industrial legacy waste:** Over **1,700 contaminated sites (2023)** from oil spills, chemical dumps, pesticides etc., impacting soil and aquifers.
  - **Heavy-metal hotspots:** Chromium, arsenic, lead often exceed limits; **Kanpur tannery belt groundwater** shows chromium levels **100–250× WHO limit**.
  - **Cost advantage:** MoEFCC estimates bioremediation can cut remediation costs by **60–70%** compared to excavation, incineration or chemical neutralisation—critical for cash-strapped ULBs and states.
- **Key Challenges in Scaling in India**
  - **Site variability & performance gaps:**
    - Microbial strains work optimally only within specific **pH, temperature, soil & contaminant profiles**.
    - A 2023 CSIR study found **~58% of lab-developed microbial formulations failed** in field conditions, showing poor transferability.
  - **Lack of standards / protocols:**
    - No unified **national protocol** for testing & validating microbial consortia at contaminated sites; CPCB (2024) notes **only 6 states** with operational bioremediation guidelines.
  - **Regulatory ambiguity for advanced biotech:**
    - Slow approvals for **GM / CRISPR-engineered microbes**; **<15% of DBT projects (2022–24)** received field-testing clearance.
    - MoEFCC pilot monitoring (2023) reported **3 of 10 GM microbe trials** had to be terminated early due to ecological risk signals.
  - **Monitoring & biosafety:**
    - Poorly monitored GM microbes risk **invasive dominance, horizontal gene transfer** and unintended ecological impacts.
    - Need robust **post-release surveillance, kill-switch strategies and clear liability frameworks**.

15. Freshwater Sponges: Bioindicators & Metal Absorbents

- **What they are:** Multicellular, immobile **freshwater animals** forming colonies; appear as **mossy mats/branched forms** on submerged substrates; often **green** due to symbiosis with **zoochlorellae**.
- **Ecology & distribution:** Thrive in **clear, slow-moving waters**; **globally distributed (except Antarctica)**; **India hosts ~31 of ~250 species**.
- **Biology: Filter feeders** (remove microbes and detritus); survive stress via **gemmules** (dormant asexual bodies).
- **Threats: Pollution**, sedimentation, **microplastics**, and **heatwaves**.
- **Ecosystem roles:**
  - **Water purification:** Filter large volumes, reducing bacteria, viruses, plankton, and organic matter.
  - **Clarity enhancement:** Remove suspended particles, improving **light penetration**.
  - **Metal sentinels: Accumulate toxic metals** (arsenic, lead, cadmium), aiding detoxification and serving as **bioindicators**.
  - **Nutrient cycling: Recycle silicon** via skeletal breakdown, supporting **diatom growth**.
  - **Habitat provision:** Porous structures host diverse **microfauna**.

16. Short-Neck Clam Recovery in Ashtamudi Lake

- **Recovery update:** The **ICAR-Central Marine Fisheries Research Institute (ICAR-CMFRI)** reports **early recovery** of the **short-neck clam** population following a **stock-enhancement programme** in **Ashtamudi Lake**.
- **Species profile: Paphia malabarica** is a **commercially important bivalve**, fast-growing (lifespan **~3 years**), inhabiting **shallow estuarine sandy–mud flats (≤4 m)**; a **benthic filter feeder** and a **bioindicator** of heavy-metal and hydrocarbon pollution.
- **Distribution:** Indo-Pacific (Gulf of Oman to Japan); in India, found on **both coasts**, with dense stocks in **Ashtamudi, Kerala**.
- **Threats: Pollution**, **invasive Charru mussels**, **over-exploitation**, and **salinity/temperature shifts**.
- **Ashtamudi significance:** A **brackish estuary** (Kallada & Pallichal rivers) connecting to the **Arabian Sea**; designated a **Ramsar Convention Site (2002)**.
- **Sustainability milestone:** The Ashtamudi clam fishery is **India's first** certified by the **Marine Stewardship Council**, underscoring sustainable management.

17. Rediscovery of Bamboo Shrimp in India

- **Finding:** Scientists rediscovered the **bamboo shrimp (*Atyopsis spinipes*)** in **Karnataka** and **Odisha** after **72 years**, confirming its presence in **mainland India**.
- **Species profile:** A **filter-feeding freshwater shrimp** (also called *Soldier Brush Shrimp*), brown to reddish-brown with a light dorsal stripe; colour intensity reflects health and environmental conditions.
- **Habitat & ecology:** Prefers **clean, well-oxygenated, fast-flowing streams** with **rocky substrates**; feeds on **detritus, microorganisms, and algae** using **fan-like appendages**; supports **nutrient cycling**.
- **Life cycle: Amphidromous**—larvae develop in **brackish/marine waters** before returning to freshwater.
- **Range & status:** Widely distributed in **Southeast Asia and Pacific islands**; **IUCN: Least Concern**.
- **Threats: Habitat degradation**, **water pollution**, and **overexploitation for the aquarium trade**.

18. Horn-Eyed Ghost Crab

- **Identity:** A **nocturnal ghost crab** distinguished by **horned eye stalks** and a **box-shaped body** with sand-coloured camouflage that **changes with surroundings**.
- **Habitat: Tropical–subtropical sandy beaches**, mainly **high intertidal and supralittoral zones**.
- **Distribution: Indo-Pacific** (excluding the Red Sea), from **East Africa to Japan, Australia, and Polynesia**; in **India** found along **Gujarat, Goa, and Visakhapatnam** coasts.
- **Performance:** Exceptionally fast—up to **~100 body lengths per second**.
- **Diet: Generalist predator/scavenger**—insects, worms, dead fish; occasionally **sea turtle hatchlings**.
- **Ecological role: Keystone coastal predator** and **ecosystem health indicator**; **burrowing aerates and mixes beach sand**.
- **Threats: Habitat loss**, human disturbance, **chemical runoff**, pollution, and **climate change**.
- **Conservation status: IUCN – Least Concern**.

19. New Jumping Spiders from Meghalaya

- **Discovery:** The **Zoological Survey of India** discovered **two new jumping spider species**—*Asemonea dentis* and *Colyttus nongwar*—from **Meghalaya**.
- **About jumping spiders (Salticidae): Diurnal**, **strong vision**, **web-less hunters**; jump up to **~50× body length** using hemolymph pressure; **globally distributed** (except Antarctica), most diverse in the tropics; Himalayan species recorded up to **~6,700 m**.
- **Asemonea dentis: Third Indian species** of genus *Asemonea*; **males** have a **tooth-like projection** on the palpal femur; males greenish-brown with a **V-shaped abdominal mark**, females creamy white with black patches.
- **Colyttus nongwar: Second Indian species** of the rare Oriental genus *Colyttus*; **oval reddish-brown carapace**; light-brown abdomen with **five V-shaped white patches**.

20. New Endemic Micro-Moths from the Himalayas

- **Discovery:** Researchers from **ICAR–Indian Agricultural Research Institute (IARI)** discovered **three endemic micro-moth species** in the **high-altitude Himalayas**, highlighting undocumented insect diversity.
- **About ICAR-IARI:** India's premier national institute for **agricultural research, education, and extension**, popularly known as the **Pusa Institute**.

New Species Identified

- **Gelechia adi:** Found in **Ramsing, Arunachal Pradesh**; named after the **Adi tribe**; **ivory-white forewings** with a **distinct black basal streak**.
- **Gelechia bilobuncusa:** Discovered in **Himachal Pradesh**; named for the **bilobed uncus** (male genitalia); **pale brown wings** with **scattered black scales**.
- **Istrianis ladakhensis:** Identified in **Ladakh**; **high-altitude adapted**; **light brown wings** with **mottled grey, white, and orange scales**.

21. New Snakehead Fish from Meghalaya

- **Discovery:** Scientists identified a new snakehead species, **Channa bhoi**, in **Meghalaya**.
- **Etymology:** Named after the **Bhoi community** of the Khasi tribe, recognising indigenous heritage.
- **Taxonomy:** Part of the **Gachua group** of **dwarf snakeheads**, noted for **high endemism** in the **Eastern Himalayas**.
- **Morphology:** **Bluish-grey body** with **distinct black spots on each scale**.
- **Habitat & range:** Occupies **shallow, slow-flowing mountain streams** with dense riparian vegetation; **endemic to Ri-Bhoi district**.
- **Ecological role:** Functions as a **micro-predator** and a **key indicator of freshwater ecosystem health**.

22. Rare Triassic Reptile Hatchling Fossil

- **Discovery:** Scientists identified **CAPPA/UFSM 0295**, a rare **hatchling fossil** of **Macrocephalosaurus mariensis**, from **southern Brazil**.
- **Age & group:** A **herbivorous rhynchosaur** from the **Late Triassic Period**.
- **Morphology:** **Quadrupedal**, **barrel-shaped body**, reaching **>2 metres** as adults; possessed a **downward-curved, beak-like snout** adapted for cropping low vegetation.
- **Endemism:** Fossils of *M. mariensis* are **exclusive to the Santa Maria region** of southern Brazil.
- **Broader context:** **Rhynchosaurs** were **extinct herbivorous reptiles** with **parrot-like beaks** that flourished during the **Triassic** before disappearing later in the period.

23. New Springtail Species from Sikkim

- **Discovery:** Researchers identified **Neelus sikkimensis** from **high-altitude Sikkim**.
- **Significance: First Indian record** of the genus **Neelus**, increasing the **global species count to eight**.
- **Taxonomy:** Belongs to **Collembola—tiny, eyeless, soil-dwelling micro-arthropods**.
- **Morphology: Whitish body** with **pale yellow patches** and **saw-like hairs on the upper lip**.
- **Habitat & role: Eu-edaphic** (deep soil/moss layers, minimal surface exposure); acts as a **soil engineer**, aiding **organic decomposition and nutrient recycling**.

24. Rock Eagle-Owl Nest Protection – Telangana

- **Action taken:** The **Telangana Forest Department** halted **quarrying** after locating a **Rock eagle-owl nest with five eggs** on a cliff, to prevent disturbance during breeding.
- **Species profile: Bubo bengalensis** (Indian/Bengal eagle-owl) is a **large horned owl endemic to the Indian Subcontinent**.
- **Identification: Brown-grey plumage**, **white throat patch**, **deep orange-yellow eyes**, and **prominent ear tufts**.
- **Habitat & range:** Prefers **rocky outcrops, scrub forests, ravines, semi-arid landscapes**; avoids humid evergreen and extremely arid zones; found across **India, Nepal, Bangladesh, Pakistan**.
- **Ecological role: Apex predator** controlling rodents—important for **natural pest regulation**.
- **Breeding: No nest-building**; lays eggs in **scrapes on bare ground, natural ledges, or cliffs**.
- **Threats: Habitat loss**, **powerline electrocution**, **illegal trade**, and **superstition-driven persecution**.
- **Conservation status: IUCN: Least Concern, CITES: Appendix II, WPA (India): Schedule I**.

25. First Record of Rainbow Water Snake in Uttar Pradesh

- **Sighting:** The **Rainbow Water Snake** was recorded **for the first time in Uttar Pradesh**, from **Dudhwa Tiger Reserve**.
- **Species profile:** A **mildly venomous, rear-fanged** aquatic snake (also called **Rainbow Mud Snake**), with a **stout body**, **two dark stripes**, **yellowish belly**, and **iridescent, rainbow-sheen scales**.
- **Habitat & behavior:** Occupies **stagnant/slow-moving freshwater** (paddy fields, canals, rivers, wetlands) with **muddy substrates**; occasionally **moves overland** between water bodies.
- **Biology: Viviparous** (gives birth to live young); feeds mainly on **fish**, also **amphibians and small vertebrates**.
- **Range: Southeast Asia** and parts of **South Asia**; in India, previously known from the **Gangetic Plains**, **Northeast**, and **eastern coast (Odisha, Andhra Pradesh)**.
- **Conservation: IUCN – Least Concern**.

26. Striated Grassbird Range Extension

- **Record:** The **Striated Grassbird** was recorded in **Chaprala Wildlife Sanctuary**, marking a **major range extension** and the **southernmost known record in India**.
- **Species profile:** A **large grassland passerine** (family **Locustellidae**) with an **elongated tail**, **streaked plumage**, and **loud calls**; inhabits **tall riverine grasslands and reedbeds** across South & Southeast Asia.
- **Identification: Reddish-brown upperparts** with **black streaks**, **yellowish eyebrow**, **whitish underparts with streaked breast**, **pink feet**, and a **black-tipped bill**.
- **Status & threats: IUCN: Least Concern**, but sensitive to **grassland loss**, **wetland degradation**, and **habitat fragmentation**.
- **Sanctuary context: Chaprala WLS** (est. **1986**, **134.78 sq km**) lies at the **Wardha–Wainganga confluence**; **monsoon flooding** sustains grassland–wetland mosaics within **southern tropical dry deciduous forests**, supporting rich terrestrial and aquatic fauna.

27. Himalayan Red Fox near Pangong Tso

- **Viral sighting:** A roadside encounter with the **Himalayan red fox** near **Pangong Tso** drew widespread attention.
- **Pangong Tso:** The **world's highest saltwater lake** (~**4,350 m**); ~**one-third in India** and **two-thirds in China's Tibet Autonomous Region**.
- **Species profile:** A **high-altitude red fox subspecies** adapted to cold deserts; **thick rusty-orange coat** (deeper red in winter) and **bushy white-tipped tail**.
- **Ecology: Opportunistic omnivore** (pikas, rodents, birds, berries, carrion); inhabits **alpine meadows, cold deserts, montane forests** at **2,500–5,000 m**.
- **Range:** Himalayas across **India, Nepal, Bhutan**, and **China's Tibetan Plateau**; in India—**Ladakh, J&K, Himachal Pradesh, Uttarakhand, Sikkim, Arunachal Pradesh**.
- **Role & threats:** Controls small-mammal populations, protecting alpine vegetation; threatened by **habitat fragmentation, feral dogs, tourism pressure, road kills**.
- **Status: IUCN: Least Concern**; **CITES: Appendix III**; **WPA (India): Schedule II**.

28. First Dhole Sighting in Kheoni WLS

- **Record:** The forest department reported the **first-ever sighting of dholes** in **Kheoni Wildlife Sanctuary**, a **dry deciduous forest** in central India.
- **Species profile: Dhole** (Asiatic wild dog) is a **highly social, medium-sized carnivore** and the **only living member of genus *Cuon***; golden-brown coat, pale underbelly, bushy black-tipped tail.
- **Ecology & behaviour: Habitat generalist** (evergreen forests to alpine steppes); **whistling dogs** using high-pitched calls; live in **packs of ~5–12** led by a dominant pair; **apex predator** regulating herbivore populations.
- **Range:** Fragmented distribution across **11 Asian countries**; in India mainly **Western Ghats, Central India, and Northeast**—the Kheoni record extends confirmed presence within central landscapes.
- **Threats: Habitat loss, prey depletion, competition** with larger carnivores, and **diseases from domestic dogs**.
- **Conservation status: IUCN: Endangered**; **CITES: Appendix II**; **WPA (India): Schedule II**.

29. Black-Capped Capuchins Imported to Bannerghatta

- **Move: Bannerghatta Biological Park** imported **eight black-capped capuchin monkeys** from **South Africa** under an **animal exchange programme**.
- **Species profile: Black-capped capuchin** (tufted capuchin) is a **New World monkey** native to the **Amazon Basin**.
- **Identification: Light brown fur** with a **distinct dark cap** on the head.
- **Range & habitat:** Widespread across **South America** (Brazil, Colombia, Ecuador, Peru, Venezuela); inhabits **moist tropical/subtropical** and **secondary forests**.
- **Behaviour: Diurnal, arboreal, highly social**; groups of **10–30** individuals.
- **Ecological role: Seed dispersal** and **pest control**.
- **Status: IUCN: Least Concern**; **CITES: Appendix II**.

30. Cyclone Senyar & Tapanuli Orangutan Crisis

- **Disaster impact: Cyclone Senyar**, a rare cyclone that formed in the **Strait of Malacca (Nov 2025)**, triggered **severe floods and landslides** across **Sumatra, Malaysia, and Thailand**, devastating habitats in **Batang Toru**, Sumatra.
- **Rarity:** Senyar is **one of only two recorded tropical cyclones** ever documented in the **Strait of Malacca**, underscoring its exceptional nature.
- **Species at risk:** The **Tapanuli orangutan**—the **world's most endangered great ape** with **<800 individuals**—has been pushed **closer to extinction**.
- **Biology & ecology:** Identified as a distinct species in **2017**; **slowest breeding cycle** among land mammals (**6–9 years**); **strictly arboreal frugivore** inhabiting **upland rainforests (300–1,300 m)**; crucial **seed disperser** ("forest gardener").
- **Range: Endemic** to the **Batang Toru highland rainforest, North Sumatra, Indonesia**—a **single, highly restricted habitat**.
- **Threat matrix: Cyclone damage** compounds existing pressures—**habitat fragmentation, hunting**, and **slow reproduction**.
- **Status: IUCN: Critically Endangered**; **CITES: Appendix I**.

31. African Forest Elephant Population Reassessment

- **New finding:** A **DNA-based survey using dung samples** estimates the **2024 population at ~135,690**, about a **16% increase since 2016**, indicating earlier counts underestimated numbers.
- **Species profile: African forest elephant** is the **smallest living elephant**, native to **West and Central Africa**; features a **straighter back, rounder ears**, and **thin, downward-pointing tusks** with **denser, pinkish ivory**.
- **Habitat & distribution:** Primarily in **dense tropical rainforests**; **~95%** of the population is in **Central Africa**, with **Gabon** hosting the largest share.
- **Social ecology:** Small **matriarch-led family groups** (up to ~20); **adult males** largely solitary except during mating.
- **Ecosystem role:** A **keystone species** and **ecosystem engineer**, dispersing seeds over long distances.
- **Threats & status:** Faces **poaching, habitat loss/fragmentation, human–elephant conflict, slow reproduction, climate change**; **IUCN: Critically Endangered**, **CITES: Appendix I**.

32. Human–Wildlife Conflict in India

- **Context:** India is witnessing **rising human–wildlife conflicts**, threatening **conservation outcomes** and **sustainable development**; recognised globally under the **Kunming–Montreal Global Biodiversity Framework (COP15, 2022)** of the **Convention on Biological Diversity**.
- **Definition:** Any **adverse interaction** arising from wildlife behaviour that **undermines human livelihoods, safety, or development goals**.

Key Causes

- **Habitat fragmentation:** Roads/railways disrupt **corridors and migration routes**, pushing animals into settlements.
- **Population pressure:** High human density drives **encroachment** into wildlife habitats.
- **Attractive crops: Sugarcane/banana** near forests draw elephants and wild pigs (frequent raids in **Assam, Odisha, Karnataka**).
- **Climate stress: Erratic rainfall, droughts, floods** reduce natural forage.
- **Forest degradation: Invasives and monocultures** diminish fodder.

33. Wildlife Survey in Buxa Tiger Reserve

- **Survey launch:** A **four-month wildlife survey** began in **Buxa Tiger Reserve** to generate **robust data on species distribution and habitat use**.
- **Location & landscape:** Situated in **Alipurduar district, West Bengal**, in the **Eastern Himalayan foothills**, covering **Bhabar and Terai** zones with a **north–south gradient** and **tropical moist humid climate**.
- **Connectivity:** Functions as an **international wildlife corridor** linking **Phibsoo Sanctuary (Bhutan)**, **Manas National Park (Assam)**, and **Jaldapara National Park (West Bengal)**.
- **Hydrology: Sankosh** forms the eastern boundary; other rivers include **Raidak, Jayanti, and Kaljani**.
- **Biodiversity:** Dominated by **Sal forests** with **150+ orchid species**; fauna includes **Asian Elephant, Tiger, Gaur, Wild Boar, Sambar, and Dhole**.
- **Tiger context:** Notified as a tiger reserve in **1983**; **no confirmed tiger records from the 1990s until December 2021**, underscoring the need for systematic monitoring.

34. Rhino Dehorning & Conservation Impact

- **Outcome: Dehorning 2,284 rhinos** led to a **75–78% reduction in poaching**, achieved with just **~1.2% of total anti-poaching budgets**; dehorned rhinos faced a **~95% lower poaching risk** than horned individuals.
- **Dehorning process:** A **veterinary-led, safe procedure** removing **90–93% of the horn above the germinal layer**, allowing **natural regrowth** without harming the animal.
- **Why horns drive poaching:** Rhino horns are **keratin** (like hair/nails) and **regrow**, but fetch **$3,300–$22,000/kg**, making poaching highly lucrative.

African Rhinos – Snapshot

- **Population:** **~22,540** total (**~15,752 White**, **~6,788 Black**).
- **Traits: Two keratin horns**; slate- to brownish-grey; **800–3,500 kg** adults.
- **Range:** Mainly **South Africa, Namibia, Kenya, Zimbabwe**; **South Africa** ~80% of global rhinos.
- **Ecology: Ecosystem engineers**—maintain grasslands by limiting woody growth; **seed dispersal** via dung middens.

Major Rhino Species (Status)

- **White Rhino:** ~16,000; **Near Threatened**.
- **Black Rhino:** ~6,500; **Critically Endangered**.
- **Javan Rhino:** **<80** (Java, Indonesia); **Critically Endangered**.
- **Sumatran Rhino:** **<80** (Sumatra); **Critically Endangered**.
- **Greater One-Horned (Indian) Rhino:** **~4,000** (India–Nepal); **Vulnerable**.

35. Hornbill Population Survey

- **Initiative:** The **Tamil Nadu Forest Department** will conduct a **statewide hornbill population survey** under the **Hornbill Conservation Initiative**.
- **Objective:** Generate baseline data and establish **India's first Centre of Excellence for Hornbill Conservation** at **Anamalai Tiger Reserve**.
- **Western Ghats species: Malabar Grey (endemic)**, **Indian Grey**, **Malabar Pied**, and **Great Hornbill**.

About Hornbills (Key Facts)

- **Distribution:** Old World tropics (**Africa, Asia, Melanesia**); **absent from the Americas**; in India, concentrated in the **Western Ghats and Northeast**.
- **Diversity: 62 species globally**; **9 in India**.
- **Ecological role:** "**Farmers of the Forest**" due to **long-distance seed dispersal**.
- **Traits:** Large **down-curved bill** with a **casque**; prominent eyelashes; mostly **arboreal** in Asia.
- **Diet & breeding:** Largely **frugivorous**; **female seals inside tree hollows** during nesting; **male provisions** through a narrow slit.
- **Flagship species: Great Hornbill—IUCN: Vulnerable**; **state bird of Arunachal Pradesh and Kerala**.

36. Vulture Soft Release in Assam

- **Approval & action (Dec 2025):** The **Central Zoo Authority (CZA)** under the **Ministry of Environment, Forest and Climate Change** approved the **scientific soft release** of **30 White-rumped Vultures** (*Gyps bengalensis*) and **5 Slender-billed Vultures** (*Gyps tenuirostris*) from the Rani centre (Guwahati) to the **6th Addition of Kaziranga National Park and Tiger Reserve** (Bishwanath Wildlife Division).
- **Assam's importance:** Assam is **India's primary stronghold** for **slender-billed vultures**, with active breeding near Kaziranga.
- **Cultural value:** Vultures symbolize **ecological balance** in rural India; linked to **cremation practices** and Hindu epics (**Jatayu, Sampati**) representing vigilance and strength.
- **Population crash:** National vulture numbers fell by **>97% (mid-1990s–2000s)** from tens of millions.
- **Primary cause: Diclofenac** (veterinary NSAID) led to **kidney failure and visceral gout** in vultures feeding on treated carcasses.
- **Ongoing threats: Habitat loss**, persecution, and other NSAIDs (**aceclofenac, nimesulide**) continue to exert pressure.

37. Project Cheetah & International Cheetah Day

- **Highlight:** Prime Minister **Narendra Modi** showcased **Project Cheetah** achievements during **International Cheetah Day (Dec 4)**, observed to support global cheetah conservation (**IUCN: Vulnerable**).
- **About the day:** Instituted in **2010** by the **Cheetah Conservation Fund** in memory of **Khayam**, a rescued cub raised in Oregon, USA.

Project Cheetah

- **Objective:** Reintroduce cheetahs in **India**, where they were declared extinct in **1952**.
- **Launch & uniqueness:** Started in **2022**; the **world's first intercontinental translocation** of a large wild carnivore.
- **Initial site: Kuno National Park—8 cheetahs from Namibia (2022)** and **12 from South Africa (2023)**.
- **Expansion: Gandhi Sagar Wildlife Sanctuary** added; **3 cheetahs shifted from Kuno in 2025**.
- **Current status: 27 cheetahs** in India—**16 born locally** and **11 translocated adults**.

38. Supreme Court on Aravalli Range

- **Ruling:** The **Supreme Court of India** set **uniform technical criteria** for Aravalli **'hills' and 'ranges'** and **suspended new mining leases** across the region.
- **Definitions:**
  - **Hill:** Any landform with **≥100 m rise** over local relief.
  - **Range: Two or more hills** within **500 m** of each other.
- **Mining controls:**
  - **Immediate ban** on new leases.
  - Future mining only after a **Management Plan for Sustainable Mining (MPSM)** is prepared.
- **Safeguards:**
  - **Automatic closure** if mining hits the **groundwater table**.
  - **No mining** in **tiger reserves, wildlife corridors, and aquifer recharge zones**.

Why Aravallis Matter

- **Desert barrier:** Checks eastward spread of the **Thar Desert**.
- **Monsoon guidance:** Steers **SW monsoon** clouds toward North India.
- **Winter shield:** Blocks **cold westerlies** from Central Asia.
- **Urban ecology:** Acts as **green lungs for Delhi-NCR** (CO_2 absorption, PM2.5 trapping).
- **Water security: Aquifer recharge** via fractured rocks.
- **Resources & rivers:** Hosts **copper, lead, zinc, silver, Makrana marble**; source of **Luni, Banas, Sabarmati**.

About the Aravalli Range

- One of the **oldest mountain systems**; **ancient fold mountains** now eroded into residual hills (**300–900 m** average).
- **Extent: ~692 km** from **Champaner (Gujarat)** to **Raisina Hill (Delhi)** via Rajasthan & Haryana.
- **Highest peak: Guru Shikhar (1,722 m)**, Mount Abu.
- **Drainage divide:** A concealed limb helps separate **Ganga–Indus** basins.

39. Supreme Court on Forest Land Diversion

- **Ruling:** The **Supreme Court of India** reaffirmed that **forest land cannot be used for non-forestry purposes without prior Central Government approval**; **state-issued agricultural leases without such approval are illegal**.

Legal Framework

- **Governing law: Van (Sanrakshan Evam Samvardhan) Adhiniyam, 1980** regulates diversion of forest land.
- **Non-forestry use:** Includes **clearing forests for cultivation** or any purpose **other than re-afforestation**.
- **Approval chain:** Proposals are vetted by the **Forest Advisory Committee** and processed by the **Ministry of Environment, Forest and Climate Change**; **central approval is mandatory**.
- **Limited delegation:** States may divert **<1 ha** for specified public utilities.
- **Appeals:** Decisions can be challenged before the **National Green Tribunal**; further appeal to the Supreme Court within **90 days**.

Compensatory Obligations

- **NPV:** User agencies must pay **Net Present Value** based on forest quality/density.
- **Afforestation: Equivalent non-forest land** or **double degraded forest land** must be afforested.
- **Funds:** Managed by **Compensatory Afforestation Fund Management and Planning Authority (CAMPA)**.

Key Exemptions (2023 Amendment)

- **Strategic projects:** Linear projects within **100 km** of international borders/LoC/LAC.
- **Security infrastructure:** Up to **10 ha**.
- **LWE areas:** Public utilities up to **5 ha**.
- **Excluded activities: Government-owned zoos, safaris, and eco-tourism facilities** are not treated as non-forestry uses.

40. Raccoon Roundworm Spread in Europe

- **Finding:** A recent study reports **widespread infection of the raccoon roundworm** (**Baylisascaris procyonis**) in **wild raccoon populations across nine European countries**, indicating an expanding zoonotic risk.

About Baylisascaris procyonis

- **Parasite:** A **nematode** living in the **small intestine of raccoons**; largely harmless to the host.
- **Human risk:** Causes **severe, often fatal neurological disease** in humans and other animals.
- **Pathology:** Ingested eggs release larvae that **migrate to the brain, spinal cord, eyes, liver, lungs, and heart**.
- **Symptoms:** Begin **1–4 weeks** post-exposure—**nausea, fatigue, poor coordination, seizures, coma**.
- **Diagnosis & treatment: No commercial diagnostic tests**; **albendazole** is the main (limited) treatment.
- **Spread: Native to North America**; now an **emerging zoonosis in Europe and parts of Asia**.
- **India context: Negligible risk** due to the **absence of wild raccoons**.

About the Raccoon

- **Species: Raccoon**—intelligent, medium-sized mammal (family **Procyonidae**).
- **Traits:** Black **"bandit mask"**, ringed tail; **highly sensitive forepaws**; food **dousing** behavior.
- **Ecology: Nocturnal, omnivorous, habitat generalist**.
- **Distribution:** Native to **North America**; established in **Europe, Japan, parts of Russia**.
- **Status: IUCN: Least Concern**.

41. Operation Thunder 2025 – Global Wildlife Crime Crackdown

Action: Interpol, with the **World Customs Organization**, conducted **Operation Thunder 2025** (15 Sept–15 Oct 2025), involving agencies from **134 countries**.

- **Results: 4,640 enforcement actions** led to seizures of **30,000+ live animals**, protected plants, wildlife parts, and **large volumes of illicit timber**.
- **Seized items: Ivory, rhino horns, pangolin scales/meat, reptiles, birds, marine species**, and **CITES-listed** plants and timber.
- **Assessment:** Interpol flagged wildlife and forestry crime as increasingly tied to **transnational organised crime**, with an **illegal market up to USD 20 billion annually**.

42. Bioenergy Expansion in India

- **Scale-up:** Under the **National Bioenergy Programme (NBP)**, India added **2,361 MW biomass power** and **227.56 MWe waste-to-energy** capacity; installed **2.88 lakh biogas plants** with **₹998 crore** support in **Phase-I (2022–26)**.
- **Leaders: Maharashtra (1,073 MW)** and **Karnataka (537 MW)** lead biomass power generation.
- **Why it matters:** Cuts import dependence (**~85% crude oil, ~50% gas**), **reduces methane** from livestock (**~44% of agri emissions**), manages **~62 Mt municipal waste** (>50% biodegradable), and monetises **~140 Mt crop residue** to boost rural incomes.
- **Key challenges: Regional skew** (NE <1% capacity), **paddy straw burning** (20–25 Mt/yr), **poor source segregation** (<30% in many cities), **higher tariffs** (₹6–7/unit vs solar/wind), and **limited advanced tech** (gasification, torrefaction).

43. Ethanol blending hits 20%: climate gains, water–food risks grow

During Question Hour, the Union Road Transport and Highways Minister highlighted the **environmental and economic gains** from India's **Ethanol Blended Petrol (EBP) Programme**, which has now reached **20% blending in 2025**, ahead of the original 2030 target.

- **About Ethanol Blended Petrol (EBP) Programme**
  - **Nature:** Central Sector scheme under **Ministry of Petroleum and Natural Gas (MoPNG)**.
  - **Objectives:**
    - Cut **crude oil import dependence** and save forex.
    - Provide a stable market for **agricultural feedstocks** (sugarcane, grain).
    - Reduce **GHG emissions** and local pollutants from petrol use.
  - **Targets & Progress:**
    - Started in **2003** with lower blending targets.
    - Original target: **20% ethanol blending by 2030** (E20).
    - India **achieved ~20% average blending in 2025, five years ahead of schedule**, up from **~1.5% in 2014**.
  - **Feedstock basket:**
    - Ethanol can be made from **sugarcane juice/syrup, molasses, FCI surplus rice, maize, damaged food grains**.
    - **Department of Food & Public Distribution** is nodal for fuel-grade ethanol production and feedstock policy.
- **Benefits Highlighted in Parliament**
  - **Emission reduction:**
    - 20% blending is estimated to have cut **CO_2 emissions by ~736 lakh metric tonnes** (cumulative).
  - **Energy security & forex savings:** Ethanol has substituted **>260 lakh metric tonnes of crude oil (2014–2025)**. This saved over **₹1.55 lakh crore** in foreign exchange.
  - **Investment & rural incomes: ₹40,000+ crore** invested in new distilleries and capacity.
    - Feedstock procurement has paid farmers about **₹1.36 lakh crore** since 2014, supporting **sugarcane and grain farmers**.
- **Emerging Challenges & Externalities**
  - **Water stress:** Producing **1 litre of ethanol from sugarcane ≈ 2,860 litres of freshwater**—a serious concern in water-stressed States growing cane.
  - **Industrial pollution:** Distilleries generate toxic **"spent wash"**, which, if untreated, can heavily pollute **soil and water bodies**.
  - **Food and price risks (grain-based ethanol):** India has shifted from a **maize exporter to importer**, with **~1 million tonnes of maize imports in 2024–25**.
    - High ethanol demand has pushed **maize prices up by 65–70%** in recent years, potentially fuelling **food & feed inflation**.
  - **Air-toxicity trade-offs:** Ethanol combustion forms **aldehydes** like **acetaldehyde and formaldehyde**, which are toxic and irritant, adding complexity to air-quality impacts.
  - **Vehicle performance & durability: Lower energy density → 5–20% drop in mileage** depending on blend, engine and driving conditions.
    - Ethanol is **hygroscopic and corrosive**, potentially damaging **fuel lines, seals and components** in non-E20-compatible vehicles over time.

44. India's renewable capacity surges, but structural risks threaten energy security

India has added **record clean energy capacity in 2025**, taking total **renewable capacity to about 254 GW** and pushing **non-fossil sources to 51.5% of installed power capacity**, achieving its COP26 target **five years ahead of 2030**. However, **DISCOM stress, grid bottlenecks and contract risks** threaten progress towards *Aatmanirbhar* and long-term energy security.

- **Current Clean Energy Profile (2025 snapshot)**
  - **Global rank:** 4th in **total installed renewable capacity** at ~**253.96 GW**, with ~**23% YoY growth**.
  - **Capacity addition: 44.51 GW added in 2025 (till Nov)** vs ~25 GW in 2024 — a *record annual addition*.
  - **Non-fossil share: 51.5% of total installed power capacity** from non-fossil sources — COP26 non-fossil capacity target met early.
  - **Solar:** Capacity up **34.98 GW** in 2025 to **132.85 GW**; YoY growth ~**41%**.
  - **Wind:** Capacity up **5.82 GW** to **53.99 GW**; YoY growth **12.5%**.
  - **FDI:** Clean energy attracted **US$3.4 billion** in the first 9 months of FY 2025 (~80% of total power-sector FDI).
- **India's Structural Advantages in Clean Energy**
  - **Solar resource:** ~**300 sunny days** with high insolation → theoretical solar potential **>750 GW**.
  - **Low tariffs:** Competitive RE auctions have made **solar & wind among the cheapest sources** of new power in India.
  - **Hydrogen opportunity:** India already consumes ~**5 million tonnes of grey hydrogen** (refineries, fertilisers); replacing this creates an **immediate domestic market** for green H_2.
  - **Strategic geography:**
    - **7,500 km coastline** → high **offshore wind** potential.
    - **Rajasthan & Gujarat plains** ideal for **solar–wind hybrids** and round-the-clock RE.
  - **China-plus-one:** With stronger **vertical integration** (polysilicon → modules, nacelles, batteries), India can become a **China+1 manufacturing hub** for global RE supply chains.
- **Key Challenges Hindering Long-Term Energy Security**
  - **DISCOM financial stress:**
    - Chronic **payment delays** and weak balance sheets of state DISCOMs create **liquidity issues** for renewable developers, raising financing costs.
  - **PPA renegotiation:**
    - Some states attempt to **renegotiate or cancel Power Purchase Agreements (PPAs)** after auctions → undermines **contract sanctity**, investor confidence and tariff stability.
  - **Grid bottlenecks:**
    - ~**60 GW** of RE projects are **"stranded" or delayed** due to inadequate transmission and congestion.
  - **High cost of capital:**
    - Cost of RE financing in India is ~**80% higher than in developed economies**, largely due to **perceived policy, payment and currency risk**.
  - **Green hydrogen economics:**
    - Green H_2 costs **US$4–5/kg**, still much higher than fossil-based **grey hydrogen**, limiting near-term commercial uptake without subsidies or carbon pricing.

45. India Adds Two New Ramsar Sites

- **Designation: Siliserh Lake** and **Kopra Reservoir** were designated as **Ramsar Sites**, taking **India's total to 96**.

Kopra Reservoir (India's 95th | Chhattisgarh's 1st)

- **Location: Bilaspur district**, Chhattisgarh.
- **Type: Hybrid wetland**—man-made reservoir that evolved into a natural ecosystem.
- **Hydrology: Rain-fed**, supported by seasonal streams of the **upper Mahanadi basin**.
- **Biodiversity:** Important **wintering/stopover site** for migratory birds (e.g., **Egyptian vulture, greater spotted eagle, common pochard, woolly-necked stork**).

Siliserh Lake (India's 96th | Rajasthan's 5th)

- **Location: Aravalli Hills**, near **Alwar**, Rajasthan.
- **Origin: Man-made (1845)**—dam on a **Ruparel River tributary** to supply Alwar city.
- **Extent & setting: ~7 sq km**; within the **buffer zone of Sariska Tiger Reserve**.
- **Ecology: Critical freshwater wetland** in a **semi-arid region**, supporting **100+ bird species**.

46. Sujalam Bharat App Launched under Jal Jeevan Mission

Launch: On **10 December 2025**, the **Ministry of Jal Shakti** launched the **Sujalam Bharat app** to strengthen **transparency, monitoring, and community participation** in rural drinking water supply under the **Jal Jeevan Mission**.

- **Platform scope:** A **national digital platform** providing **real-time, scheme-level data** on rural water supply infrastructure across **all States and Union Territories**.
- **Technology partner:** Developed with technical support from **Bhaskaracharya National Institute for Space Applications and Geo-informatics (BISAG-N)**.
- **Governance impact:** Enhances **accountability and community ownership** by enabling transparent tracking and public oversight of schemes.
- **O&M focus:** Supports a **structured, digital, and systematic approach** to **operation and maintenance** of rural water supply systems.
- **Database integration:** Operationalises the **Sujalam Bharat Database**, assigning each scheme a **unique Sujalam Bharat–Sujal Gaon ID** for **precise mapping of service areas and beneficiary households**.

47. SilverLine Project vs Bairabi–Sairang Rail

- **Centre's direction:** The **Union Government of India** asked **Kerala** to **address technical and environmental concerns** of the **SilverLine Project** and **integrate it with the existing broad-gauge network**.
- **SilverLine (Kerala):** A **530-km semi–high-speed corridor** from **Thiruvananthapuram to Kasaragod**, proposed to cut travel time from **~12 hours to <4 hours**, covering **11 districts** and easing congestion on Kerala's coastal rail line; implemented by **Kerala Rail Development Corporation Ltd. (K-RDCL)**, a Kerala–Indian Railways JV.
- **Comparative example:** The **Bairabi–Sairang railway line** (51.38 km) in **Mizoram** was inaugurated despite tougher terrain, delivering **first-ever rail connectivity to Aizawl**—the **fourth Northeast capital** on the national rail grid.
- **Engineering benchmark:** Bairabi–Sairang features **Bridge No. 196** with a **104-m pier**, **India's second-highest railway pier**, underscoring feasibility in challenging hills.

48. Exocyst Complex & Autophagy

- **Discovery:** Researchers from **Jawaharlal Nehru Centre for Advanced Scientific Research (JNCASR)** identified a **previously unknown role of the exocyst protein complex in autophagy**, beyond its known function in secretion.
- **Autophagy role:** Autophagy is a **cellular waste-removal and recycling process**, crucial for **cellular homeostasis**, especially in **long-lived cells like neurons**.
- **Disease linkage: Defective autophagy** is implicated in **Alzheimer's, Parkinson's, Huntington's diseases**, and **cancer progression**.
- **Cancer paradox:** Autophagy acts as a **tumour suppressor in early stages**, but **advanced cancers can hijack it** to support survival and growth.
- **Mechanism uncovered:** The **exocyst complex (8 proteins)**—with **7 essential for autophagosome formation**—is **directly required** for building functional autophagosomes.
- **Failure mode:** Loss or dysfunction of the exocyst complex **disrupts autophagosome formation**, leading to **non-functional cellular waste-processing**.
- **Therapeutic promise:** Clarifying this regulatory role **opens new targets** for therapies against **neurodegenerative diseases and cancers** linked to impaired autophagy.

49. CITES marks 50 years, tightens global wildlife trade protections

The **Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)** celebrated its **50th anniversary** at **CoP20 in Samarkand, Uzbekistan**—the first CITES CoP held in Central Asia.

Parties adopted several decisions to **uplist species, strengthen bird and big-cat protections, and step up action against illegal wildlife trade**, while approving a **budget hike for 2026–28**.

- **Key Outcomes of CoP20 (Samarkand)**
  - **Species uplistings: 77 species** added to CITES Appendices, including significant **uplistings of sharks and iguanas**, tightening international trade controls.
  - **Bird safeguards:** Stronger protection for **African hornbills, vultures and threatened songbirds**, reflecting concern over pet trade and body-part use.
  - **Asian big cats:** Approval of an **independent reporting system** to support evidence-based decisions for **tigers, leopards, Asiatic lions** and other Asian big cats.
  - **Illegal wildlife trade focus: Samarkand Declaration** emphasises **technology use, online wildlife crime monitoring and regional cooperation** to counter illegal trade.
  - **Budget decision:** Parties agreed to a **6.98% budget increase** for the CITES Secretariat for **2026–2028**.
- **About CITES (static, exam-focused)**
  - **Nature:** Global treaty to ensure **international trade in wild animals and plants does not threaten their survival**.
  - **History:**
    - Proposed at an **IUCN meeting (1963)**;
    - Signed in **Washington D.C. (1973)**;
    - Entered into force in **1975** → hence 50 years in 2025.
  - **Membership & scope:**
    - **185 Parties** (184 countries + EU), regulating trade in **40,000+ species**.
    - Secretariat hosted by **UNEP in Geneva**.
  - **Legal character:**
    - **Legally binding** on Parties, but does **not override national law**—each Party must enact domestic laws (e.g. Wildlife Protection Act, 1972 for India).
- **CITES Appendices – Protection Levels (Very important for Prelims)**
  - **Appendix I:**
    - Species **threatened with extinction**; **highest protection**.
    - **Commercial trade generally prohibited**; only exceptional non-commercial trade (e.g. scientific) with strict permits.
  - **Appendix II:**
    - Species **not yet endangered**, but may become so unless trade is regulated.
    - Commercial trade allowed **with export (and sometimes import) permits**; may include **"zero quota"** to effectively ban trade.
  - **Appendix III:**
    - Species listed **unilaterally by a Party** seeking international help to control trade.
    - Trade allowed with **CITES permits or certificates of origin**, depending on listing country.

50. CeNS Breakthrough in Water Splitting

- **Discovery:** Scientists at **Centre for Nano and Soft Matter Sciences (CeNS), Bengaluru** developed a **novel catalyst-activation method** to improve **water-splitting efficiency** for **clean hydrogen production**.
- **Problem addressed:** The **oxygen evolution reaction (OER)**—the slow, energy-intensive step in electrolysis that limits overall efficiency.
- **Approach:** Targeted **metal–organic coordination polymers (COPs)**, whose active sites are typically blocked by water/solvent molecules.
- **Innovation: Argon plasma activation** created **coordinatively unsaturated metal sites** in COPs, **boosting electrocatalytic activity** without structural damage.
- **Validation: XRD, TEM, and XPS** analyses confirmed enhanced performance in **Ni- and Co-based COPs** while preserving bulk framework integrity.
- **Outcome: Lower OER onset potentials** and **faster reaction kinetics** under **alkaline conditions** compared to untreated catalysts—marking a significant step toward **efficient green hydrogen**.

51. World's Largest Colonial Spider Web

- **Discovery:** A **106 sq m** single colonial spider web—the **largest recorded**—was found in a **sulfur-rich cave** in **Vromoner Canyon**.
- **Species involved:** The colony comprised the **Barn funnel weaver** and the **Dwarf weaver**—both typically **solitary**, with the former usually **preying on** the latter.
- **Why coexistence occurred: Total darkness** curtailed visual hunting, reducing predation; **high hydrogen sulfide** levels sustained **dense midge populations**, eliminating food competition.
- **Ecological insight:** Extreme cave conditions can **override normal species interactions**, enabling large-scale communal web formation.

52. Sarahan Pheasantry & Western Tragopan

- **Conservation Effort:** Sarahan Pheasantry (Himachal Pradesh) runs a **captive-breeding programme** to maintain a stable reserve population of the **western tragopan**.
- **Species Identity:** Western tragopan (*Tragopan melanocephalus*), locally called **Jujurana** ("king of birds"); **State bird of Himachal Pradesh**.
- **Status (Corrected):** **IUCN – Vulnerable** (not Endangered); **CITES – Appendix I**; **WPA – Schedule I**.
- **Habitat:** Undisturbed **temperate coniferous/mixed forests** with dense bamboo undergrowth at **2,400–3,600 m**.
- **Distribution:** Fragmented pockets in **northern Pakistan, J&K, Himachal Pradesh, and western Uttarakhand**; **Great Himalayan National Park** holds the largest known population.
- **Biology:** Males display a **purple-blue throat wattle and blue horns** during courtship; females are cryptically coloured.
- **Ecological Role:** **Indicator species** of Himalayan temperate forest health; aids **seed dispersal**.
- **Threats:** **Habitat fragmentation**, grazing pressure, and **poaching** for plumage.

DECEMBER 2025

SCI & TECH

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33. Cosmic Filament with Aligned Spins

1. Chandrayaan-3 Reveals Electrically Active Lunar South Pole

Data from **Chandrayaan-3** show that the Moon's south polar region is **far more electrically active** than earlier estimates—based on the **first in-situ, low-altitude plasma measurements** ever made there.

Instrument Behind the Discovery

- **RAMBHA-LP** (*Radio Anatomy of Moon-Bound Hypersensitive Ionosphere and Atmosphere – Langmuir Probe*) was a key payload on the **Vikram** lander.
- Unlike earlier missions that inferred plasma properties from **high-altitude flybys**, RAMBHA-LP measured plasma **just above the surface** at the Chandrayaan-3 landing site, **'Shiv Shakti'**.

Key Scientific Findings

- **High Electron Density: 380–600 electrons/cm³** detected near the surface—**significantly higher** than previous lunar estimates.
- **Hot Electrons: 3,000–8,000 K** electron temperatures indicate **energetic near-surface plasma**.
- **Dynamic Plasma Regime:**
  - **Daytime:** Dominated by **solar wind** interactions.
  - **Night-side phases:** Plasma properties change when the Moon passes through **Earth's geomagnetic tail (magnetotail)**.
- **Molecular Effects:** Traces of **CO_2 and H_2O vapour** may influence ionisation and plasma behaviour near the surface.

Why This Matters

- **Rewrites Lunar Ionosphere Models:** Confirms the lunar ionosphere—though tenuous—is **locally active and variable**, especially near the south pole.
- **Human & Robotic Operations:** Plasma can affect **surface charging, dust levitation**, communications, and **instrument reliability** for future landers and habitats.
- **Resource & Environment Studies:** Interactions between plasma and **volatiles (water, CO_2)** are crucial for understanding **in-situ resource utilisation (ISRU)** prospects.
- **Earth–Moon Space Weather Link:** Highlights how **Earth's magnetotail** periodically reshapes the Moon's near-surface environment.

Key Concepts

- **Plasma:** Ionised gas with free electrons and ions; electrically neutral overall but **highly responsive to electromagnetic forces**.
- **Lunar Ionosphere:** A **very thin, weak plasma layer** just above the Moon's surface.
- **Earth's Geomagnetic Tail:** The elongated **night-side extension** of Earth's magnetic field formed by solar-wind pressure.

Bottom line: Chandrayaan-3's RAMBHA-LP has shown that the lunar south pole hosts a **hotter, denser, and more dynamic plasma environment** than previously thought—critical knowledge for the Moon's next phase of exploration.

2. SA to Deploy Small Nuclear Reactor on Moon under Lunar Fission Surface Power Project

The **United States** plans to deploy a **compact nuclear fission reactor on the Moon** by the **early 2030s** under its *Lunar Fission Surface Power Project*. This marks a strategic shift toward **space nuclear energy systems** to support long-duration lunar and Mars missions, overcoming limits of solar power.

Why Nuclear Power in Space?

Long Lunar Nights: A lunar day lasts ~29.5 Earth days, causing ~14 Earth days (~336 hours) of darkness; solar arrays cannot provide continuous power during these nights.

Reliability: Nuclear systems deliver **24×7 power** unaffected by sunlight, dust storms, or temperature extremes — critical for life support, habitats, labs, drilling, and exploration units.

High Power Demand: Future missions, especially **In-Situ Resource Utilisation (ISRU)** — extracting water, oxygen, fuel from lunar ice — require power levels **>1 MW** that solar alone can't reliably supply.

- *ISRU* uses local resources to reduce reliance on Earth-launched supplies, making missions sustainable.

Technologies for Nuclear Power in Space

1. **Radioisotope Thermoelectric Generators (RTGs):**
   - Converts heat from decay of **Plutonium-238** into electricity.
   - Output: ~100–300 watts (used in *Voyager*, *Cassini*, *Curiosity*).
   - Limitation: Too low power for habitats/industrial use.
2. **Compact Fission Reactors:**
   - **Container-sized reactors** generating **10–100 kW continuously**.
   - Capabilities: Habitat power, heating, 3D printing, oxygen production, communications.
   - To be demonstrated on Moon as part of Artemis-era infrastructure.
3. **Nuclear Thermal Propulsion (NTP):**
   - Nuclear core heats **hydrogen propellant** that expands through a rocket nozzle.
   - Provides **high thrust** with greater efficiency than chemical rockets.
   - E.g., **DARPA's DRACO** program explores such systems.
4. **Nuclear Electric Propulsion (NEP):**
   - Reactor generates electricity, ionises propellant (e.g., xenon), and accelerates ions via electromagnetic fields.
   - Offers **high efficiency, low thrust** over long durations — ideal for deep-space cargo missions.

Legal Framework Governing Nuclear Power in Space

- **Outer Space Treaty (1967):**
- **Liability Convention (1972):**
- **UN Principles Relevant to Nuclear Power (1992):**

3. NASA Loses Contact with MAVEN Mars Orbiter After a Decade

NASA has **lost communication** with its Mars Atmosphere and Volatile Evolution mission (**MAVEN**), marking a potential end to one of the most scientifically significant Mars orbiters after **over 10 years of operations**.

About the MAVEN Mission

- **Agency:** NASA
- **Launch:** 2013
- **Mars Orbit Insertion:** 2014
- **Primary Role:** First spacecraft **exclusively dedicated** to studying **Mars' upper atmosphere and ionosphere**.

Core Scientific Objective

- To understand **how and why Mars lost its atmosphere**—especially **water vapour and carbon dioxide**—and how this transformed Mars from a **warm, wet planet** into the **cold, arid world** seen today.

Landmark Scientific Findings

- **Atmospheric Escape Confirmed:**
  MAVEN established that **solar wind and solar storms** strip atmospheric gases from Mars due to the planet's **weak magnetic field**.
- **Scale of Loss:**
  Mars has lost ~**two-thirds of its original atmosphere** over billions of years.
- **Climate Transformation:**
  This atmospheric erosion explains the disappearance of **liquid water** from the Martian surface.
- **Solar Influence:**
  Rates of atmospheric loss were much higher when the **young Sun was more active**.

Critical Operational Role

- **Orbital Relay Hub:**
  MAVEN functioned as a **key communications relay**, transmitting data from surface missions like
  - **Curiosity**
  - **Perseverance**

    back to Earth.

Loss of MAVEN increases dependence on **other aging Mars orbiters** for relay support.

Indian Parallel

- **Mars Orbiter Mission (Mangalyaan)**
  - Entered Mars orbit in **2014**, around the same time as MAVEN.
  - Operated by **ISRO**.
  - Focused on **atmospheric studies, surface imaging, and methane detection**, showcasing India's early deep-space capability.

4. Cassini Reanalysis Challenges the Idea of a Global Ocean on Titan

A fresh reanalysis of data from **Cassini–Huygens** suggests that **Titan**, Saturn's largest moon, **may not possess a planet-wide subsurface ocean**, revising one of the most exciting conclusions drawn from earlier observations.

What Earlier Studies (2008) Suggested

- **Tidal Flexing Evidence:**
  Strong **tidal deformation** of Titan—caused by **Saturn**'s gravity—was detected through **Doppler shifts** in Cassini's radio signals during close flybys.
- **Inference:**
  Such large flexing was interpreted as evidence of a **global liquid water ocean** beneath Titan's icy crust, similar to Europa or Enceladus.

What the New Reanalysis Finds

- **Revised Interior Model:**
  Titan's observed flexibility can be explained by a **partially molten ice–water mixture** rather than a fully liquid ocean.
- **Heat Dissipation Effect:**
  This slushy layer allows flexing **but dissipates tidal heat efficiently**, preventing the maintenance of a stable, global subsurface ocean.
- **Key Shift:**
  Flexibility ≠ guaranteed global ocean.

Does This End Titan's Habitability Story?

Not entirely.

- **Localised Liquid Pockets:**
  Titan may still host **regional pockets of warm liquid water** (up to ~20 °C).
- **Geochemical Cycling:**
  These pockets could enable **mineral exchange** between the rocky core and icy crust.
- **Astrobiological Implication:**
  While complex life is unlikely, **conditions for simple microbial life** cannot be ruled out.

Key Concept: Tidal Flexing

- **Definition:** Repeated stretching and squeezing of a moon due to its planet's gravity.
- **Why It Matters:**
  - Generates internal heat
  - Reveals clues about internal layers (solid vs liquid)
  - Used as indirect evidence for subsurface oceans

5. Astronomers Spot First-Ever "Superkilonova" Event, AT2025ulz, 1.3 Billion Light-Years Away

Astronomers have identified **AT2025ulz — a candidate superkilonova**, marking the **first potential observation of a rare double explosion** in deep space combining characteristics of both a supernova and a kilonova, offering evidence for **sub-solar mass neutron stars**.

What is a Superkilonova?

Definition: A *superkilonova* is a **hypothesised rare cosmic event** where a **supernova explosion** and a **kilonova** arise from the *same progenitor* — essentially a double explosion.

Kilonova: Results when two neutron stars merge, emitting both **gravitational waves** and light across the electromagnetic spectrum.

Mechanism:

Supernova Stage: A massive star collapses and explodes, leaving behind extremely dense remnants called **neutron stars** — sometimes two close binary neutron stars.

Kilonova Stage: These newborn neutron stars rapidly spiral together and **merge**, releasing gravitational waves and a kilonova explosion.

The merger can take place **almost immediately after the supernova**, yielding a *combined brightness and unique signature*.

AT2025ulz: The First Candidate

Observed: Located roughly **1.3 billion light-years away**.

Detection: Gravitational Waves: On *18 August 2025*, the **LIGO–Virgo–KAGRA** collaboration picked up a signal indicating a binary neutron star merger.

- **Electromagnetic Follow-Up:** The **Zwicky Transient Facility** and other telescopes observed a transient — **AT2025ulz** — in the same region.

Unique Observational Traits:

- **Initial Signal:** Showed characteristics similar to a *kilonova* (rapid fading red glow and heavy element signatures).
- **Subsequent Brightening:** Days later, it *brightened and became bluer*, showing features typical of a **supernova**, including hydrogen emissions — an unusual combination.

Scientific Significance

- **Sub-Solar Mass Neutron Stars:** Gravitational-wave data hinted that at least one of the colliding objects had **less mass than our Sun** — a phenomenon previously theorised but **not observed** until now.
- **First Direct Evidence:** This event potentially confirms the existence of such **sub-solar neutron stars** and gives astrophysicists insight into how **massive star collapse** might create them.
- **New Class of Explosion:** A superkilonova blends two explosive mechanisms, providing a novel window into stellar evolution, heavy element formation, and gravitational-wave astrophysics.

6. Geminid Meteor Shower (December 13–14, 2025)

- One of the strongest annual meteor showers, peaking in mid-December with best visibility in India on **13–14 December 2025**.

  Caused by debris from **3200 Phaethon**, an Apollo-type near-Earth asteroid (unusual, as most showers come from comets).

- Known for **bright, slow-moving meteors** and frequent **fireballs**, often visible to the naked eye.

Key Terms

- **Meteor**: Streak of light produced when a meteoroid burns up in Earth's atmosphere (mainly mesosphere).
- **Meteoroid**: Small rocky or metallic debris moving through interplanetary space.
- **Meteorite**: Fragment that survives atmospheric entry and reaches Earth's surface.
- **Asteroids**: Rocky remnants of planet formation, mostly found in the asteroid belt.
- **Comets**: Icy bodies that release gas and dust, forming a tail when near the Sun.

7. ISRO's LVM3 Successfully Launches Heaviest Commercial Satellite BlueBird-6 into LEO

The **Indian Space Research Organisation (ISRO)** successfully launched the **BlueBird Block-2 satellite (BlueBird-6)** aboard its heavy-lift rocket **Launch Vehicle Mark-3 (LVM3-M6)** on **24 December 2025**, marking the **heaviest satellite launched from Indian soil**.

Mission Overview

- **Launch Vehicle: LVM3** (formerly **GSLV Mk-III**), India's most powerful launch vehicle; sixth operational flight on the **LVM3-M6** mission.
- **Launch Site: Satish Dhawan Space Centre**, Sriharikota, Andhra Pradesh.
- **Orbit: Low Earth Orbit (LEO)** (~518–520 km altitude).

About BlueBird Block-2 (BlueBird-6)

- **Developer: AST SpaceMobile**, a U.S.-based space company.
- **Purpose:** The satellite is part of a **next-generation global communications constellation** that aims to provide **direct satellite-to-standard smartphone connectivity** for **4G/5G voice, video, text messaging, streaming, and data services** — without specialised ground antennas.
- **Key Features:**
  - **Large Phased-Array Antenna:** ~223 m² — among the largest commercial communications antennas in LEO.
  - **Significant Capacity Gain:** Offers nearly **10× data capacity** compared to predecessor satellites, enabling near-continuous global coverage.
- **Payload Mass:** Approximately **6,100 kg**, making it **the heaviest commercial satellite** launched from India and the **largest communications satellite deployed into LEO** by ISRO.

About Launch Vehicle Mark-3 (LVM3)

- **Configuration:** Three-stage launcher with:
  - Two **S200 solid strap-on motors** (first stage),
  - A **liquid core stage (L110)**,
  - A **cryogenic upper stage (C25)**.
- **Capabilities:**
  - Can lift ~**8,000 kg to LEO** and ~**4,000 kg to Geosynchronous Transfer Orbit (GTO)**.
- **Achievements:** Apart from commercial missions, LVM3 has launched key national payloads including **Chandrayaan-2, Chandrayaan-3**, and multiple **OneWeb** satellites, establishing a **100% success record** over nine launches.

8. ISRO Tests Drogue Parachutes for Gaganyaan

- **Successful Test:** ISRO validated drogue parachutes of the Gaganyaan crew module deceleration system at the **RTRS facility, TBRL, Chandigarh**.
- **Objective:** Assess performance, reliability, and robustness under extreme flight conditions and parameter variations.
- **Collaboration:** Conducted jointly by **VSSC (ISRO)**, **ADRDE**, and multiple **DRDO laboratories**.

Gaganyaan Deceleration System

- **Multi-stage system** using four parachute types for safe re-entry and landing.
- **Sequence:** Apex cover separation → **Drogue parachutes** (stabilise & slow) → Pilot parachutes → Main parachutes (safe touchdown).
- **Drogue Parachute Role:** High-speed stabilisation and braking device, critical for enabling safe main parachute deployment.

9. Google's Project Suncatcher

- **Initiative:** Google's Project Suncatcher aims to deploy **solar-powered AI data centres in space by 2027** to cut the climate and resource costs of terrestrial data centres.
- **Core Idea:** Shift energy-intensive AI computing to orbit, using **continuous solar power** to reduce dependence on Earth's land, water, and electricity.
- **How It Works:** Satellites fitted with **modular computing racks** and **AI-optimised TPUs** process data in space, interlinked via **laser-based optical communication**, with results transmitted back to Earth.
- **Key Features:** Uninterrupted solar energy, high-speed inter-satellite laser links, and **radiation-hardened chips** designed to operate reliably in harsh space conditions.

10. MahaCrimeOS AI

Microsoft CEO Satya Nadella launched **MahaCrimeOS AI**, India's **first AI-powered operating system for law enforcement**, to strengthen cybercrime investigations by the Maharashtra Police.

Purpose: Accelerates cybercrime detection, analysis, and investigation using AI.

Developers: Jointly built by Maharashtra government's **MARVEL**, cybersecurity startup **CyberEye**, and **Microsoft India Development Centre (IDC)**.

Legal Alignment: Supports **time-bound investigations** mandated under the **Bharatiya Nyaya Sanhita (BNS)**.

Significance: Marks a major step toward **AI-enabled policing and governance** in India, improving efficiency, accuracy, and case turnaround time.

11. Meta–Google TPU Talks: Why It Matters for the AI Chip Market

Reports indicate that **Meta is in advanced discussions to use Google's Tensor Processing Units (TPUs)** for its AI workloads. If finalised, this would mark a significant shift away from Meta's heavy dependence on **Nvidia GPUs**, potentially reshaping the competitive dynamics of the global AI chip ecosystem.

About Tensor Processing Units (TPUs)

What are TPUs? TPUs are **application-specific integrated circuits (ASICs)** developed by Google in **2016**, purpose-built to accelerate **AI and machine learning workloads**, especially deep learning.

How They Work: TPUs are optimised for **tensor-based mathematical operations** (matrix multiplications), enabling:

- Massive parallel processing
- Faster training and inference of AI models
- Lower latency for large datasets

Performance Leap:

- Google's **TPUv7 "Ironwood"** reportedly **matches Nvidia's Blackwell platform** in both **compute power and memory capacity**.
- This narrows what was once a substantial performance gap between GPUs and TPUs.

Efficiency Advantage:

TPUs deliver **higher throughput per watt**, making them more **energy-efficient** than:

- General-purpose CPUs
- Many GPU-based AI systems at hyperscale

Key Technical Concepts (Quick Clarity)

Tensor: A multi-dimensional data structure (scalars, vectors, matrices, higher dimensions) used in AI to represent images, text embeddings, weights, etc.

GPU vs TPU:

- **GPU:** General-purpose parallel processor, dominant in AI training and inference.
- **TPU:** Specialised AI accelerator, optimised for scale, efficiency, and predictable workloads.

Big Picture Takeaway

If Meta shifts even part of its AI workloads to **Google TPUs**, it would signal a **structural shift in the AI hardware market**—from Nvidia-centric dominance to a more **competitive, diversified accelerator ecosystem**, with long-term implications for pricing, innovation, and global AI infrastructure.

12. DHRUV64: India's First Indigenous 64-bit Microprocessor Unveiled

The Ministry of Electronics and Information Technology (MeitY) has unveiled **DHRUV64**, India's **first fully indigenous 64-bit microprocessor**, marking a major step toward self-reliance in advanced chip design under **Atmanirbhar Bharat**.

What is DHRUV64?

- **Type:** 64-bit, dual-core microprocessor
- **Clock Speed:** 1.0 GHz
- **Architecture: RISC-V** (open-source, licence-free)
- **Developer: Centre for Development of Advanced Computing (C-DAC)**
- **Programme:** Developed under the **Microprocessor Development Programme (MDP)**
- **DIR-V Lineage:** Third processor under the **Digital India RISC-V (DIR-V)** programme, after **THEJAS32** and **THEJAS64**

Key Applications

5G infrastructure

Automotive electronics

Industrial automation

Consumer electronics

Internet of Things (IoT) devices.

Why DHRUV64 Matters

- **Technological Sovereignty:** Reduces dependence on foreign proprietary chip architectures.
- **Cost & Innovation Advantage:** RISC-V enables domestic startups, academia, and industry to innovate without licensing barriers.
- **Ecosystem Building:** Strengthens India's **Electronics System Design and Manufacturing (ESDM)** ecosystem.
- **Strategic Depth:** Lays groundwork for secure, trusted hardware in telecom, defence-adjacent, and critical infrastructure sectors.

Related Initiatives & Concepts

- **Microprocessor:** The CPU of an electronic system—executes instructions and controls operations.
- **RISC-V:** An open instruction set architecture (ISA) that allows flexible, scalable chip design.
- **DIR-V Programme:** A MeitY initiative to position India as a global hub for ESDM through indigenous RISC-V development.
- **Upcoming Chips:** India is also developing **Dhanush** and **Dhanush+** processors.

13. Scientists Measure Quantum Chaos (OTOCs) Using Google's 65-Qubit Chip, Marking Quantum Advantage

Researchers successfully **measured Out-of-Time-Order Correlators (OTOCs)** — a key metric for quantum chaos and information scrambling — on **Google's 65-qubit "Willow" superconducting quantum processor**, running the *Quantum Echoes* algorithm about **13,000× faster** than known classical algorithms, signaling progress toward practical **quantum advantage**.

Out-of-Time-Order Correlators (OTOCs)

- **Definition & Purpose:** OTOCs are **metrics of quantum chaos**, showing how a **tiny disturbance** at one time affects measurements at later times in a quantum system.
- **Quantum Echo:** By nudging the system and then running it **backwards** in time, scientists check whether the system retraces its state — a strong "echo" indicates stability; a weak or absent echo indicates **information scrambling** and chaos.
- **Information Scrambling:** A process where quantum information spreads across system degrees of freedom so thoroughly that it cannot be recovered in its original form — key in understanding thermalisation, black-hole dynamics, and robust quantum devices.
- **Hardware Benchmarking:** Because OTOCs are highly sensitive to noise and errors, they are valuable for **testing and benchmarking quantum computing hardware**. Measuring them effectively demonstrates improved coherence and error management.

Quantum Computing

- **Qubits:** Unlike classical bits (0 or 1), **qubits leverage superposition**, enabling them to be in both 0 and 1 simultaneously, drastically increasing computing possibilities.
- **Entanglement & Interference:** Essential quantum phenomena that allow qubits to correlate in ways classical bits cannot, enabling parallelism.
- **Quantum Advantage:** The threshold where a quantum processor performs a **task faster or more efficiently** than any classical computer — here demonstrated by the *Quantum Echoes* algorithm outpacing classical peers by ~13,000× on this specific task.

Wider Quantum Context

National Quantum Mission (NQM) — India : Building **50–1000 qubit systems**, **secure quantum networks**, and **advanced quantum sensors** to strengthen scientific and strategic capabilities (India's National Quantum Mission).

Q-Day — Quantum Threat to Cryptography

- **Meaning:** "Q-Day" refers to a future point when quantum computers can **break existing public-key cryptosystems** — especially RSA-2048 — by efficiently solving underlying mathematical problems (e.g., factoring large numbers using **Shor's algorithm**).
- **Harvest Now, Decrypt Later:** Adversaries may store today's encrypted data to decrypt future when quantum computers mature.
- **Post-Quantum Cryptography (PQC):** Cryptographic systems designed to be secure against quantum attacks are under global development and standardisation:
    - **NIST PQC Standards:** CRYSTALS-Kyber (encryption), Dilithium (digital signatures), and SPHINCS+ (backup).

14. Optical Frequency Combs: Light Rulers Transforming Precision Metrology

Recent advances in **precision optics** and **high-accuracy measurement systems** have renewed focus on **Optical Frequency Combs (OFCs)**, which are now foundational tools in modern **metrology**, atomic clocks, astronomy, and next-generation communication technologies.

What is Metrology?

Metrology is the science of measurement. It ensures **standardisation, calibration, and traceability**, so that measurements are accurate, comparable, and universally accepted (crucial for science, industry, navigation, and defence).

Optical Frequency Comb (OFC): Core Concept

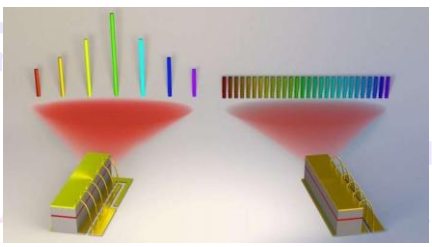
- An **Optical Frequency Comb** is a **specialised laser source** that acts like an **ultra-precise ruler for light frequencies**.
- Its invention was recognised with the **2005 Nobel Prize in Physics**.

How It Works

- The laser emits **thousands of discrete, equally spaced spectral lines**, resembling the **teeth of a comb**.
- Each "tooth" has a precisely known frequency.
- By comparing an unknown light signal with these reference lines, scientists can measure **frequency, wavelength, and time** with extreme precision.

Types of Optical Frequency Combs

1. **Mode-Locked Laser Combs**
   - Most widely used
   - High stability and accuracy
2. **Kerr Microcombs**
   - Extremely compact (chip-scale)
   - Crucial for portable and integrated photonics
3. **Electro-Optic (EO) Combs**
   - Very high repetition rates
   - Useful in high-speed signal processing
4. **Quantum Cascade Laser (QCL) Combs**
   - Operate in the infrared region
   - Important for molecular spectroscopy and gas sensing



Key Applications

- **Optical Atomic Clocks :** Enable timekeeping with accuracy better than one second over the age of the universe
- **Astronomy & Exoplanet Detection :** Detect minute stellar "wobbles" to identify planets around distant stars
- **Fibre-Optic & Quantum Communications :** Enable dense data transmission and frequency multiplexing
- **Precision Spectroscopy:** Identification of molecules, gases, and isotopes with high sensitivity

15. India to Host India-AI Impact Summit 2026: Global South Leads AI Governance Discourse

India will host the **India-AI Impact Summit** in **New Delhi (16–20 February 2026)**, marking the **first time this global AI summit series is held in the Global South**. The summit follows earlier global AI meets such as the **UK AI Safety Summit (2023)**, **AI Seoul Summit (2024)** and **Paris AI Action Summit (2025)** (co-chaired by India).

About the India-AI Impact Summit

- **Nature:** Global, multi-stakeholder AI governance summit
- **Core Objective:** Shape **long-term global AI governance pathways**, rather than rushing into binding regulations
- **India's Positioning:** Championing **inclusive, development-centric AI** aligned with Global South priorities

Key Focus Areas

- **AI Safety & Trust**
- **Interoperability of AI systems**
- **Equitable access to compute & data**
- **Accountability and responsible deployment**
- **Scalable innovation without stifling growth**

Guiding Framework: Three Pillars

1. **People** – Human-centric AI, inclusion, skills and ethics
2. **Planet** – Sustainable AI, energy efficiency, climate-aligned deployment
3. **Progress** – Innovation, productivity, and economic transformation

Seven Chakras of the Summit Agenda

1. **Human Capital** – AI skills, education and workforce readiness
2. **Inclusion** – Bridging digital & AI divides
3. **Safe & Trusted AI** – Ethics, transparency, explainability
4. **Resilience** – AI for disaster response, health, food security
5. **Innovation & Efficiency** – Productivity gains across sectors
6. **Democratising AI Resources** – Access to compute, models and data
7. **AI for Economic & Social Good** – Development-oriented AI use cases

Special Inclusion Initiatives

- **YUVAi:** Youth-led AI innovation platform
- **AI by HER:** Women-led AI solutions and leadership integration
  These initiatives aim to correct global AI leadership imbalances.

16. Indian Policing Shifts to Digital Residue-Based Investigations from Traditional Evidence

Indian law enforcement agencies are increasingly relying on **digital residue** — electronic footprints from online and device activities — as **primary evidence** in investigations, enabled by evolving laws like the **Bharatiya Sakshya Adhiniyam, 2023** and digital intelligence systems such as **BHARATPOL**.

What is Digital Residue? : Digital residue refers to **electronic trails** generated when everyday digital activities occur — like online payments, app logins, cloud interactions, FASTag usage, or device authentications. These traces serve as modern evidence in crime detection and legal processes.

Types of Digital Evidence in Policing

1. Device Attribution:

- **One-Time Passwords (OTPs), mobile verification logs, device IDs** link online activities and transactions to specific users and devices, enabling attribution of a digital act to an individual.

1. **Spatial Reconstruction:**
   - **FASTag toll alerts**, delivery app logs, and telecom session data help reconstruct **inter-state movement patterns**, even where a suspect may dispose of primary devices.
2. **Intent Proof:**
   - **Search histories, AI chatbot queries, deleted cloud backups**, and digital drafts can reveal **premeditation or intent** in offences such as fraud, cybercrime, or conspiracy.
3. **Temporal Proof:**
   - **Timestamped digital logs** such as banking app activities or OTP-based authorisations provide precise **time markers** critical in temporal reconstruction of events (e.g., financial frauds).

Legal Basis and Frameworks in India

1. **Bharatiya Sakshya Adhiniyam (BSA), 2023:**
   - Recognises **electronic records** (server logs, location data, device metadata) as **primary evidence**. This updates traditional evidence law to accommodate digital traces in investigations and trials, simplifying admissibility and reducing dependency on intermediaries.
2. **BHARATPOL (2025):**
   - A **centralised digital intelligence system** launched by the **Central Bureau of Investigation (CBI)**. It integrates **big data analytics and artificial intelligence** to analyse real-time digital residue, identify threats, and track fugitives.
3. **TIUE Norms:**
   - **Telecommunication Identifier User Entities (TIUEs)** classification mandates that apps and services using **mobile numbers** require **strict SIM–user binding**, enhancing accountability and reducing fake or anonymous digital profiles.

17. Thorium-229 Nuclear Clock Breakthrough

Scientists have, for the first time, detected the nuclear "tick" of **Thorium-229 in a solid**, enabling the development of compact, ultra-precise nuclear clocks.

Core Concepts

- **Nuclear clocks** measure time using transitions within the atomic nucleus (proton–neutron states), unlike atomic clocks based on electron transitions.
- **Thorium-229** has an exceptionally low-energy nuclear transition, ideal for timekeeping but long obscured by **internal conversion** (energy transfer to electrons instead of photon emission).

What Was Achieved

- **Method:** Vacuum-ultraviolet (VUV) laser excited Thorium-229 nuclei embedded in a thin thorium dioxide film.
- **Detection:** Timed electric fields captured delayed electrons from nuclear decay, bypassing difficult photon detection.
- **Precision:** Resonance measured at **2,020,407.5 GHz**, implying a clock error of **1 second in ~15.8 billion years**.

Why It Matters

- **Unmatched accuracy:** Enables next-generation navigation and timing systems.
- **Miniaturisation:** Solid-state, thin-film design allows compact nuclear clocks for satellites and mobile platforms.
- **Scalability:** Eliminates need for rare, transparent crystals, reducing cost and complexity.
- **Geophysical use:** Ultra-stable clocks can detect tiny tectonic shifts, improving earthquake and volcano early-warning systems.

18. India's GE (Genome-Edited) Crops Advance Rapidly Amid Stagnation in GM Crop Approvals

After **Bt cotton (2006)**, India's **GM crop approvals stalled**, but **genome-edited (GE) crops** are progressing swiftly due to **regulatory relaxation, scientific breakthroughs, and policy support** — with GE rice and mustard varieties nearing approval and deployment.

What is Gene Editing?

- **Definition:** Gene editing modifies a plant's **own native genes** by making **precise cuts at targeted DNA sites** using a **protein (e.g., Cas enzyme)** guided by an RNA sequence, creating mutations mimicking **natural variations**.
- **No Foreign DNA:** Unlike GM (Genetically Modified) crops, GE doesn't introduce **foreign DNA**; final plants remain **transgene-free**.

Differences: GE vs GM Crops

Feature	GE Crops	GMOs (Genetically Modified)
DNA Source	Native gene edits only	Adds foreign genes from other species
Regulatory Burden	Streamlined regulatory path	Stringent biosafety and multi-stage approvals
Traits	Precision edits, quicker development	Often broader trait introduction
Developers	Public sector + small labs enabled	Dominated by large corporations
Regulation in India	IBC clearance if no foreign DNA	GEAC clearance required
Note: GE crops transgene-free, while GMOs carry transgenes.		

India's Progress in Genome Editing

- **GE Rice Lines Cleared:** Improved versions of **Samba Mahsuri** and **MTU-1010** completed multi-location trials (2023–24). Samba Mahsuri showed ~**19% yield increase** and MTU-1010 showed **salt and alkaline tolerance**.
- **GE Mustard Advancing:** A **low-pungency, canola-quality mustard** with disease and pest resistance is in advanced trials and may be approved soon.
- **Development Traits:** GE tools have been used to enhance traits such as yield, drought/salinity tolerance, and quality attributes.

Technologies Behind GE in India

- **CRISPR–Cas9:** Widely used for drought and salinity tolerance edits.
- **CRISPR–Cas12a:** Used for editing yield-linked genes (e.g., cytokinin oxidase/Gn1a) in rice.

Indigenous Tools: India has developed **TnpB-based miniature editors** that are **cost-effective, patent-free, and highly precise**, increasing accessibility for local research.

19. Autophagy Breakthrough

Indian researchers have identified **exocyst-mediated regulation of autophagy**, opening new therapeutic possibilities for neurodegenerative diseases and cancer.

Autophagy Basics

- Autophagy is a vital cellular "self-cleaning" process that removes damaged organelles, toxic protein aggregates, and pathogens.
- It is crucial for long-lived cells like neurons and helps prevent infections and cellular dysfunction.
- Waste is enclosed in **autophagosomes** (double-membrane vesicles) and degraded in **lysosomes**.

New Scientific Findings

- The **exocyst complex** (eight-protein complex earlier linked to secretion) is essential for **autophagosome formation**.
- Loss of the exocyst disrupts autophagy, leading to toxic waste buildup and **neuronal cell death**.
- Mechanisms were mapped using **yeast models**, as autophagy pathways are evolutionarily conserved.

Significance

- **Neurodegeneration:** Targeting the exocyst may restore waste clearance in Alzheimer's and Parkinson's disease.
- **Cancer:** Modulating autophagy can suppress early tumour growth or weaken advanced cancers.
- **Therapeutic Potential:** Identifies a new, precise molecular target for disease-modifying treatments.

20. Biostimulants

Biostimulants are emerging as a sustainable farming input in India, aimed at reducing chemical dependence while improving crop resilience and productivity.

- **Definition:** Natural or biologically derived substances/microorganisms that enhance plant growth, nutrient uptake, and stress tolerance without acting as fertilisers.
- **Function:** Improve nutrient-use efficiency and plant metabolism rather than directly supplying nutrients.
- **Sources & Use:** Derived from seaweed extracts, humic/fulvic acids, protein hydrolysates, microbes, amino acids, and botanical extracts; commonly applied via foliar spray.
- **Regulation in India:** Governed under the **Fertiliser Control Order (1985)** since 2021; only products notified in **Schedule VI** are allowed.
- **Oversight:** Regulated by the **Central Biostimulants Committee**, ensuring quality control and standardisation.

21. Annatto Research – CSIR–CFTRI (Mysuru)

CSIR–Central Food Technological Research Institute (CSIR–CFTRI) has undertaken research projects on **annatto** to support natural colourant applications in food systems.

About Annatto

- **Source:** Natural food colouring and flavouring derived from seeds of the **Achiote tree (Bixa orellana)**.
- **Origin & Names:** Native to tropical America; widely cultivated in India, Kenya, and the Philippines. Known as the **"Lipstick Tree"**; called **Sinduri** in Sanskrit and Hindi.
- **Key Pigments:**
  - **Bixin** – oil-soluble, reddish-orange
  - **Norbixin** – water-soluble, yellow-orange
- **Usage Rank:** Second most used natural food dye globally (after caramel).

Industrial & Health Relevance

- **Food & Cosmetic Uses:** Cheddar cheese, butter, margarine, snacks, smoked fish, and cosmetics—imparts yellow-orange hues.
- **Health Attributes:** Rich in antioxidants (e.g., **tocotrienols**); reported **antimicrobial** and **anti-inflammatory** properties; traditional uses include relief from heartburn, fevers, and skin ailments.

Production & Trade

- **Global Leader: Peru** is the largest producer.
- **India's Cultivation:** Tamil Nadu, Andhra Pradesh, Karnataka, Odisha, and Gujarat.
- **Export Trend:** India's export share is rising, driven by **clean-label** and natural ingredient demand.

22. Artemisinin Resistance

Concern: Artemisinin resistance is emerging in parts of **Africa**, echoing earlier resistance patterns from **Southeast Asia**, threatening global malaria control.

Drug Origin: Artemisinin is a fast-acting antimalarial derived from *Artemisia annua* (wormwood), extracted using low-temperature methods to preserve activity.

Breakthrough: Discovered in the **1970s**, it transformed malaria treatment, especially against **chloroquine-resistant** parasites.

Mode of Action: Effective against **all Plasmodium species**, disrupting parasite replication inside **red blood cells**.

Pharmacology: Very **short half-life** → monotherapy fails; must be combined with longer-acting drugs.

Standard Treatment: WHO recommends Artemisinin-based Combination Therapies (ACTs) for *Plasmodium falciparum* malaria.

Severe Malaria: Intravenous artesunate (an artemisinin derivative) is the treatment of choice.

- **Implication:** Rising resistance risks higher treatment failure, increased mortality, and setback to malaria elimination goals.

23. PathGennie: Faster, Physics-Accurate Drug Discovery

- **What it is:** *PathGennie* is a new **open-source computational framework** that efficiently simulates how drug molecules **unbind from protein targets**—a key determinant of drug performance.
- **Why it matters:** It accurately estimates **drug residence time** (how long a drug stays bound), often a better predictor of efficacy than binding strength alone.
- **What's new:** Unlike traditional molecular dynamics methods that struggle with **rare, slow unbinding events** and use **artificial forces or high temperatures**, PathGennie preserves **natural molecular behaviour**.
- **How it works:** Uses **direction-guided adaptive sampling**—many **ultrashort, unbiased simulations** are run, and only trajectories naturally progressing toward unbinding are extended.
- **Key advantage: Bias-free and physically realistic**, capturing true kinetic pathways while **dramatically accelerating drug discovery workflows**.

24. DRI Busts Mephedrone Unit under Operation Hinterland Brew

- **Action:** The Directorate of Revenue Intelligence (DRI) dismantled a clandestine drug-manufacturing unit in Maharashtra, seizing **128 kg of mephedrone** under *Operation Hinterland Brew*.
- **About Mephedrone (4-MMC):** A **synthetic stimulant** (amphetamine–cathinone class) causing euphoria and alertness but associated with **addiction, cardiovascular stress, hallucinations, seizures and fatal toxicity**; banned in India under the **NDPS Act, 1985**.
- **Health & Environmental Note:** Classified as a **xenobiotic**—a foreign chemical requiring metabolic detoxification, posing risks to health and ecosystems.
- **Operation Hinterland Brew:** A **DRI anti-narcotics drive** targeting illegal drug labs in remote/rural areas, aligned with **Nasha Mukt Bharat Abhiyaan** and stricter enforcement of the **NDPS Act**.

25. Rising Use of Sahyog Portal for Online Content Blocking

- **Trend:** 2,312 unlawful content blocking orders issued between Oct 2024–Oct 2025 (~6 per day), each often covering multiple URLs/accounts.
- **Platforms Affected:** Meta platforms account for **78%+** of orders; **WhatsApp** is the most targeted.
- **Scale: 118+ online intermediaries** are onboarded to the portal.

About the Sahyog Portal

- **Purpose:** Centralised, single-window system for government agencies to flag and remove unlawful online content.
- **Administration:** Managed by the **Indian Cyber Crime Coordination Centre** under the **Ministry of Home Affairs**.
- **Process:** Authorised officials flag unlawful URLs on the portal; automated formal notices are sent to intermediaries.
- **Legal Basis: Section 79(3)(b)** of the IT Act, 2000 and **Rule 3(1)(b)** of the IT Rules, 2021.
- **Compliance:** Intermediaries must remove content upon "actual knowledge" or risk losing **safe harbour** protection.

26. FSSAI Launches Nationwide Testing Drive for Nitrofurans in Eggs

The **Food Safety and Standards Authority of India (FSSAI)** has initiated a **pan-India surveillance drive** to test egg samples for **nitrofurans contamination**, amid concerns over antibiotic residues entering the food chain.

About Nitrofurans

Nature: Synthetic **broad-spectrum antimicrobial drugs** earlier used in human and veterinary medicine.

Common Compounds:

- *Nitrofurantoin*
- *Furazolidone*
- *Nitrofurazone*
- *Furaltadone*

Mode of Action:

- Primarily **bacteriostatic** (inhibit bacterial growth); become **bactericidal at high doses**.
- Effective against **Gram-positive & Gram-negative bacteria**, protozoa and some fungi.
- More active in **acidic environments**.

Public Health Concerns

- **Long-term exposure risks:**
  - Carcinogenicity
  - DNA damage
  - Liver and lung toxicity
  - Nerve damage and blood disorders
- Residues in food products (eggs, meat, milk) pose **serious food safety risks**.

Regulatory Status

- **International:** Banned in **EU, USA and Australia** for use in food-producing animals.
- **India: Formally banned in March 2025** for food animals.
- **Enforcement:** FSSAI monitoring to ensure compliance across poultry and livestock sectors.

Why Eggs?

- Poultry farming has historically seen **misuse of antimicrobials** for growth promotion and disease prevention.
- Eggs can act as **direct residue carriers**, affecting consumers without further processing.

Scientific Context (Quick Recall)

- **Gram-positive bacteria:** Thick peptidoglycan cell wall; easier antibiotic penetration.
- **Gram-negative bacteria:** Thin wall + outer membrane; higher antibiotic resistance.

27. SC in *Amlesh Kumar v. State of Bihar* (2025) Declares Forced Narco-Analysis Unconstitutional

The **Supreme Court of India** set aside a **Patna High Court order** permitting **involuntary narco-analysis** tests on accused persons in *Amlesh Kumar v. State of Bihar*, reaffirming that forced narco-analysis violates fundamental rights under **Articles 20(3)** and **21** of the Constitution and cannot be used as evidence.

What is a Narco Test?

- A **narco-analysis test** involves administering a sedative (e.g., **Sodium Pentothal**) intravenously to induce a **semi-conscious** state with lowered inhibitions, during which investigators hope the subject will disclose concealed facts.
- **Not foolproof:** Results are often incoherent and may be influenced by the drug, raising reliability issues.

Key Highlights of SC Ruling

1. **Forced Test Unconstitutional:**
   - The Court held that **involuntary narco-analysis tests** violate:
     • **Article 20(3)** — Right against self-incrimination; a person cannot be compelled to be a witness against themselves.
     • **Article 21** — Right to life and personal liberty, including bodily autonomy and mental privacy.
   - Any direction for forced narco tests without consent is **invalid and unconstitutional**.
2. **Consent Requirement:**
   - Narco tests may be conducted only with **free, informed consent** of the subject, recorded before a **magistrate**, following safeguards laid down in **Selvi v. State of Karnataka (2010)**.
3. **Limited Evidentiary Value:**
   - Results of narco-analysis — even when voluntary — **cannot by themselves prove guilt**. They can only serve as **investigative leads** and must be corroborated with independent evidence (e.g., under Section 27 of the Evidence Act).
4. **Voluntary-Only Scope:**
   - An accused may **volunteer** to undergo narco testing during the defence stage of a trial (e.g., under Section 253 of BNSS) but there is **no absolute right** to demand such a test; the court must scrutinise voluntariness and necessity.

Judicial Background & Precedents

- **Selvi v. State of Karnataka (2010):** A landmark SC judgment held that **involuntary narco, polygraph, and brain-mapping tests** violate the right against self-incrimination (Article 20(3)) and personal liberty (Article 21). It permitted such tests only when **voluntary** and with safeguards.
- **Subsequent Cases:**
  • **Vinobhai v. State of Kerala (2025)** reaffirmed that narco results cannot by themselves establish guilt and must be corroborated.
  • **Manoj Kumar Saini v. State of MP (2023)** similarly emphasised that narco tests are investigative aids, not stand-alone proof.

28. Biosecurity Gains Strategic Priority in India Amid Rising Biotech and Dual-Use Risks

Rapid progress in **biotechnology**, **synthetic biology**, and **dual-use research** — which can be repurposed for harmful applications — has heightened the risk of **deliberate biological threats**, prompting India to strengthen its **biosecurity strategies** across health, agriculture, and national security domains.

What is Biosecurity?

- **Definition:** Biosecurity encompasses **policies, practices, and institutional mechanisms** to **prevent deliberate misuse** of biological agents, toxins, or life-science technologies that could harm humans, animals, plants, or the environment.
- **Scope:** It spans **lab security**, **surveillance**, **intelligence**, **response protocols**, **dual-use oversight**, and **inter-agency coordination**.
- **Biosafety vs Biosecurity:**
  - **Biosafety** focuses on preventing **accidental release** and ensuring safe laboratory practices.
  - **Biosecurity** focuses on preventing **intentional misuse** and malicious access to biological agents or technologies.

Why India Needs Stronger Biosecurity

1. **Demographic Vulnerability:**
   - With a **population >1.4 billion** and high urban density, even limited outbreaks can escalate rapidly, stretching health systems — a lesson from **COVID-19**.
2. **Agriculture & Livelihood Risk:**
   - ~42% of India's workforce depends on agriculture. **Deliberate attacks on crops or livestock** could undermine **food security, rural incomes, and national stability**.
3. **Dual-Use Research Risks:**
   - Advanced life-science tools (e.g., gene editing, synthetic biology) can be repurposed for harmful ends if oversight is inadequate. The **World Health Organization (WHO)** notes gaps in oversight of high-risk labs globally.
4. **Non-State Threats:**
   - Terrorist groups or rogue actors may seek to misuse biological agents. Past concerns include alleged **ricin toxin** cases in India.
5. **Global Competitiveness:**
   - India's ranking at **66th in the Global Health Security (GHS) Index 2023** signals room for improvement in preparedness and response capabilities.

India's Existing Biosecurity Framework : Institutional Architecture

- **Department of Biotechnology (DBT):**
  - Oversees biotechnology research regulation, **biosafety protocols**, and guidelines for genetic manipulation.
- **National Centre for Disease Control (NCDC):**
  - Coordinates **disease surveillance**, outbreak investigation, and public-health response.
- **Animal & Plant Health Authorities:**
  - The **Department of Animal Husbandry** and the **Plant Quarantine Organisation** monitor risks from zoonotic diseases and agricultural bio-threats.

29. India Advances in Directed Energy Weapons (DEWs)

Hyderabad-based aerospace and defence firm **Apollo Micro Systems** has secured **DRDO approval** to access **Directed Energy Weapon (DEW) technologies**, marking a significant step in India's indigenous next-generation warfare capabilities.

What are Directed Energy Weapons (DEWs)?

- **Mechanism:** DEWs use **focused energy beams** to disable or destroy targets **without physical projectiles**.
- **Energy Source:** Operate using **electromagnetic waves or subatomic particles**, not kinetic force.
- **Speed & Precision:** Engage targets at **or near the speed of light**, enabling near-instant, highly precise strikes.

Types of Directed Energy Weapons

1. **High-Energy Lasers (HEL):**
   - Emit concentrated infrared or visible light.
   - Cause **thermal damage** to drones, missiles, sensors, or aircraft skins.
2. **High-Power Microwaves (HPM):**
   - Produce electromagnetic pulses that **disrupt or destroy electronic circuits**.
   - Effective against drone swarms and electronic systems.
3. **Particle Beam Weapons:**
   - Accelerate electrons, protons, or ions.
   - Disrupt **molecular and atomic structures** of targets (largely experimental).
4. **Millimetre Wave Weapons:**
   - Emit electromagnetic waves that cause **intense skin heating**.
   - Designed for **non-lethal crowd control**, without permanent injury.

Key Advantages of DEWs

- **Low Cost per Shot:** Far cheaper than missiles or conventional ammunition.
- **No Reload Requirement:** Continuous firing possible as long as power is available.
- **High Stealth:** Silent, often invisible, and **impossible to evade** due to light-speed engagement.
- **Precision & Minimal Collateral Damage:** Ideal for urban and high-value target environments.

Strategic Significance for India

- Enhances **counter-drone and missile defence** capabilities.
- Supports **Aatmanirbhar Bharat** in advanced defence technologies.
- Positions Indian private industry within the **future battlefield ecosystem** alongside DRDO.

30. Indian Army Inducts Indigenous Software Defined Radios (SDRs)

The **Indian Army** has signed a contract to procure its **first indigenously designed and manufactured Software Defined Radios (SDRs)**, developed by **Defence Research and Development Organisation (DRDO)** and produced by **Bharat Electronics Limited (BEL)**. This marks a major milestone in secure, network-centric and self-reliant military communications.

What are Software Defined Radios (SDRs)?

- **Core Idea:** Replace fixed hardware components with **software-based signal processing**.
- **Flexibility:** Radios can be rapidly reconfigured for **different frequencies, waveforms, and missions** through software updates—without changing hardware.
- **Security:** Supports **strong encryption** and anti-jamming features, crucial for contested battlefields.

Key Features

- **Multi-band & Multi-mode Communication:** Operates across various frequency bands and communication modes.
- **High Data Rates:** Enables voice, data, and video transmission for modern battlefield needs.
- **MANET Capability:**
  - Supports **Mobile Ad hoc Networks**, where each unit acts as a node.
  - Ensures **self-healing, resilient communication** even if some links or nodes are destroyed.
- **Interoperability via IRSA:**
  - Standardised under the **Indian Radio Software Architecture (IRSA)**.
  - Allows **waveform portability** and seamless communication across the **Army, Navy, and Air Force**.

Applications of SDRs

- Tactical battlefield communication
- Secure command-and-control networks
- Tactical data links
- Radar and electronic warfare systems
- Defence telecom networks
- Future-ready architectures, including **IoT-enabled military systems**

Key Concepts Explained

- **MANET (Mobile Ad hoc Network):**
  A decentralised network without fixed infrastructure (no towers or base stations). Communication continues dynamically even if some nodes fail.
- **IRSA (Indian Radio Software Architecture):**
  A national standard ensuring interoperability among SDRs through common software interfaces and shared waveforms.

31. Superconducting magnetic levitation (maglev)

China has successfully tested **superconducting magnetic levitation (maglev)** technology by accelerating a **tonne-class vehicle to 700 km/h in just two seconds**, setting a new global benchmark in high-speed ground transport.

⚙️ How Maglev Technology Works

Maglev systems eliminate wheel–rail contact, drastically reducing friction and enabling ultra-high speeds.

Levitation

- Powerful magnetic forces lift the vehicle **1–10 cm above the guideway**, countering gravity.
- This "magnetic cushion" removes mechanical friction.

Propulsion

- **Linear motor systems** embedded in the guideway create moving magnetic fields.
- These fields **pull the vehicle forward and push it from behind**, enabling rapid acceleration.

Guidance

- Lateral magnetic forces keep the vehicle **centred and stable** on the guideway, even at extreme speeds and during curves.

🧲 Primary Types of Maglev Systems

🔹 Electromagnetic Suspension (EMS)

- Uses **magnetic attraction** between electromagnets on the train and a ferromagnetic rail.
- **Levitation at rest** is possible.
- Example: Shanghai Maglev (commercial EMS).

🔹 Electrodynamic Suspension (EDS)

- Uses **magnetic repulsion** from superconducting magnets.
- Enables the **highest speeds globally**.
- Requires **wheels at low speeds** until sufficient lift is generated.
- China's test belongs to this category.

🔹 Inductrack (Passive EDS)

- Uses **permanent magnets on the vehicle** and wire loops in the track.
- **Fail-safe and energy-efficient**, as no powered track magnets are required.

🚀 Significance of China's Test

- **Unprecedented Acceleration:** Reaching 700 km/h in 2 seconds demonstrates extreme propulsion and control capability.
- **Near-Aviation Speeds on Land, Technology Leadership:** Positions China at the forefront of next-generation high-speed mobility.
- **Future Applications:** Potential use in **inter-city corridors**, **hyper-fast cargo**, and **strategic transport infrastructure**.

👉 *Maglev is not just faster rail – it represents a paradigm shift in how frictionless, energy-efficient transport systems may shape the future of mobility.*

32. India Crosses Historic Milestone with Over 1 Lakh Patent Applications in FY 2024–25

For the **first time**, India's **patent applications** exceeded **1.1 lakh** in **FY 2024–25**, reflecting a deepening domestic innovation ecosystem and stronger IP (Intellectual Property) culture. This growth accompanies increases across other IPR categories, underscoring India's rising competitiveness in innovation.

Key IP Filing Trends (FY 2024–25)

- **Patent Filings:** Patent applications crossed **110,000** in FY 2024–25, up from ~92,168 in FY 2023–24 — a historic first for India. Domestic applicants accounted for ~**62**% of all filings.
- **Overall IPR Growth:** Total IP filings across categories grew ~**18–20**%, reaching ~7.5 lakh applications.
- **Design Registrations:** Jumped ~**41.5**% to ~**43,005**, indicating increased emphasis on industrial and aesthetic design.
- **Trademarks & GIs:**
  - Trademarks rose ~16% to ~**5.5 lakh+**.
  - Geographical Indication (GI) applications more than **doubled** from 134 to 275.

Drivers of the IP Surge

1. **Policy Reforms:**
   - The **Patents (Amendment) Rules, 2024** streamlined prosecution timelines, reduced compliance friction, and simplified filing procedures, enhancing ease of patenting and reducing delays.
2. **Digital Transformation:**
   - Adoption of **AI-enabled tools** (e.g., Trade Mark Search Technology) and the **IP Saarthi chatbot** improved examination speed, accuracy, and user support, broadening access and reducing backlogs.
3. **Startup & Academia Growth:**
   - Expansion of startups, increased R&D spending, and stronger linkages between academia and industry boosted indigenous patenting. India now hosts **1.2 lakh+ startups** and **1,100+ incubators**, feeding the innovation pipeline.
4. **Manufacturing & Tech Momentum:**
   - Growth in electronics, pharmaceuticals, electric vehicles (EVs), and consumer goods amplified demand for patents and industrial designs.
5. **Awareness & Outreach:**
   - IP awareness missions encouraged institutions and students to engage with the IP system, expanding the base of innovators.

33. Cosmic Filament with Synchronized Galaxy Spins

Researchers have identified a ~**50 million light-year–long cosmic filament** hosting **at least 14 galaxies** whose **rotation axes are aligned with the filament's direction**—a coordinated motion not anticipated by standard models.

What makes this discovery unique?

- **Coherent spin alignment:** Galaxies embedded in the filament were found to **spin in the same direction as the filament itself**, suggesting a shared dynamical influence.
- **Model challenge:** Conventional galaxy-formation models treat spin acquisition as largely stochastic after initial tidal torques. This finding implies **strong, persistent environmental control** by large-scale structures.
- **Angular momentum transfer:** It provides direct evidence that the **cosmic web can torque galaxies**, shaping how they rotate and evolve.

Cosmic Filaments: Quick Primer

- **Definition:** Thread-like structures that **connect galaxy clusters**, forming the skeleton of the **cosmic web**.
- **Scale:** Among the **largest structures in the universe**, stretching **hundreds of millions of light-years**.
- **Composition:** Dominated by **dark matter**, with intergalactic gas and galaxies tracing the filaments.
- **Formation:** Matter collapses under gravity—first into sheets, then into **long filaments** at their intersections.
- **Function:** Act as **cosmic highways**, funneling cold gas and smaller galaxies from voids into dense regions.

Why this reshapes our understanding

- **Galaxy growth:** Filaments don't just supply fuel; they **influence galaxy spin, morphology, and star-formation histories**.
- **From chance to choreography:** The result shifts the narrative from random spin acquisition to **environment-driven evolution**.
- **Better simulations:** Cosmological models may need refinement to **encode filament-driven torques** more accurately.

Bottom line: The universe's largest structures are not passive scaffolding—they actively **orchestrate how galaxies spin and grow**.

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GEOGRAPHY

DISASTER Management

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3. India scales up ‘Tsunami Ready’ villages
4. Volcanic Ash Advisory after Hayli Gubbi Eruption
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11. El Niño 2024: Coral Bleaching & Great Barrier Reef
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20. Denotified, Nomadic & Semi-Nomadic Tribes
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1. World Summit on Disaster Management 2025

- **Announcement:** At the **World Summit on Disaster Management** in **Dehradun**, Union Minister **Jitendra Singh** announced the **expansion of meteorological systems in Uttarakhand** to strengthen disaster preparedness.
- **Organisers:** Hosted by **Uttarakhand State Council for Science and Technology (UCOST)** in collaboration with the **National Disaster Management Authority (NDMA)**.
- **Theme (2025):** *Strengthening International Cooperation for Building Resilient Communities.*
- **Purpose:** Global platform engaging stakeholders from **50+ countries** for **dialogue, knowledge sharing, capacity building, collaboration**, and **innovation showcase**.
- **Framework:** Built on the **"5Es"—Engage, Educate, Enable, Empower, Excel**; workshops span **Earth, Water, Air, Fire, and Space**.
- **Recognition: Bhagirath Awards** honour leadership and innovation in **climate action** and **disaster risk reduction**.

2. NDMF Extended to Panchayati Raj Institutions

- **Decision:** The **Union Government of India** extended access to the **National Disaster Mitigation Fund (NDMF)** to **Panchayati Raj Institutions**, strengthening **local-level disaster prevention and resilience**.
- **NDMF overview:** Created in **2021** by the **Ministry of Home Affairs**, mandated under **Section 47 of the Disaster Management Act, 2005**, and administered by the **National Disaster Management Authority (NDMA)**.
- **Funding:** The **15th Finance Commission** earmarked **₹13,693 crore (2021–26)**—India's **first dedicated national window** exclusively for **disaster mitigation**.
- **Focus areas: Urban flooding, drought-prone regions**, and **seismic risk zones**.
- **NDMA role:** Apex body (est. **2006**, chaired by the **Prime Minister**) that **approves the National Disaster Management Plan**, issues **binding guidelines**, and administers **NDRF/NDMF**, overseeing national preparedness.

3. India scales up 'Tsunami Ready' villages to bolster coastal resilience

India is fast progressing toward becoming the **first Indian Ocean Region (IOR) country with 100 officially "Tsunami Ready" coastal villages**, under UNESCO-IOC's **Tsunami Ready Recognition Programme (TRRP)**.

About Tsunami Ready Recognition Programme (TRRP)

Launched by: Intergovernmental Oceanographic Commission (IOC) of **UNESCO**.

Nature: International, **community-based, voluntary and performance-based** recognition programme.

Goal: Build **tsunami-resilient coastal communities** through **risk assessment, preparedness and effective response**.

Indicators: Certification requires compliance with **12 indicators** across three pillars:

Assessment – hazard mapping, population & infrastructure at risk, evacuation routes, signage.

Preparedness – community awareness programmes, school drills, dissemination of information.

Response – functional **early warning reception**, evacuation plans, regular mock drills.

India's Tsunami Ready Journey

Implementation structure:

National Tsunami Ready Board under **Ministry of Earth Sciences (MoES)**.

INCOIS (Indian National Centre for Ocean Information Services), Hyderabad – nodal body for **ocean data, tsunami early warning, advisories and TRRP execution**.

Milestones: India became **first in IOR to receive "Tsunami Ready" recognition** when **two villages in Odisha** were certified in **2020**.

Global context: Under the **UN Ocean Decade (2021–2030)**, UNESCO-IOC aims for **100% of at-risk coastal communities tsunami-ready by 2030**.

Why Tsunami Ready Matters for India : India has a **7,500 km coastline** exposed to tsunamis from the **Indian Ocean** (e.g., 2004 Indian Ocean tsunami).

Mains Practice Question:

"India's Tsunami Ready Recognition initiative aims to make vulnerable coastal communities disaster-resilient through a village-level certification process. Explain the key features of the Tsunami Ready programme and analyse its significance for implementing the Sendai Framework and SDG-11 along India's coastline."

4. Volcanic Ash Advisory after Hayli Gubbi Eruption

- **Event:** Volcanic ash from **Hayli Gubbi** in **Ethiopia** entered Indian airspace, leading to **flight rerouting and cancellations**; ash plume rose to **~14 km**, moving at **100–120 km/h** across **Ethiopia → West Asia → northern India**, then toward China.
- **Aviation risk:** Ash contains **silicate glass and rock** that **melt inside jet engines (~1600°C)**, forming deposits that **block cooling channels**, risking **engine stall/shutdown**.
- **Additional hazards:** **Abrasion** of windscreens/sensors/blades, **runway contamination**, **pressurisation issues**, and **navigation/radio interference**.
- **Regulatory action:** **Directorate General of Civil Aviation (DGCA)** advised airlines to **avoid affected altitudes**, **report engine anomalies**, and **check runway contamination**.
- **Precedents:** Severe ash encounters caused multi-engine failures in **British Airways Flight 9 (1982)** and **KLM Flight 867 (1989)**.

5. Bezymianny Volcano Reforms Its Peak

- **Event: Bezymianny volcano** has **nearly rebuilt its summit** decades after a catastrophic explosion destroyed it.
- **Background:** Name means **"Unnamed"**; presumed extinct for **~1,000 years** until reactivation in **1955–56**.
- **Type: Stratovolcano**—steep cone formed by **alternating viscous lava flows and volcanic debris**.
- **Location: Central Kamchatka Depression, Russia**; part of the **Klyuchevskoy Volcanic Group**, alongside **Klyuchevskaya Sopka**.
- **Tectonics:** Driven by **Pacific Plate subduction** at the **Kuril–Kamchatka Trench**, near a complex plate junction.
- **Eruption style:** Predominantly **Peléan—lava-dome growth and collapse** producing **fast, extremely hot pyroclastic flows**.
- **Peak reformation:** Since **1956**, **near-continuous dome growth** via **effusive and explosive activity** has progressively refilled the crater, rebuilding the peak.

6. Jharia CO leak exposes legacy coal-mining fires and rehab failures

A **carbon monoxide (CO) gas leak in Kenduadih** in the **Jharia coalfields, Jharkhand**, caused deaths and mass displacement, highlighting how **legacy underground coal fires, gas pockets and unstable seams** from pre-nationalisation mining continue to endanger present-day settlements.

Legacy Mining & Vulnerability of Kenduadih

Legacy mining: Decades of unregulated mining **before nationalisation** left behind:

- **Underground fires**,
- **Gas pockets** (CO, methane),
- **Unstable seams and subsidence**,
- which now lie **directly under human settlements**.

Toxic gas exposure: CO levels reportedly touched **~2,000 ppm**, enough to cause **rapid asphyxiation during sleep**, leading to at least **two confirmed deaths** and multiple hospitalisations.

Habitation risk: About **1,200 families** still live above fire-affected seams, making them highly vulnerable to **sudden gas leaks, land subsidence and house collapses**.

Invisible hazard: CO is **colourless, odourless, non-irritant**, so residents get **little warning** before poisoning symptoms (headache, dizziness, unconsciousness).

Emergency preparedness gaps: Reports of **ambulances without oxygen, delayed medical response, and poor local awareness** indicate weak on-ground disaster readiness.

Jharia Master Plan (JMP) – Design vs Reality

Objective: To **extinguish underground fires** and **relocate people** from unsafe zones in Jharia coalfields.

Timeline: Original plan notified **2009**, nominally ended **2021**; a **revised JMP approved in June 2025** extends timelines and scope.

Rehabilitation strategy: Construction of **~16,000 housing units** at sites like **Belgarhia township** for affected families.

Current status: Around **3,700 flats are occupied**; remaining units are under construction, with a target completion by **2028**.

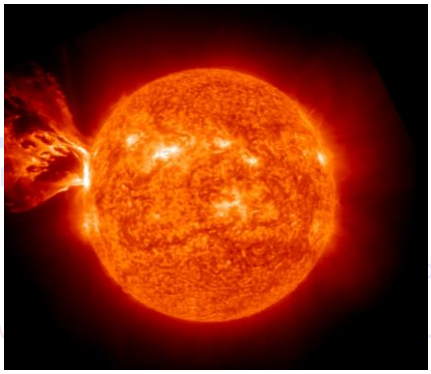
7. Sudden Stratospheric Warming (SSW)

- **What it is:** A **rapid stratospheric temperature rise (up to ~50°C in days)**.

Trigger: Upward-propagating Rossby waves from the troposphere deposit energy in the stratosphere.

- **Mechanism:** Energy transfer **weakens the polar vortex**; deceleration causes **air compression and heating**.
- **Downward influence:** Warmed stratospheric air **disrupts the jet stream**, allowing **Arctic cold to spill into mid-latitudes**.
- **Surface impacts: Prolonged cold spells, snowstorms, and anomalous weather** across **North America, Europe, and Asia**; effects typically appear **1–3 weeks later**.
- **Polar vortex:** A **year-round cold, low-pressure system** around the poles, **strongest in winter**, maintaining cold air via anticlockwise flow.
- **Rossby waves: Large-scale meanders** in high-altitude winds driven by **Earth's rotation and Coriolis variations**.

8. X1.9-Class Solar Flare Recorded



- **Event: NASA** recorded an **X1.9-class solar flare** on **30 November 2025** using the **Solar Dynamics Observatory (SDO)**.
- **What are solar flares: Sudden magnetic energy releases** from **field-line reconnection near sunspots**, emitting intense radiation across **radio, UV, X-ray, and gamma-ray** bands.
- **Scale & class: X-class flares are the strongest**; the numeric value (**1.9**) denotes intensity.
- **Dynamics:** Bright solar regions lasting **minutes to hours**, rapidly heating plasma to **millions of degrees**.
- **Impacts:** Can **disrupt radio and navigation, affect satellites and power grids**, pose **radiation risks to astronauts**, and **enhance auroras** during geomagnetic storms.
- **SDO mission:** Launched in **2010** under NASA's **Living With a Star** program; uses **AIA, HMI, and EVE** instruments in **geosynchronous orbit** for **continuous, high-resolution, multi-wavelength** solar monitoring.

9. Early-Universe Spiral Galaxy "Alaknanda"

- **Discovery:** Indian researchers in **Pune** identified **"Alaknanda"**, a **Milky Way–like spiral galaxy** from the **early universe (~1.5 billion years after the Big Bang)**.
- **Galaxy profile:** A **massive spiral** with **two well-defined arms**, located **~12 billion light-years away**, seen when the universe was **~10% of its current age**.
- **Naming:** Called **Alaknanda** after the Himalayan river; described as a **"sister" to the Milky Way (Mandakini)**.
- **Instruments:** Discovered with **James Webb Space Telescope**; follow-up kinematics planned using **Atacama Large Millimeter/submillimeter Array (ALMA)**.
- **Why it matters:** **Challenges prevailing models** that predicted early galaxies to be **chaotic, clumpy, and turbulent**, not **well-organised spirals**.
- **Spiral galaxies:** Rotating **disk systems** with **spiral arms**, a **central bulge**, and an **extended halo**; the **Milky Way** is a **barred spiral**.

10. Galaxy Gas Mass Overestimation – New Insight

- **Discovery:** Scientists from **Raman Research Institute** found that **standard methods may significantly overestimate gas mass around galaxies**.
- **Core finding:** A **substantial share of highly ionised oxygen** detected near galaxies likely comes from the **intergalactic medium (IGM)**, not the **circumgalactic medium (CGM)** as commonly assumed.
- **Galaxy gas structure:** Galaxies are embedded in vast halos (**≈10–20×** visible size) comprising an **inner CGM** and an **outer IGM**, alongside dark matter.
- **Why CGM matters:** The **CGM regulates gas inflow/outflow**, shaping **star formation** and **long-term galaxy evolution**.
- **Methodological limit:** Current estimates infer CGM mass from **ionised oxygen absorption**, but **cannot cleanly separate CGM vs IGM contributions** along the line of sight.
- **Model result:** **Theoretical modeling** shows a **significant fraction of oxygen attributed to CGM actually originates in the IGM**, implying revisions to **galaxy formation and evolution models**.

11. El Niño 2024: Coral Bleaching & Disease on the Great Barrier Reef

- **Impact:** The **2024 El Niño** caused **mass coral bleaching** and triggered a **black band disease outbreak** in **Goniopora (flowerpot/daisy) corals** on the **Great Barrier Reef**.
- **Goniopora corals:** Photosynthetic **stony corals** with vibrant colours; highly **sensitive to heat stress**.
- **Black band disease:** A **bacterial infection** forming a **dark, advancing microbial band** that **kills coral tissue** and exposes the skeleton—often exacerbated by **warmer waters**.
- **Reef profile:** World's **largest coral ecosystem** in the **Coral Sea** off **Queensland**; **~2,300 km** long with **3,000+ reefs** and **900 islands**; hosts **~400 coral species**, **1,500 fish species**, **4,000 molluscs**, and **6 of 7 marine turtles**.
- **Status & threats:** **UNESCO World Heritage Site (since 1981)**; threatened by **climate change, rising sea temperatures, ocean acidification, and polluted runoff**; **UNESCO** has recommended listing it as **"in danger."**

12. Delhi Ridge Management Board Reconstituted

- **Decision:** The **Ministry of Environment, Forest and Climate Change** reconstituted the **Delhi Ridge Management Board (DRMB)** with **statutory powers**, following directions of the **Supreme Court of India**.
- **Legal status:** Notified under **Section 3(3) of the Environment (Protection) Act, 1986**, empowering the DRMB to issue **binding environmental directions**.
- **Mandate:** Acts as a **single-window authority** for all permissions on **Delhi Ridge land use and management**.
- **Oversight:** A **Central Empowered Committee (CEC)** representative reports **quarterly** to the Supreme Court.
- **Composition:** **13-member board** chaired by the **Delhi Chief Secretary**; includes representatives from **DG Forests (MoEFCC)**, **MoHUA**, a **CEC nominee**, and **two civil society experts**.

About the Delhi Ridge

- **Geology:** Northernmost extension of the **Aravalli Range**—among the **oldest fold mountains (~1.5 billion years)**.
- **Extent & zones: 7,777 ha**, divided into **Northern, Central, South Central/Mehrauli, and Southern Ridge**.
- **Ecological role:** Delhi's **"Green Lungs"**, absorbing **CO_2 and air pollutants**.

13. Sweet Revolution boosts honey output under National Beekeeping Mission

India has **doubled honey production** from about **76,000 MT to over 1.5 lakh MT** in the last decade and **tripled honey exports**, credited largely to the government's **"Sweet Revolution"** and the **National Beekeeping and Honey Mission (NBHM)**. The Mission has been extended to **FY 2025–26**, reinforcing its role in **farm diversification and rural incomes**.

About NBHM & 'Sweet Revolution'

Type: Central Sector Scheme under **Ministry of Agriculture & Farmers' Welfare**.

Launch: Under **Atmanirbhar Bharat** for **FY 2020–21 to 2022–23**, now extended to **2025–26**.

Aim: Increase **honey and hive-product production**,

Enhance **crop yields via pollination**,

Raise **beekeepers' incomes** and promote **allied agri-livelihoods**.

Implementing body: National Bee Board (NBB).

- **Mission Structure – Three Mini Missions**
  - **Mini Mission I – Production:**
    - Promotes **scientific beekeeping,** modern hives, disease management, queen rearing and migratory beekeeping to boost productivity.
  - **Mini Mission II – Post-harvest & Markets:**
    - Builds **testing labs, processing and storage units**, value-add facilities (filtering, flavouring, packing) and organised market channels.
  - **Mini Mission III – Research & Innovation:**
    - Supports **region-specific R&D** for different agro-climatic zones; addresses issues like bee diseases, pesticide impacts, forage mapping, climate stresses.
- **Key Initiatives Under NBHM**
  - **Digital support – Madhukranti Portal:**
    - National **honey registration and traceability** platform to track producers and batches, reduce **adulteration**, and boost consumer/exporter confidence.
  - **Institutional support:**
    - Promotion of **FPOs, SHGs, cooperatives** for beekeepers; special focus on **women's participation and capacity-building**.
  - **Skill & value-add:**
    - Training, exposure visits and tech dissemination for high-value products – **royal jelly, propolis, bee venom, beeswax** – moving beyond raw honey.
  - **Research facility:**
    - **National Centre of Excellence in Beekeeping at IIT Roorkee** for advanced R&D, standardisation of practices and training of master trainers.

14. Aroma Mission Wins Rashtriya Vigyan Team Puraskar 2025

- **Award:** The **Aroma Mission team** behind India's **Purple (Lavender) Revolution** received the **Rashtriya Vigyan Team Puraskar 2025** at the national science awards ceremony.
- **Purple Revolution:** Launched in **2016** by the **Ministry of Science and Technology** to build an **aromatic-crops–based agro-economy**; popularly called the **Lavender Revolution**.
- **Pilot & impact:** Began in **Doda district, Jammu & Kashmir**, now known as **India's Lavender Capital**.
- **Implementation:** Executed under **Council of Scientific and Industrial Research (CSIR)** through the **Aroma Mission**, with technical support from **Indian Institute of Integrative Medicine (IIIM), Jammu**.
- **Farmer support:** Provided **free lavender saplings**, **training**, and set up **~50 distillation units** for on-site oil extraction.
- **Scale-up:** The **J&K lavender model** is being replicated for other aromatic crops (**lemongrass, citronella**) across **Himalayan and Northeast states**.
- **Crop value:** **Lavender (Lavandula spp.)** yields **high-value essential oil** used for **fragrance**, **antimicrobial**, and **insect-repellent** applications.

15. Subansiri Lower Hydroelectric Project (SLHEP)

- **Operational milestone:** The **first unit** of **India's largest hydropower project**, the **Subansiri Lower Hydroelectric Project**, has become operational after long delays due to **Seismic Zone V risks** and **environmental protests**.
- **Location & river:** Built on the **Subansiri River** at **Gerukamukh**, on the **Arunachal Pradesh–Assam border**; Subansiri is a **trans-Himalayan antecedent river** (origin: Tibet as **Chayul Chu**) and the **largest right-bank tributary of the Brahmaputra**.
- **Developer:** **National Hydroelectric Power Corporation (NHPC)**.
- **Capacity & design:** **2,000 MW** total (**8 × 250 MW**); **116 m concrete gravity dam**.
- **Project type:** **Run-of-the-river** with **limited pondage**, relying on natural flow and head without large storage.
- **Co-benefits:** Provides a **flood cushion** to mitigate **flash floods in downstream Assam**.
- **Strategic significance:** Strengthens the **national power grid**, supports **India's Net Zero 2070** pathway, and accelerates **Northeast energy development**.

16. Dulhasti Stage-II Hydropower Project Approved

- **Approval:** The **Union Government of India** approved the **260-MW Dulhasti Stage-II** hydropower project on the **Chenab River** in **Kishtwar district, Jammu & Kashmir**.
- **Project profile: Run-of-the-river** scheme in the **Chenab basin**, developed by **National Hydroelectric Power Corporation (NHPC)** under a **BOOT** framework.
- **Capacity & output: 260 MW (2 × 130 MW)** with ~**803 million units/year** expected generation.
- **Expansion:** Extends the **390-MW Dulhasti Stage-I**, operational since **2007**.
- **BOOT model: Build–Own–Operate–Transfer**—asset transferred to government after a fixed concession.

Chenab River – Essentials

- **Origin:** Formed at **Tandi (HP)** by **Chandra** and **Bhaga** rivers (from opposite sides of **Baralacha Pass**).
- **Name:** From Persian **Chan (Moon) + Aab (Water)**.
- **Tributaries: Miyar Nalla, Sohal, Thirot, Bhut Nalla, Marusudar, Lidrar**.
- **Key dams: Salal, Aalal, Baglihar, Dulhasti**.

17. Moei River & Cyber-Slavery Trafficking Route

Security concern: The **Moei River** has become a **key trafficking corridor**, used to move victims into **Myanmar-based cyber-slavery compounds** across a porous border.

About the Moei River

- **Transboundary river:** Known as **Thaungyin/Tonge Yin** in Myanmar; a **left-bank tributary of the Salween River**.
- **Source & flow:** Originates in the **Tenasserim Hills** (Indo-Myanmar ranges) and flows **north–northwest** for ~**327 km**, a direction reflecting **tectonic control** rather than typical monsoonal drainage.
- **Course:** Drains **western Thailand**, then enters **Myanmar**, ultimately reaching the **Andaman Sea** via the Salween.
- **Border role:** Forms long stretches of the **Thailand–Myanmar international boundary**, notably near **Mae Sot–Myawaddy**, a historically **porous frontier**.
- **Connectivity:** The **Mae Sot–Myawaddy crossing** lies on the **India–Myanmar–Thailand Trilateral Highway**, underscoring the river's importance for **regional trade, connectivity, and security**.

18. China's antimony export curbs deepen global critical mineral risks

China has **tightened export controls on antimony** after uncovering large-scale smuggling, reinforcing its **strategic grip over this dual-use critical mineral**. As China controls roughly **half of global antimony processing**, the move raises concerns about **supply security, price volatility and defence/clean-tech dependence** on a single supplier.

Antimony – Properties & Uses

Nature: Semi-metal; silvery-white, brittle, crystalline solid; **poor conductor of heat and electricity**, vapourises at relatively low temperatures.

Occurrence: Not abundant; present in **small quantities in 100+ mineral species** (e.g. stibnite).

Major uses:

- **Flame retardants: ~60% of global demand** (plastics, textiles, electronics casings, building materials).
- **Defence:** High-purity antimony is used in **ammunition, armour-piercing projectiles, specialty alloys**.
- **Electronics & sensors:** Antimony compounds in **semiconductors, infrared detectors, photonics**.
- **Energy storage:** Added to **lead–acid batteries** to improve plate strength, durability and charge–discharge performance.

Why China Dominates & Controls Antimony

- **Processing dominance:** China handles **~48% of global antimony processing**, so any export control **directly impacts world supply and prices**.
- **Reserve advantage:** Out of **~2.17 million tonnes** of global reserves, China is among the largest holders, enabling **long-term supply management and stockpiling**.
- **Dual-use strategic value:** Antimony is treated as a **dual-use material** (civil + defence + high-tech). Export controls give China **geopolitical leverage** over countries dependent on its processed output.
- **Environmental trade-offs:** Mining and smelting are **energy-intensive and polluting**; China uses **production quotas, zoning and environmental caps** to control output and local damage—these tools also double as **supply levers**.

Global Implications of China's Export Tightening

- **Supply concentration risk:** With China controlling about **half of processing capacity**, curbs can:
  - disrupt **defence supply chains** (ammo, armour),
  - affect **electronics, flame retardant, battery and chemical** industries globally.
- **Price volatility:** Past restrictions have triggered **double-digit price spikes**, increasing input costs and encouraging stockpiling behaviour.

19. Japan's Deep-Sea Rare Earth Extraction Plan

- **Project:** Japan plans a **pilot deep-seabed mining project** near **Minamitorishima Island**, targeting **rare-earth-rich marine mud** at ~**6,000 m depth**—the **world's first sustained extraction attempt** at such depths.
- **Resource scale:** The area is estimated to contain **>16 million tonnes of rare earth oxides**, notably **dysprosium and terbium** (critical for high-performance magnets).
- **Strategic rationale:** Aims to **reduce dependence on China**, which dominates global rare earth supply and has **tightened export controls**.

Seabed Rare Earth Elements (REEs)

- **What they are: 17 rare earth elements** concentrated in **deep-sea mineral deposits**.
- **Where found: Pelagic clays**, **polymetallic nodules**, and **cobalt-rich ferromanganese crusts**.
- **Why extraction is easier:** REEs are **adsorbed on iron–manganese oxides** (not locked in hard crystals); the **mud is unconsolidated**, enabling extraction **without blasting or drilling**.
- **Value profile: Higher "basket value"** due to a greater share of **heavy REEs**; **low radioactivity** and **room-temperature leaching**.

Risks & Constraints

- **Environmental:** Potential **disruption of deep-sea ecosystems and food webs**.
- **Regulatory & viability: Industrial-scale feasibility unproven**; the **International Seabed Authority (ISA)** has **not finalised its mining code**.

20. Denotified, Nomadic & Semi-Nomadic Tribes: Status & Issues

- **Government stance:** The **Parliament of India** was informed that the **Centre is not considering fresh classification** of **Denotified, Nomadic and Semi-Nomadic Tribes (DNT/NT/SNT)** despite multiple study recommendations.
- **Who are DNTs:** Communities once labelled **"criminal tribes"** under the **Criminal Tribes Acts (1871–1947)**; the law was repealed in **1952** (Ayyangar Committee), but many were later covered under **Habitual Offenders Acts**, perpetuating stigma.
- **Why reclassification matters:**
    - **Reservation access:** Lack of clear **SC/ST/OBC** status leaves many without quotas; **SI 2023** found **~85 DNT groups** unclassified.
    - **Justice & inclusion:** Corrects historic injustice and enables targeted welfare; **only ~13–15%** DNT families received benefits (Census 2011).
    - **Administrative clarity:** Prevents duplication and conflicts across State lists.
- **Key hurdles:** Rigid SC/ST/OBC categories for mobile groups, **State–Centre list divergence**, poor documentation, and **no standalone legal mandate** (changes require Parliamentary action under **Articles 341/342**).
- **Way forward :** Create a **national registry** linking State/Central lists; consider a **separate legal schedule** for DNTs; simplify documentation under **SEED**; enforce **time-bound certification**; establish a **periodic independent review commission**.
- **SEED scheme: Scheme for Economic Empowerment of DNT/NT/SNT** provides **coaching, health insurance, housing support, and livelihoods**, but uptake is constrained by classification and documentation gaps.

21. Gandikota Canyon

- **What is a canyon:** A **deep, narrow valley with steep cliffs**, formed mainly by **long-term river erosion**, exposing rock layers that record geological history.

About Gandikota Canyon

- **Location: Gandikota Canyon**, in the **Erramala Hills**, along the **Penna River**.
- **Landform:** A **deep gorge** carved over geological time through **red sandstone and granite**; popularly called the **"Grand Canyon of India."**
- **Physiography:** Part of the **Rayalaseema plateau**, within the **Deccan Peninsular system**.
- **Tourism:** Peak **~3,000 visitors/day** on weekends; **~830/day** on average.
- **Connectivity: ~300 km from Bengaluru** and **225 km from Tirupati**, enabling combined heritage–pilgrimage circuits.

Historical & Cultural Significance

- **Gandikota Fort:** Founded in **1123 CE** by the **Pemmasani Nayaks** (Kakatiya feudatories).
- **Records:** Mentioned in **Mackenzie Kaifiyat** manuscripts; described by **Jean-Baptiste Tavernier**.
- **Architecture:** Blend of **Vijayanagara temple style** and **Indo-Islamic elements**.

DECEMBER 2025

HEALTH & NUTRITION

1. Onchocerciasis
2. Haemorrhagic Septicaemia
3. Diabetic Retinopathy
4. Dieback disease
5. Nimesulide Ban
6. GLP-1 Medicines for Adult Obesity Treatment
7. Organ Donation Rate
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1. Onchocerciasis

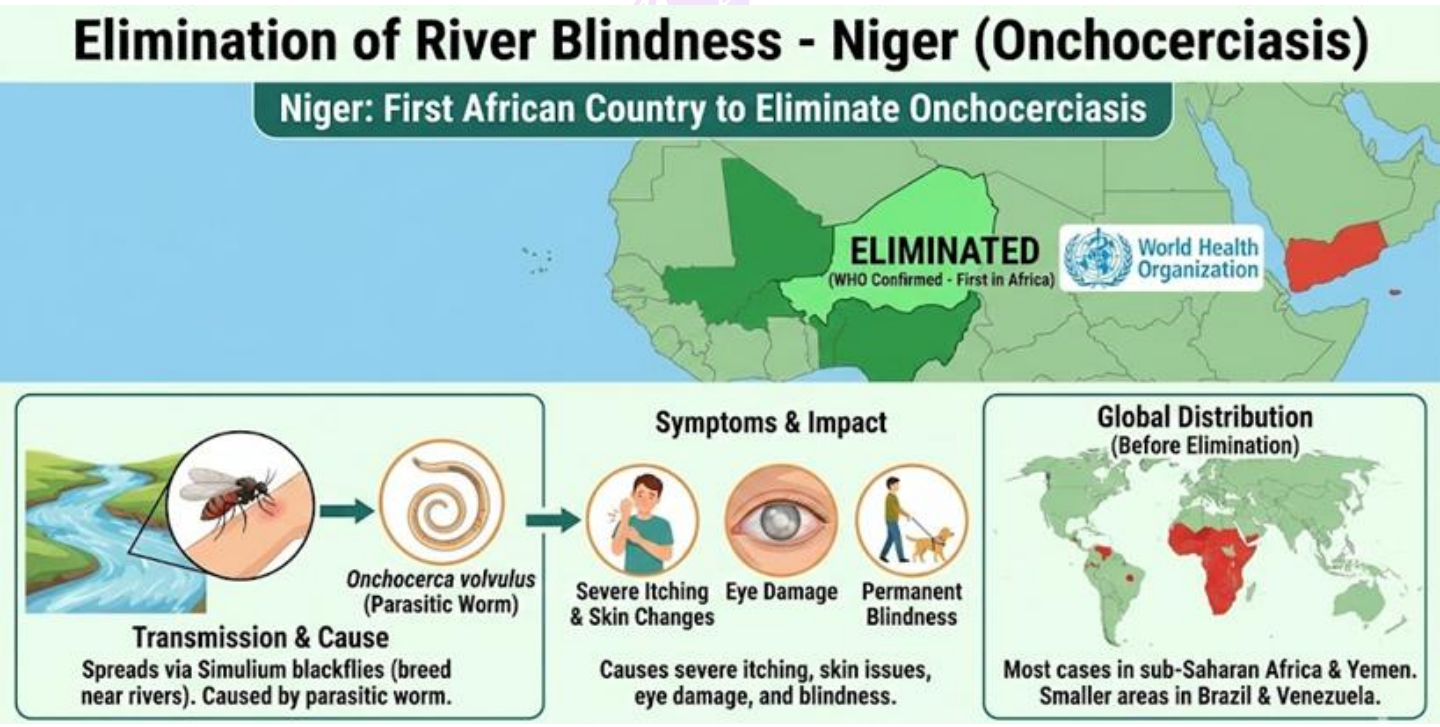
- **Onchocerciasis Eliminated:** Niger became the **first African country** and **5th globally** to eliminate **onchocerciasis (river blindness)** after meeting **WHO transmission interruption criteria**.

- **Disease Profile:** A **non-contagious Neglected Tropical Disease (NTD)** caused by the parasitic worm ***Onchocerca volvulus***, transmitted by bites of infected **Simulium (blackfly)**, endemic mainly to **sub-Saharan Africa**.

- **Health Impact:** Causes **intense itching, skin lesions and progressive blindness**; it is the **second leading infectious cause of blindness** worldwide after **trachoma**.

- **Elimination Strategy:** Achieved through **sustained community-wide mass drug administration (MDA) of ivermectin**, which lowers parasite load and **breaks transmission cycles**.

- **Significance:** Demonstrates effectiveness of **long-term public health interventions**, **WHO-led disease elimination frameworks**, and **global cooperation** in controlling NTDs.



2. Haemorrhagic Septicaemia

Incident: Ten **BLACKBUCKS** died at **Tata Steel Zoological Park, Jamshedpur**; preliminary cause identified as **haemorrhagic septicaemia (Pasteurellosis)**.

- **Disease Profile:** A **highly acute bacterial disease** caused by ***Pasteurella multocida***, affecting **cattle, buffaloes and susceptible wild ungulates**.
- **Transmission & Ecology:** Spreads via **contaminated feed, water, aerosols and fomites**; outbreaks peak in **humid/monsoon conditions**; **endemic to South & Southeast Asia**, including India.
- **Clinical Features:** **Very high mortality** with sudden **high fever, throat/neck swelling, respiratory distress**, often causing **rapid death**, especially in **younger animals**.
- **Control & Relevance:** Managed through **annual vaccination in endemic zones**, **early-stage antibiotic therapy**, and **strict biosecurity, sanitation and isolation**—important for **wildlife health management** and **zoonotic-risk governance**.

3. Diabetic Retinopathy

Initiative: Armed Forces Medical Services (AFMS) launched **India's first AI-driven community screening programme** for **Diabetic Retinopathy (DR)** using **MadhuNetrAI**.

MadhuNetrAI: A **web-based AI tool** that enables **automated retinal image screening at community level** and generates **real-time disease prevalence data**, strengthening **preventive public health outreach**.

About Diabetic Retinopathy: A **microvascular complication of long-standing diabetes** caused by **chronic hyperglycaemia**, damaging retinal blood vessels; a **leading cause of preventable blindness in adults**.

Disease Progression: Advances from **non-proliferative stage** (early vessel damage) to **proliferative stage** with abnormal neovascularisation, leading to severe vision loss if untreated.

Significance: AI-based early detection enables timely referral and treatment, crucial for **blindness prevention**, especially in large, resource-constrained populations.

4. Dieback disease

Issue: Dieback disease is causing large-scale decline of **NEEM TREES in Telangana**, prompting **treatment trials by forestry researchers**.

Nature of Disease: A **fungal plant disease** marked by **progressive death of branches from the tip backward**, often leading to **complete tree mortality**.

Causative Agents: Mainly **soil-borne fungi** such as **Phytophthora**, which proliferate in **warm, wet and humid conditions**.

Pathology: Fungal infection **damages roots**, blocks **water and nutrient uptake**, resulting in **dehydration and canopy collapse**.

Symptoms: Leaf wilting and browning, stem cankers, fruit rot, canopy thinning, and **near-total fruit loss**.

Management: No permanent cure; control relies on **early detection, improved soil drainage, sanitation**, and **experimental treatment protocols** to slow spread and limit ecological and economic losses.

5. Nimesulide Ban

Decision: India has **banned oral immediate-release nimesulide formulations above 100 mg** in **public interest**.

Legal Basis: Issued under **Section 26A of the Drugs & Cosmetics Act, 1940**, based on recommendations of the **Drugs Technical Advisory Board (DTAB)**.

Drug Profile: Nimesulide is a **non-steroidal anti-inflammatory drug (NSAID)** used for pain and fever management.

Health Rationale: High-dose nimesulide is linked to **serious hepatotoxicity, acute liver failure**, and **reported fatalities**, despite availability of **safer NSAID alternatives**.

Scope: Dose-specific restriction, not a complete prohibition of the drug.

Ecological Concern: Nimesulide residues pose a continuing threat to vulture populations, adding an environmental dimension to the ban.

6. WHO Issues First Global Guidelines on GLP-1 Medicines for Adult Obesity Treatment

The **World Health Organization (WHO)** has released its **first-ever global guideline** on using **Glucagon-Like Peptide-1 (GLP-1) receptor agonist medicines** for **obesity management in adults**, recognising obesity as a **chronic, relapsing disease** and outlining a comprehensive treatment approach with conditional recommendations.

What are GLP-1 Medicines?

- **Glucagon-Like Peptide-1 (GLP-1) receptor agonists** are drugs that mimic the body's natural **GLP-1 hormone**.
- They **stimulate insulin secretion**, **suppress glucagon**, **slow digestion**, reduce appetite, and help **lower blood glucose and body weight**.

Common GLP-1 agents recommended:

- **Liraglutide**, **Semaglutide**, and **Tirzepatide** — originally developed for diabetes, now repurposed for obesity care.

Key Features of the WHO Guidelines

1. **Conditional Recommendations:** WHO *conditionally* recommends **long-term use** of GLP-1 therapies for adults with obesity (BMI ≥30) — *except in pregnant women* — due to *uncertain long-term safety, high costs, and limited health system readiness*.
2. **Comprehensive Lifelong Care Model:** Obesity is recognised as a **chronic disease** requiring lifelong management with **multimodal care** — including **screening, diagnosis, medication, lifestyle changes, and behavioural support**.
3. **Mandatory Behavioural Supports:** GLP-1 therapies **must be combined** with **intensive behavioural interventions** — structured healthy diet plans, regular physical activity, goal-setting and counselling — to improve outcomes.
4. **Equitable Access & Health Equity:** WHO highlights that **cost and access barriers** could widen health inequities; current production capacity may benefit **fewer than 10%** of eligible people by **2030**, urging policy action on manufacturing scale-up and affordability.

About Obesity

- **Definition:** WHO defines **obesity** as a **Body Mass Index (BMI) ≥30** in adults.
- **Global Burden:** Obesity and overweight affect **over 1 billion people** globally, with numbers projected to rise by 2030, worsening health system pressures and chronic disease risk.
- **India Context:** Indian surveys indicate rising overweight and obesity prevalence — significant public health concern tied to non-communicable diseases in adults (e.g., NFHS data show substantial proportions of overweight men and women). *(Specific NFHS numbers are widely reported; exact figures would be drawn from NFHS 5 data.)*

7. India's Deceased Organ Donation Rate Remains Below 1 pmp Despite Legal Framework, Signalling Systemic Gaps

Even after three decades of the **Transplantation of Human Organs and Tissues Act (THOTA), 1994**, India's **deceased organ donation rate** remains low (~0.77 per million population in 2023), far below global leaders like Spain (~49 pmp), contributing to thousands of preventable deaths each year due to lack of organs.

Organ Donation Performance in India

- **Low Deceased Donation Rate:** India's deceased donor rate is under **1 per million population (pmp)** — around 0.77 pmp in 2023 — compared with Spain's ~49.38 pmp.
- **Life Lost Due to Shortages:** An estimated **hundreds of thousands of deaths** occur annually due to non-availability of suitable organs.
- **Low Brainstem Death (BSD) Utilisation:** Only a **small fraction of ICU deaths** are certified as brainstem deaths despite a large number being medically eligible, limiting organ retrieval opportunities.
- **Living Donor Dominance:** Around **85% of transplants in India still come from living donors**, in contrast with developed nations where deceased donations make up **70–80%** of transplants.

India's Legal Framework – THOTA & Institutional Bodies

- **Transplantation of Human Organs and Tissues Act, 1994 (THOTA):**
  - **Legalised Brainstem Death (BSD):** THOTA recognises **brainstem death as legal death**, enabling retrieval of organs from deceased donors.
  - **Regulatory Role:** It regulates living donations, transplant hospitals, and penalises organ trade and commercialisation.
  - **Mandatory Forms:** Includes **Form 8** (consent for organ donation) and **Form 10** (brainstem death declaration).
- **National & Sub-National Bodies:**
  - **NOTTO (National Organ and Tissue Transplant Organisation):** Apex body under the **Ministry of Health and Family Welfare** for organ allocation, registry, and coordination.
  - **ROTTO (Regional):** Facilitates regional organ sharing and allocation.
  - **SOTTO (State):** State nodal agencies responsible for awareness, training, hospital networks, and consent processes.

8. Rising Institutional Deliveries Help Drive India's Decline in Maternal Mortality Rate

The **Union Health Minister** highlighted that the **increase in institutional deliveries** in India has significantly contributed to the **decline in the Maternal Mortality Rate (MMR)**, reflecting improved access to skilled care and emergency obstetric services.

What Are Institutional Deliveries?

- **Definition:** Births conducted in a **medical institution** under the supervision of **trained health professionals** with the capacity to manage complications and emergencies.
- **Current Status:** India's **institutional delivery rate** has increased to ~**89%**, with **public health facilities handling about 62%** of these cases. Regional differences persist — e.g., **Kerala and Tamil Nadu approach nearly 100%**, while **Nagaland (~46%) and Bihar (~76%)** lag behind.

Maternal Mortality Rate (MMR)

- **Definition:** MMR is the number of **maternal deaths per 100,000 live births** in a given time period.
- **SDG Target:** Sustainable Development Goal (SDG 3.1) aims to reduce global MMR **below 70 per 100,000 live births by 2030**.
- **India's Progress:** According to the **Sample Registration System (SRS)**:
    - MMR stood at ~**88 per 100,000 live births (2020–22)** — a marked decline from past decades.
    - In earlier SRS releases, MMR had declined from 130 in 2014–16 to 97 in 2018–20 and 93 in 2019–21.

Role of Institutional Deliveries in Reducing MMR

1. **Skilled Attendance at Birth:**
    - Institutional deliveries ensure **skilled birth attendants**, emergency obstetric care, and access to surgical interventions (e.g., caesarean sections) when needed — crucial for preventing maternal deaths from haemorrhage, pre-eclampsia, sepsis, and obstructed labour.
2. **Emergency Response & Referral:**
    - Hospitals can provide **timely referral systems**, blood transfusion services, and management of complications, reducing delays that often contribute to maternal deaths.
3. **Integrated Antenatal & Postnatal Care:**
    - Delivering in institutions often correlates with higher uptake of **antenatal and postnatal services**, enabling early detection and management of high-risk pregnancies.

9. National Convention on Health Rights Reaffirms Need for Health as a Fundamental Right in India

The **National Convention on Health Rights**, organised by **Jan Swasthya Abhiyan (JSA)** and allied groups in **New Delhi (Dec 11–12, 2025)**, reaffirmed that **healthcare should be recognised as a fundamental right** and called for policy reforms to reduce inequities, expand public provision, and curtail the commercialisation of health services.

About the National Convention on Health Rights

- Organised by **Jan Swasthya Abhiyan (People's Health Movement – India)**, a broad coalition of civil society groups, professionals, and activists from **20+ states**.
- Aim: To strengthen the **movement for health as a fundamental human right** and push for **universal, equitable, affordable, and quality healthcare**.
- The convention brought together health professionals, activists, community leaders, and Parliamentarians to debate policy priorities and articulate a **ten-point agenda** for legislative and systemic reforms.

India's Health Sector — Key Issues Highlighted

1. **Low Public Health Spending:** India's **per capita public health spending is about US $25 per year**, well below global averages, with the **Union Budget's health share around ~2%** of total expenditure.
2. **High Out-of-Pocket (OOP) Expenditure:** Nearly **48% of health spending** is borne directly by individuals, pushing millions into **catastrophic expenditure and poverty**. Safety net schemes exist but gaps remain.
3. **Medicine Affordability:** Roughly **80% of medicines are outside price control**, contributing to high treatment costs.
4. **Public Dependence on Health Services: Over 80 crore Indians** depend on public health services, yet access, quality, and infrastructure are uneven.
5. **Inequities in Access:** Structural disparities (social, economic, geographic) result in utilisation gaps — for example, lower institutional delivery and service uptake among marginalised groups.

Significance of Health as a Fundamental Right

- **Universal Access:** Ensures basic health services for **vulnerable and excluded populations**, reducing inequity and discrimination.
- **System Accountability:** A rights framework can enforce **quality standards, grievance redressal, transparency**, and accountability of health providers (public and private).
- **Financial Protection:** Reduces financial hardship and poverty driven by health costs; Lancet estimates show **tens of millions fall into poverty annually due to medical bills**.

10. Pradhan Mantri Rashtriya Bal Puraskar

Veer Bal Diwas: Observed annually on **26 December** to commemorate the martyrdom of **Sahibzada Zorawar Singh and Sahibzada Fateh Singh**, the younger sons of **Guru Gobind Singh**.

Historical Context: They were executed in **1705 at Sirhind** by Mughal governor **Wazir Khan** for refusing to renounce their faith, symbolising supreme courage and religious freedom.

PM Rashtriya Bal Puraskar (PMRBP): On this occasion, the **President of India** confers the awards at **Rashtrapati Bhavan** to recognise **exceptional achievements and bravery of children** across fields.

Significance: Reinforces national values of **bravery, sacrifice, moral conviction, and youth inspiration**, rooted in India's historical and cultural legacy.

11. Rashtra Prerna Sthal Inaugurated

- **Rashtra Prerna Sthal Inauguration:** On **25 December 2025**, PM **Narendra Modi** inaugurated **Rashtra Prerna Sthal** in **Lucknow** on the **101st birth anniversary of Atal Bihari Vajpayee**, observed as **Good Governance Day**.
- **Location:** Situated on the **banks of the Gomti River**, Uttar Pradesh.
- **Dedication:** Commemorates **Atal Bihari Vajpayee**, **Syama Prasad Mookerjee**, and **Deendayal Upadhyaya**.
- **Key Features:**
  - Three bronze statues (**~65 ft** high each).
  - **Lotus-shaped museum** (**~98,000 sq ft**) with digital, immersive and interactive exhibits.
- **Significance:** Reflects ideals of **nationalism, good governance, public service**, and India's constitutional and democratic journey.

12. SC Holds ICC Can Hear POSH Complaints Even If the Accused Is an 'Outsider'

The **Supreme Court of India** has ruled that a woman can file a **sexual harassment complaint** under the **Sexual Harassment of Women at Workplace (Prevention, Prohibition and Redressal) Act, 2013 (POSH Act)** with the **Internal Complaints Committee (ICC)** at her own workplace even if the accused (respondent) is **not employed there** — i.e., an "outsider." This decision enhances access to justice and reinforces the protective intent of the law.

Key Ruling by the Supreme Court

- **Aggrieved Woman's ICC Has Jurisdiction:** The Court clarified that the **ICC constituted at the workplace of the aggrieved woman** can **receive and inquire** into a sexual harassment complaint under Section 11 of the POSH Act **even if the respondent works in a different department or organisation**.
- **Broad Definition of "Workplace":** The Act's definition of "workplace" includes any place visited by the employee during employment; it does **not require the respondent to be employed in the same workplace** as the complainant for the ICC to exercise jurisdiction.
- **Inquiry vs Disciplinary Action:** The ICC at the complainant's workplace is empowered to **conduct a preliminary/fact-finding inquiry**. If harassment is established, the **employer of the respondent** (even in another organisation) is required to **take disciplinary action** under applicable service rules based on the ICC's findings.
- **Employer Cooperation:** Employers are **duty-bound to cooperate** with the ICC of the aggrieved woman's workplace by providing information and assistance to facilitate the inquiry.

Background of the Case : The case arose from a complaint by an Indian Administrative Service (IAS) officer alleging sexual harassment by an Indian Revenue Service (IRS) officer at her workplace in New Delhi. The respondent challenged the ICC's jurisdiction on the ground that he was not employed at the complainant's workplace. The Supreme Court rejected the jurisdictional challenge and upheld the ICC's authority.

About the POSH Act

- **Full Name:** *Sexual Harassment of Women at Workplace (Prevention, Prohibition and Redressal) Act, 2013*
- **Origins:** The Act gives statutory backing to the **Vishakha Guidelines (1997)** laid down by the Supreme Court that recognised sexual harassment as a violation of women's rights under Articles 14, 15, and 21 of the Constitution. It mandates the constitution of an **Internal Complaints Committee (ICC)** in every workplace with 10 or more employees.

13. VBSA Bill, 2025 Seeks Unified Higher Education Regulator Under NEP 2020 Vision

The **Viksit Bharat Shiksha Adhishthan (VBSA) Bill, 2025** was introduced in Parliament to **reform India's higher education regulatory architecture** by creating a **single umbrella body** with three specialised councils, replacing the **fragmented system of UGC, AICTE and NCTE** to align governance with the National Education Policy (NEP) 2020.

Background & Objectives

Need for Reform: India's higher education has long been overseen by multiple regulators (UGC, AICTE, NCTE) with overlapping mandates, leading to confusion, delay, and bureaucratic friction. VBSA seeks to **simplify regulation**, **enhance autonomy**, and **boost quality** and **global competitiveness** as envisioned in **NEP 2020's "light but tight" regulatory philosophy**.

Core Objectives:

- **Light-But-Tight Regulation:** Reducing excessive inspections while ensuring quality.
- **Quality Enhancement:** Strengthening academic standards and accreditation.
- **Institutional Autonomy:** Enable graded autonomy for high-performing institutions.
- **Global Competitiveness:** Facilitate entry of foreign universities into India

Key Provisions of the VBSA Bill, 2025

- **Umbrella Regulator:** Establishes **Viksit Bharat Shiksha Adhishthan** as the **apex coordinating body** for higher education.
- **Three Independent Councils:**
    1. **Viksit Bharat Shiksha Viniyaman Parishad** (Regulatory Council)
    2. **Viksit Bharat Shiksha Gunvatta Parishad** (Accreditation Council)
    3. **Viksit Bharat Shiksha Manak Parishad** (Standards Council)
    4. Each council will have up to **14 members** with presidents who are ex-officio members of the apex body.
- **Regulatory Unification:** Repeals the **UGC Act (1956)**, **AICTE Act (1987)** and **NCTE Act (1993)**, subsuming their functions into the new bodies.
- **Accreditation & Standards:** Introduces an **outcome-based institutional accreditation** framework and independent standard-setting mechanisms.
- **Foreign Universities:** Regulates entry and operations of **foreign universities** in India with safeguards and compliance norms.
- **Grant Separation:** Removes **grant-disbursal powers** from the regulator; funding will be handled by the **Ministry of Education** or designated mechanisms, preserving regulatory objectivity.

14. Hornbill Festival

Protected Area Permit (PAP) Issue: Nagaland has opposed the re-imposition of the **PAP regime**, stating that it restricts **foreign tourist inflow**, even during periods of temporary relaxation by the Centre.

Hornbill Festival: Launched in **2000**, it is Nagaland's flagship cultural festival, held **1–10 December** at **Naga Heritage Village, Kisama**, coinciding with **Nagaland Statehood Day (1 December)**.

Cultural Significance: Named after the **hornbill bird**, a symbol of Naga identity; showcases **tribal traditions, morung culture, folk dances, indigenous sports, crafts, cuisine**, and contemporary cultural events.

Tourism & Outreach: Attracts **over 1.5 lakh visitors**, including foreign tourists, artists and researchers; considered Nagaland's largest tourism platform.

UPSC Relevance: Highlights the tension between **internal security regulations (PAP)** and **cultural diplomacy, tourism promotion, and regional development** in border states.

15. Bharat Ranbhoomi Darshan

Event: Sikkim is hosting a **supercar rally** to promote **battlefield and border tourism** under the **Bharat Ranbhoomi Darshan** initiative.

Bharat Ranbhoomi Darshan: A **digital platform (app + web portal)** jointly developed by the **Ministry of Defence and Ministry of Tourism**.

Coverage: Provides regulated public access to **77 strategically significant sites** along the **LAC and LoC**, including **Galwan Valley, Doklam, Longewala and Nathu La**, many earlier restricted.

Objectives: Boost **border tourism**, enhance **military heritage awareness**, and strengthen **civil–military connect**.

Features: Virtual tours, historical narratives, route details, and a **single-window permit system** for controlled access to sensitive border areas.

16. PM Highlights Khiamniungan Tribe — 'Source of Great Water' Naga Community of Eastern Nagaland

Prime Minister **Narendra Modi** recently highlighted the **Khiamniungan tribe** in his *Mann Ki Baat* programme, drawing attention to one of the prominent **Naga ethnic groups** known for its rich cultural heritage, trans-border presence, and traditional practices.

Who Are the Khiamniungan?

- The **Khiamniungan** are a major **Naga tribe** inhabiting **eastern Nagaland (Tuensang & Noklak districts)** and neighbouring **north-western Myanmar**.
- Their name comes from the words **'khiam' (water)**, **'niu' (great)** and **'ngan' (source)**, meaning **"source of great water/river."**
- Traditionally based on a **clan-based social structure**, the tribe has maintained distinctive cultural identities.

Language & Identity

- The primary language is **Patsho Khiamniungan**, a **Sino-Tibetan** language with several dialects spoken across villages in India and Myanmar.
- The tribe today embraces Christianity (predominant in Nagaland) while retaining indigenous cultural practices.

Livelihood & Traditional Practices

- **Agriculture:** Jhum (shifting) cultivation is the mainstay of the economy, and livestock rearing supplements livelihoods.
- **Cliff Honey Harvesting:** The community is noted for traditional **cliff honey hunting** — a unique cultural and subsistence practice passed down generations.

Cultural Traits

- **Attire & Symbols:** Traditional attire features **bright colours**, ornaments made of **cowries and conch shells**, and distinctive headgear.
- **Music & Instruments:** Music plays a central role in ceremonies; **drums (gourd/bamboo)** and wind instruments accompany folk songs and dances.

Festivals of the Khiamniungan Tribe

The tribe's festivals are closely tied to the **agricultural cycle** and community cohesion:

1. **Miu (Sowing/Pre-Agricultural Festival):**
2. **Tsokum (Harvest Festival):**
3. **Khaotzao Sey Hok-ah (Post-Agricultural Festival):**

*(Note: Some sources use variant spellings like **Tsoukum/Tsoukum Sumai** and **Khaozaosey-Hok-ah** for these festivals.)*

17. Dandami Madia Tribe

Community: Dandami Madia tribe (also called **Bison-Horn Maria / Khalpati Maria**), belonging to the **Gond tribal group**, inhabiting **southern Bastar, Chhattisgarh**.

Cultural Highlight: Bison Horn Maria dance, characterised by distinctive **bison-horn ceremonial headgear**, represents a living expression of Gond tribal culture.

Habitat & Economy: Forested regions of **Darbha, Tokapal, Lohandiguda and Dantewada**; livelihood based on **forest-linked agriculture**, supplemented by **hunting and fishing**.

Language: Dandami Maria (Dravidian Maria language); some use of **Gondi dialects**.

Social & Cultural Practices: Ghotul youth dormitory system; acceptance of **widow remarriage and divorce**; **syncretic belief system** blending **animism with Hindu elements**.

18. New PMO Complex Named Seva Teerth

Renaming: The new PMO complex under the **Central Vista Redevelopment Project** has been renamed **Seva Teerth**, replacing the earlier **Executive Enclave**.

Components: It will house the **Prime Minister's Office (PMO)**, **Cabinet Secretariat**, **National Security Council Secretariat (NSCS)** and **India House**.

Symbolism: Part of a broader shift toward **service-oriented institutional nomenclature**, seen earlier in **Rajpath → Kartavya Path** and **Race Course Road → Lok Kalyan Marg**.

About PMO: Established as the **PM's Secretariat in 1947** and renamed **PMO in 1977**; it is the **apex executive support office** of the Prime Minister.

Structure & Functions: Politically headed by the **Prime Minister** and administratively by the **Principal Secretary**; coordinates **inter-ministerial work**, **Centre–State relations**, and matters requiring the **PM's approval**.

19. Digital Addressing System DHRUVA

DHRUVA (Digital Hub for Reference and Unique Virtual Address): Proposed by the **Department of Posts** under the **Post Office Act, 2023** as part of India's **Digital Public Infrastructure (DPI)** initiative.

Objective: Create a **national digital addressing system** by replacing traditional physical addresses with **standardised, UPI-like virtual labels** (e.g., *name@entity*) for seamless public and private service delivery.

Key Feature: Virtual addresses are linked to **precise geographic coordinates**, improving accuracy in informal, rural and unmapped areas.

Two-layer Architecture:

- **Foundational Layer – DIGIPIN:** A **10-character alphanumeric code** based on latitude–longitude mapping every ~**14 sq m**, ensuring high spatial precision.
- **Digital Address Layer:** Allows users to generate **easy-to-remember virtual address labels** mapped to their DIGIPIN.

Significance: Enhances last-mile delivery, interoperability across platforms, and efficiency in governance and logistics.

20. New Indian Standard for Incense Sticks

IS 19412:2025 (Agarbatti Standard): Released on **National Consumer Day (24 Dec 2025)** by the Union Minister for Consumer Affairs; developed by the **Bureau of Indian Standards (BIS)**.

Key Provisions: Prohibits harmful chemicals, classifies incense sticks into **machine-made, hand-made, and traditional masala**, and prescribes **quality norms for raw materials** to enhance consumer safety.

Industry Significance: India is the **world's largest producer and exporter of agarbattis**; industry size ≈ **₹8,000 crore annually**.

About BIS: India's **National Standards Body**, established under the **BIS Act, 2016**, under the Ministry of Consumer Affairs; responsible for **standard formulation, certification, and quality assurance**.

21. Caller Name Display

Caller Name Presentation (CNAP): DoT to mandate **nationwide display of KYC-registered caller names** for Indian numbers after a pilot in **Haryana**, to curb **spam, fraud and impersonation**.

Mechanism: Network-level implementation, similar to existing "**Suspected/Suspicious call**" tagging on major telecom networks.

Policy Decision: Proposed in **2022**; **DoT overruled TRAI's opt-in model** and directed **default activation** for users.

Exemptions: Caller Line Identification Restriction (CLIR) permitted only for **ministers, senior officials, and security/intelligence agencies**.

Concerns & Stand: Privacy concerns raised by telecom bodies and digital-rights groups (esp. vulnerable users); **DoT maintains only the caller's identity is disclosed**, not the recipient's.

22. GhostPairing

GhostPairing Cyber Threat: On **22 Dec 2025**, **MeitY** issued an advisory warning about **GhostPairing**, a cyber-campaign hijacking **WhatsApp accounts** by exploiting the **device-linking feature**.

Modus Operandi: Victims receive a **trusted-looking message** (e.g., "Hi, check this photo") with a **malicious link** and fake social-media-style preview, redirecting to a **phoney verification page**.

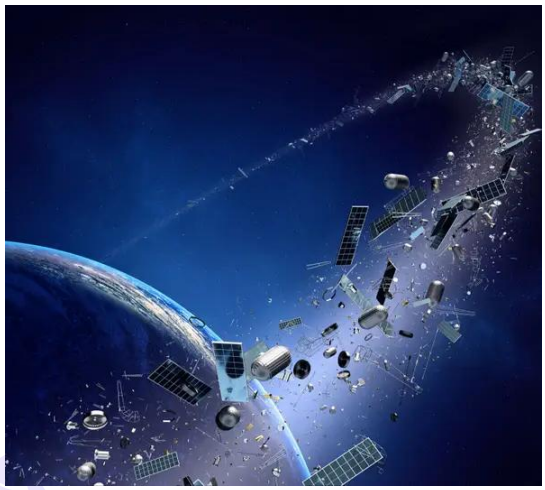
Account Takeover: After entering the **phone number**, attackers **link their own device** to the victim's WhatsApp **without SIM swap or password theft**, gaining full access to **chats and contacts**.

Concern: Often **no immediate alert** to the user, highlighting risks from **social engineering** and misuse of **account-linking features** in messaging platforms.

23. SpaceX's Launch of 29 Satellites Fuels Concerns Over Crowded Orbits and Kessler Syndrome Risks

SpaceX recently launched **29 new satellites into Low Earth Orbit (LEO)** as part of its Starlink megaconstellation, rekindling global concerns about **orbital congestion** and the theoretical **Kessler Syndrome**—a chain reaction of collisions that could imperil satellites and space operations.

SpaceX & Satellite Proliferation



SpaceX's **Starlink constellation** has already deployed thousands of satellites, making it one of the largest single operators in orbit. Recent launches (e.g., 29 satellites in mid-Dec 2025) highlight rapid expansion and crowding in LEO.

SpaceX and other operators (OneWeb, Amazon's Project Kuiper, China's planned constellations) aim for tens of thousands of active small satellites in the coming decade, dramatically increasing LEO traffic.

What Is Kessler Syndrome?

- **Kessler Syndrome** is a theoretical cascade effect first proposed by **NASA scientist Donald J. Kessler in 1978**, where a sufficiently dense population of orbital objects causes collisions that generate debris, leading to more collisions in a **runaway chain reaction**.
- The concern arises when **collision rates exceed natural removal** (e.g., atmospheric drag), potentially turning certain orbital bands into self-sustaining debris clouds that are hazardous or unusable.

Why It Matters

- **Satellite services disruption:** A true Kessler cascade could make vast swaths of LEO unsafe, impairing services like **communication, navigation (GPS), earth observation, and weather forecasting**.
- **Crewed spaceflight risks:** Space debris poses a hazard to crewed missions and space stations due to high orbital speeds and kinetic energy, where even small fragments can cause catastrophic damage.
- **Global space sustainability:** Without effective **space traffic management**, debris mitigation, and coordinated international norms, megaconstellations could exacerbate congestion and long-term sustainability challenges.

Personality Obituary

Personality	Field / Identity	Key Contributions & Achievements	UPSC Relevance
Vinod Kumar Shukla (1937–2025)	Hindi Literature	Jnanpith Award winner; Sahitya Akademi Award for Deewar Mein Ek Khidki Rahti Thi; notable works: Naukar Ki Kameez, Lagbhag Jai Hind, Pedon Par Kamra; works translated globally	Culture – Indian literature, literary awards
Ram Vanji Sutar (1925–2025)	Sculpture / Art	Designer of Statue of Unity (world's tallest statue); J.J. School of Art gold medallist; iconic statues of Mahatma Gandhi and Chhatrapati Shivaji Maharaj	Art & Culture – Modern Indian art, monuments
Sreenivasan (1956–2025)	Cinema (Malayalam)	Actor in ~225 films; landmark screenplays (Nadodikkattu, TP Balagopalan MA, Varavelpu); known for realism and social satire	Culture – Indian cinema, regional arts
Kalyan Chattopadhyay (1942–2025)	Cinema (Bengali)	FTII graduate; debut in Apanjan; acted in Satyajit Ray's Pratidwandi; 5-decade career	Culture – Parallel cinema, film institutions
Khaleda Zia (1945–2025)	Politics (Bangladesh)	First woman PM of Bangladesh (1991); long-time BNP chairperson; key rival of Sheikh Hasina	International Relations – Neighbourhood, Bangladesh politics

DECEMBER 2025

HISTORY
ART & CULTURE

1. Sirpur Readied for UNESCO World Heritage Nomination
2. Keezhadi Flood Burial
3. Boramani Stone Labyrinth Discovery (Maharashtra)
4. “Lotus Light: Piprahwa Relics Exhibition
5. Assam Day (2 December): Remembering Chaolung Sukapha
6. Commemorative Stamp Perumbidugu Mutharaiyar II
7. Special Discussion on 150 Years of Vande Mataram
8. PM Modi at Adwa Victory Memorial
9. Goa Liberation Day (19 December 2025)
10. Karthigai Deepam Festival
11. Punjab Grants “Holy City” Status to Key Sikh Centres
12. Charaichung Festival – Reviving Asia’s Protected Bird Habitat
13. Deepavali Inscribed on UNESCO’s Intangible Cultural Heritage
14. India Voices Over Damage to Preah Vihear Temple
15. ASI Hosts National Workshop on Project Mausam
16. INSV Kaundinya: Revival of Ancient Maritime Heritage
17. UNESCO Inscribes Sindh’s Boreendo on Urgent Safeguarding List

1. Sirpur Readied for UNESCO World Heritage Nomination

The Government of India is preparing **Sirpur**, one of central India's most significant early-medieval urban centres, for nomination to the **UNESCO World Heritage Site (WHS)** list, highlighting its exceptional archaeological, architectural, and multi-religious legacy.

About Sirpur Archaeological Site

- **Location:** On the banks of the **Mahanadi River** in, **Chhattisgarh**.
- **Chronology:** Flourished between **5th–12th centuries CE**.
- **Discovery:** Identified in **1882** by **Alexander Cunningham**, the first Director-General of the Archaeological Survey of India.
- **Historic Name:** **Shripura / Sripura** — "city of auspiciousness" or "city of Lakshmi".
- Capital of **Dakshina Kosala** under **Panduvanshi** and **Somavamshi** dynasties.
- **Urban-Religious Hub:** Supported **Buddhism, Shaivism, Vaishnavism, and Jainism**, reflecting rare religious coexistence.
- **Travel Accounts:** Mentioned by the 7th-century Chinese pilgrim **Xuanzang**, underscoring its international repute.
- **Lakshmana Temple (7th century):**
  - Brick-built **Vishnu** temple with a **brick shikhara** and richly carved stone door.
  - One of the finest surviving early brick temples in India.
- **Surang Tila Complex:**
  - **Panchayatana-style** temple complex on a raised terrace.
  - Five shrines (four **Shiva**, one **Ganesha**).
  - **Shiva lingams** in four distinct colours, reflecting ritual symbolism.
- **Ananda Prabhu Kuti:**
  - A **Buddhist Vihara** featuring a **monolithic Buddha**.
  - Displays **syncretic Buddhist–Hindu iconography**.
  - Inscription refers to **King Shivagupta Balarjuna**, indicating royal patronage across faiths.
- **Urban Remains:**
  - **6th-century market complex**, palaces, residential quarters, advanced water systems, and a public bathhouse.
  - Evidence of Sirpur's role as a **commercial and craft centre** linked to long-distance trade.

2. Keezhadi Flood Burial

A recent scientific study on the **Keezhadi** archaeological site along the Vaigai River indicates that a **major flood event in the 9th century CE** buried large parts of its Sangam-era urban settlement, likely forcing abandonment or relocation.

- **Location & Context:** Keezhadi lies in **Sivaganga district (near Madurai)** in the **Vaigai River basin** and dates to the **Sangam Age**, corroborating literary descriptions of urban life and trade.
- **Urban Evidence:** Excavations reveal **brick buildings, open drains, terracotta pipelines, ring wells**, and craft activity (weaving, dyeing, bead-making, pottery).
- **Flood Signature: High-energy flood sediments** overlying brick structures confirm a **large Vaigai River flood**.
- **Dating: OSL dating** shows burial occurred **~1,155 years ago (c. 9th cen. CE)**.
- **Impact:** Flood deposits covered **houses, drainage, and industrial areas**, disrupting habitation.
- **Climatic Context:** Linked to **late-Holocene wet–dry fluctuations** and **river channel shifts** that destabilised river-dependent settlements in South India.
- **Method Note: OSL dating** measures time since mineral grains were last exposed to sunlight, dating their burial.

Data are consistent with stratigraphy, sedimentology, and OSL chronology.

3. Boramani Stone Labyrinth Discovery (Maharashtra)

Archaeologists have discovered **India's largest circular stone labyrinth** in the **Boramani grasslands**, shedding light on Satavahana-era trade and cultural contacts.

- **Structure:** Circular labyrinth measuring **50 × 50 feet** with **15 concentric stone circuits**.
- **Boramani Stone Labyrinth Discovery (Maharashtra)**
- **Chronology:** Dated to **~2,000 years ago (Satavahana period)**.
- **Uniqueness:** **Largest circular stone labyrinth** recorded in India to date.
- **Design Link:** Pattern closely matches **labyrinth motifs on ancient Cretan coins** used across the Roman world.
- **Probable Function:** Likely served as **landmarks/navigation markers** guiding **Roman merchants** along **inland trade routes** in the Deccan.

4. "Lotus Light: Relics of the Awakened One" — Piprahwa Relics Exhibition

The Union Ministry of Culture is hosting **"Lotus Light: Relics of the Awakened One"** in New Delhi, bringing into public view the historically significant **Piprahwa Relics**, closely associated with the life and legacy of the Buddha.

About the Piprahwa Relics

- **Discovery (1898):** Unearthed at **Piprahwa Stupa** by British engineer **William C. Peppe**.
- **Historical Identification:** Piprahwa is widely identified with ancient **Kapilavastu**, the Buddha's homeland.
- **What the Relics Include:** Bone fragments (believed to be of the Buddha), crystal and steatite caskets, gold ornaments, and gemstones.
- **Epigraphic Evidence:** A **Brahmi inscription** attributes the relics to the **Sakya clan**, dating them to the **3rd century BCE**, making them the earliest Buddhist relics known.

Colonial-Era Dispersal & Custody

- **Treasure Trove Act (1878):** The British Crown claimed the find.
- **Distribution:**
  - Buddha's **bone relics** were gifted to **King Rama V of Siam (Thailand)**.
  - Most **gem relics** were sent to the **Indian Museum, Kolkata**.

Later Excavations & Current Holdings

- **ASI Excavations (1971–77):** The **Archaeological Survey of India** uncovered **22 additional bone relics** in steatite caskets.
- **Present Preservation:** These are housed at the **National Museum**.
- **2025 Repatriation:** Relics held by the **Peppé family** surfaced at a Hong Kong auction and were **repatriated to India**, restoring important pieces of the assemblage.

Why This Exhibition Matters

- **Civilisational Heritage:** Presents tangible links to early Buddhism and the Sakya lineage.
- **Scholarly Value:** Reinforces archaeological, epigraphic, and historical consensus on Piprahwa–Kapilavastu.
- **Cultural Diplomacy:** Highlights ethical restitution and heritage stewardship through repatriation.

In essence: *"Lotus Light"* reunites and contextualises one of the most significant Buddhist relic assemblages, offering the public a rare encounter with the material history of the Buddha's legacy.

5. Assam Day (2 December): Remembering Chaolung Sukapha

Every year on **2 December**, **Assam Day (Asom Divas)** is observed to commemorate **Chaolung Sukapha**, the visionary founder of the **Ahom Kingdom (1228 CE)** and widely revered as the **"Architect of Greater Assam."**

Who was Chaolung Sukapha?

- **Origin:** A Tai prince of the Shan tribe from **Mong Mao** (present-day Yunnan / Upper Myanmar region).
- **Arrival in Assam:** Entered the Brahmaputra valley in 1228 CE and laid the foundations of a durable polity that lasted nearly **600 years**.
- **First Capital:** Established his initial seat of power at **Charaideo** in Upper Assam.
- **UNESCO Recognition: Charaideo Maidams** were inscribed as a **UNESCO World Heritage Site in July 2024**.

Key Contributions of Chaolung Sukapha

1) Political & Social Integration

- Pursued **reconciliation over conquest**, integrating indigenous communities such as the **Moran** and **Barahi**.
- Encouraged **intermarriage** between Tai-Ahoms and local groups, creating social cohesion and legitimacy.

2) Administrative Innovation

- Organised the state into **khels (phoids)**—functional units for administration, production, and defence.
- Instituted the **paik system**:
  - **Paiks** were able-bodied adult males who rendered **compulsory labour or military service**.
  - In return, they received **ga-mati**—rent-free, **non-hereditary** and **non-transferable** cultivable land.
- Created enduring high offices such as **Buragohain** and **Borgohain**, anchoring a stable governance structure.

3) Economic Transformation

- Introduced and expanded **wet-rice cultivation**, harnessing Assam's floodplains.
- This agrarian base sustained population growth, surplus generation, and state resilience.

4) Cultural Synthesis

- Interaction between **Tai-Ahom language, beliefs, and customs** with local traditions forged a **composite Assamese culture**.
- This legacy was meticulously recorded in the **buranjis**—chronicles meaning *"a storehouse of knowledge about the past"*, initially in Tai-Ahom and later predominantly in Assamese.

In essence: Assam Day honours Chaolung Sukapha's enduring vision—**unity through integration, prosperity through agrarian innovation, and identity through cultural synthesis**—that continues to define Assam today.

6. Commemorative Postage Stamp Honouring Perumbidugu Mutharaiyar II

A **commemorative postage stamp** was released in honour of **Perumbidugu Mutharaiyar II** by the Vice President, recognising his historical role in early medieval Tamil polity, administration, warfare, and temple architecture.

About Perumbidugu Mutharaiyar II

- **Period:** c. **705–745 CE : Aliases:** *Suvaran Maran*, *Shatrubhayankar* ("terror to enemies")
- **Political Position:** A powerful ruler of the **Mutharaiyar lineage**, serving as **feudatories of the Pallava dynasty**.
- **Territorial Extent:** Control over key Cauvery basin regions—**Tiruchirappalli, Thanjavur, Pudukkottai, Perambalur**, and adjoining tracts.
- **Governance & Military:** Remembered as a **strong administrator and capable military leader**, consolidating Pallava authority in the central Tamil region.
- **Religion & Intellectual Climate:** A **Shaivite patron**, yet upheld **religious tolerance**, hosting Jain scholarly debates and interactions, including visits by **Jain monk Vimalachandra**.
- **Architectural Legacy:** The Mutharaiyars were **pioneers of early stone temple architecture**, especially **rock-cut and early structural shrines**—notably at **Narthamalai** and **Sendalai**.
- **Historical Transition:** The Mutharaiyars were eventually defeated by **Vijayalaya Chola**, paving the way for the **rise of the Chola dynasty in Thanjavur**.

About the Pallava Dynasty

- **Founder: Simhavishnu** (c. **575 CE**), after defeating the Kalabhras.
- **Rule:** c. **575–897 CE**, from **Kanchipuram**, spanning north Tamil Nadu and south Andhra.
- **High Point:** Under **Mahendravarman I** and **Narasimhavarman I (Mamalla)**; frequent conflicts with the **Chalukyas of Vatapi** and southern Tamil powers.
- **Architectural Contribution:** Laid the **foundations of Dravidian architecture**—from **rock-cut caves** to **monolithic rathas** and **structural stone temples** (e.g., **Shore Temple**, **Kailasanatha Temple**).
- **Cultural Patronage:** Strong support for **Shaivism and Vaishnavism**; the **Bhakti movement** flourished with **Alvars and Nayanmars**, alongside vibrant **Sanskrit and Tamil** literary activity.
- **Decline:** Prolonged warfare weakened the dynasty; the last ruler **Aparajitavarman** was defeated by the **Cholas**, ending Pallava rule.

7. Parliament to Hold Special Discussion on 150 Years of *Vande Mataram*

The **Parliament** has scheduled a special discussion to commemorate **150 years of the National Song *Vande Mataram***, reviving debates over its historical usage and the 1937 Congress Working Committee's decision to adopt only the first two stanzas for national gatherings.

Origin and Literary Context

- **Author & Date:** Written by **Bankim Chandra Chattopadhyay in 1875** and later included in his 1882 Bengali novel *Anandamath*, published in *Bangadarshan*.
- **Structure:** The poem has **six stanzas** — the first two are largely Sanskritised; the rest primarily in Bengali.
- **Portrayal:** In *Anandamath*, ascetic warrior-monks sing the hymn in praise of **Mother India**, personified as goddess **Durga**.

Musical Composition

- **Early Tune:** An initial composition was created by **Jadunath Bhattacharya** at the author's request.
- **Tagore's Version: Rabindranath Tagore** later composed the most widely recognised tune based on **Raga Desh Malhar**.
- **Public Debut:** Tagore's rendition was first sung publicly at the **1896 Congress Session** in Calcutta.

Role in Freedom Movement

- **Partition of Bengal (1905):** *Vande Mataram* became the central slogan of the **Swadeshi and Boycott Movement**.
    - First publicly raised on **7 August 1905** at Calcutta's Town Hall.
    - It became customary as the opening song at **All-India Congress sessions** — for example at the 1905 Varanasi session with Sarala Devi Chaudhurani's rendition.

Symbol of Defiance:

- The British attempted to ban its public use; chanting it became an act of resistance, with many freedom fighters facing arrest.
- It inspired publications such as **Bande Mataram** (edited by Aurobindo, launched by Bipin Chandra Pal) and later a namesake Urdu daily by Lala Lajpat Rai.
- In 1907, **Bhikaji Cama** unfurled an early version of the Indian flag in Stuttgart with *Vande Mataram* inscribed on it.

Post-Independence Recognition

- On **24 January 1950**, the Constituent Assembly under **Dr. Rajendra Prasad** declared *Vande Mataram* the **National Song of India**.
- It is to be **honoured equally** with the National Anthem *Jana Gana Mana*, though **not legally enforceable** under the *Prevention of Insults to National Honour Act, 1971*.

Parliamentary protocol: a session opens with the **National Anthem** and concludes **sine die** with the **National Song *Vande Mataram***.

8. PM Modi at Adwa Victory Memorial

Tribute Paid: Prime Minister **Narendra Modi** paid tribute at the **Adwa Victory Memorial** in Addis Ababa, Ethiopia.
It Commemorates: Ethiopia's victory over Italian forces in the **1896 Battle of Adwa**.

Battle of Adwa (1896)

- **Conflict:** Decisive Ethiopian victory over Italy in the **First Italo-Ethiopian War**.
- **Cause:** Dispute over the **Treaty of Wuchale (1889)**—the Amharic version allowed optional Italian mediation, while the Italian text imposed mandatory control over Ethiopia's foreign relations.
- **Outcome: Treaty of Addis Ababa**—Italy formally recognised Ethiopia's full independence and sovereignty.
- **Historical First:** Marked the first major defeat of a European colonial power by an African state.

Significance

- **Anti-Colonial Impact:** Shattered myths of European invincibility and racial superiority.
- **Global Influence:** Inspired anti-colonial movements worldwide, including in India.

Bottom Line: Adwa stands as a foundational symbol of successful resistance to colonialism and a milestone in global anti-imperial history.

9. Goa Liberation Day (19 December 2025)

- **Commemoration:** Goa observed its **64th Liberation Day** on 19 December 2025, marking **Operation Vijay**, which ended nearly **450 years of Portuguese rule**.
- **Colonial Rule: Goa** became a Portuguese colony in **1510** under **Afonso de Albuquerque**.
- **Early Nationalism:** Organised resistance grew in the early 20th century; **Tristão de Bragança Cunha** founded the **Goa National Congress (1928)**.
- **Civil Liberties Push: Ram Manohar Lohia** defied a ban on public meetings at Margao on **18 June 1946**—now **Goa Revolution Day**.
- **Failed Diplomacy:** India's peaceful efforts (1947–1961) to secure liberation did not succeed.
- **Military Action:** India launched a tri-services operation on **18 December 1961**; the Portuguese Governor-General **Manuel António Vassalo e Silva** surrendered on **19 December 1961**, liberating **Goa, Daman and Diu**.
- **Integration:** Incorporated as a Union Territory via the **12th Constitutional Amendment Act, 1962**; **statehood granted in 1987**.

10. Karthigai Deepam Festival

- **Event:** The **Maha Deepam** was lit atop **Arunachaleswarar Hill**, marking the conclusion of the **10-day Karthigai Deepam festival** in Tiruvannamalai.
- **Timing:** Celebrated in the Tamil month of **Karthigai (November–December)**, aligned with the **full moon** and the **Karthigai star**.
- **Religious Significance:** Dedicated to **Lord Shiva as Agni Lingam**, symbolising divine light, wisdom, and the removal of ignorance.
- **Ritual Practice:** Homes, streets, and temples are illuminated with **oil lamps**, reflecting a Diwali-like tradition of light over darkness.
- **Regional Spread:** Observed widely across **Tamil Nadu**, and also in parts of **Kerala** and **Andhra Pradesh**.

11. Punjab Grants "Holy City" Status to Key Sikh Centres

The Punjab government has declared **Amritsar**, **Anandpur Sahib**, and **Talwandi Sabo** as **"Holy Cities"**, recognising their central role in Sikh religious life and introducing stricter norms to preserve sanctity and promote pilgrimage.

- **Religious Significance:** The three cities host **three of the five Takhts (imperial thrones) of Sikhism—Akal Takht** (Amritsar), **Takht Keshgarh Sahib** (Anandpur Sahib), and **Takht Damdama Sahib** (Talwandi Sabo).
- **Other Takhts:** The remaining two are **Takht Patna Sahib** in Bihar and **Takht Hazur Sahib** in Maharashtra.
- **Supreme Authority: Akal Takht** is considered the highest among the five; **Hukumnamas (divine edicts)** guiding the Sikh community are issued from the Takhts.
- **Regulatory Measures:** The status entails a **ban on liquor, tobacco, cigarettes, and meat** within city limits.
- **Tourism Boost:** The move aims to enhance **religious tourism infrastructure** and uphold the spiritual character of these sacred cities.

12. Charaichung Festival – Reviving Asia's Oldest Protected Bird Habitat

Assam's **Majuli** is hosting the **Charaichung Festival**, a community-driven initiative to revive **Charaichung Bird Sanctuary**, regarded as **Asia's first protected bird sanctuary**.

About the Charaichung Festival

- **Purpose:** Annual conservation-focused festival aimed at protecting and restoring the Charaichung Bird Sanctuary.
- **Community Initiative:** Organised by Majuli-based NGO **Majulir Sahitya**, highlighting local stewardship over ecological heritage.
- **Approach:** Blends awareness, cultural expression, and grassroots action to mobilise conservation support.

About Charaichung Bird Sanctuary

- **Historic Origin:** Established in **1633** by Ahom king **Pratap Singha** on Majuli island as a protected bird site—centuries before modern wildlife laws.
- **Legal Status:** Not notified under the Wildlife (Protection) Act, 1972; protection historically derived from customary royal and community norms.
- **Avifaunal Richness:** Hosts ~**150 bird species**, including storks, herons, egrets, whistling ducks, ibises, and migratory waterfowl along the **Central Asian Flyway**.
- **Ecological Setting:** Integral to the **Brahmaputra floodplain** wetland mosaic, providing breeding, roosting, and wintering habitats.

Conservation Concerns

- **Riverbank Erosion:** Accelerated erosion threatens habitat continuity on Majuli.
- **Wetland Shrinkage & Siltation:** Reduces foraging and nesting areas.
- **Hydrological Changes:** Altered flows disrupt seasonal habitat cycles.
- **Habitat Fragmentation:** Weakens ecological connectivity for birds.

Why it matters: Charaichung represents an early Asian model of bird protection rooted in indigenous governance. The festival underscores how **community-led conservation** can complement formal legal frameworks to safeguard fragile riverine ecosystems.

13. Deepavali Inscribed on UNESCO's Intangible Cultural Heritage List (2025)

On **10 December 2025**, **Deepavali** was officially inscribed on **UNESCO's Representative List of the Intangible Cultural Heritage of Humanity** during the **20th Session of the Intergovernmental Committee**, held at **Red Fort**, New Delhi.

1. Universal Cultural Message
2. Global Diaspora Connect
3. Diversity of Living Practices
4. Sustainable Development Linkages

UNESCO acknowledged Deepavali's contribution to:

- **Social cohesion & community wellbeing**
- **Traditional crafts & artisanal livelihoods** (lamps, decorations, sweets)
- **Cultural education** and informal learning
- **Gender equality**, given women's central role in rituals, crafts, and transmission of knowledge
- Alignment with multiple **Sustainable Development Goals (SDGs)**

About UNESCO's Intangible Cultural Heritage (ICH) List

Recognises **practices, expressions, knowledge, and skills** passed down through generations Focuses on **living traditions**, community participation, and cultural diversity rather than monuments

Year	ICH Element / Practice	Key Comment / Significance
2008	Vedic Chanting	Oral transmission of Vedic hymns precise phonetics
2008	Ramlila	Folk theatrical enactment of the Ramayana
2008	Kutiyattam (Kerala)	One of the oldest living Sanskrit theatre traditions
2009	Ramman (Uttarakhand)	Ritual theatre festival of Garhwal Himalayas
2010	Mudiyettu (Kerala)	Ritual dance-drama of Goddess Kali
2010	Kalbelia Folk Songs Dances (Rajasthan)	Nomadic community dance tradition
2010	Chhau Dance (Odisha, Jharkhand, WB)	Masked martial dance tradition
2012	Buddhist Chanting of Ladakh	Sacred Buddhist ritual recitations
2013	Sankirtana (Manipur)	Vaishnavite ritual music, dance, and drumming
2014	Thatheras of Jandiala Guru (Punjab)	Traditional brass and copper craft
2016	Yoga	Indian physical, mental, and spiritual discipline
2016	Nowruz *(Multinational)*	Persian New Year celebrated by multiple communities
2017	Kumbh Mela	World's largest peaceful religious gathering
2021	Durga Puja in Kolkata	Community-based festival blending art and ritual
2023	Garba of Gujarat	Traditional circular dance linked to Navratri
2025	**Deepavali (Diwali)**	Festival of Lights symbolising victory of light over darkness

14. India Voices Over Damage to Preah Vihear Temple

India has expressed concern over reports of damage to conservation facilities at the **Preah Vihear Temple** amid renewed clashes along the Thailand–Cambodia border. As a country with deep civilisational ties to Southeast Asia and a strong record in heritage conservation, India underscored the need to protect cultural property during conflicts.

About Preah Vihear Temple

- **Dedication & Location:** A **Hindu temple dedicated to Lord Shiva**, located in **Preah Vihear province**, northern Cambodia, dramatically sited atop a cliff in the **Dangrek Mountains** along the Cambodia–Thailand border.
- **Historical Period:** Built during the **Khmer Empire** between the **11th–12th centuries CE**—initiated under **Suryavarman I (1002–1050 CE)** and expanded by **Suryavarman II (1113–1150 CE)**.
- **Architecture:** Exemplifies classical **Khmer temple architecture**, organised along an **~800-metre axial processional pathway** with **five gopuras** (gateway towers) linked by stairways and paved causeways.
- **Global Recognition:** Inscribed as a **UNESCO World Heritage Site in 2008** for its outstanding architectural value and testimony to Khmer civilisation.

Why the Issue Matters

- **Cultural Heritage at Risk:** Border tensions threaten not only lives and stability but also **irreplaceable heritage assets**.
- **International Obligations:** Protection of cultural sites during armed conflict aligns with **UNESCO conventions** and broader norms of international humanitarian law.
- **Regional Sensitivity:** Preah Vihear has been a long-standing **symbolic and legal flashpoint** in Thailand–Cambodia relations, making preservation efforts especially sensitive.

Bottom line: India's statement reinforces the principle that **heritage conservation must be safeguarded even amid geopolitical tensions**, urging restraint and protection of world heritage sites like Preah Vihear.

15. ASI Hosts National Workshop on Project Mausam

The **Archaeological Survey of India (ASI)** organised a **National Workshop on Project Mausam** in New Delhi to collect expert and stakeholder inputs for advancing the project's research, documentation, and UNESCO nomination roadmap.

What is Project Mausam?

- **Launch & Ministry:** A **cultural–maritime heritage initiative** launched in **2014** under the **Ministry of Culture**.
- **Core Idea:** Revive and document **monsoon-enabled maritime networks** that historically connected the **Indian Ocean world**.
- **Geographic Reach:** Encompasses **39 Indian Ocean rim countries**, highlighting shared heritage shaped by seasonal winds (mausam).

Major Goal

- **UNESCO Nomination:** Inscribe identified places and sites as a **transnational mixed "Route"** on the **UNESCO World Heritage List**, recognising both **cultural** and **natural** values.

Why It Matters (UPSC Relevance)

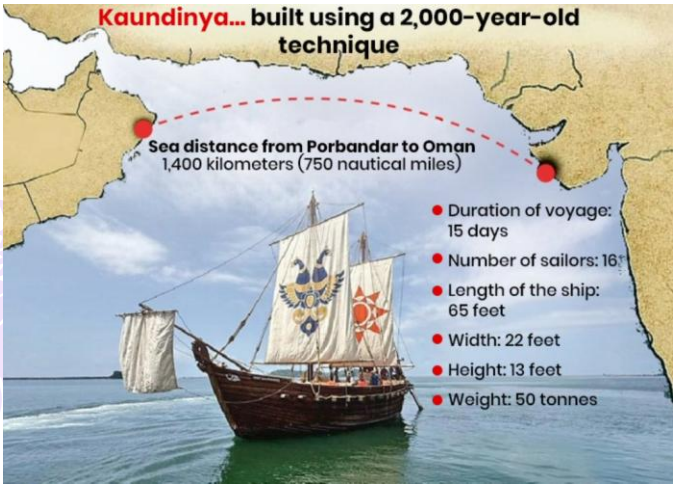
- **Soft Power & Diplomacy:** Positions India as a cultural bridge in the Indian Ocean Region (IOR).
- **Heritage Innovation:** Route-based, transnational nomination aligns with evolving UNESCO practices.
- **Economic & Cultural History:** Reframes globalisation through pre-modern monsoon trade networks.

Prelims takeaway: Project Mausam = **Monsoon-driven Indian Ocean connectivity + ASI-led + transnational UNESCO Route ambition.**

16. INSV Kaundinya: Revival of Ancient Maritime Heritage

Maiden Voyage: On **29 December 2025**, **INSV Kaundinya** will begin its **first overseas voyage** from **Porbandar (Gujarat)** to **Muscat (Oman)**, retracing historic Indian Ocean trade routes.

- **Heritage Design:** The vessel is a **reconstruction of ancient Indian ships**, built entirely using **stitched-plank technology**—wooden planks stitched with **coconut coir rope** and sealed with **natural resins**, without nails or metal fastenings.
- **Historical Significance:** This indigenous technique once enabled Indian mariners to sail to **West Asia, Africa, and Southeast Asia** centuries before modern shipbuilding methods.



- **Institutional Collaboration:** The ship was built under a **tripartite MoU** between the **Indian Navy**, the **Ministry of Culture**, and **Hodi Innovations**.
- **Cultural Milestone:** The voyage symbolises the **revival of India's ancient shipbuilding and seafaring traditions**, highlighting India's long-standing maritime legacy in the Indian Ocean world.

17. UNESCO Inscribes Sindh's Boreendo on Urgent Safeguarding List

Decision: UNESCO has inscribed **Boreendo**, a traditional vessel-flute from Pakistan's Sindh–Thar region, on the **Intangible Cultural Heritage in Need of Urgent Safeguarding** list.

- **What is Boreendo:** A **handmade spherical terracotta vessel-flute** (sun-dried and kiln-fired) with a hollow resonator, one air inlet, **3–5 finger holes**, often painted with natural motifs; it produces **soft, breathy pastoral tones** used in folk songs, courtship, and seasonal gatherings.
- **Antiquity:** Shows **continuity with terracotta flutes from Mohenjo-Daro**, linking it to **Indus Valley Civilisation** musical traditions.
- **Threat Status:** The craft and performance survive **only via oral tradition** in **Keti Mir Muhammad Lund (Sindh)**; a **shrinking practitioner base** places it at high risk of disappearance.
- **Urgent Safeguarding List—Purpose:** Flags **endangered living traditions** under the **2003 UNESCO Convention**, triggering **time-bound safeguarding plans**, periodic reporting, and eligibility for **international assistance**.