

Comprehensive Current Affair compilation useful UPSC, SSC, NABARD, IBPS, RRB, SPSC Exams



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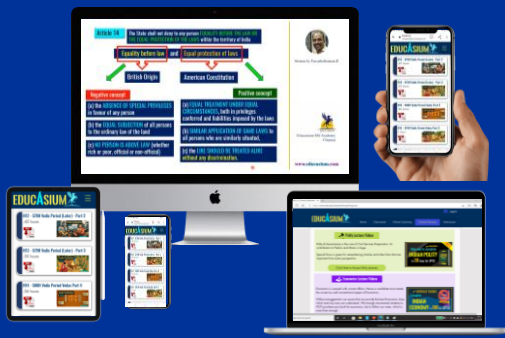
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FOREWORD

The **January Edition of EPIC UPSC Current Affairs** marks an important moment in your preparation journey. As we release this edition many of you may have submitted your application for the Civil Services Examination. The form is filled, the commitment is made – now the real execution begins.

With that seriousness in mind, this edition moves beyond routine news compilation and focuses sharply on **exam-oriented understanding**. Each topic has been carefully curated, filtered, and mapped to the UPSC syllabus to help you understand not just *what happened*, but *why it matters*, and *how it can be applied in both Prelims and Mains*.

This month especially, current affairs must not feel like scattered information. It must become **structured preparation**. Our effort remains to simplify complexity, prioritise relevance, and convert dynamic events into high-yield, concept-driven insights.

Note from the Team

As the exam cycle gains momentum, we have streamlined this edition to ensure faster loading and smooth offline access, keeping visual elements minimal and focus maximum. January also marks a period of strategic academic strengthening within Team Educasium.

We deeply appreciate the trust you place in us. As you step into this crucial phase after applying for the exam, know that we stand with you – committed, consistent, and focused.

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 dedicated to delivering disciplined, value-driven, and concept-rich learning experiences that cultivate clarity, resilience, and administrative temperament.

As you move from intention to action this month, let this edition serve not merely as reading material – but as a strategic companion in your journey.

On behalf of the EPIC UPSC Team, we reaffirm our commitment to consistency, academic integrity, and thoughtful innovation – ensuring every edition strengthens your preparation with purpose.

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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JANUARY 2026

INDIAN POLITY GOVERNANCE

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2026



1. Judicial Contours of Matrimonial Cruelty: Financial Control vs Criminal Liability



The Supreme Court of India clarified that **financial dominance or monetary control by a husband does not per se amount to “cruelty”**, unless it causes **demonstrable mental or physical harm**, cautioning against misuse of criminal provisions in matrimonial disputes.

What is Matrimonial Cruelty? (Legal Meaning)

Criminal Cruelty: Conduct likely to cause **grave injury, mental trauma, or drive a woman to suicide**, or harassment linked to **unlawful demands**.

Civil Wrong: Economic or emotional abuse that may not meet criminal thresholds but is remediable under **civil law**.

Statutory Framework Governing Matrimonial Cruelty

Law	Key Provision	Nature
IPC 498A → BNS 85 (2023)	Cruelty by husband/relatives causing grave harm or dowry-linked harassment	Criminal
Dowry Prohibition Act, 1961	Penalises giving, taking, or demanding dowry	Criminal
Protection of Women from Domestic Violence Act, 2005	Protection orders, residence, maintenance, compensation	Civil
CrPC/ BNSS	Arrest safeguards, procedural checks	Procedural

Court’s Reasoning

- **Ordinary Wear and Tear:** Routine marital discord, incompatibility, or insensitive behaviour ≠ criminal cruelty.
- **Process Fairness:** Vague accusations expose individuals to **prolonged, oppressive litigation**.
- **Higher Evidentiary Threshold:** Criminal prosecution demands **tangible material**, not subjective dissatisfaction.

UPSC Exam Relevance: Prelims: BNS §85, Dowry Prohibition Act, Domestic Violence Act, misuse safeguards

Mains (GS-II): Judiciary, gender justice, access to justice, criminal law reform

Essay: Women’s rights vs due process; limits of criminalisation in social reform

Mains Question “Criminal law must protect women without becoming an instrument of private vendetta.” In the light of recent Supreme Court observations on matrimonial cruelty, critically examine the balance between gender justice and due process of law.

2. Invalidating Unilateral Talaq: Gender Justice vs Personal Law Autonomy



Ongoing reviews by the **Supreme Court of India** on Muslim personal law have revived the debate on abolishing all forms of unilateral talaq, with petitioners arguing that extra-judicial divorce practices undermine **gender equality, dignity, and economic security**.

What is Unilateral Talaq? : Unilateral talaq refers to **extra-judicial divorce initiated solely by the husband**, without reciprocal consent, judicial oversight, or equal procedural rights for the wife.

Current Status of Unilateral Talaqs in India

Talaq-e-Biddat (Instant Triple Talaq) : Declared unconstitutional in *Shayara Bano v. Union of India* (2017) and later **criminalised** under the **Muslim Women (Protection of Rights on Marriage) Act, 2019**.

Talaq-e-Ahsan : A **single pronouncement** followed by a **90-day iddat** period for reconciliation; **still legally valid** as an extra-judicial divorce.

Talaq-e-Hasan : **Three pronouncements over three months** (during tuhr); **currently under constitutional challenge** in *Benazeer Heena v. Union of India* (2025).

Why Invalidate All Forms of Unilateral Talaq?

Fundamental Rights : Violates **Articles 14 & 15** (equality and non-discrimination on sex).

Right to Dignity : Extra-judicial divorces create insecurity and arbitrariness, infringing **Article 21**.

Economic Security : Sudden dissolution often leads to **homelessness, loss of maintenance, and livelihood shocks**.

Gender Asymmetry : Men enjoy absolute divorce power; women must seek **judicial relief or pay compensation** (e.g., khula).

Maintenance Evasion : Extra-judicial talaq is sometimes used to **bypass alimony and child support** obligations.

International Commitments : Inconsistent with CEDAW and India's obligations to ensure **equal rights at marriage dissolution**.

UPSC Exam Relevance : **Prelims**: Forms of talaq; *Shayara Bano* (2017); MWPRD Act, 2019; Articles 14, 15, 21, 25, 44 : **Mains (GS-II)**: Personal laws, gender justice, constitutional morality, judicial review.

Mains Question : *Extra-judicial divorce practices challenge the constitutional promise of gender equality*. Examine the case for invalidating all forms of unilateral talaq in India, balancing religious freedom with fundamental rights.

3. Delhi HC Affirms Woman's Autonomy in Abortion Decisions



The Delhi High Court ruled that forcing a woman to continue an unwanted pregnancy violates bodily integrity and mental health, reaffirming that husband's consent is not required for abortion under Indian law.

Core Issue : Whether a woman can be compelled to continue pregnancy due to marital status or lack of spousal consent.

Key Highlights of the Delhi HC Ruling

- **No Spousal Consent Needed:** The MTP Act does not require husband's consent for termination.
- **Article 21 Protection:** Abortion falls within personal liberty, bodily integrity, and decisional autonomy.
- **Mental Health Recognised:** Marital discord accepted as a valid ground due to its impact on mental well-being.
- **Liberal Interpretation:** MTP Rule 3-B(c) ("change of material circumstances") must be interpreted broadly, not restrictively.

Legal & Constitutional Framework

- **General Criminal Law:** Causing miscarriage is an offence under IPC/BNS except as permitted by the MTP Act.
- **MTP (Amendment) Act, 2021**
 - Up to 20 weeks: Opinion of one doctor
 - 20-24 weeks: Opinion of two doctors (specified categories)
 - Beyond 24 weeks: Only for substantial foetal abnormalities (State Medical Board)
 - Any stage: Permitted to save the woman's life
- **Constitutional Backing**
 - **Article 21:** Reproductive autonomy, dignity, bodily integrity
 - **Right to Privacy:** *Puttaswamy (2017)* – choice to procreate or abstain
 - **Equality Jurisprudence (2022 SC rulings):** No discrimination based on marital status in abortion access

UPSC Exam Relevance


Prelims: MTP Act provisions; Article 21; Right to Privacy

Mains: GS-II (Fundamental Rights, gender justice, judicial interpretation of social laws)

Mains Practice Question

"Judicial interpretation has transformed abortion law in India from a restrictive medical framework to a rights-based regime." Examine in light of recent Delhi High Court ruling.

4. Age of Consent vs Child Protection: Rethinking POCSO's Bright Line

 The Supreme Court, in **State of Uttar Pradesh vs Anurudh**, flagged the **misuse of the POCSO Act, 2012** in cases involving *consensual adolescent relationships*, reopening the debate on whether India's **uniform age of consent (18 years)** needs recalibration.

Background: POCSO Act, 2012

- **Objective:** First comprehensive law to protect children (<18 years) from sexual assault, harassment and pornography.
- **Strict Liability:** Criminalises *all* sexual activity below 18, **irrespective of consent**.
- **Mandatory Reporting:** Section 19 mandates reporting of suspected offences.
- **Special Courts:** Sessions Courts designated as POCSO courts; cases to be disposed within **1 year**.
- **2019 Amendment:** Enhanced punishments, including **death penalty** for aggravated penetrative sexual assault; added grounds like assault causing death and assault during natural calamities.

Why the Age of Consent Is Being Questioned – Comparative Snapshot

Arguments for Lowering / Relaxing	Arguments Against Lowering
Mismatch with Social Reality – NFHS-4: ~39% of girls reported first sexual experience before 18.	Loss of Clear Protection – Dilutes the “bright-line” legal safeguard against grooming & trafficking.
Consensual Romantic Cases – Enfold (2016–20): 24.3% of POCSO cases involved consensual romance; 82% victims refused testimony.	Coerced Consent Risk – MoWCD (2007): Over 50% abusers are known persons; consent may be illusory.
Judicial Overload – ~25% aggravated assault cases involve adolescent relationships, burdening courts meant for serious abuse.	Child Protection Concern – Risk of normalising exploitation under the guise of consent.

Key Challenges in the Present Framework

- **Weaponisation by Families:** POCSO used to counter elopement or inter-caste/inter-faith relationships.
- **Procedural Rigidity:** Mandatory reporting and non-compoundable offences prevent sensitive handling.
- **Judicial Inconsistency:** Conflicting High Court views on consensual adolescent relationships create uncertainty.

Mains Practice Question : “The strict age of consent under POCSO has led to unintended criminalisation of adolescent relationships.” Critically examine the need for reform while safeguarding children from exploitation.

5. SC Declares Menstrual Hygiene a Fundamental Right



On 30 January 2026, the Supreme Court of India ruled that menstrual hygiene is integral to the **Right to Life and Dignity under Article 21**. The Court issued **binding nationwide directions** for ensuring menstrual health access.

Key Directions & Constitutional Basis

- **Fundamental Right Recognition:**
 - Access to menstrual hygiene linked to **dignity, health, equality, and bodily autonomy** under **Article 21**.
 - Reinforces Articles **14 (Equality)** and **15(3) (Protective discrimination for women & children)**.
- **Free Sanitary Napkins:**
 - All States & UTs must provide **biodegradable sanitary pads free of cost** to adolescent girls in schools.
- **Policy Implementation:**
 - Mandatory pan-India enforcement of the **Menstrual Hygiene Policy for School-going Girls** (Classes 6–12).
- **School Infrastructure Mandate:**
 - Functional, hygienic, **gender-segregated toilets** with privacy safeguards.
 - Applies to **both government and private schools**.
- **Penalty Clause:**
 - Non-compliant private schools may face **derecognition**.
- **Judicial Observation:**
 - Menstrual stigma and poor sanitation negatively affect **girls' education, health outcomes, and dignity**.

6. Punish Earlier or Reform Better? The Debate on Lowering the Juvenile Age



The Hindu reported that a Bill proposes **lowering the transfer threshold** under the **Juvenile Justice (Care and Protection of Children) Act, 2015** from **16 to 14 years** for children accused of **heinous offences**. The proposal has triggered a sharp debate between **deterrence-based criminal justice** and the **rehabilitative philosophy** of juvenile law.

What is the 'Transfer System'? A legal mechanism (introduced in 2015) allowing **children aged 16–18** accused of **heinous offences** (minimum punishment **7 years or more**) to be **tried as adults**, subject to safeguards.

How the Transfer System Works

- **Preliminary Assessment:**
 - Conducted by the **Juvenile Justice Board (JJB)** to assess:
 - Mental capacity ; Ability to understand consequences
 - Circumstances of the offence
- **Children's Court:**
 - If transferred, the court may:
 - Try the child as an adult, or Retain juvenile treatment based on case facts.

7. Care Cannot Cage Liberty: Bombay HC Sets Constitutional Limits on 'Protective Custody' under PITA



The Bombay High Court ordered the release of an adult trafficking survivor detained in a protective home under the Immoral Traffic (Prevention) Act, 1956 (PITA). The Court held that welfare 'care' cannot morph into forced confinement, and constitutional liberty prevails over routine custodial practices.

About the Immoral Traffic (Prevention) Act, 1956 (PITA)

- **Objective:** Prevent commercial sexual exploitation and trafficking by targeting organised trade (brothels, traffickers, pimps), **not victims**.
- **Prostitution per se: Not illegal;** the Act criminalises ancillary activities (brothel-keeping, procuring, detaining, living off earnings).
- **Institutions under PITA:**
 - **Protective Home (s.2(g))** – care and rehabilitation of rescued persons.
 - **Corrective Institution (s.2(b) read with s.10A)** – detention of offenders after conviction.
- **Custody safeguards (s.17):** Post-rescue custody is **time-bound** and subject to **magisterial inquiry**, to prevent unlawful confinement.

Key Observations of the Court

1) Constitutional Primacy over Statute

- **Liberty First:** For adults, placement in a protective home must meet **constitutional standards of personal liberty**; it is not automatic welfare custody.
- **Article 19 weight:** Freedom of **movement, residence, and livelihood** does **not stand suspended** merely due to trafficking history.

2) Procedural Safeguards Are Mandatory

- **Strict timelines:** **10 days** initial custody; **Up to 3 weeks** interim custody – **no extensions by default**.
- **Reasoned inquiry:** Magistrates must **record reasons based on material evidence**, not assumptions about vulnerability or livelihood choices.

3) Court's Test: "Care" vs "Detention"

- **Care:** Voluntary, autonomy-respecting support – counselling, shelter **with consent**, rehabilitation **outside exploitation**.
- **Detention:** Compulsion, restricted movement/choice, confinement **despite refusal**.
- **Consent is central:** For a **major**, institutional care **cannot be forced**.
- **Exit right:** Once an adult expresses a wish to leave, continued stay becomes **detention**, not care.

4) Evidence Standard to Restrain Liberty

- **Material-based justification:** Any restraint must rest on **specific evidence** on record.
- **Reject speculation:** "May return to sex work" is **too vague** to justify custody.
- **Victim ≠ Offender:** Survivors cannot be treated as offenders absent penal conduct.
- **Poverty ≠ detention ground:** Lack of income warrants **assistance**, not confinement.

8. Hindu Adoptions and Maintenance Act, 1956



The Supreme Court of India held that a widowed daughter-in-law can claim maintenance from her father-in-law's estate under the Hindu Adoptions and Maintenance Act, 1956 (HAMA). The Court clarified that the phrase "any widow of his son" covers widowhood irrespective of whether it occurred before or after the father-in-law's death.

About the Hindu Adoptions and Maintenance Act, 1956

- **Nature:** A key component of the Hindu Code Bills, codifying laws on adoption and maintenance to standardise Hindu personal law.
- **Applicability:** Applies to Hindus, Buddhists, Jains, and Sikhs; excludes Muslims, Christians, Parsis, and Jews.
- **Objective:** To legally define obligations of maintenance among family members and regulate adoption.

Key Provisions Relevant to the Ruling

- **Section 19:** A father-in-law is bound to maintain a widowed daughter-in-law who lacks independent means and cannot maintain herself.
- **Section 22: Heirs of a deceased person's estate** are obligated to maintain all dependents out of the estate.
- **Dependent Definition:** Includes "any widow of his son", as clarified by the Supreme Court, without temporal limitation.

9. Lambadas Tribe: ST Status Under Judicial Scrutiny



A Special Leave Petition (SLP) in the Supreme Court challenges the inclusion of the Lambadas in Telangana's Scheduled Tribes (ST) list. The petition raises questions over criteria and constitutional provisions governing ST classification.

Constitutional Framework for ST Inclusion

- **Article 342:** Empowers the President to specify Scheduled Tribes for a State/UT; Parliament can amend the list.
- Inclusion/exclusion requires **Parliamentary legislation**, not executive order.

About Lambadas Tribe

- **Other Names:** Sugalis / Banjaras.
- **Distribution:** Predominantly in Telangana and Andhra Pradesh; also found in Karnataka, Maharashtra, and Rajasthan.
- **Origin:** Believed to trace roots to the Marwar region of Rajasthan.
- **Traditional Occupation:** Caravan-based transport of goods (salt, grains, forest produce), which declined during British railway expansion.
- **Language:** Speak "Gor Boli" (Lambadi), a distinct Indo-Aryan dialect.
- **Legal Status:** Recognised as a Scheduled Tribe in Telangana under Article 342 of the Constitution (President's notification, subject to Parliamentary amendment).

10. Supreme Court Split Verdict on Prior Sanction for Probing Public Servants



In January 2026, a two-judge Bench of the Supreme Court delivered a **split verdict** on the constitutional validity of **Section 17A of the Prevention of Corruption Act, 1988**, which mandates **prior government approval** before investigating public servants. Due to divergent opinions, the matter has been referred to the Chief Justice of India for constitution of a larger Bench.

Core Issue: Section 17A of the PCA

- **Inserted by:** Prevention of Corruption (Amendment) Act, 2018
- **Provision:** Requires **prior approval of the competent government authority** before initiating inquiry or investigation against a public servant for actions taken in official capacity.

Against Section 17A	In Favour of Section 17A	Middle Path Suggested
Violation of Article 14 – Creates unequal legal protection for public servants.	Administrative Autonomy – Prevents “fear psychosis” in bona fide decision-making.	Independent Approval Authority – Prior sanction to be vested with bodies like Lokpal or Lokayukta instead of the executive.
Impunity Risk – May delay or obstruct anti-corruption investigations.	Policy Paralysis Check – Protects officials from hindsight-based criminalisation.	Ensures protection without compromising investigative independence.
Judicial Precedent – Similar protection under Section 6A of the DSPE Act struck down in Subramanian Swamy v. CBI.	Limited Scope – Applies only to acts done in discharge of official duties.	Balances anti-corruption enforcement with administrative efficiency.
Institutional Conflict – Executive approval may undermine probe agencies’ independence.	–	–

About the Prevention of Corruption Act, 1988

- **Primary anti-corruption law** governing public servants in India.
- **2018 Amendment (UNCAC-aligned):**
 - Criminalised **bribe-giving** (up to 7 years imprisonment).
 - Introduced **corporate criminal liability** for bribery.
 - Narrowed “criminal misconduct” to **misappropriation** and **disproportionate assets**.
 - Inserted **Section 17A (prior approval clause)**.
- **Key Provisions:**
 - **Section 2(c):** Broad definition of “public servant”.
 - **Section 3:** Appointment of special judges for speedy trials.

UPSC Exam Relevance

Prelims: PCA 1988, Section 17A, Lokpal, DSPE Act, UNCAC

Mains: GS II: Judiciary, accountability, executive oversight ; GS IV: Ethics in public administration, probity, corruption control.

11. One House Is Enough: Supreme Court Upholds Lok Sabha Speaker's Power in Judge Removal Process



In January 2026, the Supreme Court upheld the Lok Sabha Speaker's unilateral power to constitute a 3-member inquiry committee under the Judges (Inquiry) Act, 1968, even when an identical removal motion was rejected by the Rajya Sabha. The ruling arose from Justice Yashwant Varma's challenge following the constitution of such a committee.

Background of the Case

- A fire at Justice Yashwant Varma's residence allegedly led to discovery of unaccounted cash.
- Removal motions were introduced simultaneously in Lok Sabha and Rajya Sabha.
- Lok Sabha Speaker admitted the motion; Rajya Sabha Deputy Chairman rejected it.
- Despite this, the Speaker constituted a 3-member Inquiry Committee, triggering the legal challenge.

Key Legal Issue

- Can the Lok Sabha Speaker act independently to constitute an inquiry committee when the other House rejects the motion?

Supreme Court's Ruling

- **House Autonomy:** Each House acts independently; rejection by one does not bind the other.
- **Section 3(2), Judges (Inquiry) Act:** A joint committee is mandatory only if both Houses admit the motion.
- Treating Rajya Sabha's rejection as binding would create an unconstitutional veto.
- **Deputy Chairman's Power:** Under Article 91, the Deputy Chairman can discharge Chairman's functions during vacancy.

Final Holding: The Speaker's unilateral action is constitutionally and statutorily valid.

Judges (Inquiry) Act, 1968

Aspect	Provision
Constitutional Basis	Articles 124(4) (SC judges) & 218 (HC judges)
Motion Threshold	100 LS MPs or 50 RS MPs
Admission Authority	Speaker / Chairman
Inquiry Committee	3 members: SC Judge/CJI, HC CJ, Distinguished Jurist
Committee Powers	Civil court powers (summon, evidence)
Voting Requirement	Special majority in each House separately
Final Authority	President issues removal order
Historical Fact	No judge removed so far via this process

12. Can the Governor Walk Out? Constitutional Boundaries of the Governor's Address



Recent walkouts by Governors during inaugural addresses to State Legislatures have triggered a constitutional debate on the **limits of gubernatorial discretion**. The issue raises questions about the **binding nature of the Governor's Special Address** and the supremacy of **aid and advice of the Council of Ministers**.

Governor's Address: Constitutional Framework

Article 175 – Discretionary Address & Messages

- **Article 175(1):** Empowers the Governor to **address either House or both Houses** of the State Legislature **at any time**.
- **Article 175(2):** Allows the Governor to **send messages** to the Legislature regarding Bills or other matters.
- **Mandatory Consideration:** The House must consider such messages with **“all convenient dispatch”** (fastest reasonable speed).

→ This is a discretionary and communicative power, not tied to legislative sessions.

Article 176 – Special Address (Core Issue)

- **Mandatory Duty:** Governor shall **address** the Legislature at:
 - The **first session after each General Election**, and
 - The **first session of every year**.
- **Purpose:** To inform the Legislature about the **“causes of its summons”**.
- **No Discretion:** The Governor **cannot refuse, modify, or abandon** this address.

→ Article 176 is **obligatory**, unlike Article 175.

Motion of Thanks: Democratic Accountability

- **Article 176(2):** Legislature must allocate time to discuss the address.
- **Motion of Thanks:**
 - Moved by the ruling party.
 - Amendments allowed to criticise omissions or policies.
- **Confidence Test:** Defeat of the Motion of Thanks = **loss of confidence in the Council of Ministers**.

Nature of the Governor's Address

- **Executive Function:** Performed strictly on the **aid and advice of the Council of Ministers**.
- **Cabinet Speech:**
 - Entirely drafted by the **State Cabinet**.
 - Represents the **elected government's policy agenda**, not the Governor's views.
- **No Editing Power:** Constitutional convention bars the Governor from **adding, deleting, or altering** the text.

Colonial Origin:

- Modeled on the British **“Speech from the Throne”**, where the Sovereign reads the government's text without discretion.

Judicial Position (Binding Precedents)

Shamsher Singh v. State of Punjab

Governor is a **constitutional head**, bound by ministerial advice in executive functions.

Nabam Rebia v. Deputy Speaker

Governor **cannot act independently** to disrupt legislative processes or government functioning.

→ Walkouts violate the **aid-and-advice doctrine**.

13. Special Intensive Revision vs NRC: Electoral Clean-up or Citizenship Filter?



Amid the deletion of nearly 19% voters in Uttar Pradesh, the Election Commission of India (ECI) has defended the **Special Intensive Revision (SIR)** of electoral rolls against allegations that it operates as a “parallel NRC”.

What is Special Intensive Revision (SIR)?

SIR is an **intensive, door-to-door verification exercise** undertaken by the ECI to **purge ineligible entries** (duplicates, deaths, migration) and ensure **accurate electoral rolls** – a constitutional function under **Article 324**.

SIR Debate: “Parallel NRC” vs ECI’s Defence

Why Critics Call SIR a “Parallel NRC”

Burden Shift – Citizens must re-prove eligibility, echoing NRC’s “prove your status” logic.

Citizenship Audit Risk – Granular checks may go beyond residence proof, resembling citizenship verification.

Scale of Deletions (~19%) – Appears unusually high for routine death/migration corrections.

Document Rigour – Scrutiny/rejection of Aadhaar or ration cards recalls evidentiary tiers used in National Register of Citizens.

Statelessness Spillover – Loss of voter ID may restrict welfare access, creating “doubtful citizen” anxieties.

Why SIR is *Not* an NRC (ECI’s Defence)

Distinct Mandate – Under **Article 324**, the Election Commission of India maintains electoral rolls, not citizenship registers (governed by Citizenship Act, 1955).

Limited Universe – Covers only 18+ eligible voters, not the entire population like NRC.

No Citizenship Loss – Deletion affects only voting rights, not legal citizenship status.

Corrective Exercise – High deletions may reflect roll clean-up of duplication or inflation.

Reversibility – Names can be restored anytime via fresh application (Form-6), unlike permanent NRC exclusion.

Constitutional & Legal Anchors

- **Article 324:** Superintendence of elections and roll integrity.
- **Representation of the People Act, 1950:** Preparation and revision of electoral rolls.

Due Process: Notice, opportunity to be heard, and appeal are essential to prevent arbitrariness.

14. ECINET Digital Platform



The Election Commission of India (ECI) launched the ECINET Digital Platform at IICDEM 2026, New Delhi. The initiative aims to strengthen **end-to-end digital electoral governance** by integrating voter services, candidate processes, and election administration. It marks a major step toward **transparent, accessible, and technology-driven elections** in India.

About ECINET

- **Nature:** A unified national digital election platform integrating **40+ existing ECI apps and web services** under a secure, interoperable architecture.
- **Users Covered:** Citizens, voters, candidates, political parties, and election officials connected through a **single digital interface**.
- **Language Access:** Available in **22 Indian languages + English**, improving inclusivity and voter outreach.
- **Legal Framework:** Operates strictly within the provisions of
 - Representation of the People Act, 1950 & 1951
 - Registration of Electors Rules, 1960
 - Conduct of Election Rules, 1961

15. National Voters' Day 2026: Citizen at the Heart of Indian Democracy



The **16th National Voters' Day (NVD-2026)** is observed on **January 25, 2026**. Theme: **"My India, My Vote"** | Tagline: **"Citizen at the Heart of Indian Democracy."** President Droupadi Murmu will preside over the national function in New Delhi.

About National Voters' Day

- **Observed Since:** 2011.
- **Purpose:** To increase **voter enrolment**, especially among newly eligible youth (18+).
- **Commemoration:** Marks the establishment of the **Election Commission of India (ECI)** on **January 25, 1950**.
- **Key Activities:**
 - National Awards for Best Electoral Practices
 - Promotion of **SVEEP** (Systematic Voters' Education and Electoral Participation) programme
 - Voter awareness and registration drives

About Election Commission of India (ECI)

- **Nature:** Permanent, autonomous constitutional body.
- **Constitutional Basis:** Article 324 of the Constitution of India.
- **Function:** Conducts and regulates elections to Parliament, State Legislatures, and the offices of President and Vice-President.

16. Delhi Declaration 2026 (Electoral Integrity)



The Election Commission of India (ECI) concluded the **International Conference on Democracy and Election Management (IICDEM) 2026** with the adoption of the **Delhi Declaration 2026**. The declaration was unanimously adopted by **42 Election Management Bodies (EMBs)**. It outlines shared global priorities to strengthen democratic election management.

About Delhi Declaration 2026


- **Nature:** Consensus-based framework to enhance electoral integrity and trust globally.
- **Review Mechanism:** EMBs agreed to **periodic progress reviews** and to reconvene in December 2026 at **India International Institute of Democracy and Election Management (IIIDEM), New Delhi**.

Institutional Exchange: IIIDEM designated as a hub for **training, professional exchange, and dissemination of best practices**.

Five Pillars of the Declaration

1. **Purity of Electoral Rolls** – Enhance accuracy, inclusion, and credibility of voter lists.
2. **Conduct of Elections** – Strengthen professionalism, transparency, and integrity.
3. **Research & Publications** – Promote collaborative research on electoral management.
4. **Use of Technology** – Encourage responsible, trust-based digital innovation.
5. **Training & Capacity Building** – Expand institutional learning and professional exchanges.

17. India Hosts 28th CSPOC: Parliamentary Speakers Meet to Shape Digital Legislatures

 In January 2026, India hosted the 28th Conference of Speakers and Presiding Officers of the Commonwealth (CSPOC) in New Delhi, witnessing record participation from over 60 Commonwealth parliaments.

The conference focused on AI integration, social media use in legislatures, public engagement, and the safety of parliamentarians, reinforcing India's leadership in parliamentary diplomacy.

What is CSPOC?

- CSPOC is an independent forum of Speakers and Presiding Officers of national parliaments from Commonwealth countries.
- It functions outside the formal structures of the Commonwealth Secretariat and the Commonwealth Parliamentary Association.

Background & Institutional Details

- **Established:** 1969
- **Founder:** Lucien Lamoureux, Speaker of the Canadian House of Commons
- **Secretariat:** Canada
- **Nature:** Informal, consensus-based platform

Key Features of CSPOC

Aspect	Details
Membership	Speakers & Presiding Officers of sovereign Commonwealth parliaments
Governance	Standing Committee chaired by Speaker of host country's Lower House
Frequency	Biennial full conference + annual Standing Committee meeting
Affiliation	Independent (not part of Commonwealth Secretariat / CPA)

18. Malayalam as Sole Official Language: Kerala's Language Bill



In January 2026, the Kerala Legislative Assembly passed the **Malayalam Language Bill, 2025**, proposing Malayalam as the **sole official language of the State**, replacing the English–Malayalam bilingual system.

The move sparked **inter-State concerns from Karnataka**, which argued that the Bill may infringe **linguistic minority rights under Articles 29 and 30** of the Constitution.

Key Provisions of the Bill

Area	Provision
Official Language	Malayalam designated as the sole official language of the State
School Education	Malayalam compulsory first language in govt & aided schools up to Class X
Legislature	All State Bills and Ordinances to be drafted and introduced in Malayalam
Judiciary	Progressive translation of District & Sessions Court orders into Malayalam
Digital Governance	Development of Malayalam-native open-source & AI tools
Public Interface	Govt signboards, notices, advertisements to prioritise Malayalam
Product Labelling	Mandatory Malayalam directions/labels on products sold in Kerala

Safeguards for Linguistic Minorities

- **Mother-tongue communication** (Tamil, Kannada, Tulu, Konkani) allowed in notified areas.
- **Exam exemptions** for non-Malayali & foreign students in Classes 9–10 & higher secondary.

Choice of language permitted under the National Education Curriculum

Constitutional & Federal Issues Raised

- **Article 29:** Right of minorities to conserve language, script, culture.
- **Article 30:** Minority right to establish & administer educational institutions.
- **Inter-State Impact:** Border districts (e.g., Kasaragod) with Kannada/Tamil speakers may face access barriers.
- **Education Concern:** Compulsory first-language rule may increase **learning burden** for minority students.
- **Process Criticism:** Alleged inadequate consultation with linguistically diverse border districts.

Higher-Order Mains Question

“Critically examine the constitutional and federal implications of States adopting a single official language, with reference to minority rights under Articles 29 and 30.”

19. OCI in Spotlight: Diaspora Law & Diplomacy



At the conclusion of the India-EU Free Trade Agreement, **Antonio Costa**, President of the European Council, publicly showcased his **Overseas Citizen of India (OCI)** card. The moment renewed attention on **OCI as a soft-power tool**, highlighting India's legal framework for engaging its global diaspora without granting dual citizenship.

What is an Overseas Citizen of India (OCI)?

- An OCI is a **foreign national of Indian origin** granted a **lifelong, multi-entry visa** to reside and work in India.
- It is **not dual citizenship**; OCI is an **immigration status**, not a political citizenship.

Legal basis: **Section 7A of the Citizenship Act, 1955**, inserted by the **Citizenship (Amendment) Act, 2005**.

- The OCI scheme was introduced to balance:
 - **Article 9 of the Constitution** (which disallows dual citizenship), and
 - India's need to **institutionally engage its diaspora**.
- In **2015**, the **PIO (Persons of Indian Origin)** scheme was merged into OCI, creating a **single OCI Cardholder category** for uniformity and administrative clarity.
- Today, OCI functions as a **quasi-citizenship model**, combining mobility and economic rights without political participation.

Mandatory Disqualifications

- Any present or past **citizenship link to Pakistan or Bangladesh** (including ancestors).
- Serving or retired personnel from **foreign military, defence or police services** (limited exceptions).
- Persons posing **security risks**, or guilty of **fraud or material concealment**.

Major Restrictions on OCI Cardholders

- **No Political Rights:** Cannot vote, contest elections, or hold legislative offices.
- **Constitutional Posts:** Ineligible for President, Vice-President, Supreme Court/High Court judgeships.
- **Public Employment:** Government jobs barred unless specifically permitted.
- **Land Ownership:** Cannot acquire **agricultural land, plantations, or farmhouses**.

20. Supreme Court Pushes States to Enforce 25% EWS Quota in Private Schools

In January 2026, the Supreme Court directed States and Union Territories to strictly implement Section 12(1)(c) of the Right to Education (RTE) Act, 2009, which mandates 25% free admission for Economically Weaker Sections (EWS) in private unaided schools. The Court intervened due to **poor and uneven enforcement across States**, resulting in thousands of vacant EWS seats every year.

What is Section 12(1)(c) of the RTE Act?

- It mandates **private unaided (non-minority) schools** to reserve **25% seats at entry level** for children from **EWS and disadvantaged groups**, with State reimbursement.
- Objective: **Social integration, equity, and access to quality education.**

Keywords: *Inclusive education, equity in schooling, affirmative action*

Why the Court Intervened

- **Implementation Gap:** Only **16 States/UTs** effectively enforce the 25% quota.
- **Vacant Seats:** Weak admission systems leave seats unfilled
Example: Delhi (2025-26) – 3,506 EWS seats vacant out of 33,212.
- **Changing School Landscape:** Around **30% of rural children** now study in private schools, making enforcement crucial for equity.

21. Right to Disconnect in Digital Workplaces



India's rapid digitalisation has intensified an "always-on" work culture, blurring boundaries between work and personal life. Rising cases of **burnout, stress, and mental health disorders** have revived the debate on granting employees a **statutory Right to Disconnect**—the right to disengage from work-related digital communications outside official working hours without fear of reprisal.

What is the Right to Disconnect?

The **Right to Disconnect** is the legal or institutional right of employees to **not respond to work emails, calls, or messages outside prescribed working hours**, without facing disciplinary action, discrimination, or career disadvantage.

Context & Background

- Digital tools (emails, messaging apps, remote platforms) have dissolved the traditional **temporal boundary of work**.
- Post-pandemic hybrid work has intensified **digital presenteeism**.
- Unlike physical overtime, digital overwork often remains **unrecorded and uncompensated**.
- Several countries have enacted **explicit legal safeguards**, while India lacks statutory recognition.

Why India Needs a Statutory Right to Disconnect

1. Overwork & Labour Stress

- **51% of Indian workers** work more than **49 hours/week** (ILO).
- India ranks **2nd globally** for longest working hours.

2. Burnout & Mental Health

- **78% of Indian employees** report job burnout (global surveys).
- Work-related stress contributes to **10–12% of mental health cases** in India.

3. Productivity Paradox

- Fatigue-driven presenteeism:
 - Increases errors
 - Reduces creativity
 - Raises attrition
- Long hours ≠ high productivity.

4. Constitutional & Directive Principles

- **Article 21:** Right to life includes **health, rest, and sleep**.
- **Article 39(e):** Protection of workers' health.
- **Article 42:** Humane conditions of work.

UPSC Exam Relevance

Prelims: Labour Codes, Article 21, OSHWC Code, ILO data

Mains: GS-II: Governance, labour reforms, constitutional rights GS-IV: Ethics of work culture, dignity of labour

22. Digital Land Governance Push: Land Stack Portal & Glossary of Revenue Terms



The **Ministry of Rural Development** launched the **Land Stack portal** and the **Glossary of Revenue Terms (GoRT)** to modernise land administration, enhance transparency, and improve citizens' **Ease of Living** through digital land governance.

What are Digital Land Governance Initiatives?

Digital land governance refers to the **use of GIS, interoperable databases, and standardised terminology** to manage land records, property transactions, and public access in a **transparent, efficient, and citizen-centric** manner.

Land Stack Portal

- **Nature:** Integrated **GIS-based** digital platform
- **Programme:** Implemented under the **Digital India Land Records Modernisation Programme**
- **Function:** Provides **consolidated land and property data** via a unified interface for citizens and government agencies
- **Global Benchmarking:** Modelled on best practices from **Singapore, the UK, and Finland**
- **Pilot Launch:** **Chandigarh and Tamil Nadu**

Significance

- Reduces fragmentation across land records (textual + spatial)
- Enables data-driven planning, faster service delivery, and fraud reduction
- Lays the foundation for **future land-linked services** (credit, taxation, urban planning)

Glossary of Revenue Terms (GoRT)

- **Purpose:** Standardises meanings of land-revenue terms to overcome **linguistic diversity**
- **Languages/Scripts:** Vernacular languages, **Hindi, English, and Roman**
- **Approach:** Ensures **nationwide data interoperability** *without replacing* state-specific terminology
- **Developed by:**
 - **Department of Land Resources**
 - In collaboration with **Centre of Excellence in Land Administration and Management**

Why it Matters

- Improves clarity for citizens, courts, banks, and administrators
- Supports seamless data exchange across states and platforms

23. Delhi Goes Digital: QR Code–Enabled Road Signage for Accountability



In January 2026, the Public Works Department (PWD), Delhi, issued guidelines mandating QR codes on all existing and future road signage across the capital. The move aims to **standardise signage, improve safety, and enable digital accountability** in urban infrastructure.

Key Features of the Initiative

- **QR Code Functionality**
 - Provides instant access to:
 - **Manufacturer details**
 - **Material specifications**
 - **Warranty information**
 - Enables **traceability and quality verification** of road assets.
- **Objective**
 - Ensure **uniformity in signage design and materials**.
 - Improve **visibility, durability, and road safety**.
 - Reduce substandard or non-compliant signage.
- **Rationale**
 - A **2024 audit by the Ministry of Road Transport and Highways (MoRTH)** flagged:
 - **Inconsistent shapes, colours, and materials** of road signs.
 - Highlighted governance gaps in **urban road standardisation**.

Implementation Roadmap

- **Phase 1**
 - QR codes linked to **basic manufacturing and warranty data**.
 - Focus on **asset identification and standard compliance**.
- **Phase 2**
 - Integration with the **PWD Sewa App**.
 - Citizens can:
 - Report **damaged or missing signage**
 - Enable **real-time grievance redressal**.



24. NATGRID and the Risk of Digital Authoritarianism



Reports indicate **expanded police access and deeper integration of NATGRID with population databases**, reviving concerns over **privacy, proportionality, and the absence of legislative safeguards** in India's intelligence architecture.

What is NATGRID ?

- NATGRID (National Intelligence Grid) is an MHA-controlled **intelligence platform** enabling authorised agencies to access multiple databases via a **single secured interface**.
- **Origin:** Approved in 2012 by executive order after the 26/11 Mumbai attacks to fix intelligence coordination failures.
- **Access:**
 - 11 central agencies
 - 21 databases (identity, travel, banking, telecom, assets, immigration).

Key Concerns

1. Shift to Population-Level Surveillance

- Integration with **National Population Register (NPR)** (~1.19 billion residents) risks moving from **targeted intelligence** to **blanket population mapping**.

2. Algorithmic Surveillance

- Tools like “**Gandiva**” enable **entity resolution across datasets**, amplifying state surveillance capacity without transparency.

3. Statutory Vacuum

- NATGRID operates **without a dedicated law**, violating **Article 21's “procedure established by law”** requirement.

Contrasts with **Justice K.S. Puttaswamy (2017)** mandate of legality, necessity, proportionality, and safeguards.

UPSC Exam Relevance

Prelims: NATGRID, NPR, DPDP Act ; Mains: GS-III: Internal security, intelligence reforms GS-II: Privacy, constitutionalism, executive power
Essay: Technology vs liberty, surveillance state

25. PANCHAM: WhatsApp-Based Governance Assistant for Panchayats



The Ministry of Panchayati Raj launched **PANCHAM (Panchayat Assistance & Messaging Chatbot)** on the eve of the **77th Republic Day (2026)**. It is a flagship digital initiative aimed at empowering **Panchayat Elected Representatives (PERs)** and grassroots functionaries.

What is PANCHAM?

- A **WhatsApp-based AI chatbot** serving as a digital governance assistant for Panchayats.
- Provides **contextual guidance, simplified workflows, and scheme-related information**.

Enables **photo-based grievance redressal** with automated status updates.

Key Features

- **WhatsApp Interface:** No separate app required; easy accessibility.
- **Multilingual Support:** Supports regional languages and voice notes.
- **24/7 Availability:** Round-the-clock governance assistance.
- **Real-Time Feedback:** Two-way communication for quicker issue resolution.
- **Anti-Corruption Tool:** Reduces reliance on intermediaries by ensuring direct digital access.

26. Parliament Museum Reopens: Showcasing India's Democratic Continuum



The Parliament Museum is set to reopen in April 2026 after undergoing major upgrades to its design and presentation.

The revamp aims to present India's democratic evolution through modern, interactive formats.

About the Parliament Museum

- **Inauguration & Location**
 - Inaugurated in 2006 by A. P. J. Abdul Kalam.
 - Located in the Parliament Library Building, New Delhi.
- **Administrative Control**
 - Administered by the Lok Sabha Secretariat.

A virtual tour is available on the official Parliament Museum website, enhancing public outreach.

Key Changes in the Upgraded Museum

- **Shift in Exhibition Style**
 - Due to space constraints, earlier life-size statues of the Constituent Assembly and select exhibits will be replaced.
 - New focus on digital and interactive displays, aligning with global museum practices.
- **Thematic Coverage**
 - Content organised across nine thematic sections.
 - Central idea: "Democracy as an intrinsic part of Indian ethos."
- **Historical Span**
 - Traces democratic traditions from:
 - 6th century BC Mahajanapadas (republican traditions like ganas and sanghas),
 - To colonial legislative developments,
 - To modern institutions such as Parliament, Constitution, and Panchayati Raj Institutions.

UPSC Exam Pointers

Prelims : Parliament Museum location, administering authority, year of inauguration.

Mains (GS-I/ GS-II) : "Indian democracy is rooted in indigenous traditions." Role of institutional museums in strengthening democratic culture and constitutional values.

27. Republic @77: Constitution, Culture and Combat Power on Display

India celebrated its 77th Republic Day on 26 January 2026, marking the enforcement of the Constitution in 1950. • For the first time, two European Union leaders attended as Chief Guests, underlining India-EU strategic convergence.

Republic Day 2026: Key Highlights

Chief Guests & Theme

- **Chief Guests:**
 - **António Costa** (President, European Council)
 - **Ursula von der Leyen** (President, European Commission)
- **Central Theme: “150 Years of Vande Mataram”**
 - *Vande Mataram* was composed in 1875 by **Bankim Chandra Chattopadhyay**.
 - Adopted as **India’s National Song on 24 January 1950**.

Other themes across tableaux: “**Viksit Bharat**” and “**Bharat – Loktantra ki Matraka**”.

Gallantry & Public Participation

- **Ashok Chakra Awardee: Shubhanshu Shukla**, the first Indian to visit the **International Space Station (ISS)**, received India’s highest peacetime gallantry award.
- **Jan Bhagidari:** Around **10,000 special invitees**, including beneficiaries of the **PM Shram Yogi Maandhan** scheme, reinforcing participatory nationalism.

Notable Tableaux

- **Ministry of I&B:** “*Bharat Gatha*” – evolution of Indian storytelling from **Shruti → Kṛiti → Drishti**.
- **Ministry of Home Affairs:**
 - *Jan Kendrit Nyay Pranali*
 - *Aatmanirbhar Bharat*
- **Uttar Pradesh:** Bundelkhand heritage – **Kalinjar Fort, Neelkanth Mahadev Temple**, and **ODOP crafts**.
- **Kerala:** **India’s first Water Metro** and achievement of **100% digital literacy**.

Nari Shakti: All-women motorcycle display by **CRPF and SSB**, featuring formations like “*Desh Rakshak*”.

Military Innovations & Strategic Signalling

Area	Key Highlights
Indigenous Systems (Debut)	Suryastra rocket launcher; Bhairav Light Commando Battalion; Shaktibaan Drone Regiment
Battle Doctrine	First-ever Phased Battle Array Format showcasing integrated ground-air combat
International Signal	EU military contingent joined the parade – first participation outside Europe
Animal Contingent	Bactrian camels, Zanskar ponies, black kites highlighting operational roles
Indigenisation	Arjun MBT, T-90 Bhisma, BrahMos, Navy tableau featuring INSV Kaundinya
Operational Tribute	Tableaux and fly-pasts honoured Operation Sindoor (2025)

Significance

- **Constitutional Continuity:** Reinforces supremacy of the Constitution and republican ideals.
- **Soft Power & Diplomacy:** EU leadership presence signals **deepening India-EU strategic ties.**
- **Military Transformation:** Showcases shift towards **indigenisation, drones, and network-centric warfare.**

Inclusive Nationalism: Emphasis on women, workers, and public participation.

28. Draft Pesticides Management Bill, 2025



The Ministry of Agriculture & Farmers Welfare (MoA&FW) has released the **Draft Pesticides Management Bill, 2025** for public consultation. The Bill seeks to **replace the colonial-era Insecticides Act, 1968**, modernise pesticide regulation, curb spurious products, and ensure **safety across the entire pesticide lifecycle** – from manufacture to disposal.

What are Pesticides? Pesticides are chemical or biological substances used to **prevent, destroy, repel, or control pests**, including insects, weeds, fungi, rodents, and other organisms harmful to crops, public health, or stored products

Context & Background

- India’s pesticide law is still governed by the **Insecticides Act, 1968**, which focuses narrowly on insect control.
- Since then:
 - Pest profiles have diversified (weeds, fungi, vectors).
 - **Biopesticides and IPM** have expanded.
 - Concerns over **farmer poisoning, residue in food, pollinator loss, and counterfeit pesticides** have intensified.
- The Draft Bill aligns India’s regime with **FAO-WHO Codex standards** and global best practices.

Institutional Framework under the Bill

Body	Role
Central Pesticides Board (CPB)	Advisory body; sets safety, labelling, packaging, storage & disposal standards
Registration Committee (RC)	Executive authority; evaluates pesticides for safety, efficacy & approval
Union Government	Declared exclusive regulator in public interest (Section 2)

UPSC Exam Relevance

Prelims: Insecticides Act vs Pesticides Bill, CPB, Registration Committee, IPM

Mains:

GS-II: Regulatory reforms, Centre-State relations

GS-III: Agriculture inputs, sustainability, food safety, environment

Essay: Sustainable agriculture, chemical regulation, farmer welfare

29. Draft National Electricity Policy 2026: Rewiring India's Power Sector for Net Zero & Viksit Bharat



The **Ministry of Power** released the **Draft National Electricity Policy (NEP) 2026** for public consultation. The draft seeks to **replace the National Electricity Policy, 2005**, aligning India's power sector with **Viksit Bharat @2047** and **Net Zero by 2070** commitments.

What is the National Electricity Policy?

A statutory policy under the **Electricity Act, 2003** that provides **long-term direction** for generation, transmission, distribution, tariffs, competition, and consumer protection in India's power sector.

Context & Background

- The **NEP 2005** focused on electrification and capacity addition in a power-deficit economy.
- **NEP 2026** reflects a shift towards:
 - **Climate transition**
 - **Financially viable DISCOMs**
 - **Competitive electricity markets**
 - **Consumer-centric governance**

Climate & Energy Transition Targets

Parameter	Target
Per Capita Electricity Consumption	2,000 kWh by 2030; >4,000 kWh by 2047
Non-Fossil Capacity	500 GW by 2030
Emission Intensity	45% reduction below 2005 levels by 2030
Nuclear Power	100 GW by 2047
AT&C Losses	Single-digit across all States

UPSC Exam Relevance

Prelims:

National Electricity Policy, USO, AT&C losses, BESS, SLDC

Mains:

GS-II: Regulatory governance, Centre-State relations, independent regulators

GS-III: Energy transition, power sector reforms, climate commitments

Essay: Energy as the backbone of India's developmental state

30. India Amends NDCT Rules to Cut Drug Approval Timelines by 90 Days



In January 2026, the Ministry of Health & Family Welfare amended the **New Drugs and Clinical Trials (NDCT) Rules, 2019**. The reforms aim to **fast-track drug development**, reduce regulatory delays, and boost India's clinical research ecosystem.

Key Highlights

Regulatory Simplification

- Streamlines approval procedures to promote **ease of doing business** in pharmaceuticals.
- Focus on reducing duplication and procedural bottlenecks.

Reduced Approval Timelines

- Overall drug development lifecycle to save **minimum 90 days**.
- Processing time for categories requiring test licences reduced from **90 days to 45 days**.

Test Licence Reform

- Earlier: Mandatory **test licence** for non-commercial manufacture.
- Now: Replaced with **prior online intimation to CDSCO**.
- Exception: High-risk drugs (cytotoxic, narcotic, psychotropic substances) still require formal approval.

Faster BA/BE Studies

- Prior permission removed for certain **low-risk Bioavailability (BA) and Bioequivalence (BE)** studies.
- Studies can begin through **simple online intimation**.
- Major boost for India's **generic drug industry**.

Digital Enablement

- Online modules introduced via:
 - **National Single Window System (NSWS)**
 - **SUGAM Portal (CDSCO's online platform)**
- Ensures transparency and seamless compliance.


Regulatory Efficiency

- CDSCO processes **30,000–35,000 test licence applications annually**.
- Reform reduces administrative burden → better manpower allocation and oversight.

About NDCT Rules, 2019

- Notified under the **Drugs and Cosmetics Act, 1940**.
- Regulate: Clinical trials ; New drug approvals ; BA/BE studies
 - Ethics committee oversight
- Implemented by **Central Drugs Standard Control Organisation (CDSCO)** under the Drugs Controller General of India (DCGI).

31. Toll Dues Now Linked to Vehicle Services: CMV Rules Amended

 On 20 January 2026, the Government notified the **Central Motor Vehicles (Second Amendment) Rules, 2026**. The amendment strengthens enforcement of **National Highway toll (user fee) payments** and supports barrier-less tolling.

Key Provisions

- **Legal Basis:** Amends the **Central Motor Vehicles Rules, 1989** under the Motor Vehicles Act framework; linked with the **National Highways Act, 1956**.
- **New Definition Introduced:**
 - **“Unpaid User Fee”** = Toll charges recorded by the **Electronic Toll Collection (ETC)** system but not paid.
- **Mandatory Toll Clearance for Services:**

Vehicle-related services will be denied if toll dues remain unpaid:

 - **No Objection Certificate (NOC)** for transfer of ownership/inter-State transfer.
 - **Certificate of Fitness (CoF)** issuance/renewal.
 - **National Permit** for commercial vehicles.
- **Form 28 Amendment:**
 - Applicants must disclose pending toll dues while applying for NOC.
- **Digital Enablement:**
 - Electronic issuance of Form 28 via designated online portals.
 - Promotes paperless, real-time compliance checks.
- **Support for MLFF:**
 - Facilitates **Multi-Lane Free Flow (MLFF)** system (barrier-less tolling).
 - Enables automated toll deduction via FASTag/ETC without physical toll plazas.

JANUARY 2026

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1. America First Revisited: U.S. Pulls Out of 66 Global Institutions



The United States announced withdrawal from **66 international organisations and treaties** under an “America First” policy review, marking a major shift towards **unilateralism** and raising concerns over the future of **multilateral global governance**, especially in climate and human rights domains.

- The U.S. conducted a strategic review classifying several multilateral bodies as **redundant, mismanaged, or misaligned with U.S. interests**.
- The move represents one of the **largest coordinated exits** from international institutions by any major power.

Key Organisations Affected

Climate: UNFCCC, IPCC, IRENA, International Solar Alliance

Significance: U.S. becomes the **first country to attempt formal exit from UNFCCC.*

Human Rights & Social: UNHRC, UN Women, UNFPA

Trade & Development: UNCTAD

Security/Diplomacy: Global Counterterrorism Forum

Scale of Withdrawal

Total bodies: 66

UN entities: 31

Non-UN bodies: 35

Why This Matters

- **Weakens multilateralism:** Reduces collective capacity to address climate change, human rights, and global crises.
- **Leadership vacuum:** Creates space for **China** and other powers to expand influence.
- **Funding shock:** Many agencies depend heavily on U.S. contributions.
- **Normative impact:** Encourages **transactional diplomacy** over rules-based order.

Mains Practice Question

“Large-scale withdrawal of a major power from international institutions reflects a crisis of multilateralism.”

Discuss with reference to the recent U.S. decision.

2. US Exits WHO, Citing Reform and Bias Concerns



On 22 January 2026, the United States officially completed its withdrawal from the World Health Organization (WHO). The move follows an executive order signed a year earlier by President Donald Trump.

Background

- The US accused WHO of being “China-centric” during the Covid-19 pandemic.
- The US Department of Health and Human Services cited:
 - Alleged mishandling of COVID-19
 - Failure to implement structural reforms

Political influence by member states

Financial Dimension

- The US refused to pay **\$260 million in pending arrears (2024–25)**.

WHO legal advisers stated that assessed contributions are **binding obligations** under WHO rules.

WHO Response

- WHO Director-General **Dr. Tedros Adhanom Ghebreyesus** termed the withdrawal:
 - A loss for the US
 - A setback for global public health cooperation

About WHO

- **Established:** 1948
- **Headquarters:** Geneva, Switzerland
- **Specialised Agency of:** United Nations
- **Core Functions:**
 - Global disease surveillance
 - Pandemic preparedness & response
 - Setting international health standards
 - Coordinating vaccination & health programmes
- **Funding Structure:**
 - Assessed contributions (mandatory)
 - Voluntary contributions (major share)

3. Responsible Nations Index (RNI)



World Intellectual Foundation (WIF) will formally launch the **Responsible Nations Index (RNI)** in New Delhi. The index evaluates **154 countries** on *responsible governance* beyond GDP or power-based metrics. It is an **India-led global initiative**, developed with academic partners to reshape how national responsibility is measured.

About the Responsible Nations Index (RNI)

- **Core Purpose:** To assess how responsibly nations govern themselves, protect the environment, and contribute to the global order.
- **Key Dimensions (3):**
 - **Internal Responsibility:** Governance quality, social well-being, inclusion, food security.
 - **Environmental Responsibility:** Environmental stewardship, sustainability, climate action.
 - **External Responsibility:** Global cooperation, ethical leadership, international responsibility.
- **Methodology:** Uses **transparent, globally available datasets** for credible cross-country comparison.
- **Institutional Partners:** Developed in partnership with **Jawaharlal Nehru University (JNU)** and **Indian Institute of Management Mumbai**.
- **Normative Aim:** Encourages global dialogue on **ethics, sustainability, food security, and responsible leadership**.
- **Promoting Body:** **World Intellectual Foundation (WIF)** – a New Delhi-based, non-partisan global think tank founded in **2021**.

4. Head of State Immunity under International Law: Limits and Debates



The U.S. capture and prosecution of Venezuelan President Nicolás Maduro following Operation Absolute Resolve has reignited debate over **Head of State immunity** – the legal protections that shield sitting leaders from foreign criminal jurisdiction – and the circumstances under which these immunities can be limited or pierced under international law.

What is Head of State Immunity?

Head of State immunity is a **rule of customary international law** that protects a sitting head of state from being **arrested, prosecuted, or sued** in the courts of other countries, based on the sovereign equality of states and to avoid interference in diplomatic functions.

Immunity from Foreign Criminal Jurisdiction

Personal Immunity (Immunity Ratione Personae)

- **Absolute protection** for **sitting heads of state** from foreign criminal jurisdiction – even for serious offences.
- Covers **all acts**, both **official and private**, during tenure.
- Grounded in **customary international law** (ICJ Arrest Warrant Case 2002 – upheld immunity for a sitting foreign minister as part of this norm).

Functional Immunity (Immunity Ratione Materiae)

- Applies **after tenure** for acts performed **in an official capacity** as head of state.
- Does **not cover private acts** or serious international crimes not part of official functions.

Pinochet precedent and similar case law show that this immunity does **not shield atrocities** like torture or genocide when they fall outside “official acts.”

Exceptions Under International Courts

International Criminal Court (ICC)

- Article **27 of the Rome Statute** displaces immunity for state officials **before the ICC**, regardless of position.
- ICC’s jurisprudence (e.g., on Omar al-Bashir) confirms that **heads of state do not enjoy immunity** for crimes under ICC jurisdiction.
- If a case is referred by the **United Nations Security Council**, states not party to the Rome Statute may also be bound.

Mains Question : *Discuss the legal foundations and limits of Head of State immunity under international law. In light of recent developments involving the capture and prosecution of foreign leaders, evaluate whether these immunities should be upheld, modified, or replaced by stronger accountability mechanisms.*

5. Somaliland: De-facto Statehood vs International Recognition



Israel has formally recognised Somaliland as an independent and sovereign state, triggering strong opposition from Somalia and the African Union, which continue to uphold Somalia's territorial integrity.

Historical Background

- **Colonial Past:** British Protectorate until June 1960
- **Brief Independence:** Became the State of Somaliland on 26 June 1960
- **Union:** Voluntarily merged with Italian Somaliland on 1 July 1960, forming the Somali Republic
- **Marginalisation:** Northern regions faced repression and neglect, especially under Siad Barre's regime
- **Separation:** After Somalia's state collapse, Somaliland declared independence in 1991

About Somaliland (Geography & Polity)

- **Location:** Horn of Africa, north-western part of internationally recognised Somalia
- **Coastline:** Along the Gulf of Aden
- **Borders:**
 - North-West: Djibouti
 - South & West: Ethiopia
 - East: Somalia & Puntland region
- **Capital:** Hargeisa

Political Status: De-facto autonomous state, but not recognised by the UN

Strategic & Economic Significance

- **Maritime Importance:** Located near the Red Sea-Indian Ocean chokepoint, close to one of the world's busiest shipping corridors
- **Berbera Port:** Developed as a regional trade and logistics hub, crucial for landlocked Ethiopia
- **Economy:** Livestock-based (sheep, goats, camels) with exports to Gulf countries

International Law & Diplomacy Angle

- **African Union Position:** Strongly supports territorial integrity of member states
- **UN Stance:** Recognises Somaliland as part of Somalia
- **Precedent Sensitivity:** Recognition risks encouraging secessionist movements elsewhere in Africa
- **Israel's Move:** Seen as geopolitically strategic, not altering Somaliland's UN status

6. Donald Trump Accepts 2025 Nobel Peace Prize Medal (Not the Prize Itself)



Donald Trump accepted the **physical Nobel Peace Prize medal** from **María Corina Machado**, the **2025 Nobel Peace Prize laureate**, during a meeting at the **White House**. The presentation was a **gesture of appreciation** for Trump's role in the **Venezuelan conflict and democracy efforts**.

Official Clarification

The **Norwegian Nobel Committee** clarified that **only the medal (physical award) can change ownership**, not the **Nobel Peace Prize title**. Thus, **Trump is not a Nobel Peace Prize laureate**.

Nobel Prize Rules

- **Non-Transferability:** Nobel Prize laureate status **cannot be transferred, shared, revoked, or reassigned** under any circumstances.
- **Final Decisions:** Decisions of Nobel awarding bodies are **final and cannot be appealed**.
- **Sharing Limit:** A Nobel Prize may be **shared by up to three individuals** in one year.
- **Peace Exception:** The **Nobel Peace Prize** may also be awarded to an **organisation**.
- **Posthumous Bar:** Prizes are **not awarded posthumously** if the recipient dies before the official announcement.
- **Laureate Lecture:** Winners must **deliver a public lecture** related to their prize within six months.

7. United States Military Operation in Venezuela: Capture of Nicolás Maduro

On 3 January 2026, the United States Armed Forces conducted **Operation Absolute Resolve**, a military intervention in **Venezuela**, resulting in the **capture of President Nicolás Maduro and his wife Cilia Flores** and their transfer to the U.S. to face criminal charges, marking an unprecedented direct U.S. military action against a sitting head of state.

What Happened? (Operation Absolute Resolve)

- The U.S. carried out a **large-scale military operation on 3 Jan 2026** targeting regime leadership and military infrastructure in **Caracas**.
- **Nicolás Maduro and Cilia Flores were captured** by U.S. forces (including special operations units) and flown to **New York** to face criminal charges.
- The operation involved **air strikes, special forces extraction, and a coordinated multi-domain assault** reportedly involving **150+ aircraft and SOF units**.

Delcy Rodríguez was sworn in as **acting president** by Venezuela's Supreme Tribunal of Justice, even as the U.S. called for a negotiated transition.

Legal & Judicial Context

- **Indictment:** Maduro had been indicted in the **United States District Court for the Southern District of New York** on charges including **narco-terrorism conspiracy and cocaine trafficking** since 2020.
- The operation effectively executed a **law enforcement and muscle intervention** to fulfill an outstanding **U.S. arrest warrant** under domestic criminal law, but carried out through military force.

Strategic Factors Behind the Operation

a) Migration & Security Pressures

- Venezuela's economic collapse precipitated large-scale migration towards the U.S. southern border, intensifying domestic political pressure.

b) Counter-narcotics Justification

- Washington labelled Maduro's regime as part of narcotics networks, framing capture as part of anti-drug efforts.

c) Geopolitical Competition

- The operation is seen as a reassertion of U.S. influence in the **Western Hemisphere** amid rising ties between Venezuela and **China, Russia, and Iran**.

d) Oil & Economic Interests

- Venezuela has the **world's largest proven oil reserves**, and U.S. commentary highlighted energy sector involvement post-operation, including oversight of oil revenue remittances to support Venezuelan public services.

8. Anti-Government Protests in Iran

Iran is witnessing its **largest anti-government protests in recent years**, triggered by a **severe economic crisis and currency collapse**, with an emerging **ideological shift towards pro-monarchy sentiments** – a departure from earlier reformist movements.

Key Drivers of the Protests

- **Currency Collapse:** Iranian rial fell to **~1.5 million/USD**, losing nearly **50% value in one year**.
- **Hyperinflation:** Official inflation at **42.2%**; food inflation at **72% YoY**.
- **Fuel Price Shock:** Introduction of **three-tier gasoline pricing** sharply increased transport and food costs.
- **Water Stress:** **Five-year drought** and mismanagement caused acute shortages across provinces.
- **Energy Crisis:** Winter **blackouts and gas shortages** intensified public anger.
- **War Impact:** The **“Twelve-Day War”** with Israel damaged nuclear and oil facilities, weakening regime credibility.
- **Sanctions Snapback:** Reimposition of **UN nuclear sanctions** cut Iran off from global banking and oil markets.

Why This Protest is Different

- Shift from **reformist slogans** to **explicit pro-monarchy rhetoric**.

Reflects erosion of faith in clerical governance and political Islam.

Implications for India

- **Strategic Port Risk:** Disruptions threaten operations at **Chabahar Port**.
- **Connectivity Threat:** Instability endangers India’s access to **International North-South Transport Corridor (INSTC)**.
- **Energy Security:** Unrest and sanctions heighten **oil price volatility**.
- **Diplomatic Balancing:** Complicates India’s relations with both **Iran and the U.S.**

Mains Practice Question

“Economic collapse and sanctions have transformed the nature of political protests in Iran.” Analyse the causes of the current unrest and its implications for India.

9. Renewed Unrest in Iran Amid Economic Stress and Regional Tensions



Widespread protests erupted across **Iran**, leading to deaths and damage to **banks and government buildings**, amid a sharp **economic downturn** and **regional security pressures**.

Drivers of the Unrest

- **Economic Crisis:** Sharp **currency depreciation** and **inflation above ~40%** eroding purchasing power.
- **Fiscal Strain:** **Security-heavy budgeting** crowding out welfare spending.
- **Regional Tensions:** Spillovers from **Iran-Israel hostilities** (largely indirect/proxy dynamics).
- **Resource Stress:** **Chronic water and energy shortages**, worsening public discontent.

Why Iran Matters for India (Prelims Pointers)

- **Strategic Access:** Provides India a **land-sea route to Afghanistan and Central Asia**, bypassing Pakistan.
- **Chabahar vs Gwadar:** India's role at **Chabahar Port** counters China-backed **Gwadar Port** under **China-Pakistan Economic Corridor**.
- **Connectivity Hub:** Anchor of the **International North-South Transport Corridor (~7,200 km)**, cutting **time (~40%)** and **costs (~30%)** vs Suez.
- **Energy Security:** Holds **~2nd-largest gas** and **~3rd-largest oil** reserves globally.
- **Indian Investments:** **ONGC Videsh's** discovery of the **Farzad-B gas field** underlines long-term stakes.
- **Trade Snapshot:** Bilateral trade **~USD 2.33 bn (FY 2022-23)**; use of **Rupee-Rial mechanisms** to navigate sanctions; Iran is a major market for **Indian basmati rice, pharma, tea, sugar, chemicals**.

10. Secondary Sanctions 2.0: U.S. Threatens 500% Tariffs on Russia's Energy Partners



The United States backed the *Sanctioning Russia Act, 2025*, proposing **500% tariffs** on Russian imports and **secondary tariffs** on countries trading in Russian energy, escalating economic pressure amid the Ukraine conflict.

Context & Objective

- Law aims to **cut Russia's war-financing capacity** by targeting **energy export revenues**.
- Marks a shift from **financial sanctions to extreme tariff-based coercion**, including **secondary sanctions**.

Key Provisions of the Act

- **Direct Tariff:** Minimum **500% duty** on all imports from **Russia**.
- **Secondary Sanctions:** Up to **500% tariffs** on imports from countries buying **Russian oil, gas, or uranium**.
- **Named Buyers:** **India, China, Brazil**.
- **Capital Markets:** Ban on listing/trading Russian firms on U.S. exchanges.
- **Energy Tech Ban:** Prohibits export of U.S. energy products & technologies to Russia.
- **Review & Waiver:** Mandatory 15-day and 90-day reviews; **one-time waiver up to 180 days** for U.S. national security.
- **Trigger Conditions:** Russia's refusal to negotiate peace, violation of peace terms, renewed invasion, or attempts to undermine **Ukraine**.

Why This Matters (Global)

- **Extraterritorial Reach:** Expands U.S. use of **secondary sanctions**.
- **Trade Weaponisation:** Tariffs used as a **geopolitical enforcement tool**.
- **Market Disruption:** Risks fragmenting global energy and trade flows.

Mains Practice Question

"Secondary sanctions and tariff weaponisation reflect the changing nature of economic statecraft." Analyse the implications of the U.S. Sanctioning Russia Act, 2025 for India.

11. U.S. Imposes 25% Tariff on Countries Trading with Iran



The **United States** announced a **25% tariff** on any country maintaining trade links with **Iran**, as part of a renewed “*maximum pressure*” strategy linked to Iran’s internal crackdown.

Implications for India (Crisp)

- **Export Risk:** Iran-linked transactions could push **effective U.S. duties up to ~75%**, hurting India’s price competitiveness.
- **Energy Shock:** ~50% of India’s crude passes through the **Strait of Hormuz**, exposing India to oil-price spikes.
- **Connectivity Threat:** Sanctions risk disrupting India’s 10-year contract at **Chabahar Port**, a gateway to Central Asia.
- **Diaspora Risk:** Escalation may affect ~10 million Indians in the Gulf and remittance stability.
- **Diplomatic Tightrope:** As **BRICS Chair (2026)**, India must balance Iran engagement with access to the U.S. market.
- **Geopolitical Drift:** Pressure on India–Iran ties could push Tehran closer to China under their long-term pact.

India-Iran Relations: Snapshot

- **Diplomacy:** 75 years of ties (since 1950).
- **Trade:** ~\$1.6 bn in FY25 (India exports ~\$1.2 bn).
- **Connectivity:** Founding members of **International North-South Transport Corridor (INSTC)**.
- **Energy:** Iran was a top-3 crude supplier to India until 2019 (imports halted due to U.S. sanctions).
- **Convergence:** Regional connectivity, counter-terrorism, Afghan stability.
- **Divergence:** U.S. sanctions, Iran–Israel tensions, China’s footprint.
- **Multilateral:** Coordination in **Shanghai Cooperation Organisation** and **Indian Ocean Rim Association**.

12. Beyond Politics: The Institutional Backbone of India–U.S. Relations



Despite periodic **political frictions and trade disputes**, India–United States ties continue to **deepen structurally** through a dense web of **institutionalised bilateral frameworks**, ensuring long-term cooperation that is resilient to short-term shocks.

Why Institutional Collaboration Matters

Institutional mechanisms:

- **Depoliticise cooperation** by locking-in commitments beyond electoral cycles
- Enable **continuity, predictability, and scale**
- Convert strategic convergence into **operational outcomes**

India–U.S. relations today are **institution-led rather than personality-led**.

Key Institutional Collaborations (Sector-wise)

Defence & Strategic Security

- **Major Defence Partnership Framework (2025–2035)**
Creates a legal and strategic basis for **military interoperability, logistics sharing, and joint planning**.
- **INDUS-X (India–U.S. Defence Acceleration Ecosystem)**
 - Promotes **co-development & co-production**
 - Flagship example: **GE F414 jet engine manufacturing in India**
 - Focus on **autonomous systems and dual-use defence tech**

Critical & Emerging Technologies

- **TRUST Framework**
 - Upgrades the **iCET (Initiative on Critical and Emerging Technologies)**
 - Focus areas: **Semiconductors, AI, supply-chain resilience**
 - Reduces dependence on **China-centric technology ecosystems**

Space Cooperation

- **ISRO–NASA Collaboration**
 - Joint missions such as **NISAR (NASA–ISRO Synthetic Aperture Radar)**
 - Integration of **Indian astronauts into ISS research protocols**

Clean Energy & Climate

- **Strategic Clean Energy Partnership (SCEP)**
 - Coordinates **over USD 1 billion** in multilateral finance
 - Focus on **solar, wind, and green hydrogen**
 - Aligns India's energy transition with global climate goals

13. India–Germany Deepen Strategic Partnership with Defence, Green Tech & Mobility Push



German Chancellor **Friedrich Merz** paid his **first official visit to India** and first Asian visit since taking office. The visit marks **75 years of diplomatic relations** and **25 years of the India–Germany Strategic Partnership**, resulting in multiple high-impact agreements across defence, green energy, technology, and mobility.

Key Outcomes of the Visit

1. Defence & Security

- **Defence Industrial Cooperation Roadmap** signed → shift from buyer-seller to **co-development & co-production**.
- **Eurodrone MALE UAV**: DRDO partnered with Europe's **OCCAR**.
- **Maritime Cooperation**: Germany to post a **Liaison Officer at IFC-IOR**; participation in **MILAN & Tarang Shakti** exercises.

2. Economy, Trade & Technology

- **India–EU FTA**: Joint push for early conclusion.
- **Semiconductor Ecosystem Partnership**: Cooperation across R&D, design and supply chains.
- **SMEs & Startups**: CEO Forum strengthened; focus on resilient global value chains.
- **Critical Minerals**: Joint Declaration on processing, recycling, and overseas asset acquisition.

3. Energy, Climate & Sustainability

- **Green Hydrogen Alignment**: India's **NGHM** aligned with Germany's Hydrogen Strategy.
- **Green Ammonia**: Binding supply agreement to Germany.
- **Climate Finance**: Germany commits **€10 billion concessional finance by 2030**.
- **Centres of Excellence**: Battery tech, green mobility, affordable healthcare.

4. Mobility, Skills & Education

- **Visa Relief**: Visa-free airport transit for Indian passport holders.
- **Global Skills Partnership**: Healthcare & renewable energy professionals.
- **Higher Education Roadmap**: Joint degrees and research collaboration expanded.

5. Regional & Global Coordination

- **Indo-Pacific Consultation Mechanism** launched.
- Reaffirmed support for **IMEC**.
- Continued coordination in **G4** for **UNSC reform**.

14. India–Japan Strategic Dialogue 18.0: AI, Critical Minerals and Economic Security at the Core



In January 2026, India and Japan concluded the **18th India–Japan Strategic Dialogue** in New Delhi, co-chaired by India’s External Affairs Minister and Japan’s Foreign Minister. The talks focused on **AI cooperation, economic security, critical minerals and defence technology**, reinforcing the Special Strategic Partnership amid Indo-Pacific uncertainties.

India–Japan Relations

- India and Japan share a **Special Strategic and Global Partnership (2014)**, anchored in shared democratic values and concerns over regional stability.
- Key frameworks include the **2008 Joint Declaration on Security Cooperation** and **ACSA (2020)** for logistics support.
- Japan remains India’s **largest ODA donor since 1958**, with flagship projects like the **Mumbai–Ahmedabad High-Speed Rail (MAHSR)**.

Key Outcomes of the 18th Strategic Dialogue

Area	Key Decisions
Artificial Intelligence	Launch of Japan–India AI Strategic Dialogue under the Japan–India AI Cooperation Initiative (JAI); Japan to invite 500 Indian AI professionals by 2030
Economic Security	Creation of a Private-Sector Dialogue on Economic Security (early 2026) covering semiconductors, ICT, clean energy, pharma
Critical Minerals	Agreement to form a Joint Working Group (JWG) to build resilient supply chains and reduce single-source dependence
Defence Technology	Progress on transfer of UNICORN (Unified Complex Radio Antenna) technology for the Indian Navy
Diplomatic Milestone	2027 declared as the 75th anniversary of India–Japan diplomatic relations

Strategic & Economic Significance

- **Indo-Pacific Stability:** India and Japan are key anchors of the **Quad**, promoting a Free and Open Indo-Pacific (FOIP) and balancing China’s assertiveness.
- **Derisking Global Economy:** Through the **Supply Chain Resilience Initiative (SCRI)** with Australia, both aim to diversify supply chains.
- **Technology & Investment:** Japan is India’s **5th-largest FDI source (~USD 43 bn)**; a new **Joint Vision (2025)** targets **JPY 10 trillion** additional private investment.
- **Demographic Complementarity:** Agreement to facilitate mobility of **500,000 skilled Indian workers** to address Japan’s ageing workforce.

Africa & Regional Connectivity: Cooperation via **AAGC** and the **Act East Forum**, including development of India’s Northeast.

15. Spain Enters the Indo-Pacific: Madrid Joins India's Oceans Initiative



During a visit to New Delhi marking 70 years of diplomatic relations, Spain formally joined the **Indo-Pacific Oceans Initiative (IPOI)**. India and Spain also agreed to upgrade ties to a **Strategic Association**, signalling deeper cooperation in maritime security, technology, and global governance.

Context & Background

- Spanish Foreign Minister **José Manuel Albares** concluded an official visit to India.
- 2026 was declared the **India-Spain Dual Year of Culture, Tourism, and Artificial Intelligence**.
- Spain announced a **new Consulate General in Bengaluru**, reflecting growing economic, tech, and people-to-people ties with southern India.

What is the Indo-Pacific Oceans Initiative (IPOI)? (Definition)

- IPOI is an **India-led, non-treaty, collaborative maritime framework** aimed at promoting a **free, open, inclusive, and rules-based Indo-Pacific maritime order**.

Genesis & Strategic Basis : Proposed by: PM Narendra Modi

- **Forum: 14th East Asia Summit**, Bangkok (Nov 2019)
- **Doctrinal Link:** Extends India's **SAGAR (Security and Growth for All in the Region)** vision from the Indian Ocean to the wider Indo-Pacific.

Operational Design of IPOI

- **Non-binding & Flexible:** No treaty obligations; voluntary cooperation.
- **Pillar-based Structure:** Countries **lead or co-lead pillars** based on expertise.

Seven Pillars of IPOI

1. Maritime Security
2. Maritime Ecology
3. Maritime Resources
4. Capacity Building
5. Disaster Risk Reduction & Management
6. Science, Technology & Academic Cooperation

Trade Connectivity & Maritime Transport

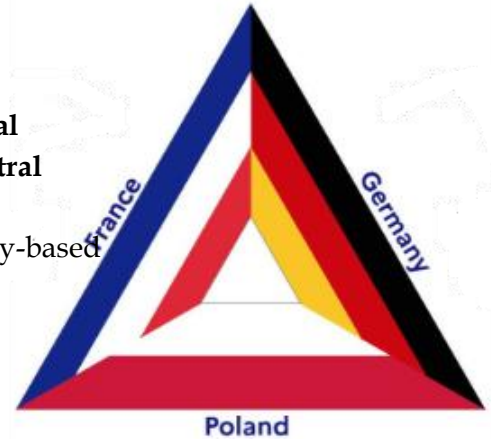
16. Weimar Triangle: India Engages Key European Trilateral



Poland backed India amid U.S. tariff threats over Russian oil imports, expressing satisfaction over India's import cutbacks during India's first engagement with the Weimar Triangle.

About the Weimar Triangle

- **Members:** France, Germany, and Poland.
- **Established:** 1991, in the post-Cold War period.
- **Purpose:** Promote **European integration** and **political reconciliation**, especially between **Western and Central Europe**.
- **Nature:** A **high-level consultative forum** (not a treaty-based alliance).
- **Core Focus Areas:**
 - European security
 - Foreign policy coordination
 - Russia-Ukraine conflict
 - Defence, economic cooperation, and cultural exchanges
- **Institutional Linkage:** Complements processes of the EU and NATO, without replacing them.



Why the Weimar Triangle Matters for India

- **Strategic Outreach:** Signals India's engagement **beyond bilateral diplomacy** with Europe.
- **Geopolitical Convergence:** Reflects shared concerns on **European security, energy disruptions, and global governance**.
- **Diplomatic Signalling:** Engagement with Poland – an EU & NATO frontline state – adds weight to India's **strategic autonomy narrative**.

Other Important Trilateral Groupings (Prelims Comparison)

- **RIC Trilateral (Russia-India-China):** Promotes **multipolarity**, coordination on global governance.
- **AUKUS (Australia-UK-US):** Defence partnership focused on **nuclear-powered submarines** and advanced technologies.
- **ANZUS (Australia-New Zealand-US):** Collective security treaty in the **Pacific**.

Trilateral Commission: Informal forum linking **North America, Europe, and Japan** on economic and political coordination.



17. EU Leaders as Chief Guests at 77th Republic Day



From 25–27 January 2026, the President of the **European Council** António Costa and the President of the **European Commission** Ursula von der Leyen are on a **State Visit to India**. They attended India's **77th Republic Day celebrations as joint Chief Guests**, marking a rare collective EU-level participation.

Key Developments

- **16th India–EU Summit:**
 - Co-chaired with PM Narendra Modi.
 - Focus on trade, security, climate, digital cooperation, and global governance reforms.
- **High-Level Engagements:**
 - Meetings with President Droupadi Murmu.
 - Restricted and delegation-level talks with the Prime Minister.
- **India–EU Business Forum:**
 - Held alongside the summit.
 - Focus on trade facilitation, investment flows, supply chains, green technology, and industry partnerships.

India–EU Relations: Snapshot

- **Strategic Partnership:** Established in 2004.
- **Trade Ties:** EU is India's **largest trading partner in goods** (>\$135 billion in 2024–25).
- **Investment Linkages:** EU accounts for ~17% of India's total FDI inflows.
- **Recent Momentum:** Visit of the **EU College of Commissioners (Feb 2025)** strengthened sectoral cooperation.
- **Ongoing Agenda:**
 - Free Trade Agreement (FTA) negotiations
 - Connectivity (IMEC)
 - Green transition & CBAM compliance

Technology & semiconductor cooperation

18. India Pushes to Seal SSAs with All 27 EU Nations



India has concluded **Social Security Agreements (SSAs)** with **14 EU countries** and plans to finalise agreements with the remaining 13 within five years. Overall, India has operationalised SSAs with **20 countries**, including Japan, UK, Canada, Australia and South Korea.

About Social Security Agreements (SSA)

- **Nature:** Bilateral treaties protecting social security rights of cross-border workers.
- **Legal Domain:** Fall under **sovereign national jurisdiction**, not EU-wide trade competence.
- **Implementing Agency (India):** Employees' Provident Fund Organisation (EPFO), under Ministry of Labour & Employment.
- **Certificate of Coverage (CoC):** Issued by EPFO to exempt Indian employees from host-country social security contributions during temporary assignments.

Core Principles of SSAs

- **Detachment Rule:** Exemption from dual contributions for short-term assignments (generally up to 5 years).
- **Totalisation Rule:** Combines service periods in both countries to qualify for pension.
- **Exportability Rule:** Pension payable even after returning to home country or moving elsewhere.

Equal Treatment: Foreign workers receive the same social security rights as host nationals.

19. India's Seafood Exports: Diversification Cushions the Tariff Shock



Despite steep US tariffs on Indian shrimp, India's seafood exports grew by 16% in value and 12% in volume, driven by rapid market diversification towards Asia and Europe, as per reports in *Indian Express* and *Financial Express*.

Snapshot: India's Seafood Exports

- Growth (Apr–Oct FY26): +16% value, +12% volume
- FY25 exports: ~USD 7.45 billion
- Export composition: Frozen shrimp >70% of marine export earnings

Indian Seafood Exports to the US: The Tariff Problem

- Effective US duty on Indian shrimp: ~59.7%
- Comparator countries (Ecuador, Vietnam, Thailand): 15–20%
- Market dependence: US absorbed ~35% of India's seafood exports (USD 2.8 bn) in FY25
- Impact: ~4% value decline in exports to the US (Apr–Oct FY26)

Drivers of Export Resilience

a) Market Diversification

- China: Share rose to 19% of exports
- Vietnam: 110% jump in export value (Apr–Oct FY26)

b) European Union Push

- EU approved 102 additional Indian fishery units
- EU already accounts for 15.1% of exports (USD 1.12 bn, FY25)

c) Product Strength

- Vannamei shrimp anchors exports due to scale, quality consistency, and cost efficiency

d) Asia–Europe Pivot

- Supply rebalancing in Asia & Europe helped offset US losses

Mains Question

India's seafood export growth amid adverse US tariffs highlights the importance of diversification but also exposes structural vulnerabilities.

Analyse with reference to product concentration and market dependence.

20. India–EU FTA Sealed: World’s Largest Democratic Trade Pact Takes Shape



India and the **European Union** announced the **conclusion of negotiations** on a landmark **Free Trade Agreement (FTA)**, described as the “*mother of all trade deals.*” Covering a combined market of **~2 billion people and ~25% of global GDP**, the pact is expected to apply provisionally by **Q4 2026** and fully enter into force by **early 2027**.

What is an FTA?

A **Free Trade Agreement (FTA)** is a bilateral or multilateral treaty that reduces or eliminates tariffs and non-tariff barriers on trade in goods and services, while setting common rules on investment, standards, and dispute resolution.

India–EU FTA: Context & Background

- Negotiations began in **2007**, stalled in **2013** over market access, IPR, and mobility issues, and were **relaunched in 2022** amid geopolitical shifts.
- The deal reflects **EU’s diversification away from China** and **India’s strategy of trade rebalancing** beyond the US–China binary.
- It complements the broader **India–EU Strategic Partnership**.

Key Provisions of the India–EU FTA

Trade in Goods

Aspect	Key Commitments
EU Tariff Elimination	99.5% of India’s exports by value
Immediate Zero Duty	90.7% of Indian export value
India’s Concessions	97.5% of EU import value
Tariff Phasing	Immediate (49.6%), 5/7/10-year cuts (39.5%)
Labour-Intensive Sectors	Textiles, apparel, leather, footwear, gems & jewellery, marine products – duty-free access
Sensitive Exclusions	Dairy, cereals, poultry, sugar
Automobiles	EU car duties reduced to 10%, quota 2.5 lakh units/year

Trade in Services

- **Market Access:**
 - India → **144 EU service subsectors** (IT, professional services, education).
 - EU → **102 Indian subsectors**.
- **Movement of Professionals:** Binding commitments on visas for **Indian IT professionals, nurses, consultants**.
- **Family Rights:** Spouses & dependents of intra-corporate transferees get **work + residence rights**.
- **AYUSH Breakthrough:** Indian AYUSH practitioners can work under **home titles** in EU states where unregulated.
- **Digital Trade:** Ban on **forced source-code transfer**, protecting Indian IT IP.

21. India–EU Trade Agreement Near Finalisation



The European Union (EU) and India are close to finalising a **historic Free Trade Agreement (FTA)**, as stated by **Ursula von der Leyen**, President of the **European Commission**. The announcement precedes her visit to New Delhi as **Chief Guest at India's 77th Republic Day** and the **16th India-EU Summit (Jan 27)**, where the deal's conclusion is expected.

Key Features of the Proposed Agreement

- **Scale:** Covers ~2 billion people and ~25% of global GDP.
- **Strategic Firsts:**
 - For the **first time**, an **EU military contingent** will participate in India's Republic Day parade outside Europe.
- **High-Level Engagement:** Attendance by the **European Council President** alongside the Commission President underscores political momentum.

India–EU Trade Relations (Snapshot)

- **Trade Volume:** EU is India's **largest goods trading partner**; bilateral trade >\$135 billion (2024–25).
- **India's Exports:** Textiles, pharmaceuticals, chemicals, electronics.
- **India's Imports:** Nuclear reactors, aircraft, heavy machinery, medical instruments.
- **FDI:** EU contributes ~17% of India's total FDI inflows.
- **Tariff Preference:** India benefits from the **Generalised Scheme of Preferences (GSP)** for select goods.

Key Challenge: **Carbon Border Adjustment Mechanism (CBAM)** poses compliance costs for carbon-intensive Indian exports.

22. India–EU Seal ‘Mother of All Deals’: Landmark Comprehensive FTA Concluded



On 27 January 2026, India and the European Union concluded negotiations for a **Comprehensive Free Trade Agreement (FTA)**. Announced during the visit of the Presidents of the **European Council and European Commission**, marking a major strategic and economic breakthrough.

Key Highlights of the India-EU FTA

Scale & Strategic Importance

- Covers the **world’s 4th largest (EU) and 2nd largest (India, PPP terms) economies.**
- Combined market size: **~USD 24 trillion GDP.**
- Impacts nearly **2 billion people.**

Strengthens India’s **Viksit Bharat @2047** global integration vision.

Market Access for Indian Exports

- **97% of EU tariff lines** opened to India.
- Covers **99.5% of India’s export value.**
- Over **70% tariff lines** see **immediate duty elimination.**

Major Beneficiaries:

- Textiles & apparel
- Leather & footwear
- Marine products
- Gems & jewellery
- Tea, coffee & spices
- Toys & sports goods
- MSMEs & labour-intensive industries

EU Access to Indian Market

- India opens **92.1% of tariff lines** (97.5% of EU export value).
- Includes **immediate + phased tariff liberalisation.**
- Sensitive sectors like **dairy and cereals protected.**

Agriculture & Rural Gains

- Preferential access for:
 - Tea
 - Coffee
 - Spices
 - Fruits & vegetables
 - Processed food

Boosts rural incomes and agri-exports.

Services & Mobility

- Covers **144 services subsectors**.
- Ensures **temporary movement of professionals** (Mode 4 under GATS framework).

Strengthens India's position as a **global services hub**.

Intellectual Property & Innovation

- TRIPS-compliant IPR framework reinforced.
- Supports **Traditional Knowledge Digital Library (TKDL)** protection.
- Opens avenues for **AYUSH services in EU markets**.

Strategic Significance

- Reduces overdependence on limited trade partners.
- Counterbalances rising protectionism & CBAM pressures.
- Deepens India's engagement with Global North economies.
- Enhances supply-chain resilience amid geopolitical fragmentation.

23. India Launches BRICS 2026 Chairship in Expanded BRICS+ Era



In January 2026, External Affairs Minister **S. Jaishankar** formally launched **India's BRICS 2026 Chairship** by unveiling the logo, theme, and official website. This will be **India's first time hosting BRICS after its expansion to 10 full members**, marking a shift in the grouping's global weight and agenda.

What is BRICS?

BRICS is an intergovernmental grouping of major emerging economies aimed at **promoting a multipolar world order**, reforming global governance institutions, and enhancing South-South cooperation.

Keywords: *multipolarity, Global South, institutional reform, South-South cooperation*

Background & Evolution

- **Coined:** Term "BRIC" by economist **Jim O'Neill (2001)**
- **Formal Grouping:** 2009 (Brazil, Russia, India, China)
- **South Africa joined:** 2010 → BRICS
- **Major Expansion (2024):** Egypt, Ethiopia, Iran, UAE
- **Latest Member (2025):** Indonesia (first SE Asian member)

BRICS 2026 Summit (India)

- **Edition:** 18th BRICS Summit
- **Theme:** "Building for Resilience, Innovation, Cooperation and Sustainability"
- **Significance:** First summit hosted by India in the **expanded BRICS+ (10 members)** format

Current Composition (Snapshot)

Category	Members
Full Members (10)	Brazil, Russia, India, China, South Africa, Egypt, Ethiopia, Iran, UAE, Indonesia
Partner Countries (13)	Includes Belarus, Bolivia, Cuba, Kazakhstan, Malaysia, Nigeria, Vietnam

- **Global Share:** ~50% of world population, ~40% of global GDP (PPP)

Key BRICS Institutions

- **New Development Bank (NDB):** Infrastructure & sustainable development financing
- **Contingent Reserve Arrangement (CRA):** Short-term balance-of-payments support
- **Interbank Cooperation Mechanism:** Local-currency trade finance
- **BRICS Remote Sensing Satellite Constellation:** Disaster, agriculture, water monitoring

24. ECI Hosts IICDEM 2026: India Positions Itself as a Global Democracy Manager

Election Commission of India is hosting the **first-ever India International Conference on Democracy and Election Management (IICDEM) 2026** in New Delhi, marking India's attempt to emerge as a **global hub for election management best practices**.

About IICDEM 2026

- **Nature:** 3-day global conference on democracy and election management
- **Venue:** Bharat Mandapam, New Delhi
- **Participants:** Election Management Bodies (EMBs), democracy practitioners, and international experts
- **Organiser:** India International Institute of Democracy and Election Management (IIIDEM) under the aegis of ECI

Key Focus Areas

1. Voter Roll Integrity

- Showcasing India's **Special Intensive Revision (SIR)** of electoral rolls
- Emphasis on accuracy, inclusiveness, and credibility of voter lists

2. Election Technology

- Discussion on **technology interventions** in elections
- Covers voter facilitation tools, roll management, monitoring systems, and modern EMB practices

About IIIDEM

- **Role:** Capacity-building and training arm of the ECI
- **Established:** 2011
- **Campus:** Dwarka, New Delhi (independent campus)
- **Track Record:**
 - 1300+ national training programmes
 - 2800+ international participants trained

Significance: A major instrument of India's **democracy diplomacy**

Election Commission of India - Constitutional Position

- **Article 324:**
 - Vests **superintendence, direction, and control** of elections in the ECI
- **Part XV (Articles 324-329):**
 - Constitutional framework governing elections

Composition

- Multi-member body:
 - **Chief Election Commissioner (CEC)**
 - **Two Election Commissioners (ECs)**
- **Tenure:** 6 years or up to age 65 (whichever earlier)
- **Appointment:** By the President of India

25. From Big Forums to Small Tables: India's Smart Diplomacy Play for 2026



India's Republic Day 2026 will feature the European Union's institutional leadership as chief guests, signalling a shift from country-centric symbolism to bloc-level engagement. With large multilateral forums facing paralysis, India is increasingly betting on "small tables diplomacy" – compact, purpose-driven coalitions that can deliver outcomes.

What is 'Small Tables Diplomacy'?

A diplomatic strategy that prioritises **small, flexible coalitions of willing partners** over large multilateral forums, enabling faster decisions, clearer agendas, and tangible implementation – especially in areas like **trade, technology, climate, and security**.

Why Big Forums Are Straining

- **Consensus Overload:** Large bodies (e.g., UN, G20) produce lowest-common-denominator outcomes.
- **Domestic Spillovers:** National politics increasingly hijack global agendas.
- **Agenda Polarisation:** Ukraine war, trade wars, and tech controls crowd out Global South priorities.

Why Small Tables Matter for India

- **Speed & Delivery:** Smaller groups avoid veto politics and enable time-bound outcomes.
- **Rule-Shaping:** Early influence over standards (AI, digital trade, climate norms).
- **Bridge-Builder Role:** India can convene where leadership gaps ("diplomatic white spaces") exist.
- **Economic De-risking:** Diversifies markets and value chains beyond single-country dependence.

India's Small Tables Diplomacy in 2026

India-EU Track

- **Beyond Tariffs:** FTA negotiations increasingly hinge on **data rules, green standards, competition norms**.
- **CBAM Pressure:** EU climate rules may raise compliance costs for Indian exports.

India & BRICS

- **Chairship Leverage:** Push execution via **New Development Bank guarantees** and project toolkits.
- **Expansion Challenge:** Wider membership dilutes cohesion and slows consensus.

26. Gaza “Board of Peace”: India Weighed into a US-Led Post-War Governance Experiment



In January 2026, U.S. President **Donald Trump** invited Prime Minister **Narendra Modi** to join a proposed Gaza “**Board of Peace**”, unveiled during Phase-II of the Israel–Hamis ceasefire. The move signals a shift from ceasefire management to a post-war governance and reconstruction framework for Gaza.

What is the Gaza “Board of Peace”?

- A **proposed international body** to oversee **post-conflict transition, governance stabilisation and reconstruction** in Gaza.

Envisioned as a **high-level political mechanism**, going beyond humanitarian ceasefire monitoring.

Core Mandates : Governance Transition: Guide Gaza towards lawful, stable governance and prevent an institutional vacuum after the war.

Funding Coordination: Pool and channel **multi-year international reconstruction finance** in an organised manner.

Structure & Design

- **Heads-Only Top Tier:** Membership limited to **heads of state/government**, indicating high political authority.
- **US-Led Architecture:** Projected under Trump’s leadership, rather than as a UN-anchored multilateral mechanism.

Why the Invite Matters for India

- **West Asia Stakes:** Stability in Gaza affects India’s **energy security, diaspora safety, trade routes**, and regional volatility.
- **Global Standing:** Signals India’s acceptability as a **credible, non-bloc “consensus builder”**.
- **Balancing Test:** Requires careful calibration between India’s strong ties with **Israel, Arab states, and Iran**.

Key Concerns & Risks

- **Legitimacy Deficit:** A US-led forum may be seen as **bypassing UN processes**, weakening acceptance.
- **Representation Gap:** Absence of meaningful **Gaza/Palestinian political representation** could undermine local legitimacy.
- **Scope Creep:** Claims of addressing wider “global conflicts” risk diluting focus and delaying Gaza-specific outcomes.

27. From Rules to Power: The Cracks in the Post-War Global Order

At the **World Economic Forum**, Canada's Prime Minister argued that the post-WWII "**rules-based order**" has often been a **partial fiction**, with powerful states exempting themselves. He warned the world is facing a **rupture, not a smooth transition**, as power politics increasingly overrides shared norms.

What is the 'Rules-Based Order'? (Definition)

A post-World War II system grounded in **international law, multilateral institutions, open trade, and collective security**, aimed at constraining power through agreed rules rather than raw coercion.

Why Are Rules-Based Orders Under Strain?

1) Selective Application of Rules

- **Asymmetry in enforcement:** International law and trade rules applied unevenly.
- *Illustration:* Divergent sanctions/condemnation patterns across conflicts (Iraq vs. Gaza/Ukraine debates).

2) The Hegemony Bargain

- The West tolerated gaps between rhetoric and reality because **US power supplied public goods**:
 - Sea-lane security (US Navy)
 - Dollar-centric financial stability
- As relative power diffuses, tolerance for exceptions declines.

3) Weaponised Interdependence

- Deep integration now enables **coercion**: tariffs, finance, export controls, supply chains.
- *Illustration:* Trump-era tariff threats even against allies.

4) Alliance Anxiety

- **Pressure tactics override norms**, unsettling partners.
- *Illustration:* Renewed push over Greenland raised concerns within NATO about alliance trust.

Global Implications

- **Shift from Rules to Power**
 - Great powers treat rules as **optional** in strategic competition.
 - *Illustration:* Russia-Ukraine war foregrounds battlefield realities over UN norms.
- **Fragmented Multilateralism**
 - Large institutions struggle to deliver outcomes.
 - *Illustration:* Stalled **World Trade Organization** dispute settlement; rise of minilaterals like **Quadrilateral Security Dialogue** and **Indo-Pacific Economic Framework**.
- **Transactional Alliances**
 - Partnerships become **deal-based**, conditional, and interest-driven rather than values-based.

28. Trump Evokes Diego Garcia to Push Greenland Claim: Strategic Sovereignty Backdrop



Former US President **Donald Trump** referenced **Diego Garcia** – a strategically leased territory in the Indian Ocean – to justify a renewed US aim to acquire **Greenland**. The comparison reflects rising **great power competition**, territorial sovereignty debates, and the geopolitics of strategic outposts in Asia and the Arctic.

Definitions : Sovereignty: Supreme authority of a state over its territory and independence from external control.

Lease vs Sovereignty: A territory can be under lease (rights to use) without transferring full sovereign authority.

Chagos Archipelago: A group of islands in the central Indian Ocean, including **Diego Garcia**, administered as the **British Indian Ocean Territory (BIOT)**.

Context & Background

- **Chagos & Diego Garcia:** Chagos is located ~500 km south of the Maldives and ~1,600 km southwest of India.
 - **Diego Garcia** hosts a **key US-UK military base** used for operations in the Middle East, Africa, and South Asia.
- **Trump’s Reference:**

Trump cited Diego Garcia’s lease arrangement to argue that long-term leases are inadequate, advocating **full US sovereignty** over Greenland to secure permanent strategic control.

Historical & Legal Evolution

Year	Event
1965	UK detaches Chagos from Mauritius before Mauritian independence → forms British Indian Ocean Territory (BIOT).
1966	UK leases Diego Garcia to the United States for a military base.
1968	Mauritius gains independence (claims Chagos was illegally detached).
2019	ICJ Advisory Opinion: UK’s retention of Chagos is unlawful; Mauritius decolonisation incomplete.
2019	UNGA Resolution demands UK withdraw from Chagos.
2025	UK agrees to transfer sovereignty of Chagos to Mauritius, retaining Diego Garcia under a 99-yr lease with an annual fee.

Significance of Diego Garcia

- **Strategic Hub:** A critical staging ground for air and naval operations across **IOR & Middle East**.
- **Maritime Surveillance:** Monitors strategic chokepoints like **Strait of Malacca** and **Bab el-Mandeb**.
- **Geopolitical Leverage:** Supports deterrence against peer competitors, especially **China’s naval expansion**.

29. Renewed U.S. Push for Greenland Highlights Arctic Geopolitics



Following recent U.S. military operations in Venezuela, President Donald Trump reiterated interest in bringing Greenland under U.S. control, reviving debates on Arctic strategy and sovereignty.

Greenland: Key Facts

- **Geography:** World's largest non-continental island, located between the Arctic and Atlantic Oceans.
- **Ice Cover:** ~80% covered by the second-largest ice sheet after Antarctica.
- **Extreme Point:** Home to Kaffeklubben Island, the northernmost land point on Earth.
- **Political Status:** Autonomous territory of Denmark – internal self-governance; Denmark handles foreign policy, defence, and currency.
- **Alliances:** Covered by NATO Article 5; not part of the European Union.
- **Geo-identity:** Geographically North American, geopolitically European.

Why Greenland Matters to the United States

- **Arctic Rivalry:** Melting ice is opening new Arctic shipping routes, intensifying U.S.-Russia-China competition.
- **GIUK Gap:** Part of the Greenland-Iceland-UK Gap, a critical chokepoint for monitoring North Atlantic naval movements.
- **Military Presence:** Hosts the U.S.-operated Pituffik Space Base (formerly Thule Air Base), vital for missile warning and space surveillance.
- **Critical Minerals:** Holds large untapped Rare Earth Element (REE) deposits, crucial for EVs, electronics, and defence supply chains, reducing reliance on China.

30. China Moves to Codify Power in Antarctica with New National Law



China has proposed the ‘**Antarctic Activities and Environmental Protection Law**’ to regulate Chinese citizens, entities and expeditions operating in Antarctica. The move signals Beijing’s shift from **participant to rule-shaper** within the Antarctic Treaty System (ATS), raising governance and strategic questions for other consultative powers, including India.

What is the Proposed Chinese Law?

A **domestic framework** to regulate **scientific, commercial and environmental conduct** of Chinese-linked activities in Antarctica, aligning national control with international obligations under the ATS.

Context & Background

- Antarctica is governed by the **Antarctic Treaty System (ATS)**, which mandates **peaceful use, scientific cooperation, and environmental protection**.
- While ATS sets international norms, **implementation is left to national laws** – creating scope for states to interpret and shape rules domestically.
- China’s expanding footprint (stations, logistics, tourism, krill fishing) exposed **domestic regulatory gaps**, now addressed through this law.

Key Provisions of the Proposed Legislation

1. Jurisdiction & Control

- **Expanded Jurisdiction:** Applies to Chinese citizens/entities and **foreign expeditions organised in or departing from China**.
- **Mandatory Permits:** Licensing required for **research, tourism, fishing, shipping** and other activities.

2. Environmental Safeguards

- **Compulsory EIAs:** Environmental Impact Assessments prior to approvals.
- **Pollution Protocols:** Strict rules on waste disposal and marine pollution control.

3. Activity Restrictions (ATS-aligned)

- **Mining Ban:** Prohibits mineral resource activities except **scientific research**.
- **Demilitarisation:** Explicit ban on military activities, reaffirming peaceful-use principles.

India’s Antarctic Presence

Aspect	Details
First Expedition	Operation Gangotri (1981)
Treaty Status	Acceded 1983; Consultative Party
Nodal Agency	National Centre for Polar & Ocean Research (Goa)
Stations	Dakshin Gangotri (decommissioned), Maitri (1989), Bharati (2012)
Upcoming	Maitri-II (by ~2032; ~₹2,000 crore)
Research Focus	Monsoon linkages, ice melt, sea-level rise

31. China's 'Justice Mission 2025' Drills Escalate Pressure Around Taiwan



China conducted a large-scale **live-fire military exercise** named **Justice Mission 2025** around **Taiwan**, simulating a **multi-directional blockade of major ports**. The drills involved **AI-enabled systems** and represented the **closest live-fire activity near Taiwan's coast**, seen as part of China's "**grey-zone**" tactics.

Justice Mission 2025: Key Features

- **Nature:** Large-scale **live-fire** exercise with **naval-air-missile coordination**.
- **Scenario:** **Encirclement and blockade** of Taiwan's critical ports and sea lanes.
- **Technology:** Display of **AI-assisted and futuristic military tools**.
- **Strategic Signal:** Falls below the threshold of war while **coercing and deterring** – typical **grey-zone warfare**.

China-Taiwan Conflict: Core Background (Static)

- **Qing Period:** Taiwan administered by China (1683–1895); ceded to Japan after the **First Sino-Japanese War (1895)**.
- **Post-WWII:** Returned to the **Republic of China (ROC)** in **1945**.
- **Civil War Split (1949):** **Kuomintang (KMT)** retreated to Taiwan; **People's Republic of China (PRC)** established on the mainland.
- **UN Status:** **UNGA Resolution 2758 (1971)** recognised the PRC as the sole representative of China; Taiwan lost its UN seat.
- **Recent Politics:** **Tsai Ing-wen's** elections (2016, 2020) marked a **pro-autonomy phase**, intensifying cross-strait tensions.
- **One China Principle:** Beijing's claim that Taiwan is part of China and the PRC is the sole legal government.
- **One China Policy:** A diplomatic approach (followed by many states) that **acknowledges** Beijing's position without formally recognising its sovereignty over Taiwan.

32. Indian Diplomat to Chair UN Advisory Board on Disarmament Matters



Indian diplomat **DB Venkatesh Varma** has been nominated to chair the **Advisory Board on Disarmament Matters (ABDM)** for the **2026–27 term**, marking the **first time an Indian national** will hold this position.

About the Advisory Board on Disarmament Matters (ABDM)

- **Established:** 1978.
- **Mandate:** Provides **high-level, independent advice** to the **United Nations** on **international security and arms control**.
- **Information Role:** Guides implementation of the **UN Disarmament Information Programme**.
- **Composition:** **15 members**, appointed by the **UN Secretary-General**, representing diverse regions.
- **UNIDIR Link:** Members serve as **Trustees of the United Nations Institute for Disarmament Research (UNIDIR)**, overseeing its programmes, personnel, and finances.

33. Indian Passport Climbs in Henley Passport Index 2026



The **Indian passport** improved its standing in the **Henley Passport Index 2026**, rising **five places to rank 80th** (from 85th in 2025). Indian passport holders now enjoy **visa-free or visa-on-arrival access to 55 destinations**.

About the Henley Passport Index

- **Publisher:** Henley & Partners.
- **Methodology:** Ranks passports by the **number of destinations accessible without a prior visa**.
- **Data Source:** **International Air Transport Association (IATA)**, which maintains the world's largest travel information database.

Global Rankings (2026)

- **Top Rank:** **Singapore** – access to **192 destinations**.
- **Second Place:** **Japan and South Korea**.
- **India:** **80th**, reflecting gradual gains in mobility.

34. Abu Dhabi Retains Title as World's Safest City



In January 2026, Abu Dhabi was ranked the **world's safest city** for the **10th consecutive year** in the **Numbeo Global Safety Index 2026**. The index evaluated **400+ cities across 150+ countries**

Key Highlights

- **Top Rank Since 2017:** Abu Dhabi has consistently held the No.1 position for a decade.
- **Key Indicators:**
 - Safety while walking alone (day & night)
 - Low crime perception
 - High public confidence in law enforcement
- **Technology-Driven Policing:**
 - AI-based predictive policing
 - Real-time CCTV & smart surveillance
 - Rapid response systems
- **Governance Model:** Integrated urban planning + digital policing + strict enforcement.

Economic Impact: High safety standards boost tourism, foreign investment, and expatriate settlement.

About Numbeo Global Safety Index

- Numbeo is a **crowd-sourced global database** tracking cost of living, crime, and quality-of-life indicators.
- Safety Index is based on:
 - Perception of crime levels
 - Fear of burglary, robbery, assault
 - Trust in police
- It is **perception-based**, not official crime-statistics-based.

Significance for UPSC

- Reflects growing role of **technology in urban governance**.
- Demonstrates link between **law & order, economic competitiveness, and liveability indices**.
- Relevant under **Smart Cities, AI in policing, urban security frameworks**.

JANUARY 2026

INTERNAL SECURITY

1. Mission Sudarshan Chakra: AI-Enabled Air Defence Shield
2. DRDO Conducts Salvo Launch of Pralay Missiles
3. Indian Army Inducts 'Suryastra' Long-Range Rocket Launcher
4. India's Indigenous LR-AShM
5. Indigenous Man-Portable Anti-Tank Guided Missile
6. Robotsystem 15 (RBS-15) Missile
7. Discombobulator Weapon System
8. IAF Upgrades Soviet-Era Pechora for Modern Air Defence Grid
9. From Vadodara to the Skies: First Privately Built Military Aircraft
10. Indian Navy Plans Largest-Ever Warship Induction in 2026
11. INS Sudarshini
12. Nagpur Ammunition Facility
13. Exercise Sanjha Shakti (Civil-Military Preparedness)
14. Exercise Desert Cyclone-II (India-UAE)
15. Persistent Issues along the Line of Actual Control (LAC)
16. Punjab Border Security Realignment
17. India-Pakistan Exchange of Nuclear & Prisoner Lists
18. Terrorism Without the Trigger: SC Broadens UAPA's Reach
19. National IED Data Management System
20. Indian Army's Bhairav Battalions
21. 78th Indian Army Day Parade
22. ICGS Samudra Pratap (Pollution Control Vessel)
23. Rajasthan's Disturbed Areas Bill
24. Himachal Pradesh's Satellite Mountain Township
25. Mir Alam Tank



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1. Mission Sudarshan Chakra: India's AI-Enabled National Air Defence Shield



The Defence Minister announced that the **Defence Research and Development Organisation (DRDO)** will lead **Mission Sudarshan Chakra**, a flagship initiative to develop a **comprehensive, indigenous, AI-enabled, multi-layered air defence architecture** for India.

What is Mission Sudarshan Chakra? : Mission Sudarshan Chakra is a **national air defence initiative** aimed at building an **integrated, automated, and resilient air defence shield** capable of countering **missiles, aircraft, drones, hypersonic threats, and cyber-electronic warfare** by 2035.

Key Features of Mission Sudarshan Chakra

- **Hybrid Doctrine (Shield + Sword)**
Moves from **passive air defence** to **active deterrence**, enabling pre-emptive and real-time interception.
- **AI & Big Data Integration**
Uses AI for **threat prediction, target prioritisation, automated interception decisions**, and sensor fusion.
- **Multi-Layered Architecture**
 - **Outer Layer:** Space-based and long-range sensors for early warning
 - **Middle Layer:** Long-range and medium-range missile interception
 - **Inner Layer:** Point defence using **lasers, anti-drone systems, and quick-reaction missiles**
- **Cyber & Electronic Security**
Hardened against **cyber warfare**, protecting **power grids, communication networks, and command systems**.
- **Civilian Infrastructure Protection**
Explicitly covers **nuclear facilities, railways, hospitals, metros, dams, and heritage sites**, unlike conventional military-centric air defence.

Integrated Defence Network

Mission Sudarshan Chakra integrates multiple indigenous command-and-control and weapon systems:

- **IACCS (Integrated Air Command and Control System)**
- **Akashteer** (Army Air Defence control system)
- **Trigun System**
- **Project Kusha** (Long-range SAM backbone)

This creates a **single, unified air picture** across Army, Navy, and Air Force.

Project Kusha: The Missile Backbone

Variant	Range	Role
M1	~150 km	Long-range interception
M2	~250 km	Extended-range air defence
M3	~350–400 km	Strategic long-range shield

- **Developed by:** DRDO with **Bharat Electronics Limited (BEL)** and private partners.

2. DRDO Conducts Salvo Launch of Pralay Missiles



The Defence Research and Development Organisation (DRDO) successfully conducted a salvo launch of two indigenously developed Pralay missiles from a single mobile launcher off the Odisha coast, validating rapid, multiple-missile firing capability.

What is a Salvo Launch? (Definition)

A salvo launch involves firing multiple missiles in quick succession from the same launcher, designed to saturate enemy air defences, improve strike assurance, and enhance battlefield survivability.

About the Pralay Missile

Feature	Details
Type	Short-range surface-to-surface ballistic missile (SRBM)
Range	150–500 km
Trajectory	Quasi-ballistic, low-altitude with mid-course manoeuvres
Propulsion	Two-stage solid-propellant rocket motor
Payload	350–1,000 kg conventional warheads (fragmentation, runway-denial submunitions)
Guidance	INS with advanced avionics
Speed	~Mach 6.1 (terminal phase)
Launcher	Road-mobile, can fire multiple missiles rapidly

Why Pralay is Strategically Significant

- **High Survivability:** Manoeuvrable, low-altitude flight reduces interception probability.
- **Rapid Response:** Solid fuel ensures quick launch readiness.
- **Conventional Deterrence:** Fills the gap between long-range strategic missiles and battlefield rockets.
- **Force Multiplier:** Salvo capability enhances strike density against time-sensitive targets (airfields, logistics hubs).

Indigenisation & Doctrine

- Strengthens **Atmanirbhar Bharat** in missile technologies.
- Supports **conventional precision strike doctrine** without nuclear escalation.
- Complements India's missile ecosystem (SRBM-MRBM continuum).

3. Indian Army Inducts 'Suryastra' Indigenous Long-Range Rocket Launcher



The Indian Army signed a contract to procure **Suryastra**, an indigenous long-range rocket launcher system, to enhance **deep-strike artillery capability**.

Suryastra: Key Features

- **Nature:** India's first indigenous, universal, multi-calibre surface-to-surface rocket launcher.
- **Industry Partnership:** Contract with an Indian private defence manufacturer in technology collaboration with Elbit Systems.
- **Range:** High-precision strikes at 150 km and 300 km.
- **Multi-Calibre Capability:** Can fire 122 mm, 160 mm, 306 mm rockets and Predator Hawk missiles from a single launcher.
- **Operational Edge:** Enables rapid switching of ammunition, improving flexibility and survivability in battlefield conditions.
- **Indigenisation Push:** Supports Atmanirbhar Bharat through technology transfer and domestic production of precision rocket artillery.

4. India's Indigenous LR-AShM to Feature at Republic Day



India's Long-Range Anti-Ship Missile (LR-AShM) is set to be showcased at the Republic Day parade, highlighting advances in **indigenous hypersonic strike capability**.

LR-AShM: Key Features

- **Developer:** Defence Research and Development Organisation (DRDO).
- **Type:** Indigenous hypersonic anti-ship missile.
- **Speed & Range:** Up to Mach 10; >1,500 km strike reach.
- **Flight Profile:** Hypersonic Glide Vehicle (HGV) boosted by a solid-fuel launcher.
- **Guidance:** Advanced RF seeker with terminal manoeuvres for precision against moving naval targets.
- **Warhead:** Conventional or nuclear, ~1,000–2,000 kg.
- **Launch Platforms:** Land-based mobile launchers and naval vessels; air-launched variants planned.
- **Strategic Significance:** Positions India among a small group of nations (with the US, Russia, China) possessing **operational hypersonic strike capability**.

5. India Successfully Tests Indigenous Man-Portable Anti-Tank Guided Missile



The Defence Research and Development Organisation (DRDO) successfully flight-tested the Man-Portable Anti-Tank Guided Missile (MPATGM) against a moving armoured target, marking a key step toward induction into the Indian Army.

About MPATGM

- **Type:** Third-generation, fire-and-forget anti-tank guided missile.
- **Role:** Designed to destroy modern main battle tanks and armoured vehicles.
- **Development & Production:**
 - **Developer:** DRDO
 - **Manufacturers:** Bharat Dynamics Limited (BDL) and Bharat Electronics Limited (BEL)
- **Range & Mobility:** 200 m-4 km; <30 kg, operable by a two-person crew.
- **Guidance:** Imaging Infrared (IIR) homing seeker enabling day/night operations.
- **Warhead:** Tandem HEAT capable of defeating explosive reactive armour and penetrating main armour.
- **Launch Options:** Man-portable tripod or vehicle-mounted launchers.

Strategic Significance: Enhances anti-armour capability and advances Aatmanirbhar Bharat in defence technology.

6. Robotssystem 15 (RBS-15) Missile



Swedish defence major **Saab** showcased the **RBS-15 missile's capability** to neutralise advanced air-defence systems such as Russia's **S-400** during recent demonstrations. The display highlighted the missile's **long-range precision strike** and **low-detectability** in contested coastal environments.

About RBS-15 Missile

- **Full Name:** Robotssystem-15 (RBS-15).
- **Type:** Long-range, fire-and-forget anti-ship missile with land-attack capability.
- **Developer:** Saab Bofors Dynamics (Sweden).
- **Operational Environment:** Designed for complex littoral and coastal zones, particularly narrow seas, straits, and island-dense archipelagos like the Baltic Sea.

Key Technical Features

- **Launch Platforms:**
 - Naval surface combatants
 - Combat aircraft
 - Land-based mobile launchers
- **Speed:** High subsonic, around Mach 0.9.
- **Range:** Exceeds 300 km.
- **Flight Profile:**
 - Sea-skimming trajectory to evade radar detection
 - Advanced guidance for terminal precision strikes
- **Strategic Edge:**
 - Optimised for restricted waters, unlike open-ocean anti-ship missiles.

7. Discombobulator Weapon System



U.S. President **Donald Trump** publicly mentioned a classified weapon he called the “**Discombobulator**”, claiming it was used during the U.S. military operation *Operation Absolute Resolve* in Caracas to capture Venezuelan leader **Nicolás Maduro**. The device allegedly **disabled Venezuelan defense systems**, preventing radar and missiles from functioning, according to Trump, though details are highly classified and not independently verified.

What Is the “Discombobulator”?

- **No Official Confirmation:** There is **no publicly verified weapon officially named “Discombobulator”** in U.S. military inventories. Experts suggest the name may be a public-facing label for a **combination of advanced technologies** rather than a single, discrete system.
- **Likely Components:**
 - **Electronic Warfare (EW) Systems:** Capabilities that disrupt or jam enemy **radars, communications, and air-defence networks** are known to exist and are routinely deployed by U.S. forces.
 - **Directed Energy / High-Power Microwave (HPM):** Such systems can produce intense electromagnetic pulses capable of **disrupting electronics** (similar to disabling semiconductor chips). Few defence programmes are exploring these technologies.
 - **Sonic / Acoustic Effects:** Eyewitness accounts referenced intense sound waves or neurological sensations (e.g., nausea, disorientation), which some speculate could involve **acoustic or directed-energy effects** consistent with the **Frey Effect** (perception of sound from microwave exposure), although this remains unverified.
- **Frey Effect:** A known phenomenon where pulsed microwave energy induces sensations of sound in the human brain; referenced in discussions of hypothetical weapons but not publicly linked to operational systems.

Operational Context

- Reports of Venezuelan radar and defense systems failing and accounts of unusual physiological reactions to energy exposures emerged after the raid. Independent confirmation of causes is still **absent**.

Experts emphasise that U.S. forces regularly use **electronic warfare aircraft (e.g., EA-18G Growler)** and cyber tools, which may achieve similar effects by jamming or suppressing defenses.

8. IAF Upgrades Soviet-Era Pechora for Modern Air Defence Grid



Bengaluru-based Alpha Design Technologies Ltd completed a **full digital upgrade of the Pechora Missile System** for the Indian Air Force (IAF). The modernisation integrates the system into **Mission Sudarshan Chakra**, strengthening India's layered air defence network.

About Pechora Missile System

- **Origin:** Soviet-origin S-125 Neva/Pechora medium-range Surface-to-Air Missile (SAM) system.
- **Induction in India:** 1970s; backbone of IAF low-altitude air defence for decades.
- **Missile Type:** Solid-fuel, two-stage, command-guided SAM.
- **Role:** Specialised in intercepting **low-flying aircraft and cruise missiles**, unlike many medium-range systems.
- **Range & Altitude:**
 - Range: ~35 km
 - Altitude: 20 metres to 25 km

Speed: Supersonic (Mach 3–3.5).

Modernisation Highlights

- Replaced outdated **valve-based electronics** with digital chip architecture.
- Digitised tracking radar and upgraded fire-control systems.
- Refurbished legacy mechanical subsystems.
- Integrated with **Mission Sudarshan Chakra** – India's IAF air defence network linking multiple radar and missile systems.

Radar Engagement Process

1. **Surveillance Radar:** Detects incoming threats up to ~100 km.
2. **Fire-Control Radar (SNR-125):** Locks target and guides missile to interception.

9. From Vadodara to the Skies: First Privately Built Military Aircraft



India's first indigenously and privately manufactured C-295 military transport aircraft is set to roll out from the Vadodara facility.

- Built by **Tata Advanced Systems Limited** in partnership with **Airbus Defence and Space**, it marks a milestone in **Make in India (Defence)**.

What is the C-295? : The **Airbus C-295** is a **medium-range, twin-engine turboprop military transport aircraft** designed for tactical airlift and multi-role missions.

Manufacturing Significance

- **Vadodara Facility (2024):**
 - India's first private-sector **Final Assembly Line (FAL)** for military aircraft.
- **Paradigm Shift:**
 - From PSU dominance (HAL) → **private-sector-led defence manufacturing**.
- **Strategic Goal:**
 - Strengthens **Make in India** and defence indigenisation.

Role in Indian Air Force

- **Replacement:** To replace the ageing **Avro-748** fleet operated by **Hindustan Aeronautics Limited**.
- Enhances **tactical mobility**, disaster response, and maritime surveillance.

Key Technical Specifications (High-Yield)

Feature	Details
Payload	Up to 10 tonnes
Cruising Speed	~480 km/h
Ferry Range	5,000–5,630 km
Endurance	11–13 hours
Engines	Twin turboprop
STOL Capability	Operates from short, unpaved airstrips

UPSC Exam Relevance

- **Prelims:** C-295, STOL, Final Assembly Line (FAL), EW Suite, Avro-748 replacement
- **Mains:** GS-III: Defence manufacturing, indigenisation, private sector in S&T

10. Indian Navy Plans Largest-Ever Single-Year Warship Induction in 2026



The Indian Navy is set to **commission 19 warships in 2026**, marking its **largest single-year fleet expansion** to counter **Indo-Pacific maritime challenges** and secure **critical sea lanes**.

Key Inductions (2026)

- **Frigates:** Nilgiri-class frigate (Project 17A) stealth frigates.
- **Survey Vessel:** Ikshak-class survey ship.
- **Diving Support:** Nistar-class diving support vessel.
- **Littoral Combat:** Multiple **Anti-Submarine Warfare (ASW) Crafts** for coastal and shallow-water roles.

Indigenisation & Capability

- **Built in India:** All 19 ships are **indigenous**, advancing self-reliance in naval shipbuilding.
- **Fleet Targets:** Toward **155–160 warships by 2030** and **200+ by 2035**.
- **Nilgiri-class Features:** **Advanced stealth**, **~75% indigenous content**, modern sensors and weapons.

11. INS Sudarshini



Indian Navy's sail training ship **INS Sudarshini** has embarked on **Lokayan 26**, a **10-month transoceanic expedition**. The ship will represent India at major **international tall-ship events** – **Escale à Sète (France)** and **SAIL 250 (New York City)** – strengthening maritime outreach.

About INS Sudarshini

- **Type:** **Indigenous three-masted sail training ship** of the Indian Navy.
- **Builder:** Goa Shipyard Limited.
- **Base:** Southern Naval Command, Kochi.
- **Sister Ship:** INS Tarangini (commissioned in 2012).

Strategic & Training Role

- **Training:** Provides **hands-on sail training** to naval cadets, enhancing seamanship and leadership skills.
- **Maritime Diplomacy:** Functions as a '**floating ambassador**', fostering goodwill and naval cooperation.

Strategic Vision: Advances India's **MAHASAGAR** vision (Maritime Advancement for Holistic Security and Growth Across Regions).

12. Nagpur Ammunition Facility



The Defence Minister inaugurated a **Medium Calibre Ammunition Manufacturing Facility** at **Solar Defence & Aerospace Limited (SDAL)** in **Nagpur, Maharashtra**. He also flagged off the **first export tranche of Guided Pinaka rockets to Armenia**.

Key Features of the Facility

- **Type:** Fully automated ammunition plant
- **Output:** Manufactures **30 mm ammunition**
- **End Users:** Weapon systems of the **Indian Army** and **Indian Navy**
- **Significance:**
 - Boosts **private-sector participation** in defence
 - Strengthens **indigenous manufacturing** under *Atmanirbhar Bharat*

India's Indigenous Defence Manufacturing (Snapshot)

- **Record Output:** ₹1.54 lakh crore in FY 2024-25 (~18% YoY growth)
 - **Private Sector Share:** ~23% of domestic defence production
 - **Targets:**
 - ₹3 lakh crore annual defence production by **2029**
- >50% private-sector participation in the near future

13. Exercise Sanjha Shakti Tests Civil–Military Emergency Preparedness



The joint **Military–Civil Fusion (MCF)** exercise **Sanjha Shakti** was conducted to assess **civil–military coordination**, emergency response, and security preparedness.

About Exercise Sanjha Shakti

- **Location:** **Dighi Range, Khadki Military Station (Pune)**, under the **Maharashtra, Gujarat & Goa Area** of the **Southern Command**.
- **Participants:** **Indian Army** and **16 civil agencies**, including **Maharashtra Police, Force One commandos, and Fire Fighting Departments**.

Key Focus Areas

- **SOP Validation:** Realistic simulations to test **Standard Operating Procedures** and **inter-agency role clarity**.
- **Communications:** Verification of **real-time communication links** between civil authorities and the **Army chain of command**.

14. Exercise Desert Cyclone-II: India-UAE Joint Military Interoperability



The second edition of the India-UAE joint military exercise “Desert Cyclone-II” concluded in Abu Dhabi, strengthening **interoperability and defence cooperation** between the two countries’ land forces.

About Exercise Desert Cyclone-II

- **Type:** Bilateral **Army** exercise
- **Objective:** Enhance **joint operational capability** for peacekeeping, counter-terrorism, and stability operations
- **Participants:**
 - India: **Mechanised Infantry Regiment**
 - UAE: **53 Mechanised Infantry Battalion (UAE Land Forces)**

Key Focus Areas

- **Sub-conventional urban operations** under UN mandate
- **IED awareness & counter-measures**
- **Heliborne operations** and rapid insertion
- **Unmanned Aerial Systems (UAS) integration** for ISR and battlefield awareness

Strategic Significance

- Enhances **jointness and interoperability** in desert and urban terrains
- Builds capacity for **UN peacekeeping-style missions**
- Reinforces **India-UAE Comprehensive Strategic Partnership**
- Improves **tactical synergy** in counter-terrorism and hybrid threats

Other Key India-UAE Military Exercises

- **Zayed Talwar (Exercise Gulf Waves):** Bilateral **naval** exercise
- **Desert Eagle:** Bilateral **air force** combat exercise
- **PASSEX (2024):** **Trilateral** passage exercise involving **India-UAE-France** in the Arabian Sea

15. Persistent Issues along the Line of Actual Control (LAC)



A recent U.S. defence report categorised Arunachal Pradesh as a Chinese “core interest”, heightening strategic sensitivities and underlining the persistence of unresolved tensions along the **Line of Actual Control (LAC)** between India and China.

What is the Line of Actual Control (LAC)?

- **De facto military boundary** separating Indian- and Chinese-controlled territories.
 - **Not a settled international border**; alignment is **not mutually agreed**.
 - **Length dispute**: India – 3,488 km; China – ~2,000 km.
 - **Origin**: Term first used by **Zhou Enlai (1959)**; India rejected it initially.
- Acceptance**: India accepted the concept under the **1993 Border Peace & Tranquillity Agreement**, based on **actual ground positions**, not Chinese claims.

Why Tensions Persist

- **Infrastructure Asymmetry**: China’s **dual-use roads, airports, and Xiaokang villages** enable rapid mobilisation.
- **Galwan Aftermath (2020)**: Ended decades of restraint; led to **permanent forward deployment**.
- **Patrolling Restrictions**: Buffer zones in **Depsang and Demchok** limit India’s traditional patrols.
- **Water Security**: China’s **Yarlung Tsangpo mega-dam** raises fears of strategic water leverage over Northeast India.
- **Status Quo Dispute**: China treats **1962 gains as settled**; India insists on restoring **pre-1962 positions**.

China’s Strategy on the LAC

- **Salami Slicing**: Incremental, low-intensity territorial advances.
- **Grey-Zone Tactics**: Renaming places in Arunachal Pradesh; lawfare and map assertions.
- **Land Border Law (2022)**: Civilian settlements as a **“first line of defence.”**
- **Deliberate Ambiguity**: Refusal to exchange **LAC clarification maps**.
- **Dual Infrastructure**: Civilian projects designed for **military use**.
- **Psychological Signalling**: Drill videos, standard maps to assert dominance.

India’s Response & Initiatives

- **Vibrant Villages Programme**: Border village development (roads, 4G, tourism).
- **Arunachal Frontier Highway**: **1,840 km** road parallel to the LAC.
- **Strategic Roads**: **73 BRO projects**, over **85% nearing completion**.
- **Heavy Load Infrastructure**: **350+** bridges/roads capable of carrying **T-90 tanks**.
- **Border Policing**: **7 new ITBP battalions**; **94 new border outposts**.
- **Narrative Push**: Documentation and revival of **traditional Indian place names**.

16. Fence, Farms & Federalism: Punjab Seeks Border Security Realignment



The Government of Punjab announced that the Union government has tentatively agreed to move the border security fence closer to the International Border (IB) with Pakistan. The move aims to restore unhindered access to ~21,300 acres of fertile farmland currently trapped between the fence and the Zero Line.

Context & Background

- Along several Punjab stretches, the border fence lies 2-3 km inside Indian territory, instead of the usual ~150 metres from the Zero Line.
- This creates a “fenced-in farming zone”, where cultivation is allowed but under tight security protocols due to infiltration, smuggling, and surveillance concerns.

How Regulated Farming Works Inside the Fence

- **Controlled Access:** Entry only during fixed hours using ID cards; supervision by BSF Kisan Guards.
- **Visibility Norms:** Tall crops (e.g., sugarcane/maize) restricted beyond 3-4 feet to maintain clear sightlines.
- **Machinery Regulation:** Pre-registration and approvals for heavy machinery (e.g., combine harvesters).
- **Tractor Quotas:** Caps on the number of tractors and pre-designated weekdays for entry.
- **Mandatory Escort:** Every tractor must be accompanied by two BSF Kisan Guards at all times.

Governance Framework for Border Fencing

- **Ministry:** Ministry of Home Affairs (Department of Border Management).
- **Executing Agencies:** CPWD / NBCC / BRO (terrain- and altitude-specific).
- **Guarding Forces:**
 - BSF (Pakistan, Bangladesh) ITBP (China) SSB (Nepal, Bhutan) Assam Rifles (Myanmar)
- **Legal Basis:** Border Security Force Act, 1968; executive orders under the Passport Act, 1920.
- **Land Acquisition:** RFCTLARR Act, 2013.
- **Policy Direction:** Shift to a Smart Wall via Comprehensive Integrated Border Management System (CIBMS) – integrating sensors, cameras, and command-control with physical fencing.

17. India–Pakistan Exchange of Nuclear & Prisoner Lists: Confidence–Building in a Hostile Dyad



India and Pakistan carried out the **annual exchange of lists of nuclear installations** and the **biannual exchange of lists of prisoners**, in accordance with long-standing bilateral agreements, marking the **35th consecutive exchange** since 1992 despite strained bilateral relations.

Exchange of Nuclear Installations List

- **Legal Basis:** *Agreement on the Prohibition of Attack against Nuclear Installations and Facilities, 1991*
- **Key Provision (Article II) :** Both countries must **annually exchange lists of nuclear installations** on 1 January.
- **Core Commitment :** Parties shall **refrain from any action** that may damage or destroy the other's nuclear facilities.
- **Significance :** Prevents **accidental escalation** in a nuclearised environment, Acts as a **nuclear confidence-building measure (CBM)**

Reinforces **strategic stability** in South Asia

Exchange of Prisoners List

- **Legal Basis:** *Agreement on Consular Access, 2008*
- **Scope :** Covers **civilian prisoners and fishermen** in custody of the other country.
- **Key Obligations**
 - **Arrest notification** within 3 months
 - **Consular access** within 90 days
 - **Repatriation** within 1 month of sentence completion, subject to nationality verification

Institutional & Legal Framework

- **Vienna Convention on Consular Relations, 1963 (Article 36)**
Mandates that foreign nationals arrested or detained must be:
 - Informed **without delay** of their right to consular access
 - Allowed communication with their embassy/consulate

This forms the **customary international law basis** for the 2008 bilateral agreement.

Historical Continuity : First Exchange: 1 January 1992

- **Current Exchange:** 35th consecutive year
- Demonstrates **treaty compliance even during diplomatic freeze**, distinguishing **security CBMs from political engagement**.

18. Terrorism Without the Trigger: SC Broadens UAPA's Reach



The Supreme Court has expanded the meaning of a "terrorist act" under the Unlawful Activities (Prevention) Act (UAPA) to include preparatory, conspiratorial and organised actions, not just the final act of violence.

UAPA at a Glance

- **Primary anti-terror law** (1967) to protect India's **sovereignty, unity and integrity**.
- **NIA jurisdiction** nationwide; **2019 amendment** allows searches/seizures with **DG-NIA sanction** (no State DGP approval).
- **Designation power**: Centre can label **organisations and individuals** as terrorists.
- **Custody & Bail**: Detention up to **180 days** without charge-sheet; **Section 43D(5)** bars bail if accusations are *prima facie* true.

What Counts as a "Terrorist Act"? (Law)

UAPA - Section 15

- **Intent test**:
 - Threaten **unity, integrity, security or sovereignty, or**
 - **Strike terror** among people (in India or abroad).
- **Means clause**: Covers conventional weapons, hazardous substances and "**any other means of whatever nature.**"

Bharatiya Nyaya Sanhita (BNS), 2023 - Section 113

- **Codifies terrorism** as a distinct offence.
- **Expanded scope**: Public intimidation, **critical infrastructure disruption, national economic security damage.**

Operational discretion: SP may register cases under **BNS or UAPA.**

Supreme Court's Interpretive Arc

- **Motive over method**: Terrorism distinguished from ordinary crime by intent to **overawe the State/terrorise society** (Hitendra Vishnu Thakur).
- **Beyond law & order**: Must threaten **national integrity**, not merely cause disorder.
- **Membership rule**: Mere membership of a banned organisation can attract liability (Arup Bhuyan - review).

The Expansion: What Changed Now

- **Preparatory acts included**: Organised planning, coordination and **conspiratorial conduct** fall within Section 15.
- **Residual means clarified**: "Any other means" includes **non-violent but deliberately terror-inducing actions.**
- **Civic paralysis lens**: **Road blockades/protests** may qualify if part of a conspiracy to **paralyse State functions** and threaten sovereignty.

Non-violent terror recognised: Physical violence is **not a prerequisite.**

19. National IED Data Management System: India Centralises Counter-IED Intelligence



The Union Home Minister inaugurated the **National IED Data Management System (NIDMS)** to centralise and analyse data on **Improvised Explosive Device (IED) incidents** across India, strengthening counter-terror capabilities.

What is an IED?

- **Improvised Explosive Device (IED):** A homemade or non-standard explosive weapon, assembled from commercial or military components, used to cause damage, casualties, or disruption.

About NIDMS

- **Nature:** A national digital platform integrating data on all bomb blasts in India since 1999, earlier spread across departmental silos.
- **Lead Agency:** National Security Guard through its National Bomb Data Centre (NBDC).
- **Collaborators:** Rashtriya Raksha University, Indian Institute of Technology Delhi, National Investigation Agency, and Indian Cyber Crime Coordination Centre.
- **Analytics:** Uses AI/ML to detect signature linkages (circuits, explosives, MO) across incidents.
- **Operational Utility:**
 - Post-blast investigations
 - Predictive analytics to pre-empt future IED attacks
- **Inter-Agency Access:** Single-click access for NIA, State ATS, State Police, and CAPFs.
- **Systems Integration:** Aligns with “One Nation, One Data Repository”; to be integrated with ICJS-2 (Inter-Operable Criminal Justice System).

20. Indian Army's Bhairav Battalions to Debut at Army Day Parade 2026



The Indian Army's newly raised **Bhairav Battalions (Desert Falcons)** will make their **Army Day Parade debut in Jaipur**, signalling a shift toward **new-generation warfighting**.

About Bhairav Battalions

- **Role:** High-speed offensive units tailored for **hybrid warfare**, drawing on lessons from recent global conflicts and India's operational experience.
- **Capability Spectrum:** Trained to execute **Special Forces-like tasks** across tactical and operational levels.
- **Force Bridging:** Designed to **bridge the gap between Para Special Forces and regular infantry**, expanding special-ops capacity across formations.
- **Scale:** **15 battalions raised**; plans to expand to **~25 battalions**.

Key Features

- **Drone-Centric Doctrine:** Creation of a pool of **1+ lakh trained drone operatives** for real-mission deployment and targeting.
- **Deterrence Signalling:** Parade debut underscores the Army's intent to institutionalise **hybrid, tech-enabled combat**.

21. 78th Indian Army Day Parade Held Outside Cantonment for the First Time



The **78th Indian Army Day Parade** was held in **Jaipur**, marking the **first time** the main parade took place **outside a military cantonment**. The event featured the **first public appearance** of the newly raised **Bhairav Battalion**.

Indian Army Day: Key Facts

- **Date:** **January 15** (annually).
- **Significance:** Commemorates the appointment of **K. M. Cariappa** as the **first Indian Commander-in-Chief** of the Army in **1949**.
- **Succession:** He succeeded **Sir Francis Roy Bucher**, the last British Commander-in-Chief.
- **Historic Venue Shift:** Traditionally held at **Cariappa Parade Ground, Delhi Cantonment**; since **2023**, the parade follows a **rotating city format**.
- **2026 Theme:** **"Year of Networking and Data Centricity."**

22. ICGS *Samudra Pratap* Commissioned as India's First Indigenous Pollution Control Vessel



The Defence Minister commissioned ICGS *Samudra Pratap* at Goa, enhancing India's marine pollution response capability.

Key Details

- **Vessel Type:** First of two indigenous Pollution Control Vessels (PCVs) for the Indian Coast Guard.
- **Builder:** Goa Shipyard Limited (GSL).
- **Indigenisation:** >60% indigenous content, aligned with Aatmanirbhar Bharat in defence manufacturing.
- **Operational Roles:** Marine oil-spill mitigation within India's EEZ; Fire-Fighting (Fi-Fi), External Power Supply (EPS), and Search & Rescue (SAR).
- **Follow-on Vessel:** ICGS *Samudra Prachet* (second PCV by GSL) with ~72% indigenous content.
- **Regional Framework:** Supports India's First Responder role under South Asia Cooperative Environment Programme (SACEP).
 - **SACEP:** Intergovernmental body (est. 1982); members – India, Bangladesh, Maldives, Pakistan, Sri Lanka, Afghanistan, Bhutan, Nepal.

23. Policing Property, Not Peace? Rajasthan's Disturbed Areas Bill Rekindles Liberty Debate

Rajasthan plans to introduce the **Disturbed Areas Bill, 2026**, drawing from Gujarat's long-standing law to regulate property transfers in communally sensitive areas. The proposal, justified on grounds of preventing distress sales and "demographic imbalance", has raised **constitutional and civil liberty concerns**.

What is a 'Disturbed Areas' Law?

- A legal framework empowering the **district administration** to regulate **immovable property transactions** in areas declared communally sensitive.
- Modelled on **Gujarat Prohibition of Transfer of Immovable Property and Provision for Protection of Tenants from Eviction from Premises in Disturbed Areas Act**, enacted after repeated communal riots to curb forced or distress-driven property transfers.

Key Provisions (Proposed Rajasthan Bill - Based on Gujarat Model)

- **Area Notification:** District Collector may declare an area "disturbed" citing communal tensions or history of unrest.
- **Prior Permission:** Any **sale/transfer of immovable property** requires Collector's approval (Section 5(a) & (b) model).
- **Seller Safeguards:** Affidavit to confirm **voluntary sale** and **fair market value**.

Administrative Inquiry: Collector conducts inquiry before approval or rejection of transfer.

Strengthened Powers (Gujarat Amendments, 2020 - Reference Point)

- **Enhanced Scrutiny:** Collector empowered to examine transactions for **communal clustering or polarisation**.
- **State Review:** Government can **suo motu review** Collector's decision, even without appeal.
- **Stricter Penalties:** Imprisonment increased from **6 months to 3-5 years** for violations.
- *Note:* Key provisions of the 2020 amendment remain **under judicial scrutiny/stay** by the Gujarat High Court – an important precedent for Rajasthan.

UPSC Exam Relevance

- **Prelims:** Disturbed Areas Act, property rights, Articles 15 & 19.
- **Mains: GS-II:** Balance between public order and fundamental rights; limits of executive discretion.

24. Himachal Pradesh to Develop Its First Satellite Mountain Township



Himachal Pradesh Housing and Urban Development Authority (HIMUDA) announced Jathiya Devi as Himachal Pradesh's first satellite mountain township, aimed at decongesting Shimla and enabling disaster-resilient urban growth.

Project Highlights

- **Urban Objective:** Decongest Shimla; create new economic hubs with planned expansion.
- **Land Use Plan:** Mixed-income housing, commercial zones, non-polluting industrial areas, and designated green spaces.
- **Sustainability:** Incorporates smart-city features and green initiatives aligned with the Sustainable Development Goals (SDGs).
- **Mountain Context:** Designed for hill ecology, slope stability, and climate resilience.

Key Concern (Social Impact)

- **Draft SIA (2025):** Flags risks of displacement, livelihood disruption, loss of agricultural land, and pressure on social infrastructure – highlighting the need for careful mitigation.

Concept Note

- **Satellite Township:** A planned urban centre near a larger city that functions independently while remaining economically and socially integrated with the parent metropolis.

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JANUARY 2026

INDIA & WORLD ECONOMY

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1. Inflation Below Comfort Zone: When Disinflation Becomes a Risk



India's CPI inflation fell below 1% for two consecutive months, far under the RBI's 4% target, triggering concerns that excessive disinflation may weaken incomes, tax buoyancy, and policy stability rather than provide relief.

Basics : Inflation: Sustained rise in general price levels.

- **Headline CPI:** Includes all items; **Core CPI:** Excludes food & fuel.
- **Targeting Framework:** 4% CPI ($\pm 2\%$) under the RBI's **Flexible Inflation Targeting (FIT)**.

Why Very Low Inflation is a Concern

- **Base Effect Illusion:** Sub-1% prints partly reflect a **high base**, clouding policy signals.
- **Expectation Mismatch:** RBI surveys show households perceive **~6.6% current inflation**, undermining headline credibility.
- **Policy Whiplash Risk:** Rate cuts now may need reversal if inflation rebounds with base normalisation.
- **Rural Income Stress:** **Negative food inflation** depresses farm realisations (e.g., soybean, pulses below MSP).
- **Corporate Margin Squeeze:** Weak core/WPI limits pricing power despite volume growth.

Fiscal Strain: Lower nominal GDP growth reduces **tax buoyancy** (GST slowdown) and complicates deficit targets.

About CPI (Quick Facts)

Publisher: NSO; variants – CPI-R, CPI-U, CPI-C.

Weights: Food highest in CPI-C (45.86%); Miscellaneous highest in CPI-U (29.53%).

Base Year: 2012 (revised to 2024).

Frequency: Monthly

UPSC Exam Relevance

Prelims: CPI variants, FIT, inflation bands

Mains: GS-III (Monetary policy, growth-inflation trade-off)

Essay: Macroeconomic stability in low-inflation regimes

2. Deflation Signals Emerge as Food Prices Turn Negative



India's retail inflation fell to a 12-year low of 2.2% in 2025, with food prices entering deflation (-0.2%) for the first time since 2014, raising macroeconomic policy concerns.

What is Deflation?

- **Definition:** A persistent fall in the general price level (negative inflation), which increases the purchasing power of money.
- **Distinction:**
 - **Deflation:** Prices fall.
 - **Disinflation:** Inflation slows (prices still rise, but at a lower rate).

Major Causes

- **Weak Aggregate Demand:** Lower consumption/investment.
- **Productivity-led Oversupply:** Output rises faster than demand.
- **Monetary Contraction:** Tight credit, high interest rates, reduced liquidity.

Key Economic Effects

- **Deflationary Spiral:** Consumers postpone purchases → profits fall → layoffs rise → real debt burden increases.
- **Debt Stress:** Falling prices raise the real value of debt, hurting borrowers.

Policy Responses

- **Expansionary Monetary Policy:**
 - Lower repo rates, quantitative easing, liquidity infusion via OMOs.
- **Expansionary Fiscal Policy:**
 - Higher public spending, tax cuts to boost demand.

3. India's Inflation Basket Gets a Makeover: New CPI Series with 2024 Base Year



In January 2026, the Ministry of Statistics and Programme Implementation (MoSPI) announced a new Consumer Price Index (CPI) series, shifting the base year from 2012 to 2024. The revision aims to capture changing consumption patterns, reduce food-driven volatility, and align India's inflation data with global statistical standards.

Key Changes in the New CPI Series (2012 → 2024 Base)

Component	Old CPI (2012 Base)	New CPI (2024 Base)	Significance
Base Year	2012	2024	Reflects current consumption
Food & Beverages	45.86%	~36.75%	Lower monsoon/vegetable shock impact
Housing, Water, Power	16.91%	17.66%	Better living-cost capture
Transport & Communication	8.59%	12.41%	Accounts for mobility & digital usage
No. of Items	299	358	Broader consumption basket
Digital Items	Minimal	Smartphones, OTT, air travel	Modern lifestyle inclusion
PDS Free Food	Implicit	Zero weight	Avoids distortion from PMGKAY
Online Prices	Absent	12 "Online Markets"	E-commerce price capture
Rural Housing Rent	Excluded	Included	Improves rural inflation accuracy
Classification	6 Groups	12 Divisions	UN COICOP 2018 compliance

UPSC Exam Relevance

- Prelims: CPI base year, COICOP, food weight, inflation measurement
- Mains: GS-III (Inflation, Monetary Policy, Statistics in governance)
- Essay: Changing consumption patterns and India's economic transition

Higher-Order Thinking Mains Question

How does the revision of the Consumer Price Index (CPI) base year reflect structural changes in India's economy? Examine its implications for monetary policy and welfare measurement. (15 marks)

4. Goldilocks Harvest & Food Inflation



2025–26 saw a **bumper crop** driven by **above-normal monsoon rainfall** and **moderate temperatures**, creating near-ideal farm conditions. As a result, **consumer food inflation averaged -0.2% in 2025** and fell to **-2.7% during Jul-Dec 2025**, signalling a **supply-led price correction**.

What is the 'Goldilocks' Farm Relief? A situation where **weather, water availability, acreage expansion, and stocks** align just right – **not too hot, not too dry** – to lift output and **cool food prices** without heavy policy intervention.

The Goldilocks Combination (Why 2025 Worked)

Surplus Monsoon: Above-normal rainfall (May–Oct 2025) ensured soil moisture and reservoir recharge.

Temperature Advantage: $+0.28^{\circ}\text{C}$ mean anomaly (1991–2020 baseline) vs $+0.65^{\circ}\text{C}$ in 2024, reducing heat-stress losses and yield volatility.

Supply-Side Drivers of Lower Food Inflation

1) Water & Irrigation Buffer

- **Reservoirs:** 90.8% of full storage in 161 major reservoirs by end-October – boosted rabi confidence and irrigation certainty.

2) Acreage Expansion (Rabi 2025–26)

Crop	Area (lakh ha)	Change
Wheat	334.17	↑ from 328.04
Mustard	89.36	↑ from 86.57
Rabi Maize	25.24	↑ from 23.49
Masoor	18.12	↑ from 17.66

Heat-Risk Benchmark: Historical March heat spikes (e.g., 2002: $+1.61^{\circ}\text{C}$ all-India; $+3.22^{\circ}\text{C}$ NW wheat belt) hurt yields; **current winter conditions reduce this risk**.

Price Cooling Across the Food Basket

- **Potato glut:** UP mandi prices ₹600–700/quintal vs ₹1,200–1,300 a year earlier – large arrivals.
- **Broad deflation:** Vegetables -18.5% (Dec); Pulses -15.1% – not a single-crop story.

UPSC Exam Relevance

- **Prelims:** Food inflation, buffer stocks, rabi crops, reservoir storage.
- **Mains:** GS-III: Agriculture, inflation management, climate risk, food security.

5. Silver Surge 2025: From Precious Metal to Strategic Industrial Asset



Silver prices surged by **over 160% in 2025**, with **December alone recording more than 30% gains**, despite interim corrections. The rally was driven by **clean energy demand, geopolitical risks, ETF-led investment flows, and global trade tensions**, positioning silver as both a **safe-haven and industrial-critical metal**.

Key Drivers Behind the Silver Price Surge

1. Industrial & Energy Transition Demand

- Silver is indispensable for **solar PV, EVs, batteries, and electronics**.
- **Solar PV alone consumes ~15–20% of global silver demand**, which is rising with global decarbonisation targets.

2. Strategic Reclassification

- The **US added silver to its Critical Minerals List**, linking it to:
 - **Section 232 tariff reviews**
 - Strategic financing and stockpiling priorities

3. Geopolitical Supply Risks

- **China's rare-metal export restrictions (2026–27)** raised fears of broader supply disruptions across critical metals, including silver.

4. ETF-Led Investment Demand (India Focus)

- **Indian Silver ETF inflows: ₹5,342 crore** (Sept 2025)
- **Gold ETF inflows: ₹1,233 crore**
- ETF demand forced **physical silver procurement**, tightening supply.

5. Dollar Weakness

- The **US dollar depreciated ~10% in 2025**, boosting the **“debasement hedge”** trade into silver, gold, copper, and bitcoin.

Silver in India

Aspect	Details
Primary Mines	None
Production Source	By-product from lead-zinc mining
Key Region	Rajasthan (Aravalli belt)
Major Producer	Hindustan Zinc Ltd
Import Dependence	High
Major Suppliers	Mexico, Peru

Why Did Silver Outperform Gold?

Aspect	Silver	Gold
Nature	Dual (industrial + safe haven)	Primarily store of value
Demand Sources	Industry + ETFs + retail + jewellery	Mainly investment & jewellery
Supply Elasticity	Inelastic (by-product metal)	More responsive (recycling & mining)
Energy Transition Link	Strong (solar, EVs)	Weak

Global Distribution of Silver

- **Top Producers:** Mexico (largest), China, Peru, Chile, Australia.
- **Mining Nature:** Mostly a **by-product of copper, lead, and zinc mining**.
- **Geological Concentration:** Andean copper belt & Asia-Pacific base-metal belts.

6. India on Track for \$4,000 Per Capita Income by 2030: SBI Report



On 19 January 2026, SBI Research projected that India could reach **\$4,000 per capita income by 2030**. This would move India into the **Upper Middle-Income Country (UMIC)** category as per World Bank classification.

Income Groups (FY 2025–26 thresholds; updated July 2025)

Category	GNI per Capita (USD)	Typical Label Used
Low Income	≤ \$1,145	Often called “Least Developed” (not a WB term)
Lower Middle Income	\$1,146 – \$4,515	Developing
Upper Middle Income	\$4,516 – \$14,005	Emerging / Developing
High Income	≥ \$14,006	Developed

Key Highlights

- **Upper Middle-Income Transition**
 - India likely to cross **\$4,000 per capita income by 2030**.
 - World Bank’s **Upper Middle-Income threshold** ≈ **\$4,500 GNI per capita** (current benchmark range updated annually).
- **GDP Milestones**
 - \$1 trillion: ~2007 (60 years after Independence)
 - \$2 trillion: 2014
 - \$3 trillion: 2021
 - \$4 trillion: 2025
 - \$5 trillion: Expected by 2027–28
- **Global Growth Position**
 - India’s real GDP growth percentile improved from **92nd to 95th percentile globally**, indicating top-tier growth performance.
- **Viksit Bharat @2047 Target**
 - To reach current **High-Income threshold** (~\$13,936 GNI per capita) by 2047:
 - Requires ~7.5% CAGR in per capita GNI.
 - Historical CAGR (2001–2024): 8.3%, suggesting feasibility.
 - If threshold rises to **\$18,000**, required CAGR ≈ 8.9%.
- **Nominal GDP Requirement**
 - With: Population growth: ~0.6%
 - GDP deflator: ~2%
 - India needs ~11.5% nominal GDP growth (USD terms).
- **Reform Imperative**
 - Sustained **structural reforms**, productivity growth, export competitiveness, and capital formation are critical for high-income transition.

7. India's Forex Reserves Touch Near-Record High, Boost External Stability



India's **foreign exchange reserves** rose sharply, driven by **valuation gains (especially gold)** and steady capital flows, signalling **external sector resilience** amid global financial volatility.

Forex reserves are **external assets** held by the **Reserve Bank of India**.

Components of Forex Reserves includes

Foreign Currency Assets (FCA): Foreign securities, deposits, treasury bills

Gold Reserves: Physical gold and gold deposits (valued at international prices)

SDRs: Special Drawing Rights allocated by the **International Monetary Fund**

Reserve Tranche Position (RTP): India's readily available IMF quota

Current Status (Latest Week)

- **Total Reserves: USD 696.61 billion** (+USD 3.29 bn WoW)
- **FCA: USD 559.61 billion** (largest share)
- **Gold: USD 113.32 billion** (sharp rise due to gold price rally)
- **SDRs: USD 18.80 billion**
- **IMF RTP: USD 4.88 billion**
- **Import Cover: >10 months** (comfortable adequacy)

8. Global Growth Limping into the 2020s: World Bank's GEP 2026 Warning



In January 2026, the World Bank released the **Global Economic Prospects (GEP) 2026** report, projecting **subdued global growth** despite resilience to trade tensions and easing inflation, and flagging jobless growth and fiscal stress in developing economies.

About Global Economic Prospects (GEP) Report

- **Nature:** Biannual flagship report of the World Bank.
- **Purpose:** Assesses **global growth trends, risks, inflation, trade, and debt** across advanced economies and EMDEs.

Key Global Findings (GEP 2026)

Indicator	Projection
Global Growth	2.6% (2026) ↓ from 2.7% (2025)
Advanced Economies	1.6% (high interest rates persist)
EMDEs	4.0% (steady but uneven)
Global Trade Growth	2.2% (protectionism drag)
Global Inflation	2.6% ↓ from 3.4%
Decade Outlook	2020s on track to be weakest since the 1960s

Structural Concerns

- **Catch-up erosion:** ~25% of developing countries poorer than in 2019.
- **Jobless growth:** Weak job creation turns demographics into a burden.
- **Fiscal stress:** Public debt at historic highs in many developing economies.

India-Specific Takeaways

- **Fastest-growing major economy:** 7.2% (FY 2025–26).
- **Growth driver:** Private consumption remains key.
- **Fiscal path:** Ongoing **fiscal consolidation** as spending restraint outweighs revenue losses from tax cuts.

UPSC Exam Relevance

- **Prelims:** Global Economic Prospects report; World Bank; EMDEs; global growth/inflation/trade trends.
- **Mains:** GS-III (Growth, employment, public finance, globalisation); Essay (Global economic slowdown, jobless growth).

Higher-Order Mains Question : “The 2020s risk becoming a lost decade for global growth.” Examine the structural reasons highlighted by the Global Economic Prospects 2026 and assess policy options for developing economies like India. (10/15 marks)

9. Age of Competition”: Global Risks Report 2026 Warns of a Fragmented World



In January 2026, the World Economic Forum released the **Global Risks Report 2026**, warning that the world is entering an “Age of Competition” marked by **multipolarity without multilateralism**, where rivalry and fragmentation are replacing cooperation.

Key Global Findings – 2026

Time Horizon	Major Risks
Short Term (2 yrs)	Geoeconomic confrontation (top risk); misinformation & disinformation
Structural Driver	Weaponisation of economic tools (sanctions, supply chains, technology controls)
Long Term (10 yrs)	Extreme weather events (top); biodiversity loss & ecosystem collapse
Fastest-Rising Risk	Adverse impacts of AI (job losses, autonomous warfare, governance gaps)
Societal Impact	Technology amplifying political polarisation & social distrust

About the Global Risks Report

- **Publisher:** World Economic Forum (WEF)
- **Nature:** Annual flagship report based on the **Global Risks Perception Survey** (experts, policymakers, business leaders).
- **Time Horizons:**
 - **Short term:** 2 years
 - **Long term:** 10 years

Purpose: Identify and rank **economic, geopolitical, environmental, technological, and social risks** to global stability.

Core Warning : **Multipolarity without multilateralism** → higher conflict, weaker global problem-solving capacity (climate, trade, tech governance).

India-Specific Findings

- **Top National Risk:** **Cyber insecurity**, ahead of inequality and weak public services.
- **Geopolitical Flashpoint:** **Indus River Basin** flagged as a potential future water-conflict zone (India-Pakistan).
- **Positive Recognition:** **Unified Payments Interface (UPI)** cited as a **global best practice** in Digital Public Infrastructure (DPI).

Higher-Order Mains Question

“The Global Risks Report 2026 describes the present era as one of ‘multipolarity without multilateralism’.” Analyse the risks this poses to global stability and evaluate India’s strategic choices in such a world.

10. Economic Survey 2025–26: Disciplined Swadeshi for High-Growth Stability



The **Economic Survey 2025–26** was tabled in Parliament by the Union Finance Minister ahead of **Union Budget 2026**. It presents a comprehensive assessment of India's economic performance and advocates a strategy of "**Disciplined Swadeshi**" – balancing domestic capability-building with deep global integration.

What is the Economic Survey? (Definition & Background)

- The **Economic Survey of India** is the Ministry of Finance's annual flagship report reviewing macroeconomic performance and policy challenges.
- Prepared by the **Economic Division, Department of Economic Affairs (DEA)** under the **Chief Economic Advisor (CEA)**.
- It has **no constitutional or statutory backing** and its recommendations are **non-binding**.
- Presented **one day before the Union Budget**; first issued in **1950–51**.

Core Theme: "Disciplined Swadeshi"

- Rejects extreme **protectionism** and blind **hyper-globalisation**.

Advocates calibrated integration into **global value chains (GVCs)** while strengthening **domestic competitiveness**, productivity, and resilience.

Key Highlights of Economic Survey 2025–26

1. Growth & Demand

- **Real GDP Growth (FY26):** 7.4% (fastest among major economies).
- **Medium-term potential growth:** Revised upward to ~7%.
- **PFCE:** Rose to **61.5% of GDP**, a 12-year high – signalling strong domestic demand.
- **Investment:** GFCF grew **7.6%**, sustaining ~30% of GDP.

2. Fiscal Position

- **Fiscal Deficit:** 4.8% (FY25, provisional); **4.4% target for FY26**.
- **Revenue Receipts:** 9.2% of GDP, reflecting better tax buoyancy.
- **Direct Tax Base:** ITR filers rose to **9.2 crore**.
- **Effective Capital Expenditure:** Increased to **4.0% of GDP**, improving expenditure quality.
- **Debt:** General government debt-to-GDP down by **7.1 percentage points** since 2020.

3. Monetary & Financial Sector

- **Repo Rate:** Cut by **125 bps** since **Feb 2025**; now at **5.25%**.
- **Banking Health:** GNPA declined to **2.2%**, a multi-decade low.
- **Financial Inclusion:** **55.02 crore Jan Dhan accounts**; capital market investors crossed **12 crore**.

Key Highlights of Economic Survey 2025–26

4. Inflation

- **Headline CPI:** Averaged **1.7% (Apr–Dec 2025)** due to food deflation.
- **Core Inflation:** Sticky at **4.62%**, driven by global precious metal prices.

5. Agriculture & Allied Sectors

- **Agri Growth (FY26):** 3.1% (moderation from FY25).
- **Structural Shift:** Horticulture output exceeded foodgrains for the **second consecutive year**.
- **Fisheries:** Production up **142% in a decade** – record **188.7 lakh tonnes**.

6. Industry & Infrastructure

- **Industrial GVA Growth:** 6.2%, manufacturing-led.
- **Railways:** **99.1% electrification** of broad-gauge network.
- **Aviation:** India became the **3rd largest domestic aviation market**.
- **Power Sector:** DISCOMs posted **positive PAT for the first time**.
- **Highways:** Operational high-speed corridors expanded to **5,364 km**.

7. Services & External Sector

- **Services Share:** 53.6% of GDP; growth projected at **9.1%**.
- **Exports:** Services exports hit **\$387.5 billion**; India ranked **7th globally**.
- **Forex Reserves:** Record **\$701.4 billion** (11 months of import cover).
- **Remittances:** **\$135.4 billion**, highest globally.

8. Social Sector & Employment

- **Unemployment Rate:** Fell to **4.9%** (Q3 FY26).
- **FLFPR:** Rose to **41.7%**.
- **MPI Poverty:** Declined sharply to **11.28%**.
- **Social Spending:** Increased to **7.9% of GDP**.
- **e-Shram:** Over **31 crore unorganised workers registered**.

11. From Economic Plumbing to Reform Execution: India's Next Growth Test



An analysis published in *The Indian Express* argues that while India's last decade focused on building **economic plumbing** – digital systems, fiscal capacity and infrastructure – the next phase must shift decisively towards **execution-oriented reforms** to raise productivity, job quality and mass consumption.

What is 'Economic Plumbing'? (Definition)

- *Economic plumbing* refers to the **foundational systems** – digital, fiscal, institutional and physical – that enable smooth policy delivery and market functioning.
- It does **not directly generate growth**, but determines how effectively reforms translate into outcomes.

India's Economic Plumbing Built in the Last Decade

Area	Key Achievements
Digital Public Infrastructure (DPI)	Aadhaar, UPI, DBT and digital service delivery improved inclusion, reduced leakages and enhanced state capacity
Fiscal Capacity	GST unified the indirect tax system; ~1.4 crore businesses brought into the tax net
Public Capex	Capital expenditure reached ~₹10.5 trillion in FY25, the highest ever, crowding-in private investment
Institutional Reforms	IBC, faceless tax assessments, digital clearances improved predictability and investor confidence
Labour Formalisation	Payroll data shows ~2 million net formal job additions per month, indicating a shift from informality

Why Execution-Focused Reforms Are Now Needed

Structural Gaps Persist

- **Productivity Challenge:** Formal job growth exists, but **job quality and productivity** remain uneven.
- **Gender Paradox:** Female Labour Force Participation (~40%) has risen, yet many women remain in **low-paid or unpaid work**.
- **Manufacturing Constraint:** Manufacturing stuck below **16% of GDP**, limiting large-scale employment generation.
- **Logistics Cost:** Reduced to ~8% of GDP (from ~13-14%), but still above global best practice (6-7%).
- **Regulatory Overload:** Despite GST coverage, MSMEs face **overlapping compliance, frequent changes and state-level frictions**.

Consumption Imbalance: Even as ~248 million exited multidimensional poverty, **mass consumption recovery lags**, while premium demand surges

12. Bank Frauds in India: Fewer Cases, Bigger Losses



The Reserve Bank of India, in its *Report on Trend and Progress of Banking in India 2024–25*, revealed a **sharp fall in the number of bank fraud cases**, but a **steep rise in the total amount involved**, highlighting a shift towards **high-value fraud concentration**.

Special Factors Explaining the Spike in Value

- **Court-Linked Reclassification**
122 high-value cases (₹18,336 crore) were re-reported after compliance with Supreme Court of India directions on **natural justice and borrower hearing**.
- **H1 FY26 Trend (Early Signal)**
 - Cases: 5,092 (↓ sharply)
 - Amount: ₹21,515 crore (↑)
→ Confirms **structural skew towards large-ticket frauds**.

Why Number of Frauds Fell

- **AI-Based Transaction Monitoring**
Velocity checks, behavioural analytics, anomaly detection across CBS platforms.
- **Stronger KYC & AML Framework**
Re-KYC mandates, video-KYC, centralised KYC registry reduced mule accounts.
- **Early Warning Systems (EWS)**
Automated alerts for abnormal account behaviour and quick account freezes.
- **Consumer Awareness**
SMS alerts, cyber helplines, nationwide digital payment safety campaigns.

Why Value of Frauds Remains High

- **Legacy Corporate Loan Frauds**
Detected late via forensic audits, especially consortium lending cases.
- **Reclassification Effect**
Earlier disputed or suppressed cases reported afresh in FY25.
- **Credit Concentration Risk**
Fewer cases, but **large exposure sizes** in advances-related frauds.

Mains Question

The recent trend in bank frauds in India indicates a shift from volume-driven to value-driven financial crimes.

Analyse the causes and suggest governance and regulatory reforms to address this challenge.

13. RBI to Reopen Urban Co-operative Bank Licensing After 22-Year Freeze



In January 2026, the Reserve Bank of India (RBI) proposed reopening the licensing window for **Urban Co-operative Banks (UCBs)**, which had remained shut since 2004. The move follows improved financial health of UCBs and aims to create **fewer, larger, and better-governed cooperative banks**.

What are Urban Co-operative Banks (UCBs)?

- **Definition:** Member-owned banks catering to **urban & semi-urban areas**, small borrowers and micro-businesses.
- **Legal Basis:** Registered under **State or Multi-State Cooperative Societies Acts**.
- **Dual Regulation:**
 - **RBI** → Banking functions (licensing, capital, prudential norms)
 - **Registrar of Cooperative Societies (RCS)** → Governance, audit, liquidation

Background & Context

- RBI halted licensing in 2004 after many new UCBs became financially weak.
- **R. Gandhi Committee** recommended licences only for **financially strong credit societies**.
- Sector reforms and consolidation have improved **capital adequacy and provisioning**, prompting policy rethink.

Current Status of UCBs (FY25)

Indicator	Status
Total UCBs	1,457
Deposit concentration	7% UCBs hold ~62.5% deposits
Capital Adequacy	Avg CAR ~18%; 92% above 12%
Asset Quality	GNPA ~6.2%; NNPA ~0.7%
Balance sheet	Assets ₹7.38 lakh cr; Deposits ₹5.84 lakh cr

RBI's Key Proposals

- **Restart licensing with stringent entry norms.**
- Preference for **large, mature co-operative credit societies**.
- Emphasis on **wider geographic footprint** to compete with SFBs, NBFCs & banks.
- **Multi-State societies preferred**; select single-State societies may qualify.

Public consultation open till 13 February 2026.

Eligibility Criteria (Proposed)

Condition	Requirement
Minimum capital	₹300 crore
Track record	10 years operations
Financial trend	Positive (last 5 years)
Capital Adequacy	≥ 12%
NNPA	≤ 3%

Credit Societies vs UCBs

Aspect	Credit Societies	UCBs
Regulator	RCS	RBI
Deposits	Members only	Public (regulated)
Lending	Members only	Members + public

14. RB-IOS 2026: RBI Tightens Timelines and Raises Compensation in Banking Grievance Redressal



In January 2026, the Reserve Bank of India notified the Reserve Bank - Integrated Ombudsman Scheme (RB-IOS), 2026, replacing the 2021 framework. The overhaul aims to speed up complaint resolution, expand coverage, and enhance consumer compensation across RBI-regulated entities.

What is RB-IOS?

- A free Alternate Grievance Redressal (AGR) mechanism for customers of RBI-Regulated Entities (REs).
- Operates on “One Nation - One Ombudsman”, i.e., jurisdiction-neutral, unified handling of complaints.
- Seeks simplification, standardisation, transparency and faster resolution.

Who is Covered?

- **Banks:** Commercial banks, RRBs, State & District Central Co-operative Banks
- **NBFCs:** With assets \geq ₹100 crore
- **Payments & Data:** UPI/system participants, Credit Information Companies

What's New in RB-IOS 2026? (Key Changes)

Area	RB-IOS 2026
Timelines	RE reply within 15 days; complainant to approach Ombudsman within 90 days (earlier 1 year)
Scope	“Deficiency in service” expanded to all services, not just financial
Compensation	Up to ₹30 lakh (financial loss) + ₹3 lakh (non-financial harm); no dispute value cap
Processing	CRPC (Centralised Receipt & Processing Centre) for uniform scrutiny
Appointments	RBI officers as Ombudsman/Deputy Ombudsman (generally 3 years)
Appeals	Both parties can appeal within 30 days
Accountability	Annual RBI report on scheme performance
Powers	Ombudsman may implead third-party REs; issue non-binding advisories for early settlement

Higher-Order Thinking Mains Question

“RB-IOS 2026 seeks to balance speed, scale and fairness in financial grievance redressal. Critically examine its potential impact on consumer protection and regulatory accountability.”

15. RBI Recommends Connecting CBDCs of BRICS Nations



The Reserve Bank of India (RBI) proposed linking the Central Bank Digital Currencies (CBDCs) of BRICS nations to enable direct cross-border payments. The move aims to cut costs and delays by bypassing dollar conversion and correspondent banks.

Key Elements of the Proposal

- **Direct Payments:** Users could pay foreign merchants directly without converting to US dollars.
- **Speed & Cost:** Eliminates intermediary correspondent banks, making trade and tourism payments faster and cheaper.
- **Liquidity Management:** Use of bilateral currency swaps to net-off trade imbalances, reducing idle “trapped” funds.
- **India’s Stance:** India opposes a single BRICS currency to preserve monetary policy autonomy.

Potential Roadblocks

- **Geopolitical Risk:** Exposure to punitive US economic measures for dollar bypass.
- **Asymmetry Risk:** Possible Chinese yuan dominance due to more advanced digital infrastructure.

Standards Gap: Difficulty in agreeing on common cybersecurity and technical standards.

16. Banks Flag Capital Shock Risk Under RBI's ECL Norms



Banks have sought further consultations with the Reserve Bank of India over the proposed **Expected Credit Loss (ECL)** framework, especially its application to **crop loans from April 2027**. Lenders fear that **seasonal repayment patterns in agriculture** could trigger disproportionate provisioning and capital erosion under the new norms.

What are Expected Credit Loss (ECL) Norms? (Definition)

The **Expected Credit Loss (ECL)** framework requires banks to **recognise loan losses upfront**, based on forward-looking risk assessment, **instead of waiting for actual default**. It mirrors **IFRS-9 accounting standards**, shifting banking regulation from *incurred loss* to *anticipated loss* recognition.

How ECL Works (Core Mechanics)

Risk Parameters:

PD (Probability of Default)

LGD (Loss Given Default)

EAD (Exposure at Default)

Cash Flow Approach: Loss = contractual cash flows - expected cash flows.

Three-Stage Asset Classification:

Regulatory Scope & Timeline

- **Coverage:** Scheduled Commercial Banks & All India Financial Institutions (Excludes SFBs, Payment Banks, RRBs)
- **Effective Date:** 1 April 2027
- **Glide Path:** Till 31 March 2031 to smooth capital impact

Stage	Asset Status	Provisioning
Stage 1	Performing	12-month ECL
Stage 2	Significant credit risk increase	Lifetime ECL (≥5% floor)
Stage 3	Credit-impaired (NPA-like)	Lifetime ECL

Key Provisions Raising Concern

- **Stage 2 Trigger:** Overdue 30-90 days → higher provisioning.
- **Provisioning Floor:** Minimum 5% lifetime ECL for Stage 2 (vs ~0.4% SMA earlier).
- **Crop Loan Rule:**
 - **Short-duration crops:** Stage 3 after **two crop seasons overdue**
 - **Long-duration crops:** Stage 3 after **one crop season overdue**

Why Are Banks Worried?

- **Seasonal Repayment Reality:** Agricultural loans (KCC, crop loans) follow **harvest-linked repayment**, not EMIs → technical overdues without real stress.
- **Routine Rollovers:** Forward/backward rollovers during crop cycles inflate “days past due”.
- **Capital Erosion Risk:** Lifetime ECL provisioning may **hit CRAR**, especially for agri-heavy public sector banks.
- **Steep Provisioning Jump:** SMA provisioning jumps from **0.4% → 5%**, causing sudden profit and capital strain.

17. Delhi Comes Under RBI's Full Banking & Public Debt Framework



The **Delhi Government** signed an MoU with the **Reserve Bank of India**, bringing Delhi under the RBI's **full banking and public debt management framework** for the first time.

Key Background

- **Earlier System:** Delhi followed an **ad hoc financial arrangement**, integrating its public accounts with the **Government of India** instead of routing them through RBI.
- **Alternative Borrowing:** Relied on sources such as the **National Small Savings Fund (NSSF)**, which carried **higher interest costs**.
- **Legal Basis:** RBI acts as **banker to States and UTs** under **Section 21A of the RBI Act, 1934** through bilateral agreements.
- **Exception:** **Sikkim** remains the **only state** with a **limited RBI agreement** for public debt management.

What Changes for Delhi

- **Borrowing Mechanism:** Access to **State Development Loans (SDLs)** at **~7%**, replacing costlier borrowing (**~12-13%** earlier).
- **Cash Management:** RBI will manage daily cash balances and **auto-invest surplus funds**, avoiding idle cash.
- **Liquidity Support:** Eligibility for **Ways and Means Advances (WMA)** and **Special Drawing Facility (SDF)** to manage short-term mismatches.
- **Fiscal Alignment:** Integrates Delhi into the **standard national framework** for cash and debt management followed by states.

18. Payments Regulatory Board Takes Charge: RBI-Led Oversight of India's Digital Payments



The first meeting of the Payments Regulatory Board (PRB) was held recently under the chairmanship of the RBI Governor, marking the operationalisation of a new statutory regulator for India's payment and settlement systems after amendments to the PSS Act.

What is the Payments Regulatory Board (PRB)?

- PRB is a statutory authority under the Reserve Bank of India (RBI) that regulates and supervises payment and settlement systems in India.
- It replaced the Board for Regulation and Supervision of Payment Systems (BPSS) in 2025 after amendments to the Payment and Settlement Systems (PSS) Act, 2007.

Key Features

- **Chairperson:** RBI Governor (ex-officio)
- **Composition:** 6 members — equal representation from RBI and the Central Government
- **Decision-making:** Majority vote; casting vote with the Chairperson in case of a tie
- **Meetings:** Mandatory minimum two meetings per year
- **Institutional Support:** RBI's Department of Payment and Settlement Systems (DPSS) reports to and assists PRB
- **Legal Invitee:** RBI's Principal Legal Adviser (non-voting)

Core Functions

- **Licensing:** Grants, regulates, and revokes licences for payment systems (UPI, cards, wallets, RTGS, etc.)
- **Standard Setting:** Prescribes technical, operational, and cybersecurity standards for payment systems
- **Supervision & Enforcement:** Inspects payment system operators and issues binding directions under the PSS Act

UPSC Exam Relevance

- **Prelims:** PRB, PSS Act, RBI's regulatory role in payments
- **Mains:** GS-III (Financial sector regulation, digital payments, institutional reforms)

19. Department of Posts Revamps ATM Infrastructure



The **Department of Posts** announced a revamp of its ATM infrastructure, with **800+ ATMs installed nationwide**, aimed at improving **banking access in rural and underserved areas**.

About ATMs in India

- **Regulatory Authority:** The **Reserve Bank of India (RBI)** regulates ATM policy.
- **Interoperability:** Enabled by the **National Payments Corporation of India (NPCI)**.

Major Types of ATMs

- **White Label ATMs (WLAs):**
Owned and operated by **non-bank entities**; licensed under the **Payment and Settlement Systems Act, 2007** to expand access, especially in rural areas.
- **Brown Label ATMs:**
Third parties own hardware and site, while **sponsor banks** handle branding, cash management, and network connectivity.
- **Micro-ATMs:**
Handheld PoS devices used by **Business Correspondents** to provide basic services via **Aadhaar-enabled Payment System (AePS)** in remote areas.
- **Cash Recycler Machines (CRMs):**
Accept deposits and **recycle notes** for withdrawals, reducing manual cash replenishment.

ATM Landscape

- Public sector banks operate the **largest ATM network**.
- **Bank-owned ATMs have declined**, while **White Label ATMs have expanded**.

20. SEBI Rewrites Broker Rulebook: From Compliance-Heavy to Investor-Centric



The Securities and Exchange Board of India (SEBI) has notified the **Stock Brokers Regulations, 2026**, replacing the 1992 framework to align broker regulation with digital trading, platform-based finance, and investor protection needs.

What are the SEBI (Stock Brokers) Regulations, 2026?

A modern regulatory framework governing stockbrokers, shifting focus from rigid procedural compliance to **risk-based oversight and investor-centric safeguards**, suitable for online, multi-service brokerage platforms.

Key Provisions (Core Changes)

Area	Provision
Scope Expansion	Brokers may offer services regulated by RBI/IRDAI/IBBI via a single entity, subject to SEBI conditions
Governance	Mandatory Designated Director resident in India (≥182 days/year)
Record Keeping	Records to be maintained for 8 years; electronic records permitted
Whistleblower	Written policy with confidential reporting mechanism
Entry Norms	New applicants need 2 years' securities trading/dealing experience
QSB Norms	Streamlined criteria for Qualified Stock Brokers (large, high-volume entities)
Investor Protection	Explicit ban on indicative/guaranteed/fixed return schemes
Primary Oversight	Stock exchanges recognised as primary regulators with enhanced reporting
Brokerage Caps	Mutual Funds: 6 bps (cash), 2 bps (derivatives)

UPSC Exam Relevance

- **Prelims:** SEBI regulations, QSB, brokerage caps
- **Mains:** GS-III (Financial markets regulation, investor protection), GS-II (Regulatory governance)

21. Tokenising Credit: India's Next Big Financial Reform



Despite world-class **Digital Public Infrastructure (DPI)**, India's **credit depth remains shallow**, especially for MSMEs. A recent policy debate argues that **financial asset tokenisation** – digitising enforceable ownership rights – could be the missing reform layer to unlock scalable credit growth.

What is Financial Asset Tokenisation?

Digital representation of **ownership rights and financial claims** (bonds, receivables, fund units) on a **programmable ledger**.

Core Feature: Assets become **transferable, pledgeable, and enforceable by design**, with embedded rules for settlement and servicing.

Problem with India's Credit System

Issue	Explanation
Low Credit Depth	Bank credit to private sector ~50% of GDP, far below deep credit economies
MSME Credit Gap	Only ~19% MSME credit demand met formally (FY21); gap ~₹80 lakh crore
Friction Bottlenecks	Slow settlement, fragmented registries, weak enforcement
Data-Collateral Mismatch	DPI verifies cash flows (Aadhaar, UPI, AA) but can't convert them into collateral
Static Assets	Digital records exist, but claims aren't programmable or continuously monitorable

How Tokenisation Can Fix This

- **Programmable Claims:** Ownership embedded in the asset → higher lender confidence.
- **Instant Settlement:** Built-in settlement & servicing reduce delays and costs.
- **Lower Information Asymmetry:** DPI verification improves underwriting quality.
- **Missing Layer Added:** Converts verified data into **pledgeable digital assets**.
- **MSME Boost:** Linking tokenised claims with ONDC enterprise data enables **real-time cash-flow-based credit**.

Higher-Order Mains Question

"India's DPI solved payments and identity, but not credit. Examine how financial asset tokenisation can bridge this gap."

22. Co-location and Dark Fibre



Securities and Exchange Board of India (SEBI) granted **in-principle approval** to settlement applications filed by the **National Stock Exchange (NSE)** in the **co-location** and **dark fibre** cases. The move is expected to **clear regulatory overhang** and **expedite NSE's long-pending IPO**.

Key Concepts Explained

- **Co-location:**
 - A globally accepted stock-exchange service allowing brokers to **place servers inside exchange data centres**.
 - Objective is to **minimise latency** (time lag), critical for **high-frequency trading (HFT)**.
- **Dark Fibre:**
 - **Unused fibre-optic cables** leased to entities to create **private, high-speed networks**.
 - Offers **greater control, speed, and security** over data transmission.

About the Cases

- **Co-location Case (since 2015):**
 - Alleged **preferential server access** to select brokers, granting **unfair HFT advantages**.
- **Dark Fibre Case:**
 - Alleged that NSE allowed an **unauthorised vendor** to install dark fibre lines, giving **superior data speeds** to certain brokers.

Regulatory Context

SEBI: Autonomous statutory regulator for **securities and commodities markets**; established **1988**, HQ **Mumbai**, with regional offices.

23. UAE Clears First USD-Backed Stablecoin 'USDU'



On 29 January 2026, the Central Bank of the United Arab Emirates (CBUAE) approved USDU, the country's first USD-backed stablecoin. The move formalises digital payment token regulation under the UAE's structured legal framework.

Key Highlights

- **Stablecoin Name:** USDU (USD-backed digital token).
- **Regulatory Basis:** Approved under UAE's Payment Token Services Regulation.
- **Issuer:** Universal Digital, regulated by the Financial Services Regulatory Authority (FSRA) of Abu Dhabi Global Market (ADGM).
- **Milestone:** First foreign payment token issuer registered with the UAE Central Bank.
- **Function:** Supports blockchain-based payments, settlements, and cross-border transfers.

About Stablecoins

- **Definition:** Cryptocurrencies pegged to reserve assets (e.g., US dollar) to reduce price volatility.
- **Types:**
 - Fiat-backed (e.g., USD-backed)
 - Crypto-collateralised
 - Algorithmic stablecoins
- **Purpose:** Used for digital payments, remittances, DeFi transactions, and tokenised settlements.

Strategic Significance

- **Regulatory Clarity:** UAE becomes one of the first major financial hubs to permit fully regulated USD-denominated digital settlements.
- **Digital Finance Hub:** Strengthens UAE's ambition to become a global fintech and crypto innovation centre.
- **Cross-Border Utility:** Facilitates faster, cheaper blockchain-based international transfers.
- **Financial Stability:** Regulation reduces systemic risks compared to unregulated crypto tokens.

24. RBI–ESMA MoU to Enable Recognition of Indian Clearing Corporations



In January 2026, the Reserve Bank of India (RBI) signed an MoU with the European Securities and Markets Authority (ESMA) during the visit of EU leadership to India. The agreement enables formal recognition of Indian Central Counterparties (CCPs) under EU regulations.

Key Highlights

- **Purpose of MoU:**
 - To facilitate **ESMA recognition of RBI-regulated Central Counterparties (CCPs)** such as **Clearing Corporation of India Limited (CCIL)**.
 - Ensures compliance with EU regulatory standards.
- **Regulatory Framework:**
 - Recognition is required under the EU's **European Market Infrastructure Regulation (EMIR)** for third-country CCPs.
 - Allows Indian CCPs to offer clearing services to **European market participants**.
- **Operational Significance:**
 - Prevents disruption in cross-border derivatives clearing.
 - Enhances confidence in India's financial market infrastructure.
- **Supervisory Cooperation:**
 - Establishes mechanisms for **consultation, regulatory cooperation, and information exchange**.
 - RBI and ESMA will jointly monitor continued compliance of recognised CCPs.
- **Strategic Context:**
 - Deepens India–EU financial market integration.
 - Supports stability in global derivatives and bond markets.

About Central Counterparties (CCPs)

- A **Central Counterparty (CCP)** interposes itself between buyer and seller in financial markets.
- It becomes the buyer to every seller and seller to every buyer, thereby reducing **counterparty risk**.
- CCIL acts as India's key CCP for government securities, forex and derivatives markets.

25. Substance Beats Structure: Supreme Court Allows GAAR to Trump Tax Treaties



In January 2026, the **Supreme Court of India** ruled that capital gains from **Tiger Global's 2018 sale of Flipkart shares to Walmart** are taxable in India. The Court held that **GAAR can override tax treaties** when arrangements lack genuine commercial substance, even if a Tax Residency Certificate is available.

Key Definitions

- **GAAR (General Anti-Avoidance Rule):** Statutory anti-abuse provisions allowing tax authorities to deny benefits from arrangements primarily aimed at tax avoidance.
- **DTAA:** Double Taxation Avoidance Agreement between two countries to prevent taxing the same income twice.
- **Substance over Form:** Principle where **economic reality** prevails over legal structuring.

Context & Background

- Tiger Global routed its investment in **Flipkart** through **Mauritius-based entities**, claiming exemption under the **India-Mauritius DTAA**.
- The Court found that:
 - Mauritius entities were **conduit structures**
 - **Strategic and commercial control** lay in the United States

Hence, the arrangement qualified as an **Impermissible Avoidance Arrangement (IAA)**.

Core Legal Findings of the Supreme Court

Issue	Court's Position
Treaty Benefit	Cannot be claimed merely by routing through a treaty jurisdiction
TRC (Tax Residency Certificate)	Necessary but not sufficient
GAAR vs DTAA	GAAR prevails over treaties in abusive arrangements
Grandfathering	Pre-2017 investments not immune if structure is sham
Indirect Transfers	Taxable if value is substantially derived from Indian assets

About GAAR (Chapter X-A, Income Tax Act)

- **Objective:** Curb aggressive tax planning and treaty shopping
- **Threshold:** Applicable only if tax benefit **exceeds ₹3 crore**
- **Expert Basis:** Designed based on recommendations of the **Parthasarathi Shome Committee**
- **Treaty Override:** GAAR can override DTAAAs where abuse is proven

Two-Step Test for Impermissible Avoidance Arrangement (IAA):

1. **Main Purpose Test:** Primary objective is to obtain tax benefit
2. **Tainted Element Test:**
 - Not at arm's length
 - Misuse or abuse of tax law
 - Lacks commercial substance (shell/conduit entity)
 - Not bona fide

About Tax Residency Certificate (TRC)

- **Definition:** An **official document** issued by a country's tax authority certifying that a person/entity is a **tax resident** of that country for a **specific financial year**.
- **Core Purpose:** To **prevent double taxation** of income earned across borders.
- **Treaty Benefit:** Enables taxpayers to **claim benefits** under applicable **Double Taxation Avoidance Agreements (DTAAAs)**.

Indian Legal Framework

- **Residency Test (India):** Determined under **Section 6 of the Income-tax Act, 1961**; typically includes **182 days' stay** in a financial year (with variations).
- **Judicial Clarification:**
 - A TRC is **necessary but not sufficient**; authorities may examine **substance over form, beneficial ownership, and anti-avoidance concerns**.

26. GSDP as Criterion for Tax Devolution



With 15th Finance Commission norms currently governing tax devolution and 16th Finance Commission recommendations awaited, rising Centre-State tensions have revived demands to explicitly use Gross State Domestic Product (GSDP) as a criterion for sharing central taxes.

What is GSDP?

- **Gross State Domestic Product (GSDP)** measures the **total economic output** of a State.
- It reflects the **size, structure, and income-generating capacity** of State economies.
- Acts as a **proxy for tax base**, especially after GST centralisation.

Why Tax Devolution Is Contested

- **GST Centralisation:** States surrendered major taxes; **GST compensation ended in 2022.**
- **Cess & Surcharge Issue:** ~22-25% of Centre's gross tax revenue is non-shareable, shrinking the divisible pool.
- **CSS Dominance:** ~40% of transfers via Centrally Sponsored Schemes, limiting State flexibility.
- **15th FC Weighting:** High weight to **income distance (45%)** and **population (15%)** reduced shares of fiscally strong States.
- **Vertical Fiscal Imbalance:** States' own tax revenue ~7% of GSDP, while expenditure responsibilities rise.

Why GSDP Is a Better Proxy

Aspect	Evidence
Direct Taxes	0.75 correlation with GSDP
GST Collections	0.91 correlation with GSDP
Efficiency-Equity	GSDP balances contribution recognition with redistribution
Distortion	Reduces HQ/PAN-based booking bias

Winners & Losers under GSDP-Based Formula

- **Likely Gainers:** Maharashtra, Tamil Nadu, Karnataka, Gujarat

Relative Losers: Uttar Pradesh, Bihar, Madhya Pradesh

UPSC Exam Relevance

- **Prelims:** GSDP, Finance Commission, divisible pool
- **Mains: GS-III:** Fiscal federalism, GST impact
 - **GS-II:** Centre-State financial relations

27. Capex Up, Debt High: RBI Flags Tight Fiscal Room for States



Reserve Bank of India released its annual “State Finances” report for FY 2025–26, assessing states’ fiscal health and budget priorities. The report highlights **higher deficits and debt**, sustained **capex push**, and **demographic-linked fiscal pressures**.

What is the ‘State Finances’ Report? : An annual RBI assessment of states’ budgets, deficits, debt, revenues, and risks, used to track **sub-national fiscal sustainability** and inform policy.

1) Fiscal Performance of States

- **Fiscal Deficit:** Consolidated GFD budgeted at **3.3% of GDP (FY25)**, up from ~3% in the preceding three years.
- **Capital Spending:** **3.2% of GDP**, signalling focus on **asset creation**.
- **Central Support:** Capex buoyed by **50-year interest-free loans** under the SASCI scheme.
- **Debt Levels:** Outstanding state liabilities at **29.2% of GDP**, well above the ~20% prudence benchmark (FRBM Review Committee, 2017).
- **Tax Structure:** SGST is the primary own tax; **growth has slowed** and its **SGDP share remains below pre-GST levels**.
- **Non-Tax Revenue:** **Steady decline** over the past decade, weakening fiscal autonomy.

2) Demographic Transition & Fiscal Strategy

- **Young States (e.g., Bihar, Uttar Pradesh):** Need higher **education & skilling** outlays to harness demographic dividend.
- **Ageing States (e.g., Kerala, Tamil Nadu):** Rising **pension and geriatric healthcare** pressures.
- **Transition States (e.g., West Bengal, Maharashtra):** Must recalibrate **revenue sustainability** and spending mix.

3) Major Concerns

- **Expenditure Rigidity:** High salaries, pensions, interest crowd out development spend.
- **Subsidy Quality:** Expansion of **non-merit subsidies/freebies** risks displacing productive social investment.
- **Discom Stress:** Persistent losses create **contingent liabilities** for states.
- **Transparency Gaps:** **Off-budget borrowings** under-disclosed, masking true debt.

28. India's Fiscal Capacity Rises: Tax-to-GDP Touches 19.6%



A recent estimate by **Bank of Baroda** pegged **India's overall tax-to-GDP ratio at 19.6% in FY2024**, covering both Centre and States. The rise is driven mainly by **strong direct tax growth and improved tax buoyancy**, signalling higher fiscal capacity.

What is Tax-to-GDP Ratio? (Definition)

- The **share of total tax revenue in nominal GDP** of a country.
- **Formula:** Total tax revenue ÷ Nominal GDP.
- **Indicator of fiscal capacity:** Reflects how effectively the state mobilises domestic resources.
- **Global benchmark:** World Bank considers **15%** a threshold for sustainable growth and poverty reduction.

Key Findings for India (FY2024-25)

Indicator	Status
Overall Tax-to-GDP	19.6% (FY24)
Central Gross Tax Revenue	11.2% of GDP (FY24) → 11.7% (FY25, projected)
Direct Tax-to-GDP	6.64% (FY24) - 15-year high; 6.7% (FY25 est.)
Tax Buoyancy (long-term)	~1.1 (taxes growing faster than GDP)
Global Position	Higher than Malaysia & Indonesia; far below OECD avg ~34%

What is Driving the Rise?

- **Direct tax strength:** Better compliance, widening base, digitisation (PAN-Aadhaar, data analytics).
- **Formalisation:** GST, e-invoicing and digital payments shrinking the informal economy.
- **Buoyancy >1:** Indicates efficiency gains rather than only rate hikes.

UPSC Exam Relevance

- **Prelims:** Tax-to-GDP ratio, tax buoyancy, direct vs indirect taxes.
- **Mains: GS-III:** Fiscal capacity, revenue mobilisation, growth-equity trade-offs.

Higher-Order Thinking Mains Question

"A rising tax-to-GDP ratio strengthens fiscal capacity but may carry growth trade-offs." Analyse India's recent tax performance in this context.

29. Financing Viksit Bharat @2047: The Hidden Capital Constraint



India aims to become a **\$30 trillion developed economy by 2047**, but a recent analysis highlights that the **core bottleneck is not ambition, but financing growth sustainably**. Falling household savings, rising debt, and inefficient capital use threaten long-term growth stability.

India's 2047 Vision

- **Developed Nation Goal:** *Viksit Bharat @2047*
 - **GDP Target:** ~\$30 trillion by 2047
 - **Per Capita Income:** ~\$18,000 (as per NITI Aayog)
- Energy Independence:** By 2047

Core Risk: Financing the Growth Path

1. Erosion of Domestic Savings

- **Net household financial savings** fell to ~5.3% of GDP (FY2023) — a multi-decade low.
- **Household debt >40%**, increasingly used for consumption rather than asset creation.
- Weakens **long-term domestic capital formation**, increasing reliance on volatile foreign flows.

2. Debt-Led Consumption Trap

- Rising EMIs + lifestyle borrowing reduce future saving capacity.
- Risks shifting India from **investment-led growth** to **fragile demand-led growth**.

3. Bank Tenor Mismatch

- Bank deposits are largely **short-term**:
 - <1 year deposits ≈ 40%
 - 1–3 years ≈ 22–26%
- But infrastructure & manufacturing need **15–30 year capital**, creating systemic mismatch.

4. Low Capital Efficiency

- **ICOR: 4–5.5**, implying high investment needed for each unit of growth.
- Delays and regulatory uncertainty lock capital without proportional output gains.

ICOR (Incremental Capital Output Ratio):

Measures how much additional capital is needed to generate one extra unit of GDP.

Lower ICOR = more efficient growth.

30. Twin Credit Push for Exporters: Interest Subvention & Collateral Support under EPM



The Government of India launched two credit-support measures – the Interest Subvention Scheme and the Collateral Support Scheme – under Niryat Protsahan, a sub-scheme of the Export Promotion Mission (EPM), to lower borrowing costs and ease collateral constraints faced by MSME exporters.

1. Policy Context & Rationale

- MSME exporters face **high credit costs** and **insufficient collateral**, affecting price competitiveness and scale.
- The twin measures target **trade finance frictions** – interest burden and guarantee gaps – within a **single, integrated export-finance framework**.

2. Interest Subvention Scheme (ISS)

- **Nature:** Central Sector Scheme providing **2.75% interest subsidy** on **rupee export credit**.
- **Objective:** Reduce borrowing costs; improve **price competitiveness** of Indian exports.
- **Implementing Bodies:** Directorate General of Foreign Trade (DGFT) with the Reserve Bank of India.
- **Budget:** ₹5,181 crore over FY 2025–FY 2030.
- **Coverage:** **Pre-shipment** (production phase) and **post-shipment** (till realisation) rupee export credit.
- **Product Scope:** ~75% of **tariff lines** (high MSME presence).
- **Exclusions:** Restricted items, waste/scrap, products under overlapping incentives (e.g., PLI).
- **Cap:** ₹50 lakh per firm per year.
- **Rate Review:** **Floating;** reviewed **biannually** linked to repo/global benchmarks.

Significance: Predictable credit costs; supports working capital cycles; complements DBT-style fiscal discipline.

3. Collateral Support Scheme (CSS)

- **Nature:** **Government-backed credit guarantee** to improve bank finance access.
- **Objective:** Ease **collateral constraints** for MSME exporters; expand export-linked working capital.
- **Implementer (Pilot):** Credit Guarantee Fund Trust for Micro and Small Enterprises (CGTMSE).
- **Coverage:** **Export-linked working capital loans** by scheduled commercial banks and eligible lenders.
- **Guarantee Extent:**
 - **Up to 85%** (Micro & Small)
 - **Up to 65%** (Medium)
- **Exposure Cap:** ₹10 crore guaranteed outstanding per exporter per FY.
- **Exclusions:** Same as ISS (restricted items, waste/scrap, overlapping schemes).

Significance: De-risks lending; crowd-in bank credit; improves MSME credit penetration.

4. Export Promotion Mission (EPM): The Umbrella

- **Nature:** Flagship central-sector export-competitiveness programme under the Ministry of Commerce and Industry.
- **Nodal Agency:** DGFT.
- **Targets:** USD 2 trillion exports by 2030; exports/GDP to 15%.
- **Integration:** Consolidates schemes (e.g., IES, MAI) into a **unified framework**.
- **Sub-Schemes:**
 1. **NIRYAT PROTSAHAN** – affordable trade finance (ISS + CSS).

NIRYAT DISHA – non-financial support (market access, readiness, competitiveness).

31. 10-Minute Delivery Model and Gig Worker Protests



Over one lakh gig and platform workers went on strike demanding the withdrawal of 10-20 minute delivery models, citing road safety risks, excessive work pressure, and livelihood insecurity, reigniting the debate on regulating hyper-fast platform economies.

What is the 10-Minute Delivery Model?

- A **quick-commerce (q-commerce)** model promising ultra-fast delivery of groceries and essentials (10-20 minutes).
- Relies on **dark stores**, algorithmic routing, and **gig delivery workers** bearing time pressure.

Arguments Against the Model

- **Worker Safety:** Speed pressure increases accident risk; India already records ~1.7 lakh road deaths annually (MoRTH).
- **False Consumer Gain:** Marginal welfare difference between 10 minutes and 20-30 minutes, but **disproportionate rise in worker stress and risk**.
- **Labour as Shock Absorber:** Platforms protect tech and marketing costs, while **labour absorbs competitive pressure** through incentives and penalties.

Algorithmic Control: Ratings, penalties, and incentives indirectly coerce unsafe driving without formal employer liability.

Government Framework for Gig Workers

Level	Initiative	Key Features
Central	Code on Social Security, 2020	Legal recognition of gig/platform workers; enables welfare schemes
Central	e-SHRAM Portal (2021)	National database; portable social security & accident insurance
Central	Draft National Framework on Gig Workers	Platform accountability, data sharing, welfare financing
State	Rajasthan Act, 2023	Aggregator registration + welfare cess
State	Karnataka Bill, 2024	Welfare Board, insurance, pensions, grievance redressal

32. Startup India @10: From Policy Push to Platform Economy



On 16 January 2026, National Startup Day marks 10 years of the Startup India initiative, launched in 2016. The milestone highlights India's transition from a regulation-heavy ecosystem to one of the world's largest startup hubs, while also reopening debates on job quality, funding depth, and innovation outcomes.

What is Startup India?

- **Startup India** is a flagship entrepreneurship programme launched in 2016 to build an **innovation-driven, inclusive startup ecosystem**.
- **Nodal Department:** Department for Promotion of Industry and Internal Trade (DPIIT), under the Ministry of Commerce & Industry.
- **Core Framework (3 Pillars):**
 1. **Regulatory simplification**
 2. **Funding support & incentives**
 3. **Industry-academia & innovation linkages**

Key Policy Instruments

- **Ease of Compliance:** Self-certification under **6 labour + 3 environmental laws** (up to 5 years).
- **Tax Incentives:** 3-year income-tax holiday within first 10 years (Section 80-IAC).
- **IPR Support:**
 - 80% rebate on patent filing
 - 50% rebate on trademark filing
 - Fast-track examination
- **Funding Architecture:**
 - **Fund of Funds for Startups (FFS)** via SIDBI
 - **Startup India Seed Fund Scheme (SISFS)**

Credit Guarantee Scheme for Startups (CGSS)

Key Achievements (2016-2026)

Indicator	Outcome
Startup ecosystem rank	3rd largest globally
DPIIT-recognised startups	2+ lakh
Direct jobs created	~2.1 million
Unicorns	125 (>\$389 bn valuation)
Regional spread	53% from Tier-2 & Tier-3 cities
Gender inclusion	48% startups have a woman director

33. From Launchpad to Marketplace: India's Space Economy Takes Off



India's space economy is emerging as one of the fastest-growing globally, driven by a decisive shift from state-led missions to **commercial participation and private innovation**, with the government targeting a **\$44 billion space economy and 8% global market share by 2033**

What is Space Economy? : The **space economy** includes all activities and value chains related to space – **launch services, satellites, ground infrastructure, space-based applications (navigation, communication, EO), and downstream data services** contributing to economic output and employment.

Current Landscape of India's Space Economy

- **Market Size:** ~\$8.4 billion (~2% of global space economy).
- **GDP Impact:** ~₹20,000 crore added over the last decade; ~96,000 jobs supported.
- **Startup Ecosystem:** ~399 space-tech startups across launch vehicles, satellites, propulsion, electronics, and data services.
- **Launch Credentials:** 434 foreign satellites launched, establishing India as a **reliable low-cost global launch hub**.
- **Multiplier Effect:** Every \$1 invested generates ~\$2.54 in GDP – indicating high productivity.

Government Initiatives & Policy Support

- **Indian Space Policy, 2023:** Allows **non-governmental entities** to undertake end-to-end space activities (launch, satellites, ground systems).
- **Manufacturing Ecosystem:** Space parks (e.g., Kerala Space Park) offering plug-and-play infrastructure.
- **FDI Liberalisation:**
 - 100% FDI (automatic route) in satellite component manufacturing
 - Up to 74% FDI in satellite operations
- **Risk Capital:** ₹1,000 crore venture fund for deep-tech space startups.

UPSC Exam Relevance

- **Prelims:** Indian Space Policy 2023, IN-SPACE, FDI limits in space sector
- **Mains: GS-III:** Space technology, indigenisation, startups, economic growth

34. Integrated Fertiliser Subsidy Claim System: Digitising India's Largest Farm Subsidy



The Government of India has launched a **fully digital, integrated fertiliser subsidy claim system**, enabling **end-to-end online processing** of fertiliser subsidy payments, in line with the **Digital India and Public Financial Management reforms** agenda.

1. Fertiliser Subsidy in India: Current Snapshot

Indicator	Status
Total subsidy (FY 2025-26 BE)	~₹1.68 lakh crore
FY 2024-25 RE	~₹1.71 lakh crore
FY 2023-24 Actual	~₹1.88 lakh crore
Urea subsidy	~₹1.19 lakh crore
P&K (NBS) subsidy	~₹49,000 crore
Share in Union Expenditure	~3%+

Fertiliser subsidy remains **one of India's largest explicit subsidies**, critical for **food security and farmer affordability**.

What is the Integrated Fertiliser Subsidy Claim System?

Nature: End-to-end digital e-Bill platform for fertiliser subsidy claims

Coverage: Handles ~₹2 lakh crore of subsidy payments annually

Nodal Ministry: Department of Fertilisers

Key Features of the New System

- **Real-Time Claim Tracking**
Fertiliser companies can submit claims online and monitor payment status transparently.
- **Tamper-Proof Audit Trail**
Centralised digital records enhance **accountability and auditability**.
- **FIFO Processing**
First-in-first-out electronic workflow reduces discretion and delays.
- **Faster Subsidy Release**
Enables **weekly, timely payments**, improving working capital for fertiliser firms.

System Integration

Seamless linkage between **iFMS** and **PFMS**, ensuring end-to-end fiscal traceability.

Institutional Architecture Behind the System

Integrated Financial Management System (iFMS)

Department-specific digital platform for **budgeting, bill processing, and subsidy management**.

Public Financial Management System (PFMS)

Central government platform under the **Controller General of Accounts** for **authorisation, payment, and monitoring of public expenditure**.

35. India Emerges as World's Largest Rice Producer



The **Union Minister of Agriculture** announced that **India has surpassed China to become the world's largest rice producer**, reflecting record output, expanded area, and sustained productivity gains supported by policy interventions.

1. About Rice (Quick Basics)

- **Seasonality:** Predominantly a **Kharif crop** (sown June–July; harvested Nov–Dec); also grown as **Rabi and Zaid** in parts of southern and eastern India.
- **Climate:** 25–35°C, high humidity; >100 cm annual rainfall.
- **Soils:** Deep **clayey/loamy** soils with high water-holding capacity.
- **Cultivation Methods:** Transplantation, broadcasting, drilling.

Water-saving innovations: **Direct Seeding of Rice (DSR)** and **Alternate Wetting and Drying (AWD)** to conserve groundwater and reduce methane.

2. Rice Production in India (Why No. 1 Now?)

- **Output:** 150.18 million tonnes (2024–25) – >28% of global production.
- **Area:** ~51–52 million hectares (largest cropped area among cereals).
- **Leading States:**
 - **West Bengal** (~15%)
 - **Uttar Pradesh** (~12%)
 - **Punjab** (~10%)
- **Yields:** **Punjab** highest (full irrigation, mechanisation); followed by **Tamil Nadu** and **Telangana**.
- **Exports:** India is also the **largest rice exporter**, accounting for ~40% of global trade.
 - **Basmati** → West Asia
 - **Non-Basmati** → Africa & Southeast Asia

3. Varieties & Innovation

- **GI-tagged:** **Basmati**, **Gobindobhog (WB)**, **Joha (Assam)**, **Navara (Kerala)**.
- **Climate-resilient:** **Kamala**, **Pusa DST Rice-1** developed by **Indian Council of Agricultural Research (ICAR)**.

Mains Question : *India's rise as the world's largest rice producer is a milestone, but sustainability remains the real test. Discuss the drivers, benefits, and environmental trade-offs of India's rice-led growth.*

36. India's Fisheries Boom: Output Doubles in a Decade, but Sustainability Risks Loom



Government data shows India's fish production has **more than doubled in the last decade**, reaching nearly **198 lakh tonnes in 2024–25**. The surge is driven by aquaculture expansion and flagship fisheries schemes, even as **export risks and sustainability challenges intensify**.

What is the Update? (Context & Background)

- India's fisheries sector has transitioned from **capture-led growth to aquaculture-driven expansion**.

Strong policy push since 2014 has boosted inland fisheries, productivity, exports and employment.

Key Achievements (at a glance)

Indicator	Status
Fish Production	~197.75–198 lakh tonnes (2024–25) vs ~95.79 lakh tonnes (2013–14)
Global Rank	2nd largest fish producer (~8% of global output)
Aquaculture Productivity	~4.77 tonnes/hectare
Seafood Exports	₹62,408 crore (record high)
Livelihood Support	~3 crore fishers & fish farmers
Employment Generated	~74.66 lakh (since 2014–15)

Government Push Behind the Growth

- Investment Scale:** ₹32,723 crore approved since 2014–15.
- Core Schemes:** Blue Revolution, PM Matsya Sampada Yojana (PMMSY), PM-Matsya Kisan Samridhi Sah-Yojana.
- Social Security:** 34.71 lakh fishers under group accident insurance.
- Credit Access:** 4.49 lakh Kisan Credit Cards issued.

UPSC Exam Relevance

- Prelims:** PMMSY, Blue Economy, aquaculture productivity, fishmeal/bycatch.
- Mains:** GS-III (Agriculture, Food security, Exports, Blue Economy, Sustainability); Essay on coastal livelihoods.

Higher-Order Thinking Mains Question

"India's fisheries sector has achieved rapid growth but faces sustainability and equity challenges." Examine the role of policy in balancing production, exports and marine conservation

37. National Cooperative Sugar Federation Seeks Relief Amid Falling Sugar Prices



The National Cooperative Sugar Federation (NCSF) urged urgent government intervention to address declining sugar prices and financial stress faced by cooperative sugar mills.

About National Cooperative Sugar Federation (NCSF)

- **Nature:** Apex cooperative body representing all cooperative sugar factories and state-level sugar cooperative federations in India.
- **Established:** 1960.
- **Legal Framework:** Registered under the Multi-State Co-operative Societies Act, 2002.
- **Administrative Oversight:** Functions under the Ministry of Cooperation.
- **Governance:** Managed by an elected Board of Directors.
- **Core Functions:**
 - Acts as the principal spokesperson for cooperative sugar mills in government forums
 - Advises on modernisation of mills and improving sugarcane recovery
 - Advocates farmers' interests within the cooperative sugar ecosystem

38. Rüsoma Orange Festival Showcases Nagaland's Citrus Economy



On 30 January 2026, the 5th Rüsoma Orange Festival commenced at Rüsoma village, about 10 km from Kohima, Nagaland. The festival promotes rural entrepreneurship and highlights the premium quality of locally grown Rüsoma oranges.

Theme: "Abundance of Rüsoma" – focusing on village welfare and citrus-based livelihoods.

Location: Rüsoma village, near Kohima, Nagaland.

Duration: Two-day annual festival.

Economic Base: 470 out of 570 households engaged in orange cultivation.

- Orange farming is the village's primary livelihood activity.

Expansion Plan: Target to expand orchards to 100 hectares in the next 6–7 years.

Festival Components:

- Cultural performances and traditional games.
- Sale of orange saplings, local cuisine, and indigenous products.

Broader Objective:

- Promote agri-based rural entrepreneurship.
- Strengthen local branding and market linkage for horticultural produce.
- Aligns with North-East's focus on value-added horticulture and farmer-led economic growth.

39. One Station One Product (OSOP) Scheme



The **One Station One Product (OSOP)** scheme is being highlighted for promoting local livelihoods and traditional crafts through Indian Railways.

Key Facts

- **Launched by:** Ministry of Railways
- **Year:** 2022
- **Objective:** Provide market access to local products and revive traditional crafts affected by industrial standardisation
- **Implementation Model:** Each railway station hosts a **dedicated outlet for one unique regional product**
- **Design Support:** Stalls are **uniformly designed by the National Institute of Design (NID), Ahmedabad**
- **Beneficiaries:** Artisans, weavers, craftsmen, and Self-Help Groups (SHGs), especially from marginalised communities
- **Broader Vision:** Aligns with the **“Vocal for Local”** initiative to strengthen regional identity and livelihoods

40. India Introduces e-B-4 Visa for Chinese Business Professionals



January 2026: India launched an **electronic Production Investment Business Visa (e-B-4)** **exclusively for Chinese nationals** to facilitate business travel linked to manufacturing and industrial activities.

Key Features of the e-B-4 Visa

- **Objective:** Streamline entry of Chinese business personnel to support **manufacturing, production, and industrial operations** in India.
- **Permitted Activities:** **Equipment installation & commissioning, quality checks, essential maintenance, production, training, and senior management consultations.**
- **Compliance:** Mandatory **electronic registration** with the **Foreigners Regional Registration Office (FRRO)** within **14 days** of arrival.
- **Validity:** **Up to 6 months** stay per visit.
- **Diplomatic Context:** Part of efforts to **normalise India–China economic engagement** amid calibrated easing of business mobility.

41. One MSME, One Window: NITI Aayog Pushes Scheme Convergence



NITI Aayog has released a **roadmap to converge MSME schemes** across ministries to reduce duplication, lower compliance burden, and improve delivery of **credit, innovation, skills, and infrastructure support**. The initiative aims to fix fragmentation that limits scheme reach despite high public spending.

What is MSME Scheme Convergence? : A governance reform approach that integrates **data, processes, and delivery platforms** of multiple MSME schemes across Centre–States so that enterprises access support through **fewer touchpoints**, with better targeting and monitoring.

Key Recommendations

1) Centralised MSME Portal

- **Single Digital Window:** AI-enabled portal integrating all MSME schemes.
- **Smart Assistance:** Chatbots, dashboards, mobile access for real-time guidance.

2) Cluster Scheme Integration

- **SFURTI + MSE-CDP:** Merge for scale efficiency.
- **Traditional Industries Sub-Window:** Dedicated support within clusters.

3) Skill Programme Rationalisation

- **Three-Tier Model:** (i) Entrepreneurship/business skills, (ii) MSME technical skills, (iii) Rural/women artisan training.
- **Overlap Removal:** Merge similar trainings while preserving inclusion.

4) Marketing Assistance Wing

- **Domestic:** Exhibitions and structured market-linkage platforms.
- **Global:** Curated international buyer connections for exports.

5) Innovation Scheme Integration

- **ASPIRE Linkage:** Integrate into MSME Innovative as an agro-rural category.
- **Budget Ring-Fencing:** Protect existing ASPIRE funds; earmark future innovation budgets.

Safeguards

- **Protected:** National SC/ST Hub; Promotion of MSMEs in NER.
- **Standalone Flagships:** PMEGP, PM Vishwakarma (size/strategic role).

Why It Matters

- **Lower Costs:** Cuts compliance and time loss for small firms.
- **Better Targeting:** Data-driven delivery reduces leakages.

Growth & Jobs: MSMEs drive ~30% GVA, ~45.7% exports, and ~11 crore jobs.

Higher-Order Thinking Mains Question

“Scheme convergence is as important as scheme expansion for MSME growth.”
Examine this statement in the context of NITI Aayog’s MSME convergence roadmap.

42. Capital Boost for MSMEs: Cabinet Clears ₹5,000 Cr Infusion into SIDBI



The Union Cabinet approved a **₹5,000 crore equity infusion** into **Small Industries Development Bank of India** to expand MSME credit coverage.

- The move aims to **scale affordable lending**, support job creation, and strengthen SIDBI's balance sheet to meet rising MSME demand.

What is SIDBI? SIDBI is India's principal development finance institution for MSMEs, established in 1990 by an Act of Parliament, under the Ministry of Finance. It provides **direct lending, refinancing, guarantees, and ecosystem support** for MSMEs.

Decision Roadmap for Capital Infusion

- **Total Infusion:** ₹5,000 crore (equity)
- **Administered by:** Department of Financial Services (DFS)

Tranche	Amount	Year
I	₹3,000 crore	2025–26
II	₹1,000 crore	2026–27
III	₹1,000 crore	2027–28

Credit Expansion Target:

- MSMEs supported to rise from **76.26 lakh (FY25)** to **102 lakh (FY28)**.

Expected Impact

- **Employment Push:**
 - Avg. **4.37 jobs per MSME** → **~25.74 lakh** additional MSME beneficiaries could create **~1.12 crore jobs** by FY28.
- **Cheaper Credit:**
 - Stronger equity improves SIDBI's ability to **raise funds at competitive rates**, lowering MSME borrowing costs.

Why Capital Infusion Is Needed

- **Rising Demand:** Rapid growth in MSME beneficiaries requires higher lending capacity.
- **Scale of Sector:** **~6.9 crore registered MSMEs** (Sept 2025) → institutional credit needs deep buffers.

Prudential Norms: Higher MSME lending raises **risk-weighted assets**; equity is needed to maintain a healthy **CRAR**.

UPSC Exam Relevance

- **Prelims:** SIDBI mandate, CRAR, CGTMSE, TReDS, MSME statistics.
- **Mains:** GS-III: MSME growth, development finance, credit transmission, employment.

43. Apple Wars: Himachal Pushes for 100% Import Duty to Shield Domestic Growers



The Government of Himachal Pradesh has demanded **100% import duty on foreign apples** and a **seasonal import ban (July–November)** to protect local farmers. The demand follows India’s recent tariff reduction on **New Zealand apples** under a Free Trade Agreement, triggering price pressure on domestic produce.

Context & Background

- India reduced **apple import duty from 50% to 25%** for New Zealand under an FTA.
- Himachal argues that **cheap off-season imports** depress prices during India’s peak harvest, affecting farmer incomes.
- Apples are a **core horticulture crop** for hill economies, especially **Himachal Pradesh and Jammu & Kashmir**.

Apple Production in India (Key Facts)

Indicator	Data
Global Rank	5th largest producer
Production (2024–25)	~2.5 million metric tonnes (+6%)
Regional Share	J&K 70%, Himachal 20%, Uttarakhand 10%
Average Yield	6–8 tonnes/ha
Global Average	40–60 tonnes/ha
Annual Imports	~0.6 million metric tonnes

Import Profile

- **Low-cost suppliers:** Turkey, Iran
- **Counter-seasonal suppliers:** New Zealand, Chile
- Imports help ensure **year-round availability**, but intensify **price competition** during domestic harvest.

Policy Demand by Himachal Pradesh

- **100% Import Duty:** To neutralise price advantage of imports.
- **Seasonal Import Ban:** July–November (peak domestic harvest).
- **Rationale:** Protect **farm incomes**, prevent distress sales, sustain hill economy.

UPSC Exam Relevance

- **Prelims:** Apple production states, FTAs, import duties, horticulture crops
- **Mains:** GS-III: Agriculture – farm incomes, horticulture, trade policy, climate impact on crops GS-II: Centre-State issues in trade and agriculture

Higher-Order Thinking Mains Question

“The demand for higher import duties on apples reflects deeper structural weaknesses in India’s horticulture sector.”

Critically analyse the issue and suggest policy measures that balance farmer protection with global trade commitments.

44. Land Acquisition: The Achilles' Heel of India's Infrastructure Push



Reviews under PRAGATI have identified **land acquisition as the single biggest bottleneck** in India's infrastructure projects. It accounts for **35% of project delays**, while **environmental clearances and right-of-way issues together contribute to 73% of total delays nationwide**.

1. What is Land Acquisition? (Definition)

Land acquisition is the **state-led process of acquiring private land for public purposes** such as infrastructure, defence, industry, and social development, with **compensation, rehabilitation, and resettlement** for affected persons.

2. Legal Framework Governing Land Acquisition

- **Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement (LARR) Act, 2013**
 - **Social Impact Assessment (SIA)** mandatory to assess effects on livelihoods, habitat, and community assets.
 - **Consent Norms:**
 - **80% consent** for private projects
 - **70% consent** for PPP projects
 - **Compensation:**
 - **4× market value (rural)**
 - **2× market value (urban)**
 - **Solatium:**

100% additional compensation for involuntary acquisition.

3. Why Land Acquisition Delays Infrastructure

- **Fragmented Land Holdings:** Small, scattered plots complicate aggregation.
- **High Transaction Costs:** Lengthy SIA, consent, and litigation processes.
- **Centre-State Divergence:** State-level amendments and variable implementation.
- **Trust Deficit:** Perceived inadequacy of rehabilitation and livelihood restoration.

Judicial Scrutiny: Frequent challenges increase uncertainty and timelines.

UPSC Exam Relevance

- **Prelims:** LARR Act provisions, SIA, consent norms, PRAGATI
- **Mains (GS-III):** Infrastructure bottlenecks, land reforms, public investment efficiency

Mains Question : *Inadequate land acquisition, rather than lack of finance, has emerged as the primary constraint on India's infrastructure expansion. Discuss the reasons and suggest reforms to balance development imperatives with social justice*

45. PPP Pipeline 2026–28: Institutionalising Private Capital for India’s Infrastructure Push



The Ministry of Finance has operationalised a **three-year Public-Private Partnership (PPP) project pipeline (FY26–FY28)**, as announced in the Union Budget 2025–26, to provide **early visibility of bankable infrastructure projects** and crowd-in private investment.

1. What is the Three-Year PPP Project Pipeline?

- A **forward-looking roadmap** prepared by the **Department of Economic Affairs** listing **852 PPP projects** across the Centre and States.
- **Objective:** Reduce uncertainty for investors, enable **long-term capital planning**, and **bridge the infrastructure financing gap**.
- **Sectors:** Transport (roads, ports, airports), energy, railways, water & sanitation; states also include **social and commercial infrastructure**.
- **Digital Integration:** Aligned with **PM Gati Shakti** for multi-modal planning and execution.

Project Prep Support: States can access **India Infrastructure Project Development Fund (IIPDF)** for DPRs and transaction advisory.

Key PPP Models Promoted

Model	Risk Allocation	Why Relevant
HAM	Shared (Govt annuity + private EPC/OM)	Reduces traffic risk, improves bankability
DBFOT	Private builds/operates, toll risk	Suitable for mature corridors
TOT	Monetisation of operating assets	Recycles capital quickly
Hybrid Social PPPs	Viability support	Enables health/education infra

Added UPSC-relevant link: **Viability Gap Funding (VGF)** remains critical to make socially desirable but marginally viable projects bankable.

UPSC Exam Relevance

- **Prelims:** PPP models; IIPDF; NMP; Gati Shakti.
- **Mains (GS-III):** Infrastructure financing, PPP reforms, risk allocation.
- **Essay:** Public finance and private capital for development.

Mains Question :

How does a forward PPP project pipeline improve infrastructure financing outcomes? Examine its significance and challenges in the Indian context.

46. Railway Electrification in India: Powering a Greener, Cheaper Rail Network



Indian Railways has electrified ~99.2% of its Broad Gauge network – about 69,427 route-km of 70,001 route-km – making India the world's largest electrified rail system.

1. Current Status

- **Coverage:** Only 574 route-km (0.8%) pending across five States; 25 States/UTs fully electrified.
- **Execution Pace:** From ~1.42 km/day (2004–14) to 15+ km/day (2019–25) – mission-mode delivery.
- **Decadal Leap:** ~46,900 route-km electrified between 2014–2025 (over two-thirds of today's network).

2. Technology & Execution Innovations

- **Mechanised Foundations:** Auger-based piling replaced manual digging – faster, safer, labour-light.
- **Automatic Wiring Trains:** Simultaneous catenary & contact wire laying with precise tensioning.
- **Standardisation:** Pan-India 25 kV AC norms ensure interoperability and safety.

3. Strategic Significance

Energy & Fiscal

- **Energy Security:** Electric traction is ~70% cheaper per km than diesel; shields from fuel-price shocks.
- **Cost Savings:** ₹2,000–2,500 crore/year fuel savings; improves operating ratio.

Climate & Renewables

- **Emissions:** Potential ~60 million tonnes CO₂/year reduction vs diesel – supports Net-Zero 2070.
- **RE Integration:** 898 MW solar (Nov 2025); ~70% (629 MW) directly feeds traction.

Operations & Capacity

- **Performance:** 20–25% higher hauling capacity, better acceleration → faster freight turnarounds, higher line utilisation.

Global Standing

Electrification Share: India 99.2% vs China ~82%, Japan ~64%, UK ~39%.

UPSC Exam Relevance

- **Prelims:** 25 kV AC standard; electrification share; traction economics.
- **Mains (GS-III):** Infrastructure-energy-climate nexus; logistics competitiveness; public sector reform.

47. Protest Against Vadhavan Port



Thousands of people staged a **protest march** against the **Vadhavan Port project** in **Maharashtra**. Protesters cited threats to **livelihoods of fisherfolk, farmers, and Adivasi communities** and potential **ecological damage** to the **Dahanu Eco-Sensitive Zone (ESZ)**.

About Dahanu Eco-Sensitive Zone (ESZ)

- **Legal Status:** A **protected eco-sensitive area** in **Palghar district**, notified by the **Ministry of Environment and Forests** in **1991**.
- **Ecological Significance:**
 - The **Dahanu-Vadhavan intertidal zone** is known as the **“Golden Belt”**.
 - Hosts **rare corals, live conches, and highly productive fish breeding grounds**.
- **Purpose of ESZ:** To regulate industrial and infrastructure activities around ecologically fragile regions.

About Vadhavan Port

- **Type:** **All-weather, deep-draft, greenfield major port**.
- **Location:** **Palghar district, ~150 km north of Mumbai**.
- **Unique Feature:** **India’s first offshore port, planned on an artificial island through land reclamation**.
- **Implementing Agency:** **Vadhavan Port Project Limited (VPPL)** – a JV between
 - **Jawaharlal Nehru Port Authority (74%)** and
 - **Maharashtra Maritime Board (26%)**.
- **Operational Model:** **Landlord Port Model** – port authority owns land & core assets; private operators run terminals.
- **Draft Advantage:** **Natural draft of ~20 metres**, enabling large container ships without heavy capital dredging.
- **Connectivity:** Linked to **Western Dedicated Freight Corridor (DFC)** and **Mumbai-Vadodara Expressway**.
- **Strategic Role:** Gateway for **IMEC and INSTC trade corridors**.

48. Uttarakhand Wins 'Best State for Aviation Ecosystem' at Wings India 2026



On 29 January 2026, Uttarakhand was awarded “Best State for Promotion of Aviation Ecosystem” at Wings India 2026. The award recognises sustained efforts in strengthening aviation infrastructure and regional air connectivity.

Key Highlights

- **Event:** Wings India 2026 – India’s flagship civil aviation event organised by the Ministry of Civil Aviation and FICCI.
- **Award Venue:** Begumpet Airport, Hyderabad.
- **Presented By:** Union Civil Aviation Minister & Civil Aviation Secretary.

Why Uttarakhand Was Recognised

- **Infrastructure Expansion:** Development of airports at Dehradun (Jolly Grant), Pantnagar, and Pithoragarh; expansion of heliports under regional connectivity schemes.
- **UDAN Implementation:** Effective rollout of the UDAN (Ude Desh ka Aam Nagrik) scheme improving last-mile connectivity in hilly terrain.
- **Tourism Boost:** Enhanced access to Char Dham and eco-tourism circuits.
- **Disaster Response:** Faster evacuation and logistics during floods, landslides, and emergencies.

Healthcare Access: Improved medical evacuation and access to tertiary healthcare facilities.

About UDAN Scheme

- **Launch:** 2016 under the National Civil Aviation Policy.
- **Objective:** Make air travel affordable and enhance regional connectivity.
- **Model:** Viability Gap Funding (VGF) provided to airlines for operating on unserved and underserved routes.
- **Focus States:** Special emphasis on hilly, northeastern, and island regions.

49. Minerals as Power: India Recalibrates Its Critical Minerals Diplomacy



India's clean-energy transition – covering EVs, batteries, renewables and semiconductors – has exposed **acute import dependence on critical minerals** amid tightening export controls and geopolitical weaponisation of supply chains. This has pushed India to **rethink minerals diplomacy from ad-hoc sourcing to strategic, value-chain partnerships**.

What are Critical Minerals?

- **Critical minerals** are metallic or non-metallic elements essential for modern technologies, economic growth and national security, **with high supply-chain disruption risk**.

Examples: **Lithium, cobalt, nickel, rare earth elements (REEs), graphite.**

Why Critical Minerals Matter for India

- **100% Import Dependence:** India imports all its lithium, cobalt and nickel – key inputs for EV batteries and energy storage.
- **China's Dominance:** China controls ~81% of global processing capacity, turning minerals into **geopolitical choke points**.
- **Downstream Risk:** In 2024–25, India imported **53,000+ tonnes of rare-earth magnets, 90% from China**, threatening EVs, wind turbines and electronics.
- **Energy Transition Link:** Minerals are the backbone of **solar panels, wind turbines, EVs, grid storage and semiconductors**.

India's Region-Wise Critical Minerals Diplomacy

Region	Strategic Value	Key Takeaways
Australia	Reliable upstream supplier	India–Australia Critical Minerals Investment Partnership (2022); lithium & cobalt projects
Japan	Resilience model	Focus on diversification, recycling, stockpiling & R&D; scope for joint processing
Africa	Long-term potential	Namibia (lithium, REEs, uranium); Zambia (copper, cobalt); value-addition opportunity
United States	Strategic but uncertain	TRUST & Strategic Minerals Recovery Initiatives; policy volatility limits depth
European Union	Standards-driven market	EU Critical Raw Materials Act & Battery Alliance; requires ESG lifecycle alignment
West Asia (Gulf)	Midstream processing	UAE & Saudi battery materials/refining; needs institutional frameworks
Russia	Diversification hedge	Large reserves & scientific links; constrained by sanctions & logistics
Latin America	Lithium frontier	Argentina–Chile–Peru–Brazil; KABIL's ₹200-crore Catamarca lithium exploration
Canada	Stable reserves	Nickel, cobalt, copper, REEs; diplomatic stability is key

50. Coking Coal Gets 'Critical & Strategic' Tag: India's Steel Security Move



In January 2026, the Government of India notified **coking coal** as a **Critical and Strategic Mineral** under the MMDR Act, 1957.

The move aims to **secure raw material supply for the steel sector**, reduce import dependence, and support **Aatmanirbhar Bharat** and **Viksit Bharat 2047** goals.

What is Coking Coal? (Definition)

- **Coking coal** is a high-grade **bituminous coal** which, when heated **in the absence of air**, converts into **coke**.
- **Coke** acts as both **fuel and reducing agent** in **blast furnaces** for iron and steel making.
- Key properties: **High carbon, low ash, low sulphur & phosphorus**, and strong **caking (plasticity) ability**.

Thermal coal, in contrast, is used only for power generation and **cannot form coke**.

Geographical Distribution (India)

- **Jharkhand (Jharia Coalfield):** ~90% of India's prime coking coal reserves

Other pockets: Raniganj (West Bengal), Bokaro (Jharkhand), Talcher (Odisha – limited quality), and parts of Madhya Pradesh

Indian coking coal is **high in ash (18-25%)**, reducing blast furnace efficiency.

Why is Coking Coal Critical for India?

- **Steel Backbone:** ~70% of India's steel is still produced via the **blast furnace–basic oxygen furnace (BF-BOF)** route.
- **Import Dependence:** India imports ~85% of its **coking coal**, mainly from **Australia, Russia, and the USA**, exposing it to **geopolitical and price shocks**.
- **Rising Demand:** India targets **300 MT steel capacity by 2030**, sharply increasing coking coal demand.

Limited Substitutability: Green hydrogen–based steel is still **costly and unscaled**.

What Does "Critical & Strategic Mineral" Status Mean?

- **Legal Basis:** Under the **MMDR Act**, minerals tagged as *Critical & Strategic* fall under **exclusive Central Government control** for auction and allocation.
- **Supply Security:** Enables prioritised mining, faster clearances, and strategic stockpiling.
- **National Security Lens:** Links mineral policy directly with **industrial resilience and defence preparedness**.

51. India Unveils First Tailings Policy to Unlock Critical Minerals



On 19 January 2026, the Government of India announced the country's **first Tailings Policy**. The policy provides a framework for recovery of **critical and strategic minerals** from mine waste, tailings ponds and dumps.

Key Highlights

- **What are Tailings?**
 - Residual waste materials left after extraction of valuable minerals from crushed ore.
 - Often stored in **tailings ponds** or mine dumps.
- **Policy Trigger:**
 - Announced following the **Union Budget 2026 commitment** to recover critical minerals from secondary sources.
- **Coverage:**
 - Recovery from **primary mineral deposits** and
 - **Secondary sources** such as legacy mine dumps and tailings.
- **Inter-Ministerial Coordination:**
 - Recognises that critical minerals may exist in materials handled by multiple ministries (not just Ministry of Mines).
 - Calls for integrated governance and data sharing.
- **Core Assessment Parameters:**
 - Location and mapping of tailing ponds and dumps.
 - Quantity of accumulated tailings.
 - Likely availability of critical/strategic elements.
 - Economic feasibility of extraction.
- **Companion Minerals Concept:**
 - Primary ores may contain trace metals (e.g., rare earths, lithium, cobalt) recoverable from tailings.

Encourages extraction of these “hidden” strategic resources.

Significance

- Reduces dependence on imports of critical minerals (essential for EVs, semiconductors, renewables).
- Promotes **circular economy in mining**.
- Supports **National Critical Minerals Strategy** and energy transition goals.
- Mitigates environmental risks of legacy mine waste.

52. Directorate General of Mines Safety Marks 125 Years of Mine Safety Oversight



The Directorate General of Mines Safety (DGMS) celebrated its 125th Foundation Day, reaffirming its statutory role in **mineworker safety, health, and welfare**.

About DGMS

- **Established: 1902.**
- **Administrative Control: Ministry of Labour and Employment.**
- **Headquarters: Dhanbad, Jharkhand (India's coal capital).**
- **Legal Mandate: Administers the Mines Act, 1952 and allied rules.**
- **Coverage: Coal, metalliferous, and oil mines.**
- **Core Functions:**
 - Safety inspections & **accident investigations**
 - **Certification** of mining professionals
 - **Statutory approvals** for mining equipment and methods
- **Digital Governance: SASHAKT portal for paperless permissions and compliance, supporting Ease of Doing Business.**

India's Mining Sector: Quick Facts

- **Economic Share: ~2% of India's Gross Value Added (GVA).**
- **Employment: ~12.5 million** (direct & indirect), largely in tribal/backward regions.
- **Global Rank: 2nd** in aluminium & crude steel; **4th** in iron ore production.
- **Leading States (by value): Odisha (1st), followed by Rajasthan, Chhattisgarh, Karnataka.**

53. Banks Enter Pension Fund Management: New Phase for India's NPS



The Pension Fund Regulatory and Development Authority (PFRDA) approved a new framework allowing banks to set up pension funds to manage assets under the National Pension System (NPS) – expanding their role beyond subscriber servicing to **direct asset management**, subject to prudential norms.

1. What Has Changed? (Policy Shift)

- **Earlier:** Scheduled Commercial Banks acted only as **Points of Presence (PoPs)** – onboarding subscribers and servicing accounts.
- **Now:** Eligible banks can **sponsor a Pension Fund Manager (PFM)** to manage NPS assets directly.
- **Eligibility:** Aligned with **Reserve Bank of India (RBI)** norms on **net worth, market capitalisation, and prudential soundness**.

Why this matters: Deepens competition in pension fund management, leverages banks' distribution strength, and broadens institutional capacity for long-term savings.

About the National Pension System (NPS)

- **Nature:** Voluntary, defined-contribution retirement scheme.
- **Regulator:** PFRDA.
- **Portability:** PRAN remains portable across jobs and locations.
- **Investment Mix:** Equities, government securities, corporate bonds, and alternatives – **market-linked returns**.
- **Eligibility:** Indian citizens and OCIs aged 18–70.

Withdrawals & Annuity

- **At age 60:**
 - **Govt employees:** Up to **60% lump sum (tax-free)**.
 - **Mandatory annuity:** **≥40%** to buy annuity (taxable pension).
- **Non-govt subscribers:** Recent reforms allow **up to 80% lump-sum** withdrawal.

PFRDA: Role & Mandate

- **Status:** Statutory regulator under the **PFRDA Act, 2013** (interim since 2003).
- **Objective:** Promote **old-age income security**.
- **Functions:** Prescribes **investment norms**, performance benchmarks, and operational guidelines.
- **Schemes Administered:** NPS, Atal Pension Yojana (APY), Unified Pension Scheme (UPS), NPS Vatsalya.

UPSC Exam Relevance

- **Prelims:** NPS features, PFRDA, PFMs, PRAN portability, annuity rules
- **Mains (GS-III):** Pension reforms, financial deepening, long-term capital

54. Future-Proofing Pensions: PFRDA Sets Up SAARG to Modernise NPS



The Pension Fund Regulatory and Development Authority has constituted the Strategic Asset Allocation and Risk Governance (SAARG) Committee to modernise the National Pension System (NPS).

The move aims to align NPS investments with **global best practices** for long-term retirement wealth creation amid evolving market risks.

What is SAARG? (Definition)

- A specialised expert committee to review and recommend reforms in **asset allocation, risk governance, and valuation** within NPS, with a **nine-month timeline**.

Committee Snapshot

- **Chairperson:** Narayan Ramachandran

Composition: 9 members (investment, risk, pensions expertise)

Key Mandates of SAARG

- **Asset Allocation Review:** Reassess **equity, debt, and money market** mixes to optimise risk-return over long horizons.
- **Diversification:** Examine **new investment options** (including alternatives) to reduce concentration and market risks.
- **Global Benchmarking:** Compare NPS guidelines with **leading global pension systems**.
- **ALM & Valuation:** Develop **asset-liability management** and **valuation standards** for alternative assets.
- **ESG Integration:** Embed **ESG and climate-transition risks** into investment decision-making.

UPSC Exam Relevance

- **Prelims:** PFRDA, NPS, ALM, ESG.
- **Mains: GS-III:** Pension reforms, long-term savings, financial market governance.

Higher-Order Thinking Mains Question

“Modern pension systems require a balance between return optimisation and risk governance.”

Discuss how the SAARG Committee can reshape India’s NPS to meet this objective.

55. Extension of Atal Pension Yojana



The Union Cabinet approved the **continuation of Atal Pension Yojana (APY) till FY 2030-31**, with government support for promotion, development, and gap funding.

Key Facts

- **Launch Year:** 2015
- **Nature:** Central Sector Scheme
- **Target Group:** Workers in the unorganised sector
- **Implementing Authority:** Pension Fund Regulatory and Development Authority (PFRDA)
- **Framework:** National Pension System (NPS)
- **Eligibility:** Non-income-tax payers aged **18-40 years** with a bank account
- **Objective:** Guaranteed monthly pension through voluntary retirement savings

56. Paripoorna Mediciam Ayush Bima



The **Ministry of Finance** launched **Paripoorna Mediciam Ayush Bima** for beneficiaries of the **Central Government Health Scheme (CGHS)**. The scheme **supplements CGHS** by expanding **cashless coverage, modern procedures, and hospital choice**.

About Paripoorna Mediciam Ayush Bima

- **Nature:** **Optional** health insurance plan to **top-up CGHS** benefits.
- **Coverage Options:** ₹10 lakh or ₹20 lakh sum insured.
- **Family Coverage:** Up to **six members** under a single policy.
- **Cost Sharing:** Choice of **70:30** or **50:50** co-sharing between **insurer and subscriber**.
- **Tax Treatment:** **GST-exempt premiums**.
- **Care Access:** Enables **cashless treatment**, access to **modern medical procedures**, and **broader hospital networks** beyond CGHS empanelment.

About CGHS

- **Established:** 1954.
- **Scope:** Comprehensive healthcare – **OPD services, diagnostics, and hospitalisation**.
- **Beneficiaries:** Serving and retired **Central Government employees** and their families.

57. Freeze First, Recover Later (Kill Switch & Cyber Insurance)



The Ministry of Home Affairs is exploring 'kill switch' mechanisms and cyber insurance solutions to counter the surge in so-called "digital arrest" scams. The move reflects a shift towards real-time prevention and post-fraud recovery as cyber frauds rise sharply in India's digital payments ecosystem.

What is a "Digital Arrest"? (Definition)

- A **social-engineering cyber fraud** where criminals impersonate police, CBI, ED, or courts via video calls, threatening "arrest" unless money is transferred immediately.

Victims are psychologically coerced into **authorising transactions themselves**, bypassing conventional fraud alerts

Context & Background

- India's rapid adoption of **UPI, mobile banking, and instant payments** has reduced transaction friction but increased vulnerability to **real-time scams**.
- Existing safeguards work **after** money leaves the account, while digital arrest scams demand **instant intervention tools**.

About the 'Kill Switch'

What it is

A **single-point emergency button** embedded in banking/UPI apps.

How it Works

- On activation:
 - Freezes **all outgoing transactions**
 - Covers **bank accounts, UPI IDs, cards, and wallets**

Prevents irreversible real-time fund transfers during panic situations.

Objective

To **break the fraud momentum** when victims are under psychological stress.

Why it Matters

Digital arrest scams rely on **speed + fear**; kill switches target the *speed* element.

About Cyber Insurance / "Cyber Sachet"

What it is

A **post-incident financial recovery mechanism** covering losses from cyber fraud.

Why Needed

- Traditional insurance:
 - Covers unauthorised transactions
 - Excludes frauds where users are tricked into authorising transfers**

Key Developments

Reserve Bank of India views digital fraud as a **systemic balance-sheet risk**, not just a compliance lapse.

Proposal for a **Fraud Insurance Pool** (on lines of terrorism insurance pools) to:

- Spread risk across banks
- Prevent isolated bank failures due to large fraud shocks

Kill Switch vs Cyber Insurance (Quick Comparison)

Aspect	Kill Switch	Cyber Insurance
Nature	Preventive	Corrective
Timing	Real-time	Post-incident
Focus	Transaction freeze	Loss compensation
Best for	Digital arrest scams	Recovery after fraud

58. International Data Privacy Day 2026



International Data Privacy Day is observed on **28 January** to promote awareness on personal data protection. Marked by the **Council of Europe**, the day commemorates **Convention 108** (2006). The **2026 theme** – **“Take Control of Your Data”** underscores individual agency and informed consent amid AI-led data economies.

What is Data Privacy? (Definition)

- Data privacy refers to an individual’s **control over collection, storage, processing and sharing of personal data**.
- It is a core pillar of **digital governance**, enabling trust, accountability and rights protection.
- In **K.S. Puttaswamy vs Union of India**, the Supreme Court affirmed **Right to Privacy** as a **fundamental right under Article 21**.

India’s Data Protection Architecture (Snapshot)

Layer	Key Elements
Parent Law	IT Act, 2000 – cyber offences, e-signatures; Section 69A for content blocking
Incident Response	Indian Computer Emergency Response Team (CERT-In)
Platform Due Diligence	IT Rules, 2021 – intermediary obligations & grievance redressal
Comprehensive Law	Digital Personal Data Protection (DPDP) Act, 2023 – consent-centric, SARAL compliance
Enforcement	DPDP Rules, 2025 – procedures & timelines
Regulator	Data Protection Board of India (DPBI) – digital-first adjudication
Appeals	Telecom Disputes Settlement and Appellate Tribunal (TDSAT)

Key Issues / Challenges

- **Consent Fatigue:** Notice overload weakens meaningful consent.
- **Children’s Data:** Stronger safeguards needed for minors in platform design.
- **Cross-Border Flows:** Absence of “data adequacy” with some partners constrains advanced services.
- **Enforcement Capacity:** Scaling DPBI expertise and timely adjudication.
- **AI Risks:** Model training, inference and deepfakes outpace regulatory clarity.

JANUARY 2026

ENVIRONMENT

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2026

1. India's Climate Targets: Progress, Paradoxes and the Road Ahead



More than a decade after the **Paris Agreement**, India's climate performance is being debated amid tensions between **rapid development**, **coal dependence**, **forest governance**, and the **energy transition**, even as several headline targets show early progress.

India's Climate Targets (Paris & Updated NDCs)

- **Net Zero:** By 2070 (COP26 pledge).
- **Non-fossil Capacity:** 500 GW by 2030.
- **Energy Mix:** 50% installed power capacity from non-fossil sources by 2030 (achieved ~51% by June 2025).
- **Emissions Intensity:** -45% by 2030 from 2005 levels.
- **Avoided Emissions:** 1 billion tonnes CO₂ by 2030.

Carbon Sink: 2.5–3.0 bn tonnes CO₂e via forests & tree cover by 2030.

Progress So Far

- **Emissions Intensity:** ~36% reduction by 2020, well ahead of target.
- **Renewables:** Non-fossil capacity rose from ~30% (2015) to ~51% (2025).
- **Carbon Sink:** ~2.29 bn tonnes CO₂e added since 2005, nearing the Paris pledge.

Key Gaps & Challenges

- **High Absolute Emissions:** ~2,959 MtCO₂e (2020); intensity gains haven't reduced totals.
- **Coal Dominance:** >70% of electricity generation still coal-based.
- **Capacity vs Generation Gap:** Renewables form 51% capacity but only ~22% of generation.
- **Storage Deficit:** ~500 MWh installed vs 336 GWh needed by 2030.
- **Forest Quality Issue:** Plantation-heavy gains mask loss of natural forests and biodiversity.

Governance Weakness: Poor utilisation of CAMPA funds in several States.

Mains Practice Question

"India has met several climate targets early, yet absolute emissions continue to rise." Analyse the reasons and suggest a balanced strategy for India's energy transition.

2. Climate Whiplash: How a Destabilised Global Water Cycle Is Driving Extreme Disasters



In 2025, floods, droughts, heatwaves and wildfires caused by disruptions in the global water cycle led to nearly **5,000 deaths and displacement of ~8 million people** worldwide. Experts warn that climate change is creating rapid swings between wet and dry extremes, a phenomenon termed “**climate whiplash.**”

What is the Global Water Cycle?

- The **global water cycle** is the continuous circulation of water between the **atmosphere, land, cryosphere and oceans** through evaporation, condensation, precipitation, runoff and groundwater recharge.
- It redistributes **water and heat**, regulating climate, ecosystems and human livelihoods.

Why is the Water Cycle Getting Destabilised?

- **Warmer Atmosphere:** Higher temperatures accelerate evaporation, drying soils faster while loading the atmosphere with more moisture → intense rainfall bursts.
- **Ocean Warming:** Warmer seas supply excess moisture, **strengthening cyclones and storms.**
- **Cryosphere Instability:** Glacier and snow melt disrupt seasonal river flows, increasing flood–drought variability.

How Water-Cycle Shifts Amplify Climate Disasters

Water-cycle change	Disaster outcome
Short, intense rainfall	Flash floods & urban flooding
High evaporation + heat	Severe agricultural & hydrological drought
Wet phase → sudden heat	Wildfire intensity surge (“climate whiplash”)
Warmer oceans	Stronger & expanding cyclone zones
Excess runoff	Landslides, dam stress, infrastructure failure

Key Concept: Climate Whiplash

- Rapid alternation between **extreme wet and extreme dry phases.**
- Wet periods increase vegetation and fuel load → sudden heat dries it rapidly → **explosive wildfires.**
- Makes disaster planning harder as extremes no longer follow predictable seasonal patterns.

Why This Matters for India

- India is highly exposed due to **monsoon dependence, glacier-fed rivers, dense cities and coastal zones.**

Destabilised water cycle can worsen **urban floods, heatwaves, drought-induced farm distress and disease outbreaks.**

3. Earth's Seasons Losing Sync: Study Flags Climate-Driven Seasonal Breakdown



A 20-year satellite-based study reports that **Earth's seasonal cycles are becoming fragmented and locally unpredictable.**

The findings link the **desynchronisation of seasons** to rising temperatures and shifting precipitation patterns due to climate change.

Key Findings

- **Seasonal Asynchrony:** Nearby regions with similar climates now show mismatched seasonal timing instead of coordinated transitions.
- **Hotspot Regions:** Strongest breakdown observed in **tropical mountains** and **Mediterranean climate zones**.
- **Divergent Growth Patterns:** Mediterranean forests may show delayed or double peak growth compared to grasslands.
- **Satellite Evidence:** Based on long-term vegetation indices (e.g., NDVI) tracking plant greening and productivity trends.

Major Impacts

- **Biodiversity Mismatch:** Pollinators emerging before flowering or migration-breeding cycles going out of sync.
- **Agricultural Uncertainty:** Altered harvest cycles (e.g., coffee farms in Colombia), weakening reliance on traditional seasonal cues.
- **Hydrological Instability:** Early snowmelt + intense rainfall bursts → floods and droughts in the same year.
- **Anthropogenic Seasons:** Human-driven cycles such as Southeast Asia's "haze season" (biomass burning) and Bali's "trash season" (monsoon waste inflow).

4. Winter Peak Shocks India's Power Grid: Climate Volatility Redefines Demand Patterns



India's peak power demand touched 245 GW on January 9, surpassing the summer 2025 peak of 242 GW, driven by unusually cold weather. This marks a structural shift where winter demand is rivaling traditional summer peaks, challenging grid planning assumptions.

What Happened? (Context & Background)

- India has historically seen **summer-driven peak electricity demand** due to cooling loads.
- In January 2026, peak demand **unexpectedly crossed summer levels**, reflecting **climate-induced volatility** and new consumption patterns.

Key Drivers of the Winter Peak Surge

- **Unusual Cold Conditions:** Increased household heating and climate conditioning loads.
- **Muted Summer 2025:** Intermittent rains and milder temperatures kept summer peaks below the projected **277 GW**.
- **Climate Volatility:** Weather unpredictability is blurring seasonal demand distinctions.
- **EV Charging Load:** Rapid adoption of electric two-wheelers, especially in towns and gig economy segments.
- **Building Design Shift:** Glass-heavy commercial/residential buildings raise year-round conditioning demand.

Impacts on the Power System

- **Short-Duration Stress Events:** Demand crossed **240 GW three times in January**, compared to seven times over Apr-Dec 2025.
- **Rising Winter Sensitivity:** Early January demand was **>3% YoY**, forcing utilities to maintain higher reserves even in winter.
- **Planning Mismatch:** Annual demand growth (1.5–2%) is modest, but **peak demand is spiking**, raising costs for peaking capacity and grid resilience.

Higher-Order Thinking Mains Question

"Climate volatility is disrupting India's traditional electricity demand patterns." Analyse the implications for power-sector planning and suggest measures to manage peak-load risks.

5. India Widens Carbon Market Net to 490 Heavy Emitters



In January 2026, the Government of India notified **Greenhouse Gas Emission Intensity (GEI) targets** for additional sectors under the **Carbon Credit Trading Scheme (CCTS)**. The move expands the **compliance coverage of the Indian Carbon Market (ICM)**.

New Sectors Brought Under Compliance

- Petroleum Refineries
 - Petrochemicals
 - Textiles
 - Secondary Aluminium
- **208 new obligated entities** added.

Total Coverage After Expansion

- **490 obligated entities** across major emission-intensive industries.
- Earlier (Oct 2025) sectors included:
 - Aluminium
 - Cement
 - Chlor-Alkali
 - Pulp & Paper (282 entities)

About Indian Carbon Market (ICM)

- **Legal Basis:** Carbon Credit Trading Scheme (CCTS), notified in **2023** under the Energy Conservation Act (amended 2022).

Objective: Reduce greenhouse gas emissions by **placing a cost on carbon** through a tradable credit mechanism.

How CCTS Works

Compliance Mechanism

- Designated industries must meet **assigned GEI reduction targets**.
- Non-compliance requires purchase of carbon credits.

Offset Mechanism

- Entities exceeding targets earn **Carbon Credit Certificates (CCCs)**.
- Credits can be traded in the carbon market.

Significance

- Deepens India's shift toward **market-based climate regulation**.
- Incentivises industries to adopt **clean technologies & energy efficiency**.
- Aligns with India's:
 - **NDC commitments under Paris Agreement**

Net-zero target by **2070**

6. ACASA-India: Digital Climate Atlas for Climate-Resilient Agriculture



Government launched the **Atlas of Climate Adaptation in Indian Agriculture (ACASA-India)**. The release marked **15 years of the NICRA programme**. It aims to enable **location-specific, data-driven climate adaptation planning** for agri-food systems.

About ACASA-India

- **Developed By:** Indian Council of Agricultural Research (ICAR) and Borlaug Institute for South Asia.
- **Nature:** A **digital climate atlas** integrating 15 years of climate-resilience research.
- **Purpose:**
 - Guide **climate-risk investments**
 - Support **district-level adaptation strategies**
 - Safeguard crops, livestock, and fisheries from climate stress
- **Policy Relevance:** Strengthens India's climate-resilience ecosystem under long-term development goals.

About NICRA (National Innovations in Climate Resilient Agriculture)

- **Launched:** 2011 by ICAR.
- **Objective:** Enhance resilience of Indian agriculture to climate variability and change.
- **Four Pillars:**
 - Strategic Research
 - Technology Demonstration in vulnerable districts
 - Capacity Building
 - Competitive Research Grants
- **Key Achievements:**
 - Developed **2,660+ climate-tolerant crop varieties**
 - Prepared **contingency plans for 650 districts**

7. 16th IRENA Assembly Held in Abu Dhabi



The 16th Assembly of the International Renewable Energy Agency (IRENA) was held in Abu Dhabi, United Arab Emirates, focusing on accelerating the global renewable energy transition in line with the UAE Consensus (COP28), Paris Agreement, and 2030 Sustainable Development Goals.

About IRENA

- **Nature:** Leading global **intergovernmental organisation** for renewable energy cooperation.
- **Established:** 2009 (Bonn, Germany); **Headquarters:** Masdar City, Abu Dhabi.
- **Status:** Independent body with **UN Observer status**.
- **Membership:** **171 members** (170 countries + EU); **India is a founding member**.
- **Mandate:** Provides data, policy advice, and investment support to scale renewables.

Key Outcomes / Focus of the 16th Assembly

- **Global Targets:** Reaffirmed push to **triple renewable capacity** and **double energy efficiency by 2030** (COP28 alignment).
- **Energy Transition:** Emphasis on just, inclusive, and finance-backed transitions, especially for developing countries.
- **India's Role:**
 - Permanent seat on the **IRENA Council**.
 - **Strategic Partnership (2022)** with IRENA on **green hydrogen** and energy planning.

8. High Seas Biodiversity Treaty (BBNJ) Enters into Force



On 17 January 2026, the **Global High Seas Biodiversity Treaty (BBNJ)** came into force. It provides a **legally binding framework** to protect marine biodiversity in areas beyond national jurisdiction (ABNJ) and supports the **30×30 target** (protect 30% of oceans by 2030).

What is the High Seas Treaty (BBNJ)?

- A **legally binding international agreement** for the **conservation and sustainable use of marine biodiversity** in the **high seas** (areas beyond national Exclusive Economic Zones).
- Adopted in **2023**, often called the **“Paris Agreement for the Ocean”** because it creates a rule-based global regime before irreversible damage occurs.
- **India signed** the agreement in **September 2024**.

Key Highlights

- **Formal Name:** *Agreement on Biodiversity Beyond National Jurisdiction (BBNJ)* under **UNCLOS (1982)** framework.
- **Coverage:** Governs **high seas**, covering nearly **two-thirds of global oceans** and almost **half of Earth’s surface**.
- **Negotiation History:** Finalised in **March 2023** after 15 years of UN-led negotiations.
- **Entry into Force:** Triggered after **60 ratifications (Sept 19, 2025)**; effective after 120 days (Jan 2026).

Ratification Status: Over **80 countries ratified**; USA signed but not ratified.

Core Pillars of the Treaty

- **Marine Protected Areas (MPAs):**
 - Enables designation of MPAs in international waters for conservation.
- **Environmental Impact Assessments (EIA):**
 - Mandatory EIAs for activities like deep-sea mining, fishing, and shipping.
- **Marine Genetic Resources (MGRs):**
 - Equitable sharing of benefits from genetic materials used in biotechnology and pharmaceuticals.
- **Capacity Building & Technology Transfer:**
 - Supports developing countries in marine research and monitoring.

Why Was the Treaty Needed? (Context & Background)

Over **60% of oceans** lie beyond national jurisdiction, historically governed by fragmented sectoral rules (shipping, fishing, mining).

Rising pressures from **deep-sea mining, industrial fishing, bioprospecting, and shipping** threatened biodiversity without a unified conservation framework.

Existing law (UNCLOS) lacked **operational conservation tools** like MPAs and mandatory EIAs for the high seas.

9. CAQM Synthesis Report: Secondary Particles Drive NCR Winter Pollution



The **Commission for Air Quality Management (CAQM)** released a synthesis report on air pollution sources in the National Capital Region (NCR). The **Supreme Court** mandated a meta-analysis to resolve conflicting datasets and enable evidence-based policymaking. The report establishes a uniform scientific basis for targeted, regional air-quality interventions.

Key Findings

- **Largest Contributor:** Secondary particulate matter accounts for **27% of winter PM2.5**, followed by **transport emissions (23%)**.
- **Ammonia Role:** **77–80% of ammonia emissions** (key precursor) arise from **agricultural fertilisers and livestock waste**, driving sulphate–nitrate particle formation.
- **Seasonal Shift:**
 - **Winter:** Combustion sources (vehicles, biomass burning) dominate.
 - **Summer:** Crustal dust becomes the primary contributor.
- **Airshed Validation:** Pollution precursors travel across state borders, supporting a **regional airshed approach** over city-specific bans.
- **Health Impact:** Winter PM2.5 levels average nearly **35 times WHO's annual safe limit (5 µg/m³)**.
- **Expanded Health Risks:** Linked not only to respiratory illness but also **hypertension, ophthalmic diseases, and lung cancer**.

10. World Bank Flags Cross-Border Air Pollution in South Asia



The World Bank report “*A Breath of Change*” highlights that air pollution in the **Indo-Gangetic Plains (IGP) and Himalayan Foothills** is transboundary in nature. It calls for **regional airshed cooperation**, as national measures alone cannot address cross-border pollution flows.

Need for Transboundary Airshed Cooperation

- **Cross-Border Spillover:** Nearly **30% of winter pollution in Indian Punjab** originates from Pakistan’s Punjab due to north-westerly winds.
- **High External Share:** Around **68% of pollution in Nepal’s Terai** region comes from neighbouring countries.
- **Weak Legal Architecture:** South Asia lacks a binding treaty like Europe’s **UNECE LRTAP Convention (1979)**; cooperation relies on the voluntary **Malé Declaration (1998)**.
- **Funding Gaps:** Monitoring and coordination weakened after Swedish aid to the Malé framework ended in 2013.
- **Urban Bias:** India’s **National Clean Air Programme (NCAP)** focuses on cities, while major emission sources (agriculture, industry, transport corridors) lie outside municipal limits.

Key Concepts

- **Airshed:** A geographical area where air pollutants mix and circulate, similar to a watershed for water.
- **LRTAP Convention:** Europe’s legally binding framework to reduce long-range transboundary air pollution.

Malé Declaration: A voluntary South Asian agreement on air pollution monitoring and information sharing.

11. Desert Dust Linked to Pathogen Spread



In January 2026, a scientific study revealed that **desert dust plumes from western India** are transporting airborne pathogens to the **Eastern Himalayas**. The findings raise concerns about **transboundary bioaerosol transport** and high-altitude health vulnerabilities.

Key Findings of the Study

Long-Range Dust Transport

- Dust storms originate in **arid western India (Thar region)**.
- Travel across the **Indo-Gangetic Plain** before depositing particles in Himalayan regions.
- Movement aided by **westerly winds and atmospheric circulation patterns**.

Pathogen Carriage

- Dust plumes carry **bioaerosols**, including bacteria and potential disease-causing pathogens.
- Microbes survive long-distance transport embedded within mineral dust particles.

High-Altitude Vulnerability

- Himalayan regions already face:
 - **Low oxygen levels**
 - **Cold climatic stress**
- These conditions increase susceptibility to infections.

Multiple Microbial Sources

- Airborne microbes include:
 - Desert-origin pathogens
 - Local Himalayan microbial communities
- Interaction may alter ecological and disease dynamics.

Health Implications

- Associated with increased risks of:
 - Respiratory illnesses
 - Skin infections
 - Gastrointestinal disorders
- Highlights emerging **climate-linked disease transmission pathways**.

Scientific Significance

- Demonstrates **atmospheric connectivity between plains and mountains**.
- Reinforces concept of **aerosol-driven disease ecology**.
- Links **climate change, desertification, and public health risks**.

Adds dimension to India's **mountain ecosystem vulnerability studies**

12. Contaminated Water Crisis in Indore: Urban Water Safety Under Stress



The city of **Indore** is facing a **public health emergency** after drinking water contamination was reported in the **Bhagirathpura area**, where **sewage seepage through a loose pipeline joint** led to a major **waterborne disease outbreak**, causing multiple deaths and thousands of illnesses.

1. What is Drinking Water Contamination?

Drinking water contamination occurs when **biological, chemical, or physical pollutants** enter potable water systems, rendering water **unsafe for human consumption** and increasing the risk of **waterborne diseases**.

2. Indore Incident: Key Facts

- **Source of Contamination:** Sewage ingress into drinking water pipelines due to **infrastructure failure**.
- **Nature of Contaminant:** **Bacterial contamination** confirmed through laboratory testing.
- **Health Impact:**
 - Acute outbreaks of **diarrhoea and vomiting**
 - **Multiple fatalities** and **thousands of reported cases**

Governance Failure: Highlights gaps in **urban water supply maintenance, pipeline integrity, and monitoring**.

3. Water Contamination Scenario in India (Structural Problem)

Dimension	Status
Urban Sewage Treatment	Only 28% treated, 72% discharged untreated
Nitrate Pollution	56% of districts exceed 45 mg/L limit
Arsenic Contamination	Ganga-Brahmaputra plains (WB, Bihar, Assam)
Annual Disease Burden	~11 million waterborne disease cases
Child Mortality	~1 lakh under-five deaths annually due to diarrhoea
Major Chemical Contaminants	Arsenic, fluoride, nitrate, uranium, radon

13. Bihar–Jharkhand Finalise Son River Water-Sharing Pact



The Bihar Cabinet approved a **water-sharing agreement** with Jharkhand on the Son River, settling a dispute pending since Bihar's bifurcation (2000). The pact revises allocations under the **Bansagar Accord** and unlocks stalled irrigation projects.

Key Provisions of the Agreement


- **Allocation:** 2.00 MAF to Jharkhand out of 7.75 MAF of Son River water.
- **Revision:** Updates the 1973 **Bansagar Accord** (earlier among Madhya Pradesh, Uttar Pradesh, and Bihar).
- **Project Clearance:** Clears the long-delayed **Indrapuri Reservoir Project**, boosting irrigation across **eight districts in Bihar**.
- **Project Profile:** Multipurpose scheme on the Son, linking **Matiawan (Bihar)** with **Kadwan (Jharkhand)**.

Constitutional & Legal Framework (Inter-State Water Disputes)

- **Article 262:** Parliament may provide for adjudication of inter-state river disputes and **exclude court jurisdiction**.
- **Seventh Schedule:** **Entry 17 (State List)** – water; **Entry 56 (Union List)** – Centre may regulate inter-state rivers in public interest.
- **Inter-State Water Disputes Act, 1956:** Enables **ad hoc tribunals** when negotiations fail; **2002 amendment** mandates tribunal formation within **1 year**, award within **3 years**, and makes the award **binding**.

River Boards Act, 1956: Provides for **advisory river boards** (none constituted so far).

14. Dhasan River – NGT Upholds Sand Mining EC Cancellation

 The National Green Tribunal (NGT) dismissed an appeal against the **cancellation of environmental clearance** granted for **sand mining** in the **Dhasan River**.

About Dhasan River

- **River System:** Right-bank tributary of the **Betwa River**, which flows into the **Yamuna River**; drains parts of the **Bundelkhand** region.
- **Historical Name:** Known as **Dasharna** in ancient sources.
- **Source & Course:** Originates near **Begumganj (Madhya Pradesh)**; forms the south-eastern boundary of **Lalitpur district (Uttar Pradesh)**; joins the Betwa near **Barua Sagar**.
- **Length & Distribution:** ~365 km total – 240 km in MP, 54 km along MP-UP boundary, 71 km in UP.
- **Tributaries:** **Kathan, Mangrar, Bachneri, Sukhanai, Rohni**.
- **Infrastructure:** **Pahari (Sujara) Dam** and **Lahchura (Ghat Lahchura) Dam** support the **Dhasan Canal System** for irrigation.

15. Pesticide Poisoning of Migratory Greylag Geese in Majuli



A flock of **Greylag Geese** was allegedly poisoned using pesticides in **Majuli district, Assam**. The incident raises concerns over **illegal hunting, wetland contamination, and threats to migratory waterbirds** in India's Ramsar wetlands.

About Greylag Goose (*Anser anser*)

- **Species Identity:** Largest grey goose species; primary wild ancestor of most domesticated geese.
- **Appearance:** Grey-brown plumage, thick neck, orange/pink bill, pink legs; pale grey forewing visible in flight.
- **Habitat:** Prefers freshwater wetlands, marshes, lakes with reed beds.
- **Distribution:** Palearctic range; breeds in northern Eurasia, migrates south in winter; common winter visitor to North & North-West India.
- **Behaviour:** Highly social; migrates in V-shaped skeins.
- **Diet:** Herbivorous – grasses, tubers, aquatic plants; also feeds on cereal crops.
- **Ecological Role:** Controls aquatic vegetation and aids nutrient cycling in wetlands.

Domestication: Among earliest domesticated birds (Ancient Egypt, ~4000 years ago).

16. New Reed Snake Species *Calamaria mizoramensis* Discovered in Mizoram



Researchers reported the discovery of a **new reed snake species, *Calamaria mizoramensis***, from **Mizoram**, adding to India's documented herpetofaunal diversity.

About Reed Snakes (Genus *Calamaria*)

- **Type:** Small, non-venomous, elusive snakes.
- **Range:** Native to South and Southeast Asia.
- **Ecology:** Often fossorial/semi-fossorial, inhabiting leaf litter and loose soil.

Calamaria mizoramensis: Prelims Pointers

- **Common Name:** Mizoram reed snake.
- **Identification:** Small, slender, dark brown body with faint longitudinal stripes; distinct yellow underside.
- **Behaviour:** Nocturnal and semi-fossorial.
- **Habitat:** Montane evergreen forests and humid hill regions.
- **Elevation Range:** ~670-1,295 metres.
- **Distribution:** Endemic to Mizoram (currently confirmed only from the state).
- **Venom Status:** Non-venomous.

17. Three New Meadow Katydid Species Discovered in Jammu & Kashmir



Entomologists reported the discovery of **three new meadow katydid species** from **Jammu & Kashmir**, adding to India's insect biodiversity records.

About Meadow Katydids

- **Taxonomy:** Belong to the family **Tettigoniidae**.
- **Appearance:** **Small-medium insects**, usually **grass-green**, with very long, **thread-like antennae** exceeding body length.
- **Phylogeny:** Though grasshopper-like, they are **more closely related to crickets**.
- **Habitat:** **Open grassy areas, meadows, wetlands**, often near **freshwater sources**.
- **Sound Production:** Males use **stridulatory files** – microscopic tooth-like ridges on forewings – to produce **rhythmic calls**.

Newly Discovered Species (Genus *Conocephalus*)

- **Conocephalus usmanii:** Flat, elongated abdominal plate; **36-tooth** stridulatory file.
- **Conocephalus nagariensis:** Spindle-shaped appendages; **34-tooth** stridulatory file.
- **Conocephalus ganderbali:** Small, slender body; **28-tooth** stridulatory file; **V-shaped ventral incision**.

18. *Hemileccinum indicum*: New Bolete Mushroom Recorded from India



A new mushroom species, ***Hemileccinum indicum***, has been discovered in the temperate oak forests of Bageshwar district, Uttarakhand. It marks the **first official Indian record** of the *Hemileccinum* genus.

Key Features

- **Type:** Bolete mushroom (has **pores, not gills**, beneath the cap).
- **Cap Morphology:** Wrinkled violet-brown when young; matures into leathery brown.
- **Pore Layer:** Pastel yellow; **does not change colour when bruised** (important diagnostic trait).
- **Microscopic Traits:**
 - SEM analysis shows **intricate pitted spores**.

Smooth stem surface distinguishes it from American and Asian relatives.

Ecological Significance

- **Ectomycorrhizal Nature:** Forms symbiotic associations with **oak (Quercus) roots**.
- **Nutrient Exchange:** Enhances absorption of phosphorus and nitrogen while receiving carbohydrates from host trees.
- **Forest Health Indicator:** Presence signals healthy temperate oak ecosystems in the Himalayas.

19. Hoya nagaensis: New Endemic Wax Plant from Nagaland



Scientists have discovered a new plant species, **Hoya nagaensis**, in the **high-altitude forests of Nagaland**. The species is **endemic to the Kavünhou Community Reserved Forest in Phek district**, Eastern Himalayas.

Key Features

- **Plant Type:** Climbing, **epiphytic vine** (grows on trees, not parasitic).
- **Latex:** Produces characteristic **milky latex**, typical of Apocynaceae family members.
- **Genus:** Belongs to *Hoya* (commonly called **wax plants**), popular in ornamental horticulture.
- **Flowers:**
 - Umbrella-shaped (umbellate inflorescence)
 - Star-like, fragrant blooms
 - Pinkish-purple spots

Densely hairy corolla lobes

Habitat & Ecology

- **Region:** Eastern Himalayan temperate forests.
- **Altitude:** Thrives in high-elevation forest ecosystems.
- **Ecological Role:** As an epiphyte, contributes to **canopy biodiversity** without harming host trees.

20. *Lepidagathis konkanensis*: New Wildflower from Konkan's Lateritic 'Sadas'



Scientists have discovered a new wildflower species, *Lepidagathis konkanensis*, from the lateritic plateaus of the Konkan region in Maharashtra. The finding highlights the ecological uniqueness and fragility of the Konkan's iron-rich 'sada' ecosystems.

About *Lepidagathis konkanensis*

- **Taxonomy:** Belongs to the genus *Lepidagathis* under the family Acanthaceae.
- **Habitat:** Grows on iron-rich lateritic plateaus ('sadas') of coastal Maharashtra.
- **Morphology:** Bears bright yellow, bilabiate (two-lipped) flowers in short, compact, densely packed spikes.
- **Reproductive Traits:** Smaller seeds and a distinctly shorter style compared to allied species.
- **Adaptation:** Survives in extremely thin soil layers under intense sunlight, strong winds, and seasonal moisture stress.
- **Ecological Significance:** Lateritic plateaus are seasonal biodiversity hotspots with high endemism, often compared to "rocky savannas."
- **Threats:** Agricultural expansion (notably mango orchards), tourism pressure, infrastructure growth, and urbanisation.

21. Two New Ant-Fly Species Discovered in India



Two new hoverfly (ant-fly) species – *Metadon ghorpadei* and *Metadon reemeri* – have been discovered from Delhi's Northern Ridge Forest and the Siruvani Hills of the Western Ghats, respectively.

Key Facts

- **Taxonomic Group:** Subfamily *Microdontinae* (hoverflies)
- **Special Behaviour:** *Myrmecophily* – larvae live inside ant colonies
- **Larval Diet:** Ant brood (eggs and larvae)
- **Ecology:** Spend most of their life within ant nests; rarely visit flowers
- **Distinctive Traits:**
 - *M. ghorpadei*: Pale brown antennae, yellow legs, golden shimmering hair
 - *M. reemeri*: Blackish antennae, rugged body, deep black hind legs

22. *Parakaempferia alba*



Scientists discovered a **new ginger species, *Parakaempferia alba***, in the **Siang Valley of Arunachal Pradesh**. The find adds to India's **Eastern Himalayan plant diversity**, a global biodiversity hotspot.

About *Parakaempferia alba*

- **Taxonomic Family:** Zingiberaceae (ginger family).
- **Growth Form:** Herbaceous plant.
- **Habitat:** Moist, shaded **tropical semi-evergreen forests** with minimal direct sunlight.
- **Altitude Range:** 150–400 metres.
- **Soil & Microhabitat:** Prefers **humid, sandy soils** along **shaded streambanks**.
- **Ecological Role:**
 - Acts as a **ground-level stabiliser** in **riparian zones**.

Helps **reduce soil erosion** through its root system.

23. Sirkeer Malkoha Recorded in Uttarakhand Hills: Indicator of Ecological Shift?



The Sirkeer Malkoha (*Taccocua leschenaultii*) was recorded for the first time in the hill tracts of Uttarkashi district, Uttarakhand. As the species usually inhabits plains and lower elevations, its appearance at higher altitudes may indicate climate-driven habitat shifts.

1. Species Profile (Definition & Identity)

- **Type:** Ground-dwelling, **non-parasitic cuckoo** native to the Indian subcontinent
- **Breeding:** Builds its own nest and raises chicks (unlike brood-parasitic cuckoos)

2. Key Identification Features

- **Plumage:** Olive-brown upperparts; long brown tail with **white tips**
- **Bill & Markings:** Curved **red beak with yellow tip**; dark **teardrop-shaped eye patch**
- **Feet:** **Zygodactyl** (two toes forward, two backward) aiding terrestrial movement

3. Habitat & Ecology

- **Preferred Habitat:** Dry scrub forests, open woodlands, thorn jungles, rocky hills
- **Altitude Range:** Mostly **below 1,500 m** (typically under 1,000 m)
- **Diet & Role:** Insects and small lizards → **natural pest control**

4. Distribution

- **Global:** India, Pakistan, Nepal, Bhutan, Bangladesh, Sri Lanka
- **India:** Widespread; **rare in snow-capped regions and extreme Northeast**

5. Conservation Status

- **IUCN:** **Least Concern** (International Union for Conservation of Nature)
- **Wildlife Protection Act, 1972:** **Schedule II**

6. Threats

- **Habitat loss** (deforestation), **pesticide exposure**, invasive species competition, **illegal hunting**

7. Significance of the Uttarkashi Sighting

- **Possible Climate Signal:** Upward range movement suggests **warming-linked habitat shifts**
- **Monitoring Need:** Highlights importance of **long-term avifaunal surveys** in the Himalayas
- **Conservation Planning:** Informs **altitudinal corridor protection** and pesticide regulation

Mains Question (10/15 Marks)

How do altitudinal range shifts in bird species serve as indicators of climate change? Discuss with reference to the recent sighting of the Sirkeer Malkoha in the Himalayan region.

24. Galaxy Frog Vanishes from Western Ghats: A Conservation Alarm



In January 2026, seven rare Galaxy Frogs were reported missing and presumed dead from the Western Ghats of Kerala.

The incident was linked to unregulated wildlife photography tourism, raising concerns about microhabitat disturbance of endemic species.

About the Galaxy Frog (*Melanobatrachus indicus*)

- **Endemism & Rarity**
 - An evolutionarily unique amphibian endemic to the southern Western Ghats.
 - The only species in the genus *Melanobatrachus* → high extinction risk.
 - **Distinctive Appearance**
 - Glossy jet-black skin with bluish-white speckles resembling a galaxy.
 - Bright orange/scarlet patches on the ventral side.
 - **Evolutionary Significance**
 - Classified as an EDGE species (*Evolutionarily Distinct and Globally Endangered*).
 - Loss would mean irreversible evolutionary history loss (important Mains point).
 - **Unique Biological Traits**
 - Non-vocal amphibian: lacks vocal sacs, eardrums, and middle ear.
 - Likely relies on visual signalling using vivid skin coloration.
 - **Behaviour & Habitat**
 - Nocturnal, secretive burrower.
 - Lives under leaf litter, rotting logs, stones.
 - Prefers moist evergreen Shola forests at 900–1,500 m elevation.
 - Found within ~10 m of perennial streams or swampy patches.
 - **Geographic Distribution**
 - Restricted to southern Western Ghats:
 - Anaimalai Hills
 - Periyar Tiger Reserve
 - Munnar region
 - Serves as the flagship species of Mathikettan Shola National Park (Kerala).
 - **Ecological Role**
 - Forest-floor insectivore controlling small invertebrates.
- Helps maintain soil health and Shola ecosystem stability.

25. Grey Slender Loris: India's Nocturnal Primate Gets Habitat Push



Kerala and Tamil Nadu have stepped up **habitat restoration and field monitoring** for the **Grey Slender Loris (*Loris lydekkerianus*)** to counter fragmentation, roadkills, and pesticide exposure reported from its range.

About Grey Slender Loris

- **Type:** Small, nocturnal, arboreal primate; primitive strepsirrhine.
- **Key Traits:** Lean body, **long slender limbs, no visible tail; large forward-facing eyes** for night vision.
- **Movement:** **Cannot leap**; uses slow **hand-over-hand climbing** along thin branches.

Diet: Mostly **insectivorous** (ants, termites form >50%).

Habitat & Distribution

- **Habitat:** Continuous forest canopies with thin twigs (sensitive to fragmentation).
- **Range:** **Southern India & Sri Lanka.**
- **India:** Tamil Nadu, Karnataka, Kerala, Andhra Pradesh.

Indian Subspecies

1. **Malabar Slender Loris** – Wet evergreen forests, **Western Ghats.**

Mysore Slender Loris – Dry deciduous forests, **Eastern Ghats & Deccan Plateau**

Threats

- Habitat fragmentation; loss of nesting trees (e.g., Acacia).
- Pet trade & superstition-driven hunting.
- **Roadkills and pesticide exposure** (insect prey decline).

UPSC Exam Relevance

- **Prelims:** Species traits, habitat, protection status, sanctuary.

Mains: **GS-III (Environment)** – species-specific conservation, habitat connectivity.

26. Royle's Pika (*Ochotona roylei*)



Rising temperatures and changing monsoon patterns are threatening Royle's pika by disrupting its specialised alpine habitat. Scientists flag the species as a sensitive indicator of climate change in the Himalayas.

About Royle's Pika (*Ochotona roylei*)

- **Taxonomy:** Small, high-altitude mammal of **Order Lagomorpha** (same order as rabbits and hares); also called the **Himalayan mouse-hare**.
- **Physical Traits:** Greyish-brown body; slightly arched head; **chestnut-coloured head**; winter coat becomes duller.
- **Habitat:** Talus slopes, alpine meadows, and open **rhododendron/conifer forests** at 2,400–5,200 m elevation.
- **Range:** **Endemic to the Himalayas**—India, Nepal, Pakistan, and Tibet; in India found in **Jammu & Kashmir, Himachal Pradesh, Uttarakhand, and Sikkim**.
- **Nesting:** Uses **natural rock crevices** (non-burrowing).
- **Winter Behaviour:** **Does not hibernate**; forages beneath snow.
- **Diet:** **Herbivorous**—grasses, herbs, mosses, lichens.
- **Ecological Role:** **Climate-change indicator species** due to high thermal sensitivity.
- **Threats:** Climate change, habitat fragmentation, population bottlenecks, invasive species.
- **Conservation Status:** **IUCN—Least Concern; WPA—Schedule I.**

27. Second Rangewide Estimation of River Dolphins in India



The Ministry of Environment, Forest and Climate Change (MoEFCC) launched the second range-wide estimation of riverine and estuarine dolphins under **Project Dolphin**. The nationwide exercise aims to generate **robust scientific data** to strengthen conservation planning for India's river ecosystems.

About the Dolphin Estimation Survey

- **Programme Framework:** Conducted under **Project Dolphin** (launched in 2020).
- **Species Covered:**
 - Gangetic River Dolphin
 - Indus River Dolphin
 - Irrawaddy Dolphin (*included for the first time*)
- **Geographic Coverage:**
 - Ganga and Brahmaputra river systems
 - Includes **Sundarbans** and **Odisha** coastal-estuarine stretches
- **Phased Approach:** Implemented in **two phases** for comprehensive coverage.
- **Methodology:** Uses **hydrophones** for underwater **acoustic monitoring**, improving detection accuracy.
- **Implementing Agencies:**
 - Coordinated by **Wildlife Institute of India (WII)**
 - In collaboration with **State Forest Departments** and **WWF-India**

Background: First Rangewide Survey

- **Estimated Population:** ~6,327 riverine dolphins across India.
- **Indus River Dolphin:** Only **three individuals** recorded in the **Beas River** (Punjab).
- **State-wise Pattern:** **Uttar Pradesh** recorded the highest population, followed by **Bihar**.

About Project Dolphin

- **Launch Year:** 2020
- **Scope:** Conservation of **both riverine and marine dolphins**.
- **Focus Areas:** Species protection, habitat restoration, pollution control, community participation, and scientific monitoring.

28. Kalai-II Hydropower Project Raises Concerns for White-bellied Heron Habitat



The **Kalai-II hydropower project** in **Arunachal Pradesh** received environmental clearance; the project site overlaps with the habitat of the **White-bellied Heron** (*Ardea insignis*).

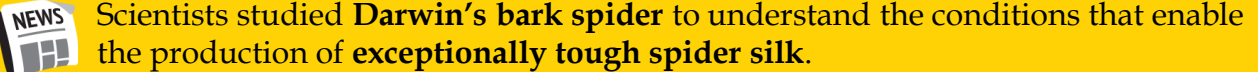
Kalai-II Hydroelectric Project: Key Facts

- **River:** Planned on the **Lohit River**, a major tributary of the **Brahmaputra**.
- **Type & Capacity:** **1,200 MW**, **pondage-based** project.
- **Infrastructure:** **Concrete gravity dam** with an **underground powerhouse**.
- **Developer:** **THDC India Ltd**, under the **Ministry of Power**.

White-bellied Heron (*Ardea insignis*): Prelims Pointers

- **Also Known As:** **Imperial Heron**; **world's second-largest heron** species.
- **Identification:** **Dark grey plumage, white throat and belly, large blackish bill** with greenish base.
- **Behaviour:** **Shy, solitary, piscivorous**; often stands motionless along **fast-flowing rivers**.
- **Habitat Preference:** **Free-flowing riverine ecosystems** with shallow stretches and **large riverside trees** for nesting; eastern Himalayan foothills.
- **Distribution:** Fragmented populations – **Bhutan (~45%), Northeast India** (notably **Namdapha and Kamlang Tiger Reserves**, Arunachal Pradesh), and **northern Myanmar**.
- **Ecological Role:** **Bioindicator** of Himalayan freshwater ecosystem health.
- **Major Threats:** **Hydropower projects, road construction, sand mining, overfishing, poaching**.
- **Conservation Efforts:** **World's first White-bellied Heron Conservation Centre** established in **Bhutan (2021)** for captive breeding.
- **Conservation Status:** **IUCN - Critically Endangered; Wildlife (Protection) Act, 1972 - Schedule I**.

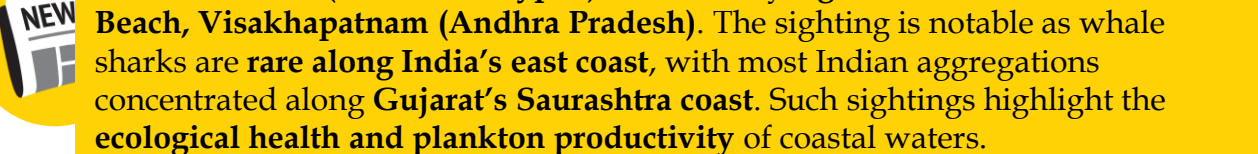
29. Darwin's Bark Spider

 Scientists studied **Darwin's bark spider** to understand the conditions that enable the production of **exceptionally tough spider silk**.

Key Facts

- It is an **orb-weaver spider endemic to Madagascar**, known for producing the **toughest biological silk** and constructing the **largest orb webs** ever recorded.
- Habitat: **Riverine forests and wetlands** of Madagascar.
- Webs are suspended across rivers using **bridge lines up to 25 metres long**.
- **Only adult females** produce ultra-tough silk.
- Female silk contains **proline-rich proteins**, giving it extreme toughness and elasticity.
- The silk is **~10 times tougher than Kevlar** and about **twice as tough as other spider silks**.
- The species was named to mark the **150th anniversary of Darwin's *On the Origin of Species***.

30. Gentle Giant Spotted off Vizag Coast

 A **Whale Shark (*Rhincodon typus*)** was recently **sighted near Rushikonda Beach, Visakhapatnam (Andhra Pradesh)**. The sighting is notable as whale sharks are **rare along India's east coast**, with most Indian aggregations concentrated along **Gujarat's Saurashtra coast**. Such sightings highlight the **ecological health and plankton productivity** of coastal waters.

About Whale Shark (*Rhincodon typus*)

- **World's largest living fish**, belonging to **Class Chondrichthyes** (cartilaginous fishes).
- **Distinctive features:** Flattened head, wide **terminal mouth** (front-opening), dark grey body with **unique white spot-stripe patterns**.
- **Feeding:** A **filter feeder**, consuming plankton, krill, and small fish using gill rakers.
- **Behaviour:** Solitary, slow-moving, and harmless to humans ("gentle giant").
- **Habitat & Range:** Warm tropical and warm-temperate oceans (21–30°C); rare in the Mediterranean.
- **Reproduction:** **Ovoviviparous** – eggs hatch inside the female, releasing live pups.
- **Threats:** Net bycatch, vessel strikes, marine plastic ingestion.
- **Conservation Status:** IUCN – **Endangered**; CITES – **Appendix II**; WPA – **Schedule I (India)**.
- **Indian Conservation:** *Save the Whale Shark Campaign* (2004, WTI) – a community-based marine conservation model.

31. Asian Waterbird Census 2026 Conducted on National Bird Day



The Asian Waterbird Census (AWC) 2026 was conducted at Delhi National Zoological Park, recording 1,310 waterbirds across 18 species, with Painted Stork as the most abundant.

Asian Waterbird Census (AWC): Key Facts

- **Nature:** Annual citizen-science programme monitoring waterbird populations across Asia.
- **Global Linkage:** Part of the International Waterbird Census (IWC).
- **Policy Utility:** Data supports identification of priority wetlands under the Ramsar Convention and the Convention on Migratory Species (CMS).
- **India Coordination:** Conducted by Bombay Natural History Society (BNHS) and the Wildlife Institute of India (WII).

Painted Stork (*Mycteria leucocephala*): Prelims Pointers

- **Type:** Large wading bird native to tropical Asian wetlands.
- **Identification:** Heavy yellow-orange bill, orange face, white body with black breast band; rose-pink tertial feathers.
- **Distribution:** Indian Subcontinent & Southeast Asia; India hosts the largest population.
- **Habitat:** Shallow freshwater wetlands, marshes, lakes, flooded fields (rice paddies).
- **Behaviour:** Non-migratory; short local movements driven by monsoon and food availability; communication via bill-clattering.
- **Threats:** Wetland degradation due to urbanisation, industrial growth, agricultural intensification.
- **Conservation Status:** IUCN - Least Concern; CITES - Appendix II.

32. NBWL Moves to Regulate Religious Structures inside Wildlife Sanctuaries



In January 2026, the **Standing Committee of the National Board for Wildlife (SCNBWL)** issued **draft guidelines** to regulate religious structures located within wildlife sanctuaries. The move followed the **Balaram Ambaji Wildlife Sanctuary case (2024–25)** in Gujarat, where forest land diversion was revoked due to lack of legal rights.

Background & Context

- India's protected areas increasingly face **encroachments and land-use pressures** in the name of faith-based activities.
- The SCNBWL – **executive arm of NBWL**, chaired by the **Ministry of Environment, Forest and Climate Change Minister** – reviews projects within/near PAs.

The Gujarat case exposed gaps in **documentation, regularisation, and oversight**, prompting uniform guidelines.

Draft Regulatory Guidelines: What Do They Say?

Aspect	Provision
New Structures	Any religious structure on forest land post-1980 (after the Forest (Conservation) Act, 1980) is treated as encroachment
Expansion	Physical expansion of existing structures generally prohibited
Limited Exception	Minor expansion allowed only to mitigate ecological conflict or provide essential public utilities
Regularisation	Pre-1980 structures require reasoned State order + final MoEFCC approval
Case-by-Case	No blanket approvals; each proposal examined individually
Faith Clause	Faith alone is not a valid ground for forest land diversion

Rules for Existing Religious Sites inside Sanctuaries

- **Permit-based Access:** Entry only with valid permit under **Section 28 of the Wildlife Protection Act, 1972**.
- **Time Restrictions:** **No movement after sunset** within sanctuary limits.
- **Construction Freeze:** No new construction during maintenance or pilgrimage events.
- **Activity Ban:** Prohibition on **horns, loud music, firearms, and non-biodegradable materials**.

UPSC Exam Relevance

- **Prelims:** NBWL, SCNBWL, Forest (Conservation) Act, WPA Section 28.
- **Mains:** **GS-III** – Conservation governance, human-wildlife interface, forest law enforcement.

33. ESZ around Kumbhalgarh Sanctuary



The Ministry of Environment, Forest and Climate Change has notified a 0-1 km Eco-Sensitive Zone (ESZ) around the Kumbhalgarh Wildlife Sanctuary in Rajasthan. • The move aims to regulate land use around the sanctuary to **reduce anthropogenic pressure** on sensitive Aravalli ecosystems.

Kumbhalgarh Wildlife Sanctuary - At a Glance

- **Location:** Rajasthan; Aravalli Range
- **Forest Type:** Dry deciduous
- **Unique Setting:** Envelops **Kumbhalgarh Fort** (a **UNESCO World Heritage Site), famed for the world's **second-longest continuous wall**.
- **Aravalli Ranges Covered:** Kumbhalgarh, Sadri, Desuri, Bokhada
- **Watershed Divide:**
 - **East:** Banas River
 - **West:** Tributaries of the Luni River

Biodiversity Highlights

- **Flagship Species:** Indian wolf (notable breeding visibility)
- **Fauna:** Leopard, Sloth Bear, Striped Hyena, Jackal, Sambar, Chinkara, Chausingha
- **Flora:** Dhok, Salar, Khair (dry deciduous assemblage)
- **Communities:** Bhils and Garasias

Eco-Sensitive Zones (ESZs) - Essentials

- **Purpose:** Buffer/transition areas around Protected Areas to **moderate development** and protect core habitats.
- **Legal Basis:** Notified under the **Environment (Protection) Act, 1986**.
- **Management Tool:** Site-specific Zonal Master Plan.
- **Activity Zoning:** Prohibited / Regulated / Permitted.
- **Typical Extent:** Up to 10 km (varies by ecological sensitivity); here, 0-1 km.

Why This ESZ Matters

- **Aravalli Protection:** One of India's oldest mountain systems; crucial for groundwater recharge and climate moderation.
- **Species Security:** Safeguards Indian wolf breeding grounds and corridor functions.
- **Heritage-Nature Synergy:** Balances conservation around a major cultural site.

34. NGT Flags Environmental Violations Around Taj Mahal ESZ



The National Green Tribunal (NGT) issued notices to the Union Environment Ministry and the Uttar Pradesh Government over alleged environmental violations in the Eco-Sensitive Zone (ESZ) surrounding the Taj Mahal.

Supreme Court Directions (Taj Protection)

- **Tree Felling Rule:** Any tree felling within a 5 km aerial radius of the Taj Mahal requires prior permission of the Supreme Court, regardless of the number of trees.
- **Taj Trapezium Zone (TTZ):** A 10,400 sq km pollution-sensitive zone notified to safeguard the monument from environmental degradation.

Taj Trapezium Zone (TTZ): Key Facts

- **Objective:** Prevent “marble cancer”, curb industrial & vehicular pollution, conserve green belts and the Yamuna floodplain.
- **Geographical Spread:** Agra, Firozabad, Mathura, Hathras (Uttar Pradesh) and parts of Rajasthan.
- **Judicial Origin:** Created pursuant to M.C. Mehta vs Union of India (Supreme Court).
- **Major Restrictions:**
 - Ban/relocation of polluting industries
 - Mandatory use of cleaner fuels (CNG / natural gas)
 - Regulation of construction activities
 - Strict control on tree felling within 5 km radius

National Green Tribunal (NGT): Prelims Pointers

- **Establishment:** NGT Act, 2010; statutory environmental adjudicatory body.
- **Procedure:** Not bound by CPC, 1908; guided by principles of natural justice.
- **Time Mandate:** Disposal of cases within 6 months of filing.
- **Jurisdiction:** Civil cases under seven environmental laws:
 - Water Act, 1974
 - Water Cess Act, 1977
 - Forest (Conservation) Act, 1980
 - Air Act, 1981
 - Environment (Protection) Act, 1986
 - Public Liability Insurance Act, 1991
 - Biological Diversity Act, 2002
- **Excluded Laws:**
 - Wildlife (Protection) Act, 1972
 - Indian Forest Act, 1927
 - Forest Rights Act, 2006

35. Wildlife Census in Kaimur Wildlife Sanctuary



A 90-day intensive wildlife census has begun in Kaimur Wildlife Sanctuary to assess whether the **prey base is sufficient to sustain tigers**.

The census is a **mandatory prerequisite** for declaring Kaimur as **Bihar's second Tiger Reserve**, after Valmiki Tiger Reserve.

About Kaimur Wildlife Sanctuary (WLS)

- **Forest Type:** Tropical dry deciduous forests in south-western Bihar, bordering Uttar Pradesh and Jharkhand.
- **Area:** ~1,500 sq km – largest WLS in Bihar.
- **Physiography:** Part of the Vindhya Range with plateaued hills, deep gorges, and waterfalls (e.g., Karkat, Telhar).
- **Hydrology:** Critical catchment for the Son and Tamsa (Tons) rivers.
- **Vegetation:** Northern Tropical Dry Deciduous Forests dominated by sal, teak, bamboo, mahua.
- **Fauna:** Leopard, sloth bear, chital, sambar, four-horned antelope, nilgai, wild boar, among others.

Protected Area (PA) Network in Bihar

- **Extent:** ~3,422 sq km (~3.5% of state area).
- **Composition:** 1 National Park, 12 WLS, 1 Tiger Reserve, 6 Ramsar sites.
- **National Park:** Valmiki National Park – the only NP in Bihar.
- **Tiger Reserve:** Valmiki Tiger Reserve (sole recognised TR).
- **Community Reserve:** Gogabil Jheel – first community reserve (aquatic & avian focus).
- **Dolphin Sanctuary:** Vikramshila Gangetic Dolphin Sanctuary – 50-km Ganga stretch.

Bird/Ramsar Site: Kanwar Lake – Asia's largest freshwater oxbow lake.

36. Aralam Becomes India's First Dedicated Butterfly Sanctuary



The Kerala Government renamed Aralam Wildlife Sanctuary as Aralam Butterfly Sanctuary under the Wildlife (Protection) Act, 1972, making it Kerala's first and India's first dedicated butterfly-protected area.

Key Facts

- **Location:** Kannur district, Kerala; northernmost protected area of the state.
- **Landscape Linkages:** Borders Brahmagiri Wildlife Sanctuary (Karnataka); functions as a **buffer** to the Nilgiri Biosphere Reserve.
- **Butterfly Diversity:** 266+ species, accounting for >80% of Kerala's recorded butterfly diversity.
- **Behavioural Phenomena:** Known for **mass migrations** and **mud-puddling** (mineral uptake on wet soil).
- **Notable Migrants:** Common Albatross and several Danaine species.
- **Other Fauna:** Slender Loris, Malabar giant squirrel, elephant, leopard, among others.
- **Hydrology:** Cheenkanni River (Cheenkannipuzha) originates in the Brahmagiri ranges and flows through the sanctuary.

37. India's First Urban Night Safari Planned at Kukrail Forest, Lucknow



India's first urban night safari is being developed at **Kukrail Forest Area, Lucknow (Uttar Pradesh)**, integrating **wildlife conservation with urban tourism**. The project draws inspiration from **Singapore Night Safari** and focuses on **nocturnal wildlife education** with minimal ecological disturbance.

Urban Night Safari: Key Features

- **Model:** Conservation-led, tourism-supported design inspired by Singapore's Night Safari.
- **Experience:** Guided nocturnal viewing through illuminated trails, designed to reduce stress on animals.
- **Objective:** Enhance public awareness, promote responsible eco-tourism, and coexistence within an urban setting.

Kukrail Forest Area: Prelims Pointers

- **Ecological Role:** ~5,000-acre green lung serving as an ecological buffer near Lucknow.
- **Urban Interface:** A rare urban-adjacent conservation zone allowing controlled public access.
- **Species Conservation:** Hosts a captive breeding and rehabilitation centre for endangered gharials.
- **Hydrology:** Traversed by the **Kukrail River**, a tributary of the **Gomti River**.

38. Human–Leopard Conflict under India’s Wildlife Regime



A farmer in **Gir Somnath district** killed a leopard while defending himself during an attack and was later booked under the **Wildlife (Protection) Act, 1972**, reigniting debate on human–wildlife conflict, self-defence, and strict liability under conservation law.

Context & Background

- India is the **global stronghold of leopards**, hosting ~13,000–14,000 individuals (Fifth Cycle Leopard Estimation, 2024).
- Rapid habitat fragmentation, shrinking prey base, and proximity to farms and settlements have increased **human–leopard encounters**, especially in western and central India.
- Leopards’ high adaptability enables survival in **human-dominated landscapes**, but also raises conflict risks.

About the Indian Leopard (*Panthera pardus fusca*)

- **IUCN Status:** Vulnerable (VU)
- **Legal Status:** Schedule I, Wildlife (Protection) Act, 1972 (highest protection)
- **Behaviour:** Solitary, nocturnal, stealth hunter; avoids humans but attacks can occur when surprised or cornered
- **Habitat:** Tropical rainforests, dry deciduous forests, temperate zones; absent in deserts and Sundarbans
- **Hotspots:** Madhya Pradesh (~3,900+), Maharashtra (~1,980), Karnataka (~1,870)
- **Urban Exception:** World’s highest urban leopard density in **Sanjay Gandhi National Park**

Legal Framework: Wildlife (Protection) Act, 1972

Key Provisions Relevant to the Case

- **Section 9:** Hunting of wild animals is prohibited by default.
- **Section 11:**
 - Allows killing **only with prior written permission** of authorities
 - Permissible when an animal poses **grave danger to human life**
 - Prevents misuse of “self-defence” as a blanket justification
- **Section 39:** Wildlife and trophies vest in the State, strengthening post-offence enforcement.

Schedules under WPA (Post-2022 Reorganisation)

- **Schedule I:** Highest protection (e.g., leopard, tiger)
- **Schedule II:** High protection species
- **Schedule III:** Protected plants
- **Schedule IV:** CITES-linked specimens regulating international trade

39. Human Pressure Peaks in Western Ghats' Sacred Groves



A recent ecological study in the **Konkan-Northern Western Ghats** region has found that **sacred groves face the highest human disturbance** compared to reserve forests, protected areas, and private forests. The findings raise concerns about the **erosion of community-led conservation** in one of India's most critical biodiversity hotspots.

What are Sacred Groves? : Sacred Groves are forest patches protected by local communities due to **religious, cultural, or spiritual beliefs**, often governed by taboos against extraction.

Context & Background

- The study compared **four forest protection regimes** in the **Northern Western Ghats-Konkan belt**:
 - Sacred groves
 - Private forests (plantations, silviculture)
 - Reserve forests
 - Protected Areas (Wildlife Sanctuaries/National Parks)

Disturbance was assessed using a **Combined Disturbance Index (CDI)** incorporating grazing, logging, lopping, tourism, fire, and infrastructure.

Key Findings of the Study

Protection Regime	Combined Disturbance Index (CDI)	Inference
Sacred Groves	~47.75	Highest human pressure
Private Forests	~34.5	High degradation
Reserve Forests	~31.5	Moderate control
Protected Areas	~17.5	Lowest disturbance

Why are Sacred Groves Under Maximum Pressure?

- Urbanisation Spillover:** Roads, housing, and settlement expansion fragment groves.
- Cultural Erosion:** Decline of traditional taboos and belief systems weakens informal enforcement.
- Livestock & Fuel Dependence:** Grazing, fodder lopping, and firewood collection degrade canopy cover.
- Festival & Tourism Load:** Ritual gatherings increase trampling and waste
 - Example: *Devara Kadu Habba* in Kodagu region.

40. Integrating Grasslands into National Climate Action Frameworks



With the United Nations declaring 2026 as the *International Year of Rangelands and Pastoralists*, global experts have underscored the need to integrate **grasslands–rangelands** into national climate plans and **Nationally Determined Contributions (NDCs)**, beyond forest-centric mitigation approaches.

What Are Grasslands?

- **Definition:** Terrestrial ecosystems dominated by grasses and herbaceous plants with sparse tree cover.
- **Global Extent:** Grasslands and rangelands cover a significant portion of the earth's land surface and support biodiversity, pastoral livelihoods and climate resilience (UN).

India's Grasslands: Include **montane–alpine bugyals** (Uttarakhand), **Banni grasslands** (Gujarat), **Terai grasslands** (North India), and **Phumdis** (Manipur).

Significance of Grasslands

- **Carbon Storage:** Store vast amounts of **soil organic carbon (SOC)** due to deep root systems – beneath grasslands like **Banni**, soil holds tens of millions of tonnes of carbon, demonstrating strong mitigation potential.
- **Albedo & Climate Regulation:** Grasslands reflect more solar radiation and act as cooling surfaces, aiding climate regulation.
- **Hydrology & Soils:** Enhance **infiltration**, recharge groundwater, reduce **erosion**, and stabilise soils.
- **Biodiversity & Livelihoods:** Home to species like the **Great Indian Bustard** and support pastoral communities whose economies depend on forage and grazing.

UPSC Exam Relevance

- **Prelims:** Grassland ecosystem, International Year of Rangelands and Pastoralists
- **Mains:** **GS-III:** Climate change mitigation, ecosystem services, land use policies; **GS-I:** Biodiversity conservation, sustainable livelihoods

41. Commercial Plantations under Forest Act 1980



The MoEFCC amended the **Consolidated Guidelines** under the **Van (Sanrakshan Evam Samvardhan) Adhiniyam, 1980**, reclassifying certain **commercial plantations on forest land as forestry activities**, exempting them from key environmental levies.

What Has Changed?

- **Reclassification:**
 - Commercial plantations of **low-rotation timber, medicinal plants, and NTFPs** on forest land are now treated as **forestry activities**, not non-forestry use.
- **Levy Exemptions:**
 - **Net Present Value (NPV)** payment waived
 - **Compensatory Afforestation (CA)** obligation waived
- **Operational Safeguards:**
 - Must follow **approved DPRs, State Working Plans**, and be **monitored by State Forest Departments**.
- **Revenue Use:**
 - Harvest and sale permitted as per state forest management norms.
 - States retain discretion over **revenue-sharing frameworks**.

Government's Rationale

- **Green Cover Expansion:** Productive use of ~2 lakh sq km of degraded/open forest land.
- **National Target:** Support India's **33% forest & tree cover goal**.
- **Import Substitution:** Reduce dependence on imported **wood pulp, paper, and timber**.

Private Capital: Attract **PPP investment** into forest restoration and management.

UPSC Exam Relevance

- **Prelims:** Forest Conservation law, NPV, CA, Working Plans
- **Mains:**
 - **GS-III:** Environment, forest governance, climate mitigation
 - **GS-II:** Federalism, tribal rights (FRA)

42. Madhav Gadgil: Pioneer of Community-Centric Ecology in India



Eminent Indian ecologist **Madhav Gadgil** passed away, marking the loss of a key architect of **people-led biodiversity conservation** in India.

Key Contributions

- **People's Biodiversity Register (PBR):** Pioneered the concept to **document local biodiversity and traditional ecological knowledge**, forming the backbone of community participation under the Biodiversity framework.
- **Western Ghats Ecology Expert Panel (2010):** As Chair (Gadgil Commission), recommended **ecologically sensitive zoning** and **strict protection for ~75% of the Western Ghats**.
- **Institution Builder:** Founded the **Centre for Ecological Sciences (CES)** at the **Indian Institute of Science (IISc)** in 1983.
- **Intellectual Legacy:** Popularised **decentralised, participatory environmental governance**, earning the title **"people's ecologist."**

Awards & Honours

- **Padma Shri (1981); Padma Bhushan (2006)**
- **Shanti Swarup Bhatnagar Prize (1986)**
- **UNEP Champions of the Earth Award (2024)**

43. Socotra Island: Yemen's Biodiversity Hotspot in the Indian Ocean



International tourists were stranded on **Socotra Island (Yemen)** after the sudden suspension of flights due to **escalating regional geopolitical tensions**, drawing attention to the island's **strategic location and global ecological significance**.

Location & Political Status

- Part of the **Republic of Yemen**.
- Located in the **north-west Indian Ocean**, between the **Guardafui Channel** and the **Arabian Sea**.
- Lies **south of the Arabian Peninsula** and **east of the Horn of Africa**.

Strategic Importance

- Close to **Bab-el-Mandeb Strait** and **Gulf of Aden**.
- Overlooks major shipping routes connecting:
 - **Indian Ocean**
 - **Red Sea**
 - **Suez Canal**

Socotra Archipelago

- Major islands: **Socotra, Abd al-Kuri, Samha, Darsa**
- Two small rocky islets.

44. Life Emerges on the Great Pacific Garbage Patch



A **Nature** study (Jan 2026) reveals that the **Great Pacific Garbage Patch (GPGP)** is no longer just a pollution zone but now hosts a novel floating ecosystem. Plastic debris is enabling **coastal species to survive in the open ocean**, raising new ecological and biosecurity concerns.

What is the Great Pacific Garbage Patch (GPGP)?

- A **persistent accumulation zone of floating plastic debris** trapped in the **North Pacific Subtropical Gyre**.
- Located **between California and Hawaii**, where circular ocean currents prevent dispersal.
- Plastics remain for **years to decades**, fragmenting into microplastics.

Key Findings of the Nature Study

Aspect	Key Insight
Neopelagic Ecosystem	Plastic supports a new hybrid community of coastal + open-ocean species
Habitat Creation	Almost all of the 105 plastic items studied hosted marine organisms
Biodiversity	46 animal types recorded (barnacles, amphipods, crabs, sea anemones)
Coastal Species Offshore	Normally shore-bound species thriving thousands of km offshore
Invasion Risk	Plastic "rafting" enables long-distance species dispersal

Why is This Ecologically Significant?

- **Breaks Natural Barriers:** Coastal organisms now cross open-ocean ecological boundaries.
- **Invasive Species Risk:** New habitats may introduce **non-native species** to distant coasts.
- **Food-Web Disruption:** Artificial substrates alter **pelagic food chains**.
- **Climate-Pollution Feedback:** Plastics act as **permanent anthropogenic reefs**, unlike natural debris.

UPSC Exam Relevance

- **Prelims:** Ocean gyres, marine pollution, invasive species, microplastics
- **Mains:** GS-III - Environmental pollution, biodiversity loss, human-nature interactions

45. The World's Largest and Permanent Plastic Dump



A scientific review titled “*The Quest for Seafloor Macrolitter*” (highlighted in Jan 2026 reporting) warns that the **ocean floor has become a permanent sink for global waste**, with over 90% of marine plastics eventually settling on the seabed. This reframes marine pollution from a surface issue to a **deep-sea ecological and governance crisis**.

What is Seafloor Macrolitter?

- **Anthropogenic solid waste >2.5 cm** in size deposited on the seabed.
- Differs from microplastics by **mass dominance** and long-term ecological impact.

Key Findings

- **Global Plastic Sink:** >90% of marine plastic sinks, making the seafloor a **cumulative, semi-permanent reservoir**.
- **Composition:** Plastics (~62%) dominate, followed by metals, glass, processed wood and **abandoned, lost or discarded fishing gear (ALDFG)**.
- **Hotspots:** Submarine canyons and enclosed seas (e.g., Mediterranean) act as litter traps due to current dynamics.
- **Persistence:** Cold, dark, low-oxygen conditions slow degradation → litter persists **for centuries**.

Ecological & Human Impacts

- **Biodiversity Threat:** >700 marine species affected; ~17% are **IUCN-listed threatened species**.
- **Ghost Fishing:** Synthetic nets continue killing fish and mammals for decades, disrupting deep-sea food webs.
- **Ecosystem Alteration:** Containers/tyres form artificial reefs, enabling **invasive species colonisation**.
- **Food Chain Risk:** Leaching of xenobiotics and heavy metals → **bioaccumulation & biomagnification**, impacting human health via seafood.

UPSC Exam Relevance

- **Prelims:** Marine pollution, macrolitter vs microplastics, UNCLOS, SDG-14
- **Mains: GS-III:** Environmental pollution, biodiversity loss, ocean governance

46. From Linear to Circular: Reimagining Waste Management in India



Recent policy discussions and expert reviews, highlighted in *The Hindu*, stress that **India must urgently transition from a linear “collect-dump” waste model to a circular economy**, to reduce pollution, recover resources, and unlock economic and climate benefits amid rapidly rising waste generation.

1. India's Waste Management Landscape (The Scale of the Problem)

- **Municipal Solid Waste (MSW):** ~1.70 lakh tonnes/day; projected to reach 165 million tonnes/year by 2030.
- **Processing Gap:** Only 55–70% of collected waste is scientifically treated; >16 crore tonnes of legacy waste lie at ~2,450 dumpsites.
- **E-waste:** India ranks 3rd globally; volumes growing 15–20% annually.
- **C&D Waste:** ~150 million tonnes/year, often dumped in wetlands/roadsides.
- **Plastic Waste:** ~9 million tonnes/year, dominated by single-use plastics.

Legal & Institutional Framework

Constitutional Basis

Article 243W & 12th Schedule: Municipalities responsible for sanitation and solid waste.

Article 51A(g): Citizens' duty to protect the environment.

- **Umbrella Law**

Environment (Protection) Act, 1986.

- **Key Rules**

Solid Waste Management Rules, 2016: Source segregation (wet/dry/domestic hazardous).

Construction & Demolition

Waste Management Rules, 2025: Introduce **EPR** and recycling targets.

Plastic Waste Management (Amendment) Rules, 2025: QR-based tracking and recycled-content mandates.

Why a Circular Waste Model Matters for India

Economic Potential : Circular economy could unlock **₹3.5 trillion annually by 2030** and create **~10 million green jobs by 2050**.

Resource Security: Recovery from **e-waste, batteries, ELVs** reduces dependence on imported virgin materials and critical minerals.

Climate Gains : Treating **50% wet waste via bio-methanation** could generate **₹2,460 crore/year** and cut **>10 Mt CO₂-eq**.

Urban Land Recovery: Remediation of dumpsites can free **>10,000 hectares** of valuable urban land.

Industrial Decarbonisation : **Refuse-Derived Fuel (RDF)** can replace **10–30%** of fossil fuel use in industries.

C&D Efficiency: **25% recycling target (2025–26)** conserves virgin minerals and lowers infrastructure costs.

47. Solid Waste Management Rules, 2026: India's Shift from Dumping to Circularity



The Ministry of Environment, Forest and Climate Change (MoEFCC) has notified the Solid Waste Management (SWM) Rules, 2026, replacing the 2016 rules. Effective 1 April 2026, the new framework strengthens source segregation, landfill restrictions, digital monitoring, and enforces the **Polluter Pays Principle** to push India towards a circular economy.

What are the SWM Rules, 2026? (Definition & Legal Basis)

- A comprehensive regulatory framework governing **segregation, collection, processing, treatment and disposal of solid waste**.
- Notified under the **Environment (Protection) Act, 1986**.

Replaces **SWM Rules, 2016**, addressing weak enforcement, landfill dependence and data opacity.

Key Provisions (Core Content)

Waste Management & Processing

Area	Provision
Source Segregation	Mandatory four-stream segregation: wet, dry, sanitary, and domestic hazardous ("special care") waste.
Landfills	Restricted only to inert and non-recyclable, non-energy-recoverable waste.
Landfill Disincentive	Higher tipping fees for unsegregated waste than for processed waste.
Legacy Waste	Mandatory mapping of all dumpsites; biomining/bioremediation with quarterly reporting.
Bulk Waste Generators (BWGs)	Must process wet waste on-site or hold an off-site processing certificate (EBWGR).
BWG Threshold	>20,000 sq m built-up area or >40,000 L/day water use or >100 kg/day waste.
MRFs	Formal recognition of Material Recovery Facilities for recyclables, e-waste and special streams.
RDF Mandate	Industries using solid fuel (cement, WtE) must substitute fuel with Refuse-Derived Fuel.
RDF Target	Gradual rise from 5% to 15% substitution over six years.
Eco-sensitive Zones	Hotels/restaurants must decentralise wet-waste processing.

UPSC Exam Relevance

- **Prelims:** SWM Rules 2026, RDF, biomining, Polluter Pays Principle
- **Mains:** GS-III: Urban pollution, waste management, circular economy
GS-II: Local governance, regulatory enforcement

48. Lucknow Declared UP's First Zero Fresh Waste Dump City



Lucknow became Uttar Pradesh's first "Zero Fresh Waste Dump" city. Achieved under Swachh Bharat Mission–Urban (SBM-U) after ensuring 100% scientific processing of municipal solid waste (MSW).

What Was Achieved?

- Commissioning of **Shivari Solid Waste Management Plant** (700 TPD capacity).
- With **three plants (700 TPD each)**, Lucknow can now process **~2,100 metric tonnes per day (TPD)** – matching daily waste generation.

No fresh waste sent to open dumpsites.

How Waste is Processed?

- **Waste Composition:**
 - 55% Organic
 - 45% Inorganic
- **Processing Model:**
 - Organic → **Compost & Biogas**
 - Inorganic → **Recycling / Refuse Derived Fuel (RDF)**

- **RDF Utilisation:**

2.27 lakh MT supplied to **cement and paper industries**.

Collection & Segregation

- **Door-to-door collection efficiency:** 96.53%
- **Source segregation:** Above 70%

Legacy Waste Remediation

- Total legacy waste: **18.5 lakh MT**
- Processed: **12.86 lakh MT**
- **Land reclaimed:** 25+ acres
- Inert material reused for **infrastructure & land development**.

49. From Fines to Fixes: Environmental Protection Fund Gets a Rulebook



The Government has **notified the Environmental (Protection) Fund (EPF) Rules, 2026**, operationalising the use of penalties collected under environmental laws.

- The move ensures that **monetary penalties are ring-fenced for pollution control and ecological restoration**, strengthening the *polluter pays* principle.

What is the Environmental (Protection) Fund (EPF)?

- A **dedicated non-lapsable fund** to channel penalties/compensation imposed for environmental violations into **restorative and preventive actions**.
- Converts decriminalisation outcomes into **environmental remediation**, not revenue maximisation.

Legal & Policy Background

- **Jan Vishwas (Amendment of Provisions) Act**
 - Decriminalised minor offences under multiple laws, including environmental statutes.
 - Retained **financial penalties**, necessitating a structured utilisation mechanism.
- Anchored in the **“Polluter Pays Principle”** recognised by Indian courts as part of environmental jurisprudence.

Sources of the Fund

Penalties/compensation imposed under:

- **Environment (Protection) Act**
- **Air (Prevention and Control of Pollution) Act**
- **Water (Prevention and Control of Pollution) Act**

Other notified environmental statutes and rules.

Permitted Uses (Indicative – 11 Broad Categories)

1. **Pollution prevention, control & mitigation** (air, water, soil)
2. **Remediation/restoration** of contaminated or degraded sites
3. **Environmental monitoring systems** (installation, O&M)
4. **Laboratory strengthening** for testing and compliance
5. **Capacity building** of regulators and technical staff
6. **Clean & green technologies** (R&D, pilots, adoption)
7. **Waste management infrastructure** (including legacy waste)
8. **River/lake rejuvenation & catchment protection**
9. **Environmental data systems & decision support**
10. **Awareness & compliance facilitation** (training, guidance)
11. **Emergency environmental response** (accidental pollution)

50. Battery Pack Aadhaar Number (BPAN): Digital Identity for EV Batteries



The Ministry of Road Transport and Highways released draft guidelines proposing a Battery Pack Aadhaar Number (BPAN) system to assign a **unique digital identity** to electric-vehicle batteries – aimed at lifecycle traceability, safety, and clean-energy governance.

What is the Battery Pack Aadhaar (BPAN) System?

- **Digital Identity:** Each EV battery gets a **unique 21-character alphanumeric ID** with a QR code.
- **Central Portal:** The BPAN links to a national digital platform that stores **verified lifecycle and compliance data**.
- **Producer Responsibility:** **Manufacturers/importers** must generate and assign BPANs.

Coverage & Applicability

- **Vehicles:** EV batteries used in **L, M, and N categories** (two/three-wheelers; passenger cars; goods vehicles).
- **Capacity Threshold:** **Industrial batteries > 2 kWh** included.
- **Scope:** New batteries and regulated refurbished flows (to curb unsafe reuse).

Data Architecture

Public (Static) Data

- Manufacturer & model details
- Technical specifications
- **Material composition**
- **Carbon footprint**

Secure (Dynamic) Data *(authorised access only)*

- **State of Health (SoH)**
- Charge/discharge cycles
- Thermal incidents & safety events

Why this split matters: Transparency for consumers and regulators, while protecting sensitive operational data.

Objectives of BPAN

- **Lifecycle Traceability:** From raw material sourcing → use → recycling → disposal.
- **Quality & Safety:** Deters counterfeit/substandard batteries and unsafe refurbishments.
- **Policy Verification:** Enables **PLI (Advanced Chemistry Cells)** checks on **domestic value addition**.
- **Circular Economy:** Improves end-of-life management and compliance with **EPR norms**.

51. Orobanche: The Invisible Parasite Undermining India's Mustard Mission



Orobanche aegyptiaca (Margoja) has emerged as a serious but largely hidden threat to mustard crops, with severe infestations cutting yields by **up to 50%** in parts of north and central India. This poses risks to **edible oil self-sufficiency targets** and farmer incomes.

What is Orobanche?

- **Orobanche** is a **root-parasitic weed** lacking chlorophyll; it cannot photosynthesise.
- It attaches to host plant roots using a **haustorium**, siphoning water, nutrients and carbon.

Early growth remains underground, making detection difficult until major damage is done.

Affected Regions

- Concentrated in **semi-arid mustard belts**:
 - Rajasthan
 - Haryana
 - Madhya Pradesh

Why is it a Serious Threat?

Feature	Relevance
High Reproductive Capacity	One plant produces up to 5 lakh seeds, viable for ~20 years
Yield Loss	Can reduce mustard yields by 40-50%
Wide Host Range	Affects mustard, tomato, potato, lentil, cabbage
Hard to Control	Underground phase escapes normal weeding & sprays

Management & Control Measures

- **Herbicide-Tolerant (HT) Hybrids** : Imidazolinone-tolerant mustard hybrids enable selective control.
- **GM Mustard Research** : Multi-herbicide-tolerant GM lines under development to prevent resistance build-up.
- **Soil Solarisation** : Summer polyethene mulching raises soil temperature, killing **up to 95%** seeds.
- **Nutrient Management** : High nitrogen fertilisation suppresses Orobanche (crop-specific feasibility required).

About Mustard (Quick Facts)

- **Season**: Rabi (Sept-Oct sowing)
- **Climate**: Cool, dry (10-25°C)
- **Soil**: Well-drained sandy loam to alluvial loam
- **Economic Role**: Contributes **>40%** of India's domestic edible oil output
- **Top Producer**: Rajasthan (≈40-45%), followed by Haryana, MP, UP, WB

JANUARY 2026

SCI & TECH

1. From Breakthroughs to Throughput: ISRO's Next Big Test
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31. Vehicles That Talk to Each Other (V2V Tech)
32. Indian Telecom Security Assurance Requirements (ITSAR)
33. PARAM Shakti Supercomputer
34. ASC ARJUN Humanoid Robot (Indian Railways)
35. ECOFIX Rapid Road Repair from Industrial Waste
36. Biomaterials for Circular Economy
37. National Environmental Standard Laboratory (NESL)



1. From Breakthroughs to Throughput: ISRO's Next Big Test



After landmark successes such as **Chandrayaan-3 (2023)**, **Aditya-L1 (2024)** and **NISAR (2025)**, **Indian Space Research Organisation** now faces a new challenge: shifting from *mission-based excellence* to *routine, large-scale and high-cadence space capability*.

Core Issue: Why the Challenge Has Changed

- **Rising Mission Complexity:** Human spaceflight (Gaganyaan), advanced science missions, and a new heavy-lift launcher are being pursued simultaneously.
- **Expectation Reset:** Success is no longer episodic; ISRO is now expected to deliver **consistently, faster, and at scale**, comparable to global space leaders.

Key Upcoming Challenges

1. Operational Bottlenecks

- **Low Launch Cadence:** Only **5 launches in 2025** against a planned **8**, due to congestion from parallel flagship missions.
- **Single-Point Control:** ISRO still acts as *designer-integrator-operator*, causing spillover delays across missions.
- **Infrastructure Limits:** Insufficient integration bays and test stands restrict parallel mission processing.

2. Governance & Legal Gaps

- **No Comprehensive Space Law:** Absence of a clear national space legislation creates regulatory uncertainty.
- **Role Overlap:** Functional separation between **ISRO, IN-SPACe, and NSIL** remains incomplete.

3. Competitiveness Constraints

- **Capital Stress:** Space-tech investment dipped sharply in 2024, reflecting long gestation risks.

Manufacturing Dependence: Over **50% of high-end avionics and space-grade electronics** are still imported, limiting scale-up.

UPSC Exam Relevance

- **Prelims:** ISRO reforms, IN-SPACe, NSIL, Gaganyaan, NGLV
- **Mains:** GS-III (Space technology, indigenisation, public-private partnership)

Mains Practice Question

"ISRO's future challenge lies not in achieving breakthroughs but in institutionalising scale and speed." Examine the operational and governance constraints behind this shift.

2. From State to Startup: India's First Private National Earth Observation Constellation



A consortium led by Pixxel has signed an agreement with Indian National Space Promotion and Authorisation Centre to build India's first private national Earth Observation (EO) satellite constellation. The move signals a structural shift from state-led EO to industry-driven operations, with the government retaining priority data access.

What are Earth Observation (EO) Satellites?

- Spacecraft equipped with **remote-sensing sensors** to monitor Earth's **physical, chemical, and biological systems** for civilian, commercial, and strategic uses.

Sensor Types (Prelims-friendly):

- **Passive sensors:** Detect reflected sunlight/thermal emissions (optical, multispectral, hyperspectral).
- **Active sensors:** Emit their own signal (e.g., **SAR**) – work day/night, all-weather.

Context & Background

- India's EO ecosystem has been **government-dominated** since **Bhaskara-I (1979)** and **IRS-1A (1988)**.
- Rising demand for **high-resolution, near-real-time geospatial data** (agriculture, disasters, security) and **data sovereignty concerns** necessitated private capacity.

Consortium & Operational Model

- **Lead:** Pixxel
- **Partners:** Dhruva Space, PierSight, SatSure
- **Model: Public-Private Partnership (PPP)**
 - Consortium **owns & operates** satellites
 - Government has **priority access** to data
 - Data also **marketed globally**

Why Hyperspectral + SAR Matters

- **Hyperspectral:** Hundreds of narrow bands → crop stress, minerals, pollution fingerprints.

SAR: Penetrates clouds/rain; night imaging → disaster response, border & maritime surveillance.

3. Fly, Land, Repeat: Reusable Rockets Redefine Sustainable Access to Space



As per *The Hindu*, **reusable rocket technology** is rapidly transforming the commercial space sector by **cutting launch costs** and enabling high-frequency launches. With the global space economy projected to **exceed \$1 trillion by 2030**, reusability is becoming the cornerstone of sustainable and competitive space access.

What are Reusable Rockets?

Reusable rockets are launch vehicles designed to **return intact after missions**, allowing **refurbishment and multiple reuses** of costly components like engines and avionics – shifting spaceflight from disposable launches to an **aviation-like transport model**.

Context & Background

- Traditional expendable rockets discard stages into oceans or burn up in the atmosphere, driving up **cost-to-orbit**.

Reusability introduces **rapid turnaround, lower marginal costs**, and supports mega-constellations, deep-space missions, and responsive launches.

Core Enabling Technologies

- **Guidance & Navigation:** GPS + Inertial Measurement Units for precision landing from orbital velocities.
- **Retro-Propulsion:** Multiple engine re-ignitions during descent to shed kinetic energy from supersonic speeds.
- **Aerodynamic Control:** **Grid fins** and active control surfaces steer the vehicle during atmospheric descent.
- **Thermal Protection:** **Silica tiles, PICA** ablators, and heat-resistant alloys withstand **~2000 °C** re-entry heat.
- **Clean Propellants (Methalox):** Liquid oxygen + methane reduce **coking**, easing refurbishment and reuse.

Landing & Recovery Systems

Method	How it Works	Examples
Vertical Landing (VTVL)	Upright touchdown using engine thrust & landing legs	SpaceX Falcon 9
Mechanical Catch	Robotic arms catch booster mid-air	SpaceX Mechazilla
Horizontal Landing	Winged glide to runway	Indian Space Research Organisation's Pushpak RLV-TD
In-Air Capture	Helicopter snags parachute line	Experimental systems
Parachute Splash-Down	Controlled ocean landing	Crew capsules, small LVs

4. Who Pays if Space Fails? Space Insurance Framework



Demand for **space insurance in India** has surged after consecutive launch failures of PSLV-C61 and PSLV-C62. With rapid **private-sector entry and 100% FDI liberalisation**, the absence of a clear insurance–liability framework is emerging as a **systemic risk**.

What is Space Insurance? : Space insurance provides financial cover against losses during **manufacturing, transport, launch, and in-orbit operations** of space assets (satellites, launch vehicles, payloads).

Why Space Insurance Is Crucial for India

1) International Legal Responsibility : Under global space law, **India bears international responsibility** for all space activities launched from its territory – **including private missions**.

Absolute liability applies for damage caused on Earth or to aircraft by Indian space objects, exposing the sovereign to uncapped claims.

2) Startup De-Risking & FDI Confidence

- Space missions are **capital-intensive, high-risk**; insurance prevents single-failure bankruptcies.
- A predictable insurance regime boosts investor confidence amid **100% FDI** and commercialisation.

3) Market Access & Competitiveness

- International customers prefer **insured launches**; mission assurance is essential to access the **\$500+ billion global space economy**.

Key Challenges in India's Space Insurance Market

- **High Premiums:** Launch insurance ~**15–20%** of mission value; premiums reportedly rose **20–30%** after recent failures.
- **Capital Strain:** Upfront premiums crowd out **R&D** for early-stage startups.
- **Reinsurance Dependence:** Limited domestic capacity → reliance on foreign reinsurance; exposure to global cycles.
- **Legislative Gap:** No umbrella **Space Activities law** defining liability caps → actuarial uncertainty.
- **Orbital Risks:** Growing debris and **Kessler Syndrome** fears raise in-orbit risk and pricing complexity.

5. Who Owns Innovation in Space? Patent Law Beyond Earth



In **January 2026**, debates resurfaced on how **international patent law**, which is inherently **territorial**, struggles to govern inventions created or used in **outer space**, a legally **non-sovereign domain**. With growing commercial and scientific activity in orbit and on the Moon, the absence of a clear space-specific IP regime has become a strategic legal gap.

What is International Patent Law?

Patent law grants inventors **exclusive rights** to make, use, or sell inventions **within a national territory**.

- There is **no single global patent**; protection depends on **national registration and enforcement**.
- International treaties (e.g., Paris Convention) only **coordinate procedures**, not create supranational rights.

Why Territorial Patent Law Fails in Space

1. Jurisdictional Mismatch

- **On Earth**: Patent enforcement is tied to **sovereign territory**.
- **In Space**: Under the **Outer Space Treaty + Registration Convention**, jurisdiction flows from the **state registering the space object**, not the physical location of the invention.

2. Module-Based Exception (ISS Model)

- The **International Space Station (ISS)** applies **module-wise patent jurisdiction** – each module follows the law of the contributing state.
- This works only because the ISS is **segmented**, not fully integrated.

3. Breakdown in Future Space Habitats

- **Lunar bases / space stations** will be:
 - Technically integrated
 - Multinational
 - Continuously modified via remote software updates and AI
- This blurs where an invention is:
 - *Made*
 - *Used*
 - *Improved*

Why This Matters (Significance)

- **Commercial Space Economy**: Mining, habitats, in-orbit manufacturing need IP certainty.
- **Strategic Competition**: A few spacefaring nations shape rules; others remain rule-takers.
- **Equity & Access**: Excessive exclusivity over life-support or survival tech risks monopolising essentials.

6. PSLV-C62 / EOS-N1 Mission Anomaly



The PSLV-C62 / EOS-N1 mission launched by **Indian Space Research Organisation (ISRO)** suffered a **technical failure in the third stage**, preventing successful orbital insertion. The mission was executed by **NewSpace India Limited (NSIL)** to deploy an **Earth Observation Satellite** and multiple co-passenger payloads into **Sun-Synchronous Orbit (SSO)**.

About Polar Satellite Launch Vehicle (PSLV)

- **Generation:** India's **third-generation** launch vehicle.
- **Stages:** **Four-stage** rocket – **two solid + two liquid** stages.
- **Mission Profile:** Widely used for **Earth observation, SSO missions, and commercial launches**.
- **Variant Used:** PSLV-DL, equipped with **two solid strap-on motors** for enhanced lift capability.

Primary Payload

- **EOS-N1 (Anvesha):**
 - **Mass:** ~400 kg
 - **Developer:** Defence Research and Development Organisation (DRDO)
 - **Type:** Hyperspectral imaging satellite
 - **Capabilities:**
 - Captures **hundreds of narrow spectral bands**
 - Enables **precise chemical identification and high-resolution terrain mapping**
 - **Applications:** National security, agriculture, resource mapping, environmental monitoring

Key Secondary Payloads

- **AayulSAT:**
 - India's **first on-orbit satellite refuelling demonstrator**
 - Aims to **extend satellite life and reduce space debris**
- **KID Capsule:**
 - **Kestrel Initial Demonstrator**, a **small re-entry capsule** developed by a **Spanish startup**
- **MOI-1 Satellite:**
 - India's **first orbital AI image laboratory**
 - Uses **edge computing** to process images **in space**, reducing data transmission to Earth

7. Chandrayaan-3 Propulsion Module's Orbital Shift



Indian Space Research Organisation (ISRO), using data from the Indian Deep Space Network (IDSN), observed that the discarded propulsion module of Chandrayaan-3 underwent a significant orbital change after a close encounter with the Moon. The event highlighted complex Earth-Moon gravitational interactions affecting spacecraft debris.

Key Details

- **Initial Disposal Orbit:** After mission completion, the propulsion module was placed in an elliptical Earth orbit (~125,000 km perigee; ~305,000 km apogee).
- **Lunar Encounter Window:** Entered the Moon's sphere of influence (Nov 4-14) with two close flybys at ~3,740 km and 4,537 km above the lunar surface.
- **Gravitational Effect:** Lunar gravity reshaped the orbit, raising the apogee to ~727,000 km and perigee to ~409,000 km – near the Moon's average Earth distance (~384,000 km).
- **Orbital Tilt:** The orbit tilted by ~22°, evidencing non-linear dynamics.
- **Physics Insight:** Demonstrates a three-body problem, where combined Earth-Moon gravitational pulls produce chaotic orbital evolution.

About the Indian Deep Space Network (IDSN)

- **Role:** ISRO's deep-space telemetry, tracking, and command facility.
- **Location:** Bayalu, near Bengaluru.
- **Function:** Supports interplanetary missions with high-precision tracking and communications.

8. NASA's Artemis II Mission



National Aeronautics and Space Administration (NASA) is set to launch **Artemis II**, the **first crewed mission** of the Artemis programme.

The mission will fly **four astronauts around the Moon** and return to Earth, marking humanity's **first return to the lunar vicinity since Apollo 17 (1972)**.

About Artemis II

- **Mission Type:** Crewed lunar flyby (no landing).
- **Crew Milestone:** Will carry the **first woman** and the **first person of colour** to the Moon's vicinity.
- **Objective:** To test **deep-space systems** of the Orion spacecraft under real mission conditions ahead of a lunar landing.

Mission Architecture

- **Launch Vehicle:** Space Launch System (SLS) – NASA's **super-heavy-lift rocket** and the **most powerful launch vehicle** ever built.
- **Crew Module:** Orion Multi-Purpose Crew Vehicle (MPCV) – NASA's next-generation, partially reusable spacecraft.
- **Trajectory:** Free-return trajectory – loops around the Moon's far side and returns to Earth using **natural gravity**, enabling safe return even in case of propulsion failure.
- **Distance Covered:**
 - ~7,400 km above the lunar surface
 - Nearly 400,000 km from Earth – the **farthest humans have ever travelled**

International Collaboration

- Partners include:
 - **European Space Agency (ESA)**
 - **Japan Aerospace Exploration Agency (JAXA)**
 - **Canadian Space Agency (CSA)**

Broader Artemis Programme

- **Goal:** Establish a **long-term human presence on the Moon** and use it as a stepping stone for **crewed Mars missions**.
- **Next Step:** **Artemis III**, which aims for a **crewed lunar landing** near the Moon's south pole.

9. NASA's Pandora Mission Launched to Decode Exoplanet Atmospheres



NASA's Pandora satellite was successfully launched aboard SpaceX's Falcon 9 rocket into a **Sun-synchronous Low Earth Orbit** as part of the "Twilight" rideshare mission. The rideshare also carried **SPARCS CubeSat** and **BlackCAT**, supporting astrophysics observations.

About the Pandora Mission

- **Mission Type:** Low-cost SmallSat under NASA's Astrophysics Pioneers Program.
- **Primary Aim:** Study the atmospheres of at least 20 exoplanets.
- **Core Problem Addressed:** Separates a planet's true atmospheric signal from **stellar contamination** (noise caused by host star variability).

How Pandora Works

- **Dual-Wavelength Observation:** Simultaneous monitoring in **visible** and **infrared** bands.
 - **Visible Light:**
 - Tracks **stellar brightness variations**
 - Monitors **starspots** and **stellar rotation speed**
 - **Infrared:**
 - Performs **transmission spectroscopy**
 - Determines **chemical composition** of exoplanet atmospheres
- **Scientific Value:** Improves accuracy of atmospheric measurements critical for **exoplanet characterisation** and future **habitable-world studies**.

Orbit Characteristics

- **Dusk-Dawn (Terminator) Orbit:**
 - Satellite flies along Earth's **day-night boundary**.
 - Ensures **continuous solar illumination** and **thermal stability**, ideal for sensitive instruments.

Other Payloads on the Twilight Mission

- **SPARCS CubeSat:** Studies **ultraviolet flares** from nearby **low-mass stars**.
- **BlackCAT:** A **wide-field X-ray telescope** to detect **high-energy cosmic events**, including **gamma-ray bursts**.

10. Mission Ends, Science Endures: Japan's Akatsuki Closes Chapter on Venus



Japan Aerospace Exploration Agency has officially **terminated the Akatsuki (PLANET-C) mission** after losing contact with the spacecraft for over a year. Akatsuki was the **only active spacecraft orbiting Venus**, providing unprecedented insights into **Venusian atmospheric dynamics**.

What was Akatsuki? : Akatsuki, also called PLANET-C or Venus Climate Orbiter (VCO), was Japan's dedicated mission to study Venus's atmosphere, weather systems, and climate.

Mission Overview

- **Space Agency:** JAXA
- **Target Planet:** Venus
- **Primary Focus:** Atmospheric circulation, cloud dynamics, and volcanism
- **Orbit:** Elliptical near-equatorial orbit, enabling long-duration cloud tracking
- **Unique Feature:** Only mission focused *exclusively* on atmospheric processes of Venus

Key Scientific Objectives

- Study **Venusian super-rotation**
- Analyse **atmospheric waves, tides, and thermal structures**
- Investigate **possible volcanic activity**

Understand Venus's climate evolution and Earth-Venus divergence

Super-Rotation Explained

Venus rotates **very slowly** (one Venus day > one Venus year).

- However, its atmosphere **circulates ~60 times faster** than the planet's surface rotation.
- Akatsuki confirmed that **solar heating and thermal tides** are major drivers of this phenomenon.

India's Venus Mission: Shukrayaan-1

Overview

- **Agency:** Indian Space Research Organisation
- **Mission Name:** Venus Orbiter Mission (VOM) / **Shukrayaan-1**
- **Launch Year:** 2028
- **Launch Vehicle:** LVM-3 (India's heaviest operational rocket)

Scientific Payload

Five cameras operating in:

- Infrared
- Ultraviolet
- Visible light

Ultra-Stable Oscillator (USO): Enabled **3-D atmospheric radio-science mapping** by studying signal distortion through the atmosphere.

11. First Commercial Space Station: Haven-1



Haven-1 is planned as the **world's first commercial space station**, signalling a shift toward privately sustained space infrastructure.

Key Facts

Type: Single-module commercial space station in **Low Earth Orbit (LEO)**

Developer: American aerospace company **Vast**, with support from NASA and private partners

Objective: Short-duration missions for **microgravity research, in-space manufacturing, and orbital tourism**

Launch Plan: Expected in **2027**, aboard a **SpaceX Falcon 9**, initially uncrewed

Design: Human-centric, with a **domed window** and **private crew quarters**

Mission Profile: **10-30 days** per mission

Lifespan: Designed for a **three-year** orbital operation

Roadmap: Acts as a **precursor to Haven-2**, a future multi-module station

12. Blue Origin's TeraWave: Space-Based Internet Backbone



Blue Origin announced plans to launch the **TeraWave satellite constellation** in **2027**. The project aims to create a **high-capacity, mission-critical global communications backbone** using a **multi-orbit architecture (LEO + MEO)**. It targets **enterprise, data-centre, and government users**, complementing terrestrial fibre networks.

About TeraWave Satellite Constellation

- **Developer:** Blue Origin
- **Nature:** A **space-based communications network** integrating **Low Earth Orbit (LEO)** and **Medium Earth Orbit (MEO)** satellites.
- **Purpose:** Provide **secure, resilient, high-bandwidth connectivity** for cloud operations, real-time IoT data, and mission-critical services.
- **Capacity:** Designed to deliver **~6 terabits per second (Tbps)** total throughput with **symmetrical upload and download speeds**.
- **Resilience:** Offers **route diversity** and backup where fibre deployment is expensive or vulnerable (remote/suburban regions).
- **Strategic Value:** Enhances **network redundancy** and continuity for governments and enterprises, especially during outages or disasters.

13. ESA's New Norcia 3 Deep-Space Antenna



The European Space Agency (ESA) inaugurated New Norcia 3 (NNO3), a deep-space communication antenna. It strengthens ESA's **Estrack network**, ensuring **24/7 uninterrupted spacecraft communication**. Located at the **New Norcia Ground Station, Western Australia**.

About New Norcia 3 (NNO3)

- **Nature:** Fourth deep-space antenna in ESA's global **Estrack** network.
- **Purpose:** Acts as a permanent "space phone line" linking mission control with spacecraft across the Solar System.
- **Coverage:** Complements sister stations to provide continuous global tracking of 20+ missions.
- **Reflector Dish:** 35-metre diameter high-gain antenna.
- **Cryogenic Cooling:** Operates at about -263°C , enabling detection of extremely weak deep-space signals.
- **AI Integration:** First ESA antenna using **AI-based noise filtering and auto-tracking** for enhanced signal precision.
- **Local Operator:** Managed by CSIRO (Australia's national science agency).
- **International Role:** Can offer cross-support to NASA, JAXA, and ISRO, enhancing global space cooperation.

About Estrack Network

- ESA's global ground-station system for spacecraft communication and tracking.
- Provides telemetry, tracking, and command (TT&C) services across interplanetary missions.

14. Study of Stellar Twin (W Ursae Majoris) Sheds Light on Binary Star Evolution



A joint study by Aryabhata Research Institute of Observational Sciences (ARIES) and the Physical Research Laboratory (PRL) analysed W Ursae Majoris (W UMa), a **stellar twin/contact binary**, using ground- and space-based data. The findings refine **mass-radius relations of low-mass stars**, improving accuracy in **exoplanet transit studies**.

Key Scientific Findings

- **Orbital Evolution:** Evidence of **interstellar mass exchange** causing **gradual orbital shifts** over time.
- **Common Envelope:** Close proximity results in a **shared outer atmosphere**, forming a “**dumbbell-shaped**” **common envelope**.
- **Magnetic Activity:** **Brightness asymmetry** indicates **dark magnetic star spots**.
- **High Stellar Activity:** Light-curve signals confirm **active outer layers**, linked to **stellar flares and magnetic events**.

What are Stellar Twins (W UMa-type Systems)?

- **Definition:** **Contact binary systems** where two stars orbit so closely that they share a **common atmosphere**.
- **Evolutionary Significance:** Represent a **late evolutionary stage** of close binaries, potentially leading to **stellar mergers**.

Instruments & Institutions

- **Observational Tools:**
 - **1.3 m Devasthal Fast Optical Telescope (DFOT)** at ARIES
 - **Transiting Exoplanet Survey Satellite (TESS)** by NASA

About ARIES: Autonomous institute under the **Department of Science and Technology**; established **1954**; located in **Nainital, Uttarakhand**.

Binary Star Systems: Prelims Basics

- **Definition:** Two stars bound by gravity orbiting a common **barycentre**.
- **Prevalence:** **~85%** of Milky Way stars exist in **binary or multiple-star systems**.
- **Components:** **Primary** (brighter/more massive) and **secondary/companion** (lighter/dimmer).

15. Magnetic Fields Found Crucial in Regulating Star Formation



A study by the **Indian Institute of Astrophysics (IIA)** revealed how **magnetic fields regulate star formation**, based on observations of the **L328 molecular cloud** (~700 light-years away). Data were obtained using the **POL-2 polarimeter** on the **James Clerk Maxwell Telescope**, Hawaii.

Key Findings

- **Multi-Scale Connectivity:** Magnetic fields remain **ordered and connected** from **large molecular clouds** down to **dense star-forming cores**.
- **Field Orientation:** A consistent **northeast-southwest alignment** guides the **inward collapse of matter**.
- **Magnetic Criticality:** Star formation depends on the **balance between magnetic pressure and gravity**.
 - **Sub-critical cores** (magnetic support > gravity) can remain **starless**.
- **Energy Scaling:** Near the L328 core, **magnetic forces, gravity, and turbulence** are each **~10× stronger** than thermal energy, decisively shaping star formation.

16. Hydrogen Molecule Emerges as a Gold Standard for Testing Fundamental Physics



Recent theoretical breakthroughs have enabled **predictions for the hydrogen molecule (H_2)** to match **ultra-precise experimental measurements**, turning it into a **benchmark system to test the limits of quantum mechanics and relativity**.

Why Hydrogen Molecule (H_2) is Special

- **Simplest stable molecule:** Contains only **two protons and two electrons**, yet exhibits full molecular quantum behaviour.
- **First-principles system:** Its small size allows predictions directly from **basic physical laws**, without empirical fitting.
- **Multi-theory sensitivity:** At extreme precision, H_2 energy levels reflect **quantum, relativistic, and nuclear-motion effects together**.

Experimental accuracy: Modern spectroscopy measures H_2 transitions with precision up to **1 part in 10^{11}** .

Earlier Theoretical Limitations

- **Electron correlation:** Strong interaction between two electrons made simplified models inaccurate.
- **Fixed-nucleus assumption:** Earlier approaches treated protons as nearly stationary, missing subtle energy shifts.
- **Incomplete relativity:** Relativistic effects were included only approximately, causing measurable mismatches.

What the New Theory Achieved

- **Fully nonadiabatic treatment:** Electrons and nuclei are treated dynamically together, removing the fixed-nucleus approximation.
- **Recoil correction:** Proton recoil due to electron motion is explicitly accounted for.
- **Precision match:** Theory now agrees with experiments at the **kilohertz level**, eliminating earlier megahertz-scale errors.

UPSC Exam Relevance

- **Prelims:** Hydrogen molecule, spectroscopy, quantum mechanics basics
- **Mains:** GS-III (Scientific research, frontier technologies, role of basic science)

17. Ultracold Atoms & Quantum Technology



In January 2026, studies highlighted that **ultracold atoms** are enabling the world's most precise atomic clocks and are becoming core platforms for **quantum simulation and quantum computing**, marking a leap in precision measurement and next-generation technologies.

What are Ultracold Atoms?

- **Definition:** Atoms cooled to **billionths of a degree above absolute zero** (0 K / -273.15°C).
- **Quantum Regime:** At such temperatures, atomic motion nearly stops and atoms behave as **matter waves**, making **quantum effects** macroscopically observable.

Keywords: *quantum coherence, matter waves, precision measurement*

How are Ultracold Atoms Produced?

1. **Laser Cooling (Doppler Cooling):**
 - Laser light tuned slightly below an atomic transition slows atoms by repeated photon absorption and emission.
 - **Nobel Prize (1997):** Awarded for laser cooling and trapping of atoms.
2. **Evaporative (Deep) Cooling:**
 - Hottest atoms are allowed to escape; remaining atoms re-thermalise at much lower temperatures.
3. **Dark Spot Trap:**
 - Protects the coldest atoms from stray laser light, preventing reheating and enabling ultra-low temperatures.

Key Quantum States : Bose-Einstein Condensate (BEC):

At ultracold temperatures, bosonic atoms collapse into a **single quantum state**, behaving like one "super-atom" (predicted by Bose-Einstein; first realised in 1995).

Major Applications

Atomic Clocks: Near-stationary atoms provide ultra-stable frequency standards → **most accurate timekeeping ever achieved**.

Navigation & Communication: Atomic clocks underpin **GPS, satellite navigation, telecom synchronisation**.

Quantum Simulation: Model complex materials (superconductivity, magnetism) that are hard to compute classically.

Quantum Computing: Ultracold atoms in optical lattices act as **scalable, low-noise qubits**.

Gravity & Earth Sensors: Cold-atom **gravimeters** detect underground structures, water tables, and volcanic activity.

18. China's 'Artificial Sun' Breaks Fusion Density Barrier



China's Experimental Advanced Superconducting Tokamak (EAST) – popularly called the “artificial sun” – has sustained plasma densities 30-65% above the Greenwald limit for 6-7 seconds, marking the first stable, long-duration breach of this critical fusion threshold. This advances the feasibility of high-output, steady nuclear fusion.

What is Nuclear Fusion?

- Fusion joins **light nuclei (Deuterium + Tritium)** to form **Helium**, releasing enormous energy – the same process that powers the Sun.
- Requires **>100 million °C**, extreme pressure, and a **plasma state**.
- **Advantages:** Near-limitless fuel, **carbon-free**, no long-lived radioactive waste, and **~4×** energy per kg compared to fission.

What is the Greenwald Limit?

- An **empirical density ceiling** in tokamaks beyond which plasma typically becomes unstable and collapses.
- Historically, brief crossings were possible – but **not sustained**.

Why EAST's Breakthrough Matters

- **Sustained Stability:** Maintained densities **well above the Greenwald limit** for several seconds – unprecedented.
- **Higher Power Potential:** Higher plasma density → **greater fusion reaction rates** → higher energy output.
- **Scalability Signal:** Shows a **practical pathway** to operate future reactors at higher performance, aiding projects like ITER.

About Tokamaks

- **Tokamak:** A doughnut-shaped device using **strong magnetic fields** to confine hot plasma for controlled fusion.
- **Global Benchmarks:**
 - **ITER (France):** World's largest tokamak under construction (35-nation collaboration).
 - **JT-60SA (Japan):** Largest **operational** tokamak currently.

India's Fusion Ecosystem

- **ADITYA-U:** India's first indigenously built tokamak (operational upgrades ongoing).
- **SST-1:** Superconducting tokamak focused on **steady-state plasma** research.
- **SST-Bharat (proposed):** Fusion-fission hybrid concept aimed at future electricity generation.

19. CMEx: NASA's Mission to Decode the Sun's Magnetic Heart



NASA has selected the **Chromospheric Magnetism Explorer (CMEx)** for an **extended concept study**, marking a major step toward understanding the Sun's chromosphere. The mission aims to improve **space weather prediction**, crucial for protecting satellites, power grids, and communication systems on Earth.

What is the CMEx Mission?

- **CMEx (Chromospheric Magnetism Explorer)** is a proposed solar physics mission of NASA.
- **Objective:** To map **magnetic fields in the Sun's chromosphere** continuously and at high resolution.
- **Why Important:** The chromosphere is where **solar flares, eruptions, and prominences** are triggered, but its magnetic structure remains poorly understood.

Key Scientific Features

- **First-of-its-Kind Observation:** Continuous, high-resolution monitoring of the chromosphere (a long-standing observational gap).
- **Technique Used: Ultraviolet spectropolarimetry** - measures polarisation of UV light to infer magnetic field strength and direction.
- **Forecasting Value:** Enhances **space weather early-warning systems**, improving lead time for geomagnetic storms that can disrupt:
 - Satellites & GPS
 - Power grids
 - Aviation & communication networks

About the Solar Chromosphere

- **Position:** Lies between the **photosphere** and the **corona**.
- **Thickness:** ~2,000–3,000 km above the photosphere.
- **Thermal Anomaly:** Temperature **rises with height** ($\approx 4,000 \text{ K} \rightarrow 25,000 \text{ K}$), unlike lower layers.
- **Visual Signature:** Appears as a **reddish-pink rim** during total solar eclipses due to **H-alpha emission**.
- **Magnetic Significance:**
 - Considered the Sun's "**magnetic heart**".
 - Birthplace of **solar flares, prominences, and spicules**.
- **Dynamic Features:**
 - **Spicules:** Jet-like plasma structures moving at 20–30 km/s, transporting energy upward.

20. New Solid–Liquid Hybrid State of Matter



Researchers from **Germany and the UK** reported a **new hybrid solid–liquid state of matter** observed at the **nanoscale**. The discovery has major implications for **high-efficiency catalysts**, especially **platinum-on-carbon catalysts** used in **fuel cells, hydrogen vehicles, pharmaceuticals, and petrochemicals**.

About the New Solid–Liquid Hybrid State

- **Scale:** Exists at the **nanoscale**, not in bulk materials.
- **Nature:** Matter simultaneously exhibits **solid-like rigidity** and **liquid-like flow** within the **same nanoparticle**.
- **Significance:** Challenges the classical idea that a substance must be either solid or liquid at a given temperature.

Key Features

- **Atomic Coexistence:**
 - Some atoms remain **fixed (solid-like)** while others **flow freely (liquid-like)** within one nanoparticle.
- **Atomic Corraling:**
 - Stationary atoms form a rigid atomic “**corral**” that confines and regulates the motion of mobile atoms.
- **Extreme Supercooling:**
 - Metals like **platinum** can remain liquid at **~350°C**, far below their normal freezing points due to confinement.
- **Unstable Solidification:**
 - When the corral breaks, the liquid freezes into a **highly unstable amorphous (glass-like) solid**, which later reverts to a **crystalline structure**.

Potential Applications

- **Catalysis:** Enhanced efficiency and durability of **fuel-cell catalysts**.
- **Green Energy:** Improved materials for **hydrogen technologies**.
- **Industrial Chemistry:** Better control over reactions in **pharmaceutical** and **petrochemical** processes.

21. Supercomputer Unlocks Mystery of the Mpemba Effect



On 6 January 2026, scientists reported the **first supercomputer-based simulations** explaining why **hotter water can freeze faster than colder water**, known as the **Mpemba Effect**. The findings resolve a long-standing scientific paradox debated for centuries.

Key Highlights

- **Scientific Breakthrough:**
 - High-resolution molecular simulations successfully modelled **ice nucleation pathways**.
 - Provides computational evidence supporting experimental observations.
- **What is the Mpemba Effect?**
 - A counterintuitive phenomenon where **hot water freezes faster than cold water** under specific conditions.
- **Mechanism Identified:**
 - As water cools, it may get trapped in **metastable intermediate molecular states**, delaying crystallisation.
 - Hotter water can sometimes **bypass these intermediate states**, leading to faster **nucleation** (initial ice crystal formation).
- **Nucleation Pathways:**
 - Hot water may follow a **shorter molecular pathway** toward solidification.
- **Beyond Water:**
 - Similar behaviour observed in **other fluid-to-solid phase transitions**, indicating broader thermodynamic relevance.

Historical Background

- First noted by **Aristotle** in ancient Greece.
- Rediscovered in the 1960s by **Erasto Mpemba**, after whom the effect is named.
- Previously controversial due to:
 - Variability in experimental conditions
 - Computational limits in modelling water's complex hydrogen bonding

Scientific Significance

- Strengthens understanding of:
 - **Phase transitions**
 - **Non-equilibrium thermodynamics**
 - **Hydrogen-bond dynamics in water**

22. PathGennie: Open-Source Breakthrough in Computer-Aided Drug Discovery



The Ministry of Science and Technology announced the development of **PathGennie**, a new open-source computational tool that significantly accelerates computer-aided drug discovery (CADD) by efficiently simulating rare drug-protein unbinding events.

What is PathGennie?

PathGennie is an open-source molecular simulation framework that helps scientists understand **drug unbinding kinetics** – how long a drug molecule stays attached to its target protein – an important determinant of **drug efficacy**, beyond mere binding strength.

Key Scientific Concept: Drug Unbinding

- **Drug Unbinding:** Refers to the **residence time** of a drug on its target protein.
- Drugs with **longer residence time** often show **better therapeutic performance**, even if binding affinity is similar.
- Traditional simulations struggle to capture such **rare molecular events** efficiently.

Who Developed It?

- Developed by scientists at **S. N. Bose National Centre for Basic Sciences**
- The institute functions under the **Department of Science and Technology (DST)**.

How PathGennie Works

- Runs **many extremely short molecular simulations**
- **No artificial force or heat** is applied
- Mimics **natural selection at the molecular level** by preserving **physically realistic pathways**
- Efficiently captures **rare unbinding trajectories** without distorting molecular physics

Broader Applications

Beyond drug discovery, PathGennie can be applied to:

- **Chemical reactions**
- **Catalytic processes**
- **Phase transitions**
- **Self-assembly phenomena**

23. Beyond Land and Gravity: India Bets on Marine & Space Biotechnology



India is exploring **marine biotechnology and space biotechnology** as next-generation R&D frontiers to unlock **novel bioactive compounds, biomaterials, and life-support solutions**. With the **Deep Ocean Mission, BioE3 policy, and ISRO's space biology programmes**, India is positioning itself early in futuristic biotech domains.

What are Futuristic Biotechnologies?

- **Marine Biotechnology:** Use of marine microbes, algae, and organisms to produce **enzymes, pharmaceuticals, nutraceuticals, biomaterials, and biostimulants** adapted to extreme conditions (salinity, pressure, temperature).
- **Space Biotechnology:** Study and use of biological systems in **microgravity and radiation** for **food production, health management, closed-loop life support, and microbial biomanufacturing** in space.

Why India Needs These Technologies

- **Blue Economy Potential:** India has **11,000+ km coastline** and an **EEZ >2 million sq km**, yet marine bio-resources remain under-utilised.
- **Land & Water Efficiency:** Marine biomass production reduces pressure on **arable land, freshwater, and conventional agriculture**.
- **Space Autonomy:** Long-duration missions require **in-space food, medicines, oxygen recycling, and waste-to-resource systems**.
- **Bioeconomy Growth:** Supports India's target of a **\$300+ billion bioeconomy**, enhancing industrial innovation.
- **First-Mover Advantage:** Early leadership helps capture **IP, standards, and global value chains** in frontier tech.

Global Comparison (Snapshot)

Region	Strength
EU	Shared marine bioprospecting infrastructure (EMBRC)
China	Massive seaweed aquaculture + deep-sea industrial linkage
USA / Japan	Advanced microgravity biotech via ISS, JAXA
India	Strong fundamentals, early-stage scaling

24. AI Tool for Predicting Intrinsically Disordered Proteins



Researchers at the **National Centre for Biological Sciences (NCBS)** developed **Disobind**, an AI-based tool to predict how **intrinsically disordered proteins (IDPs)** interact inside cells. The tool advances understanding of **protein-protein interactions** that were previously difficult to map due to lack of fixed structure.

About Intrinsically Disordered Proteins (IDPs)

- **Nature:** Proteins with **dynamic, flexible** (“shapeshifting”) **conformations** rather than a single stable 3D structure.
- **Prevalence:** Constitute **~30–40% of the eukaryotic proteome**.
- **Functions:** Central to **cell signalling, gene regulation, and cellular communication networks**.

Disease Links: Malfunctioning IDPs are associated with **cancer, Alzheimer’s, Parkinson’s disease, and diabetes**.

About Disobind

- **Type:** Open-source AI deep learning model.
- **Core Capability:** Predicts **binding interactions of IDPs** using **only amino acid sequences** – no prior 3D structural data required.
- **Performance:** Demonstrated **higher accuracy** than tools like **AlphaFold-Multimer** and **AlphaFold3** in identifying **IDR binding interfaces**.
- **Applications:**
 - Enables mapping of interactions across large genomes.
 - Opens avenues to target **previously “undruggable” flexible protein regions**, aiding precision medicine.

25. India's First State-Funded BSL-4 Lab to Come Up in Gujarat



India's first state-funded Bio-Safety Level-4 (BSL-4) laboratory is being established in Gandhinagar, Gujarat, to strengthen research on high-risk zoonotic diseases. The facility will be fully funded and administered by the Government of Gujarat through the Gujarat State Biotechnology Mission.

Key Features & Strategic Importance

- **National Status:** The Department of Biotechnology (DBT) plans to designate it as a National Centre for High Containment Pathogen Research Facility under the BioE3 Policy.
- **Research Focus:** Enables work on high-risk pathogens such as Ebola, Marburg, Nipah, Crimean-Congo Haemorrhagic Fever, and Kyasanur Forest Disease.
- **Strategic Aim:**
 - Reduce dependence on foreign BSL-4 facilities
 - Accelerate indigenous vaccine and therapeutic development

Civilian Network: Will be India's second civilian BSL-4 lab, after the National Institute of Virology (NIV), Pune.

About Bio-Safety Level-4 (BSL-4) Laboratories

- **Security Level:** Highest level of biological containment for deadliest and exotic pathogens.
- **Pressure Control:** Maintains negative air pressure, ensuring air flows into the lab during leaks.
- **Air Safety:** Exhaust air passes through redundant double HEPA filtration.
- **Personnel Protection:** Scientists work in full-body, air-supplied positive-pressure suits; if breached, air flows outward to prevent infection.

26. Kerala Declares *Bacillus subtilis* as India's First State Microbe



Kerala became the **first Indian state** to designate a **State Microbe** – *Bacillus subtilis*. Announcement coincided with the launch of the **Centre of Excellence in Microbiome (CoEM)** at Thiruvananthapuram. Move aims to promote **microbiome awareness, biotechnology research, and invisible biodiversity conservation.**

About *Bacillus subtilis*

- **Type:** Rod-shaped, Gram-positive bacterium (Class: Bacilli).
- **Common Name:** Hay/grass bacillus.
- **Habitat:** Soil, vegetation, and gastrointestinal tracts of humans & ruminants.
- **Survival Mechanism:** Forms **endospores** resistant to extreme heat, radiation & desiccation.
- **Metabolism:** Facultative anaerobe (grows with or without oxygen).
- **Genetic Feature:** Naturally competent – can uptake foreign DNA (model organism in molecular biology).

Applications & Significance

- **Probiotic Use:** Enhances gut microbiota & immunity.
- **Agriculture:** Bio-fungicide & plant growth promoter (rhizosphere colonisation).
- **Industrial Use:** Produces enzymes (amylases, proteases) & vitamins (B2, K2).
- **Bioremediation:** Removes hydrocarbons & heavy metals from contaminated sites.
- **Fermentation:** Used in traditional foods like **Kinema (Sikkim)** and **Akhuni (Nagaland)**.

Centre of Excellence in Microbiome (CoEM)

- First **state-level microbiome research institution** in India.
- Focus: Human health, soil microbiome, sustainable agriculture & climate resilience.

India's National Microbe

- **Declared (2012):** *Lactobacillus delbrueckii* subsp. *bulgaricus*.
- **Occasion:** COP-11 of the Convention on Biological Diversity (Hyderabad).
- **Significance:** Recognises role of microbes in food fermentation (curd/dahi) & biodiversity awareness.

27. India Becomes First Country to Commercially Produce Bio-Bitumen



India has become the **first country to commercially produce bio-bitumen**, with an indigenous technology developed by **CSIR institutes**, successfully tested on a national highway stretch in Meghalaya, reducing import dependence and emissions.

What is Bio-Bitumen?

- **Bio-bitumen** is a **bio-based binder** that partially replaces petroleum bitumen in asphalt roads.
 - Produced from **biomass residues** such as agricultural waste.
- Functions as the **binding material** holding aggregates in road construction.

Technology & Development

- **Developed by:** CSIR-CRRI and CSIR-Indian Institute of Petroleum
- **Process:**
 - Agri-waste → **Fast pyrolysis** (400–600°C, oxygen-free)
 - Bio-oil → refined into **road-grade bio-bitumen**
- **Field Trial:** 100-m stretch on NH-40 (Jorabat-Shillong Expressway)
- **Performance:** **20–30% replacement** of conventional bitumen without performance loss

Why It Matters

- **Import Substitution:** India imports ~50% of its bitumen requirement.
- **Economic Gain:** 15% blending can save **₹4,500 crore/year** in forex.
- **Climate Benefit:** Lower lifecycle emissions than fossil bitumen.
- **Farm Income:** Utilises rice straw, reducing **stubble burning**.

Urban Resilience: Some mixes reduce heat absorption, mitigating **Urban Heat Island** effect.

UPSC Exam Relevance

- **Prelims:** Bio-bitumen, pyrolysis, alternative binders
- **Mains:** **GS-III:** Sustainable infrastructure, climate mitigation, agri-waste utilisation
Essay: Circular economy, indigenous technology for green growth

Mains Practice Question

How can bio-bitumen contribute to India's goals of sustainable infrastructure and circular economy? Examine.

28. India Develops 3.4V High-Voltage Supercapacitor for Next-Gen Energy Storage



In January 2026, Indian researchers developed a **high-voltage supercapacitor (3.4V)** using a dual-functional porous graphene carbon nanocomposite electrode. The innovation enhances energy storage performance for **EVs, renewable energy systems and grid-scale storage.**

Key Highlights

Research Institution

- Developed by the **International Advanced Research Centre for Powder Metallurgy and New Materials (ARCI)**.
- ARCI is an autonomous institute under the **Department of Science and Technology (DST)**.

Voltage Breakthrough

- Conventional commercial supercapacitors operate at **2.5–3.0 volts** (electrolyte stability limits).
- New system achieves **3.4 volts**, increasing energy density significantly.
- Since energy $\propto V^2$, higher voltage yields disproportionately higher energy storage.

Advanced Electrode Design

- **Dual-functional porous graphene carbon nanocomposite electrode:**
 - Water-repellent surface
 - Compatible with organic electrolytes
- Enhances stability and safety at higher voltage.

Performance Gains

- **~33% higher energy storage capacity.**
- **Power density:** Up to **17,000 W/kg**.
- **Durability:** Retains **~96% performance after 15,000 cycles**.
- Rapid ion transport due to highly porous structure → improved electrochemical efficiency.

Green Manufacturing

- Produced via **hydrothermal carbonisation** using **1,2-propanediol**.
- Avoids harsh chemicals → environmentally sustainable process.

Concept Clarity

Supercapacitors vs Batteries

- Supercapacitors store energy via **electrostatic charge separation**, not chemical reactions.
- Offer:
 - Very fast charging/discharging
 - High power density
 - Longer lifecycle
- Limitation: Lower energy density than Li-ion batteries (now improved with higher voltage).

29. ₹26,070-crore Kamala Hydroelectric Project Approved in Arunachal Pradesh



The Public Investment Board (PIB) approved the ₹26,070-crore Kamala Hydroelectric Project in Arunachal Pradesh, clearing a major central investment proposal. PIB (chaired by the Secretary, Department of Expenditure) appraises and recommends central projects above ₹500 crore.

About Kamala Hydroelectric Project

- **Project Identity:** Formerly Subansiri Middle HEP; a storage-based hydroelectric project.
- **River:** On the Kamala River, a major tributary of the Subansiri.
- **Dam Design:** 216-m high concrete gravity dam with a flood cushion to manage monsoon inflows.
- **Capacity:** 1,720 MW; ~6,870 million units of annual generation.
- **Implementation Model:** BOOT (Build-Own-Operate-Transfer) partnership between NHPC Limited and the Arunachal Pradesh Government.
- **Policy Alignment:** Supports India's Net Zero by 2070 by strengthening renewable capacity and grid stability.

30. Chips to Start-up (C2S) Programme



The **Chips to Start-up (C2S) Programme** has reported **measurable outcomes** in building **industry-ready semiconductor design talent** and strengthening India's **indigenous chip-design ecosystem**.

Launched in 2022 by **Ministry of Electronics and Information Technology (MeitY)**, it targets **scale, access, and design democratisation**.

About the C2S Programme

- **Nature:** An **umbrella capacity-building initiative** for semiconductor design.
- **Objective:** Create **industry-ready VLSI and embedded design professionals** and deepen India's **fabless design base**.
- **Nodal Agency:** **Centre for Development of Advanced Computing (C-DAC)**.
- **Training Target:** **85,000 B.Tech/M.Tech/PhD learners over 5 years** in **VLSI & Embedded Systems**.

Key Enablers

- **ChipIN Centre (C-DAC):**
 - Centralised access to **high-cost EDA tools** via remote infrastructure for students and startups.
- **Fabrication Support:**
 - Collaboration with **Semiconductor Laboratory Mohali (SCL)** for **Multi-Project Wafer (MPW)** fabrication of student designs.
- **Design Democratisation:**
 - Extends chip design beyond elite institutes to a **wider national education ecosystem**.

Key Achievements (to date)

- **Enrollment:** **>1,00,000** students.
- **Trained:** **~67,000** in advanced chip design.
- **IP Creation:** **75+ patents** filed by institutions.

Prototyping: **56 student-designed chips** fabricated.

31. Vehicles That Talk to Each Other: India's Push for V2V Safety Tech



The Ministry of Road Transport and Highways (MoRTH) is examining a nationwide rollout of Vehicle-to-Vehicle (V2V) communication technology to curb India's high road accident fatalities and improve real-time road safety.

What is Vehicle-to-Vehicle (V2V) Communication?

- **Definition:** V2V enables vehicles to exchange **real-time safety data** (speed, position, braking) using short-range wireless signals.
- **Network Model:** Operates via **Vehicular Ad-hoc Networks (VANETs)** – vehicles act as nodes, without relying on cellular towers.
- **Safety Messaging:** Uses **Basic Safety Messages (BSMs)** broadcast up to **10 times/second** within **~300 metres**.
- **Hardware:** Onboard Units (OBUs) with secure modules enable **encrypted, authenticated** communication.
- **ADAS Link:** Feeds into **Advanced Driver Assistance Systems** for automated braking or evasive actions.

Key Safety Applications

- **Collision Warning:** Alerts for sudden braking or blind-spot vehicles.
- **Intersection Safety:** Warns of cross-traffic at junctions.
- **Emergency Alerts:** Notifies approaching ambulances/fire engines.

Platooning: Enables close, coordinated truck movement to reduce drag and improve fuel efficiency.

Why It Matters for India

- **Accident Reduction:** Predictive warnings can prevent crashes before human reaction kicks in.
- **Cost-Effective Safety:** Complements road engineering and enforcement without massive physical infrastructure.
- **Future-Ready Mobility:** Lays groundwork for **connected and autonomous vehicles**.

Mains Practice Question

"Vehicle-to-Vehicle (V2V) communication can significantly improve road safety but raises new governance challenges." Discuss with reference to India. (10/15 marks)

32. Indian Telecom Security Assurance Requirements (ITSAR)



MeitY clarified that ITSAR does NOT mandate public disclosure of proprietary smartphone source code; any sharing is only with government-approved labs for security testing.

What is ITSAR?

- **Indian Telecom Security Assurance Requirements (ITSAR)** are mandatory technical security standards to protect telecom networks and national security.
- **Issued by:** National Centre for Communication Security (NCCS), under DoT.
- **Applicability:** All designated telecom equipment (manufactured, imported, or used in India) connected to telecom networks.

Binding on: OEMs, importers, dealers, and telecom service providers.

Core Security Provisions

- **No Backdoors/Malware:** Equipment must be free from hidden vulnerabilities.
- **Mandatory Testing:** Security evaluation at **Telecom Security Test Laboratories** before deployment.
- **Crypto Control:** Only NCCS-approved cryptographic algorithms and protocols permitted.

Proposed Rules for Smartphones

- **Source Code Access:** Limited sharing with approved labs (not public disclosure).
- **App Control:** Users must be able to uninstall non-essential pre-installed apps.
- **Log Retention:** Security logs to be stored for **1 year**.
- **Malware Protection:** Periodic, automatic OS-level malware scans.
- **Update Intimation:** NCCS to be informed before major software updates/patches.

33. PARAM Shakti: India's Indigenous Supercomputing Push Gets a Boost



The Ministry of Electronics and Information Technology (MeitY) inaugurated **PARAM Shakti**, a new supercomputing facility at **Indian Institute of Technology Madras**, under the **National Supercomputing Mission (NSM)**, strengthening India's push for **high-performance computing (HPC) self-reliance**.

What is PARAM Shakti?

PARAM Shakti is a **state-of-the-art indigenous supercomputer** installed at IIT Madras.

It is developed under NSM by **Centre for Development of Advanced Computing (C-DAC)**.

Key Features

- **Computing Power: 3.1 Petaflops** (≈ 3.1 quadrillion calculations/second).
- **Indigenous Hardware:** Built on the **Rudra motherboard** (designed & manufactured in India).
- **Interconnect:** Uses **Trinitra**, an indigenously developed high-speed network fabric.
- **Energy Efficiency:** Power Usage Effectiveness (PUE) of **1.2-1.4** (globally competitive).
- **Software Stack:** Native **AlmaLinux-based** operating system, ensuring strategic control.
- **Access Model:** **Open access** – about **40% capacity reserved for external researchers**.

Major Applications

- **Healthcare:** Drug discovery and molecular simulations.
- **Climate Science:** High-resolution weather forecasting & climate modelling.
- **Engineering:** Aerospace, nuclear simulations, fluid dynamics.
- **AI & Data Science:** Training large AI models under the **IndiaAI Mission**.

PARAM Shakti in India's Supercomputing Ecosystem

- **National Supercomputing Mission (2015):** Jointly led by MeitY & DST.
- **Systems Installed:** **38 supercomputers** across India.
- **National Capacity:** **~ 44 Petaflops**, targeted to exceed **200 Petaflops** under IndiaAI.
- **Milestones:**
 - **PARAM 8000 (1991):** India's first indigenous supercomputer.
 - **Param Shivay (IIT-BHU):** First NSM-era system.
 - **Param Pravega (IISc):** One of India's largest academic systems (~ 3.3 PF).

34. ASC ARJUN: Indian Railways Deploys Humanoid Robot for Station Security



Indian Railways deployed a humanoid robot “ASC ARJUN” at Visakhapatnam Railway Station. The deployment aims to **modernise station security, crowd management, and passenger assistance**, working alongside the Railway Protection Force (RPF). It marks a **first-of-its-kind, fully indigenous humanoid robot deployment** across the Indian Railways network.

About Humanoid Robot ASC ARJUN

- **Indigenous Development:** Built entirely using **home-grown AI and robotics technology**.
- **Operational Role:** Supports station surveillance, passenger interface, and emergency alerting.

Key Features & Capabilities

- **AI Surveillance:** Uses **Face Recognition System (FRS)** and **AI-based crowd analytics** to detect intrusions and manage congestion.
- **Multilingual Assistance:** Delivers automated safety messages in **English, Hindi, and Telugu**.
- **Autonomous Patrols:** Conducts **round-the-clock platform patrols** with semi-autonomous navigation and obstacle avoidance.
- **Emergency Response:** Integrated **fire and smoke sensors** send real-time alerts to control rooms.
- **Human-Robot Interface:** Passenger-friendly design with gestures like “**Namaste**” and salutes for RPF personnel.

35. Fix in 20 Minutes: ECOFIX Turns Industrial Waste into Rapid Road Repair



The **Technology Development Board** has signed a commercialisation agreement for **ECOFIX pothole repair technology**.

Developed by **CSIR-Central Road Research Institute**, ECOFIX offers a **fast, all-weather, low-emission** solution for urban road maintenance.

What is ECOFIX? : ECOFIX is a **ready-to-use, cold-mix pothole repair material** designed for rapid and durable road maintenance – even under **wet or waterlogged conditions**.

Context & Background : Conventional **hot-mix bitumen patching** requires dry conditions, tack coats, and traffic blocks, leading to **repeat failures** during monsoons. ECOFIX addresses these gaps with **instant application**, faster reopening, and **lower carbon footprint**.

Composition & Technology : **Processed steel slag** (industrial byproduct)

- **Specialised polymeric binder** (enhanced adhesion & flexibility)

Why it works: High interlocking strength of slag + polymer bonding = **longer life** under traffic loads.

How ECOFIX Differs from Conventional Mixes

Feature	ECOFIX	Conventional Bituminous Mix
Application	Direct, even in water	Needs dry surface
Tack Coat	Not required	Required
Temperature	Cold-mix	Hot-mix
Traffic Opening	~20 minutes	Several hours
Emissions	Low	High (heating & transport)

About Steel Slag

What is Steel Slag?

- A **non-metallic byproduct** of steelmaking formed when impurities are removed using limestone/dolomite fluxes.

Key Properties

- **Composition:** Calcium, silicon, magnesium, iron oxides
- **Strength:** Harder and more durable than limestone
- **Density:** ~3.2-3.6 g/cc (higher than natural aggregates)

Applications

- **Low-carbon cement:** Supplementary cementitious material
- **Environmental remediation:** Treats acidic mine drainage; immobilises heavy metals
- **Agriculture:** Neutralises acidic soils; supplies micronutrients (e.g., silicon)
- **Roads:** Can **fully replace natural aggregates**, reducing thickness and cost

36. Biomaterials: Nature-Based Alternatives for a Low-Carbon, Circular Economy



With the global pivot to **low-carbon and circular production systems**, **biomaterials** are gaining traction as substitutes for **fossil-based plastics, textiles, and industrial inputs**, aligning sustainability with industrial competitiveness.

What are Biomaterials?

Biomaterials are materials **derived wholly or partly from biological sources** (plants, microbes, agricultural residues) or **produced using biological processes**, intended to **replace or interact with conventional materials** across packaging, textiles, construction, and healthcare.

Types of Biomaterials

- **Drop-in biomaterials:** Chemically identical to petro-materials; compatible with existing systems (e.g., **bio-PET**).
- **Drop-out biomaterials:** Chemically different; need new processing/end-of-life systems (e.g., **PLA – polylactic acid**).
- **Novel biomaterials:** New functionalities (self-healing, bio-active, tissue scaffolds).

India's Current Status

- **Market size:** India's bioplastics market **~USD 500 million (2024)**; high growth expected.
- **Large investments:** **Balrampur Chini Mills** commissioning a large PLA facility in Uttar Pradesh.

Startup momentum: **Phool.co** (temple-waste based materials) and **Praj Industries** (bioplastics demo plants).

Why Biomaterials Matter for India

- **Environmental gains:** Plastics contribute **~3.4% of global GHGs**; India generates **~4.1 MT plastic waste/year** – bio-alternatives cut lifecycle emissions.
- **Industrial competitiveness:** Global bioplastics market projected **USD 39–45 bn by 2030** – critical amid carbon border measures.
- **Farm income diversification:** Valorises **~350 MT agri-residue/year**, reducing stubble burning.
- **Import substitution:** India imports **~85% of petrochemical feedstocks** – biomaterials reduce exposure.

37. Global-standard certification facilities—the National Environmental Standard Laboratory (NESL)



The CSIR–National Physical Laboratory (CSIR–NPL) inaugurated two global-standard certification facilities – the National Environmental Standard Laboratory (NESL) and the National Primary Standard Facility for Solar Cell Calibration – placing India among a small group of countries with top-tier measurement infrastructure.

CSIR–National Physical Laboratory (CSIR–NPL)

- **Status:** India’s National Metrology Institute (NMI).
- **Core Functions:**
 - Maintains **Indian Standard Time (IST)** using atomic clocks.
 - Calibrates national **SI units**, weights, and measures.

Develops **Bharatiya Nirdeshak Dravya (BND)** – India’s **Certified Reference Materials (CRMs)**.

National Environmental Standard Laboratory (NESL)

- **Global Standing:** Asia’s first and world’s second NESL (after the UK).
- **Purpose:** Testing & certification of air pollution monitoring instruments under **Indian climatic conditions** (temperature, humidity, dust).
- **Significance:**
 - Cuts reliance on foreign certification.
 - Saves foreign exchange.
 - Boosts **Make in India** for environmental instruments.

National Primary Standard Facility for Solar Cell Calibration

- **Apex Role:** India’s **primary standard lab** for solar PV metrology.
- **Global Club:** Makes India the **5th country** (after **USA, Germany, China, Japan**) with primary PV calibration standards.
- **Technology:** Uses **Laser-based Differential Spectral Responsivity (L-DSR)** system, co-developed with **Physikalisch-Technische Bundesanstalt (PTB)**.
- **Precision:** **0.35% measurement uncertainty** – among the **highest globally**.
- **Impact:** Enables **domestic certification** of solar cells/modules; reduces costs and turnaround time for manufacturers.

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GEOGRAPHY

DISASTER Management

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1. Bomb Cyclone: When Winter Storms Explode



In January 2026, a powerful bomb cyclone struck the northern United States, triggering severe blizzards, power outages, and large-scale travel disruption. The event renewed focus on extreme mid-latitude weather systems and their increasing intensity.

- **What is a Bomb Cyclone?**
 - Also called a **weather bomb**.
 - An **intensifying mid-latitude cyclone** that undergoes **bombogenesis**.
- **Bombogenesis**
 - A **rapid fall in central pressure of ≥ 24 millibars in 24 hours** (standard at 60° latitude).
 - Leads to **very steep pressure gradients** → **violent winds**.
 - *Note:* Pressure threshold varies slightly with latitude (important Prelims trap).
- **Formation Conditions**
 - Occurs mainly in **winter**.
 - Triggered when **cold Arctic air** clashes with **warm, moist oceanic air**.
 - Warm air rises rapidly → **surface pressure drops sharply** → storm intensifies explosively.
- **Key Physical Processes**
 - Strong **jet stream support** (upper-level divergence).
 - High **ocean heat content** fuels rapid intensification.
 - Similar dynamics to **Nor'easters** along the US East Coast (but not all Nor'easters are bomb cyclones).
- **Impacts**
 - **Hurricane-like winds** (up to ~95 mph / 150 kmph).
 - **Blizzards, heavy snowfall or rain**, coastal flooding.
 - **Flash temperature drops** of 40–50°F within hours.
 - Severe **power failures and transport shutdowns**.
- **Global Hotspots**
 - **Northwest Atlantic** – influenced by the **Gulf Stream**.
 - **Northwest Pacific** – influenced by the **Kuroshio Current**.
 - **Southern Ocean margins** – eastern coasts of **Australia** and **South America**.
- **Climate Change Link**
 - Warming oceans provide **more latent heat**, increasing storm intensity.
 - Arctic amplification may **strengthen temperature contrasts**, favouring explosive cyclogenesis.
 - Frequency uncertain, but **severity is rising**.

2. Warmest La Niña Shock: 2025 Defies Cooling Expectations



The Berkeley Earth Annual Temperature Report 2025 revealed that 2025 became the warmest La Niña year on record, despite La Niña's typical cooling influence.

Key Findings (Berkeley Earth Report 2025)

- **Global Anomaly:** +1.44°C annual average in 2025; 3rd warmest year globally despite months of La Niña.
- **Heat Footprint:** 9.1% of Earth's surface recorded its highest annual average temperature.
- **Land vs Ocean:** Record warmth over 10.6% of land and 8.3% of oceans.
- **Population Exposure:** ~770 million people (8.5%) experienced record-warm annual temperatures, largely in Asia.
- **No Record Cold:** Zero regions recorded a record-cold year.
- **Persistent Warming:** The last 11 years are the 11 warmest in the instrumental record.

About La Niña

- **Definition:** The cool phase of ENSO, marked by cooler-than-normal sea surface temperatures in the equatorial Pacific.
- **Frequency & Duration:** Occurs every few years; can persist for months and recur as double-dip events.
- **Triple-Dip La Niña:** A rare event lasting ~three years (2020–early 2023).

Typical Effects of La Niña

- **India & SE Asia:** Above-normal monsoons.
- **Australia (east):** Wetter conditions.
- **SE Africa:** Cooler, wetter winters.
- **W. Canada & NW USA:** Colder winters.
- **S. USA:** Winter drought.

3. Record Ocean Warming in 2025



A 2025 study titled “Ocean Heat Content Sets Another Record in 2025” reported that Earth’s oceans absorbed the highest amount of heat ever recorded since observations began in the 1960s. The findings underline oceans’ role as the **primary heat sink** of anthropogenic climate change.

Ocean Heat Content (OHC)

- **Meaning:** Ocean Heat Content is the **total heat energy stored in the oceans**.
- **Measurement:**
 - Measured in **joules (J)**.
 - Compared against the **1971–2000 average**, taken as **zero baseline**.
- **Significance:** OHC is a **more reliable indicator of global warming** than surface temperature because oceans store heat over long periods.

Key Findings of the 2025 Study

- **Record Heat Uptake:**
 - Oceans absorbed **+23 zettajoules (ZJ)** of heat in 2025
 - Higher than **+16 ZJ in 2024**
- **Depth Coverage:** Heat estimates cover the **upper 2,000 metres** of the ocean.
- **Heat Sink Role:** Oceans absorb about **90% of excess heat** trapped by greenhouse gases.
- **Sea Surface Temperature:**
 - Global average SST in 2025 was **~0.5°C above the 1981–2010 baseline**
 - Ranked as the **third-highest on record**

Impacts of Ocean Warming

- **Increased Stratification:**
 - Warm surface waters reduce vertical mixing → **nutrient-poor surface** and **oxygen-depleted deep waters**.
- **Food Web Disruption:**
 - Reduced nutrient upwelling threatens **phytoplankton**, the base of marine food chains.
- **Marine Heatwaves:**
 - Frequency has **doubled (1982–2016)**, as noted by the **Intergovernmental Panel on Climate Change (IPCC)**.
- **Coral Bleaching:**
 - Heat stress reduces coral reproduction and increases mortality.
- **Storm Intensification:**
 - Warmer oceans fuel **stronger cyclones**, heavier rainfall, and severe coastal flooding.

4. Polar Vortex Disruption Triggers Massive US Winter Storm



A powerful winter storm impacted **nearly 17 US states**, affecting around **157 million people**. The event was linked to the **southward expansion of the polar vortex**, bringing Arctic air deep into mid-latitudes. Heavy snowfall, prolonged freezes, and extreme cold conditions were reported.

About Polar Vortex

- **Definition:** A large, persistent **low-pressure system** of extremely cold air circulating around the **polar regions**.
- **Location:** Exists over both **North Pole and South Pole**.
- **Seasonal Pattern:**
 - **Strongest in winter**
 - Weakens during spring and summer

Types of Polar Vortex

- **Tropospheric Polar Vortex (0–15 km):**
 - Directly influences daily weather
 - Linked to storms, cold waves
- **Stratospheric Polar Vortex (15–50 km):**
 - Strongest in autumn & winter
 - Sudden Stratospheric Warming (SSW) events can disrupt it

Mechanism Behind Extreme Cold

- **Cold Air Spill:** Weak vortex allows Arctic air to detach and move southward.
- **Jet Stream Distortion:** Circular jet stream becomes wavy, enabling cold air intrusion.
- **Cold Trapping:** Altered circulation keeps cold air stationary over regions → prolonged winter storms.

Climate Change Link

- **Arctic Amplification:** Polar regions warming faster than global average.
- **Reduced Temperature Gradient:** Weakens vortex stability.

Higher Instability: Increased frequency of vortex displacement → extreme winter outbreaks.

5. Atmospheric Heating over the Indo-Gangetic Plain



A recent study by the Aryabhata Research Institute of Observational Sciences (ARIES) and the Indian Institute of Astrophysics (IIA), using data from AERONET sites, found that **water vapour causes significantly greater atmospheric heating than aerosols over the Indo-Gangetic Plain (IGP)** – challenging the aerosol-centric view of regional climate forcing.

Key Definitions

- **Water Vapour Radiative Effect (WVRE):** Atmospheric heating caused by absorption and re-emission of infrared radiation by water vapour; the **largest contributor to natural greenhouse warming**.
- **Aerosols:** Microscopic solid or liquid particles suspended in air that **scatter or absorb solar radiation**, producing cooling or warming effects.
- **AERONET:** A global ground-based aerosol monitoring network coordinated by NASA.

Context & Background

- The **Indo-Gangetic Plain (IGP)** is one of the most polluted and densely populated regions globally.
- Previous climate studies focused mainly on **aerosol-induced atmospheric heating** (especially black carbon).
- This study analysed **five years of high-frequency radiative and aerosol data** from **six AERONET sites** across the IGP.

Key Findings of the Study

Aspect	Observation
Dominant heating agent	Water vapour heats the atmosphere far more than aerosols
Effect of aerosols	Aerosols modulate but do not override WVRE
Clean atmosphere	WVRE strongly heats the lower and middle troposphere
Polluted atmosphere	Heating shifts towards the upper atmosphere
Seasonal pattern	Heating intensifies during winter, when humidity + pollution coexist
Model implication	Challenges the single-factor aerosol heating model

Significance

- **Monsoon Dynamics:** Vertical heating profiles affect pressure gradients and monsoon circulation.
- **Heatwave Risk:** Enhanced WVRE can intensify heat stress and night-time warming.
- **Climate Modelling:** Calls for better integration of **humidity-aerosol interactions** in Indian climate models.

Policy Insight: Air-pollution mitigation alone cannot address regional warming without **climate-water linkages**.

6. Peering Inside Popocatépetl: First High-Resolution 3D Image of a Volcano's Interior



Scientists from **National Autonomous University of Mexico** have produced the **first-ever high-resolution 3D image of the interior of Popocatépetl**, one of the world's most active volcanoes, after **five years of continuous data collection** under hazardous conditions.

What Was Achieved?

- **Deep 3D Mapping:** Internal structure imaged **up to 18 km below the crater**.
- **Multiple Magma Reservoirs:** Revealed **several magma pools at different depths**, rather than a single chamber.
- **Asymmetric Distribution:** Magma concentrations are **stronger toward the southeast flank**.

Paradigm Shift: Challenges the **classical single-chamber model**, advancing realistic **“magma plumbing system”** concepts.

How Was the Study Conducted? (Methodology)

- **Dense Seismic Network:** Seismographs increased from **12 to 22**, enabling near-complete perimeter coverage.
- **High-Frequency Recording:** Ground vibrations captured **100 times per second**, detecting subtle subsurface motions.
- **AI-Based Analysis:** Machine learning classified seismic tremors and inferred **material type, temperature, depth, and physical state** within the volcano.

Why It Matters (Significance)

- **Better Eruption Forecasting:** Knowing **where and how deep** magma accumulates improves interpretation of seismic precursors.
- **Disaster Preparedness:** Nearly **25 million people within ~100 km** benefit from **targeted risk zoning and evacuation planning**.
- **Global Benchmark:** Sets a replicable standard – **dense seismology + AI** – for monitoring high-risk volcanoes worldwide.

Interior of a Volcano (Concepts to Remember)

- **Magma Chamber:** Subsurface reservoir of molten magma.
- **Conduit:** Passage through which magma ascends.
- **Vent:** Surface opening ejecting magma, ash, and gases.
- **Fractures:** Crustal cracks enabling magma/gas movement.
- **Gas Pockets:** Accumulated gases that increase explosivity.

7. Lonar Lake at Risk: Rising Waters Threaten India's Unique Impact Crater



Lonar Lake (Maharashtra) is witnessing an **unprecedented rise in water levels**, threatening its fragile ecosystem and submerged heritage structures. Freshwater inflow from **borewell-induced underground channels** and increased rainfall has altered its unique chemical balance.

What is Happening?

- **Catchment Disturbance:** Borewell drilling punctured Deccan basalt layers, activating groundwater channels feeding the crater.
- **New Springs:** Emergence of freshwater springs increased inflow.
- **Rainfall Factor:** Above-normal rainfall further elevated lake levels.

Ecological & Cultural Impacts

- **Alkalinity Decline:** Freshwater inflow reduced salinity and alkalinity, threatening extremophilic microbes.
- **Microbial Risk:** Haloarchaea (responsible for the 2020 pink colour) face habitat stress.
- **Temple Submergence:** Ancient temples along crater rim partially submerged.
- **Agro-Chemicals:** Pesticide runoff causing chemical and geological damage.

About Lonar Lake

- **Type:** Hyper-velocity meteorite impact crater formed during the **Pleistocene Epoch**.
- **Uniqueness:** India's only **basaltic impact crater**; one of only four such craters worldwide.
- **Location:** Buldhana district, Maharashtra, within **Lonar Wildlife Sanctuary**.
- **Hydrology:** Endorheic (no outlet), historically saline & alkaline – known as a '**Soda Lake**'.
- **Recognition:**
 - Declared **Ramsar Site (2020)** – Maharashtra's second Ramsar site.
 - Notified **National Geo-heritage Monument** by Geological Survey of India (GSI).

Cultural Heritage: Daitya Sudan Temple (Hemadpanthi style) and Kamalja Devi Temple located on crater rim.

8. Finke River



The **Finke River** in **central Australia** is widely regarded as the **world's oldest river system still flowing**, with an estimated age of **300–400 million years**. Its course provides key insights into **antecedent drainage** and long-term landscape evolution.

About the Finke River

- **Type & Length:** A **major but intermittent (non-perennial)** river of central Australia, about **600–640 km** long.
- **Indigenous Name:** **Larapinta**, named by the **Arretnte** people.
- **Key Tributaries:** **Ellery Creek, Palmer River, and Hugh River.**
- **Geological Significance (Antecedence):**
 - The river **predates surrounding mountain uplift.**
 - It has maintained a **broadly stable course** despite major tectonic and erosional events – an example of **extreme geological persistence.**

Course of the River

- **Source Region:** **MacDonnell Ranges, Northern Territory.**
- **Formation Point:** Confluence of **Davenport Creek** and **Ormiston Creek.**
- **Flow Direction:** Runs **south-west** toward South Australia and the **Simpson Desert** region.
- **Flood Behaviour:** During major floods, waters can extend to the **Macumba River** and ultimately **Lake Eyre.**

9. Sela Lake



Two tourists drowned after the **frozen surface of Sela Lake cracked**, highlighting risks at **high-altitude glacial lakes** during winter thaw-freeze cycles.

About Sela Lake (Paradise Lake)

- **Type:** High-altitude glacial lake that remains frozen in winter.
- **Location:** Tawang district, Arunachal Pradesh.
- **Elevation:** ~13,700 ft (4,170 m), near the summit of Sela Pass.
- **Cultural Significance:** Revered by **Monpa** communities and Buddhist monks as one of 101 sacred lakes.
- **Hydrology:** Source of the **Nuranang River**, a tributary of the **Tawang River** system.

Associated Features

- **Sela Pass:** Connects **Tawang** with **West Kameng** and mainland India via NH-13.
- **Sela Tunnel:** World's longest twin-lane tunnel above 13,000 ft, enabling year-round connectivity across the pass.

Monpa Tribe: Major ethnic group of Tawang & West Kameng; **Buddhist**; known for 1,000-year-old handmade paper tradition.

10. Gangapur Dam Aerial Display



The **Indian Air Force (IAF)** conducted a special **aerial display over Gangapur Dam** near Nashik, Maharashtra. The event drew attention to the dam's **engineering significance and strategic importance** in regional water security.

About Gangapur Dam

- **Location:** Near **Nashik, Maharashtra**, built on the **Godavari River** at its confluence with the **Kashyapi River**.
- **Type & Record:** An **earthfill dam** and **Asia's longest earthen dam**.
- **Engineering Design:** Constructed using **Terzaghi's soil mechanics principles**, ensuring long-term structural stability.
- **Safety Feature:** Equipped with a **unique emergency spillway** to protect the dam body if the main spillway fails.

Utility: Supplies **irrigation and drinking water** to Nashik city and surrounding **drought-prone regions** of Maharashtra.

11. Accident Reported Inside Vishnugad–Pipalkoti Hydroelectric Project



Several workers were injured after a **collision between a locomotive train and a goods train** inside the **Vishnugad–Pipalkoti Hydroelectric Project** tunnel during construction works in **Uttarakhand**.

About Vishnugad–Pipalkoti Hydroelectric Project

- **Type:** Run-of-the-river hydropower project (no large reservoir).
- **River:** Located on the **Alaknanda River**, a major headstream of the **Ganga**.
- **Location:** **Chamoli district, Uttarakhand** (Himalayan region prone to landslides and flash floods).
- **Developer:** **Tehri Hydropower Development Corporation (THDC India Ltd)** – a Centre–State joint venture.
- **Capacity:** **444 MW** (4 units × 111 MW each).
- **Funding:** **World Bank–assisted project**.
- **Design Feature (UPSC-relevant):** Uses **long head-race tunnels** to divert river water to the powerhouse, a typical feature of Himalayan run-of-river projects.

Prelims Pointers

- **Alaknanda River** originates from **Satopanth Glacier** and meets **Bhagirathi** at **Devprayag** to form the **Ganga**.
- **Run-of-river projects** minimise submergence but involve **extensive tunnelling**, raising concerns related to **geological fragility** in the Himalayas.
- **THDC India Ltd** is also associated with the **Tehri Dam Project** on the **Bhagirathi River**.

12. Aquatic Biodiversity Initiatives under Namami Gange



Multiple aquatic biodiversity conservation initiatives were launched at Wildlife Institute of India (WII), Dehradun under the Namami Gange Mission. The initiatives strengthen freshwater species protection, habitat restoration, and science-based river rejuvenation.

Key Initiatives Launched

- **Aqua Life Conservation Monitoring Centre (Aqua Centre):**
 - Set up as a **national research and policy hub** for freshwater biodiversity.
 - Operates under **Namami Gange** with labs for **ecotoxicology, aquatic ecology, spatial ecology, and microplastics analysis**.
- **Dolphin Rescue Ambulance:**
 - Rapid emergency response system for **distressed Gangetic dolphins**.
- **Indian Skimmer Conservation Project:**
 - Launched with **Bombay Natural History Society (BNHS)** to protect this riverine bird.
- **Gharial Habitat Frameworks:**
 - New conservation frameworks to support **habitat restoration** for the **critically endangered Gharial**.
- **Afforestation Drive:**

‘Ek Ped Maa Ke Naam’ campaign to strengthen riverine ecosystems.

About Namami Gange

- **Nature:** Central Sector Programme launched in **2014** for rejuvenation of the **River Ganga** and its tributaries.
- **Implementing Agency:** **National Mission for Clean Ganga** under the **Ministry of Jal Shakti**.
- **Core Objectives:**
 - **Pollution abatement**
 - **River rejuvenation, including biodiversity conservation**
- **Strategic Pillars (8):** Sewerage infrastructure, biodiversity conservation, afforestation, riverfront development, Ganga Gram, effluent monitoring, public awareness, and river-surface cleaning.

Extension: Continued as **Namami Gange Mission-II** till **March 2026**.

13. Disaster Risk Financing: From Relief to Resilience



The Organisation for Economic Co-operation and Development in its *Economic Outlook for Southeast Asia, China and India* has highlighted **Disaster Risk Financing (DRF)** as a **critical pillar of economic resilience**, especially for disaster-prone emerging economies like India.

1. What is Disaster Risk Financing (DRF)?

Disaster Risk Financing refers to **pre-planned financial arrangements** that ensure **timely availability of funds** for disaster response, recovery, and reconstruction, while **minimising fiscal shocks** to governments.

👉 Shift: Ex-post relief → Ex-ante financial preparedness

2. Key Global & Regional Findings (OECD)

- **Rising Disaster Frequency:** Asia records ~100 disasters annually.
- **Human Impact:** Nearly 80 million people affected each year over the last decade.
- **Climate Intensification:** Climate change is increasing the **severity and unpredictability** of disasters, raising fiscal risks.

3. India-Specific Findings

- **Global Vulnerability:** India ranks **2nd in the World Risk Index 2025**, after the Philippines.
- **Economic Losses:** Average annual disaster loss of ~0.4% of GDP (1990–2024).
- **Hazard Profile:**
 - **Hydrological:** Floods, landslides
 - **Meteorological:** Cyclones, storms, heatwaves
- **Insurance Gap:** Only ~9% of disaster losses are insured, exposing households and public finances.
- **Fiscal Pattern:** Heavy reliance on **reactive, post-disaster funding**.
- **Growth Risk:** Recurrent shocks threaten India's **6–7% growth trajectory**.

OECD Recommendations for India

- **Legal Reform:**
 - Make **risk-layered DRF** a statutory fiscal responsibility.
- **Insurance Innovation:**
 - Promote **parametric insurance** and **catastrophe bonds** (payouts triggered by rainfall, wind speed, etc.).
- **Risk Pooling:**
 - Participate in **regional risk pools** like SEADRIF to spread losses.
- **Capacity Building:**
 - Train officials in **financial resilience**, not just emergency relief.

14. MHA Pushes Uniform Crowd Management Protocols After Repeated Stampede Risks



In January 2026, the Ministry of Home Affairs (MHA) issued a directive to all States and Union Territories to **standardise crowd management practices**. The move aims to **prevent loss of life during mega events** and strengthen inter-agency coordination through documentation and post-event audits.

What is Crowd Management?

- **Definition:** Planned organisation, monitoring, and control of large human gatherings to ensure **public safety, smooth movement, and panic prevention**.
- It is a **non-structural disaster risk reduction measure**, especially relevant for religious, political, cultural, and sporting events.

Context & Background

- India has witnessed repeated **stampede-related fatalities** at religious congregations, festivals, and public events.
- Most incidents stem from **poor planning, unclear accountability, weak communication, and absence of post-event learning**.

The **National Disaster Management Authority (NDMA)** already issues crowd safety guidelines, but enforcement has been uneven across States.

Key Mandates in the MHA Directive

- **Organiser Accountability:** Mandatory submission of **crowd flow plans, evacuation routes, medical arrangements, surveillance layout**.
- **Police Documentation:** State police to maintain **event-wise records** of deployment, logistics, and incidents.
- **Post-Event Review System:** Compulsory audits after mega-events to identify lapses. Findings to feed into a **central national repository** for data-driven planning.
- **Identification Norms:** Distinct **dress codes/badges for organisers and volunteers** to enable quick identification during emergencies.

Legal & Constitutional Framework

- **Article 19(1)(b):** Right to peaceful assembly, subject to **reasonable restrictions** for public order.
- **Police Act, 1861:** Empowers police to regulate public assemblies.
- **Disaster Management Act, 2005:**
 - Authorises NDMA to issue **binding crowd safety guidelines**.
 - Provides for **penalties for non-compliance**.

15. 21st Raising Day of the National Disaster Response Force (NDRF)



January 19, 2026 marks the **21st Raising Day** of the **National Disaster Response Force (NDRF)**, completing **20 years since its establishment**. The occasion highlights NDRF's role as India's **primary specialised disaster response force**.

About the National Disaster Response Force (NDRF)

- **Nature:** A specialised paramilitary force for response to **natural and man-made disasters**.
- **Legal Basis:** Constituted in **2006** under the **Disaster Management Act, 2005**.
- **Administrative Control:**
 - Functions under the **Ministry of Home Affairs (MHA)**.
 - Governed by the **National Disaster Management Authority (NDMA)**.
- **Composition:** **16 battalions**, drawn on deputation from **Central Armed Police Forces (CAPFs)**.
- **Operational Role:**
 - Search and rescue operations
 - Handling **CBRN** (Chemical, Biological, Radiological, Nuclear) emergencies
 - Training **State Disaster Response Forces (SDRFs)**
 - Community awareness and capacity-building programmes

16. Rajasthan's First Fully Organic Gram Panchayat



Bamanwas Kankar village has become Rajasthan's first gram panchayat to receive full organic certification, covering all farmland and livestock. The achievement is notable for being a **community-led transition driven largely by women farmers**, aligning with India's push towards sustainable agriculture.

What is Organic Farming?

- A **holistic farming system** that avoids **synthetic fertilisers, pesticides, GMOs, growth regulators**, and chemical feed additives.
- Relies on **natural inputs**, crop rotation, composting, biological pest control, and soil health management.

Significance of the Certification

- **First-of-its-kind in Rajasthan** at the panchayat level → model for **area-wide organic conversion**.
- **Women-led collective action** strengthens social capital and inclusive rural development.
- Enhances **soil health, biodiversity**, and **climate resilience** in arid/semi-arid regions.
- Improves **market access and price realisation** through certified organic branding.

Organic Farming in India: Snapshot

- **Global Rank:** 1st in number of organic producers; 2nd in certified organic area.
- **Leading States:** Madhya Pradesh, Maharashtra, **Rajasthan**, Gujarat.
- **Landmark:** **Sikkim** – world's first 100% organic state (2016).
- **Exports:** Oilseeds, tea, coffee, basmati rice.

Key Government Initiatives

- **PKVY:** Cluster-based organic farming; financial aid & **PGS certification**.
- **MOVCDNER:** Value-chain development in North-East.
- **NPOP (APEDA):** Accreditation for **export-oriented organic certification**.
- **PM-PRANAM:** Incentivises reduction in chemical fertiliser use.
- **Jaivik Kheti Portal:** Direct market linkage for organic produce.

17. India's First Commercial Tropical RAS Facility for Rainbow Trout Inaugurated



The **Smart Green Aquaculture Farm and Research Institute** and a **Recirculatory Aquaculture System (RAS) Facility** were inaugurated in **Hyderabad, Telangana**. It is **India's first commercial-scale tropical RAS-based aquaculture farm for rainbow trout**, enabling **year-round cultivation** and advanced training.

About Recirculatory Aquaculture System (RAS)

- **Technology:** Land-based, closed-loop aquaculture that filters and reuses water in a controlled environment.
- **Water Efficiency:** ~90-99% water recycled using advanced mechanical and biological filtration.
- **Core Components:** Biofilters, mechanical filters, oxygenators, UV/ozone units for waste, toxin, and pathogen control.
- **Advantages:** Supports high-density fish farming, minimal water use, and lower disease/biosecurity risks.
- **Capacity Building:** Facility provides hands-on training in automation, biosecurity, and modern aquaculture systems.
- **Policy Support:** Financial assistance available under **Pradhan Mantri Matsya Sampada Yojana (PMMSY)** for establishing RAS units.

18. Karan Fries and Vrindavani Cattle Breeds Registered to Boost Dairy Productivity



The National Bureau of Animal Genetic Resources (NBAGR) registered the **Karan Fries** and **Vrindavani** cattle breeds to enhance **national dairy productivity**. Both breeds yield **~1.5-3× higher milk** over a **10-month lactation** compared to many indigenous breeds.

About the Breeds

- **Karan Fries:**
 - **Developer:** National Dairy Research Institute (NDRI)
 - **Genetic Make-up:** Holstein-Friesian (exotic) × Tharparkar (indigenous)
- **Vrindavani:**
 - **Developer:** Indian Veterinary Research Institute (IVRI)
 - **Genetic Make-up:** Holstein-Friesian, Brown Swiss, Jersey (exotic) × Haryana (indigenous)

About NBAGR

- **Role:** India's nodal agency for **identification, characterisation, and registration** of livestock and poultry genetic resources.
- **Established:** 1984 | **Location:** Karnal, Haryana.
- **Institutional Status:** Autonomous body under **Indian Council of Agricultural Research (ICAR)**.
- **National Repository:** Recognised by the **National Biodiversity Authority (NBA)** as the **national germplasm repository** for domesticated animals.
- **Global Linkage:** India's nodal agency to **Food and Agriculture Organization (FAO)**; monitors **SDG Target 2.5** (genetic diversity of seeds and domesticated animals).

JANUARY 2026

HEALTH & NUTRITION

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2. Lancet Commission Pushes Citizen-Centric UHC
3. Certifications Under National Quality Assurance Standards
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29. UGC Makes Campus Equity Enforceable
30. National Sports Governance Rules, 2026
31. Breathing Against the Clock (also environmental health)
32. National Campaign on Entrepreneurship under DAY-NRLM
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45. RVC at Republic Day: Guardians of India's Military Animals
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48. MY Bharat Crosses 2 Crore Registrations
49. Catherine O'Hara Passes Away at 71



1. Delhi to Declare Human Rabies a Notifiable Disease: Surveillance for “Zero by 30”



The Government of NCT of Delhi is set to declare **human rabies a notifiable disease** under the **Epidemic Diseases Act, 1897**, mandating reporting by all public and private healthcare providers to strengthen **disease surveillance and response**, in line with India’s rabies elimination goals.

What Does “Notifiable Disease” Mean?

A **notifiable disease** is one that **must be mandatorily reported** to government authorities by doctors, hospitals, and laboratories when **suspected, probable, or confirmed**.

- **Legal Basis:** State public health laws / **Epidemic Diseases Act, 1897**
- **Reporting Timeline:**
 - Urgent cases: **verbal reporting within 24 hours**
 - Routine cases: **written reporting within 3 days**
- **Enforcement:** Non-compliance can attract **legal penalties**
- **Surveillance Link:** Data flows into the **Integrated Disease Surveillance Programme (IDSP)**

Precedent: The Union government mandated nationwide notification for tuberculosis (2012).

What Has Delhi Decided?

- **Mandatory Reporting** of suspected/probable/confirmed human rabies by all healthcare providers.
- **Alignment** with the **National Action Plan for Dog-Mediated Rabies Elimination (NAPRE)** targeting **elimination by 2030**.
- **Status Across India:** **20 states** have already notified human rabies.

About Rabies (Prelims Essentials)

- **Nature:** Preventable **viral disease of the central nervous system**; **~100% fatal** once symptoms appear.
- **Causative Agent:** **Rabies virus (RABV)**.
- **Transmission:** Saliva via **animal bites/scratches** (not via blood, urine, faeces).
- **Primary Reservoir:** **Domestic dogs (~99%)**; some wildlife reservoirs exist.
- **Incubation:** Typically **1-3 months**, can exceed **1 year**.

Global Target: “Zero by 30” led by **World Health Organization, FAO, and WOA** to end dog-mediated human rabies deaths by **2030**.

2. People Before Programmes: Lancet Commission Pushes Citizen-Centric UHC for India



A **Lancet Commission** has urged India to adopt a **citizen-centred healthcare delivery model** as the core pathway to achieving **Universal Health Coverage (UHC)**. The report flags high out-of-pocket spending, fragmented care, and weak preventive systems as key barriers to equitable health access.

What is Citizen-Centric Universal Health Coverage?

- A model of UHC that **places citizens' needs, experiences, and feedback at the centre** of health system design, delivery, financing, and accountability – rather than provider- or scheme-driven approaches.

Why India Needs a Citizen-Centric UHC Approach

Structural Gaps

- **High OOP Expenditure:** ~47–50% of total health spending → weak financial protection.
- **Low Public Spending:** <2% of GDP (below **National Health Policy target of 2.5%**).
- **Rising NCD Burden:** ~60% of deaths due to NCDs → need for continuous primary care.
- **Demographic Pressure:** ~140 million elderly (60+) → long-term and geriatric care demand.

Key Challenges in the Current Health System

- **Human Resource Deficit:** 20–30% vacancies in specialists/medical officers in many states.
- **Catastrophic Health Spending:** 14–17% households face catastrophic expenses.
- **Fragmented Care:** ~70% outpatient care in private sector → duplication, variable quality.
- **Weak Prevention:** Low screening for diabetes, hypertension; late diagnosis increases complications.

3. India Crosses 50,000 Certifications Under National Quality Assurance Standards



The Government of India announced achieving **50,000+ certifications** under the **National Quality Assurance Standards (NQAS)** for **public health facilities**, marking a major scale-up in quality assurance.

About NQAS

- **Launch:** 2015 by the **Ministry of Health and Family Welfare**.
- **Objective:** Improve **quality, safety, and patient experience** in public health facilities through standardized benchmarks.
- **Nodal Agency:** **National Health Systems Resource Centre (NHSRC)** under the **National Health Mission (NHM)**.
- **Coverage:**
 - Initially **District Hospitals**
 - Expanded to **secondary & primary care facilities**
 - Includes **Integrated Public Health Laboratories (IPHLs)** (since 2024)
- **Assessment Framework:** Evaluates facilities across **8 Areas of Concern**, aligned with **global best practices** and **International Society for Quality in Health Care (ISQua)** standards.
- **Target:** **≥50%** of public healthcare facilities to be certified by **March 2026**.
- **Policy Linkage:** Supports **Universal Health Coverage (UHC)** goals under the **National Health Policy, 2017**.

4. Health Ministry Eases Clinical Trial Rules to Boost India's Pharma R&D



In January 2026, the Ministry of Health and Family Welfare (MoHFW) notified amendments to the New Drugs and Clinical Trials (NDCT) Rules, 2019 to reduce regulatory burden and speed up drug research. The reforms aim to make India a global R&D hub by adopting a risk-based, trust-driven regulatory approach aligned with global best practices.

What are NDCT Rules, 2019? (Definition & Background)

- The **New Drugs and Clinical Trials (NDCT) Rules, 2019** replaced relevant provisions of the **Drugs and Cosmetics Rules, 1945**.
- They provide a **unified regulatory framework** for:
 - New drugs
 - Clinical trials
 - Bioavailability (BA) and Bioequivalence (BE) studies
- **Administered by: Central Drugs Standard Control Organisation (CDSCO)** under the **Drugs Controller General of India (DCGI)**.
- **New Drug Status:** A drug is considered “new” for **4 years after first approval**, including new indications, dosage forms, or delivery systems.

Key Amendments Notified in 2026

Area	Earlier Requirement	Amended Provision (2026)	Impact
Test Licence (R&D)	Mandatory licence for small-quantity manufacturing	Replaced with prior online intimation to CDSCO	Faster lab-to-trial transition
High-Risk Drugs	Licence required	Licence still mandatory cytotoxic, narcotic, psychotropic	Safety preserved
Test Licence Timeline	90 days	45 days	50% time reduction
BA/BE Studies (Low-risk)	Prior CDSCO approval	Only intimation required	Generic pipeline accelerated
Digital Processing	Fragmented portals	NSWS + SUGAM integration	Transparency & ease of doing research

Digital Governance Architecture

- **SUGAM Portal:** CDSCO's online platform for drug approvals.
- **National Single Window System (NSWS):** Centralised clearance platform to reduce inter-departmental delays.
- Ensures **traceability, transparency, and auditability** of approvals.

Significance of the Amendments

- **Time Efficiency:** Cuts ~90 days from early-stage drug development cycles.
- **Regulatory Decongestion:** CDSCO handles ~30,000–35,000 test licences and ~4,000–4,500 BA/BE applications annually – workload now sharply reduced.
- **Generic Drug Advantage:** Faster BA/BE studies strengthen India's role as the “pharmacy of the world.”

5. India's Missing Shield: The Adult Immunisation Gap Among the Elderly



The Hindu highlighted that while India has ~130 million people aged 65+, elderly vaccine coverage is <5%, starkly lower than 75-90% childhood coverage under UIP. The gap raises risks from **influenza, shingles, and pneumococcal disease**, amplifying morbidity, mortality, and healthcare costs.

Why Elderly Vaccination Matters

- **Immunosenescence:** Ageing weakens immune responses → longer infections, severe complications, higher frailty.
- **Shingles (Herpes Zoster):** Lifetime risk ~30%, rising to ~50% at ≥85; complications include **post-herpetic neuralgia**, vision loss, stroke risk.
- **Influenza in India: Biannual peaks (monsoon + winter)** → near year-round exposure for seniors.
- **Pneumococcal Disease: Case fatality 20-25%** in ≥65 years vs ~5-10% in younger adults.

Key Barriers

- **Cost Burden:** Most adult vaccines are **out-of-pocket**; high-cost vaccines (e.g., shingles) deter uptake → coverage <5%.
- **Weak Systems:** No adult registries, limited surveillance, low provider training, minimal public campaigns.
- **Hesitancy Myths:** “Not 100% effective = useless”, fear of side effects/injections.
- **Follow-up Failure:** Annual influenza and 5-10 year boosters lack reminder systems.

What a Robust Adult Schedule Would Look Like

Vaccine	Why	Frequency
Influenza	Prevent seasonal spikes	Annual
Pneumococcal	Severe pneumonia/sepsis risk	As per age/condition
Shingles (Zoster)	Neuralgia & stroke risk	As recommended
Td/Tdap	Waning immunity	10-year boosters

6. India's Malaria Endgame: Zero Indigenous Cases by 2030



India is pursuing an ambitious goal under the **National Framework for Malaria Elimination (NFME) 2016–2030** to achieve **zero indigenous malaria cases by 2030**, with nationwide interruption of transmission targeted by **2027**. Recent data show sharp declines in cases across most districts, but regional and biological challenges persist.

What is Malaria?

- **Definition:** A mosquito-borne parasitic disease caused by *Plasmodium* protozoa and transmitted by infected female *Anopheles* mosquitoes.
- **Pathophysiology:** Parasites multiply in the **liver**, then infect **red blood cells**, causing cyclical fever and systemic complications.

India's Progress So Far

- **District-Level Success:** **160 districts across 23 States/UTs** reported **zero indigenous cases (2022–2024)** – indicating local transmission interruption.
- **National Decline:** Malaria incidence reduced by **~80% (2015–2023)**.
- **Regional Burden:** India still accounts for **~73.3% of South-East Asia's malaria cases (2024)**.
- **State Example:** Tamil Nadu reduced cases from **5,587 (2015)** to **321 (2025)**.

Key Strategies Adopted by India

Strategy	Core Elements	Institutional Backbone
Surveillance	Real-time reporting, outbreak response	IDSP, digital dashboards
Universal Diagnosis	"Test-Treat-Track" approach	National Strategic Plan for Malaria Elimination (2023–27)
Vector Control	Larval source management, IRS, LLINs	National Vector Borne Disease Control Programme
Treatment	ACT-based regimens	National Drug Policy on Malaria

7. India's Silent Nutrition Crisis: Why Vitamin B12 Deficiency is Endemic



Recent health reporting highlights that **Vitamin B12 deficiency affects nearly half of India's population**, cutting across age and income groups. Despite food sufficiency, **dietary patterns, drug use, and absorption issues** have made B12 deficiency a **chronic public-health concern**, with serious neurological, maternal, and cardiovascular consequences.

What is Vitamin B12?

- **Vitamin B12 (Cobalamin)** is a **water-soluble vitamin** containing cobalt.
- **Stored in the liver for 3-5 years**, delaying symptom onset.
- **Physiological Roles:**
 - DNA synthesis
 - Red Blood Cell formation (erythropoiesis)
 - Maintenance of **myelin sheath** (nerve insulation)
 - Conversion of **homocysteine** → **methionine**

Absorption Mechanism:

- Requires **Intrinsic Factor (IF)** secreted by stomach parietal cells.
- Absorbed in the terminal ileum.

Dietary Sources:

- Naturally present **only in animal foods**: meat, fish, eggs, milk.
- **Absent in unfortified plant foods.**

Vitamin B12 Deficiency: Scale & Context

Indicator	India	Developed Countries
Prevalence	47-53% (all ages)	~6% (mostly elderly)
Nature	Endemic	Age-related
Detection	Often delayed	Earlier diagnosis

Why Underdiagnosed in India?

- Non-specific early symptoms (fatigue, tingling, poor focus)
- Long hepatic storage masks deficiency

Limited routine screening

Major Causes in India

- **Dietary Pattern:** Predominantly vegetarian diets without fortification
- **Low Dairy Intake:** Especially among poor & elderly
- **Cooking Loss:** Prolonged boiling of milk
- **Drug-Induced Malabsorption:**
 - Metformin (diabetes)
 - Proton-pump inhibitors & antacids

8. Iron Deficit India: The Silent Nutrition Crisis Behind Anaemia



Iron nutrition remains a major public health challenge in India, with **persistently high anaemia prevalence** driven by low dietary intake, poor absorption, and cereal-heavy diets. Despite supplementation and food fortification, **iron deficiency continues to undermine women's health, child development, and workforce productivity.**

What is Dietary Iron?

- **Iron** is an essential micronutrient required for oxygen transport, energy production, immunity, and brain development.
- Exists in **two dietary forms**:
 - **Heme iron** (animal sources): absorption up to **35%**
 - **Non-heme iron** (plant sources): absorption up to **15%**

Dietary Sources & Absorption

- **Heme sources:** Red meat, poultry, seafood
- **Non-heme sources:** Pulses, green leafy vegetables, eggs, fortified cereals
- **Enhancers:** Vitamin C-rich foods (citrus, amla, tomato)
- **Inhibitors:**
 - Calcium
 - Tannins (tea, coffee)
 - Phytates (whole grains, cereals)

Recommended Intake (ICMR-NIN)

- **Adult women:** 29 mg/day
- **Adult men:** 19 mg/day

Upper safe limit: 45 mg/day (to avoid toxicity)

Why Iron is Crucial

- Haemoglobin & myoglobin formation → oxygen delivery
- ATP generation via electron transport chain
- Neurotransmitter synthesis & myelination (brain development)
- Immune cell proliferation
- DNA synthesis & repair
- Thermoregulation and metabolic control

UPSC Exam Relevance

- **Prelims:** Iron types, RDA, absorption inhibitors/enhancers, Anaemia Mukh Bharat
- **Mains:** GS-II (Health & Nutrition) – Anaemia, maternal health, food fortification

Essay: Nutrition security and human capital

9. India's Protein Push: Nutrition Reform or Marketing Spin?



A growing number of Indians are turning to **high-protein foods and supplements**, driven by fitness awareness and lifestyle diseases. However, concerns are rising over **misleading "proteinised" foods**, supplement safety, and neglect of balanced nutrition.

What are Proteins? (Basics)

- **Definition:** Proteins are essential macronutrients made of **amino acids** required for growth, repair, enzymes, hormones, and antibodies.
- **Recommended Intake:** ~0.8-1.2 g/kg/day (higher for elderly, athletes, recovery).
- **Sources:** Pulses, dairy, eggs, fish/meat, soy, nuts, millets.

Deficiency Effects: Muscle loss, poor immunity, fatigue, slower recovery, higher metabolic risk.

New Protein Consumption Trends

- **Protein Add-ons:** Fast-food chains offer protein slices/add-ons (~5 g extra protein/serving).
- **Functional Dairy:** Rise of Greek yoghurt, cottage cheese, Skyr – high protein + convenience.
- **Supplement Routine:** Urban consumers using whey/plant protein (targeting 90-100 g/day).
- **FMCG "Proteinisation":** Cereals, snacks, breads, dosa batters fortified with protein.

Drivers Behind the "Protein Wave"

- **High Deficiency Base:** ~73% Indians estimated protein-deficient.
- **Lifestyle Diseases:** Carb-heavy diets linked to obesity/metabolic disorders (ICMR flags).
- **Market Signal:** Protein market \$1.52 bn (2025) → \$2.08 bn (2030).
- **Convenience Demand:** Easy, on-the-go protein options mainstreamed.

10. Spina Bifida: Renewed Push for Folic Acid Awareness and Fortification



Health experts urged making **folic acid awareness and food fortification** a public health priority to prevent **Spina Bifida**, one of India's most common birth defects.

About Spina Bifida

- **Nature:** A **neural tube defect (NTD)** where the spinal cord fails to develop properly in **early pregnancy**, leading to **paralysis and lifelong disability**.
- **India's Burden:** Affects **>25,000 children annually** (~4 per 1,000 births), among the **highest globally**.
- **Key Manifestations:** **Lower-limb weakness/paralysis, bladder-bowel dysfunction, clubfoot/orthopaedic deformities; hydrocephalus** common.
- **Cognition:** **Intellectual ability usually normal**; quality of life improves with timely care.

Prevention & Management

- **Prevention:** **Periconceptional folic acid** (before conception and early pregnancy) can **prevent >70%** of cases.
- **Treatment:** **Early neurosurgical closure**, management of hydrocephalus (often **shunt**), plus **rehabilitation**, orthopaedic care, and **lifelong urology support**.

Types of Spina Bifida

- **Spina Bifida Occulta:** Mild, "hidden"; often **asymptomatic**, incidentally detected.
- **Meningocele:** **Meningeal sac with fluid**; usually less severe.
- **Myelomeningocele:** **Most severe**; spinal cord involvement with **paralysis**.

Nutritional Pointer

- **Folic Acid:** A **B-complex vitamin** essential for **early neural tube development**; adequate intake **before conception** is critical to prevent NTDs.

11. “Beyond Alcohol: MASLD Emerges as India’s Silent Liver Epidemic”



The Hindu highlighted **Metabolic Dysfunction–Associated Steatotic Liver Disease (MASLD)** as a rapidly rising yet underdiagnosed health threat in India. The condition was **renamed from NAFLD** to enable diagnosis based on **metabolic risk factors**, rather than excluding alcohol intake alone.

What is MASLD?

- **MASLD** is a metabolic liver disease characterised by:
 - **Hepatic steatosis** (fat >5% of liver cells) **and**
 - At least **one cardiometabolic risk factor** (obesity, Type 2 diabetes, hypertension, dyslipidaemia).
- 👉 Earlier known as **Non-Alcoholic Fatty Liver Disease (NAFLD)**.

Why Was NAFLD Renamed to MASLD?

- NAFLD defined disease by **what it was not** (non-alcoholic).
- MASLD:
 - Focuses on **positive metabolic drivers**
 - Reduces stigma
 - Improves early diagnosis and risk stratification.

Primary Causes

- Sedentary lifestyle
- High-calorie diets (especially **fructose-rich foods**)

Insulin resistance and metabolic syndrome

Disease Spectrum

Stage	Description
Simple Steatosis	Fat accumulation without inflammation
MASH	Metabolic Dysfunction–Associated Steatohepatitis (inflammation + cell injury)
MetALD	MASLD with moderate alcohol intake (below ALD thresholds)
Fibrosis	Progressive liver scarring
Cirrhosis	Advanced scarring → liver failure
HCC	Hepatocellular carcinoma (liver cancer)

UPSC Exam Relevance

- **Prelims:**
 - MASLD, MASH, MetALD, FibroScan, FIB-4 score
- **Mains:**
 - GS-II: Public health challenges, NCD prevention
 - GS-III: Human capital and productivity

12. Superbugs in Delhi Air



A recent study by researchers at **Jawaharlal Nehru University** has found that **Delhi's air carries a high load of antimicrobial-resistant bacteria ("superbugs")**, raising concerns about the **airborne spread of antimicrobial resistance (AMR)** in polluted urban environments.

What are Superbugs? Superbugs are microorganisms that have developed **antimicrobial resistance (AMR)** to **multiple antibiotics**, including **last-resort drugs**.

- AMR reduces the effectiveness of standard treatments, increasing **morbidity, mortality, and healthcare costs**.

Key Findings of the Study

- **Drug Resistance Profile**
 - 73% of airborne bacterial isolates were **single-drug resistant**.
 - 36% showed **multidrug resistance (MDR)**.
- **Bacterial Composition**
 - **Eight species of airborne staphylococci** identified.
 - Presence of **methicillin-resistant staphylococci**, a major AMR concern.
- **Safety Threshold Breach**
 - Concentration of staphylococci at all sampling sites **exceeded safety limits recommended by the World Health Organization (WHO)**.
- **Seasonal Pattern**
 - **Higher bacterial abundance in winter**, when:
 - Lower temperatures enhance bacterial survival.

Poor air quality and atmospheric inversion trap pollutants and microbes.

About Staphylococci

- **Nature:** Gram-positive, spherical bacteria (cocci).
- **Metabolism:** **Facultative anaerobes** (can survive with or without oxygen).
- **Common Species:** *Staphylococcus aureus*.
- **Habitat:** Normally present on **human skin and nasal passages**.
- **Pathogenic Potential:**
 - Minor: boils, skin infections.
 - Severe: **pneumonia, endocarditis, sepsis**.

Methicillin-resistant Staphylococcus (MRSA-type organisms) are resistant to **penicillin and methicillin**, severely limiting treatment options.

Why This Matters (Significance)

- **New Transmission Pathway:** Highlights **air as a vector for AMR**, not just hospitals or water bodies.

13. Scabies Resurgence: A Neglected Tropical Threat Returns



A global resurgence in scabies cases has renewed public health concerns, especially in tropical and densely populated regions. Rising outbreaks highlight gaps in hygiene access, early detection, and community-level treatment strategies.

About Scabies

- **Causative Agent:** Microscopic mite *Sarcoptes scabiei var. hominis*.
- **Infection Mechanism:** Female mites burrow into the epidermis to lay eggs → allergic reaction to mite proteins & faeces → severe itching.
- **Transmission:** Mainly through prolonged skin-to-skin contact; spreads rapidly in households, schools, prisons, and care homes.
- **Types:**
 - *Classic scabies* – Low mite burden, intense nocturnal itching.
 - *Crusted (Norwegian) scabies* – Massive mite load, thick crusts; common in immunocompromised persons.
- **Symptoms:** Severe pruritus (worse at night), pimple-like rash, burrow tracks in skin folds.
- **Complications:** Secondary bacterial infection (Staphylococcus/Streptococcus) → septicaemia, rheumatic heart disease, kidney damage.
- **Treatment:** Topical Permethrin 5% cream (first-line); Oral Ivermectin in severe or mass-treatment cases.
- **Disease Burden:** Affects ~200 million people globally; India's prevalence ranges 13–59%, with rural household attack rates up to 30.9%.
- **Vulnerable Groups:** Children, elderly, institutional populations.
- **Global Status:** Recognised as a Neglected Tropical Disease (NTD) by WHO in 2017.

UPSC Relevance

- Link with SDG-3 (Good Health & Well-being).
- Intersection of infectious disease control, hygiene access, and rural health systems.

14. Menkes Disease



The U.S. Food and Drug Administration (FDA) approved Zyncubo (copper histidinate) as the first-ever treatment for Menkes disease.

About Menkes Disease

- **Nature:** A rare, severe **X-linked genetic disorder**, also called *kinky hair syndrome*.
- **Onset:** Symptoms usually appear at **2–3 months of age** in infants.
- **Genetic Cause:** Caused by mutation in the **ATP7A gene**, which encodes a protein responsible for **copper transport across cell membranes**.
- **Pathophysiology:**
 - Copper accumulates in the **intestine and kidneys**
 - **Severe copper deficiency** occurs in the **brain and liver**, impairing neurological development
- **Gender Pattern:** Primarily affects **males**; females are usually **asymptomatic carriers**.
- **Incidence:** ~1 per 100,000–250,000 live births worldwide.

Clinical Features

- **Hair:** Brittle, sparse, colourless “*steely*” or *kinky hair*
- **Neurological:** Seizures, hypotonia, developmental delay
- **Skeletal & Vascular:** Bone weakness, fragile blood vessels

Why Copper Matters

- Copper is an **essential trace element** required for:
 - Cellular energy production
 - Connective tissue formation
 - Iron metabolism
 - Brain development

15. Huntington's Disease



New studies and a **gene-therapy clinical trial (AMT-130)** show promise in **slowing disease progression** by targeting the **toxic mutant huntingtin protein**. Early results indicate **slower cognitive decline**, especially in **processing speed and reading ability**.

About Huntington's Disease (HD)

- **Nature:** A **genetic, progressive neurodegenerative disorder** affecting **movement, cognition, and emotions**.
- **Onset & Course:** Typically diagnosed between **30–50 years**; survival is often **15–20 years** after diagnosis.
- **Prevalence:** **~5 per 100,000** globally (rare, but high life-impact due to early adult onset).
- **Current Treatment:** **No cure**; symptomatic management with drugs, physiotherapy, and supportive care.

Genetic Basis & Pathophysiology

- **Causative Gene:** **HTT gene** (codes for the huntingtin protein).
- **Mutation Effect:**
 - Mutated HTT produces **abnormal huntingtin proteins**.
 - These proteins **aggregate into toxic clumps**, disrupting neuronal function.

Outcome: Progressive **neuronal death**, especially in brain regions controlling movement and cognition.

Treatment Breakthrough (AMT-130)

- **Therapy Type:** **Gene therapy** aimed at **reducing production of the mutant huntingtin protein**.
- **Key Finding:** Evidence of **slower cognitive decline**, particularly in **processing speed and reading measures** – a critical milestone in disease modification.

16. When Drinking Water Turns Deadly: Fixing India's Unsafe Urban Tap Water



In **Indore**, at least **21 deaths** were linked to **contaminated tap water**, caused by **sewage ingress through leaking pipelines**. The incident highlights systemic failures in **urban water supply design, maintenance, and monitoring**, raising concerns for public health across Indian cities.

What is the Problem?

Urban tap water becomes unsafe when **treated drinking water pipelines get contaminated**, mainly due to **sewage mixing** arising from poor infrastructure design, intermittent supply, and weak surveillance.

Why Urban Tap Water is Unsafe in India

- **Intermittent Supply:** Stop-start flow causes pressure loss; during off-hours, pipes suck in sewage through cracks.
- **High Leak Burden:** Ageing pipelines leak heavily; India loses **~38% treated water as Non-Revenue Water (NRW)**.
- **Sewer Proximity:** Drinking-water and sewer lines often run dangerously close; **CPHEEO norms** (≈ 3 m horizontal, 1-1.5 m vertical separation) are routinely violated.
- **Unmapped Utilities:** Lack of accurate underground maps hides high-risk stretches and delays preventive action.

Weak Surveillance: Water-quality labs often sit within supply agencies, causing **conflict of interest** and delayed alerts.

17. Cities That Never Sleep: Urban Noise Pollution as India's Silent Health Crisis



News India flagged that **urban noise levels are rising sharply**, but governance still treats noise as a **nuisance**, not a **measurable public-health threat**. Despite statutory limits, routine city soundscapes frequently **exceed safe thresholds**, with thin monitoring masking hotspots and harmful peaks.

What is Noise Pollution?

- **Unwanted or excessive sound** that harms health and comfort.
- **Indian limits (Noise Rules, 2000):**
 - **Day:** 75 dB(A) (industrial) → 50 dB(A) (residential); **Silence zones:** 50 dB(A)
 - **Night:** 70 dB(A) → 40 dB(A); **Silence zones:** 40 dB(A)

Current Status in Indian Cities

- **High daily exposure:** ~65–75 dB(A) in monitored urban areas.
- **Traffic dominance:** Road traffic routinely >70 dB(A); honking spikes ~80 dB(A).

Sparse network: ~82 fixed stations nationwide (≈26 in Delhi) → many **hyper-local hotspots unmeasured**.

Why Urban Noise Is a Serious Health Issue

- **Cardio-metabolic stress:** Chronic 70–80 dB(A) linked with stress activation and **hypertension risk**.
- **Sleep disruption:** Night sound near ~68.6 dB(A) disrupts sleep even in “quiet” areas.
- **Cognitive fatigue:** Workplace >80 dB(A) → concentration loss, headaches, fatigue.
- **Hearing harm:** Sustained exposure increases **tinnitus** and auditory strain.
- **Frequency effects:**
 - **High-frequency (2–8 kHz):** hearing damage
 - **Low-frequency (<250 Hz):** hypertension, cognitive fatigue

Constitutional Safeguards

- **Article 21:** Right to life includes protection from harmful noise (health & sleep).
- **Article 19:** Speech/religion subject to public order – cannot override others’ liberty.
- **Articles 48A & 51A(g):** State and citizen duty to protect the environment.

18. Breathing Against the Clock: Air Pollution Puts India's Sporting Dream at Risk



International athletes have complained to the **International Olympic Committee** about hazardous air at Indian venues, while domestic athletes train under chronic exposure. Persistent severe AQI is emerging as a **sports performance, health, and hosting risk** for India.

Air Pollution Landscape in India

- **Global rank:** India stands **5th** among the most polluted countries (IQAir 2024–25).
- **Extreme episodes:** Mid-Jan 2026 saw **Delhi AQI >500**; $PM_{2.5} \approx 73 \times$ WHO guideline.
- **Widespread exposure:** **~44%** of cities face chronic pollution; **1,787 cities** exceeded national $PM_{2.5}$ norms over five years (CREA, 2026).
- **Health toll:** **~1 in 8 deaths** linked to air pollution (**~ 2+ million/year**).
- **Economic loss:** **~\$36.8 bn/year** (**~1.36% of GDP**).

Why Athletes Are Disproportionately Affected

- **Physiological risk:** During exertion, athletes inhale **10–20× more air/min**, increasing deep-lung $PM_{2.5}$ deposition.
- **Performance loss:** High AQI linked to **1.1–1.5%** drop in elite endurance output.
- **Training disruption:** India's **winter peak training season** coincides with worst pollution → indoor shifts/relocations.
- **Equity gap:** Elites relocate; **grassroots athletes cannot**, widening health and performance inequalities.

Implications for India's Global Sporting Ambitions

- **Hosting credibility:** IOC prioritises **climate-positive Games**; sustained severe AQI weakens a **2036 Olympic bid**.
- **Soft power:** Athlete withdrawals citing toxic air (e.g., major opens) portray India as an **unsafe elite-sport destination**.
- **Talent pipeline:** Chronic exposure during formative years damages lungs, eroding the **Khelo India** cohort's potential.

Infra inefficiency: Outdoor stadiums under-used in winter; costly domestic/overseas camp relocations.

UPSC Exam Relevance

- **Prelims:** $PM_{2.5}$, AQI, WHO guidelines, CREA.
- **Mains:**
 - **GS-III:** Air pollution externalities; human capital; urban governance.

19. Plastics: The Next Big Public Health Crisis



A global lifecycle assessment published in **The Lancet Planetary Health** warns that **health burdens from plastic-related emissions will more than double by 2040** under current trends. The study reframes plastic pollution from an environmental issue to a **major global public health emergency**.

What is the Study About?

It is the **first global-scale lifecycle assessment** of plastics that quantifies **human health impacts across the entire plastics chain** – from fossil fuel extraction, production, use, disposal, to open burning.

- Uses **Disability-Adjusted Life Years (DALYs)** as a unified metric to measure health loss.

DALYs = Years of Life Lost (premature death) + Years Lived with Disability

Key Findings

Aspect	Key Insight
Health Burden	Plastic-related emissions may cause >2× increase in DALYs by 2040 (business-as-usual).
Production Trend	Global plastic production unlikely to peak before 2100, locking in long-term risks.
Pollution Pathways	Health damage occurs across air, water and soil exposure routes.
Chemical Opacity	Thousands of chemicals used in plastics remain undisclosed or poorly studied, limiting regulation.
Evidence Gap	Lack of transparency undermines risk assessment, regulation and treaty negotiations.

Major Health Impacts Identified

- **Air Pollution:**
 - Fine particulate matter (PM_{2.5}) from plastic production and open burning → **asthma, cardiovascular diseases, premature deaths.**
- **Toxic Chemical Exposure:**
 - Additives (phthalates, PFAS, flame retardants) linked to **cancers, endocrine disruption, neurodevelopmental disorders.**
- **Non-Communicable Diseases (NCDs):**
 - Chronic exposure raises risks of **diabetes, infertility, immune disorders.**
- **Environmental Justice Angle:**
 - Health impacts are **disproportionately borne by low-income communities** near production sites and waste dumps.

UPSC Exam Relevance

- **Prelims:** DALYs, plastic lifecycle, health impacts of pollution
- **Mains: GS-III:** Environmental pollution, sustainable development, public health externalities

20. Campus Distress Under the Scanner: Supreme Court Steps In on Student Suicides



In **Amit Kumar v. Union of India (2026)**, the Supreme Court flagged a disturbing rise in **student suicides across Higher Education Institutions (HEIs)** and issued **interim directions** based on a **National Task Force (NTF) report**. The Court emphasised institutional accountability, mental health infrastructure, and timely governance reforms.

Background & Context

- **Student suicides (~13,000 in 2022)** form a significant share of India's overall suicide burden (NCRB).
- In the **15–29 age group**, suicide is among the **leading causes of death**.
- Despite this, only **3.5% of 60,383 HEIs** responded to the NTF survey, exposing weak engagement and denial.

Key Findings of the National Task Force

Dimension	Key Insight
Mental Health Services	~65% HEIs have no mental health service provider; 73% lack full-time professionals
Institutional Capacity	Rapid expansion of enrolment not matched by counselling, grievance or support systems
Equity Stress	Marginalised students face discrimination, language barriers, disability access gaps
Academic Pressure	Rigid attendance, heavy workload, faculty shortages, opaque placements
Campus Culture	Ragging persists in some campuses, normalised as "bonding"

Key Interim Directions by the Supreme Court

- **Mandatory FIR:** Any suicide involving a cognisable offence must lead to an FIR – no institutional cover-ups.
- **Annual Reporting:** HEIs must submit yearly data on suicides/unnatural deaths to **UGC and regulators**.
- **Vacancy Timelines:**
 - Teaching & non-teaching posts → filled within **4 months**.
 - Senior admin posts (VC/Registrar) → ideally within **1 month**, maximum **4 months**.
- **Scholarship Protection:** Students cannot be barred from classes/exams due to delayed disbursals; backlog to be cleared within **4 months**.
- **Strict Compliance Warning:** HEIs put on notice for non-compliance with anti-ragging, grievance redressal, equity and sexual harassment regulations.

21. India's Agrarian Suicide Crisis: Structural Distress Beneath Cyclical Relief



A 28-year analysis (1995–2023) of data from the National Crime Records Bureau (NCRB) reveals that **farmer and agricultural labourer suicides remain persistent and regionally concentrated**, with a **sharp resurgence in 2023** after nearly a decade of decline, underscoring unresolved structural agrarian distress.

1. Scale and Long-Term Trends

- **Cumulative Burden (1995–2023)**
~3.94 lakh farmers and agricultural labourers died by suicide
→ Average ~13,600 deaths annually
 - **Peak Crisis Phase (2000–2009)**
~1.54 lakh suicides
2002 recorded 17,971 deaths – highest on record
 - **Recent Spike (2023)**
10,786 suicides, a ~75% increase over 2022
 - **Changing Profile (2023)**
 - Agricultural labourers: 6,096
 - Cultivators: 4,690
- Signals growing distress among **landless and semi-landless workers**

Regional Concentration of the Crisis

Dimension	Key Facts
Epicentre States (2023)	Maharashtra (4,151), Karnataka (2,423)
Regional Share (since 1995)	Southern & Western India: ~72.5%
Other Hotspots	Andhra Pradesh & Telangana together: ~1.7 lakh suicides

The crisis is **spatially clustered**, not evenly distributed, indicating **structural regional vulnerabilities**.

Role of Welfare Interventions

- **MGNREGA Effect**
Post-2010, suicides declined steadily, coinciding with expanded wage employment under **Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA)**.
- **State-Level Turnarounds**
 - **Kerala:** 1,118 suicides (2005) → 105 (2014)

West Bengal: Zero reported cases by 2012

→ Indicates the importance of **non-farm income buffers and social security**.

22. Acid Attacks in India: Law Exists, Justice Lags



A 2009 Delhi acid attack case ended in acquittal after 16 years, exposing low conviction rates, prolonged judicial delays, and systemic failures in delivering justice and rehabilitation to acid attack survivors.

What is an Acid Attack?

An **acid attack** involves the intentional throwing or administering of corrosive substances to cause **permanent disfigurement, disability, or death**, primarily targeting women and girls.

Status of Acid Attacks in India

- **Incidence: 207 cases in 2023** (up from 176 in 2021) – persistence despite legal deterrence.
- **Gendered Crime: 80–85% victims are women**; perpetrators are overwhelmingly men (National Crime Records Bureau).
- **Under-reporting:** Independent estimates suggest **~1,000 attacks annually**, suppressed by stigma, fear, and family pressure.
- **Hotspots (2023):** West Bengal (57), Uttar Pradesh (31), Gujarat (15).

Legal Framework Against Acid Attacks

- **Criminalisation: Bharatiya Nyaya Sanhita (BNS), 2023 – Section 124**
 - **Punishment: 10 years to life imprisonment + mandatory compensation.**
 - **Attempt: 5–7 years imprisonment.**
- **Free Medical Care:** Mandatory **free emergency treatment** in all hospitals; non-compliance punishable.
- **Regulated Acid Sale:** Photo-ID verification, buyer registers, SDM oversight (per Supreme Court directions).

Implementation Gaps (Core Problem)

- **Low Convictions:** Of 703 pending cases (2023), only 16 convictions.
- **Judicial Delays:** Trials often exceed a decade; the 2009 Delhi case ended after 16 years despite SC's call for speedy trials.
- **Weak Investigation:** Only 86 charge-sheeted cases out of 207 (2023) – poor evidence collection, pressure to settle.
- **Compensation Delays:** Statutory **₹3 lakh** often reaches survivors **after years**, delaying rehabilitation.

23. Counting Women's Invisible Labour



Recent analyses and debates highlight that **women's unpaid care and domestic work**, though central to household functioning and economic productivity, remains **excluded from GDP calculations and policy design**, perpetuating gender inequality in India.

What is Women's Invisible Labour?

Unpaid domestic and care work – such as cooking, cleaning, childcare, elder care, and emotional labour – performed largely by women, which sustains households and the labour force but is **not monetised or formally recognised**.

Status in India

- **Time Burden:** Women spend ~5.5 hours/day on unpaid care work vs ~1.5 hours for men (Time Use Survey, 2019).
- **Care Share:** Women perform ~83% of total unpaid care work.
- **Economic Value:** Estimated at ₹22-26 lakh crore annually (~13-15% of GDP), yet excluded from national accounts.

Labour Force Impact: Nearly 60% of working-age women remain outside paid employment due to care responsibilities.

Why Is It Undervalued?

- **GDP Bias:** Only market-based activities are counted as “productive”.
- **Gender Norms:** Care work seen as a social duty, not economic labour.
- **Policy Blind Spot:** Public spending on care services is <1% of GDP.
- **Statistical Gaps:** Labour surveys undercount unpaid and home-based work, underestimating women's work participation by 20-25%.

Consequences

- **Low Female LFPR:** Around 37%, among the lowest globally.
- **Income Gap:** Women earn ~28% less than men on average.
- **Social Inequality:** Care burden shifts to poorer, marginalised women.
- **Growth Loss:** Enabling women's participation could add ~\$700 bn to GDP (McKinsey).

UPSC Exam Relevance

- **Prelims:** Time Use Survey, unpaid care work, ILO Convention 189
- **Mains:**
 - **GS-II:** Gender justice, labour reforms, social security
 - **GS-I:** Role of women, social empowerment

24. PANKHUDI Portal Launched to Strengthen Women & Child Development Ecosystem



The Ministry of Women and Child Development launched the PANKHUDI digital portal to improve coordination, transparency, and outcome-based delivery in women and child development initiatives.

About PANKHUDI Portal

- **Nature:** A single-window digital platform integrating government bodies, CSR partners, NGOs, and other stakeholders.
- **Core Focus Areas:** Nutrition, health, early childhood care & education, child protection, and women's safety.
- **Governance Features:**
 - End-to-end tracking of proposals and outcomes
 - Non-cash financial routing to ensure transparency and accountability
- **Objective:** Foster inclusive, collaborative, and results-oriented development while streamlining CSR-government partnerships.
- **Mission Linkages:** Strengthens implementation of flagship schemes – Mission Poshan 2.0, Mission Vatsalya, and Mission Shakti.

25. Karnataka HC Limits BNS Section 69 in Consensual Relationships



The Karnataka High Court clarified the scope of Section 69 of the Bharatiya Nyaya Sanhita (BNS), 2023, cautioning against its misuse in failed consensual relationships.

Key Takeaways

- **Legislative Intent:** Section 69 targets **deceit, fraud, and sexual exploitation**, not emotional fallout from consensual relationships.
- **False Promise Test:** A promise of marriage becomes criminal **only if dishonest intention existed from the very beginning**.
- **No Retroactivity:** Consensual relationships cannot be criminalised later based solely on subsequent disputes.
- **Legal Nature of Offence:** Section 69 is **cognisable, non-bailable, non-compoundable**, and **triable by a Court of Session**, with punishment up to 10 years imprisonment + fine.

26. Samagra Shiksha 3.0: From Access to Learning Outcomes



The Union Education Minister held consultations with States on **Samagra Shiksha 3.0 (2026–2031)**, the next phase of India’s flagship school education scheme, aimed at **full implementation of NEP 2020** with a sharp focus on **learning outcomes, AI-enabled pedagogy, and accountability**.

What is Samagra Shiksha 3.0?

- **Definition:** A Centrally Sponsored Scheme integrating pre-primary to Class 12 education to operationalise NEP 2020.
- **Timeline:** 2026–2031 (Phase 3 of Samagra Shiksha).
- **Nodal Ministry:** Ministry of Education (Department of School Education & Literacy).

Education Continuum: Treats schooling as a single continuum under the 5+3+3+4 structure.

Key Features of Phase 3.0

- **AI-enabled Learning:** Use of Personalised Adaptive Learning (PAL) to address individual learning gaps.
- **Outcome-linked Funding:** Central support tied to improvements in learning levels and PGI scores.
- **Foundational Priority:** Strengthens NIPUN Bharat (reading & numeracy by Grade 3).
- **Curriculum Parity:** Quality equivalence across State Boards via PARAKH.
- **Vocational Integration:** Skilling from Class 6, aligned with local economies.
- **Teacher Capacity:** 100% teacher training through NISHTHA.
- **Digital Push:** ICT labs and smart classrooms in all upper primary & secondary schools.
- **Community Role:** State manages systems & salaries; communities shape school culture.

Evolution Across Phases (At a Glance)

Aspect	1.0	2.0	3.0
Vision	Scheme merger	NEP alignment	Full NEP execution
Focus	Access & infra	Equity & inclusion	Learning outcomes
Technology	Limited ICT	DIKSHA	AI-led PAL
Funding	Expenditure-based	Hybrid	Outcome-linked
Vocational	Secondary	Strengthened	From Class 6
Assessment	Board-centric	Competency-based	PARAKH parity

27. Higher Education Reset: One Regulator to Rule Them All?



The **Viksit Bharat Shiksha Adhishthan (VBSA) Bill, 2025** has been introduced to **overhaul higher education regulation**, replacing multiple overlapping regulators with a **single, NEP 2020-aligned framework** to improve access, quality, and global credibility.

Background & Need

- **System Explosion:** 1,000+ universities and ~42,000 colleges (AISHE), but **fragmented approvals and monitoring** slow growth.
- **Low Access:** GER ~28%, far from NEP's ambition.
- **Research Deficit:** R&D spend ~0.7% of GDP → compliance-heavy institutions.
- **Global Gap:** Limited top-tier presence (≈45 Indian institutions in QS 2025).
- **Employability Mismatch:** ~1.5 crore graduates annually; only **45–50% employable**.

Key Provisions of the VBSA Bill, 2025

- **Umbrella Regulator:** Establishes **Viksit Bharat Shiksha Adhishthan (VBSA)**.
- **Three Councils:**
 1. **Regulation Council** (licensing & oversight)
 2. **Accreditation Council** (outcome-based)
 3. **Standards Council** (curricula & benchmarks)
- **Regulatory Unification:** Repeals **UGC (1956), AICTE (1987), NCTE (1993)** Acts.
- **Outcome-Based Accreditation:** Shifts focus from inputs to learning outcomes.
- **Grant Separation:** Funding handled by the Ministry, not the regulator.
- **Foreign Universities:** Clear rules for entry and operation in India.
- **Digital Transparency:** Mandatory public disclosure of courses, finances, governance.
- **Coverage:** Central/State Universities, Colleges, INIs, IoEs, Technical & Teacher Education.
- **Exemptions:** Medicine, Dentistry, Nursing, Law, Pharmacology, Veterinary Sciences.

28. Classrooms to Campuses Abroad: India–UK Education Ties Go Global



The UK announced a **new International Education Strategy**, naming **India as one of five priority countries** to expand education exports.

- Education cooperation is a core pillar of **India-UK Vision 2035**, with a shift from student mobility to **campus-level and research partnerships**.

Context & Background

- The UK is repositioning **education as a strategic export sector**, while India is expanding higher education capacity to meet demographic demand.
- The partnership is moving from **mobility-only (students going abroad)** to **transnational education (foreign campuses in India)**.

Why India is a Focus Country for the UK

- **Scale Demand:** India plans to expand its **~40 million** student base and needs **~30 million new seats**.
- **Campus Expansion:** **9 UK universities** plan to open campuses in India, signalling long-term institutional presence.
- **Student Mobility:** **~1.7 lakh Indian students** are currently studying in the UK, making India one of the **largest source countries**.

Significance for India

- **Capacity Creation:** Despite **1,100+ universities** and **45,000+ colleges**, demand outpaces supply – foreign campuses ease pressure.
- **Quality Upgrade:** India's **GER ~28% (2021-22)**; global institutions bring quality benchmarks and faster expansion.
- **Skill Readiness:** With **~65% of the population below 35**, global curricula enhance employability.
- **Research Boost:** India spends only **~0.65% of GDP on R&D**; partnerships strengthen labs, faculty exchange and innovation output.

Policy Enablers (Often Missed in CA Notes)

- NEP 2020 explicitly allows **top foreign universities to operate in India**.
- **UGC (Setting up and Operation of Campuses of Foreign Higher Educational Institutions in India) Regulations, 2023** provide the regulatory framework enabling UK campuses.

29. From Advisory to Accountability: UGC Makes Campus Equity Enforceable



The University Grants Commission notified the **Promotion of Equity in Higher Education Institutions Regulations, 2026**.

- The rules convert earlier **advisory anti-discrimination norms into enforceable obligations**, with institutional penalties for non-compliance.

Why These Regulations Were Needed (Context & Background)

- **Rising complaints:** Caste-discrimination cases reported to UGC rose **118.4%** from 173 (2019–20) to 378 (2023–24).
- **Pending cases:** Despite disposals, pendency increased from **18 to 108**, showing recurring disputes and uneven resolution.
- **Symbolic flashpoints:**
 - **Rohith Vemula (2016)**

Payal Tadvi (2019)

highlighted alleged institutional caste exclusion and regulatory gaps.

What Changed from the UGC Regulations, 2012

- **Advisory → Enforceable:** Earlier norms lacked penalties; **2026 rules empower UGC to act** against defaulting institutions.
- **Procedural Clarity:** **Time-bound inquiry and appeal mechanisms** introduced.
- **Expanded Coverage:** **OBCs explicitly included**; scope widened to **explicit, implicit, indirect and structural discrimination**.

Key Provisions: UGC Anti-Discrimination Regulations, 2026

A. Institutional Mechanisms (Mandatory in Every HEI)

- **Equal Opportunity Centre (EOC):** Nodal body for equity policy implementation and grievance handling.
- **Equity Committee:**
 - Chaired *ex officio* by the Head of Institution
 - Members include faculty, non-teaching staff, civil society and students
 - **Mandatory representation:** SC, ST, OBC, women, persons with disabilities
- **Equity Squads:** Mobile vigilance teams to monitor vulnerable campus spaces.
- **Equity Ambassadors:** Department/hostel/library-level nodal persons to promote equity and enable reporting.
- **24×7 Equity Helpline:** Confidential grievance access; serious cases may link to law-enforcement where penal law applies.
- **Ombudsperson:** Independent appellate authority with **binding directions**.

30. National Sports Governance Rules, 2026 Notified to Reform Sports Bodies



The Ministry of Youth Affairs and Sports notified the National Sports Governance Rules, 2026 under the National Sports Governance Act, 2025, laying down uniform governance norms for National Sports Federations (NSFs).

Key Provisions of the Rules

- **SOM Inclusion:** General Bodies of NSFs must include **at least four Sportspersons of Outstanding Merit (SOMs)**.
- **Eligibility Criteria:** SOMs must be **≥25 years old** and **retired for at least 1 year** from active sport.
- **Achievement Grading:** Introduces a **10-tier achievement system**, prioritising **Olympic and international medallists** for governance roles.
- **Gender Representation:** **50% of SOMs must be women**; **Executive Committees** must include **at least four women**.
- **Election Oversight:** Establishes a **National Sports Election Panel** to ensure **free, fair, and manipulation-free elections**.
- **Disqualification Clause:** Individuals **convicted and sentenced to imprisonment** are barred from contesting elections or holding committee posts.
- **Compliance Timeline:** All National Sports Bodies must **amend constitutions/bye-laws within 6 months** to align with the Rules.

31. Breathing Against the Clock: Air Pollution Puts India's Sporting Dream at Risk



International athletes have complained to the **International Olympic Committee** about hazardous air at Indian venues, while domestic athletes train under chronic exposure. Persistent severe AQI is emerging as a **sports performance, health, and hosting risk** for India.

Air Pollution Landscape in India

- **Global rank:** India stands **5th** among the most polluted countries (IQAir 2024–25).
- **Extreme episodes:** Mid-Jan 2026 saw **Delhi AQI >500**; $PM_{2.5} \approx 73 \times$ WHO guideline.
- **Widespread exposure:** **~44%** of cities face chronic pollution; **1,787 cities** exceeded national $PM_{2.5}$ norms over five years (CREA, 2026).
- **Health toll:** **~1 in 8 deaths** linked to air pollution (**$\approx 2+$ million/year**).
- **Economic loss:** **~\$36.8 bn/year** (**$\approx 1.36\%$ of GDP**).

Why Athletes Are Disproportionately Affected

- **Physiological risk:** During exertion, athletes inhale **10–20× more air/min**, increasing deep-lung $PM_{2.5}$ deposition.
- **Performance loss:** High AQI linked to **1.1–1.5%** drop in elite endurance output.
- **Training disruption:** India's **winter peak training season** coincides with worst pollution → indoor shifts/relocations.
- **Equity gap:** Elites relocate; **grassroots athletes cannot**, widening health and performance inequalities.

Way Forward (Actionable & Exam-Ready)

- **Event AQI Protocols:** Mandatory thresholds, rescheduling windows, and athlete protection plans aligned to **WHO $PM_{2.5}$** guidance.
- **Clean Training Windows:** Shift endurance camps to cleaner regions/seasons; create **seasonal calendars**.
- **Stadium Safeguards:** Green buffers, dust suppression, low-emission access zones, and real-time displays.
- **Air-shed Governance:** Regional controls (transport, construction, biomass burning) around host cities.
- **Equity Focus:** Subsidised clean-air facilities for **district-level** athletes.

32. National Campaign on Entrepreneurship Launched Under DAY–NRLM



The Ministry of Rural Development (MoRD) launched the **National Campaign on Entrepreneurship** under Deendayal Antyodaya Yojana–National Rural Livelihoods Mission (DAY–NRLM) to boost inclusive non-farm rural entrepreneurship.

About DAY–NRLM

- **Launch Year:** 2011.
- **Aim:** Reduce rural poverty through **strong SHG institutions, self-employment, financial inclusion, livelihood diversification, and social empowerment.**

Campaign Objectives & Design

- **Core Objective:** Accelerate **non-farm rural enterprise development** and strengthen **grassroots entrepreneurial capacity.**
- **Approach:** Builds on proven models like the **Start-up Village Entrepreneurship Programme (SVEP)** and deepens linkages with **formal financial institutions.**

Key Targets

- **Capacity Building:** Train **50,000 Community Resource Persons (CRPs)** as enterprise promoters at the village level.
- **Entrepreneurship Training:** Provide **Entrepreneurship Development Programme (EDP)** training to **50 lakh women SHG members** nationwide.
- **Lakhpati Didi Goal:** Support creation of **3 crore “Lakhpati Didis”** – women SHG members earning **₹1 lakh or more annually.**

33. Creator's Corner: Prasar Bharati Pushes India's Creator (Orange) Economy



Prasar Bharati launched **Creator's Corner** on DD News to showcase curated content by **digital creators nationwide**, strengthening India's **creator (orange) economy**. The initiative complements **World Audio Visual & Entertainment Summit (WAVES)**, positioned as a catalyst for large-scale youth empowerment and economic activity.

About Creator's Corner

- **Nature:** Dedicated DD News platform featuring **independent digital creators' content**.
- **Objective:** Promote the **digital economy** and **quality content creation** via partnerships between **Prasar Bharati and creators**, offering **national visibility**.
- **Coverage Themes:** News & current affairs, culture, travel, cuisine, art & literature, health, education, science & tech, environment, entertainment.
- **Broadcast:** 7:00 PM (Mon-Fri) on DD News; **repeat at 9:30 AM** next day.

Creator (Orange) Economy: Concept

- **Definition:** An ecosystem where **content creators, digital platforms, brands, and intermediaries** interact to generate **value and revenue**, largely driven by **intellectual property** and digital distribution.

About Prasar Bharati

- **Legal Basis:** Established under the **Prasar Bharati Act, 1990**.
- **Status:** **Autonomous public broadcaster** under the **Ministry of Information & Broadcasting**.
- **Constituents:** **Doordarshan and All India Radio**.

Major WAVES-linked Initiatives

- **Indian Institute of Creative Technology:** Skilling youth in **media, animation, and content creation**.
- **WAVES Bazaar:** Global pitching and networking platform for creators.
- **WAVEX Accelerator:** Startup support in **AVGC-XR** (Animation, VFX, Gaming, Comics, Extended Reality).

34. From TV Codes to OTT Screens: Government Proposes Age-Based Digital Content Rules



The Ministry of Information and Broadcasting has proposed the Draft IT (Digital Code) Rules, 2026 to regulate obscenity and classify online content. The move seeks to extend broadcast-style content standards to OTT and digital platforms, reviving debates on free speech and regulatory overreach.

Background & Legal Basis

- The draft rules are issued under Section 87(1) of the Information Technology Act.
- They aim to operationalise Supreme Court guidance on balancing Article 19(1)(a) (freedom of speech) with reasonable restrictions under Article 19(2).

The framework mirrors the Cable Television Networks Rules, extending similar norms to digital content.

Key Provisions of the Draft Rules

1) Age-Based Classification System

A five-tier content rating for online curated content:

- U - Universal
- U/A 7+
- U/A 13+
- U/A 16+
- A - Adult

2) Mandatory Disclosures

Clear age ratings and content descriptors (violence, nudity, substance use) must be displayed before streaming.

3) Parental & Access Safeguards

Parental controls mandatory for 13+ content.

Verified access systems for adult-only content.

4) Content Restrictions : Prohibition on content that: Attacks religions or promotes communal disharmony

Glorifies violence, crime or substance abuse

Professional content exemption for medical, scientific, academic audiences.

5) Intermediary Liability

Online Curated Content Providers (OCCPs) face civil consequences for non-compliance with obscenity norms.

6) Obscenity Standard

Content deemed obscene if lascivious, prurient, corrupting, or offensive to good taste or decency (language similar to IPC/earlier media law).

Significance

- **Child Protection:** Brings uniform age classification across TV and digital media.
- **Regulatory Clarity:** Attempts to standardise content norms in a fragmented OTT space.
- **Constitutional Alignment:** Explicitly anchors regulation in Articles 19(1)(a)-19(2).

35. Report Flags Structural Gaps Driving Road Fatalities in India



The **Ministry of Road Transport and Highways (MoRTH)** and **SaveLIFE Foundation** released a report analysing **road-accident severity**, proposing a **data-driven roadmap** toward **Zero-Fatality Districts**.

The report underscores **structural deficiencies** and calls for **better coordination and resource use** to reduce deaths.

Key Findings

- **Geographic Concentration:** >25% of road deaths occur in just **100 districts**; **Uttar Pradesh** leads in severe districts, followed by **Tamil Nadu** and **Maharashtra**.
- **Highest Severity:** **Nashik Rural** and **Pune Rural**.
- **Design over Behaviour:** ~59% of fatalities occur **without traffic violations**, pointing to **poor road design** (e.g., inadequate illumination).
- **High-Risk Timing:** ~53% of deaths occur **6 PM-midnight** due to poor visibility, fatigue, and night traffic.
- **Corridor Concentration:** **18 corridors** of **National Highways Authority of India (NHAI)** and state PWD roads account for ~54% of fatalities.
- **Vulnerable Users:** Pedestrians and two-wheeler riders are disproportionately affected; in **Pune (2025)** they accounted for ~90% of deaths.
- **Emergency Response Gap:** The **108 ambulance service** fails to reach ~80% of victims in time, undermining the **Golden Hour** response.

36. Flamingo Festival 2026 is being held at Nelapattu Bird Sanctuary, marking the seasonal arrival of migratory birds.

Nelapattu Bird Sanctuary

- **Location:** Andhra Pradesh, near **Pulicat Lake** (India's 2nd-largest brackish lagoon).
- **Ecological Significance:** One of Southeast Asia's largest breeding colonies of **Spot-billed Pelicans**.
- **Habitat Type:** Protected wetland ecosystem and major feeding ground for flamingos.

Flamingos

- **Identification:** Long-legged waders with pink plumage, S-shaped neck, filter-feeding bill.
- **Species:** Six globally; **Greater Flamingo** (largest), **Lesser Flamingo** (smallest).
- **Diet & Colour:** Feed on algae, insects, small crustaceans; pink colour from **carotenoids**.
- **Behaviour:** Highly social; live in large colonies (**flamboyance**); seasonally migratory.

37. Lohri: North India's Winter Harvest Festival



Droupadi Murmu extended greetings to citizens on the occasion of **Lohri**, a major winter harvest festival of North India.

About Lohri

- **Region:** Celebrated mainly in **Punjab, Haryana, and Himachal Pradesh**.
- **Agrarian Significance:** Marks the **ripening of rabi crops** and farmers' thanksgiving for the harvest.
- **Astronomical Link:** Coincides with the **end of the winter solstice** and the **sun's northward journey**.
- **Core Ritual:** **Bonfire at sunset** symbolising **Agni** and the return of warmer days; people perform **parikrama** and offer traditional foods (rewri, peanuts, jaggery).
- **Cultural Expression:** Community bonding through **folk songs** and dances like **Bhangra** and **Gidda**.

38. Kheechna Festival Sparks Child Rights Debate in Rajasthan



Reports highlighted the **adverse impact on underage girls** due to informal unions during the **Kheechna (Bhagoria) festival** in Rajasthan. Concerns relate to **child marriage, school dropouts, and adolescent pregnancies**, raising constitutional and legal questions.

About Kheechna (Bhagoria) Festival

- **Community:** Celebrated by the **Bhil and Garasia** tribal communities.
- **Region:** Western Madhya Pradesh and Southern Rajasthan.
- **Timing:** Held annually in **March (Phalguna)** for about 7 days before Holi.
- **Cultural Feature:** Traditionally symbolises **freedom of partner choice**, where young men and women elope to form informal unions.
- **No Formal Rituals:** No priests, dowry, legal registration, or written documentation.

Key Issues & Legal Concerns

- **Child Marriage Risk:** Many participants are minors; informal unions bypass the **Prohibition of Child Marriage Act, 2006**.
- **Legal Grey Zone:** Absence of formal documentation makes state intervention difficult.
- **Social Media Influence:** Digital connectivity has expanded the practice beyond festival duration.
- **Rights Conflict:**
 - **Article 29** – Protection of cultural rights
 - **Article 21A** – Right to education
 - **Article 24** – Protection of children from exploitation
- **Impact:** School dropouts, early pregnancies, poor maternal health, intergenerational poverty.

39. Sri Govindaraja Swamy Temple: A Major Sri Vaishnava Centre at Tirupati



Sri Govindaraja Swamy Temple, one of the oldest and most prominent temples in **Tirupati, Andhra Pradesh**, was highlighted for its historical, ritual, and architectural significance.

- **Consecration:** Established in **1130 AD** by **Ramanujacharya**, a central figure of Sri Vaishnavism.
- **Original Deity:** Initially dedicated to **Sri Parthasarathi** (a form of Lord Krishna); later **Govindaraja Swamy** became the presiding deity.
- **Historical Legend:** Govindaraja's idol is believed to have been **shifted from Chidambaram to Tirupati** during religious disturbances under **Kulothunga Chola II**.
- **Ritual Tradition:** A major **Sri Vaishnava** centre; rituals strictly follow the **Vaikhanasa Agama**.
- **Architecture:** Blend of **Dravidian** and **Vijayanagara** styles.
- **Structural Features:**
 - Multiple **gopurams**, including a **seven-storeyed Rajagopuram** with intricate carvings
 - **Pyramidal vimana**
 - **Pillared mandapas**
- **Temple Complex:** Houses several **subsidiary shrines** dedicated to Vaishnavite deities.

Associated Philosophy

- **Ramanujacharya's Thought:** Propounded **Vishishtadvaita Vedanta** – a qualified non-dualism mediating between **Advaita** and **Dvaita**.
- **Major Works:** *Sri Bhashya* and *Bhagavad Gita Bhashya*.

40. Padma Awards 2026: 131 Civilian Honours Announced Ahead of Republic Day



The **President of India** announced the **Padma Awards 2026** on the eve of Republic Day. A total of **131 awards** were approved across the three Padma categories, recognising distinguished service in **art, public affairs, sports, trade & industry**, and other fields, including several **posthumous honours**.

What are the Padma Awards?

- **Definition:** The Padma Awards are **India's highest civilian honours** (after the Bharat Ratna), instituted in **1954**.
- **Purpose:** To recognise **distinguished service** in diverse fields such as art, literature, science, public affairs, sports, medicine, social work, etc.

Announcement: Annually on the **eve of Republic Day**.

Categories of Padma Awards

Award	Rank	Nature of Service
Padma Vibhushan	Highest	Exceptional & distinguished service
Padma Bhushan	Second	Distinguished service of high order
Padma Shri	Third	Distinguished service in any field

Eligibility & Selection

- **Eligibility:** Open to all persons, irrespective of occupation or status.
- **Exclusion:** Serving government servants are generally excluded **except doctors and scientists**.
- **Selection Body:** **Padma Awards Committee**, constituted annually by the Prime Minister and **headed by the Cabinet Secretary**.
- **Approval:** Recommendations → Prime Minister → **President of India**.
- **Award Nature:** Recipients receive a **Sanad and medallion; no cash grant**.

Important Constitutional & Legal Aspect

- **Article 18 (No Titles):**
 - In **Balaji Raghavan vs Union of India (1995)**, the Supreme Court held that **Padma Awards are not "titles"** and therefore constitutional, **provided they are not used as prefixes or suffixes**.

Special Points for Prelims

- Awards were **suspended** during **1977-80** and **1992-95**.
- Originally named **Pahela Varg, Dusra Varg, Tisra Varg** (renamed in 1955).
- Announced **annually**, not intermittently.

41. Jeevan Raksha Padak Awards 2025 Announced



The President of India approved the **Jeevan Raksha Padak Series Awards 2025** for **30 individuals**, including **six posthumous awardees**.

The awards recognise **exceptional acts of courage in saving human lives**.

About Jeevan Raksha Padak Awards

- **Nature:** Civilian bravery award for life-saving acts.
- **Established:** 1961.
- **Announcement:** Annually on Republic Day (January 26).

Administered by: Ministry of Home Affairs (MHA).

Award Categories

1. **Sarvottam Jeevan Raksha Padak** – For conspicuous courage in circumstances of **very great danger to life**.
2. **Uttam Jeevan Raksha Padak** – For courage under **great personal danger**.
3. **Jeevan Raksha Padak** – For courage involving **serious risk of grave bodily injury**.

Eligibility & Scope

- Open to **persons from all walks of life**, including armed forces, police, and civilians.
- Applicable for acts performed **beyond the call of duty**.
- Covers rescues during **drowning, fires, accidents, landslides, natural calamities, animal attacks**, etc.
- Acts must be recommended within **two years** of occurrence.

Selection Process

- Nominations submitted via **Rashtriya Puraskaar Portal** by State Governments/UTs/Union Ministries.
- Scrutinised by a high-level **Jeevan Raksha Padak Awards Committee**.
- Final approval by the **Prime Minister and the President of India**.

42. Subhash Chandra Bose Aapda Prabandhan Puraskar 2026



The **Subhash Chandra Bose Aapda Prabandhan Puraskar 2026** has been announced for **Institutional** and **Individual** categories. The awards recognise **exemplary contributions in disaster management**, announced annually on **January 23** (birth anniversary of Netaji Subhas Chandra Bose). The award is administered by the **National Disaster Management Authority (NDMA)** under the **Ministry of Home Affairs**.

Awardees - 2026

- **Institutional Category: Sikkim State Disaster Management Authority (SSDMA)**
 - Recognised for **community-centric disaster resilience**, preparedness planning, and local capacity-building.
- **Individual Category: Lieutenant Colonel Seeta Ashok Shelke**
 - Honoured for leading **HADR operations** during the **2024 Wayanad landslides and floods**.
 - Supervised construction of a **190-foot Bailey bridge at Chooralmala**, restoring critical connectivity.

Key Facts for Prelims

- **Nature:** National award for disaster management excellence (individuals & institutions).
- **Administered by:** NDMA (MHA).
- **Prize Money:**
 - Institutional: **₹51 lakh + certificate**
 - Individual: **₹5 lakh + certificate**
- **Eligibility:** Indian nationals and Indian institutions; **self-nominations permitted**.

43. Parakram Diwas – Honouring Subhas Chandra Bose



January 23 is observed as **Parakram Diwas** to commemorate the birth anniversary of **Subhas Chandra Bose**. The day was officially notified by the **Government of India in 2021** to honour Bose's courage, nationalism, and contribution to India's freedom struggle. In **January 2026**, the Prime Minister paid tribute to Bose, reaffirming his legacy in India's anti-colonial movement.

Key Facts for Prelims

- **Birth:** January 23, 1897, Cuttack (Odisha).
- **ICS Resignation:** Left the Indian Civil Service in **1921** to join the freedom struggle.
- **Ideology:** Advocated **Purna Swaraj**, socialism, and militant nationalism; rejected Dominion Status.
- **INC Leadership:**
 - President at **Haripura Session (1938)** – set up the **National Planning Committee**.
 - Re-elected at **Tripuri Session (1939)**; resigned following ideological differences with Gandhian leadership.
- **Forward Bloc:** Founded in **1939** to unite radical nationalists.
- **INA & Azad Hind:**
 - Took command of the **Indian National Army (INA)** in **1943** at Singapore.
 - Proclaimed the **Provisional Government of Free India (Azad Hind)** in **1943**.
 - INA was originally formed in **1942** by **Mohan Singh** from Indian PoWs captured by Japan.
- **Women's Role:** Established the **Rani of Jhansi Regiment**, the first women's combat unit in India's freedom struggle.

44. Martyrs' Day 2026: 78th Death Anniversary of Mahatma Gandhi



January 30, 2026 marks the 78th death anniversary of Mahatma Gandhi, observed as Martyrs' Day (Shaheed Diwas). The day commemorates Gandhi's assassination in 1948 and honours all martyrs of India's freedom struggle. March 23 is also observed as Martyrs' Day to honour Bhagat Singh, Rajguru and Sukhdev.

About Martyrs' Day (30 January)

- Observed annually at **Raj Ghat, New Delhi** with a **two-minute silence** at **11:00 AM** nationwide.
- Also referred to as **Sarvodaya Day**, reflecting Gandhi's vision of "Welfare of All."
- Commemorates Gandhi's assassination by **Nathuram Godse** on **30 January 1948** at Birla House (now Gandhi Smriti), Delhi.

Mahatma Gandhi (1869-1948): Key Highlights

Early Life

- Born: **October 2, 1869**, Porbandar, Gujarat.
- Studied Law in London (1888-1891).
- Mentor: **Gopal Krishna Gokhale**.

South Africa Phase (1893-1914)

- Developed **Satyagraha (truth-force)** against racial discrimination.
- Founded **Natal Indian Congress (1894)**.
- Established **Phoenix Settlement** and **Tolstoy Farm**.

Major Movements in India

- **Champaran Satyagraha (1917)** - Indigo farmers (first civil disobedience in India).
- **Ahmedabad Mill Strike (1918)** - First hunger strike.
- **Kheda Satyagraha (1918)** - Revenue remission during famine.
- **Non-Cooperation Movement (1920)** - First nationwide mass movement.
- **Salt Satyagraha (Dandi March, 1930)** - Protest against salt tax.
- **Quit India Movement (1942)** - "Do or Die" call.

Philosophical Pillars

- **Ahimsa** (Non-violence)
- **Satya** (Truth)
- **Asteya** (Non-stealing)
- **Aparigraha** (Non-possession)
- **Sarvodaya** (Welfare of All)

Literary Contributions

- *Hind Swaraj* (1909)
- *The Story of My Experiments with Truth*
- Edited: *Young India*, *Harijan*, *Navajivan*, *Indian Opinion*

Titles

- "**Mahatma**" - conferred by **Rabindranath Tagore**
- "**Father of the Nation**" - popularised by **Subhas Chandra Bose**

45. Bactrian Camels on Kartavya Path: Cold Desert Survivors in Focus



Two Bactrian camels – *Galwan* and *Nubra* – marched in the Animal Contingent at the **2026 Republic Day Parade**. The event spotlighted this rare cold-desert species found in India's Nubra Valley (Ladakh).

About Bactrian Camel (*Camelus bactrianus*)

- **Taxonomy:** Large, even-toed ungulate native to **Central Asian cold deserts**.
- **Key Feature:** Possesses **two humps** (unlike one-humped dromedary camel).
- **Thermal Adaptation:** Survives extreme range from **-40°C to +40°C**.
 - Grows thick shaggy coat in winter; sheds in summer.
- **Water Adaptation:**
 - Can eat snow for hydration.
 - **Wild Bactrian camel** is the only land mammal capable of drinking water saltier than seawater.
- **Habitat:** Semi-arid cold deserts, rocky steppes, stony plains with sparse vegetation.

Species Types

1. **Domesticated Bactrian Camel**
 - Widely distributed across Central Asia.
 - Used historically for Silk Route trade caravans.
2. **Wild Bactrian Camel (*Camelus ferus*)**
 - **IUCN Status:** Endangered
 - Restricted to **Gobi Desert (Mongolia, China)** and **Taklamakan Desert (China)**.

Indian Context

- Found **only in Nubra Valley (Ladakh)**.
- Remnants of ancient **Silk Route trade networks**.

Adapted to high-altitude cold desert ecosystem.

Ecological Role

- Large desert grazer regulating sparse vegetation.
- Aids in **long-distance seed dispersal**, maintaining desert biodiversity.

46. 6th Khelo India Winter Games (KIWG) 2026



The **6th Khelo India Winter Games (2026)** have commenced in **Leh, Ladakh**, with a **two-leg format** – ice sports in **Leh** and snow events in **Gulmarg**. **Figure Skating**, an Olympic discipline, has been introduced for the first time.

Key Facts

- **Organisers:** Ministry of Youth Affairs and Sports (MYAS) & Sports Authority of India (SAI)
- **Objective:** Promote winter sports, build grassroots talent, and prepare athletes for international competitions
- **Scheme Linkage:** Part of the **Khelo India Scheme** (launched FY 2016-17)

Athlete Support: Selected Khelo India Athletes receive ~₹6.28 lakh per year for 8 years

47. MY Bharat Crosses 2 Crore Registrations, Boosting Youth-Led Governance



The MY Bharat (Mera Yuva Bharat) Portal has crossed **2 crore registrations** since its launch in 2023. The milestone reflects growing youth participation in governance, volunteering, and nation-building initiatives.

About MY Bharat

- **Launch:** 2023 under the Ministry of Youth Affairs & Sports (MYAS).
- **Nature:** Autonomous digital platform for youth engagement.
- **Age Group:** Targets individuals aged **15–29 years**.
- **Vision Shift:** From “*youth development*” to “*youth-led development*.”
- **Structure:** Integrated digital portal + mobile app linked with on-ground programmes.

Key Features

- **Experiential Learning:** Opportunities in volunteering, internships, and skill-building.
- **Centralised Youth Database:** Enables evidence-based policymaking and targeted outreach.
- **Digital Governance Tool:** Facilitates structured youth participation in national missions.
- **Skill & Civic Engagement:** Supports professional growth aligned with India’s demographic dividend goals.

Strategic Significance

- Institutionalises structured youth participation in public policy.
- Strengthens digital governance architecture in the youth sector.
- Supports long-term demographic and skilling strategy aligned with *Viksit Bharat @2047* vision.

48. Catherine O'Hara Passes Away at 71



On 30 January 2026, Emmy-winning actor **Catherine O'Hara** passed away at the age of 71. She was globally celebrated for her iconic portrayal of Moira Rose in *Schitt's Creek*.

Key Highlights

- **Breakthrough Role:** Played *Moira Rose* in the Canadian sitcom *Schitt's Creek* (2015–2020), earning critical acclaim and an **Emmy Award for Outstanding Lead Actress in a Comedy Series (2020)**.
- **Award Milestone:** *Schitt's Creek* made history at the **2020 Emmy Awards**, sweeping all major comedy categories; it later dominated the **2021 Golden Globe Awards**.
- **Popular Film Roles:**
 - *Kate McCallister* in *Home Alone* (1990) and its sequel.
 - *Delia Deetz* in *Beetlejuice* (1988).
- **Career Roots:** Began with improvisational comedy troupe **The Second City (Toronto)**; associated with mockumentary-style comedy under director Christopher Guest.
- **Legacy:** Recognised for distinctive comedic timing, character-driven satire, and cultural impact in television comedy.

JANUARY 2026

HISTORY ART & CULTURE

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1. Mannathu Padmanabhan: Kerala's Social Reformer & Anti-Caste Icon



In January 2026, Prime Minister Narendra Modi paid tribute to **Mannathu Padmanabhan** on his **149th birth anniversary**. The occasion highlighted his role in Kerala's anti-caste movements and social reform during the national movement.

- **Birth & Background**
 - Born on **2 January 1878** at **Perunna, Kottayam (Kerala)**.
 - Popularly called the "**Madan Mohan Malaviya of Kerala**" for combining social reform with nationalism.
- **Institution Builder**
 - Founder of the **Nair Service Society (NSS)** in **1914**.
 - NSS aimed at **social upliftment, education, and internal reform** of the Nair community.
 - Worked for **social unity and removal of caste-based disabilities**, not caste supremacy.
- **Role in Anti-Caste Movements**
 - Prominent leader of the **Vaikom Satyagraha (1924–25)** demanding temple road access for lower castes.
 - Actively associated with the **Guruvayur Satyagraha (1931–32)** for temple entry.
 - **Symbolically abandoned the caste title "Pillai"**, reinforcing anti-caste ideology.
- **Freedom Struggle & Nationalist Orientation**
 - Supported **Gandhian methods** of protest and social reform.
 - Advocated **social reform as a prerequisite for Swaraj**.
 - Acted as a bridge between **community reform and the national freedom movement**.
- **Recognition & Legacy**
 - Conferred the title "**Bharatha Kesari**" (**1959**) by President **Dr. Rajendra Prasad**.
 - Remembered as a **key architect of Kerala's social renaissance**, alongside Narayana Guru and Ayyankali.

2. Somnath Swabhiman Parv: Remembering Resilience in Stone



Somnath Swabhiman Parv has been launched to commemorate 1,000 years since Mahmud of Ghazni's 1026 CE attack on the Somnath Temple, celebrating India's civilisational resilience, cultural continuity, and revival ethos.

About Somnath Temple

- **Religious Significance:** Revered as the **first of the twelve Jyotirlingas** of Lord Shiva.
- **Location:** Prabhas Patan, Gujarat, at the confluence of the **Kapila, Hiran, and Saraswati** rivers with the **Arabian Sea**.
- **Baan Stambh:** An arrow pillar on the sea wall indicating an **unobstructed sea route to the South Pole**.

Historical Trajectory

- **Mythic Origins:** Tradition attributes phased construction – **gold (Somraj), silver (Ravana), wood (Krishna)**.
- **Medieval Phase:**
 - Destroyed by **Mahmud of Ghazni (1026 CE)**.
 - Rebuilt in stone by **Bhimdev I (Solanki/Chaulukya)**.
 - Renovated by **Kumarapala**; restored by **Mahipala I** after **Alauddin Khalji's 1299 attack**.
- **Early Modern:** **Ahilyabai Holkar (1783)** built the **"Old Somnath"** beside the ruins.
- **Modern Revival:** Present temple completed in **1951**, symbolising post-Independence cultural renewal.

Architectural Style: Māru-Gurjara (Chaulukya)

- **Period & Region:** 11th–13th centuries; western India.
- **Lineage:** Synthesis of **Maha-Maru (Rajasthan)** and **Maha-Gurjara (Gujarat)**; a **Nagara sub-style**.
- **Key Features:**
 - **Highly ornate** carvings; complex geometry.
 - **Multiple projections/recesses** on exterior walls.
 - **Shikhara** ringed by **Urushringas** (mountain-like skyline).
- **Components:** **Garbhagriha, Gudha-mandapa, Sabha-mandapa**, often with **Kirti-torana**.
- **Major Examples:** **Sun Temple, Modhera; Dilwara Temples, Mount Abu; Rani-ki-Vav, Patan**.

Significance of Somnath Swabhiman Parv

- **Civilisational Memory:** Reframes Somnath as a symbol of **continuity amid destruction**.
- **Cultural Nationalism:** Highlights **heritage revival** in modern India.
- **Pedagogic Value:** Links **medieval history, architecture, and modern nation-building**.

3. Bhadrakali Temple Inscription Highlights Somnath's Reconstruction History



The **Bhadrakali Temple Inscription** at **Prabhas Patan** (near the **Somnath Temple**) drew attention as a key **epigraphic source** on the temple's multiple reconstructions.

Key Details of the Inscription

- **Date & Medium:** Carved in **1169 CE**.
- **Yuga Tradition Recorded:** Attributes Somnath's construction to four yugas – **Chandra (gold), Ravana (silver), Krishna (wood), and Bhimdev Solanki (stone)**.
- **Historical Claim:** Records the **fourth reconstruction** by **Bhimdev Solanki**; notes a **fifth rebuilding** under **Kumarapala**.
- **Nature of Record:** A **prashasti (eulogy)** for **Bhava Brihaspati**, spiritual preceptor to **Kumarapala**, appointed **chief priest of Somnath**.
- **Dynastic Context:** Linked to the **Solanki (Chaulukya) dynasty** of Gujarat, notable patrons of temple architecture.

4. Karthigai Deepam at Thiruparankundram Hill Allowed with Restricted Access



The **Madras High Court** permitted **ceremonial lamp lighting** for **Karthigai Deepam** at **Thiruparankundram Hill**, allowing **only temple officials** and excluding public access. **Karthigai Deepam** is **Tamil Nadu's oldest festival of lights**, observed in the **Tamil month of Karthigai**, honouring **Lord Shiva and Lord Murugan**.

About Thiruparankundram Hill

- **Location & Geomorphology:** A **319-metre monolithic rock** near **Madurai** in the **Vaigai river basin**.
- **Murugan Tradition:** Regarded as the **first among the six holy abodes (Arupadai Veedu)** of **Lord Murugan**.
- **Temple Architecture:** The **Arulmigu Subramanian Swamy Cave Temple** at the base is an **8th-century rock-cut shrine** from the **Pandya period**.
- **Rare Iconography:** Depicts **Lord Shiva and Lord Vishnu facing each other** – an uncommon representation.
- **Jain Heritage:** **Tamil-Brahmi inscriptions** and **stone beds** indicate **Jain monastic use** since the **2nd century BCE**.

5. Zehanpora Stupa: Kushan-Era Buddhist Complex Unearthed in Kashmir



Archaeologists unearthed a ~2,000-year-old **Buddhist monastic complex** at Zehanpora (Jammu & Kashmir), revealing extensive **Kushan-period remains** spread over ~10 acres.

Key Archaeological Findings

- **Structural Remains:** Multiple stupas, viharas (monastic buildings), apsidal chaityas (prayer halls), and stone foundations.
- **Chronology:** Kushan period (1st–3rd century CE) – a peak phase of Buddhist patronage under rulers like **Kanishka** and **Huvishka**.
- **Artistic Style:** Strong **Gandharan influence** – stucco/stone traditions reflecting **north-western Buddhist networks**.
- **Trade & Pilgrimage Link:** Located on a **Silk Route-linked corridor** connecting **Kashmir** with the **Gandhara** region.
- **Historical Identification:** Recognised as the **third node** of a **Kushan-era triad** – with **Kanispur** and **Ushkur (Huvishkapura)** referenced in historical texts.

6. 2nd Global Buddhist Summit (GBS)



The **International Buddhist Confederation (IBC)**, in collaboration with the **Ministry of Culture**, will organise the **2nd Global Buddhist Summit** in **New Delhi**. Theme: **“Collective Wisdom, United Voice, and Mutual Coexistence”**. The summit will showcase **NORBU**, an AI model to engage youth with Buddhist teachings. The **1st Global Buddhist Summit (2023)** adopted the **Delhi Declaration**, linking Buddhism with **mental well-being and environmental sustainability**.

About the Organiser

- **International Buddhist Confederation (IBC)**
 - Headquartered in **New Delhi**
 - Conceived in **2011**, formally established in **2012** under the Ministry of Culture
 - Membership: **320+ organisations across 39 countries**

7. World's Oldest Known Rock Art Discovered in Indonesia



Archaeologists discovered the **world's oldest known rock art** in **Liang Metanduno cave, Muna Island (Indonesia)**, dated to **at least 67,800 years ago** using uranium-series dating.

Key Facts

- **Artwork Type:** Modified hand stencil with deliberately narrowed fingers (animal/claw-like symbolism)
- **Dating Technique:** Uranium-series dating of overlying calcium carbonate
- **Earlier Record Broken:** 51,200-year-old wild pig painting from South Sulawesi
- **Anthropological Significance:** Supports the “**long chronology**” of early human migration
- **Sahul:** Pleistocene supercontinent linking Australia, New Guinea, Tasmania, and Aru Islands
- **Cognitive Insight:** Evidence of advanced symbolic thinking in early Southeast Asian humans

8. Nebra Sky Disc: World's Oldest Astronomical Map?



A 3,800-year-old Bronze Age artefact from Germany – the **Nebra Sky Disc** – is being widely recognised as the **world's oldest known astronomical mapping tool**. It reflects advanced prehistoric knowledge of celestial observation and seasonal cycles.

About the Nebra Sky Disc

- **Discovery & Date:** Found in 1999 on Mittelberg Hill, Germany; dated to c. 1800–1600 BCE (**Bronze Age Europe**).
- **Material:** Bronze disc (~30 cm diameter) with **gold inlays** depicting celestial objects.
- **Celestial Symbols:**
 - Crescent moon
 - Sun (or full moon)
 - 32 stars
 - Clear depiction of the **Pleiades star cluster**
- **Astronomical Significance:**
 - Likely functioned as an **early sky map**.
 - May have helped synchronise lunar and solar calendars.
 - Possibly used to determine agricultural seasons and ritual timings.
- **Cultural Importance:**
 - Considered the **oldest concrete representation of the cosmos**.
 - Listed under UNESCO's Memory of the World Register.

About the Pleiades Cluster

- A young open star cluster in the **Taurus constellation**.
- Located ~440 light-years from Earth.
- Visible to the naked eye; historically linked with seasonal agricultural cycles across ancient civilisations.

9. Private Participation in Monument Conservation



The **Ministry of Culture** has decided to end the **sole operational control** of the **Archaeological Survey of India** in monument conservation, allowing **empanelled private conservation agencies** to execute restoration works under ASI supervision.

What Has Changed?

- **Operational Shift:** Private agencies can now **implement conservation works**, while ASI retains **regulatory oversight**.
- **Empanelment:** Heritage Conservation Architects will be empanelled; donors may directly hire approved agencies.
- **Eligibility:** Implementing agencies must have experience conserving **heritage structures over 100 years old**.
- **Oversight Safeguard:**
 - ASI approval mandatory for **Detailed Project Reports (DPRs)**
 - Technical supervision remains with ASI
- **Funding Route:** Contributions channelled through the **National Culture Fund (NCF)**.
- **Incentive:** 100% **CSR eligibility and tax exemption** for donors.

Legal & Institutional Framework

- **AMASR Act, 1958:** Core law for protection of ancient monuments and archaeological sites.
- **AMASR Amendment, 2010:**
 - **100 m Prohibited Area** (no construction)
 - **200 m Regulated Area** (construction with permission)
- **National Monuments Authority (NMA):** Regulates activities in protected zones.
- **Constitutional Mandate:**
 - **Article 49:** State duty to protect monuments of national importance
 - **Article 51A(f):** Fundamental duty of citizens to preserve heritage
- **ASI:**
 - Established in **1861** by **Alexander Cunningham**
 - Enforces **Antiquities and Art Treasures Act, 1972**

10. Granth Kutir: Scriptural Heritage Library Inaugurated at Rashtrapati Bhavan



President Droupadi Murmu inaugurated **Granth Kutir** at **Rashtrapati Bhavan**. The scripture library is designed to preserve India's literary heritage across its **11 classical languages**. It symbolises a shift towards curated works rooted in **indigenous knowledge systems**.

About Granth Kutir

- **Nature:** A dedicated scripture and heritage library within Rashtrapati Bhavan.
- **Collection:** Around **2,300 books** and **50 rare manuscripts**.
- **Manuscript Media:** Written on **palm leaf, bark, cloth, and handmade paper**.
- **Purpose:** Promote awareness of India's **civilisational traditions** and unity in diversity.
- **Cultural Orientation:** Replaces colonial-era texts with works grounded in India's traditional intellectual heritage.

Classical Languages in India

- **Definition:** Ancient languages with **independent literary traditions and historical depth**, influencing later philosophical and literary works.
- **Recognition Authority:** Based on criteria recommended by a **Linguistic Experts Committee**.
- **Recognised Classical Languages (11):**
 - **Tamil (2004)**
 - **Sanskrit (2005)**
 - **Kannada (2008)**
 - **Telugu (2008)**
 - **Malayalam (2013)**
 - **Odia (2014)**
 - **Marathi (2024)**
 - **Pali (2024)**
 - **Prakrit (2024)**
 - **Assamese (2024)**

Bengali (2024)

11. Bulleh Shah: Voice of Mystical Unity Amid Contemporary Tensions



A shrine dedicated to 17th-century Sufi poet **Bulleh Shah** in Mussoorie, Uttarakhand, was recently vandalised. The incident has revived discussions on India's shared Sufi-Bhakti cultural heritage.

About Bulleh Shah (1680-1757)

- **Identity:** Prominent Punjabi Sufi poet associated with the **Qadiriyya Silsila**.
- **Birthplace:** Uch (present-day Pakistan) / later settled in Kasur (Punjab region).

Spiritual Guide: Disciple of **Shah Inayat Qadiri**, a lower-caste Arain farmer – defying caste hierarchy.

Philosophy & Thought

- **Mystical Orientation:** Emphasised **Tariqat (inner spiritual path)** over orthodox **Shariat (external law)**.
- **Doctrine:** Advocated *Wahdat-al-Wujud* (Unity of Existence) – God and creation as one reality.
- **Syncretism:** Blended **Sufi mysticism** with elements of **Hindu Vedanta**.
- **Humanism:** Promoted universal love (*Ishq*), equality, and rejection of caste, creed, and ritualism.
- **Religious Critique:** Challenged both **Mullahs and Brahmins** for ritualistic rigidity.

Literary Contributions

- **Poetic Form:** Popularised the **Kafi** style – lyrical devotional poetry sung in qawwalis and Punjabi folk music.
- **Major Works:** *Kafian, Barah Maha, Siharfi, Athwara*.
- His verses remain integral to Punjabi Sufi musical traditions across India and Pakistan.