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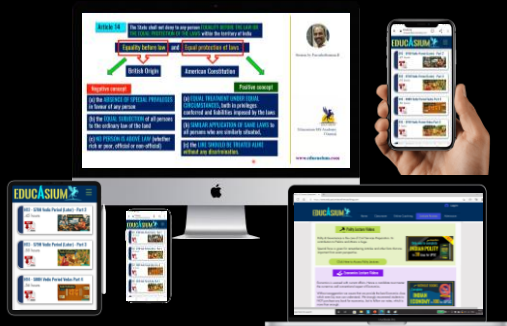
India's e-Rupee Expansion
& UPI – UPU Integration

India's SMR-Led
Nuclear Push

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FOREWORD

The **EPIC UPSC Current Affairs Magazine – October Edition** continues our mission to go beyond mere news collation – transforming information into **insightful, exam-relevant analysis**. Each topic has been carefully mapped to the **UPSC syllabus**, enabling aspirants to grasp not only *what happened*, but also *why it matters* and *how it connects to Prelims and Mains questions*.

This compilation represents our ongoing effort to **simplify, prioritize, and streamline** current affairs into **high-yield, exam-ready content**. Every section has been designed to help aspirants develop conceptual clarity and sharpen their analytical precision for both stages of the Civil Services Examination.

→ Note from the Team:

To ensure **faster loading and easy offline access**, the visual content has been kept minimal in this edition. The Educasium Team has also undergone a **strategic restructuring** this month to expand and enhance our upcoming initiatives – and we thank you sincerely for your continued trust and patience during this transition.

At **Educasium IAS Academy**, the vision remains steadfast: to empower every serious UPSC aspirant with **reliable, structured, and meaningful guidance**. Under the direction and commitment of **Purushoth Sir**, we continue to deliver learning experiences that inspire excellence and resilience.

On behalf of the entire **EPIC UPSC Team**, we renew our pledge to maintain consistency, academic integrity, and innovation – ensuring that each edition of this magazine remains a **companion of substance** in your civil services journey.

Team EDUCASIUM
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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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SEPTEMBER 2025

INDIAN POLITY GOVERNANCE

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1. Bihar’s 85% Quota Proposal and Maharashtra’s Maratha Inclusion Revive the 50% Reservation



Recent moves by **Bihar** to propose **85% reservations** in state services and by **Maharashtra** to extend **Maratha benefits under Kunbi certificates** have reignited debate over the **50% ceiling on reservations** set by the Supreme Court. Concurrently, the Court has sought the **Centre’s view on applying the “creamy layer” principle** to **SCs and STs**, intensifying discourse on equality and representation.

Constitutional Provisions

- **Article 15(4) & 15(5):** Permit special provisions for socially and educationally backward classes in education.
- **Article 16(4) & 16(4A):** Enable reservations in public employment for backward classes and promotion for SCs/STs.
- **Central Quota Distribution:** OBC – 27%, SC – 15%, ST – 7.5%, EWS – 10% → **Total 59.5%.**
- **State Variations:** States like Tamil Nadu (69%) and Jharkhand exceed the limit through special laws or Ninth Schedule placement.

Judicial Stand on Reservation

Case	Year	Key Principle
Balaji v. Mysore	1962	Reservations must stay within “reasonable limits”; informal 50% cap introduced.
State of Kerala v. N.M. Thomas	1975	Moved toward substantive equality – reservations seen as an instrument of equality, not an exception.
Indra Sawhney (Mandal Case)	1992	Upheld OBC quota, reaffirmed 50% ceiling (exceptions possible); introduced creamy layer exclusion for OBCs.
Janhit Abhiyan v. Union of India	2022	Upheld 10% EWS quota; ruled that 50% ceiling applies only to socially and educationally backward classes, not EWS.



UPSC Relevance: **GS Paper 2:** Issues Related to Reservation, Equality of Opportunity, Judicial Review, Constitutional Provisions on Social Justice. **GS Paper 1 (Society):** Role of Caste in Contemporary Politics.
Keywords: *Creamy Layer, Indra Sawhney Judgment, Rohini Commission,*



HOT Question: “Critically examine whether the 50% cap on reservations remains relevant in contemporary India. Should it be reinterpreted in light of substantive equality and intra-group disparities?”



2. Sonam Wangchuk's Hunger Strike Revives Demand for Ladakh's Statehood and Sixth Schedule Safeguards



Activist **Sonam Wangchuk's hunger strike in Leh** has reignited demands for **statehood for Ladakh** and inclusion under the **Sixth Schedule** of the Constitution to protect the region's fragile ecology, tribal rights, and democratic autonomy.

Demands of the Protesters

1. **Full Statehood:** Restoration of a **democratic legislature and administrative autonomy** to ensure accountable governance.
2. **Sixth Schedule Inclusion:** Constitutional safeguards to protect **land, culture, employment, and resources** of Ladakh's predominantly tribal population.
3. **Local Representation:** Strengthening of **Hill Development Councils** and protection from demographic influx.

Background

- In **2019**, after the **revocation of Article 370**, Ladakh was separated from J&K and made a **Union Territory without a legislature**.
- Since then, groups like the **Leh Apex Body** and **Kargil Democratic Alliance** have repeatedly sought constitutional protection.

In **June 2025**, the President notified **four regulations** for Ladakh — including **85% reservation for Ladakhis** in jobs, domiciles, and protection for **local languages and hill councils**, but protests continue for constitutional rather than executive guarantees



UPSC Relevance: GS Paper 2: Federalism, Devolution of Powers, Role of Governors, and Tribal Autonomy.

GS Paper 3: Border Area Development, Tribal Livelihoods, and Sustainable Governance.



HOT Question: "Examine the relevance of extending Sixth Schedule provisions to Ladakh. How can constitutional autonomy address the region's governance and ecological challenges?"



3. MHA Renews Suspension of Operations (SoO) Pact and Restores Free Movement on NH-02 Ahead of PM's Manipur Visit



The **Ministry of Home Affairs (MHA)** has **renewed the Suspension of Operations (SoO)** agreement with **Kuki insurgent groups** and announced the **reopening of National Highway (NH)-02** for civilian and essential movement — a major confidence-building step before the Prime Minister's visit to **Manipur**, following a year of ethnic unrest and territorial restrictions.

About the Suspension of Operations (SoO) Agreement

- **Origin:** Signed in **2008**, it is a **tripartite ceasefire pact** between the **Government of India, Government of Manipur**, and **Kuki insurgent groups** under two umbrella bodies —
 - **Kuki National Organisation (KNO)** and
 - **United People's Front (UPF)** — representing **24 Kuki-Zomi groups**.
- **Purpose:** To curb insurgency and enable political dialogue for lasting peace.
- **Background:** The pact **lapsed in 2024** after the Manipur government withdrew following **ethnic clashes (May 2023)** between **Meitei** and **Kuki-Zo** communities.
- **Renewed Terms (2025):**
 - Assurance of **Manipur's territorial integrity** (no demand for separate administration).
 - **Relocation and consolidation** of militant camps.
 - **Deposition of arms** and **verification of cadres**.
 - **Direct stipend transfers** to verified members via DBT.
 - **Monitoring by a Joint Group** of security and government officials.

About NH-02 Free Movement

- **Route:** NH-02 connects **Imphal Valley** with **hill districts**, linking **Meitei-majority** and **Kuki-Zo** regions.
- **Significance:** Serves as a **lifeline for trade, transport, and medical supplies**.
- **Recent Development:** The "**free movement**" directive reopens the highway to restore **civilian connectivity**, symbolising a step toward **normalisation and reconciliation** after prolonged ethnic blockades and inter-district fragmentation.



UPSC Relevance: **GS Paper 3:** Internal Security, Linkages between Development and Extremism, Insurgency in North-East India.
GS Paper 2: Cooperative Federalism, Centre-State Coordination in Security
Keywords: SoO Agreement, KNO, UPF, NH-02, Ethnic Conflict in Manipur,



HOT Question: "Discuss the role of Suspension of Operations (SoO) agreements in peacebuilding in India's Northeast. Evaluate their effectiveness in balancing security imperatives and ethnic autonomy."



4. Supreme Court's Pendency Reaches Record 88,417 — A Wake-Up Call for Judicial Reform



The **Supreme Court of India's case backlog** has reached an unprecedented **88,417 cases in 2025**, marking a **7.8% rise** from 2024. The surge underscores **structural inefficiencies** in India's justice delivery system and renews calls for **urgent judicial reforms**, decentralisation, and adoption of digital innovations.

Trends in Case Pendency

- **Total Pendency:** 88,417 (2025) vs ~82,000 (2024).
- **Composition:** Civil cases – **78.7%**, Criminal cases – **21.3%**.

Annual Disposal: 52,630 new filings vs 46,309 disposals → **88% efficiency**, but filings outpace clearance.

Key Drivers of Backlog

1. **Low Judge–Population Ratio:**
 - India: **21 judges per million people** (vs Law Commission's 50/million norm).
 - Judicial vacancies exceed **5,600**, including **30% in High Courts**.
2. **Overuse of Article 136 (Special Leave Petitions):**
 - Transforms the Supreme Court from a **Constitutional Court** to an **error-correction appellate body**, crowding its docket.
3. **Government Litigation:**
 - Government is India's **largest litigant (~50%)**, appealing even settled matters, clogging dockets.
4. **Procedural Inefficiencies:**
 - **Adjournments**, lack of statutory timelines, and **paper-based workflows** prolong trials.
5. **Vacancy & Infrastructure Gaps:**
 - Delayed appointments, inadequate staff, and obsolete court technology impede throughput.

Reform Measures & Way Forward

1. **Cassation Benches:**
 - Implement **Law Commission's 229th Report** — set up **4 regional Cassation Benches** to handle routine appeals and decentralise justice delivery.
2. **Strengthen Judicial Capacity:**
 - Raise judge strength to **50 per million** and fill all pending vacancies promptly.
3. **All India Judicial Service (AIJS):**
 - Standardise recruitment, ensure transparency, and address subordinate-level shortages.
4. **Digital Courts:**
 - Expand **e-Courts Project** and tools like **SUPACE (AI-driven case management)** for smarter listings and analytics.



HOT Question: "Judicial delay is not just a procedural issue but a constitutional and economic crisis." Discuss in light of the rising pendency in the Supreme Court and suggest comprehensive reforms.



5. Supreme Court's Gender Imbalance — Only One Woman Among 34 Judges Highlights Systemic Barriers

With **Justice B.V. Nagarathna** as the **sole woman judge** in the **Supreme Court's 34-member Bench**, India's apex judiciary faces renewed scrutiny for **gender underrepresentation**. Since 1950, only **11 women judges (3.8% of 287 total appointments)** have served on the Supreme Court, underscoring deep structural inequities in judicial appointments.

Systemic Barriers

- 1. Opaque Appointment Process:**
 - The **Collegium system** prioritises caste, seniority, and regional representation, while **gender** remains an **unwritten, secondary criterion**.
- 2. Bar-to-Bench Disparity:**
 - Only **one woman (Justice Indu Malhotra)** has been directly elevated from the Bar, compared to **nine men**, reflecting **glass ceilings** in legal practice.
- 3. Late-Stage Appointments:**
 - Women are often appointed at **advanced career stages**, limiting tenure and leadership opportunities (e.g., Chief Justice prospects).
- 4. Missing Intersectionality:**
 - No woman judge** has been appointed from **Scheduled Castes, Scheduled Tribes, or other marginalised communities**, revealing deeper diversity deficits.

Implications

- Representation Gap:** Despite forming ~50% of India's population, women constitute **only 3.8%** of top judiciary positions.
- Judicial Outcomes:** Gender-diverse benches bring **broader empathy and lived experience**, vital in **cases on gender justice, sexual violence, and family law**.
- Public Legitimacy:** A judiciary lacking diversity **erodes trust** and questions the system's **egalitarian and inclusive ethos** under the Constitution.



UPSC Relevance: **GS Paper 2:** Structure and Functioning of the Judiciary, Representation in Institutions. **GS Paper 1:** Role of Women and Issues of Representation. **Keywords:** Gender Parity, Collegium System, Judicial Diversity, B.V. Nagarathna, Bar-to-Bench Pathways, Judicial Reform



HOT Question: "A representative judiciary is integral to substantive justice." Examine the causes of gender imbalance in India's higher judiciary and suggest measures for structural reform.



6. Supreme Court Issues Uniform DNA Evidence Guidelines to Standardise Forensic Protocols



In **Devakar v. State of Tamil Nadu (2025)**, the **Supreme Court of India** framed **uniform national guidelines** for **collection, storage, and use of DNA evidence** in criminal investigations. The ruling seeks to ensure **forensic credibility, chain-of-custody integrity**, and **constitutional safeguards** for privacy and fair trial rights.

Guidelines for DNA Handling

- **Collection Protocol:** Every DNA collection must include **FIR details** and be signed by the **doctor, investigating officer, and witness** to ensure authenticity.
- **Timely Transport:** Samples must reach **Forensic Science Laboratories (FSLs)** **within 48 hours**; any delay requires **written justification**.
- **Secure Storage:** Sealed samples can be **opened or resealed only with trial court approval** to prevent tampering.

Custody Register: Mandatory **chain-of-custody register** to record every evidence transfer and maintain traceability.

Legal & Institutional Framework

- **Article 20(3):** DNA collection does **not violate self-incrimination**, as it's physical evidence, not testimonial.
- **Article 21:** Ensures **privacy and dignity** in DNA collection processes.
- **BNSS, 2023 (Sections 53 & 53A):** Authorises DNA examination of accused persons during investigation.
- **Criminal Procedure (Identification) Act, 2022:** Permits collection of **DNA and biometric data** from convicts and detainees.
- **Bharatiya Sakshya Adhiniyam (BSA), 2023 – Section 39:** Recognises **DNA reports as expert opinion** admissible in court.
- **State Responsibility:** 'Police' and 'Public Order' under **State List** → States oversee collection and preservation procedures.



UPSC Relevance: **GS Paper 2:** Judicial and Legal Reforms, Right to Privacy (Article 21), Criminal Justice System. **GS Paper 3:** Science and Technology, Internal Security, Forensic Innovation.
Keywords: DNA Evidence, Devakar v. State of Tamil Nadu (2025), BNSS 2023, BSA 2023, Forensic Chain of Custody, Criminal Procedure (Identification) Act 2022, Right to Privacy (Puttaswamy Case).



HOT Question: "DNA evidence has transformed criminal justice in India, but its regulation has not kept pace." Discuss the significance of the Supreme Court's 2025 guidelines and the challenges in ensuring ethical forensic use.

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7. Supreme Court Upholds Bar on Anticipatory Bail in Caste Crime Cases under SC/ST (Prevention of Atrocities) Act



In **Kiran v. Rajkumar Jivaraj Jain (2025)**, the **Supreme Court** overturned a **Bombay High Court** order granting **anticipatory bail** to an accused in a caste atrocity case. The Court reaffirmed that **Section 18 of the SC/ST (Prevention of Atrocities) Act, 1989** bars anticipatory bail for prima facie offences, reinforcing the Act's intent to **protect Dalits and tribals from intimidation and coercion**.

Anticipatory Bail – Concept & Legal Basis

- **Definition:** A pre-arrest legal safeguard that allows a person to apply for bail in anticipation of arrest for a non-bailable offence.
- **Legal Provision:**
 - Earlier under **Section 438 of the CrPC, 1973**, now **Section 482 of the Bharatiya Nagarik Suraksha Sanhita (BNSS), 2023**.
- **Jurisdiction:** Can be granted by the **Sessions Court** or **High Court**.
- **Purpose:** Prevents **unnecessary detention**, protecting **personal liberty** under **Article 21**.

Why Anticipatory Bail is Barred under the SC/ST Act

- **Statutory Bar:** Section 18 of the SC/ST Act **expressly excludes** anticipatory bail under Section 438 CrPC (now Section 482 BNSS).
- **Rationale:**
 - Prevents **victim intimidation**, **witness tampering**, and **social pressure** on Dalits and tribals.
 - Upholds the **spirit of deterrence** and ensures **speedy and uncompromised investigation**.
- **Judicial Guideline:** Courts must **not hold a “mini-trial”** at the bail stage — only ascertain if a **prima facie case** exists.

About the SC/ST (Prevention of Atrocities) Act, 1989 : Objective: To **prevent atrocities** against Scheduled Castes and Scheduled Tribes by non-SC/ST persons.

- **Special Features:**
 - Establishes **Special Courts** in each district for **speedy trials**.
 - Provides for **relief, protection, and rehabilitation** of victims.
 - Offences are **cognisable and non-bailable**.
 - **Arrest without warrant** permissible.
 - **Anticipatory bail not applicable** under Section 18.



UPSC Relevance: Paper 2: Judiciary, Social Justice, Rights of SCs/STs, Criminal Justice Reforms. **GS Paper 1 (Society):** Caste Discrimination and Social Empowerment. **Keywords:** SC/ST Act 1989, Anticipatory Bail, Section 18 Bar, BNSS 2023, Victim Protection, Kiran v. Rajkumar Jivaraj Jain (2025).



HOT Question: “The bar on anticipatory bail under the SC/ST (Prevention of Atrocities) Act is essential to uphold social justice, yet demands procedural safeguards against misuse.” Discuss with reference to recent Supreme Court rulings



8. Supreme Court Suggests Reconsidering Criminal Defamation — Balancing Free Speech (Article 19) with Reputation as Dignity (Article 21)



In 2025, the **Supreme Court** observed that the **criminalisation of defamation** may warrant reconsideration, reviving the debate between **free speech as a democratic cornerstone (Article 19(1)(a))** and **reputation as a facet of dignity and life under Article 21**. The Court's remark reopens a constitutional discussion last settled in *Subramanian Swamy v. Union of India (2016)*.

What is Defamation?

- **Definition:** Any **false statement—spoken, written, or published—causing unjust harm** to a person's reputation.
- **Types:** **Libel:** Written or published defamation.
Slander: Spoken or oral defamation.
- **Dual Character:** Treated as both a **civil wrong** (damages/compensation) and a **criminal offence** (punishment).
- **Statutory Basis:** Defined under **Section 356, Bharatiya Nyaya Sanhita (BNS) 2023**, replacing **Sections 499–500 of IPC**.
- **Punishment:** Imprisonment up to **2 years**, fine, or both; may include **community service**.

Procedure: **Non-cognisable, bailable, and compoundable** offence—filed before a magistrate, not directly by police.

Why Defamation Should Be Criminalised

- **Protection of Dignity:** Reputation is intrinsic to **Article 21's protection of life and dignity**.
- **Deterrent Effect:** Criminal sanction **deters malicious campaigns**, especially protecting weaker individuals from defamation by powerful entities.
- **Public Order Safeguard:** False or inflammatory allegations can **disrupt communal harmony**, justifying limited restrictions under **Article 19(2)**.

Why Defamation Should Not Be Criminalised

- **Chilling Effect on Speech:** Criminalisation instils **fear of arrest and prosecution**, discouraging criticism, satire, or investigative journalism.
- **Weaponisation:** Misused through **SLAPP suits (Strategic Lawsuits Against Public Participation)** to silence dissent or political opposition.
- **Disproportionate Penalty:** Imprisonment for speech-related harm is excessive; prolonged trials themselves become **a form of punishment**.
- **Global Context:** Many democracies, including the UK (2009), **decriminalised defamation** recognising civil law as sufficient remedy.



HOT Question: "Criminal defamation laws in India reflect a colonial hangover that undermines free expression." Critically evaluate this statement in light of recent judicial observations.



9. Delhi High Court Case Revives Debate on Personality Rights and “John Doe” Injunctions



In 2025, **Aishwarya Rai Bachchan** approached the **Delhi High Court** seeking protection of her **personality rights** — including her name, image, and likeness — from unauthorised use by unknown individuals (“John Does”). The petition reflects growing judicial recognition of **celebrity identity protection** in the digital era.

About Personality Rights

- **Definition:** Personality rights are legal rights that enable individuals — particularly public figures — to control **commercial use of their identity**, including **name, image, voice, likeness, or signature traits**.
- **Legal Basis in India:**
 - No dedicated statute; derived from **Article 21 (Right to Privacy and Dignity)**.
 - Protected indirectly under **Copyright Act, 1957** (for creative works) and **Trademarks Act, 1999** (for brand or name misuse).
 - Judicial precedent treats personality as an **intangible asset** with both **privacy and property dimensions**.
- **Scope:** Extends to celebrities, athletes, influencers, and even posthumous use (e.g., using a deceased actor’s image for ads).
- **Personality vs. Consumer Rights:**
 - **Personality rights** safeguard *identity and reputation* from exploitation.
 - **Consumer rights** ensure *market fairness and protection* for buyers, not identity misuse.

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10. Supreme Court Partially Stays Waqf (Amendment) Act, 2025 — Balances Religious Autonomy with State Oversight



The **Supreme Court** issued an **interim order** on the **Waqf (Amendment) Act, 2025**, staying contentious provisions related to administrative control and eligibility criteria, while upholding key reforms in property governance. The case highlights the ongoing **constitutional debate between community autonomy under Article 26** and **state regulation for transparency in religious endowments**.

Background

- The **Waqf (Amendment) Act, 2025**, enacted in April, sought to reform **management, auditing, and ownership verification** of Waqf properties across India.
- Petitioners challenged the Act for **violating Article 26** (freedom of religious denominations to manage their own affairs in matters of religion).
- The law aims to address **encroachments, unregistered waqfs, and misuse** of endowment properties, while ensuring **public accountability**.

Provisions Stayed by the Supreme Court

1. Collector's Powers over Waqf Properties

- **Stayed:** Section 3C empowering district collectors to **unilaterally declare Waqf land as government property** and alter records.
- **Reason:** Termed *prima facie arbitrary* — violates due process and **community management rights**.
- **Direction:** Disputed properties to **retain Waqf status** until Tribunal adjudication; **no third-party rights** to be created.

2. Inclusion of Non-Muslims in Waqf Bodies

- **Issue:** The amendment expanded non-Muslim representation in Waqf Boards and the Central Waqf Council.
- **SC Cap:** Maximum **4 non-Muslims** in the 22-member Central Council and **3 non-Muslims** in 11-member State Boards — ensuring participation without diluting religious character.

3. Five-Year Islamic Practice Rule

- **Clause Stayed:** Requirement that only those **practising Islam for at least 5 years** may create a Waqf.
- **Reason:** Lack of verification mechanism; violates **freedom of religion under Article 25** and procedural fairness.



Provisions Upheld by the Supreme Court

1. Abolition of “Waqf by Use”

- Earlier principle allowed property **used for religious or charitable purposes** to be *deemed Waqf* without registration.
- **Upheld:** SC cited misuse leading to encroachments and land disputes; affirmed the need for **formal documentation**.

2. Application of Limitation Act

- Waqf properties earlier exempted from limitation periods for filing claims.
- **Upheld:** Brings **legal parity** with other property regimes, ensuring **certainty and finality** in land disputes.



UPSC Relevance: **GS Paper 2:** Constitutional Provisions (Articles 25–30), Separation of Religion & State, Role of Judiciary. **GS Paper 1:** Communal Harmony and Minorities. **Keywords:** *Waqf (Amendment) Act 2025, Article 26, Collector’s Powers, Waqf by Use, Limitation Act, Religious Autonomy vs State Regulation.*



HOT Question: “Judicial scrutiny of the Waqf (Amendment) Act, 2025 highlights the challenge of balancing state regulation with religious autonomy.” Discuss in light of Article 26 and recent Supreme Court rulings.

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11. ECI Tightens Scrutiny after Mass Fraudulent Voter Deletions in Karnataka's Aland Constituency



The **Election Commission of India (ECI)** ordered an inquiry into alleged **fraudulent voter deletions** in Karnataka's **Aland constituency (2023)**, where over **6,000 false Form 7 applications** were submitted to manipulate electoral rolls. The case underscores vulnerabilities in India's voter deletion system and the need for **robust procedural safeguards** to prevent disenfranchisement.

Legal Framework

- **Statutory Authority:** Section **22 of the Representation of the People Act (RPA), 1950** empowers **Electoral Registration Officers (EROs)** to delete names from rolls after inquiry – either *suo motu* or upon application.
- **Permissible Grounds for Deletion:**
 1. Death of the elector.
 2. Change of ordinary residence outside the constituency.
 3. Duplicate registration in another area.
 4. Other legal ineligibility (e.g., underage, disqualification).
- **Form 7:** Enables any elector to seek deletion of another's name within **30 days of draft roll publication**.

Procedure for Deletion

1. **Application & Verification:** Booth Level Officers (BLOs) verify facts on the ground—whether the voter is deceased, shifted, or duplicate.
2. **Formal Inquiry:** ERO conducts a quasi-judicial hearing before passing deletion orders.
3. **Record Maintenance:** Deletion orders and documents are archived for **three years** for audit and accountability.

Significance of the Aland Case

- Exposed **systemic manipulation risks** during mass roll revisions.
- Triggered **ECI directives** for cross-verification, random audits, and digital logs of deletion requests.

Reinforced the constitutional importance of the **Right to Vote (Article 326)** and **ECI's autonomy (Article 324)** in maintaining free and fair elections.



UPSC Relevance: **GS Paper 2:** Electoral Reforms, Role of Election Commission, Representation of the People Act, 1950.

Keywords: Voter Deletion, Form 7, Section 22 RPA 1950, ECI Safeguards, Aland Case (2023), Booth Level Officers, Electoral Integrity.



HOT Question: "The Aland voter deletion case highlights the tension between electoral transparency and voter disenfranchisement." Examine the need for stronger institutional safeguards in maintaining accurate electoral rolls



12. Supreme Court Allows Aadhaar as 12th Identity Document for Bihar's Electoral Roll Revision



On **8th September 2025**, the **Supreme Court** directed the **Election Commission of India (ECI)** to accept **Aadhaar cards** as a **standalone identity document** for inclusion in Bihar's revised voters' list during the **Special Intensive Revision (SIR)**. The Court, however, reiterated that **Aadhaar is not proof of citizenship**, addressing concerns over its potential misuse in the electoral process.

Background

- The case arose from petitions (including by the **Rashtriya Janata Dal**) alleging that ECI officials were rejecting Aadhaar for voter enrolment, insisting only on the **11 pre-specified identity proofs** listed under ECI notifications.
- The **Special Intensive Revision (SIR)** of electoral rolls in Bihar aimed to update and verify voter data ahead of the state elections.

Supreme Court's Directions

- Aadhaar as 12th Document:** Aadhaar card can now be used **independently** to establish identity for voter registration or inclusion in electoral rolls.
- Verification Power:** ECI officials may **verify authenticity and genuineness** of submitted Aadhaar data before acceptance.
- Undertaking by ECI:** The Court recorded the **ECI's assurance** that Aadhaar will be accepted as valid proof of identity during SIR.

Clarification on Citizenship: The Court explicitly stated that **Aadhaar does not establish citizenship**, and inclusion in voter rolls still requires satisfaction of **citizenship under Article 326 and RPA, 1950**.



UPSC Relevance: **GS Paper 2:** Electoral Reforms, Role of ECI, Right to Vote, Aadhaar and Privacy. **Keywords:** Aadhaar-Voter Linkage, Supreme Court 2025 Order, Article 326, ECI Powers, Representation of the People Act, 1950, Digital Electoral Roll.



HOT Question: "While Aadhaar enhances ease of identification, it cannot substitute the citizenship test in India's electoral framework." Discuss in light of the Supreme Court's 2025 order permitting Aadhaar for voter registration.

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13. ECI Reviews Nationwide Special Intensive Revision (SIR) — India's First Comprehensive Voter Roll Overhaul in 20 Years



The **Election Commission of India (ECI)** conducted a nationwide readiness assessment for the **Special Intensive Revision (SIR)** during the **Third Conference of Chief Electoral Officers (CEOs)** in New Delhi. The 2025 SIR marks India's **first large-scale revision in two decades**, aimed at achieving a **uniform, accurate, and inclusive voter roll** across all States and Union Territories.

About Special Intensive Revision (SIR)

- **Definition:** SIR is a targeted voter list revision ordered by the ECI in exceptional situations such as mass inaccuracies, large-scale omissions, or political exigencies.
- **Objective:** To correct flawed rolls, remove duplicates (especially due to migration), and ensure **inclusive enrolment**.
- **Legal Basis:** *Section 21(3)* of the **Representation of the People Act (RPA), 1950** empowers ECI to revise rolls "in such manner as it deems fit."
- **Methodology:** Conducted via **house-to-house physical verification** by **Booth Level Officers (BLOs)** to authenticate voter identity, residence, and documentation.
- **Historical Context:** India's earlier SIRs were conducted intermittently between **1952–2004**; the **2025 SIR** is the **first nationwide revision in 20 years**.

Rationale for Nationwide SIR

- **Uniform Roll Synchronisation:** Establishes a **centralised revision cycle** across States/UTs to ensure consistent data standards and eliminate procedural disparities.
- **Duplicate Prevention:** Helps track internal migration and eliminate **multiple enrolments** across constituencies.
- **Migrant Mapping:** Addresses India's **~400 million internal migrants**, ensuring each voter is correctly matched to their home constituency.
- **Booth Rationalisation:** Enables capping of polling stations to **1,200 voters per booth**, reducing travel distance and enhancing accessibility in tribal/remote areas.
- **Digital Transparency:** Integration with **ECINET** (Election Commission Network) links over **40 digital tools**, enabling **real-time voter data updates** and public transparency.



UPSC Relevance: **GS Paper 2:** Electoral Reforms, Representation of the People Act, Role of ECI, Voter Inclusion, Good Governance.

Keywords: *Special Intensive Revision (SIR), Section 21(3) RPA 1950, Electoral Roll Accuracy, Booth Level Officer, ECINET, Voter Duplication,*



HOT Question: "The Special Intensive Revision of 2025 reflects both the scale and complexity of maintaining India's democratic register." Analyse how the SIR initiative strengthens electoral integrity while addressing operational challenges.



14. Recent Electoral Reforms by the Election Commission of India (2025)

1. ECINET Portal – Unified Digital Ecosystem

Overview:

The **Election Commission of India (ECI)** launched an upgraded version of the **ECINET** portal – a unified digital platform integrating all election-related services for better transparency, efficiency, and security.

Key Features:

- **e-Sign Verification:**
 - Newly introduced **e-sign feature** allows users to verify their identity using **Aadhaar-linked mobile numbers**, streamlining official authentication.
- **Unified Access:**
 - Integrates **40 earlier mobile and web applications** (such as ENCORE, ERONet, ERO-Net, SVEEP, cVIGIL, etc.) into **one platform**, eliminating multiple logins.
- **Data Security:**
 - Only **authorised officials** can enter or edit data to prevent manipulation or unauthorised alterations in electoral rolls.
- **Efficiency:**
 - Enables **real-time synchronisation** of voter roll management, candidate data, polling logistics, and counting results within a single interface.

Significance:

- Strengthens **digital governance and transparency** in election management.
- Reduces administrative delays and ensures **tamper-proof, auditable workflows**.

Promotes **ease of access** for officials and

2. Ballot Paper Design Reform – Candidate Photographs on EVMs

New Mandate: Under **Rule 49B of the Conduct of Elections Rules, 1961**, the ECI has made **colour photographs of candidates** mandatory on **EVM ballot papers** starting with the **2025 Bihar elections**.

Specifications:

- **Photograph Dimension:** 2 cm × 2.5 cm, with the face occupying **three-fourths of the frame**.
- **Formatting:** Candidate names, party symbols, and serial numbers will appear in **bold Indian numerals**.
- **Layout Limit:** Maximum of **15 candidates (including NOTA)** per sheet to ensure clarity and legibility.

Purpose & Impact:

- **Enhanced Identification:** Prevents voter confusion among candidates with similar names.
- **Error Reduction:** Reduces incidence of **inadvertent or miscast votes**.

Transparency & Accessibility: Aids **illiterate and elderly voters** in recognising candidates visually.



3. Counting Procedure Reform – Pre-2019 Postal Ballot Rule Reinstated

Directive:

The ECI restored the **pre-2019 counting protocol**, mandating that **all postal ballots must be counted before finalising EVM results**.

Counting Procedure:

- **Penultimate Round Rule:** The **second-to-last round of EVM counting** begins only after **postal ballot counting is completed** at that centre.
- **Segmented Counting:**
 - In multi-centre constituencies, **EVM tally pauses** only where postal ballot counting continues; others proceed uninterrupted.
- **Operational Preparedness:**
 - **Returning Officers (ROs)** must deploy sufficient **staff and counting tables** to handle rising postal ballot volumes.

Rationale:

- **Legal Compliance:** Restores alignment with **Rule 54A of the Conduct of Elections Rules, 1961** requiring postal ballots to be counted first.
- **Transparency:** Prevents early EVM trends from influencing perception in **tight contests**.
- **Scalability:** Addresses increased postal ballot use by **senior citizens (85+), PwDs, and service voters**.

Significance of These Reforms

Reform	Focus Area	Objective	Expected Impact
ECINET Integration	Digital Governance	Unified data & process integration	Transparency and operational efficiency
Candidate Photo Mandate	Ballot Design	Prevent voter confusion	Improved voter confidence & reduced error
Postal Ballot Priority Rule	Counting Integrity	Ensure legal sequencing & fairness	Enhanced credibility of election outcomes



UPSC Relevance: **GS Paper 2:** Electoral Reforms, Role of Election Commission, Governance & Transparency **Keywords:** *ECINET, e-Sign, Rule 49B, Rule 54A, Postal Ballot, Electoral Roll, Digital Governance, Electoral Integrity*



HOT Question: “The Election Commission’s 2025 reforms—from ECINET integration to counting protocol changes—represent a digital and procedural leap in India’s electoral governance.” Discuss.



15. Senior Advocate R. Venkataramani Reappointed as Attorney General of India for a Two-Year Term



On **26th September 2025**, the **Law Ministry** announced the **reappointment of Senior Advocate R. Venkataramani** as the **Attorney General (AG) for India** for another **two-year term**, effective **1st October 2025**. The appointment was approved by the **President of India** under **Article 76 of the Constitution**.

About the Attorney General of India

- **Constitutional Basis:** Article **76** of the Constitution provides for the **Attorney General for India**, the **highest law officer of the country**.
- **Appointment:** Appointed by the **President** on the **recommendation of the Union Government**.
- **Eligibility:** Must be a person qualified to be appointed as a **Judge of the Supreme Court**, i.e.
 - Citizen of India, and
 - Has been a Judge of a High Court for 5 years / Advocate in High Court for 10 years / eminent jurist in the President's opinion.
- **Tenure:** No fixed tenure; serves during the **pleasure of the President**.

Removal: Can be removed by the President at any time.

Functions and Powers

- **Legal Advisor:** Advises the **Government of India** on legal matters and performs legal duties assigned by the President.
- **Court Representation:** Has the **right of audience in all courts** in India.
- **Parliamentary Role:** Can **participate** in proceedings of Parliament (without voting rights).
- **Litigation Role:** Represents the **Union Government** in Supreme Court and High Courts in constitutional and public interest cases.
- **Advisory Role:** Provides opinions on complex legal and constitutional questions referred by the government.



UPSC Relevance: **Paper 2:** Constitutional Bodies, Separation of Powers, Role of Attorney General, Governance and Legal Framework.
Keywords: Article 76, Attorney General, R. Venkataramani, Law Ministry, Constitutional Office, Legal Advisor, Government Counsel.



HOT Question: "The Attorney General acts as a bridge between the government and the judiciary, ensuring that governance remains within the framework of law." Discuss in light of the constitutional and functional position of the Attorney General of India.



16. 10th All-India Conference of the Central Administrative Tribunal (CAT)



The **10th All-India Conference of the Central Administrative Tribunal (CAT)** was held in **New Delhi**, bringing together judicial and administrative members, policy experts, and government representatives to discuss **structural reforms** for faster, fairer, and more transparent resolution of **service-related disputes** of public servants

About the Central Administrative Tribunal (CAT)

- **Constitutional Basis:** Established under **Article 323A** (inserted by the **42nd Amendment, 1976**) and the **Administrative Tribunals Act, 1985**.
- **Nature:** A **quasi-judicial body** for adjudicating disputes and complaints relating to **recruitment and service conditions** of public servants under the **Union** and certain **PSUs**.
- **Objective:** To **reduce High Court burden** in service-related cases and ensure **speedy, specialised adjudication**.

Composition

- **Headquarters:** Principal Bench — New Delhi.
- **Benches:** 18 outlying benches across India.
- **Membership (2025):** 69 Members — 35 Judicial (including Chairperson) and 34 Administrative.
- **Eligibility:**
 - *Judicial Member* — Must be a High Court Judge (or qualified to be one).
 - *Administrative Member* — Must have held a senior post (Additional Secretary level or above).

Jurisdiction & Functioning

- Covers disputes of **Central Govt. employees, All-India Services, and notified PSUs**.
- Operates on principles of **natural justice** and aims for **expedited disposal** — records a **92.9 % disposal rate**.
- Not bound by strict Civil Procedure Code but guided by **equity, justice, and good conscience**.
- Proceedings before CAT are deemed **judicial proceedings** under IPC Sections 193 & 228.

Appeal Mechanism

- **High Court Review:** CAT orders are subject to writ jurisdiction under **Articles 226 & 227** (as per *L. Chandra Kumar v. Union of India, 1997*).
- **Supreme Court Appeal:** Further appeal by **Special Leave Petition (Article 136)**.



HOT Question: "Tribunalisation was intended to ensure efficiency and specialisation in justice delivery but has raised questions about independence and oversight." Analyse in light of the functioning of the Central Administrative Tribunal.

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17. C.P. Radhakrishnan Elected as the 15th Vice President of India



On **9th September 2025**, **C.P. Radhakrishnan**, the **National Democratic Alliance (NDA)** nominee, was elected as the **Vice President of India**, defeating **INDIA bloc candidate Justice B. Sudershan Reddy** in a closely contested election. The Vice President's office had fallen vacant after **Jagdeep Dhankhar's resignation** due to health reasons in **July 2025**

Election Highlights

- **Result:** C.P. Radhakrishnan secured **452 first-preference votes**, while Justice B. Sudershan Reddy received **300 votes**.
- **Invalid Votes:** 15 ballots were declared invalid.
- **Voter Turnout:** 98.20% – 767 MPs voted out of 781 eligible members.
- **Abstentions:** 13 MPs abstained – 7 from **BJD**, 4 from **BRS**, 1 from **SAD**, and 1 Independent.
- **Returning Officer:** Rajya Sabha Secretary-General **P.C. Mody**.

Constitutional Basis

- **Article 63:** There shall be a **Vice President of India**.
- **Article 64:** The Vice President is **ex officio Chairperson of the Rajya Sabha**.
- **Election Process:**
 - Conducted by the **Election Commission of India**.
 - **Electoral College:** Members of both **Houses of Parliament (Lok Sabha + Rajya Sabha)** vote through **proportional representation by means of a single transferable vote** and **secret ballot**.
- **Eligibility (Article 66):**
 - Citizen of India.
 - At least **35 years of age**.
 - Qualified for election as a **Rajya Sabha member**.
 - Must not hold any office of profit under the Government.
- **Term:** 5 years; can resign to the **President** or be removed by a **Rajya Sabha resolution** approved by **Lok Sabha**.



UPSC Relevance: **GS Paper 2:** Indian Constitution — Parliament, Executive, Constitutional Offices, Federal Institutions.

Keywords: Vice President of India, Article 63–70, Election by Proportional Representation, Rajya Sabha Chairperson, Constitutional Office.



HOT Question: “The Vice President of India occupies a unique constitutional position — balancing legislative leadership and executive contingency.” Discuss with reference to Articles 63–70 of the Constitution.



18. ADR Report Reveals 31% of MPs and 29% of MLAs Face Serious Criminal Charges



According to the **Association for Democratic Reforms (ADR)**, **31% of current Members of Parliament (MPs)** and **29% of Members of Legislative Assemblies (MLAs)** face **serious criminal charges** such as murder, attempt to murder, and crimes against women. This marks a sharp rise from **14% in 2009 to 31% in 2024**, highlighting the deepening **criminalisation of Indian politics**.

Key Drivers of Criminalisation

- **Electoral Winnability:** Political parties prioritise candidates with money and influence, ignoring criminal records.
- **Money & Muscle Power:** Candidates with criminal backgrounds control illicit funds and local gangs to mobilise votes.
- **Opaque Political Funding:** Loopholes in **cash donations** and misuse of **electoral bonds** fuel corruption.
- **Vote-Bank Politics:** Caste- and identity-based mobilisation turns criminals into **"Robin Hood figures."**
- **Weak Media Scrutiny:** Political control over media limits exposure of tainted candidates.
- **State-Crime Nexus:** Criminals enter politics for immunity, while parties leverage them for electoral advantage.
- **Structural Loopholes:** The **First-Past-The-Post (FPTP)** system allows victories with minority vote shares.

Judicial Interventions

- **ADR vs Union of India (2002):** Mandatory disclosure of candidates' criminal, financial, and educational details.
- **PUCL vs Union of India (2004):** Voters' right to know upheld under Article 19(1)(a).
- **Lily Thomas (2013):** Immediate disqualification of convicted legislators.

Public Interest Foundation (2018): Directed parties to publicise criminal cases of candidates



UPSC Relevance: **GS Paper 2:** Electoral Reforms, Role of ECI, Criminalisation of Politics, Ethics in Governance. **Keywords:** *ADR Report 2025, Representation of the People Act, Electoral Bonds, Bahubali Culture, PUCL Case, Lily Thomas, Public Interest Foundation.*



HOT Question: "Criminalisation of politics is the most dangerous form of corruption as it strikes at the root of democracy." Examine the causes and critically evaluate the reforms needed to curb it



19. Rajasthan's Anti-Conversion Bill



Rajasthan Assembly passed the **Rajasthan Prohibition of Unlawful Conversion of Religion Bill, 2025**, introducing **stringent penalties** and procedural oversight to curb **coercive, fraudulent, or marriage-based religious conversions**. The bill marks one of the toughest anti-conversion legislations in India.

Key Provisions

- **Expanded Definition:** The term *conversion* now includes **marriages undertaken solely for the purpose of religious conversion**, nullifying such unions.
- **Marriage Annulment:** Family courts can **annul marriages** proven to be motivated by religious conversion.
- **Prior Intimation:** Converts must **inform the District Magistrate (DM)** before conversion to allow official scrutiny.
- **Non-Bailable Offences:** All offences under the Act are **non-bailable**, restricting judicial discretion in bail matters.
- **Penalty:**
 - **General Offence:** Imprisonment up to **7 years** and fines up to **₹5 lakh**.
 - **Aggravated Cases (minors, SC/ST, women):** Up to **life imprisonment** and fines up to **₹25 lakh**.
- **Property Confiscation:** Authorities may **seize assets** linked to funding or facilitating unlawful conversions.
- **Burden of Proof:** Lies on the accused to prove that the conversion was voluntary.

Objective & Rationale

- To **prevent coercive and fraudulent conversions** through force, allurement, or marriage.
- To ensure **transparency and oversight** in the exercise of **freedom of religion** under Article 25.
- To address concerns over **"love jihad"** and maintain **public order** in a multi-religious state.

Concerns & Criticisms

- **Freedom of Choice:** Critics argue the law **infringes Article 25**, which guarantees freedom to profess, practice, and propagate religion.
- **Administrative Overreach:** Mandatory notice to DM may expose converts to **social harassment** or **surveillance**.
- **Misuse Potential:** Vague definitions of coercion or inducement may criminalise **interfaith marriages** undertaken voluntarily.



UPSC Relevance: **GS Paper 2:** Fundamental Rights, Federalism, Role of State Legislatures, Judicial Review.

Keywords: Article 25, Religious Freedom, Anti-Conversion Law, Marriage and Conversion, Public Order, Rajasthan Bill 2025



HOT Question: "Anti-conversion laws aim to protect freedom of religion but risk undermining it." Critically examine in light of recent state legislations, including the Rajasthan Prohibition of Unlawful Conversion of Religion Bill, 2025

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20. Supreme Court Excludes Political Parties from the Scope of the POSH Act



On **15th September 2025**, the **Supreme Court of India** dismissed a petition seeking to bring **women political workers** under the **Sexual Harassment of Women at Workplace (Prevention, Prohibition and Redressal) Act, 2013 (POSH Act)**, ruling that **political parties cannot be treated as “workplaces.”**

Case Background

- **Petitioners:** Filed by advocate *M.G. Yogamaya*, argued by *Senior Advocate Shobha Gupta* and *Advocate Sriram Parakkat*.
- **Demand:** To include political parties within the **definition of ‘employer’** and mandate **Internal Complaints Committees (ICCs)** within political organisations.
- **Grounds:** The exclusion of women in political work from POSH protections lacked **rational basis**, violating **Article 14 (Equality)** and **Article 21 (Dignity and Safety)**.
- **Relief Sought:** Judicial declaration that political parties must adhere to workplace protection procedures under the POSH Act.

Supreme Court’s Observation

- **Core Issue:** Whether political parties can be classified as *employers* or *workplaces* under the Act.
- **Ruling:** The Bench held that political parties are **voluntary associations**, not statutory or commercial employers; hence, they **fall outside the POSH framework**.
- **Rationale:** Expanding the Act’s scope would require **legislative amendment**, not judicial interpretation.
- The Court cautioned that such inclusion could open a **“Pandora’s box”** of unforeseen legal consequences for non-traditional entities.

Workplace under the POSH Act

- Defined to include:
 - Government and private organisations, corporations, NGOs.
 - Educational institutions, hospitals, and households employing domestic workers.
 - Locations visited in the course of employment (including transport).
 - Virtual or remote work environments in both formal and informal sectors.

However, political parties and legislative bodies are not explicitly mentioned.



About the POSH Act (2013)

- **Origin:** Enacted to give statutory force to the **Vishakha Guidelines (1997)** issued by the Supreme Court in *Vishakha v. State of Rajasthan*.
- **Objective:** Ensure a **safe, dignified, and harassment-free work environment** for women.
- **Key Features:**
 - **Internal Complaints Committee (ICC):** Mandatory for establishments with ≥ 10 employees.
 - **Local Complaints Committee (LCC):** For unorganised sectors or establishments with < 10 employees.
 - **Complaint Timeline:** Within **3 months** of the incident (extendable by ICC).
 - **Penalties:** Non-compliance may lead to fines up to ₹50,000 and cancellation of licenses.



UPSC Relevance: **GS Paper 2:** Social Justice, Role of Judiciary, Women Empowerment, Rights and Legislation.

Keywords: POSH Act 2013, Vishakha Guidelines, Workplace Definition, Political Parties, Gender Justice, Article 14, Article 21.



HOT Question: "The Supreme Court's exclusion of political parties from the POSH Act highlights a major legislative gap in protecting women in political spaces. Critically analyse this judgment and suggest institutional remedies."



21. Government Expands Opium Poppy Licensing for 2025–26 to Over 1.21 Lakh Farmers



On **12th September 2025**, the **Union Government** released the **Annual Licensing Policy** for **opium poppy cultivation** in **Madhya Pradesh, Rajasthan, and Uttar Pradesh** for the crop year **2025–26 (October 1, 2025 – September 30, 2026)**, marking a major expansion of legal cultivation to ensure adequate supply for **medical, scientific, and pharmaceutical use**

Key Highlights

- **Farmer Inclusion:**
 - **1.21 lakh farmers** to receive cultivation licenses — a **23.5% rise** from last year.
 - **15,000 new farmers** included under revised eligibility norms.
- **Medical & Industrial Purpose:**
 - Ensures sufficient **alkaloid supply** for **pain management, palliative care, and pharmaceutical production**.
 - Supports India's growing **indigenous capacity** for producing **essential narcotic drugs** such as morphine and codeine.
- **Eligibility Criteria:**
 - **Gum Cultivators:** Must achieve a **Morphine Yield (MQY-M)** of **≥4.2 kg/hectare**.
 - **Concentrate of Poppy Straw (CPS) Cultivators:**
 - Farmers with **3.0–4.2 kg/hectare** yield qualify for CPS cultivation.
 - CPS licenses granted for **5 years**, subject to compliance.
- **Digitisation & Inclusivity:**
 - **Historical digital records (since 1995–96)** integrated into the licensing portal.
 - **Marginal farmers** previously excluded due to incomplete data regain eligibility.
- **Performance Incentives:**
 - **High-performing CPS farmers** achieving **≥900 kg/hectare** unlanded poppy straw can shift to **traditional gum cultivation**.
 - Promotes **higher morphine yield** and reduces **diversion risks** to illicit channels.

Regulatory & Administrative Context

- Governed under the **Narcotic Drugs and Psychotropic Substances (NDPS) Act, 1985** and the **NDPS Rules, 1985**.
- **Central Bureau of Narcotics (CBN)** under the **Department of Revenue, Ministry of Finance** regulates all licensing, procurement, and diversion control.

India remains the **only country** permitted by the **UN Commission on Narcotic Drugs (CND)** to produce **opium gum and CPS** through **both methods** for **medicinal use**.



HOT Question: “Examine the significance of India’s opium poppy licensing policy in balancing public health needs, farmer livelihoods, and narcotic diversion control.”



22. NCB Annual Report 2024 Highlights Record Drug Seizures and Rising Drone, Maritime, and Synthetic Trafficking Threats



The **Ministry of Home Affairs** released the **Narcotics Control Bureau (NCB) Annual Report 2024**, revealing unprecedented drug seizures and emerging trafficking trends. Simultaneously, **U.S. President Donald Trump** designated **23 nations — including India, China, Afghanistan, and Pakistan** — as *major drug transit or illicit drug-producing countries*, spotlighting global narcotics concerns.

Current Illicit Drug Landscape in India (2024 Highlights)

- **Record Volume:**
 - **13,306 quintals seized**, the highest to date.
 - **Cannabis (41%)** and **Opiates (39%)** together constituted ~80% of total seizures.
- **Drone Proliferation:**
 - Drone-smuggling incidents rose from **3 (2021)** to **179 (2024)** — mostly along the **Punjab border**, signalling *aerial trafficking evolution*.
- **Coastal Vulnerability:**
 - Maritime drug seizures up **500-fold since 2019**, reaching **10,564 kg in 2024**, underscoring weak surveillance of **western seaports and harbours**.
- **Synthetic Shift:**
 - Synthetic drug seizures jumped **6 times**, totalling **11,994 kg**, indicating the rise of *domestic methamphetamine & MDMA production* in hidden labs.
- **Enforcement Surge:**
 - **1.22 lakh arrests** made, but **low conviction rate** exposes *judicial backlog and investigative complexity*.

India's Geographic Context

- **Golden Crescent:** Southwest Asia's opium hub — **Afghanistan, Iran, Pakistan** — supplies **heroin** into India's northwest corridor.

Death (Golden) Triangle: Southeast Asia's **synthetic drug hub** — **Myanmar, Thailand, Laos** — channels **methamphetamine** into India's northeast



UPSC Relevance: **GS Paper 3:** Internal Security, Organized Crime, Border Management. **GS Paper 2:** India-US Relations, Governance, Role of MHA, and International Treaties. **Keywords:** *NCB Annual Report 2024, Narcotics Trafficking, Golden Crescent, Golden Triangle, Synthetic Drugs,*



HOT Question: "India's strategic location between two major narcotic hubs has complicated its internal security landscape. Analyse the emerging patterns of drug trafficking and the policy measures needed to address them"



23. MoEFCC Notifies Van (Sanrakshan Evam Samvardhan) Amendment Rules, 2025



The **Ministry of Environment, Forest and Climate Change (MoEFCC)** has notified the **Van (Sanrakshan Evam Samvardhan) Amendment Rules, 2025**, revising the **Forest Conservation Rules, 2023**, to expedite environmental clearances, support critical mineral mining, and improve monitoring mechanisms.

Background

- The **Forest Conservation Act, 1980**, renamed under the **Van (Sanrakshan Evam Samvardhan) Adhiniyam, 2023**, regulates diversion of forest land for non-forest purposes.
- The **2025 Amendment Rules** aim to balance environmental safeguards with the nation’s developmental and strategic needs, particularly in **linear infrastructure, defence, and mineral exploration**.

Key Highlights of the Amendment

Aspect	Amendment (2025)	Significance / Implication
Linear Projects	Centre empowered to define preparatory works after Stage-I approval; Stage-I approval validity extended from 2 years to 5 years; clear distinction between in-principle and final approvals.	Facilitates timely completion of linear infrastructure (roads, pipelines, railways) that often face procedural delays.
Defence & Strategic Projects	Offline submission of applications permitted for defence, national security, and strategic projects (earlier only online).	Eases procedural bottlenecks for sensitive projects in border or remote areas with limited digital access.
Critical Minerals Mining	Mining leases for critical minerals require compensatory afforestation; minimum land use duration reduced from 20 years to 10 years.	Promotes exploration aligned with India’s Critical Minerals Policy, ensuring faster access while retaining ecological safeguards.
Compensatory Afforestation (CA) Land	CA land need not be mandatorily notified as “protected forest” under the Indian Forest Act, 1927 – now optional.	Grants states flexibility in identifying and managing afforestation lands, reducing bureaucratic delays.
Enforcement & Compliance	Forest officers empowered to initiate legal proceedings, with stricter monitoring and compliance reporting mandated.	Strengthens accountability and ground-level enforcement of conservation norms.



HOT Question: “The Van (Sanrakshan Evam Samvardhan) Amendment Rules, 2025, seek to balance ecological conservation with India’s strategic and economic imperatives. Critically examine this statement



24. MHA Cancels FCRA Licence of Sonam Wangchuk's NGO SECMOL amid Ladakh Protests

Amid continuing protests in **Ladakh** demanding **statehood and Sixth Schedule status**, the **Ministry of Home Affairs (MHA)** cancelled the **FCRA registration** of **Sonam Wangchuk's NGO – Students' Educational and Cultural Movement of Ladakh (SECMOL)**, citing **violations under the Foreign Contribution (Regulation) Act, 2010**. This decision comes during heightened tensions between the Centre and local civil society over **environmental and governance issues in the Union Territory**.

About the Foreign Contribution (Regulation) Act (FCRA)

- **Emergency Origin:**
 - Initially enacted in **1976 during the Emergency**, to prevent **foreign interference in domestic politics** and regulate **foreign funding** of Indian entities.
- **Legal Consolidation:**
 - The **FCRA, 2010** replaced the 1976 Act, modernising compliance and explicitly prohibiting use of foreign funds for **activities detrimental to national interest**.
- **Registration Mandate:**
 - NGOs, associations, and individuals must **register with the MHA** or obtain **prior permission** to receive foreign funds.
 - Registration is **valid for 5 years**, subject to renewal.

Key Features & Controls

- **20% Cap on Administrative Expenses:**
 - Post the **2020 Amendment**, NGOs can spend only up to **20%** of foreign funds on overheads such as salaries, rent, or administration.
- **Single SBI Account Rule:**
 - All foreign donations must be received in a **designated FCRA account at SBI, New Delhi Main Branch** to ensure centralised monitoring.
- **Aadhaar Requirement:**
 - Office bearers and directors must provide **Aadhaar numbers** for identification and compliance.
- **IB Background Checks:**
 - The **Intelligence Bureau (IB)** conducts security verifications before registration or renewal.
- **Suspension Power:**
 - The MHA can **suspend or cancel FCRA licences for up to 180 days** during investigation or non-compliance.



HOT Question: "Examine the role of the Foreign Contribution (Regulation) Act, 2010 in balancing transparency and freedom of association for civil society organisations in India."

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25. India Notifies First-Ever National Policy on Geothermal Energy (2025) to Boost Clean Energy Diversification



On **15th September 2025**, the **Government of India** notified the **National Policy on Geothermal Energy, 2025**, with the objective of harnessing India’s geothermal potential to support the **Net Zero 2070** target. The policy was launched by the **Ministry of New and Renewable Energy (MNRE)** to integrate geothermal energy into India’s renewable energy portfolio.

Objective

- To position **geothermal energy** as a **clean, dependable, and sustainable pillar** of India’s energy transition.
- To develop an enabling ecosystem for **exploration, technology development, and commercial utilisation** of geothermal resources.

Key Features of the National Policy on Geothermal Energy (2025)

Category	Policy Provision	Significance / Outcome
Diverse Applications	Utilisation not just for electricity generation, but also district heating, aquaculture, greenhouse farming, cold storage, space cooling, desalination, and Ground Source Heat Pumps (GSHPs).	Expands energy use beyond power plants; supports agriculture, housing, and tourism.
Framework & Strategy	Focus on R&D, inter-ministerial coordination, and global best practices for geothermal exploration and management.	Strengthens institutional and technical capacity.
Innovation Push	Promotes hybrid geothermal–solar plants, Enhanced Geothermal Systems (EGS), Advanced Geothermal Systems (AGS), and retrofitting abandoned oil wells for geothermal use.	Encourages low-carbon innovation and circular utilisation of old assets.
Alignment with Net Zero Goals	Geothermal to contribute to India’s Net Zero 2070 target by diversifying renewable energy mix.	Integrates clean baseload energy into India’s long-term decarbonisation pathway.
Collaborative Growth Model	MNRE to work with state governments, oil & gas PSUs, research institutions, and global geothermal bodies.	Fosters knowledge exchange and private–public partnerships.
Pilot Phase (2025–26)	Five pilot projects approved for resource assessment and demonstration to evaluate geothermal feasibility before large-scale rollout.	Provides scientific baseline for commercial expansion.



India's Geothermal Potential

- Estimated potential: **~10 GW** (MNRE estimates).
- Major sites:
 - **Puga Valley (Ladakh)**
 - **Tattapani (Chhattisgarh)**
 - **Manikaran (Himachal Pradesh)**
 - **Cambay Graben (Gujarat)**
 - **Bakreswar (West Bengal)**
 - **Godavari Basin (Andhra Pradesh)**



UPSC Relevance: GS Paper 3: Environment, Energy, Science & Tech, Sustainable Development.

Keywords: Geothermal Energy Policy 2025, MNRE, Net Zero 2070, Enhanced Geothermal Systems (EGS), Ground Source Heat Pumps



HOT Question: "Geothermal energy offers India a unique opportunity to expand its renewable base beyond solar and wind. Discuss the potential and policy challenges in making it a commercially viable energy source."

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5. India Offers Digital, Health & Climate Ties to Central America
6. India-France to Jointly Develop Jet Engine for AMCA
7. 15th India-Japan Summit Deepens Strategic Partnership
8. Mali, Burkina Faso & Niger Quit International Criminal Court
9. India-EFTA Trade Pact (TEPA) Comes into Effect
10. India-Israel Ink Bilateral Investment Agreement
11. Iran-IAEA Agree on New Nuclear Inspection Framework
12. India-Australia Sign MoU on Food Safety Cooperation
13. India-ADB Ink \$125M Loan for Assam Urban Resilience
14. SCO Tianjin Summit Adopts Declaration on Terrorism & Sovereignty
15. India Hosts FIPICT Meet to Boost India-Pacific Ties
16. Pacific Nations Adopt "Ocean of Peace" Vision
17. India Leads 3rd Global Food Regulators Summit 2025
18. India to Co-Host WHO Global Summit on Traditional Medicine
19. India to Host 89th IEC General Meeting in Delhi
20. 80th UNGA Marks 30 Years of Beijing Declaration
21. India Reviews Pakistan-Saudi Defence Pact
22. Massive Landslide Hits Sudan's Darfur Region
23. US Revokes Iran Chabahar Sanctions Waiver
24. Red Sea Cable Disruption Hits India-Europe Link
25. Oil India Discovers Hydrocarbons in Andaman Basin
26. Israel Launches First Airstrike on Doha
27. Australia, Canada & UK Recognise Palestine
28. India Supports Two-State Solution at UNGA
29. OPEC+ to Raise Oil Output from October 2025
30. India Signs 15-Year Deal to Explore Deep-Sea Minerals
31. UAE Launches World's First Sovereign Mobility Cloud
32. China Introduces 'K Visa' for Global STEM Talent
33. Modi-Xi Dialogue Revives Panchsheel Principles
34. UN High Seas Treaty Set for 2026 Enforcement

1. Sushila Karki Becomes Nepal's First Woman Prime Minister



On **12th September 2025**, **Sushila Karki**, Nepal's former **Chief Justice**, took oath as the **interim Prime Minister**, becoming the **first woman to hold the country's top executive post**. Her appointment followed the resignation of **KP Sharma Oli** amid a youth-driven anti-corruption movement led by **Generation Z** activists.

About Sushila Karki

- **Background:** Served as **Chief Justice of the Supreme Court of Nepal (2016–2017)** — the first woman to do so.
- **Judicial Legacy:** Known for her **independent judgments**, strong stance against corruption, and defence of constitutionalism.
- **Significance of Appointment:** Marks a historic step for **gender representation** and **judicial neutrality in executive governance**.

Context and Political Developments

- **Crisis Trigger:** Former PM **KP Sharma Oli** resigned amid public outrage over corruption, governance paralysis, and poor youth engagement.
- **Youth-Led Transition:**
 - The movement, largely coordinated through **Discord and social media**, demanded transparent, digital-era leadership.
 - Karki's selection followed a **public voting process** — a first in Nepal's political history.
- **Symbolism:** Reflects the rise of **digital democracy**, youth political participation, and regional experimentation with **tech-enabled governance**.

Nepal's Constitutional Framework

- **System:** Federal parliamentary republic under the **Constitution of Nepal (2015)**.
- **Executive Power:** Vested in the **Council of Ministers** led by the Prime Minister, appointed by the **President under Article 76**.
- **Interim Mechanism:** Used during **caretaker phases** when no clear majority exists, ensuring neutrality in governance until elections.



UPSC Relevance: **GS 2:** India and its neighbourhood; political developments in South Asia; women in leadership; democratic institutions.



HOT Question: “Examine how digital civic movements and youth participation are reshaping political accountability and leadership transitions in South Asian democracies, with reference to recent events in Nepal.”

2. India Announces First Two Cross-Border Rail Links with Bhutan to Deepen Economic and Strategic Connectivity



India approved two new **India–Bhutan rail corridors** — **Kokrajhar–Gelephu (Assam–Bhutan)** and **Banarhat–Samtse (West Bengal–Bhutan)** — spanning **89 km** at a cost of **₹4,033 crore**. These are the first-ever railway links between India and Bhutan, marking a new phase in bilateral connectivity and regional integration

About the Projects

- **Kokrajhar–Gelephu Line:**
 - Length: ~57 km.
 - Connects Assam's Bodoland Territorial Region with Bhutan's Gelephu.
 - Gelephu is being developed as a *Mindfulness City* and Special Administrative Region (SAR) focused on sustainable tourism and investment.
- **Banarhat–Samtse Line:**
 - Length: ~32 km, connecting West Bengal's Dooars region to Bhutan's southern Samtse Dzongkhag.
- **Implementation:** Executed by **Northeast Frontier Railway (NFR)**; designated as a **Special Railway Project** under the *Railways Act, 1989* for fast-track clearances.
- **Objective:** Facilitate trade, tourism, and regional development under India's *Neighbourhood First* and *Act East* policies.

Strategic and Economic Significance

- **Trade Boost:** Provides Bhutan direct access to India's ports and industrial zones, lowering logistics costs and transit times.
- **Regional Integration:** Links Bhutan with India's multimodal corridors (Bharatmala, Sagarmala, and PM Gati Shakti).
- **Security Dimension:** Enhances border infrastructure near the India–China–Bhutan tri-junction, complementing India's border area development efforts.

Cultural Linkage: Strengthens people-to-people ties between Assam's Bodo region and southern Bhutan through traditional trade routes.



UPSC Relevance: **GS Paper 2:** India–Bhutan relations; neighbourhood diplomacy; connectivity corridors; India's development cooperation.
GS Paper 3: Infrastructure development and regional logistics



HOT Question: “Examine how the proposed India–Bhutan rail links can transform bilateral economic relations while addressing strategic and regional connectivity challenges in the eastern Himalayas

3. India and Mauritius Sign Satellite Tracking Pact, Strengthening Strategic Partnership in Indian Ocean



During Mauritian Prime Minister **Navinchandra Ramgoolam's** state visit to **India (Sept 2025)**, both nations signed a **landmark agreement** to establish a **satellite telemetry, tracking, and telecommunications station** in Mauritius near **Diego Garcia**, boosting India's maritime surveillance and space cooperation footprint in the Indian Ocean

India–Mauritius Relations: Overview

- **Strategic Alignment:** Mauritius is a key pillar of India's **SAGAR (Security and Growth for All in the Region)** and **Indo-Pacific** vision.
- **UN & IORA Partnership:** Mauritius supports India in the **UN, Indian Ocean Rim Association (IORA)**, and **decolonisation debates** such as the **Chagos Archipelago sovereignty issue**.

New Space Cooperation Agreement

Facility: The new **satellite tracking and telemetry station** will enhance India's capacity to monitor its **satellites, launch vehicles, and maritime domain** in the Indian Ocean.

Significance:

- Strengthens India's **strategic presence** near **Diego Garcia**, where the US maintains a base.
- Improves **real-time data collection, navigation, and surveillance** to counter rising **Chinese naval activity**.
- Reinforces India's status as a **regional security provider** and **space power**.
- **Political Symbolism:** India reaffirmed its **support for Mauritius' sovereignty** over the **Chagos Islands**, aligning with international law and decolonisation norms.

Economic & Developmental Cooperation

- **Trade & FDI:** Mauritius remains India's **2nd-largest FDI source (FY 2023–24)** and a **gateway to Francophone Africa** through the **Comprehensive Economic Cooperation & Partnership Agreement (CECPA 2021)**.
- **Projects Funded by India:**
 - **Metro Express Project, New Parliament Building, and ₹487-crore Water Pipeline Replacement.**
 - Investments in **renewable energy, digital connectivity, and port infrastructure.**



HOT Question: “Discuss the strategic and diplomatic significance of India's satellite tracking agreement with Mauritius in the context of Indo-Pacific geopolitics and the SAGAR vision.”

4. India–Mauritius Sign Satellite Tracking Station Pact near Diego Garcia, Expanding India’s Strategic Reach in the Indian Ocean



On **12th September 2025**, **India and Mauritius** signed a **landmark agreement** to establish a **satellite telemetry, tracking, and telecommunications (TT&C) station** in **Mauritius**, near **Diego Garcia**, marking a major step in India’s **space cooperation and maritime surveillance network** in the **Indian Ocean Region (IOR)**.

Aspect	Details
Parties Involved	Government of India & Government of Mauritius
Signed During	Visit of Mauritian Prime Minister Navinchandra Ramgoolam to India
Facility Type	Telemetry, Tracking & Telecommunication (TT&C) station for Indian satellites and launch vehicles
Purpose	To support satellite monitoring, data collection, telemetry reception, and communication with launch vehicles beyond mainland visibility range
Additional Scope	Includes collaboration in space science, applications, research, and education between both nations
Implementing Agency (India)	Indian Space Research Organisation (ISRO) in coordination with the Department of Space (DoS)
Implementing Agency (Mauritius)	Mauritius Research and Innovation Council (MRIC) and Ministry of Information Technology, Communication & Innovation



UPSC Relevance: GS Paper 2: India and its Neighbourhood | Bilateral Agreements | International Institutions, GS Paper 3: Space Technology | Security & Strategic Sectors | SAGAR Vision



HOT Question: “India’s new space tracking station in Mauritius reflects the convergence of space diplomacy and maritime strategy.” Discuss the strategic and geopolitical significance of this development in the context of Indo-Pacific security architecture.

5. India Offers Digital, Health, and Climate Partnerships to Central America at the Fifth India–SICA Meeting



On **25th September 2025**, External Affairs Minister **Dr. S. Jaishankar** participated in the **Fifth India–SICA (Central American Integration System) Foreign Ministers' Meeting**, offering India's expertise in **digital payments (UPI)**, **IT**, **pharmaceuticals**, **renewable energy**, and **agriculture** to bolster development cooperation with Central America.

About SICA (Central American Integration System)

- **Establishment:** Founded in **1991**, SICA is the institutional framework for regional integration in Central America.
- **Members:** **Costa Rica, El Salvador, Guatemala, Honduras, Nicaragua, and Panama**; later joined by **Belize** and the **Dominican Republic** as full members.
- **Objective:** Promote peace, democracy, economic integration, and sustainable development across the region.

India–SICA Cooperation Highlights

- **Shared Challenges:** Both regions face common issues—**developmental gaps, climate change, and poverty alleviation**—creating space for knowledge exchange and south–south cooperation.
- **Digital Payments Diplomacy:** India proposed the **Unified Payments Interface (UPI)** framework, recognised globally for its **real-time, secure, low-cost transfers**; UPI now handles **over half of global cashless transactions**.
- **Technology & Health:** Collaboration in **pharmaceutical manufacturing, tele-medicine, and e-governance** through India's **Digital Public Infrastructure (DPI)** model.
- **Agriculture & Food Security:** India offered training in **precision farming, agri-tech, and supply-chain resilience** to improve productivity.
- **Energy & Climate Cooperation:** India invited SICA nations to partner in **solar, bio-energy, and green hydrogen projects** under the **International Solar Alliance (ISA)** and **Mission LiFE** frameworks.
- **Private-Sector Engagement:** Indian firms expressed investment interest in **agriculture, renewable energy, pharmaceuticals, and IT services** within SICA economies.



UPSC Relevance: **GS Paper 2:** India's bilateral & regional relations, soft power diplomacy, Act Latin America policy, digital diplomacy, and south–south cooperation. **GS Paper 3:** Role of technology in inclusive growth, renewable energy partnerships.



HOT Question: “Discuss how India's digital and renewable energy cooperation with SICA nations strengthens South–South cooperation and advances India's foreign policy objectives in Latin America.”

6. India–France Joint Project to Develop 120–140 kN Jet Engine for AMCA Fighter Aircraft



The Government of India is likely to approve a **joint venture between Safran (France) and DRDO** to co-develop **120–140 kilo-Newton jet engines** for India's indigenous **Advanced Medium Combat Aircraft (AMCA)** stealth fighter. The project, to be built under **Indian Intellectual Property Rights (IPR)** with **complete technology transfer**, will be a major leap in India's aero-engine self-reliance.

About the Project

- **Partners:** Defence Research and Development Organisation (DRDO) and French aerospace firm **Safran**.
- **Purpose:** Develop a high-thrust turbofan engine to power India's upcoming **twin-engine stealth AMCA** under the "Make in India" and **Atmanirbhar Bharat** initiatives.
- **Technology Transfer:** Includes **single-crystal turbine blade technology**, advanced thermal coatings, and hot-section metallurgy — areas previously restricted to top engine-producing nations.
- **Production:** Engines will be co-manufactured in India under **100% technology transfer**, ensuring local supply chains and maintenance autonomy.
- **Strategic Outcome:** India will become the **fifth nation globally** (after the US, UK, Russia, and France) capable of producing high-performance jet engines domestically.

About Jet Engines

- **Definition:** A **reaction engine** that generates forward thrust by expelling high-speed exhaust gases.
- **Classification:**
 - **Turbojet:** Simple design, high speed, low fuel efficiency.
 - **Turbofan:** Balanced performance; used in modern combat aircraft.
 - **Turboprop:** Efficient for short-range aircraft.
 - **Ramjet/Scramjet:** Used in supersonic/hypersonic applications.
- **Key Component:**
 - **Single-Crystal Blade:** A turbine blade made from a single crystal superalloy that resists deformation and melting under **>1,500°C** temperatures — crucial for sustained high-thrust performance.



UPSC Relevance: **GS Paper 3:** Defence Technology, Indigenisation, Strategic Partnerships. **Prelims:** Defence R&D organisations, Aircraft engine types, Atmanirbhar Bharat in aerospace.



HOT Question: "How does indigenous jet engine development under projects like AMCA strengthen India's strategic autonomy and defence indigenisation goals?"

7. 15th India–Japan Annual Summit in Tokyo Deepens Strategic and Technological Partnership



The **15th India–Japan Annual Summit** was held in Tokyo, marking a major milestone in bilateral relations. The summit produced multiple Memoranda of Understanding (MoUs) and declarations aimed at strengthening cooperation in defence, economy, digital technology, clean energy, and cultural exchange – reaffirming Japan’s status as a key Indo-Pacific partner.

Strategic & Security Cooperation

- **Joint Vision Statement:** Set a **10-year roadmap** across eight strategic domains including defence, maritime security, digital partnership, and clean energy.
- **Joint Declaration on Security Cooperation:** Upgrades the defence partnership through enhanced **2+2 dialogues, maritime surveillance, and joint exercises**.
- **Diplomatic Training MoU:** Institutionalises structured exchanges between Indian and Japanese diplomats, think tanks, and officials.

Economic Cooperation

- **Investment Boost:** Japan pledged **\$68 billion** in private investment for India over the next decade, doubling earlier commitments.
- **India–Japan SME Forum:** Enhances collaboration between micro, small, and medium enterprises to expand trade and innovation.
- **Next-Generation Mobility Partnership:** Facilitates cooperation in **logistics, EVs, hydrogen vehicles, and urban transport systems**.

Technological & Space Collaboration

- **Digital Partnership 2.0:** Builds on DPI cooperation—promoting **AI, cybersecurity, and data governance**.
- **India–Japan AI Initiative:** Joint research in **LLMs, ethical AI, and digital capacity-building**.
- **Critical Minerals MoC:** Ensures supply-chain resilience for rare earths and battery minerals.
- **ISRO–JAXA Cooperation:** Advances the **Chandrayaan–5 Joint Lunar Polar Exploration Mission**.

Environment & Sustainability

- **Joint Crediting Mechanism (JCM):** Allows Japan to invest in **decarbonising technologies** in India with credit sharing.
- **Hydrogen & Ammonia Declaration:** Promotes joint innovation in **green hydrogen, ammonia fuels, and clean logistics**.



UPSC Relevance: **GS Paper 2:** Bilateral, Regional and Global Groupings; India–Japan Relations; Indo-Pacific Strategy. **GS Paper 3:** Technology Cooperation, Energy Transition, and Sustainable Development Goals.



HOT Question: “Discuss how the outcomes of the 15th India–Japan Annual Summit strengthen India’s role in the Indo-Pacific through strategic, technological, and environmental cooperation

8. Mali, Burkina Faso, and Niger Announce Withdrawal from the International Criminal Court



Three West African countries — **Mali, Burkina Faso, and Niger** — jointly announced their **withdrawal from the International Criminal Court (ICC)**, accusing it of “*selective justice*” and bias against African nations. The decision follows their coordinated alignment under the **Alliance of Sahel States (AES)**.

About the International Criminal Court (ICC)

- **Established:** Under the **1998 Rome Statute**; became operational on **1 July 2002**.
- **Headquarters:** *The Hague, Netherlands*.
- **Membership:** 125 countries (Ukraine became the 125th in 2025).
- **India's Status:** *Not a member* — India cites sovereignty and jurisdictional concerns.
- **Nature:** A **permanent international tribunal** that prosecutes individuals (not states) for **genocide, crimes against humanity, war crimes, and aggression**.
- **Relationship with UN:** Independent of the UN but cooperates under a *separate legal agreement*.

Reason for Withdrawal

- **Selective Justice:** African leaders allege ICC disproportionately targets African nations while ignoring Western interventions.
- **Sovereignty Assertion:** Reflects post-coup governments' resistance to perceived external judicial interference.
- **Precedent:** Similar withdrawals attempted by *Burundi (2017)* and *Philippines (2019)*.
- **Rule of Withdrawal:** Effective **one year after formal notification** to the **UN Secretary-General** (as per Article 127 of the Rome Statute).



UPSC Relevance: **GS Paper 2:** International Institutions, Effect of Policies of Developed Nations on Developing Countries, and India's Role in Global Governance. **Keywords:** ICC, Rome Statute, Selective Justice, Alliance of Sahel States (AES), UN-ICC Relations, Africa and Global



HOT Question: “Critically analyse the relevance of the International Criminal Court in ensuring global justice. Do the recent African withdrawals reflect a crisis of legitimacy in international institutions?”

9. India–EFTA Trade and Economic Partnership Agreement (TEPA) Comes into Effect from Oct 1, 2025



India and the **European Free Trade Association (EFTA)** – comprising **Iceland, Liechtenstein, Norway, and Switzerland** – signed the **Trade and Economic Partnership Agreement (TEPA)** to deepen trade, investment, and sustainable cooperation. The pact, effective **October 1, 2025**, is India's first with binding environmental and labour standards.

About EFTA

- **Established:** 1960 (Stockholm Convention) as a parallel bloc to the EU.
- **Members:** Iceland, Liechtenstein, Norway, Switzerland – all non-EU states.
- **Economic Weight:** Collective GDP > \$1 trillion; 9th largest merchandise trader and 5th in commercial services.

Market-Access Commitments

- **EFTA Offer:** 92.2 % of tariff lines covering 99.6 % of India's exports; full liberalisation for **non-agricultural goods** and tariff concessions on **Processed Agricultural Products (PAPs)**.
- **India's Offer:** 82.7 % of tariff lines covering 95.3 % of EFTA exports (mostly gold > 80 % of imports).
- **Exclusions:** Dairy, soya, coal, and sensitive agricultural products kept out.
- **Special Gain: Duty-free access** for **basmati and non-basmati rice** without reciprocity.
- **Sensitive Sectors:** Pharma, medical devices, and processed food linked with **PLI schemes**.

Key Provisions & Significance

- **Investment Commitment:** EFTA to invest **US \$100 billion** in India within 15 years, generating **1 million jobs**.
- **Sustainability Clause:** India's **first FTA** embedding binding provisions on **labour rights, environment, and human rights**.
- **Legal Certainty:** Ensures rule-based trade predictability aligning with WTO norms.
- **Strategic Context:** Diversifies India's trade beyond traditional partners (EU/US), strengthens ties with high-income innovation economies.



UPSC Relevance: **GS Paper 2:** India's Bilateral and Multilateral Trade Relations; WTO and FTA frameworks. **GS Paper 3:** FDI, Employment Generation, and Sustainable Trade Practices.



HOT Question: "The India–EFTA TEPA marks a paradigm shift in India's trade policy by coupling market access with sustainability and investment guarantees. Discuss the implications for India's manufacturing and export competitiveness."

10. India and Israel Sign Bilateral Investment Agreement to Strengthen Economic Cooperation



On **8th September 2025**, India and Israel signed a **Bilateral Investment Agreement (BIA)** in New Delhi, marking a significant step in expanding trade and investment ties. The agreement, signed by **Union Finance Minister Nirmala Sitharaman** and **Israel's Finance Minister Bezalel Smotrich**, aims to provide **greater investor protection, legal certainty, and a robust dispute-resolution framework**.

About the Bilateral Investment Agreement (BIA)

- **Purpose:** To promote and protect investments by ensuring **fair, equitable, and transparent treatment** of investors from both countries.
- **Investor Protection:** Safeguards against **expropriation**, guarantees **compensation for losses**, and ensures **free transfer of funds and returns**.
- **Dispute Resolution:** Introduces an **independent arbitration mechanism** for investor-state disputes, ensuring neutrality and predictability.
- **Transparency Measures:** Both parties commit to clarity in regulatory policies and stable investment environments.
- **Scope:** Covers investments in manufacturing, defence, clean energy, fintech, and innovation sectors — key pillars of India-Israel collaboration.

India-Israel Investment Landscape

- **Current Bilateral Investments:** Approx. **USD 800 million**; expected to rise substantially post-agreement.
- **Trade Complementarity:** Israel's strength in **technology, irrigation, and defence innovation** complements India's **manufacturing and digital economy**.
- **Institutional Mechanism:** Builds upon the **India-Israel Strategic Partnership (2017)** and **I2U2 framework** (India-Israel-UAE-USA) focusing on innovation and infrastructure.



UPSC Relevance: **GS Paper 2:** Bilateral Relations, Investment Treaties, India-West Asia Cooperation. **GS Paper 3:** FDI, Ease of Doing Business, Economic Diplomacy



HOT Question: “Discuss how the 2025 India-Israel Bilateral Investment Agreement strengthens India’s investment climate and aligns with its broader West Asia strategic partnerships.”

11. Iran and IAEA Agree on New Inspection Framework Amid Risk of UN Sanctions “Snapback”



On **9th September 2025**, Iran and the **International Atomic Energy Agency (IAEA)** announced a **framework agreement** to resume **nuclear inspections** at facilities damaged during **U.S. and Israeli airstrikes** earlier in 2025. The move aims to restore monitoring access and transparency amid growing tensions over Iran’s nuclear enrichment levels and threats of renewed **UN sanctions by European powers (E3)**.

Background

The **2015 Joint Comprehensive Plan of Action (JCPOA)** was signed between Iran and the **P5+1 (U.S., UK, France, Russia, China + Germany)**, limiting Iran’s uranium enrichment in exchange for sanctions relief.

The U.S. **withdrew in 2018**, re-imposing sanctions, after which Iran gradually resumed enrichment. In **2025**, a series of **airstrikes by Israel and the U.S.** damaged Iran’s key enrichment facilities at **Natanz and Fordow**, disrupting IAEA monitoring equipment.

Key Highlights of the 2025 Iran–IAEA Framework

Provision	Description	Significance
Resumption of Inspections	IAEA to resume on-site inspections and remote surveillance at affected enrichment and centrifuge assembly facilities.	Restores international oversight and data continuity.
Verification Scope	Includes uranium stockpile accounting, enrichment levels, and centrifuge reinstallation monitoring.	Aims to prevent clandestine escalation beyond declared limits.
Conditionality Clause	Iran warned the framework would collapse if Western sanctions are re-imposed.	Highlights fragile political trust and linkage to sanctions relief.
Technical Cooperation	IAEA experts to assist Iran in rebuilding damaged sensors and cameras for monitoring continuity.	Enhances transparency and safety assurance.
Timeline & Confidentiality	Details remain undisclosed; Iran insists on limited access and non-disclosure of sensitive military data.	Balances sovereignty concerns with verification obligations.

E3 “Snapback” Threat

- **France, Britain, and Germany (E3)** triggered the **UN “snapback” mechanism** to restore sanctions lifted under the 2015 JCPOA, citing non-compliance.
- The process, under **UNSC Resolution 2231**, reinstates all sanctions unless vetoed within 30 days — a clause **not subject to veto** once invoked.
- The E3 emphasised that only a **credible IAEA inspection process** and **renewed U.S.–Iran negotiations** could avert re-imposition.



HOT Question: “The “snapback” mechanism under the JCPOA illustrates both the strengths and limitations of global non-proliferation frameworks. Critically evaluate in the context of recent Iran–IAEA developments.

12. India and Australia Sign MoU to Strengthen Food Safety Cooperation



On **24th September 2025**, the **Food Safety and Standards Authority of India (FSSAI)** and **Australia's Department of Agriculture, Fisheries and Forestry (DAFF)** signed a **Memorandum of Understanding (MoU)** in New Delhi to enhance collaboration in **food safety, trade facilitation, and capacity building**.

About the MoU

- **Objective:** To promote mutual cooperation on food standards, risk assessment, laboratory strengthening, and import/export quality controls.
- **Key Areas of Cooperation:**
 - Exchange of **best practices** in food safety management.
 - **Knowledge sharing** on regulatory frameworks and scientific risk-based inspection systems.
 - **Alignment of import/export procedures** to reduce duplication and facilitate smoother trade.
 - **Technical collaboration** in laboratory testing, food traceability, and digital certification.
 - **Capacity building** for Indian officials through training, workshops, and joint research.

Significance for India–Australia Partnership

- **Trade Facilitation:** Enhances mutual trust and regulatory equivalence, reducing barriers in food trade.
- **Quality Assurance:** Helps improve compliance with **Codex Alimentarius** international standards.
- **Institutional Strengthening:** Reinforces India's efforts to modernise FSSAI's science-based regulatory system.
- **Agri-food Sector Boost:** Supports India's growing exports in **dairy, seafood, horticulture, and processed foods**, sectors where Australia maintains stringent biosecurity norms.

About FSSAI

- **Established:** 2006 under the **Food Safety and Standards Act**.
- **Nodal Body:** Under the **Ministry of Health and Family Welfare**.
- **Mandate:** To set science-based food standards, regulate manufacturing, storage, distribution, sale, and import to ensure safe and wholesome food for human consumption.



UPSC Relevance: **GS Paper 2:** Bilateral relations (India–Australia), global standards harmonisation. **GS Paper 3:** Food security, food safety regulation, international trade facilitation.



HOT Question: “India’s collaboration with developed countries in food safety regulation can enhance both consumer confidence and export competitiveness.” Discuss with reference to the India–Australia MoU (2025).

13. India–ADB Sign Loan Agreement to Enhance Urban Liveability and Climate Resilience in Assam



India and the **Asian Development Bank (ADB)** signed a **loan agreement** to improve **urban liveability, water management, and climate resilience** in Assam's key towns. The project supports sustainable urban infrastructure, flood control, and climate-adapted civic amenities in the state's rapidly urbanising river basins.

About the Project

Objective: To upgrade water supply, drainage, and waste management systems, improving health and liveability for urban residents.

Climate Focus: Integrates **green infrastructure**, flood-resilient designs, and nature-based solutions to reduce disaster vulnerability.

Capacity Building: Strengthens local urban bodies in planning, governance, and financial management.

Sustainability: Encourages public-private partnerships and women's participation in urban service delivery.

About the Asian Development Bank (ADB)

Establishment: 1966, headquartered in **Manila, Philippines**.

Membership: **69 members** (49 from Asia-Pacific, 20 non-regional).

Newest Member: **Türkiye (2025)**.

Voting System: Weighted voting based on shareholding, similar to the World Bank.

Major Shareholders: Japan and the USA (largest), followed by China and India.

India's Role: Founding member; has received ~14% of ADB's project commitments, especially in transport, energy, and urban development.

Origin: Proposed under **UN-ESCAP (Bangkok)** to promote regional economic cooperation and social progress.

Significance of the Loan

Urban Modernisation: Enhances liveability in Assam's flood-prone cities.

Climate Resilience: Supports India's NAPCC goals and SDG-11 (Sustainable Cities & Communities).

Regional Equity: Strengthens North-East India's integration into the national infrastructure network.



UPSC Relevance: **GS Paper 2:** India's bilateral and multilateral development partnerships. **GS Paper 3:** Infrastructure, Disaster Management, Climate-resilient Urban Planning.



HOT Question: "How can multilateral development banks like ADB play a transformative role in making India's urbanisation both inclusive and climate-resilient?"

14. SCO Tianjin Summit 2025 Adopts Declaration on Terrorism, Sovereignty, and Global Conflicts



On **1st September 2025**, leaders at the **Shanghai Cooperation Organisation (SCO)** Summit in **Tianjin, China**, adopted a **joint declaration** reaffirming the organisation's united stance against terrorism and support for state sovereignty amid escalating regional and global tensions.

Key Outcomes of the SCO Tianjin Declaration (2025)

- **Strong Stance on Terrorism:**
 - Condemned the **April 22 Pahalgam terrorist attack (India)**, expressing condolences and demanding accountability for perpetrators, sponsors, and financiers.
 - Rejected **double standards** in counter-terrorism and called for collective action against cross-border terrorism.
- **Sovereignty and Territorial Integrity:**
 - Reaffirmed adherence to the **UN Charter principles**, emphasising **respect for sovereignty and non-interference**, particularly significant amid India–China border frictions.
- **Pakistan–China Context:**
 - The statement followed reports of **Chinese-origin weapons and intelligence support to Pakistan** during India's **Operation Sindoor**, exposing regional security complexities.
- **Regional Terrorism:**
 - Condemned terror attacks in **Pakistan's Jaffer Express and Khuzdar**, highlighting a shared threat perception across South Asia.
- **Middle East Conflict:**
 - Expressed grave concern over the **Gaza humanitarian crisis**, calling for an **immediate ceasefire, humanitarian access**, and a **just Palestinian settlement**.
 - **Condemned Israeli and US strikes on Iran (June 2025)** as violations of sovereignty and **international law**.



UPSC Relevance: **GS Paper 2:** International Institutions, Regional Groupings, India's Neighbourhood Policy. **GS Paper 3:** Internal Security, Cross-border Terrorism, Global Conflict Impact.



HOT Question: “The 2025 SCO Tianjin Declaration underscores both cooperation and contradiction among its members. Analyse how India can balance its regional security interests within the SCO framework

15. India Hosts FIPIC Foreign Ministers' Meeting at 80th UNGA to Deepen India–Pacific Islands Cooperation



During the **80th United Nations General Assembly (UNGA)** in **New York (September 2025)**, India convened the **Forum for India–Pacific Islands Cooperation (FIPIC)** Foreign Ministers' Meeting to review progress on the **12-point action plan** announced by PM Modi at **FIPIC-III (2023, Papua New Guinea)** and reaffirm its commitment to the **Act East** and **Indo-Pacific** policies.

About the Forum for India–Pacific Islands Cooperation (FIPIC)

- **Launch:** Established in **2014 (Suva, Fiji)** to institutionalise India's engagement with the **14 Pacific Island Countries (PICs)**.
- **Members:** Fiji, Papua New Guinea, Samoa, Tonga, Tuvalu, Solomon Islands, Palau, Vanuatu, Cook Islands, Nauru, Niue, Kiribati, Marshall Islands, and Micronesia.
- **Purpose:** Strengthen cooperation on **climate change, sustainable development, renewable energy, health, and digital connectivity**.
- **Strategic Context:** Reflects India's intent to be a **developmental partner** in the **Blue Pacific** within its **Indo-Pacific Vision**.

Key Outcomes & India's Commitments under FIPIC

- **Digital & Education Connectivity:**
 - Expansion of **e-Vidya Bharati** (tele-education) and launch of the **Pan-Pacific Islands e-Network**.
- **Climate & Energy Cooperation:**
 - Establishment of a **USD 1 million fund** to support **climate adaptation** and **clean energy projects**.
- **Capacity Building:** **EPIC UPSC Classes**
 - Training for Pacific diplomats, youth, and civil servants; special visitor programmes for leadership development.
- **People-to-People Exchange:**
 - **Visa-on-arrival** for Pacific citizens at Indian airports.
 - Promotion of **Yoga**, traditional medicine, and cultural linkages.
- **Developmental Grants:**
 - Enhanced **grant-in-aid for community projects** under India's development partnership assistance.



UPSC Relevance: **GS Paper 2:** India's Foreign Policy, International Institutions, Regional Groupings.
GS Paper 3: Climate Change, Blue Economy, Sustainable Development.



HOT Question: "The FIPIC initiative represents India's diplomatic outreach to the Blue Pacific as part of its Indo-Pacific vision. Evaluate its strategic and developmental significance."

16. Pacific Island Leaders Adopt “Ocean of Peace” Vision to Balance U.S.–China Rivalry and Advance Climate Solidarity



On **8th September 2025**, Pacific Island leaders began a **week-long regional summit** in **Honiara, Solomon Islands**, deliberating on **security, climate change, and international partnerships**. The summit is expected to endorse the **“Ocean of Peace” Declaration**, aiming to uphold regional neutrality amid intensifying **U.S.–China rivalry** in the Pacific and to promote **climate justice and resilience** through regional cooperation

About the Pacific Islands Forum (PIF)

- **Founded:** 1971 (as the South Pacific Forum) to promote regional political, economic, and environmental cooperation.
- **Members:** 18 states — including **Fiji, Samoa, Tonga, Papua New Guinea, Vanuatu, Solomon Islands, Kiribati**, and **Cook Islands**, along with **Australia and New Zealand**.
- **Secretariat:** Suva, Fiji.
- **Observer Partners:** India, Japan, China, U.S., France, and the EU.

Key Highlights of the 2025 Summit (Honiara)

- **“Ocean of Peace” Declaration:**
 - Advocates **neutrality and stability** in the Pacific, resisting militarisation and major-power rivalry.
 - Seeks to maintain the Pacific as a **zone of peace, nuclear-free, and environmentally secure** region.
- **COP31 Support:**
 - Member states backed **Australia’s bid** to host the **2026 UN Climate Conference (COP31)**, reinforcing its role as a regional climate ally.
 - Focus on **sea-level rise, climate-induced migration**, and **climate finance for adaptation**.
- **Diplomatic Tensions:**
 - The **Solomon Islands excluded 24 donor partners**, including **China, Taiwan, and the U.S.**, after Beijing objected to **Taiwan’s inclusion**.
 - Reflects complex alignments — **13 recognise China, 3 maintain ties with Taiwan**, and **3 have defence compacts with the U.S.**
- **Security Context:**
 - Forum seeks autonomy in security partnerships and **rejects external military bases** that could destabilise regional peace.
 - Renewed call for **Pacific-led regionalism** under the **2050 Blue Pacific Continent Strategy**.



UPSC Relevance: **GS Paper 2:** Regional groupings and India’s relations with Pacific Island nations. **GS Paper 3:** Climate diplomacy, Blue Economy, and sustainable development goals



HOT Question: “The Pacific Islands’ ‘Ocean of Peace’ vision reflects the region’s aspiration to remain neutral amid major power rivalry while prioritising climate resilience. Analyse its global and Indian significance.

17. 3rd Global Food Regulators Summit 2025: India Leads Global Dialogue on Safe, Sustainable, and Mindful Food Systems



The **3rd Global Food Regulators Summit 2025** was organised in **New Delhi** by the **Food Safety and Standards Authority of India (FSSAI)** under the **Ministry of Health & Family Welfare**. The summit brought together global food regulators to deliberate on harmonising safety standards and promoting innovation in sustainable food systems.

About the Summit

- **Theme:** “*Evolving Food Systems – Yatha Annam Tatha Manah*” — signifies the deep interlinkage between **food quality, mental well-being, and societal harmony**.
- **Organiser:** FSSAI, in collaboration with **WHO, FAO, Codex Alimentarius Commission**, and **European Food Safety Authority (EFSA)**.
- **Objective:** To establish a global platform for knowledge-sharing, regulatory convergence, and adoption of next-generation food safety technologies.

About FSSAI

- **Statutory Basis:** Established under the **Food Safety and Standards Act, 2006**.
- **Nodal Ministry:** Ministry of Health & Family Welfare.
- **Role:** Lays down science-based standards for food articles, regulates manufacture, storage, distribution, sale, and import to ensure **safe and wholesome food** for human consumption.
- **Vision 2047:** FSSAI aims to achieve “**Safer Food for a Healthier Nation**” by integrating **AI-based traceability, blockchain monitoring**, and **One Health principles**.

Significance of the Summit

- **Global Harmonisation:** Aligns India’s food regulations with **Codex standards**, facilitating export competitiveness.
- **Food Innovation:** Showcases advances in **lab-grown meat, fortification, nutraceuticals, and sustainable packaging**.
- **One Health Approach:** Promotes interlinkages between **human, animal, and environmental health** in food systems.



UPSC Relevance: **GS Paper 2:** Health policy, international cooperation, governance in regulation. **GS Paper 3:** Biotechnology in food safety, One Health, sustainable development. **Prelims Focus:** FSSAI structure, Food Safety and Standards Act, Codex Alimentarius.



HOT Question: “Discuss how India’s leadership through the Global Food Regulators Summit advances the goals of food safety, trade harmonisation, and the One Health approach.”

18. India to Co-Host 2nd WHO Global Summit on Traditional Medicine 2025



The **Ministry of Ayush**, in collaboration with the **World Health Organization (WHO)**, will host the **2nd WHO Global Summit on Traditional Medicine** in **New Delhi**. The event aims to integrate traditional medicine into global healthcare systems and sustainable well-being models.

About the Summit

- **Theme:** “*Restoring Balance for People and Planet: The Science and Practice of Well-being.*”
- **Objective:** To serve as an international platform for experts, researchers, policymakers, and practitioners to share knowledge and evidence-based best practices in traditional medicine.
- **Previous Summit:** The first summit was held in **Gandhinagar (2023)** during India’s G20 Presidency.

About Traditional Medicine

- **Definition (WHO):** Traditional Medicine refers to **codified or non-codified knowledge systems** that predate modern biomedicine and emphasise natural, plant-based, and holistic healing methods.
- **Examples:** Ayurveda, Yoga, Siddha, Unani, Naturopathy, Homeopathy, and other indigenous systems.
- **Relevance:** Over **170 WHO member states** report the use of traditional medicine, forming an integral part of primary healthcare for nearly **80% of the world’s population**.

Significance of the Summit

- **Global Integration:** Aims to develop frameworks for integrating **traditional and modern medicine** within national health systems.
- **Research & Evidence:** Promotes scientific validation and global data-sharing on traditional medicine efficacy and safety.
- **Sustainability Link:** Emphasises **biodiversity conservation, ethical sourcing of medicinal plants**, and **climate-resilient healthcare**.
- **Economic Value:** Strengthens India’s soft power and boosts global trade in herbal and Ayush-based products.

Institutional Support: Builds on the **WHO Global Centre for Traditional Medicine (GCTM)**, established in Jamnagar, Gujarat (2022).



UPSC Relevance: **GS Paper 2:** Health policy, international cooperation, traditional medicine integration. **GS Paper 3:** Sustainable development, biodiversity in healthcare. **Prelims Focus:** WHO Global Centre for Traditional Medicine (GCTM), Ministry of Ayush initiatives.



HOT Question: “Discuss the role of traditional medicine in achieving Universal Health Coverage and sustainable well-being. How does India’s leadership in WHO initiatives strengthen this vision?”

19. India to Host 89th IEC General Meeting in New Delhi in September 2025



The **Bureau of Indian Standards (BIS)** has announced that India will host the **89th General Meeting** of the **International Electrotechnical Commission (IEC)** from **15 to 19 September 2025** at Bharat Mandapam, New Delhi. The event will bring together over 2,000 experts from more than 100 countries to deliberate on global electrotechnical standards

Definitions & Context

- **IEC (International Electrotechnical Commission):** A global non-profit standards body founded in 1906, headquartered in Geneva, which develops international standards in electrical, electronic and related technologies.
- **BIS (Bureau of Indian Standards):** India's statutory national standards body under the Ministry of Consumer Affairs responsible for formulating standards, certification, and representing India in international standardisation bodies.
- **IEC General Meeting:** Held annually, bringing together management, technical committees, member national committees, industry experts, to review policy, standards roadmap, elect officers, and discuss emerging technological challenges.

Key Features

- **Dates & Venue:** 15–19 September 2025 at **Bharat Mandapam**, New Delhi.
- **Participation scale:** Over 2,000 experts from 100+ countries.
- **Exhibition & Thematic Zones:** An **EV Zone**, showcasing over 30 production-ready electric vehicles by major OEMs, was inaugurated by the Commerce & Industry Minister Piyush Goyal.
- **India's Role in LVDC:** India will act as the **Global Secretariat for Low Voltage Direct Current (LVDC)** standardisation, a critical domain for clean energy solutions.
- **Young Professionals Programme:** 93 young professionals globally will participate in workshops, boot camps, and technical visits under the IEC YP programme.
- **Technical / Management Committees:** The meeting will host >150 technical & management committee sessions covering AI, e-mobility, inclusive standards, sustainable world themes.



UPSC Relevance: **Prelims:** Know IEC, BIS, standards bodies, and India's role in global standardisation. **GS Paper 3:** Technology, standards, clean energy, digital infrastructure, manufacturing competitiveness.



HOT Question: "Evaluate India's hosting of the 89th IEC General Meeting 2025 as a strategic move in its technology diplomacy. What are the opportunities and risks in leveraging standardisation as a part of India's industrial and global ambitions?"

20. 80th UN General Assembly Focuses on Women's Empowerment, Marks 30 Years of Beijing Declaration



The **80th session of the United Nations General Assembly (UNGA 80)** convened in New York in September 2025, with its general debate centred on **women's empowerment, gender equality, and UN reforms**. The session commemorated **30 years of the 1995 Beijing Declaration, 15 years of UN Women, and 80 years since the founding of the UN**.

Context & Key Highlights

- **Theme:** The UNGA 80, led by new President **Annalena Baerbock (Germany)**, emphasised “*Empowering Women, Strengthening Multilateralism*”, underlining gender equality as central to peace and sustainable development.
- **UN Reform – UN80 Initiative:**
 - Launched by **UN Secretary-General António Guterres** in 2025 to modernise the UN system.
 - Aims to strengthen efficiency, agility, and accountability through:
 1. **Mandate Review:** Evaluating outdated resolutions and overlapping missions.
 2. **Institutional Restructuring:** Streamlining agencies and harmonising development operations.
 3. **System Alignment:** Improving coherence across humanitarian, development, and peacebuilding pillars.
- **Beijing Declaration & Platform for Action (1995):**
 - Adopted at the **Fourth World Conference on Women, Beijing**.
 - Identified **12 critical areas** (e.g., education, health, economy, violence, environment, decision-making).
 - Continues as the **global benchmark for women's rights**, influencing SDG 5 (Gender Equality).
- **Milestones Observed:**
 - **UN Women (2010):** Consolidated four earlier entities into a single UN body for gender equality.
 - **UN 80 (1945–2025):** Celebrating 80 years of the UN Charter and reaffirming multilateralism amid global polarisation.



UPSC Relevance: **GS Paper 2:** International Institutions – UN reforms, role of UN Women, global governance. **GS Paper 1:** Role of women and women's organisations in global empowerment.
Essay / Ethics: Multilateralism and equality as pillars of just global order.



HOT Question: “The Beijing Declaration remains the most comprehensive global blueprint for gender equality, yet progress has been uneven. In this context, critically evaluate how the UN80 Reform initiative could revitalise global governance for women's empowerment.”

21. India to Assess Pakistan–Saudi Arabia Strategic Mutual Defence Agreement



India announced it will closely evaluate the **Strategic Mutual Defence Agreement** signed between **Pakistan and Saudi Arabia** in September 2025, which pledges joint defence in case of external aggression. The pact has strategic implications for India's national security and the regional balance of power in West and South Asia.

About the Agreement

- **Key Clause:** Any external aggression against one signatory will be treated as aggression against both.
- **Scope:** Covers intelligence cooperation, joint military training, arms supply, and potential deployment coordination.
- **Context:** Pakistan is seeking deeper Gulf security ties amid strained relations with the US and economic dependence on Saudi financial aid.

Implications for India

- **Security Concerns:**
 - Strengthens Pakistan's military backing, potentially emboldening cross-border posturing.
 - May complicate India's maritime and energy security calculus in the **Arabian Sea and Gulf region**.
- **Strategic Significance:**
 - Positions Saudi Arabia as a key regional security actor beyond its traditional West Asian sphere.
 - Could revive Cold War-style bloc politics between **India–UAE–Israel** alignment vs **Pakistan–Saudi nexus**.
- **Diplomatic Balancing:**
 - India–Saudi ties remain strong under the **Strategic Partnership Council (2019)** with cooperation in energy, investment (\$100 billion pledge), and counterterrorism.
 - India will aim to sustain Saudi engagement to prevent deep alignment with Pakistan-led agendas.

Regional Context

- Reflects Riyadh's evolving security diversification post-US retrenchment in the Gulf.
- Could affect India's **West Asia policy**, especially its participation in **IORA**, **IMEC (India–Middle East–Europe Corridor)**, and **energy diplomacy**.



UPSC Relevance: **GS Paper 2:** India's bilateral relations, regional groupings, and security implications. **GS Paper 3:** Internal and external security challenges; defence cooperation and maritime security.



HOT Question: "India's West Asia policy has evolved from energy diplomacy to strategic partnership. In this context, analyse the implications of the Pakistan–Saudi Arabia defence pact for India's regional security calculus."

22. Devastating Landslide Destroys Tarasin Village in Sudan's Darfur Region



A catastrophic landslide in **Tarasin village**, located in the **Darfur region of western Sudan**, nearly wiped out the settlement, highlighting the vulnerability of mountainous and conflict-affected regions to natural disasters.

Geographical Context

- **Darfur Region:** Lies in **western Sudan**, bordered by **Chad, Libya, and the Central African Republic (CAR)**.
- **Mountain System:** Home to the **Jebel Marra (Marrah Mountains)**, a volcanic massif reaching about **3,042 m**, Sudan's highest point.
- **Climatic Factors:**
 - Intense seasonal rainfall over deforested volcanic slopes increases soil instability.
 - Desertification and land degradation amplify disaster risks.

Conflict and Humanitarian Background

- Darfur faces **prolonged ethnic conflict** between **Arab and African communities**, complicating rescue and relief operations.
- Ongoing instability has led to **mass displacement**, food insecurity, and limited infrastructure for disaster response.

About Sudan

- **Location:** Northeastern Africa; bordered by **Egypt (N), Eritrea & Ethiopia (E), South Sudan (S), CAR & Chad (W), Libya (NW)**, and the **Red Sea (NE)**.
- **Capital:** *Khartoum*—where the **White Nile** merges with the **Blue Nile**.
- **Physical Features:** Includes the **Sahara Desert, Nile Basin**, and **Jebel Marra volcanic highlands**.
- **Economy:** World's **largest producer of Gum Arabic**, crucial in food, cosmetics, and pharmaceuticals.

Significance

- Reflects growing intersection of **climate vulnerability and conflict zones** in Africa.
- Underscores the need for **regional disaster preparedness**, geotechnical monitoring, and humanitarian coordination.



UPSC Relevance: **GS Paper 1:** Geographical features & natural disasters. **GS Paper 2:** International issues and humanitarian crises. **GS Paper 3:** Disaster management; climate vulnerability in fragile states.



HOT Question: “Discuss how environmental degradation and armed conflict together exacerbate disaster vulnerability in regions like Sudan's Darfur.”

23. US Revokes Sanctions Waiver for Iran's Chabahar Port, Affecting India's Regional Connectivity Projects



The **United States revoked the sanctions waiver** granted for the development of **Chabahar Port in Iran**, a project India has been spearheading since 2002. The waiver's cancellation, effective **29 September 2025**, comes under the **Iran Freedom and Counter-Proliferation Act (IFCA)**, complicating India's strategic connectivity and trade ambitions in Central Asia.

Background & India's Role

- **Origins:** Cooperation began in **2002**, formalised during **Khatami-Vajpayee talks (2003)**.
- **2016 Trilateral Pact:** Signed by **India, Iran, and Afghanistan**, accelerating port and transit infrastructure.
- **Operator:** *India Ports Global Limited (IPGL)* manages **Shahid Beheshti terminal**.
- **Capacity:** Planned 82 million tonnes per annum across four phases.
- **Operational Milestone:** First wheat consignment to Afghanistan in **2017**, Afghan exports via Chabahar began in **2019**.
- **Funding:** Annual allocations by India (₹100 crore in FY 2023–24), but progress slowed by sanctions and logistic bottlenecks.

Why the Waiver Was Withdrawn

- **US "Maximum Pressure" Policy:** Renewed sanctions campaign to isolate Iran's regime.
- **Recent Trigger:** **US strikes on Iranian nuclear facilities (June 2025)** intensified tensions.
- **Legal Basis:** Revocation under **IFCA**, cancelling exemptions earlier provided for humanitarian and infrastructure projects.

Implications for India

EPIC UPSC Classes

- **Connectivity Setback:** Disrupts India's **access to Afghanistan & Central Asia**, undermining investments and the counterbalance to **China's Gwadar Port** (Pakistan).
- **Economic Impact:** Hampers India's **wheat & humanitarian shipments** to Afghanistan; may delay **International North–South Transport Corridor (INSTC)** logistics.



UPSC Relevance: **GS Paper 2:** India's neighbourhood diplomacy, regional connectivity, and balancing multilateral relations. **GS Paper 3:** Infrastructure & economic corridors; international sanctions and energy security.



HOT Question: "Discuss how recurring US sanctions on Iran affect India's strategic autonomy and regional connectivity initiatives such as Chabahar Port and the International North–South Transport Corridor (INSTC)."

24. Disruptions in Red Sea Undersea Cables Strain India–Europe Digital Connectivity



Damage to **SEA-ME-WE 4** and **IMEWE** submarine fibre-optic cables in the **Red Sea** increased India–Europe internet latency and disrupted global data traffic. The incident highlights the strategic vulnerability of the Red Sea corridor—through which most Asia–Europe digital traffic flows—to conflict and physical hazards.

Vulnerability of the Red Sea Corridor

- **Chokepoint:** The **Bab-el-Mandeb Strait**, linking the Red Sea and Gulf of Aden, concentrates a majority of Asia–Europe cables.
- **Conflict Exposure:** **Houthi hostilities** and naval tensions in the Red Sea threaten infrastructure security.
- **Anchor & Shipping Damage:** Heavy maritime activity and accidental anchoring frequently cut or stress cables.

About Undersea (Submarine) Cables

- **Nature:** Fibre-optic cables laid on ocean floors, spanning over **1.5 million km** globally.
- **Working Principle:** Use **total internal reflection** to transmit terabits of data as light pulses.
- **Repeaters:** Optical amplifiers placed every **60–80 km** maintain signal strength.
- **Dependence:** Carry nearly **99%** of international internet and telecom traffic.

Advantages

- **Ultra-High Bandwidth:** Offer much greater capacity and lower latency than satellites.
- **Cost-Effective:** Cheaper per bit than satellite links, scalable with demand.
- **Reliability:** Multiple paths allow rerouting during localised outages.

Challenges

- **Physical Damage:** From anchors, trawling, earthquakes.
- **Repair Bottlenecks:** Require specialised ships and multi-nation clearances.
- **Security Threats:** Espionage, sabotage, or conflict-driven disruptions.
- **Environmental Risks:** Coastal erosion and tectonic activity affect routes.

India's Undersea-Cable Ecosystem

- **Regulator:** **Department of Telecommunications (DoT)** licences and monitors systems.
- **Network Footprint:** **17 international cables** across **14 landing stations** in **five coastal cities**—mainly **Mumbai & Chennai**.
- **Capacity Growth:** Activated bandwidth expanded **nine-fold** since 2016 to **132 Tbps (2023)**.
- **Upcoming Projects:** **2Africa Pearls (Meta-led)**, **India-Asia Xpress (IAX)**, and **India-Europe Xpress (IEX)** to boost redundancy and lower latency.



HOT Question: “Assess how geopolitical conflicts and chokepoint vulnerabilities in undersea-cable corridors can impact India’s digital economy and strategic autonomy. Suggest measures to enhance cable security and redundancy.”

25. Oil India Reports First Hydrocarbon Discovery in the Andaman Basin



Oil India Ltd (OIL) announced the first discovery of hydrocarbons during its ongoing exploration in the **Andaman Basin**, marking a breakthrough in India's frontier deep-water energy exploration and potentially expanding the nation's hydrocarbon map.

Geographical Context

- **Location:** The Andaman Basin forms part of the **Bengal–Arakan geological province**, lying between the **Andaman and Nicobar basins**.
- **Tectonics:** Situated along the **Indian Plate–Burma microplate boundary**, shaped by **subduction and deformation** processes.
- **Regional Continuity:** Geologically connected to **North Sumatra (Indonesia)** and **Irrawaddy–Margui (Myanmar)** – both known for rich hydrocarbon deposits.

Strategic & Economic Significance

- **Energy Security:** India imports ~88% of crude oil and ~50% of natural gas; a commercial find here could reduce import dependence.
- **Diversification:** Opens a **new offshore exploration frontier** beyond existing basins like **Krishna–Godavari, Cambay, and Mumbai Offshore**.
- **Indo-Pacific Leverage:** Strengthens India's **energy presence in the Bay of Bengal**, vital for Indo-Pacific maritime strategy.
- **Sustainability:** Discovery of natural gas (a cleaner fuel) supports India's **COP commitments and net-zero goals**.
- **Economic Boost:** Deep-sea exploration could generate local jobs, infrastructure, and foreign investment.

Government Initiatives

- **HELP (2016):** Unified exploration licence for all hydrocarbons with revenue-sharing and pricing freedom.
- **National Deep-Water Exploration Mission:** Promotes offshore exploration using advanced technology.
- **OALP:** Enables companies to bid for exploration blocks year-round.
- **National Data Repository (NDR):** Centralised geoscientific database aiding investor access.
- **FDI Policy:** 100% FDI permitted in exploration and production.
- **No-Go Area Opening:** Allows private and public entities to explore previously restricted offshore zones.



UPSC Relevance: **GS Paper 1 (Geography):** Plate boundaries, marine basins, tectonics. **GS Paper 3 (Economy & Environment):** Energy security, import dependence, renewable transition, hydrocarbon policy reforms.



HOT Question: “Discuss how the discovery of hydrocarbons in the Andaman Basin could reshape India's energy security landscape and its strategic presence in the Indo-Pacific.”

26. Israel Conducts First-Ever Airstrike on Qatar, Targeting Hamas Leaders in Doha



In September 2025, Israeli fighter jets struck targets in **Doha**, allegedly housing Hamas leaders under Qatari protection. This unprecedented move marked **Israel's first direct attack on a Gulf Arab state**, escalating regional tensions and disrupting **US-led ceasefire negotiations** in Qatar.

Background and Context

- **Target:** The strike aimed to eliminate Hamas leadership operating from Doha, which has acted as a mediator in the Gaza conflict.
- **Trigger:** Israel accused Qatar of indirectly sheltering and funding Hamas amid stalled ceasefire talks.
- **Timing:** Occurred during sensitive **US-Qatar-led negotiations** to halt the Gaza offensive.

Regional and Global Impact

- **Geopolitical Shock:** First-ever Israeli attack on a US-allied Gulf state, highlighting Tel Aviv's growing autonomy from Washington.
- **Arab Realignment:** Shifts focus among Arab states — from countering Iran to **reassessing Israel's assertive military posture**.
- **International Fallout:** Spain and several EU members called for sanctions; the **UN Security Council** convened an emergency session.
- **Energy Risks:** Qatar, one of the world's top LNG suppliers, faces heightened geopolitical risk affecting global gas markets.
- **Strategic Pattern:** Follows Israel's **June 2025 strike on Iran**, indicating a broader doctrine of preemptive regional action.

Implications for India

- **Energy Security:** India imports ~45% of its LNG from Qatar; conflict-induced instability could raise energy prices.
- **Diaspora Safety:** Over **700,000 Indian workers** in Qatar risk exposure to conflict-related disruptions.
- **Diplomatic Tightrope:** India condemned the attack while reaffirming ties with all stakeholders — Israel (defence), Qatar (energy), and the U.S. (strategic).
- **Policy Relevance:** Reinforces India's advocacy for de-escalation and adherence to the **Two-State Solution** in West Asia.



UPSC Relevance: **GS Paper 2:** India's foreign policy, bilateral and regional groupings, West Asia diplomacy.
GS Paper 3: Energy security, global trade risks, impact on diaspora



HOT Question: "Critically analyse how Israel's first-ever strike on a Gulf state could reshape regional alliances and affect India's energy and diaspora interests in West Asia."

27. Australia, Canada & UK Recognise the State of Palestine — Historic Western Policy Shift



Ahead of the **80th UN General Assembly Session**, **Australia, Canada, and the United Kingdom** formally recognised the **State of Palestine**, joining 147 out of 193 UN member states — including **India, China, and Russia** — that already recognise Palestinian statehood. The move is expected to influence the global debate on the **Two-State Solution**.

Background

- The **Palestinian territories** include the **West Bank, East Jerusalem, and Gaza Strip** — occupied since the 1967 Six-Day War.
- The **State of Palestine** declared independence in 1988 under the **Palestine Liberation Organization (PLO)**, gaining UN “non-member observer state” status in 2012.
- Recognition by traditional Western allies marks a **major diplomatic realignment**.

Implications

For Palestinians:

- Strengthens diplomatic legitimacy and access to international bodies like the **International Criminal Court (ICC)**.
- Raises global pressure on Israel to **restore humanitarian access** and resume peace negotiations.

For Israel:

- Reflects **growing isolation** among its traditional allies.
- Raises fears that recognition may **embolden Hamas** and weaken Israel’s security narrative.

For Global Politics:

- Marks the **first coordinated Western recognition** of Palestine, signalling a tilt towards **multilateral diplomacy**.
- Puts pressure on the **United States**, which continues to veto full UN membership for Palestine.
- Revives debate around the **Two-State Solution**, the long-standing framework envisioning peaceful coexistence between Israel and Palestine.

India’s Stand

- India was **among the first non-Arab countries** to recognise the State of Palestine in **1988**.
- India supports the **Two-State Solution**, calling for sovereign, independent states within secure and recognised borders, while maintaining strong relations with Israel.



HOT Question: “Discuss the significance of Western recognition of Palestine in reshaping global diplomatic alignments and its implications for India’s West Asia policy.”

28. India Backs 'New York Declaration' at UNGA Supporting the Two-State Solution for Palestine



On **12th September 2025**, India voted in favour of a **UN General Assembly resolution** endorsing the '**New York Declaration**' on the peaceful settlement of the Palestine issue. The resolution, **introduced by France**, was adopted with **142 nations in favour**, **10 against** (including the US and Israel), and **12 abstentions**.

About the New York Declaration

- Adopted at a **high-level UN conference (July 2025)** co-chaired by **France and Saudi Arabia**.
- Reaffirms global commitment to a **peaceful, just, and lasting resolution** of the **Israeli–Palestinian conflict** through the **Two-State Solution**.
- Urges collective international action to end the **Gaza conflict**, ensure humanitarian access, and protect civilians.

Key Provisions

- **Call on Israel:**
 - Commit publicly to the **Two-State Solution**.
 - Cease **settlement expansion, land annexation**, and **violence** against Palestinians.
 - Uphold international humanitarian law in the **Occupied Palestinian Territories (OPT)**, including **East Jerusalem**.
- **Palestinian Rights:**
 - Reaffirms the **right to self-determination**.
 - Declares **Gaza** an inseparable part of a **unified Palestinian state** with the **West Bank**.
- **Warning:**
 - Without global guarantees and enforcement, the conflict may **escalate**, threatening **regional peace**.

India's Stand

- India reaffirmed its long-standing support for the **Two-State Solution**, calling for the creation of **an independent, viable, and sovereign Palestine** coexisting peacefully with Israel within secure and recognised borders.
- India continues to maintain **balanced diplomacy** – supporting **Palestinian statehood** while deepening **defence, technology, and trade cooperation with Israel**.

Opposition

- The resolution was opposed by **Israel, the United States, Hungary, and Argentina**, among others – arguing that it unfairly targeted Israel and ignored Hamas's role in violence.



HOT Question: "Critically analyse India's support for the New York Declaration on Palestine in the context of balancing its strategic ties with both Israel and the Arab world."

29. OPEC+ 'Voluntary Eight' to Raise Oil Output from October 2025, Prioritising Market Share Over Price Stability



The core group of eight OPEC+ countries, known as the *Voluntary Eight*, announced an increase in crude oil production to **137,000 barrels per day from October 2025**, marking a strategic shift towards expanding market share amid growing competition from non-OPEC producers.

About the Voluntary Eight and OPEC+

- The *Voluntary Eight* include **Saudi Arabia, Russia, Iraq, UAE, Kuwait, Kazakhstan, Algeria, and Oman**, representing the core bloc coordinating OPEC+'s voluntary output cuts or increases.
- **OPEC+ (Vienna Group)** was formed in **2016**, comprising **13 OPEC members and 10 non-OPEC oil-producing nations** (e.g., Russia, Oman, Kazakhstan).
- Collectively, OPEC+ supplies **around 40% of global crude output** and influences oil prices worldwide.

Factors Driving Production Hike

- **Market Share Reclaim:** The group seeks to regain lost share from non-OPEC producers like **Brazil, Guyana, and the U.S. shale industry**.
- **Quota Breaches:** Persistent non-compliance by Iraq and Kazakhstan weakened internal discipline.
- **Post-COVID Demand Divergence:** A *K-shaped recovery* led to uneven global consumption.
- **Geopolitical Dynamics:** U.S. sanctions, Gulf politics, and Russia's wartime needs altered output strategies.
- **Saudi Strategy:** Riyadh, acting as a *swing producer*, prioritises influence over price stability to retain leadership within OPEC+.

Economic Implications

- **For Global Markets:** Increased supply may soften crude prices, lowering inflationary pressures.
- **For India:** India, the world's **third-largest crude importer (over 85% import dependency)**, could benefit from stable or reduced prices but faces risks of volatility from geopolitical shocks.



UPSC Relevance: **GS Paper 2:** India's energy diplomacy, global groupings and their effect on India's interests. **GS Paper 3:** Energy security, global oil market trends, and macroeconomic impact on inflation and fiscal deficit.



HOT Question: "OPEC+ has evolved from a price-fixing cartel to a strategic market influencer." Analyse this transformation and its implications for India's energy security

30. India Signs 15-Year Contract with the International Seabed Authority to Explore Polymetallic Sulphides in the Carlsberg Ridge



On **20th September 2025**, India signed a **15-year exploration contract** with the **International Seabed Authority (ISA)** for **exclusive rights to explore Polymetallic Sulphides (PMS)** in the **Carlsberg Ridge** of the Indian Ocean. This makes India **the first country globally** to hold **two such exploration contracts**, reaffirming its leadership in deep-sea resource research.

About Polymetallic Sulphides (PMS)

- **Definition:** PMS are mineral deposits formed by **precipitation of metals from hydrothermal fluids** emerging from oceanic crusts.
- **Composition:** Rich in **iron, copper, zinc, silver, gold, and platinum**, vital for renewable energy technologies, electronics, and green infrastructure.
- **Formation Sites:** Found along **mid-ocean ridges** and **volcanic hydrothermal vents**.

India's Ocean Exploration Milestone

- **New Contract (2025):** For the **Carlsberg Ridge**, located in the northwest Indian Ocean.
- **Existing Contract (2016):** For **Central Indian Ridge & Southwest Indian Ridge**.
- **Implementing Agency:** **Ministry of Earth Sciences (MoES)** under the **Deep Ocean Mission** framework.
- **Strategic Benefit:** Expands India's blue economy footprint, enhances resource security, and boosts deep-sea technological capabilities.

About the International Seabed Authority (ISA)

- **Origin:** Established under the **1982 UN Convention on the Law of the Sea (UNCLOS)** and the **1994 Implementation Agreement (Part XI)**.
- **Headquarters:** Kingston, Jamaica.
- **Membership:** 170 Members (169 States + European Union).
- **Mandate:** Organises, regulates, and controls mineral-related activities in the **international seabed area ("Area")** beyond national jurisdictions.
- **Motto:** "*Common Heritage of Mankind*" – ensuring equitable use of ocean resources for all humanity.

Carlsberg Ridge:

- Located between **the Arabian and Somali basins**, part of the seismically active **mid-ocean ridge system** in the Indian Ocean, formed by divergent plate boundaries.



UPSC Relevance: GS Paper 1: Oceanography – features and resource potential of the Indian Ocean. GS Paper 3: Blue Economy, Mineral Resources, and International Cooperation. Prelims: ISA–UNCLOS framework, mineral types (PMS, polymetallic nodules, cobalt crusts).



HOT Question: "India's dual contracts with the International Seabed Authority mark a new phase in its Blue Economy ambitions." Discuss the scientific and strategic implications of this development.

31. UAE Launches World's First Sovereign Mobility Cloud to Accelerate Autonomous Transport



On **25 September 2025**, the **United Arab Emirates (UAE)** launched its **first Sovereign Mobility Cloud** at the *Dubai World Congress for Self-Driving Transport*, marking a major step in creating a secure, AI-enabled digital foundation for next-generation autonomous transportation systems.

About the Sovereign Mobility Cloud

- Developed by **Core42's Sovereign Public Cloud** and powered by **Microsoft Azure**.
- Ensures **data sovereignty**, keeping all transport-related data **within UAE borders** under national regulations.
- Designed to support **high-definition mapping, vehicle telematics, fleet operations, traffic management**, and **digital twins** (virtual replicas of real-world systems).
- Managed deployment by **Space42**, which will lead integration, testing, and pilot programs.

Key Features

- **Regulatory Sandboxes & Test Hubs:** Enable safe experimentation and innovation for startups and research institutions under UAE's transport laws.
- **Cybersecurity & Privacy:** Protects mobility data against external access through sovereign-enabled encryption frameworks.
- **Collaboration Ecosystem:** Connects government, industry, and academia to co-develop smart mobility technologies.

Strategic Significance

- **Autonomous Mobility Leadership:** Positions UAE as a global pioneer in **AI-driven, sovereign transport infrastructure**.
- **Digital Sovereignty:** Reduces dependence on foreign data storage and enhances national control over critical digital assets.
- **Economic Growth:** Boosts the UAE's *Smart Dubai* and *UAE Centennial 2071 Vision* for sustainable, tech-led economic diversification.
- **Regional Benchmark:** Sets a model for other Gulf nations exploring AI-based urban mobility governance.



UPSC Relevance: **GS Paper 3:** Applications of AI, Data Sovereignty, Smart Infrastructure, and Transport Technology. **GS Paper 2:** E-Governance, Innovation Policy, and Global Technological Diplomacy.



HOT Question: "How do sovereign cloud platforms like the UAE's Mobility Cloud represent the intersection of data sovereignty, AI innovation, and smart-city governance? Examine their implications for India's autonomous mobility ambitions."

32. China Launches 'K Visa' to Attract Global STEM Talent amid Rising U.S. Visa Barriers



China introduced the **K visa** to attract young global talent in **Science, Technology, Engineering, and Mathematics (STEM)** fields, following the U.S. decision to impose a **\$100,000 fee on new H-1B visa applications**, making American tech migration costlier.

About the K Visa

- **Eligibility:** Open to foreign graduates from top global or Chinese universities with STEM degrees, and professionals involved in STEM research or education.
- **Flexibility:** Offers long-term stays, job mobility across research projects, and no mandatory local employer sponsorship – unlike most Chinese work visas.
- **Activities Permitted:** Employment, internships, collaborative research, and entrepreneurship in technology and innovation sectors.
- **Duration & Processing:** Multi-entry visa valid for up to **5 years**, with faster digital application processing.

Significance

- **Talent Magnetism:** Aims to counter U.S. and EU restrictions and make China a preferred destination for high-skilled global professionals.
- **STEM National Strategy:** Supports China's **Made in China 2025** and **Innovation-Driven Development Strategy**, strengthening its R&D base and technological self-reliance.
- **Soft Power Tool:** Enhances China's global image as an innovation-friendly hub amid rising geopolitical competition for tech talent.

Comparison: K Visa vs. U.S. H-1B

Feature	China's K Visa	U.S. H-1B Visa
Sponsorship	Not required	Employer-sponsored
Cap Limit	No cap	Annual cap (85,000)
Cost	Low	\$100,000 proposed fee
Mobility	Cross-job/project mobility allowed	Restricted to one employer
Focus	STEM research, education, innovation	Employment in U.S. firms



UPSC Relevance: GS Paper 2: International Relations – Global Human Resource Mobility, Soft Power Diplomacy **GS Paper 3:** Science & Tech – Innovation Ecosystems, Global Talent Competition. K Visa, STEM Talent Migration, H-1B Visa, Innovation Diplomacy, Talent Nationalism



HOT Question: “How do changing immigration and visa policies in major powers like the U.S. and China reflect the emerging global competition for STEM talent? Discuss the implications for India's innovation ecosystem.”

33. Modi–Xi Dialogue Revives Panchsheel: China Emphasises Five Principles of Peaceful Coexistence



During the recent **Modi–Xi bilateral meeting**, China reaffirmed the **Five Principles of Peaceful Coexistence (Panchsheel)** as the guiding framework for India–China relations, highlighting its historical and strategic importance in shaping Asian diplomacy and global order.

About Panchsheel

- Codified in the **1954 Agreement on Trade and Intercourse between India and the Tibet Region of China**, Panchsheel enshrines mutual respect for sovereignty and peaceful coexistence.
- **Five Principles:**
 1. Mutual respect for sovereignty and territorial integrity
 2. Mutual non-aggression
 3. Mutual non-interference in internal affairs
 4. Equality and mutual benefit
 5. Peaceful coexistence

Historical Evolution

- **1955 Bandung Conference:** Integrated Panchsheel into the *Ten Principles of International Peace*.
- **1957 UNGA Resolution:** Recognised Panchsheel as part of *international law and diplomacy*.
- **1961 Belgrade NAM Summit:** Elevated Panchsheel as a foundational principle of the *Non-Aligned Movement (NAM)*.

Contemporary Relevance

- **Strategic Autonomy:** Embodies India's *non-alignment and sovereignty* in a multipolar world.
- **Multilateral Diplomacy:** Reflected in India's participation in *BRICS, SCO, and G20*, emphasizing equality and cooperation.
- **Conflict Resolution:** Offers a non-military framework for resolving disputes and promoting global peace.
- **Maritime and Economic Dimension:** Encourages balanced trade partnerships and rules-based Indo-Pacific engagement.

Structural Challenges

- **Border Instability:** Doklam (2017) and Galwan (2020) incidents test the limits of peaceful coexistence.
- **Economic Imbalance:** India's trade deficit with China (~\$100 billion) undermines "mutual benefit."



UPSC Relevance: **GS Paper 2:** India and its Neighbourhood Relations, Bilateral Agreements, NAM, and Principles of Foreign Policy.
GS Paper 1 (History): Evolution of India's foreign policy and post-Independence diplomacy.



HOT Question: "Evaluate the contemporary relevance of the Panchsheel Principles in India–China relations. How do structural asymmetries challenge its implementation in the 21st century?"

34. UN High Seas Treaty Crosses Ratification Threshold: Morocco Becomes 60th Nation, Clearing Path for 2026 Enforcement



Morocco became the **60th country** to ratify the **UN High Seas Treaty (BBNJ Agreement)**, fulfilling the requirement for global enforcement by **January 2026**. The treaty establishes a legally binding framework for **conserving and sustainably using marine biodiversity beyond national jurisdictions**.

About the High Seas Treaty (BBNJ Agreement)

- **Adopted:** 2023 under the **United Nations Convention on the Law of the Sea (UNCLOS, 1982)**.
- **Full Name:** *Agreement on the Conservation and Sustainable Use of Marine Biological Diversity of Areas Beyond National Jurisdiction (BBNJ)*.
- **Coverage:** Applies to the **high seas**—areas beyond 200 nautical miles from coastlines, outside national EEZs.
- **Scope:** Encompasses **~two-thirds of the world's oceans** and nearly **half of Earth's surface**.

Key Provisions

1. **Marine Protected Areas (MPAs):** Enables countries to establish international MPAs to conserve ecosystems and endangered species.
2. **Environmental Impact Assessments (EIA):** Mandatory for planned activities such as deep-sea mining or industrial fishing to prevent ecological harm.
3. **Benefit Sharing:** Ensures **equitable sharing** of benefits from **marine genetic resources (MGRs)**, including those used in pharmaceuticals and biotechnology.
4. **Capacity Building & Technology Transfer:** Commits developed nations to support developing countries in research, conservation, and monitoring efforts.
5. **Decision-Making:** Operates under a **Conference of the Parties (COP)** structure for governance and compliance.



UPSC Relevance: **GS Paper 3:** Environment – Conservation of Marine Biodiversity, Sustainable Use of Natural Resources. **GS Paper 2:** International Institutions – Global Environmental Governance and Treaties.



HOT Question: “Discuss the significance of the UN High Seas Treaty (BBNJ Agreement) in promoting equitable and sustainable ocean governance. What challenges impede its global implementation?”

SEPTEMBER 2025

DEFENCE & INTERNAL SECURITY

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EPIC UPSC Classes



1. DRDO Transfers Technologies to Industry

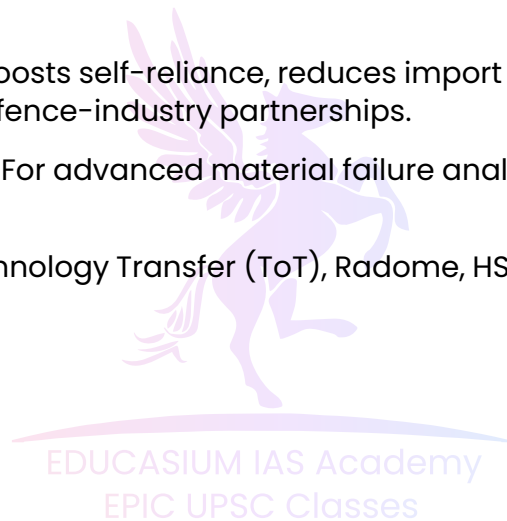


DRDO's Defence Metallurgical Research Laboratory (DMRL), Hyderabad, transferred three key defence materials technologies to Indian industries and signed an MoU with the Aircraft Accident Investigation Bureau (AAIB).

- **Transferred Technologies:**

- *High-Strength Radomes* → *BHEL (Jagdishpur)*: Protect missile sensors.
- *DMR-1700 Steel* → *JSPL (Angul)*: Ultra-high strength plates for defence platforms.
- *DMR-249A HSLA Steel* → *Bhilai Steel Plant (SAIL)*: Naval-grade plates for warships.

- **Significance:** Boosts self-reliance, reduces import dependence, strengthens defence-industry partnerships.
- **MoU with AAIB:** For advanced material failure analysis in aircraft accident investigations.
- **Keywords:** Technology Transfer (ToT), Radome, HSLA steel, Atmanirbhar Bharat.



UPSC Relevance: GS-2: Government-Industry collaboration, Defence policy. GS-3: Indigenisation of technology, Defence R&D, Self-reliance in strategic sectors.



HOT Question "Indigenisation of defence materials is as crucial as weapons manufacturing for India's strategic autonomy. Discuss."



2. Defence Procurement Manual 2025



The Ministry of Defence released **DPM 2025**, replacing the 2009 version, to streamline and accelerate revenue procurement worth nearly ₹1 lakh crore annually.

What is DPM?

Rulebook for procurement of goods/services for daily ops, maintenance, and readiness of Armed Forces & Defence Ministry establishments.

Key Features of DPM 2025:

Self-Reliance: Promotes indigenisation under revenue head, aligned with Finance Ministry norms.

Decentralisation: Procurement powers delegated to CFAs at field level → faster approvals.

Relaxed Penalties: No liquidated damages during development; minimal penalties post-prototype to encourage suppliers.

Broader Indigenisation Ecosystem:

DAP 2020: Prioritises "Buy Indian (IDDM)".

DPEPP 2020: Targets ₹1.75 lakh cr production & ₹35,000 cr exports by 2025.

iDEX / ADITI: Support to start-ups & MSMEs.

SRIJAN Portal & Positive Indigenisation Lists: Import substitution.

Defence Corridors: Infra push in UP & TN.

Keywords: DPM, CFA, revenue procurement, indigenisation, iDEX, DPEPP.



UPSC Relevance: GS-2: Government policies, transparency, public procurement reforms. GS-3: Defence modernisation, indigenisation, self-reliance in strategic sectors.



HOT Question: "Evaluate the significance of DPM 2025 in accelerating defence procurement while promoting indigenisation. How does it complement initiatives like DAP 2020 and iDEX?"



3. India's 15-Year Defence Modernisation Roadmap



The Ministry of Defence released the **Technology Perspective and Capability Roadmap (TPCR) 2025**, a 15-year vision document for capability development of the Indian Armed Forces.

What is TPCR?

A long-term roadmap identifying priority technologies, weapons, and systems for the Armed Forces.

Key Highlights of TPCR 2025:

- *Unmanned Systems*: UAVs & stealth UCAVs for surveillance & precision strikes.
- *Advanced Weapons*: Hypersonic missiles (scramjet propulsion), directed energy weapons.
- *Precision Firepower*: Loitering munitions, smart ammunition replacing conventional stockpiles.
- *Soldier Systems*: AR-enabled battlefield management & situational awareness.
- *Cyber Networks*: Secure satellite-based, cyber-hardened UAV communications.
- *Indigenisation*: Industry-military-government R&D partnerships to reduce imports.

Definitions:

- *UAV*: Drone, autonomous aircraft without onboard pilot.
- *UCAV*: Armed drone for offensive combat roles.

Keywords: TPCR, UCAV, scramjet, hypersonic missile, directed energy weapons, AR warfare.



UPSC Relevance: **GS-2:** Defence policy & governance.
GS-3: Science & Tech in defence, indigenisation, cybersecurity, strategic preparedness



HOT Question “Critically examine how the Technology Perspective and Capability Roadmap (TPCR) 2025 reflects the changing nature of warfare and India's pursuit of self-reliance in defence technology.”



4. DRDO, Social Innovators Shine at Changemaker



On **28th September 2025**, *The Hindu Businessline* hosted the 7th Changemaker Awards, honouring contributions in education, social welfare, digital innovation, indigenous production, and defence.

Major Awardees:

- *Changemaker of the Year*: **DRDO** – for its role in *Operation Sindoor*, neutralising enemy assets and safeguarding borders.
- *Digital Transformation Award*: **Bhashini** – AI-based language translation platform; processes 20+ million translation requests daily, bridging India's linguistic diversity.
- *Financial Transformation Award*: **Kalpana Kumari**, MD of Girijan Cooperative Corporation – promoted *Araku Valley Coffee* (Arabica variant), empowering tribal farmers with AI-driven livelihood support.

Significance:

- *DRDO*: Defence preparedness, indigenous capability.
- *Bhashini*: Digital governance, inclusivity through local languages.
- *Araku Coffee initiative*: Tribal empowerment, indigenous production, AI in agriculture.

Keywords: Operation Sindoor, Bhashini, AI in agriculture, Araku Coffee, Changemaker Awards.



UPSC Relevance: **GS-2:** Defence policy & governance.
GS-3: Science & Tech in defence, indigenisation, cybersecurity, strategic preparedness



HOT Question "Discuss how recognitions like the Changemaker Awards highlight the convergence of technology, governance, and social empowerment in India's development journey."



5. Indian Army's Advanced Air Defence Radars



The Indian Army is enhancing its **Akashteer air defence network** with new radar systems to detect and counter low radar cross-section (RCS) threats, including drones and stealth aerial objects.

- **About Akashteer:** Integrated command and control system for coordinating ground-based air defence weapons of the Army.
- **New Radar Systems:**
 - **LLLR-I (3D AESA):** 50 km range, tracks 100 targets, all-terrain operation.
 - **LLLR-E:** Equipped with EOTS & passive RF detection; detects swarm drones & camouflaged targets day/night.
 - **ADFCR-DD:** Mobile unit integrating search, track & fire-control radars with IFF; provides target data to VSHORADS.
 - **LLR (Low-Level Light Weight Radar):** Compact system for low-flying threats.
- **Key Tech:**
 - **AESA:** Electronically steered beams → faster, accurate detection.
 - **VSHORADS:** Man-portable missile systems for short-range aerial defence.
- **Significance:** Strengthens counter-drone capability, enhances situational awareness, critical for modern asymmetric warfare.
- **Keywords:** Akashteer, AESA, LLLR, ADFCR-DD, VSHORADS, counter-drone warfare.



UPSC Relevance: **GS-2:** Defence preparedness, governance in strategic sectors. **GS-3:** Science & Technology, cyber-physical security, asymmetric warfare challenges.



HOT Question

"Emerging threats like swarm drones and stealth UAVs demand new forms of air defence. Evaluate India's radar modernisation efforts with reference to the Akashteer upgrade."



6. Indian Army to Establish Drone Training Centres



After lessons from **Operation Sindoor**, the Indian Army announced the setting up of **19 drone training centres** across premier establishments, making drone proficiency compulsory for all ranks by 2027.

Roadmap:

- Drone hubs integrated into Category A institutions nationwide.
- Procurement of ~1,000 drones (nano, micro, small, medium, FPV) with simulators, indoor/outdoor ranges.
- Vendor-led training of 25 personnel each at Deolali, Mhow, Dehradun & Bengaluru.
- Training hubs fully operational by **Jan 2026**.
- Target: *Every soldier drone-trained by 2027* (ARTRAC initiative).

Strategic Significance:

- *Operational Preparedness*: Real-time ISR (intelligence, surveillance, reconnaissance), tactical strikes.
- *Modernisation*: Aligns with Army's UAV & counter-UAV integration at battalion level.
- *Skill Development*: Ensures standardised drone literacy across ranks, reducing dependence on specialists.

Keywords: Operation Sindoor, ARTRAC, FPV drones, ISR, UAV integration.



UPSC Relevance: **GS-2:** Defence policy, training reforms.
GS-3: Tech-driven modernisation of armed forces, asymmetric warfare, drones in security.



HOT Question "Operation Sindoor has underlined drones as decisive tools of modern warfare. How is the Indian Army institutionalising drone warfare capacity, and what challenges may arise in this transformation?"

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7. India's Theatre Command Plan



India is restructuring its military by creating **integrated theatre commands**, the biggest reform since Independence, to unify Army, Navy, and Air Force control under the CDS for joint operations.

- **What are Theatre Commands?**

Joint structures combining Army, Navy & Air Force assets under a single commander responsible for operations in a geographical theatre.

- **Rationale:**

- Prepares for *multi-domain warfare* (cyber, space, drones, precision strikes).
- Eliminates duplication of resources → faster decision-making.
- Promotes joint planning, procurement & training.
- Based on *Shekatkar Committee (2015)* recommendation of 3 major commands:
 - *Northern*: China border.
 - *Western*: Pakistan border.
 - *Southern*: Maritime domain.

- **Challenges:**

- *IAF Concerns*: Division of scarce assets, doctrinal dilution.
- *Resource Allocation*: Army budget dominance worries Navy & IAF.
- *Doctrinal Issues*: Over-centralisation vs. service-specific flexibility.
- *Comparative Risk*: Foreign models may not suit India's context.

- **Way Forward:**

- Phased rollout & pilot commands.
- Doctrinal harmony & role clarity.
- Civil-military dialogue for consensus.

- **Keywords:** Theatresisation, CDS, Shekatkar Committee, jointness, multi-domain warfare.



UPSC Relevance: **GS-2:** Defence reforms, civil-military relations, government committees. **GS-3:** Security challenges, force modernisation, multi-domain warfare.



HOT Question "India's creation of integrated theatre commands is hailed as the biggest defence reform since Independence. Critically analyse its benefits and challenges in the Indian security context."



8. Reforms for Modernising Cantonments



The Government of India is preparing a **roadmap to modernise cantonments**, making them sustainable, citizen-friendly urban ecosystems with better governance and civic amenities.

- **Key Reform Initiatives:**
 - Renewable energy adoption → *net-zero emissions*.
 - *e-Chhawani 2.0*: Upgraded digital platform for online civic services.
 - Reduced penalties under the *Jan Vishwas Act* to improve ease of living.
- **About Cantonments:**
 - *Definition*: Permanent military stations where troops are housed; also inhabited by civilians.
 - *History*: Established by East India Company after *Battle of Plassey (1757)*; first at *Barrackpore (1765)*.
 - *Administration*: Union Government jurisdiction (Union List, Entry 3, Schedule VII).
 - *Governance*: Managed by *Cantonment Boards* under *Cantonments Act, 2006*.
 - *Structure*: 4 classes of Boards (Class I–IV) based on population & area, with civilian–military representation.
- **Significance of Reforms:**
 - Strengthens civil–military harmony in urban areas.
 - Ensures sustainable growth, digital governance, and efficient service delivery.
 - Reduces conflicts between military control and civilian needs.
- **Keywords**: e-Chhawani, Jan Vishwas Act, Cantonments Act 2006, Barrackpore 1765, Union List Entry 3.



UPSC Relevance: **GS-1:** Urbanisation & colonial legacies.
GS-2: Local governance, statutory bodies, digital platforms.
GS-3: Sustainability, net-zero, defence land management.



HOT Question “Discuss the challenges in managing India’s cantonments and evaluate the significance of ongoing reforms in balancing defence needs with civilian urban governance.”



9. India's Mega Drone Drill 'Cold Start'



India will hold a **tri-service exercise named 'Cold Start'** in Madhya Pradesh, the largest such drill since *Operation Sindoor*, to test drones and counter-drone systems against emerging aerial threats.

- **About the Exercise:**
 - Tri-service participation: Army, Navy, Air Force.
 - Partners: Industry, R&D agencies, academia.
 - Focus: Drone deployment, swarm tactics, counter-drone measures.
 - Location: Madhya Pradesh.
- **Significance:**
 - Builds jointness & integrated defence readiness.
 - Strengthens India's counter-drone warfare capability.
 - Compared to *Sudarshan Chakra* – protection in all directions, enhancing strategic edge.
- **Context:**
 - *Operation Sindoor* showed drones as central to modern combat.
 - Cold Start doctrine (earlier Army war strategy against Pakistan) now symbolically adapted for joint exercises.
- **Keywords:** Cold Start exercise, Operation Sindoor, tri-service integration, counter-drone warfare.



UPSC Relevance: **GS-2:** Defence reforms, jointness of services.
GS-3: Emerging technologies in warfare, UAV & counter-UAV systems, security preparedness.



HOT Question "Emerging drone warfare has compelled India to rethink joint military doctrines. Discuss the significance of exercises like Cold Start in strengthening integrated defence preparedness."

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10. Indian Navy's Shipbuilding Programme



The Indian Navy is pursuing its **largest-ever indigenous shipbuilding programme**, with 54 vessels under construction, central to India's **SAGAR vision** (Security and Growth for All in the Region).

- **Programme Highlights:**
 - *Scale:* 54 vessels under construction → fleet >200 by 2035, ~230 by 2037.
 - *Indigenisation:* Core to **Atmanirbhar Bharat**; shifts India from import dependency to domestic production.
 - *Economic Impact:* Boosts autonomy, creates large-scale employment, strengthens defence industrial base.
- **INS Androth:**
 - Second of 8 **Arnala-class ASW Shallow Water Crafts** (built by GRSE, Kolkata).
 - Named after *Androth Island* (Lakshadweep).
 - Specs: 77m vessel, diesel-waterjet propulsion, advanced SONAR, lightweight torpedoes, indigenous rockets.
 - *Indigenous Content:* ~80%.
 - *Role:* Enhances **anti-submarine warfare & coastal defence** in shallow waters.
- **Significance:**
 - Strengthens **SAGAR vision** and maritime security.
 - Reduces reliance on foreign platforms.
 - Enhances surveillance and deterrence in IOR (Indian Ocean Region).
- **Keywords:** SAGAR, Arnala-class, INS Androth, GRSE, Atmanirbhar Bharat, ASW.



UPSC Relevance: **GS-2:** Maritime diplomacy, SAGAR vision. **GS-3:** Indigenisation, defence production, Blue Economy, employment generation.



HOT Question: "India's SAGAR vision requires not just maritime diplomacy but also naval self-reliance. Analyse how the Navy's indigenous shipbuilding programme addresses both security and economic objectives."



11. Indian Navy Commissions INS Aravali in Gurugram



On **12th September 2025**, the Indian Navy commissioned **INS Aravali** at Gurugram, a naval base focused on enhancing information, communication, and maritime domain awareness capabilities.

- **About INS Aravali:**
 - Location: Gurugram, Haryana.
 - Role: Strengthens command, control, communication, and Maritime Domain Awareness (MDA).
 - Symbolism: Named after *Aravali Range* → steadfastness & resilience.
 - Crest: Mountains & rising sun → vigilance, strength, advanced tech dawn.
 - Motto: “*Maritime Security through Collaboration.*”
- **Strategic Significance:**
 - Supports **MAHASAGAR vision** (*Mutual and Holistic Advancement for Security and Growth Across Regions*).
 - Reinforces India as *Preferred Security Partner* in the Indian Ocean Region (IOR).
 - Enhances interoperability, coordination, and domain awareness in multi-domain security.
- **Keywords:** INS Aravali, Maritime Domain Awareness, MAHASAGAR, IOR security, Gurugram.



UPSC Relevance: **GS-2:** India's maritime diplomacy, role in IOR, MAHASAGAR vision. **GS-3:** Naval modernisation, information & communication infrastructure for security.



HOT Question: “Critically analyse the significance of INS Aravali in advancing India's MAHASAGAR vision and strengthening its role as a net security provider in the Indian Ocean Region.”



12. India's Maritime Reforms



India enacted a **comprehensive maritime legislative reform in 2025**, streamlining port, shipping, and coastal governance while raising concerns of centralisation, ownership, and regulatory overreach.

- **Key Legislations (2025):**
 - *Indian Ports Bill*: Sets up **Maritime State Development Council (MSDC)** to align port policies.
 - *Merchant Shipping Act*: Allows partial foreign ownership; mandates registration of all vessels; recognises *Bareboat Charter-Cum-Demise (BBCD)* leasing.
 - *Coastal Shipping Act*: Mandates a National Strategic Plan on cabotage & vessel licensing.
 - *Carriage of Goods by Sea Bill*: Aligns liability norms with *Hague-Visby Rules*.
- **Other Initiatives:**
 - *One Nation One Port (ONOP)*: Single-window documentation.
 - *Green Tug Transition & Harit Sagar*: Push for zero-carbon operations.
 - *Sagarmala 2.0*: ₹40,000 cr shipbuilding, recycling & port modernisation.
 - *Jal Marg Vikas*: Boost NW-1 Haldia-Varanasi waterway.
- **Gains:**
 - Port turnaround time cut to ~48 hrs (↑ efficiency by 49%).
 - Inland freight rose 8x (18.1 → 145.5 MMT).
 - ~100 MMT capacity unlocked under *Project Unnati*.
 - ₹5.79 lakh cr projects identified under PPP model.
- **Concerns:**
 - Centralisation weakens *cooperative federalism*.
 - Clause 17 excludes civil courts → weaker oversight.
 - Foreign equity rules unclear → ownership risks.
 - Heavy compliance burden for small operators.
 - 75% of India's transshipment handled abroad (loss ~\$200m annually).
- **Keywords:** MSDC, BBCD leasing, Hague-Visby Rules, Sagarmala 2.0, Harit Sagar, ONOP.



UPSC Relevance: **GS-2:** Federalism, Centre-State relations, regulatory bodies. **GS-3:** Infrastructure, Blue Economy, logistics efficiency, sustainability.



HOT Question "India's maritime legislative overhaul of 2025 promises efficiency but raises constitutional and sovereignty concerns. Critically evaluate."



13. Agni-Prime Tested from Rail-Based Mobile Launcher System



India successfully conducted a test of the **Agni-Prime nuclear-capable ballistic missile** from a *rail-based mobile launcher system*, enhancing cross-country mobility and rapid response capability.

About Agni-Prime:

- *Range*: ~2000 km; medium-range, nuclear-capable.
- *Developer*: DRDO.
- *Design*: Two-stage, solid-propellant, canisterised → lightest Agni variant.
- *MIRV (Multiple Independently Targetable Re-entry Vehicle)*: Can carry & release multiple warheads at different targets from a single missile.
- *Launch Features*:
 - *Cold Launch*: Gas ejection from canister before motor ignition → safety + faster prep.
 - *Salvo Mode*: Multiple launches in succession to overwhelm defences.

Strategic Significance:

- Enhances survivability of missile forces (mobility, quick deployment).
- Strengthens deterrence posture vis-à-vis regional threats.
- Supports India's no-first-use but credible minimum deterrence policy.

Keywords: Agni-Prime, MIRV, Canisterised Missile, Cold Launch, Salvo Mode, DRDO.



UPSC Relevance: GS-2: Strategic security, India's nuclear doctrine.

GS-3: Indigenisation in defence tech, missile programme.



HOT Question "Agni-Prime reflects both technological sophistication and strategic mobility in India's deterrence arsenal. Discuss its significance in the evolving regional security environment."



14. Death Crescent and Death Triangle



India reframed the terms **Golden Triangle** and **Golden Crescent** as **Death Triangle** and **Death Crescent** to highlight narcotics' destructive social, economic, and security impact.

- **Rationale for Change:**
 - *Deterrence Strategy*: "Death" strips glamour, linking drugs with mortality.
 - *Perception Management*: Removes positive "Golden" economic connotation.
 - *Policy Alignment*: Supports NDPS Act, 1985 & *Nasha Mukht Bharat* campaign.
- **About Death Crescent (Afghanistan–Pakistan–Iran):**
 - Produces ~80% of global *opium* & *heroin*.
 - *Afghanistan*: World's largest producer/exporter.
 - Weak governance, Taliban insurgencies, and porous borders enable trafficking.
- **About Death Triangle (Myanmar–Laos–Thailand):**
 - Traditional hub of opium cultivation (Mekong tri-border).
 - *Myanmar's Shan State*: Major producer of synthetic methamphetamines.
 - Remote terrain aids concealment of drug labs & smuggling corridors.
- **Significance for India:**
 - Both regions feed into South Asia's trafficking routes.
 - Narco-terrorism financing insurgencies and organised crime.
 - Public health crisis, youth addiction, and socio-economic burden.
- **Keywords:** NDPS Act, *Nasha Mukht Bharat*, Death Crescent, Death Triangle, Narco-terrorism.



UPSC Relevance: **GS-2:** Policy & governance (NDPS Act, anti-narcotics strategy). **GS-3:** Internal security, narco-terrorism, border management, transnational organised crime.



HOT Question "Discuss how the renaming of Golden Triangle and Golden Crescent as 'Death Triangle' and 'Death Crescent' reflects India's evolving strategy against narcotics and narco-terrorism."



15. AFSPA Extended in Manipur, Arunachal & Nagaland



The Ministry of Home Affairs extended the **Armed Forces (Special Powers) Act, 1958 (AFSPA)** for six months in parts of the Northeast due to persisting ethnic violence and insurgency.

State-wise Extension:

- *Manipur*: Entire state under AFSPA except 13 police stations in 5 valley districts; reason – ongoing ethnic violence (since May 2023).
- *Nagaland*: In force in 9 districts + 21 police stations across 5 districts; reason – Naga insurgency.
- *Arunachal Pradesh*: 3 full districts + parts of Namsai; reason – cross-border militant activity.

About AFSPA (1958):

- *Declaration (Sec 3)*: Centre/Governor/UT Admin can declare “disturbed area”; reviewed every 6 months.
- *Powers (Sec 4)*: Use lethal force, arrest without warrant, search without warrant.
- *Assembly Ban*: Prohibits gatherings of 5+ people.
- *Immunity (Sec 6)*: No prosecution without Central sanction.
- *Review Mechanism*: To prevent permanent imposition.

Significance:

- Ensures operational flexibility for Armed Forces in insurgency-hit zones.
- Criticised for *human rights concerns*, limited accountability, and conflict with democratic freedoms.

Keywords: Disturbed Area, Sec 3 & 4 AFSPA, Immunity Clause, Insurgency, Human Rights.



UPSC Relevance: **GS-2:** Federalism, Centre–State relations, rights vs security. **GS-3:** Internal security, insurgency in Northeast, border management.



HOT Question: “AFSPA is often called a ‘necessary evil’ in India’s internal security framework. Critically analyse its relevance in the context of insurgency in the Northeast.”



SEPTEMBER 2025

ECONOMY

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2. De-Dollarisation
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1. India's GDP Growth Faces "Foreign Capital Paradox" Amid Weak Inflows



Despite **robust GDP growth in FY 2024–25**, India saw **historically weak foreign capital inflows**, raising concerns over financing stability, BoP management, and investment sustainability.

- **Key Numbers (FY 2024–25):**
 - Gross FDI inflows: **\$81 bn**, but **net FDI = \$0.4 bn** (sharp collapse).
 - FPIs: **\$15 bn equity outflows**, but **\$19 bn bond inflows** provided cushion.
 - ECB inflows: **\$15.8 bn** stabilised BoP.
 - Outward FDI: **\$29.2 bn** (+75%), draining domestic capital.
- **Paradox:** Strong GDP ≠ Strong capital inflows.
 - Causes: Weak earnings, high valuations, tariff uncertainty, regulatory hurdles, IPO exits.
- **Consequences:**
 - *BoP Pressure* → financing CAD harder.
 - *Rupee Depreciation* risk.
 - *Reserve Decline* → external vulnerability.
 - *Growth Impact* → lower investment financing.
 - *Debt Risk* → ECB reliance raises repayment burden.
- **Policy Measures:**
 - GST relief to boost consumption.
 - *Reform Taskforce* for ease of doing business.
 - *BIT update* for investor protections.
 - *PLI expansion* to draw greenfield FDI.
 - *SEBI oversight* for transparency.
- **Way Forward:**
 - Simplify approvals & compliance.
 - Strengthen arbitration & dispute resolution.
 - Build infrastructure corridors to attract capital.
 - Balance FDI inflows with outward FDI.
 - Deepen corporate bond markets.
- **Keywords:** Net FDI, FPI, ECB, outward FDI, capital account, BoP.



UPSC Relevance: **GS-2:** Bilateral investment treaties, global trade risks. **GS-3:** Economy – BoP, FDI vs FPI, external sector stability.



HOT Question: "India's strong GDP growth has not translated into robust foreign capital inflows. Analyse the reasons behind this paradox and its implications for India's growth financing."

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2. Global Reserve Diversification Signals Gradual De-Dollarisation



Recent global data show a steady diversification of foreign exchange reserves, indicating gradual de-dollarisation, even though U.S. Treasuries remain the world's primary "safe-haven" asset.

What is De-Dollarisation?

Definition	The deliberate reduction of the U.S. dollar's dominance in international trade, finance, and reserve management.
Objective	Reduce vulnerability to U.S. sanctions, exchange rate volatility, and political conditionalities.
Instruments	Use of local currencies, regional payment systems, commodity-based reserves, and non-dollar asset diversification.
Driver	Explanation
Sanctions Risk	The U.S. weaponisation of finance (sanctions, SWIFT bans) prompted countries to seek autonomy in payments.
Fiscal Strains in U.S.	Repeated debt-ceiling crises and rising U.S. deficits have eroded the "risk-free" perception of Treasuries.
Trade Realignments	Bilateral trade settlements in local currencies (e.g., India-Russia, China-Brazil) reduce dollar dependence.
Gold Preference	The pandemic and wars (Ukraine, Middle East) triggered a return to hard-asset reserves for stability.
Technological Alternatives	Emergence of BRICS Pay, Cross-Border Interbank Payment Systems (CIPS), and CBDCs as non-SWIFT channels.

The Indian Context

- **RBI Strategy:** Increasing gold holdings and diversifying forex reserves to reduce exposure to dollar fluctuations.
- **Rupee Trade:** India settling oil imports with Russia, UAE, and Sri Lanka in INR.
- **Digital Infrastructure:** UPI and RuPay integration in cross-border settlements.
- **Gold Policy:** India now among top 10 central bank gold buyers post-2020 pandemic era.



HOT Question: "De-dollarisation is less about dethroning the dollar and more about hedging against its dominance."
Discuss with reference to recent global reserve diversification trends.



3. India's Trade Deficit with China Hits \$99.2 Billion in FY 2024–25



India's trade deficit with China touched **\$99.2 billion in 2024–25**, accounting for ~35% of India's overall trade imbalance, raising alarms over structural dependence and economic vulnerability.

- **Why Deficit is a Concern:**
 - *Structural Dependence:* China dominates imports in pharma, electronics, renewables, consumer goods.
 - *Critical Inputs:* 97.7% erythromycin, 96.8% silicon wafers, 86% flat panels, 82.7% solar cells, 75.2% lithium-ion batteries from China.
 - *Everyday Goods:* 80.5% laptops, 91.4% embroidery machinery, 98.9% viscose yarn sourced from China.
- **Risks of Dependence:**
 - Strategic leverage in crises.
 - India's share in bilateral trade shrank to 11.2% (from 42.3% two decades ago).
 - Cheap imports disincentivise local manufacturing, erode competitiveness.
- **Impact of Rising Deficit:**
 - Forex reserve pressure.
 - Rupee depreciation → import-led inflation.
 - Hollowing out of domestic industry, slowing industrial growth.
- **Policy Measures:**
 - *PLI Schemes* (14 sectors) to promote domestic manufacturing.
 - *Quality Standards* & certifications to limit substandard imports.
 - *Supply Diversification* & alternative sourcing encouraged.
 - *Import Monitoring* by DGTR.
 - *Anti-dumping duties* on several Chinese products.
- **Keywords:** Trade deficit, supply chain dependence, PLI scheme, DGTR, anti-dumping.



UPSC Relevance: **GS-2:** India–China relations, strategic leverage of trade. **GS-3:** External sector, industrial policy, self-reliance vs dependence.



HOT Question: "India's ballooning trade deficit with China reflects both economic dependence and strategic vulnerability. Analyse its causes, risks, and policy responses."

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4. India Records \$11.11 Billion Gross FDI Inflow in July 2025, Highest Since May 2021



The **RBI reported \$11.11 billion FDI inflow in July 2025**, the strongest monthly inflow in over 4 years, reflecting renewed investor confidence amid global headwinds.

- **About FDI:**
 - Defined as non-resident acquiring $\geq 10\%$ equity in listed companies / any equity in unlisted.
 - *Stable capital*: Long-term, non-debt, unlike volatile FPIs.
 - *Governance*: Consolidated FDI Policy 2020 + FEMA (Non-Debt Instruments) Rules 2019.
 - *Regulators*: DPIIT (policy), RBI (enforcement).
 - *Prohibited sectors*: Atomic energy, gambling, chit funds, tobacco, Nidhi cos, real estate (except development).
- **Routes:**
 - *Automatic Route*: No prior approval; post-reporting to RBI.
 - *Government Route*: Prior approval via FIPF (e.g., defence, multi-brand retail, broadcasting).
- **Types & Methods:**
 - *Horizontal, Vertical, Conglomerate FDI*.
 - *Greenfield*: New setup (e.g., Hyundai Tamil Nadu plant).
 - *Brownfield*: Acquisition (e.g., Vodafone–Hutchison).
- **Recent Trends (2024–25):**
 - Gross FDI: **\$81 bn**, +14% YoY.
 - Cumulative inflows since 2000: >\$1 trillion; \$748.78 bn since 2014.
 - **Top Sources**: Singapore (30%), Mauritius (17%), US (11%).
 - **Top Sectors**: Services (19%), Software/Hardware (16%), Trading, Telecom, Manufacturing.
 - **Top States**: Maharashtra (39%), Karnataka (13%), Delhi (12%).
- **Keywords**: Automatic Route, Government Route, Greenfield, Brownfield, FEMA 1999, DPIIT, FIPF.



UPSC Relevance: **GS-2:** Bilateral investment treaties, regulatory environment.

GS-3: External sector, capital inflows, FDI vs FPI, economic reforms



HOT Question: “FDI inflows are a stable source of financing India’s growth story, but regulatory complexity and sectoral sensitivities remain bottlenecks. Discuss with reference to recent trends.”

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5. US Imposes 100% Tariff on Branded & Patented Pharma Products (Effective Oct 2025)



The US announced a **100% tariff on branded and patented pharmaceutical imports** from October 1, 2025, with exemptions only for companies building plants in the US.

- **Immediate Impact on India:**
 - *Minimal disruption:* 85–90% of India's pharma exports to US are generics (not covered).
 - *Exposure:* Branded/patented exports (e.g., Sun Pharma via contract manufacturing) face impact.
 - *Market:* Indian pharma stocks dipped sharply after announcement.
- **Broader Trade Context:**
 - US also levied 50% tariff on kitchen cabinets, bathroom vanities.
 - Shift from *country-specific* to *product-specific* tariffs → tariff weaponisation.
 - Highlights India's need for *export diversification* and stronger domestic demand.
- **India's Pharma Sector (2025):**
 - Size: ~\$66 bn industry; 3rd largest by volume, 14th by value.
 - Global role: Supplies ~20% of world's generics; ~40% of US generics; 55–60% UNICEF vaccines.
 - US share: ~35% of India's pharma exports.
 - Policy push: *PRIP Scheme* & *PLI scheme* promoting innovation & affordability.
- **Keywords:** Generics, branded drugs, tariff weaponisation, PRIP scheme, PLI scheme.

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UPSC Relevance: **GS-2:** India–US trade relations, WTO & tariff disputes. **GS-3:** Pharma sector, industrial policy, export diversification, Atmanirbhar Bharat.



HOT Question: "India is known as the 'pharmacy of the world,' yet its pharma exports remain vulnerable to tariff weaponisation by major markets. Discuss in the context of US's 2025 tariff announcement."

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6. U.S. Imposes \$100,000 One-Time Fee on New H-1B Visa Petitions



From **September 2025**, the U.S. will levy a **\$100k surcharge on new H-1B visa applications** under a Presidential Proclamation, aimed at restricting skilled migration and protecting U.S. jobs. Renewals and current holders are exempt; waivers possible in healthcare, defence, and critical tech sectors.

About H-1B Visa:

- Legal Basis: *Immigration Act, 1990*.
- Duration: 3 years + 3-year extension (AC21 Act).
- Indian Share: ~71% approvals (FY2024); China ~12–13%.
- Wage Gap: 70% Indian petitions (FY2023) < \$100,000 vs U.S. IT median \$104,420.

Why Fee Was Imposed:

- *Political Pressure*: Immigration = top voter issue (rose from 2.1% in 2012 → 14.6% in 2024).
- *Fiscal Goal*: Raise ~\$100 bn for U.S. Treasury.
- *Labour Protection*: H-1B avg salary \$66,000 → wage suppression.
- *National Security*: Prevent visa misuse, fraud, money laundering.
- *Skill Realignment*: Balance foreign STEM inflow with U.S. job creation.

Implications for India:

- *Positive*:
 - Talent retention for AI, semiconductor innovation.
 - IT shift → offshore delivery & Global Capability Centres (GCCs).
 - Greater leverage in trade negotiations.
- *Negative*:
 - IT export slowdown (<4% growth forecast FY26).
 - Humanitarian disruption (stranded workers, family separation).
 - Project risks due to curtailed short-term mobility.

Way Forward:

- Scale GCCs in India (Bengaluru, Hyderabad, Pune).
- Expand U.S. local hiring to reduce dependence.
- Explore alternatives (O-1, EB-1A, Canada/UK pathways).
- Engage U.S. for waivers & predictable frameworks.
- Channel returning talent into R&D and product-led growth.

Keywords: H-1B visa, GCCs, wage disparity, Presidential Proclamation, NDAs in trade.



UPSC Relevance: **GS-2:** India–US relations, diaspora issues, immigration policy. **GS-3:** IT exports, services economy, technology workforce mobility. **GS-1 (Society):** Impact on Indian diaspora & migration trends.



HOT Question: “Critically evaluate the implications of the U.S. H-1B visa surcharge for India’s IT sector, skilled workforce mobility, and long-term technology strategy.”

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7. PM Modi Marks 11 Years of Make in India Initiative



On the **11th anniversary of Make in India (2014–2025)**, PM Modi highlighted its achievements in boosting India's economy, manufacturing ecosystem, and entrepreneurship under the *Vocal for Local* vision.

- **About the Programme:**
 - Launched: 2014, led by **DPIIT (Ministry of Commerce & Industry)**.
 - Aim: Position India as global design & manufacturing hub.
 - Objectives:
 - Industrial growth 12–14% annually.
 - Generate 100 million jobs.
 - Raise manufacturing share to 25% of GDP by 2025.
 - Four Pillars:
 - *New Processes* – ease of business reforms.
 - *New Infrastructure* – industrial corridors, logistics.
 - *New Sectors* – focus on priority industries.
 - *New Mindset* – Govt as facilitator, not regulator.
- **Make in India 2.0 (2021):** Expanded to **27 priority sectors**.
- **Supporting Initiatives:**
 - *PLI Schemes* (electronics, pharma, auto, textiles, etc.).
 - *PM GatiShakti National Master Plan*.
 - *India Semiconductor Mission (2021)*.
 - *National Logistics Policy (2022)*.
- **Significance:**
 - Attracted record FDI inflows.
 - Boosted manufacturing competitiveness.
 - Enhanced integration with global value chains.
- **Keywords:** Make in India 2014, DPIIT, PLI, GatiShakti, Semiconductor Mission, NL Policy.



UPSC Relevance: **GS-2:** Governance reforms, ease of doing business.
GS-3: Industrial policy, manufacturing growth, self-reliance.



HOT Question: "Evaluate the progress of Make in India in transforming India into a global manufacturing hub. How do supporting initiatives like PLI and GatiShakti strengthen its objectives?"

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8. Government Reopens PLI Scheme Applications for White Goods



The government has **reopened applications for the PLI scheme in white goods**, reflecting sectoral growth and renewed investor confidence in domestic manufacturing.

- **White Goods:**
 - Large, durable household appliances (refrigerators, ACs, washing machines, dishwashers).
 - Term originates from their earlier availability only in *white*.
- **PLI Scheme:**
 - Launched: 2020 → boost domestic manufacturing & self-reliance.
 - White goods (ACs & LED lights) added in *April 2021* for 7 years.
 - *Coverage*: 14 sectors – incl. electronics, auto, drones, textiles, pharma.
 - *Incentives*: Linked to incremental sales & investments; encourages technology adoption, scale.
- **Achievements:**
 - Shifted AC & LED component production to India.
 - Attracted investments of ~₹1.76 lakh crore.
 - Created ~12 lakh jobs.
- **Significance:**
 - Boosts Make in India & Atmanirbhar Bharat.
 - Reduces import dependence.
 - Enhances competitiveness in global value chains.
- **Keywords:** White goods, PLI scheme, ACs, LEDs, economies of scale, Make in India.

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UPSC Relevance: **GS-2:** Governance & industry policy.
GS-3: Manufacturing, employment, industrial growth, Atmanirbhar Bharat.



HOT Question: “Critically analyse the role of the Production-Linked Incentive (PLI) scheme in strengthening India’s manufacturing ecosystem, with special reference to white goods.”

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9. India Eyes Global Talent in Critical Technologies Amid U.S. Cuts and Visa Curbs



With **U.S. science funding cuts and tighter visa norms**, India has a window to attract top global researchers and strengthen its critical technology ecosystem.

- **India's Research Profile:**
 - Only 2.5% of world's highly-cited papers & 2% of top researchers.
 - Among top 5 in 29 tech domains, but weak in breakthroughs vs. China.
 - Barriers: Low pay, poor labs, lack of career pathways, fragmented recruitment.
- **Recent Govt Initiatives:**
 - Anusandhan National Research Foundation.
 - ₹1 lakh crore R&D Innovation Fund.
 - "Ease of Doing Science" reforms.
- **Proposed Solutions:**
 - Create *Focused Research Organisations (FROs)* in frontier tech areas.
 - Recruit 500+ global researchers in 5 years, esp. early-career talent.
 - Enable joint appointments, rotational leadership, project-based entry.
 - Example: *IIT Delhi* as national anchor for *quantum communication*.
- **Design Principles:**
 - Pool industry + state funds → world-class salaries & labs.
 - Launch sovereign tech strategic missions.
 - Hybrid ecosystems: global + indigenous + industry collaboration.
 - Ensure continuity, predictable funding, & mission-driven structures.
- **Keywords:** ANRF, R&D Innovation Fund, FROs, sovereign tech, quantum communication.



UPSC Relevance: **GS-2:** Policy & institutional reforms in science governance. **GS-3:** R&D ecosystem, talent retention, critical technology & innovation.



HOT Question: "India has the opportunity to emerge as a global magnet for scientific talent. Analyse the reforms needed in research governance, funding, and talent absorption to achieve this."



10. India Targets Top 5 Global Shipbuilding Rank by 2047 under Maritime India Vision



India, ranked **16th in shipbuilding today**, has set ambitious targets under the **Maritime India Vision** to become a top 5 shipbuilding nation by 2047, strengthening its blue economy.

- **Key Targets:**
 - 2030: Enter world's top 10 maritime nations.
 - 2047: Reach top 5 in shipbuilding.
 - *GDP Contribution*: Raise maritime sector share from 4% → 12%.
 - *Seafarers*: Expand global workforce share from 12% → 25%.
- **Government Initiatives:**
 - *Financial Support*: \$3 bn Maritime Development Fund; 45% for shipbuilding/repair.
 - *National Shipbuilding Mission*: Strategic long-term framework.
 - *Shipbreaking Credit Note*: Incentives for recycling, sustainability.
 - *Subsidies*: Up to 30% for green/non-conventional ships.
 - *FDI*: 100% automatic route in shipping & shipbuilding.
 - *Infra Push*: \$82 bn port capacity expansion by 2035.
- **Challenges:**
 - Current share <1% of global shipbuilding.
 - High capital intensity, tech gaps.
 - Tough competition from *China, South Korea, Japan*.
 - Need for stronger R&D in green shipping and private sector entry.
- **Keywords:** Maritime India Vision, National Shipbuilding Mission, Shipbreaking Credit Note, Blue Economy.



UPSC Relevance: **GS-2:** Maritime diplomacy, FDI policies.
GS-3: Infrastructure, industrial growth, Blue Economy, sustainability.



HOT Question: "Discuss the significance of India's Maritime India Vision in boosting the blue economy. What challenges must India overcome to achieve its 2047 shipbuilding target?"

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11. India Signs First-of-its-Kind ISA Agreement for Polymetallic Sulphides in Carlsberg Ridge



India became the **first country to sign an exploration agreement with the International Seabed Authority (ISA)** for polymetallic sulphides in the *Carlsberg Ridge* (Arabian Sea), strengthening its access to critical minerals for clean energy.

- **About ISA:**
 - HQ: Jamaica.
 - Established under *UNCLOS (1982)* to regulate seabed resources beyond national jurisdiction ("the Area").
 - All exploration rights in international waters require ISA approval.
- **Polymetallic Sulphides:**
 - Deep-sea rock-like deposits rich in *manganese, cobalt, nickel, copper*.
 - Uses: EV batteries, renewable energy tech, electronics, advanced alloys.
 - Seen as *critical minerals* for energy transition.
- **Carlsberg Ridge:**
 - ~3,00,000 sq. km underwater mountain range in Arabian Sea.
 - Boundary between *Indian & Arabian tectonic plates*.
- **India's Previous Contracts with ISA:**
 - 2002: Central Indian Ocean Basin (exploration till 2027).
 - 2016: Polymetallic sulphides in Indian Ocean Ridge (till 2031).
 - 2024: Applied for Carlsberg Ridge & Afanasy-Nikitin Seamount (Sri Lanka contested latter under extended continental shelf claims).
- **Significance for India:**
 - Access to *strategic minerals* for energy security & Atmanirbhar Bharat.
 - Boosts deep-ocean R&D under *Deep Ocean Mission*.
 - Strengthens India's role in global seabed governance under UNCLOS.
- **Keywords:** ISA, UNCLOS, polymetallic sulphides, Carlsberg Ridge, critical minerals, Deep Ocean Mission.



UPSC Relevance: **GS-2:** UNCLOS, India's maritime diplomacy.
GS-3: Energy transition, Blue Economy, critical minerals.



HOT Question: "India's agreement with the ISA for polymetallic sulphides exploration marks a milestone in deep-sea mining. Analyse its significance for India's energy transition and maritime strategy."

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12. India Retains Top Spot in Global Milk Production, Contributes ~25% of Supply



India continues as the **world's largest milk producer**, accounting for one-fourth of global supply, with rising productivity, strong cooperative networks, and major government-backed initiatives.

- **Sector Profile:**
 - Dairy = India's **top agricultural product**, contributing **5% to GDP**.
 - Supports **8 crore farmers**, majority smallholders.
 - *Production*: 146.3 MT (2014–15) → 239.3 MT (2023–24), +63.5%.
 - *Growth*: Avg. 5.7% annually; productivity up 26.3%.
 - *Per capita*: 471 g/day (vs world avg. 322 g).
 - *Global ranking*: Highest bovine productivity growth (2014–22) at +27.4%.
- **Cooperative Strength:**
 - 22 federations + 25 Milk Producer Organisations (MPOs).
 - Network covers 2.35 lakh villages & 1.72 cr farmers.
 - Women: ~70% of workforce; 48,000 women-led societies & 16 women-run MPOs.
- **Key Schemes:**
 - *Rashtriya Gokul Mission (2014)* – Breed improvement & indigenous conservation.
 - *NPDD (2014, revamped 2021)* – Procurement, processing, marketing infra.
 - *National Livestock Mission (2021–22)* – Employment & productivity.
 - *LHDCP (2024–26)* – Vaccination & disease control.
 - *AHIDF (2020)* – Infra for value-addition, under Atmanirbhar Bharat.
 - *White Revolution 2.0 (2024–29)* – +50% cooperative milk procurement.
- **Significance:**
 - Food & nutritional security (protein, calcium).
 - Women empowerment & rural livelihood driver.
 - Value-chain potential for exports, processing, cold-chain.
- **Keywords:** White Revolution, NPDD, AHIDF, Gokul Mission, Women in Dairy.



UPSC Relevance: **GS-2:** Welfare schemes, women participation in cooperatives.
GS-3: Agriculture diversification, rural economy, livestock productivity.



HOT Question: "India's dairy sector is both a growth engine and a social welfare tool. Discuss the role of cooperatives and government initiatives in sustaining India's leadership in milk production."

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13. India Unveils Logistics Cost Report, LDB 2.0, and LEADS 2025 on Make in India's 10th Anniversary



The **Commerce Ministry** released a **logistics cost assessment report, LDB 2.0, and LEADS 2025**, aligning with the *National Logistics Policy (2022)* to enhance efficiency, reduce costs, and boost global competitiveness.

- **Logistics Cost Report (DPIIT):**
 - *Method:* Hybrid model → national surveys + secondary data; benchmarked with EU/US practices.
 - *Key Findings:*
 - Logistics cost = **7.97% of GDP** (vs earlier 13–14%).
 - Cost growth slowed in last 5 years due to freight corridors & connectivity reforms.
 - *Insight:* Multi-modal logistics reduces per tonne-km transport cost.
- **Logistics Data Bank (LDB) 2.0:**
 - Joint initiative by DPIIT & NICDC Logistics Data Services.
 - Enables *real-time tracking* of logistics networks.
 - *Features:* Container tracking on **high seas**, domestic visibility via ULIP, heat maps of regional gaps.
 - Enhances *supply chain dependability*.
- **LEADS 2025 (Logistics Ease Across Different States):**
 - Benchmarks states/UTs on logistics efficiency.
 - Corridor-based analysis of *truck speeds, journey times, waiting periods*.
 - Uses *real-time dashboards & digital monitoring* for policymaking & infra planning.
- **Significance:**
 - Improves India's logistics competitiveness in global trade.
 - Supports *Make in India, GatiShakti, NL Policy 2022*.
 - Strengthens India's bid to reach **top 25 rank in World Bank's Logistics Performance Index**.
- **Keywords:** Logistics cost 7.97% GDP, LDB 2.0, LEADS 2025, ULIP, freight corridors.



UPSC Relevance: **GS-2:** Governance, Centre–State benchmarking, policy coordination.
GS-3: Infrastructure, logistics efficiency, industrial competitiveness.



HOT Question: "India's logistics reforms—through cost benchmarking, real-time data systems, and state-level competitiveness indices—are key to reducing trade costs and enhancing global competitiveness. Discuss."



14. Census 2027: Registrar General Proposes Retaining Current Urban Definition



The **Registrar General of India** has proposed keeping the *current urban definition unchanged* for Census 2027 to maintain comparability with earlier data, despite concerns of undercounting and governance gaps.

- **Current Urban Definitions:**
 - *Statutory Towns*: Declared by states; managed by ULBs (municipal corporations, councils, nagar panchayats).
 - *Census Towns*: Settlements with population >5,000, density >400/sq. km, and ≥75% male workers in non-agricultural jobs.
 - Urban population (2011 Census): **31%** (likely underestimated).
- **Limitations:**
 - *Governance gap*: Semi-urban clusters remain under Panchayati Raj bodies with poor fiscal autonomy.
 - *Undercount*: Independent studies estimate true urban share in 2011 was **35–57%**.
 - *Transition zones*: Villages with urban features lack municipal planning & services.
 - *Gender bias*: Male-worker criterion excludes women's informal/unpaid work, migrants, gig workers.
- **Proposed Reforms (Way Forward):**
 - *Broader metrics*: Use multi-dimensional measures (e.g., EU's DEGURBA framework).
 - *Inclusive indicators*: Replace male-centric criterion with gender-neutral labour force data.
 - *Transitional category*: Create status for "in-between" settlements (China's townships, South Africa's transitional areas).
 - *Dynamic revision*: Adopt remote sensing, GIS, and UN-Habitat style SDG-11 monitoring for frequent updates.
- **Keywords**: Statutory towns, Census towns, urbanisation undercount, DEGURBA, transitional zones.



UPSC Relevance: **GS-1**: Urbanisation, settlement geography.
GS-2: Local governance, urban-rural divide.
GS-3: Planning & infrastructure deficits, SDG-11 (sustainable cities).



HOT Question: "India's current definition of urban areas undercounts the true extent of urbanisation, leading to governance and planning deficits. Critically evaluate in the context of Census 2027." casiumacademy.com



15. India, FAO Sign Agreement to Develop Blue Ports in Gujarat and Diu



The **Ministry of Fisheries, Animal Husbandry & Dairying** signed a **Technical Cooperation Programme (TCP)** with **FAO** to develop India's first *Blue Ports* at **Vanakbara (Diu)** and **Jakhau (Gujarat)**, boosting sustainable fisheries and the blue economy.

- **About FAO:**
 - Founded: 1945, HQ: Rome, Italy.
 - Role: UN agency for food security, agriculture, fisheries, and sustainability.
- **Blue Ports:**
 - Sustainable, technology-driven fishing harbours.
 - *Features:* AI, IoT, 5G-enabled monitoring, eco-measures (rainwater harvesting, sewage treatment, energy-efficient lighting).
 - *Significance:* Enhances marine sustainability, food security, climate resilience, export growth, and coastal jobs.
- **India's Initiatives:**
 - Pilot Blue Ports: Vanakbara, Jakhau (FAO-supported).
 - Karaikal (Puducherry) also under development.
 - Supported by *PM Matsya Sampada Yojana (PMMSY)* and *Fisheries Infrastructure Development Fund (FIDF)*.
- **Blue Economy:**
 - Defined by World Bank: *Sustainable use of ocean resources for growth, jobs, and ocean health.*
 - Key for India's maritime economy, climate action, and SDG-14.
- **Keywords:** Blue Port, FAO, PMMSY, FIDF, Blue Economy, Vanakbara, Jakhau.



UPSC Relevance: **GS-2:** International cooperation (India–FAO).
GS-3: Blue economy, sustainable fisheries, climate resilience, infrastructure.



HOT Question: "Blue Ports represent a fusion of technology, sustainability, and livelihood promotion. Analyse their role in strengthening India's Blue Economy."

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16. SEBI Introduces Reforms to Ease Foreign Investment and Boost Capital Markets



India unveiled a set of **capital market reforms** to attract foreign investment, streamline market access, and enhance investor protection, marking a major step in aligning with global best practices.

- **SEBI Background:**
 - Est. 1988; statutory powers under *SEBI Act, 1992*.
 - Capital markets regulator under *Ministry of Finance*.
- **Key Reforms:**
 - **SWAFAT-FI Framework:** *Single Window Automatic & Generalised Access for Trusted Foreign Investors* → Simplifies entry for sovereign investors and regulated public retail funds (mutual funds, pensions).
 - **India Market Access Portal:** One-stop digital platform for FPI registration, compliance & approvals.
 - **Asset Reclassification:**
 - REITs → reclassified as equity.
 - InvITs → retained as hybrid.
 - Allows mutual funds to invest in real estate & infra.
 - **IPO Rule Change:** Min Public Offer cut from **5%** → **2.75%** for firms with ₹1–5 lakh cr market cap → quicker listings & fundraising.
 - **New AIF Category:** For accredited investors with lighter compliance.
 - **Exit Load Reform:** Max redemption fee in mutual funds reduced **5%** → **3%** to strengthen investor protection.
- **Key Terms:**
 - **FVCI:** Foreign Venture Capital Investor → unlisted equity in startups/VCs.
 - **REIT:** Trust owning income-generating real estate, distributes dividends.
 - **InvIT:** Trust pooling capital for infra projects, returns via tolls/leases.
- **Significance:**
 - Enhances India's *ease of doing business* in capital markets.
 - Boosts foreign capital inflows & market liquidity.
 - Strengthens retail investor trust.
 - Aligns India with *global financial hubs*.
- **Keywords:** SEBI reforms 2025, SWAFAT-FI, REIT, InvIT, AIF, exit load.



UPSC Relevance: **GS-2:** Regulatory bodies, governance of financial markets.

GS-3: Indian economy, capital markets, FDI/FPI reforms.



HOT Question: "Recent reforms by SEBI aim to balance foreign investor access with domestic market stability. Discuss their significance for India's capital markets."

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17. GST Reforms 2025 : agricultural rationalisation, next-gen GST structure, insurance relief, e-commerce delivery tax clarity, and GST Appellate Tribunal setup.



The **56th GST Council meeting (2025)** introduced wide-ranging reforms including rationalised agri taxation, insurance exemptions, digital refunds, e-commerce delivery taxation, and the establishment of a GST Appellate Tribunal.

GST Reforms

1. Agriculture Rationalisation

- **Rates:** Most agri & processed foods at **0–5%**; farm equipment **5%**; bio-inputs **5%**; milk/paneer exempt; processed dairy **5%**.
- **Exports:** 90% refund within 7 days.
- **Gains:** Lower cultivation cost, fewer adulteration incentives, simpler tax.
- **Challenges:** Revenue risk, contradictions (export bans/stock limits), product classification issues.
- **Way Forward:** Market reforms, harmonised classification/refunds, GST literacy for farmers.

2. 56th GST Council – Next-Gen Reform

- **Structure:** Two main slabs **5% & 18%**, ~40% for sin/luxury goods.
- **Institutions:** GSTAT set up; inversion corrected; intermediary exports exempt; automated refunds (90% provisional).
- **Exemptions:** Essentials, medicines, education, individual insurance.
- **Relief:** Lower GST on fertilisers, farm tools, RE devices, labour-intensive sectors.
- **Gains:** +100–120 bps GDP; CPI –1.1 pp; faster refunds; fewer disputes.
- **Constraints:** ₹48,000 cr revenue gap, state equity concerns, slab placement disputes, GSTN readiness.
- **Way Forward:** Gradually add petroleum/alcohol; compensate states; upgrade GSTN (AI-tools); quarterly fitment reviews.

3. Insurance Reforms

- **Policy:** Individual term/health insurance = GST-exempt; group plans = 18%.
- **Positives:** Lower premiums, wider coverage, higher demand.
- **Issues:** No ITC (adds ~3% cost), margin pressure, group-plan exclusion.
- **Way Forward:** Clarify ITC treatment; resolve inverted duty; ensure savings reach consumers.



4. GST on Delivery via E-Commerce

- **Rule:** Delivery charges via e-commerce taxed **18%**; food continues at **5%**. Direct restaurant delivery = composite **5%**.
- **Example:** Platform ₹100 food + ₹10 delivery → ₹116.8 total; direct restaurant → ₹115.5.
- **Objectives:** Tax clarity, wider base, compliance shifted to platforms.
- **Issues:** Higher customer cost, delivery partner squeeze, self-delivery distortion.
- **Way Forward:** Itemised bills, fair cost-sharing, monitor consumer/gig-worker impact.

5. GST Appellate Tribunal (GSTAT)

- **Setup:** Quasi-judicial body under Sec.109, CGST Act 2017.
- **Role:** Second-tier forum; first common Centre-State dispute body. Appeals within 3 months, filed online.
- **Powers:** Natural justice based, civil court-like (summons, enforce orders).
- **Structure:** Principal Bench Delhi (headed by SC/HC judge), 31 State Benches (45 cities, 2 judicial + 2 technical members).
- **Digital:** GSTAT e-Courts Portal for filing, tracking, hearings.



UPSC Relevance: GS Paper 2: Fiscal federalism, tribunal reforms.

GS Paper 3: Indirect taxation, agriculture reforms, financial inclusion, digital governance.



HOT Question: Critically evaluate how GST rationalisation and institutional reforms in 2025 balance revenue mobilisation with economic growth.



18. RBI's e-Rupee and UPI Expansion: Transforming India's Digital Finance Ecosystem



The Reserve Bank of India's **Central Bank Digital Currency (CBDC)**, the **e-rupee**, combined with rapid UPI growth (700+ million daily transactions) and **Next-Gen GST reforms**, is positioned to enhance financial inclusion, transparency, and efficiency.

About CBDC (Central Bank Digital Currency)

- A **sovereign digital currency** issued by the central bank, equivalent in value to paper currency.
- The **e-rupee** is transacted via wallets and can be used for payments, transfers, and targeted delivery.

Rationale for Expansion

1. **Financial Inclusion** – Enables direct transfers without bank accounts; benefits migrants and underbanked families.
2. **Tax Compliance** – Blockchain-backed traceability reduces fraud and boosts GST compliance.
3. **Remittances** – Wallet-to-wallet cross-border transfers lower costs and cut dollar dependence.
4. **Targeted Subsidies** – Funds can be pre-programmed for specific uses (e.g., fertiliser, health schemes).
5. **Efficiency** – Combines UPI's reach with CBDC's security for faster settlements.

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About Blockchain

- A **decentralised digital ledger** that records transactions permanently and securely across distributed nodes.
- Ensures **immutability, transparency, and reduced fraud risk** in financial operations.



UPSC Relevance: GS Paper 3: Indian Economy – Digital economy, financial inclusion, taxation reforms, fintech regulation.

GS Paper 2: Governance – Direct benefit transfers, inclusive growth, service delivery mechanisms.



HOT Question: Discuss how the introduction of the e-rupee strengthens India's digital economy when combined with UPI and GST reforms. Highlight the challenges in large-scale adoption.

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19. RBI issues new directions for digital payment security, mandating multi-factor authentication from April 2026.



On **25th September 2025**, the RBI released the “**Authentication Mechanisms for Digital Payment Transactions**” **Directions, 2025**, replacing SMS-based OTP reliance with stronger **multi-factor authentication** to enhance consumer protection.

Key Provisions

- **Two-Factor Authentication:** All digital payments must use at least two factors, one of which must be **dynamic and unique per transaction**.
- **Coverage:** Applicable to all payment system providers and participants (banks & non-banks), for **domestic payments** and **cross-border card-not-present transactions**.
- **Cross-Border Security:** Issuers to validate all international card-not-present transactions by **1st Oct 2026**.
- **Risk-Based Approach:** Authentication may vary by behaviour patterns, geolocation, or transaction type to detect anomalies.
- **Consumer Protection:** Issuers are **fully liable** for losses if directions are not followed.
- **Data Privacy Link:** Framework aligns with the **Digital Personal Data Protection Act, 2023**, ensuring both payment safety and data protection.

Future Impact

- Strengthens **trust in digital finance**, reduces fraud risk.
- Promotes **global alignment** of Indian payment systems, supporting cross-border e-commerce.
- Encourages innovation in **biometric, tokenisation, and AI-based authentication**.



UPSC Relevance: **GS Paper 2:** Governance – Digital Personal Data Protection Act, consumer protection.

GS Paper 3: Economy – Digital finance, fintech regulation, payment security.



HOT Question: Evaluate how RBI’s multi-factor authentication framework can balance digital payment innovation with consumer protection.

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20. RBI issues revised guidelines for Payment Aggregators (PAs)



On **15th September 2025**, the Reserve Bank of India released updated norms for **Payment Aggregators (PAs)**, aimed at strengthening transparency, fraud prevention, and grievance redressal in the digital payments ecosystem.

Key Provisions

- **Dispute Resolution Policy:** Board-approved framework with clear refund timelines for customer grievances.
- **Fraud Prevention & Data Security:** PAs must deploy robust IT infrastructure, fraud detection, and monitoring systems.
- **Authorisation Requirements:**
 - Banks exempt from RBI authorisation.
 - Non-bank PAs must apply via RBI's portal.
 - Entities under other regulators need to submit **NoC within 45 days**.
- **Marketplace Restrictions:** PAs barred from engaging in marketplace activities; can only aggregate funds for merchants with direct contracts.
- **Authentication Rules:** **ATM PINs cannot be used** for card-not-present transactions; only secure, standardised methods allowed.
- **Transaction Limits:** PAs cannot impose arbitrary limits; responsibility lies with card-issuing banks based on customer profile.

Significance

- Enhances **consumer protection** and confidence in digital payments.
- Improves **accountability of intermediaries** in India's fast-growing fintech sector.

Aligns with India's larger push for **safe, inclusive, and transparent digital finance**.



UPSC Relevance: **GS Paper 2:** Governance – Consumer protection, regulatory frameworks. **GS Paper 3:** Economy – Digital payments, fintech regulation, financial inclusion.



HOT Question: Critically analyse the role of Payment Aggregator guidelines in strengthening India's digital payment ecosystem. How do they balance innovation with consumer protection?

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21. Two-Factor Authentication (2FA) becomes crucial amid rising cyber threats



With **22.7 lakh cybercrime cases reported in India in 2024**, the RBI and other regulators are emphasising **2FA adoption** to secure digital payments, government portals, and critical infrastructure.

About Two-Factor Authentication (2FA)

- Requires **two independent credentials**:
 - Something you know** → Password/PIN.
 - Something you have** → TOTP from authenticator app/token.

How TOTP Works?

- Generates a **6-digit password valid for ~30 seconds**.
- Based on a **shared secret key** between server & user device.
- Uses cryptographic algorithms to create time-bound codes.
- Codes generated via **apps** (Google Authenticator, Authy) or **hardware tokens**.
- Prevents replay attacks → intercepted codes become useless.

Significance for India

- Cybercrime surge** → urgent need for secure logins.
- Supports Digital India** → UPI, ONDC, e-governance.
- Inclusive Security** → SMS OTPs safeguard rural/semi-urban users at low cost.

Critical Infrastructure → Defence & government systems need robust 2FA



UPSC Relevance: GS Paper 2: Governance – Cybersecurity in e-governance. GS Paper 3: Internal Security & S&T – Cyber threats, digital payment safety.



HOT Question: Evaluate the role of Two-Factor Authentication (2FA) in strengthening India's cybersecurity framework. What challenges remain in its widespread adoption?

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22. Account Aggregator (AA) framework marks four years



The **RBI's Account Aggregator system**, launched in 2021, has completed **four years**. It now covers **2.2 billion accounts across 112 million users**, becoming a core element of India's **Digital Public Infrastructure (DPI)**.

About the AA Framework

- **Definition:** Account Aggregators (AAs) are **RBI-regulated NBFCs** that enable **consent-based sharing of financial data** between users and service providers.
- **Function:** They act only as **data intermediaries**—cannot view, store, or monetise data.
- **Coverage:** Consolidates data from banks, insurance, mutual funds, pensions, and tax platforms.
- **Integration:** Part of India's **DPI stack**, alongside Aadhaar, UPI, ONDC, recognised globally during India's **G20 Presidency (2023)**.

Significance

- **Financial Inclusion:** Allows small businesses & individuals to access loans based on verified digital data.
- **Transparency:** Prevents data misuse; ensures sharing happens only with explicit user consent.
- **Efficiency:** Reduces paperwork, speeds up credit access, strengthens fintech innovation.
- **Trust:** Enhances user confidence in India's digital economy.



UPSC Relevance: **GS Paper 2:** E-governance, citizen-centric services, data protection.

GS Paper 3: Indian Economy – Financial inclusion, digital infrastructure, fintech.



HOT Question: Critically analyse the role of the Account Aggregator framework in strengthening India's Digital Public Infrastructure. What challenges remain for its large-scale adoption?

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23. India unveils UPI–UPU Integration Project to revolutionise cross-border remittances.



On **8th September 2025**, at the **28th Universal Postal Congress in Dubai**, India launched the **UPI–UPU Integration project**, linking India's **UPI** with the **UPU Interconnection Platform** to make cross-border transfers instant, secure, and affordable.

About the Project

- **Collaborators:** Department of Posts, NPCI International Payments Ltd (NIPL), and Universal Postal Union (UPU).
- **Objective:** Merge India's **digital payment system (UPI)** with the global **postal network (UPU)**.
- **Features:** Enables **instant, low-cost money transfers**, particularly aiding migrants and families in developing economies.

India's Commitment

- India pledged **USD 10 million** during this UPU cycle to support:
 - Innovation & digital payments.
 - E-commerce facilitation.
 - Training & capacity building in member countries.

Significance

- **Financial Inclusion:** Expands access to secure transfers for underserved populations.
- **Remittance Advantage:** India, the world's top remittance recipient (~\$125 bn annually), strengthens leadership in global payment innovation.
- **Soft Power:** Enhances India's role as a digital governance leader under **Digital Public Infrastructure diplomacy**.
- **Global Model:** Sets precedent for digital–postal integration in other UPU countries.

About UPU (Universal Postal Union)

- A UN specialised agency (est. 1874, HQ: Bern, Switzerland).
- Coordinates international postal policies & fosters global postal network integration.



UPSC Relevance: **GS Paper 2:** International institutions, global governance, India's diplomacy. **GS Paper 3:** Economy – Remittances, financial inclusion, digital payments.



HOT Question: Discuss the significance of the UPI–UPU Integration Project for India's role in global financial inclusion. How does it align with India's Digital Public Infrastructure diplomacy?

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24. Gig Economy in India: Rising growth amid precarious livelihoods



India's gig economy, projected by **NITI Aayog** to expand from **7.7 million (2020–21) to 23.5 million workers by 2029–30**, is reshaping the digital marketplace but faces rising concerns over **algorithmic control and lack of social protection**.

Growth Trajectory

- Digital economy set to hit **\$1 trillion in 5 years**, driven by online consumption.
- Gig work accelerated post-COVID-19 due to demand for **flexibility, autonomy, and multiple income streams**.
- Platforms use **AI and algorithms** to allocate tasks, monitor efficiency, and manage workforce.

Structural Challenges

1. **Precarious Livelihoods:** Low wages, long hours, limited social protection.
2. **Algorithmic Management:** Opaque rating systems restrict worker autonomy.
3. **Legal Vacuum:** Labour Codes (2020) mention gig workers, but **implementation remains weak**.
4. **Social Erosion:** Gig jobs reduce community bonds, making workers "faceless" in urban economies.

Way Forward

- **Social Security:** Insurance, health cover, contributory pension for gig workers.
- **Tripartite Framework:** State–platform–worker collaboration for fair wages & conditions.

Policy Alignment: National gig work policy aligned with **SDG 8 (Decent Work)** using real-time data on workforce conditions.



UPSC Relevance: **GS Paper 2:** Governance – Social security & labour rights. **GS Paper 3:** Economy – Informal sector, employment generation, digital economy.



HOT Question: Critically examine how the rise of India's gig economy poses both opportunities and challenges for labour rights and social security. Suggest policy measures.

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25. Formalisation of India's workforce accelerates, but informality and job quality remain challenges.



The **Pulse Report FY25 by Quess Corp**, India's largest staffing solutions provider, highlights a significant increase in formal employment, EPFO expansion, and female workforce participation, signalling progress toward labour market formalisation.

Key Trends

- **Formal Workforce:** 13.1% of India's workforce in the formal sector.
- **EPFO Growth:** Net new subscribers in FY25 → **139.78 lakh (highest ever)**; 61% under age 29.
- **Female LFPR:** Rose to **41.7% (2023–24)**, but only 25% of new EPFO subscribers are women.
- **EPFO Role:** Statutory body (Ministry of Labour & Employment) managing provident fund, pension, and insurance schemes for organised workers.

Challenges

1. **Persisting Informality:** ~85% workforce outside payrolls & social protection.
2. **Sectoral Skew:** Agriculture dominates; non-farm sectors not absorbing adequately.
3. **Gender Gap:** Rising LFPR but under-representation in formal jobs.
4. **Quality of Jobs:** Surge in gig/temporary jobs raises wage & benefit concerns.
5. **Compliance Hurdles:** MSMEs face difficulties with GST, EPFO-ESI, digitised payroll.

Government Initiatives

- **Make in India, PLI Schemes:** Promote large-scale formal manufacturing jobs.
- **Employment Linked Incentive (ELI) Scheme:** Incentivises net job creation.
- **Labour Codes (2020):** Consolidated 29 laws → 4 codes, focusing on social security & formalisation.
- **Skill India & PMKVY 4.0:** Industry-led skilling for formal job absorption.
- **Udyam Assist Portal & Shram Suvidha Portal:** Support MSME workers & ease compliance.
- **GST Reduction:** From 18% → 5% on staffing services, boosting formal hiring.



UPSC Relevance: **GS Paper 2:** Welfare schemes, governance, labour codes. **GS Paper 3:** Employment, economic reforms, inclusive growth.



HOT Question: Critically evaluate the progress of labour market formalisation in India. How can policy frameworks balance workforce expansion with job quality and inclusion?

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26. Household disposable incomes projected to rise in 2025, supported by strong GDP growth and disinflation.



The **Chief Economic Advisor (CEA)** projected a rise in **household disposable incomes in 2025**, citing India's **Q1 FY26 GDP growth at 7.8%**, record-low inflation, and supportive fiscal measures.

About Disposable Income

- Net income available to households **after tax**, which can be used for **consumption or savings**.

Key Drivers of Higher Disposable Income

- Disinflation:** Retail inflation fell to **1.55% (July 2025)**, improving purchasing power.
- Tax Relief:** Union Budget 2025–26 lowered direct taxes; incomes up to **₹12 lakh exempt**.
- GST Reforms:** Rate simplification expected to reduce prices, spur consumption.
- Digital Evidence:** UPI merchant data reflect strong urban demand beyond official surveys.
- Rural–Urban Convergence: FMCG data** show rural demand growth outpacing urban for six straight quarters.

Significance

- Boosts **consumption-driven growth**.
- Narrows **rural–urban demand divide**.

Signals **resilient household spending** as a pillar of India's growth story.



UPSC Relevance: GS Paper 3: Indian Economy – Growth, inflation, taxation, consumption patterns.

Essay: “Consumption as the engine of India's growth.”



HOT Question: Disposable income is the backbone of consumption-led growth in India. Discuss how fiscal and monetary measures in 2025–26 are shaping this trajectory.

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27. Out-of-Pocket Expenditure (OOPE) in India declines to 39.4% of health spending but remains a key barrier to Universal Health Coverage.



According to the **National Health Authority (NHA)**, India's **OOPE fell from 62.6% (2014-15) to 39.4% (2021-22)** of Total Health Expenditure (THE). Despite this decline, OOPE remains nearly **double the global average (18-20%)**, continuing to drive medical impoverishment.

About OOPE

- Defined by NHA as **direct household payments** for health services at the point of care, **excluding subsidies/insurance reimbursements**.

Trends & Estimates

- Decline:** 62.6% (2014-15) → 39.4% (2021-22).
- Public Spending:** Govt. expenditure rose from **29% (2014-15) → 41.4% (2019-20)** of THE.
- Global Context:** Still ~2× global average.
- Data Gaps:** Relies on outdated NSS 2017-18; ignores COVID-19 surge & shows contradictions with GDP accounts.

Factors Behind High OOPE

- Low Public Spending:** ~2% of GDP on health vs WHO's 5% target.
- Private Dependence:** 70% outpatient & 60% inpatient care delivered privately.
- Expensive Medicines:** 60% of outpatient OOPE; price disparities up to 3400%.
- Insurance Gap:** ~40 crore Indians in the “**missing middle**” lack insurance.
- Weak PHCs:** Inadequate facilities push minor cases to costly tertiary hospitals.

Consequences

- Catastrophic Spending:** 17% households spend >10% income on health.
- Poverty Impact:** ~55 million Indians pushed into poverty annually (WHO–World Bank).
- Debt Cycle:** Informal loans, asset sales, intergenerational debt.
- Care Denial:** Delayed treatment → advanced illness & preventable deaths.
- Inequality:** Higher burden on rural poor, women, informal workers.



UPSC Relevance: **GS Paper 2:** Health policies, Universal Health Coverage, governance in service delivery. **GS Paper 3:** Human capital, poverty & inequality, economic impact of healthcare.



HOT Question: High Out-of-Pocket Expenditure continues to impede India's journey towards Universal Health Coverage. Analyse the reasons and suggest policy measures.

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28. NITI Aayog's "AI for Viksit Bharat" Report (2025):



NITI Aayog released its **2025 report "AI for Viksit Bharat"**, positioning artificial intelligence (AI) as a transformative driver of **inclusive economic growth and governance reforms**.

Potential Outcomes of AI-led Growth

- **GDP Boost:** \$500–600 bn annually by 2035 ($\approx$ 8–9% of long-term GDP growth).
- **Manufacturing:** +30% output via automation & defect-detection → \$90 bn annual gain.
- **Financial Inclusion:** AI-powered alternate credit can onboard **150 mn underserved borrowers**.
- **Agriculture:** AI-driven advisories & yield models → 20–25% farm output rise in drought/rainfed zones.
- **Healthcare:** AI-assisted triage in rural CHCs may cut **diagnostic backlog by half** and address 80% doctor shortfall.

Enablers for AI Readiness

- **Compute Capacity:** ~50,000 GPUs needed by 2027 for training large domestic models.
- **Model Sovereignty:** Foundational models in **Indian languages** critical for accessibility & autonomy.
- **Data Access:** Publicly available labelled datasets + secure sharing rules.
- **Workforce:** **2.5 million skilled AI professionals** needed by 2030.
- **Regional Spread:** AI hubs in Tier-2/3 cities for startup ecosystems & local adoption.

Barriers to Deployment

- **Compute Bottleneck:** <2% global compute power, GPU shortages, high energy costs.
- **Data Fragmentation:** Weak, siloed datasets (esp. Indian languages) reduce accuracy.
- **Talent Shortage:** Low researcher density, brain drain.
- **MSME Divide:** 60+ mn MSMEs lack tools/awareness; adoption skewed towards large firms.
- **Regulatory Lag:** No sector-specific rules for privacy, consent, cybersecurity.



UPSC Relevance: **GS Paper 2:** Governance & digital inclusion.
GS Paper 3: Economy, Science & Tech (AI, data economy, MSME digitisation).



HOT Question: Discuss how artificial intelligence can support India's journey towards Viksit Bharat by 2047. What barriers must India overcome to ensure equitable AI adoption?

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29. RRI unveils dual trap optical tweezers with unprecedented precision for biomolecule manipulation



Researchers at **Raman Research Institute (RRI), Bengaluru**, developed a **dual trap optical tweezers system** with next-gen detection capabilities, enhancing India's standing in advanced biomedical research tools.

Key Features

- **Next-Gen Optical Tweezers:** Builds on Nobel-winning 2018 tech, using focused laser beams to manipulate microscopic particles & measure ultra-small forces.
- **Confocal Detection Scheme:** Each detector monitors only its own trap → no signal interference → enables **stable, long-duration experiments**.
- **Integration:** Works with **phase contrast & fluorescence microscopy**, plug-and-play module for existing microscopes.
- **Compact & Modular:** Add-on design, no structural changes needed → boosts accessibility for labs.

Research Applications

- **Single Molecule Studies:** Precise force measurements at nano-scale.
- **Biological Manipulation:** Applications in **neuroscience, drug discovery, medical research**.
- **Long-term Experiments:** Stable trapping for extended biological/chemical studies.

Commercialisation

- Patent under process.
- Expected to be commercialised → **affordable advanced research tools** for Indian institutions.



UPSC Relevance: GS Paper 3: Science & Tech (Biotechnology, Nobel technologies in India, R&D infrastructure).

Essay / Ethics: "Science for Social Justice," "Indigenous R&D and Global Competitiveness."



30. NITI Aayog launches Frontier Tech Repository to accelerate technology



In September 2025, **NITI Aayog** unveiled the **Frontier Tech Repository** under its **Frontier Tech Hub**, to mainstream emerging technologies in governance, livelihoods, and public service delivery.

Key Features

- **Frontier Tech Hub:** Strategic platform to track, test, and scale emerging technologies for **inclusive growth & resilient governance**.
- **Frontier Tech Repository:** Digital repository of **200+ impact stories** across **agriculture, healthcare, education, and security**, highlighting real-world applications.
- **Frontier 50 Initiative:** Guides **50 Aspirational Districts/Blocks** to adopt repository solutions → faster service delivery in remote/underserved regions.
- **NITI Frontier Tech Impact Awards:** Annual recognition for **3 states**, rewarding governance innovations with frontier tech → states receive expansion support.

Strategic Significance

- **Viksit Bharat 2047 Goal:** Strengthens India's transition into a knowledge-driven, tech-powered economy.
- **Inclusive Development:** Ensures aspirational districts benefit from cutting-edge tools, reducing regional disparities.

Governance Modernisation: Encourages adoption of **AI, blockchain, drones, IoT** in public service delivery.



UPSC Relevance: **GS Paper 2:** Governance, transparency, e-governance initiatives.
GS Paper 3: Science & Tech applications in daily life and development



31. India ranks 38th in Global Innovation Index 2025; China enters top 10 for the first time.



On **16th September 2025**, the **World Intellectual Property Organisation (WIPO)** released the **18th edition of the Global Innovation Index (GII)**.

Global Rankings

- **Top 5:** Switzerland, Sweden, USA, South Korea, Singapore.
- **China:** Entered **top 10** for the first time.
- **Other top performers:** UK, Finland, Netherlands, Denmark.

India's Position

- Ranked **38th** → among the **longest-running overperformers** relative to income level.
- Recognised for strong performance in **ICT services exports, startups, and digital public infrastructure**.

Emerging & Rising Economies

- **Middle-income climbers:** China (10), India (38), Türkiye (43), Vietnam (44), Philippines (50), Indonesia (55), Morocco (57).
- **Fastest risers since 2020:** Saudi Arabia (46), Qatar (48), Brazil (52), Mauritius (53), Bahrain (62), Jordan (65).

Regional Highlights

- **Sub-Saharan Africa leaders:** South Africa (61), Senegal (89), Rwanda (104).

R&D Trends

- Global R&D growth **slowed to 2.9% in 2024** (from 4.4%) and projected **further down to 2.3% in 2025**.



UPSC Relevance: **GS Paper 2:** Governance, WIPO & international indices. **GS Paper 3:** Innovation, R&D, startups, science and tech for inclusive growth.



32. MoSPI launches digital transformation products to build AI-ready statistical ecosystem.



On **26th September 2025**, the **Ministry of Statistics & Programme Implementation (MoSPI)** launched a suite of digital products at the **29th Conference of Central and State Statistical Organisations (CoCSSO)** to modernise India's statistical system.

Key Digital Initiatives

1. **Revamped MoSPI Website (mospi.gov.in)**
 - Cloud-first architecture.
 - Advanced search, intuitive navigation.
 - AI-based multilingual chatbot for real-time query handling.
2. **Go! Stats App**
 - Now available on **iOS** (launched earlier on Android, already 10k+ downloads).
 - Provides mobile access to official statistical data.
3. **PAIMANA Portal (ipm.mospi.gov.in)**
 - **Project Assessment Infrastructure Monitoring and Analytics for Nation-building.**
 - Replaces **OCMS**.
 - Tracks projects worth **₹150 crore+** across sectors.
 - Features: analytics-driven reports, customizable dashboards, mobile app.
4. **National Metadata Structure (NMDS) Portal (nmds.mospi.gov.in)**
 - Central repository of standardized metadata for all data-producing agencies.
 - Features: version control, audit trails, export options, API integration, advanced filtering.



UPSC Relevance: Prelims: MoSPI, PAIMANA, NMDS, CoCSSO.
GS Paper 2 (Governance): E-governance, accountability, data-driven policy.
GS Paper 3 (Economy): Statistical modernisation, project monitoring, AI in governance.



33. CAG report reveals unsustainable debt trends in Indian states (2013–2023).



On **25th September 2025**, **CAG K. Sanjay Murthy** released a **decade-long analysis (2013–14 to 2022–23)** highlighting rising state debt, fiscal stress, and breaches of fiscal prudence norms.

- **Debt Surge:** State debt tripled from **₹17.57 lakh crore (2013–14)** to **₹59.60 lakh crore (2022–23)** (22.17% of GDP).
- **Debt-to-GSDP Ratio:** Rose from **16.66% to 22.96%**.
 - Highest → **Punjab (40.35%), Nagaland (37.15%), WB (33.70%).**
 - Lowest → **Odisha (8.45%).**
- **Debt Burden:** Ranged **128–191% of revenue receipts** and **127–190% of non-debt receipts.**
- **Golden Rule Breach:** **11 states** used borrowings for current expenditure (salaries, subsidies).
- **Capital Gap:** In **Andhra Pradesh & Punjab**, capital expenditure <30% of net borrowings → unsustainable debt use.

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UPSC Relevance: Prelims: Terms – GSDP, Public Debt, Golden Rule, FRBM Act. GS Paper 3: Issues in public finance, fiscal federalism, debt sustainability



HOT Question: Rising state-level debt poses long-term risks to India's fiscal stability. Critically analyse the role of the FRBM Act and CAG findings in ensuring fiscal discipline.

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34. Bihar uses satellite-based Night-Time Light data to track block-level growth (2017–2023).



The **Bihar government (2017–2023)** used **satellite night-time light (NTL) data** to assess economic activity and regional growth where conventional data is weak.

Key Details

- **NTL Indicator:** Proxy for economic development, correlates strongly with GDP, industrialisation, and electrification.
- **Block-Level Mapping:** Enabled granular monitoring of growth, helping identify priority districts.
- **Inclusive Growth:** Formerly insurgency-affected districts have now emerged as “growth districts,” showing economic integration.
- **Global Practice:** Similar NTL applications are used by World Bank, IMF, and UN for real-time economic tracking.

Significance

- **Policy Tool:** Helps target infrastructure, welfare, and investment interventions.
- **Data Strengthening:** Complements weak or lagged household/state GDP data.

Security Angle: NTL patterns reveal recovery of disturbed regions into productive growth zones.



UPSC Relevance: Prelims: NTL as proxy for GDP; applications of remote sensing in economy. **GS Paper 3:** Inclusive growth, data-driven governance, use of technology in public policy.



HOT Question: Discuss the role of satellite-based Night-Time Light (NTL) data in strengthening India’s economic planning and governance, with reference to Bihar’s recent study.

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35. Unified RERA Portal launched to enhance transparency in real estate sector (Sept 2025).



On **4th September 2025**, the **Minister of Housing & Urban Affairs, Manohar Lal**, launched the **Unified Real Estate (Regulation and Development) Act, 2016 (RERA) portal** during the **5th Central Advisory Council meeting** in New Delhi.

Key Details

- **Objective:** One-stop platform consolidating RERA data across States/UTs.
- **Coverage:** Provides reliable access to information on **registered projects, developers, and agents**.
- **Integration:** Merges state-level RERA portals into a single national digital system.
- **Ease of Compliance:** Simplifies regulatory filing and monitoring for real estate developers.
- **Stakeholder Empowerment:** Enhances transparency, accountability, and consumer trust in housing markets.

Significance

- **For Homebuyers:** Centralised data reduces fraud and misinformation.
- **For Developers:** Simplified compliance procedures reduce duplication.
- **For Governance:** Strengthens regulatory oversight and ensures **uniform standards** across India.

Economic Angle: Boosts investor confidence in the real estate sector, a key driver of GDP and employment.



UPSC Relevance: **GS Paper 2:** Governance reforms, consumer protection, digital governance.
GS Paper 3: Impact on real estate, urbanisation, and economic growth.



HOT Question: The launch of the Unified RERA Portal marks a new phase in India's real estate governance." Discuss its significance for homebuyers, developers, and regulators

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SEPTEMBER 2025

ENVIRONMENT

1. India needs \$467 bn by 2030 to decarbonise key sectors.
2. Urbanisation : Building climate-resilient cities by 2050.
3. Urban noise pollution emerges as a major public-health crisis.
4. Single-use plastic ban falters amid weak enforcement.
5. SC seeks jail for stubble burning,
6. Climate change intensifies lightning-wildfires
7. SC extends firecracker ban nationwide
8. Wastewater reuse key to tackling India's water stress.
9. Delhi, IIT Kanpur begin cloud seeding to fight air pollution.
10. Indore tops Swachh Vayu Sarvekshan 2025;
11. Wayanad landslide flagged as "Grey Rhino" disaster warning.
12. India launches 'Vulture Network' portal for conservation.
13. Eight tigers to be relocated to revive Sahyadri reserve.
14. Chhattisgarh's tiger numbers double, showing recovery.
15. Ivory poaching in Cameroon cuts elephant population by 86%.
16. Periyar Reserve finds 12 new species in biodiversity survey.
17. IUCN recognises India's Dugong Reserve as global model.
18. Pallas's Cat photographed for first time in Arunachal.
19. Mukhi becomes first Indian-born cheetah to reach adulthood.
20. Climate change expands habitat of India's 'Big Four' snakes.
21. Rare Blue Dragon sea slugs spotted in warming Mediterranean.
22. Broad Scarlet dragonfly found in Western Ghats highlands.
23. New orchid species Gastrochilus pechei discovered in India.
24. NBFGR develops designer clownfish for aquaculture.
25. Two new Aspergillus fungi species found in Western Ghats.
26. Messor ibericus ants show rare cross-species reproduction.
27. Two Bihar wetlands gain Ramsar status.
28. Cold Desert Biosphere joins UNESCO's world network.
29. India pushes global eco-label for Lakshadweep tuna.
30. Tamil Nadu launches TN-SHORE for mangrove restoration.
31. Maldives microatolls reveal faster Indian Ocean sea-level rise.
32. China's rise as 'electro-state' threatens India's competitiveness.
33. India pursues energy sovereignty to cut import dependence.
34. Power Ministry begins stakeholder mapping for Energy Stack.
35. Cities key to India's clean-energy transition: WRI report.
36. India targets fully swadeshi solar value chain by 2028.
37. India adds record 23 GW renewables — fastest global growth.
38. PM opens world's first bamboo bio-ethanol plant in Assam.
39. India explores isobutanol-diesel blending
40. India launches first National Geothermal Energy Policy.
41. Tamil Nadu inaugurates port-based green hydrogen project.
42. BEE drafts stricter CAFE norms for vehicle emissions.
43. India drafts Sustainable Aviation Fuel (SAF) policy.
44. Nationwide EV-charging rollout under PM E-DRIVE scheme.
45. MoEFCC exempts uranium mining from public consultations.
46. Environment Audit Rules 2025 shift to trust-based compliance.
47. Green Credit Programme revised to prioritise ecosystem value.
48. India ranks 99 in UN SDG Index 2025; health lags persist.
49. Census 2027 to feature geo-tagged building mapping.

1. India Needs USD 467 Billion by 2030 to Decarbonise Power, Steel, Cement and Transport.



A recent study projected that India will require USD 467 billion (approx. ₹39 lakh crore) by 2030 to decarbonise its four most emission-intensive sectors—power, steel, cement, and transport—marking a crucial step toward meeting India's net-zero target by 2070.

Overview: The study adopts a bottom-up sectoral model, estimating an annual investment need of USD 54 billion (1.3% of GDP) between 2022–2030.

Sectoral Breakdown:

- Steel & Cement: Account for over 80% of financing needs, driven by high-cost Carbon Capture & Storage (CCS) technology and limited clean hydrogen availability.
- Power: Needs only USD 57 billion due to falling renewable energy costs and expanding battery storage.
- Transport: Focuses on electric vehicle (EV) adoption, charging infrastructure, and battery supply chains.

Policy Recommendations:

- Incentivise private investment through subsidies, R&D support, and green finance instruments.
- Establish a National EV Framework and strengthen grid infrastructure with pumped hydro and battery storage.
- Allow controlled fiscal expansion up to 2.5% of GDP to attract global climate funds.

Significance:

- India's transition is financially achievable if policies align with finance mobilisation.
- Provides a replicable template for other developing nations pursuing low-carbon growth.

Keywords: Decarbonisation, CCS, EVs, Green Finance, Energy Transition, Fiscal Deficit, Net Zero 2070.



UPSC Relevance: GS Paper 3 – Economy & Environment: Sustainable development, energy transition, carbon capture, and fiscal policy for green growth.



HOT Question: “India's decarbonisation pathway is as much a financing challenge as it is a technological one.” Discuss in light of the recent estimates for climate transition funding

2. India's Urbanisation Challenge: Building Climate-Resilient Cities by 2050



With nearly **a billion people expected to live in Indian cities by 2050**, rapid urbanisation poses severe **climate-related risks** such as floods, heat stress, and infrastructure collapse. The study underscores that India has a **narrow window** to construct climate-resilient, inclusive, and sustainable urban systems.

- **Urban Climate Risks:**

- **Flooding:** By 2030, two-thirds of city residents could face **pluvial flooding**, with losses projected up to **\$30 billion by 2070**.
- **Heat Islands:** Cities record **3–5 °C higher temperatures** than rural areas due to dense construction and low vegetation.
- **Housing Deficit:** Over **50 % of housing stock for 2070** is yet to be built – offering both risk and opportunity for green design.
- **Transport Disruption:** Just **10–20 % road flooding** can cripple **half the city's transport network**.
- **Municipal Strain:** Inefficient waste, drainage, and power systems worsen disaster impact.
- **Governance Gap:** Weak local capacity and low private participation hinder long-term resilience.

- **Way Forward:**

- **Smart Zoning:** Restrict construction in **floodplains, coasts, and landslide-prone zones** using **GIS-based master plans**.
- **Green Infrastructure:** Restore **wetlands, urban forests, and green corridors** to manage floods and mitigate heat.
- **Resilient Transport:** Develop **elevated metros, flood-proof roads, and evacuation routes** under the **Smart City Mission** and **PM Gati Shakti**.
- **Urban Climate Finance:** Issue **Urban Climate Bonds**, adopt **PPP models**, and integrate resilience in city budgeting.

- **Keywords:** Urban Heat Island, Pluvial Flooding, Climate Resilience, Smart City Mission, Green Bonds, Gati Shakti.



UPSC Relevance: **GS Paper 1 & 3** – Urbanisation, Disaster Management, Climate-Resilient Infrastructure, Sustainable Development.



HOT Question: “*India's urbanisation is inevitable, but climate resilience is a choice.*” Discuss how planning and finance reforms can make Indian cities sustainable by 2050.

3. Urban Noise Pollution: The Invisible Public Health and Constitutional Crisis



Recent studies show that **65–85% of monitoring sites in Delhi and other metros breach CPCB noise limits**, revealing that India's cities face a **growing public health emergency** linked to urban noise — undermining citizens' **Article 21 right to life, peace, and dignity**.

Definition:

Noise pollution refers to **unwanted or harmful sound** that causes health and environmental impacts.

The **Central Pollution Control Board (CPCB)** sets limits under the **Noise Pollution (Regulation and Control) Rules, 2000** — typically **55 dB (day) / 45 dB (night)** for residential areas.

Urban Exceedance:

Urban centres consistently record **65–85% exceedance** of permissible noise levels, especially near traffic corridors and construction zones.

Health Impacts:

- **Auditory Loss:** 27% of industrial workers experience hearing impairment; exposure above **85 dB** causes permanent damage.
- **Cardiovascular Effects:** Chronic exposure increases risk of **hypertension, ischemic heart disease, and stroke**.
- **Cognitive Decline:** Leads to poor concentration, disrupted sleep cycles, and reduced productivity.

Ecological Impact:

Alters **bird song frequencies**, disorients pollinators, and affects animal communication, disturbing urban biodiversity.

Institutional and Governance Challenges:

- **Weak Monitoring:** The **National Ambient Noise Monitoring Network (NANMN)** lacks sensor coverage and enforcement capacity.
- **Fragmented Accountability:** Poor coordination between **SPCBs, police, and municipalities**.
- **Cultural Normalisation:** Honking and construction noise accepted as routine urban behaviour.

Keywords: CPCB, Noise Rules 2000, Article 21, NANMN, Acoustic Policy, Public Health Externality.



UPSC Relevance: **GS Paper 3** – Environment, Pollution Control, and Urban Challenges. **GS Paper 2** – Governance and Fundamental Rights (Article 21 & Article 48A).



HOT Question: ““Noise pollution is not just an environmental issue but a constitutional one.” Discuss the need for legal, institutional, and cultural reforms to ensure the right to a peaceful environment

4. India's Single-Use Plastic Ban Faces Enforcement Gaps and Public Apathy



Despite India's **nationwide ban on 19 identified single-use plastic (SUP) items since 2021**, usage remains widespread. Weak enforcement, poor segregation infrastructure, and low public awareness have undermined efforts to curb the plastic crisis.

- **Definition:**
The **Plastic Waste Management Rules, 2016** define *single-use plastic* as “**a plastic item intended to be used once before being discarded or recycled.**”
- **Legal Framework:**
 - National ban under **Plastic Waste Management Rules, 2016** and **Extended Producer Responsibility (EPR) Guidelines, 2022**.
 - Prohibited items include **earbuds, straws, plastic cutlery, plates, cups, wrapping films, and banners below 100 microns**.
 - **Karnataka (2016)** was the first state to enact a ban under the **Environment Protection Act, 1986**.
- **Current Scenario:**
 - **Annual Generation:** India produces about **5.5 million tonnes** of single-use plastic waste annually — nearly **43% of total plastic waste**.
 - **Recycling Gap:** Only **~30%** is officially recycled; the rest ends up in **landfills, open burning, or waterways**.
 - **Global Position:** India is the **third-largest SUP producer**, though per capita consumption (~4 kg/year) is far below the global average (21 kg).
- **Challenges:**
 - **Weak Enforcement:** Local bodies lack monitoring staff and scientific disposal capacity.
 - **Industry Pushback:** Inadequate eco-friendly alternatives for small manufacturers.
 - **Behavioural Apathy:** Low public participation in waste segregation.
 - **Infrastructure Gap:** Inconsistent waste collection and material recovery facilities (MRFs).
- **Keywords:** SUP, PWM Rules 2016, EPR, CPCB, Bioplastics, Environment Protection Act 1986.



UPSC Relevance: GS Paper 3 – Environment, Pollution Control, Waste Management, Governance Challenges.



HOT Question: ““India’s single-use plastic ban is legally sound but operationally weak.” Analyse the key challenges in implementation and suggest measures to ensure effective plastic waste governance.

5. Supreme Court Urges Jail Terms for Stubble Burning; Calls for Alternatives to Blanket Bans



The **Supreme Court of India** recently urged the Centre to explore **imprisonment provisions** for repeated stubble-burning offences and directed the **Commission for Air Quality Management (CAQM)** to devise practical alternatives to **blanket bans** that harm workers' livelihoods during Delhi-NCR's winter pollution crisis.

Definition: Stubble burning refers to the intentional burning of paddy residues left after harvest to quickly prepare land for the next crop—especially between rice and wheat seasons in north India.

Environmental & Health Consequences:

Major contributor to Delhi-NCR winter smog and fine particulate matter (PM_{2.5}).

Depletes soil nutrients (e.g., nitrogen, phosphorus, potassium).

Emits CO₂, CO, and CH₄, worsening greenhouse gas emissions.

Causes respiratory illnesses and regional air quality deterioration.

Alternatives to Burning:

In-situ management: Happy Seeder, Super Straw Management System (SMS), and PUSA bio-decomposer.

Ex-situ uses: Paddy straw used in biomass power plants, bio-CNG, packaging, and ethanol production.

Crop Diversification: Promote millets and pulses to reduce residue intensity.

Government Framework & Initiatives:

Legal Basis:

Environment Protection Act (EPA), 1986 – bans open stubble burning.

CAQM Act, 2021 – empowers region-wide enforcement.

CAQM Rules, 2024 – impose fines up to ₹30,000 depending on land size.

Subsidies & Mechanisation: Sub-Mission on Agricultural Mechanisation (SMAM) supports machinery and Custom Hiring Centres.

Keywords: Stubble Burning, CAQM, EPA 1986, PUSA Bio-Decomposer, SMAM, Blanket Ban, Air Pollution.



HOT Question: “India’s stubble burning crisis reflects a conflict between environmental protection and agrarian livelihoods.” Discuss policy measures needed to balance both objectives

6. Climate Change Intensifies Lightning-Induced Wildfires and Hydrological Hazards



Scientists have warned that **climate change is increasing lightning-induced wildfires**, particularly in northern latitudes like **Canada and Siberia**, where warming, dryness, and lightning clusters are combining to cause record forest burn events and subsequent **flood and landslide hazards**.

- **Core Concept:**

Lightning-induced wildfires occur when **cloud-to-ground lightning** ignites **dry vegetation**, especially during prolonged **moisture deficits** and heat waves.

These events are now rising sharply due to **global warming and atmospheric instability**.

- **Key Drivers:**

- **Moisture Deficit:** Vegetation dryness increases combustibility.
- **Surface Warming:** Enhances **lightning frequency** and intensity.
- **Risk Overlap:** When lightning coincides with **high Fire Weather Index (FWI)** days, ignition probability spikes.
- **Thunderstorm Clusters:** Convective systems trigger **clustered lightning** that can ignite multiple fires simultaneously.

- **Global Impacts:**

- **Burn Disparity:** Lightning causes **~50% of Canada's wildfires** but accounts for **~90% of burned area**.
- **Economic Costs:** Annual **1.96 million hectares burned**, causing heavy timber loss and firefighting expenses.
- **Air Quality Impact:** Wildfire smoke negates earlier **air-pollution gains**, raising respiratory illness risk.
- **Hydrological Chain Effects:** Burnt slopes exposed to intense rain increase **flash floods, debris flow, and landslide** risk.

- **Keywords:** Lightning Wildfires, Fire Weather Index, Moisture Deficit, Remote Sensing, Hydrological Cascade.



UPSC Relevance: GS Paper 1 & 3 – Climate Change, Natural Hazards, Disaster Management, and Environmental Conservation.



HOT Question: “Climate change is transforming lightning from a meteorological event into a wildfire trigger.” Examine how this trend intensifies cascading environmental hazards.

7. Supreme Court Extends Firecracker Ban Beyond NCR, Declares Clean Air a National Right



The Supreme Court held that **firecracker bans must not remain confined to Delhi–NCR**, recognising **air pollution as a nationwide crisis** and upholding **clean air as part of the fundamental right under Article 21**

Context & Key Observations

- The Court questioned the **NCR-centric focus** of pollution control, noting that cities like **Amritsar and Lucknow** experience comparable or worse air quality.
- It reiterated that the **Right to Life includes the Right to Clean Air** across India.
- The **CJI highlighted the disproportionate impact** of air pollution on **daily wage earners and street vendors**.
- The Court dismissed manufacturers' claims of **90 % cleaner "green crackers,"** citing independent studies showing only **~30 % emission reduction**.

Key Issues

- **Equity & Justice:** Unequal enforcement of bans undermines uniform application of Article 21.
- **Enforcement Challenges:** Seasonal bans encourage **hoarding and illegal sales**.
- **Livelihood Risks:** The **Sivakasi (Tamil Nadu)** firecracker hub employs lakhs; blanket bans threaten employment without alternatives.
- **Technology Gap:** "Green crackers" lack **mass-scale validation and certification mechanisms**.

Regulatory Framework

- **Delhi–NCR:** Year-round prohibition since Dec 2024 on manufacture, sale, storage, and bursting.
- **Other States:**
 - **Bengaluru:** Green crackers 8–10 PM during festivals.
 - **Chennai:** Limited slots 6–7 AM & 7–8 PM.
 - **West Bengal:** Total ban with strong enforcement.
- **CSIR–NEERI:** (Nagpur, est. 1958) nodal agency for **green-cracker R&D** under Ministry of Science & Technology.



UPSC Relevance: GS Paper 3 – Environment & Pollution Control; GS Paper 2 – Fundamental Rights, Article 21, Environmental Governance.



HOT Question: “*The right to clean air cannot be geographically selective.*”
Discuss how judicial interventions can ensure equitable environmental governance across India.

8. India's Water Stress Deepens: Wastewater Reuse Emerging as Key to National Water Security

With per capita freshwater availability below the global scarcity threshold and groundwater in 21 major cities projected to run dry by 2030, India faces an acute water crisis. Policymakers and experts are calling for large-scale **wastewater reuse** to bridge the rising demand–supply gap.

India's Water Stress Landscape

- **Population Pressure:** India hosts 18 % of global population but only 4 % of freshwater resources.
- **Decline in Availability:** Per capita freshwater availability has dropped by **73 % since 1951**, placing India in the “**water-stressed**” category (below 1,700 m³ per person).
- **NITI Findings:** 600 million Indians face high to extreme water stress; reservoir storage fell to **40 % (March 2024)**—lowest in 5 years.
- **Urban Crisis:** Delhi, Chennai, Bengaluru among 21 cities at risk of groundwater depletion by 2030.

About Wastewater & Its Impacts

- **Definition:** Used water from domestic, industrial or agricultural sources containing physical, chemical & biological pollutants.
- **Scale:** India generates **72,000 MLD wastewater**, treating only **28 %**.
- **Consequences:** Pollutes 70 % of water bodies; causes **37.7 million** waterborne illness cases yearly; Yamuna alone receives **641 MLD** untreated discharge.
- **Agriculture:** Nutrient-rich runoff causes **eutrophication** (e.g. Vembanad Lake).

Potential of Wastewater Reuse

- **Water Supply Augmentation:** NITI's CWMI (2019) – India can reuse **up to 80 %** of wastewater, especially for irrigation & industry.
- **Pollution Control:** Prevents toxic effluent flow into rivers and aquifers.
- **Resource Recovery:** Extraction of nutrients (N, P) for fertiliser & biogas generation.
- **Groundwater Recharge:** **Kolar (Karnataka)** model successfully restored aquifers via treated wastewater.

Government Framework

- **Water (Prevention & Control of Pollution) Act 1974** – established CPCB / SPCBs.
- **National Water Policy 2012 & Reuse Framework** – emphasise recycling.
- **Missions:** *Namami Gange, AMRUT, Swachh Bharat 2.0, Smart Cities* integrate sewage treatment & reuse.
- **Draft Rules 2024:**
 - Bulk users → **reuse 50 % wastewater by 2031.**
 - Housing societies → **reuse 20 % by 2027–28.**



HOT Question ““India's water crisis is less about scarcity and more about mismanagement.” Critically examine the role of wastewater reuse in ensuring water security and sustainable urbanisation

9. Delhi Partners with IIT Kanpur for Cloud Seeding Experiments to Combat Air Pollution



In October 2025, the **Delhi government** will conduct its **first artificial rain trials** through **cloud seeding**, in collaboration with **IIT Kanpur**, to mitigate hazardous air pollution and smog during winter months.

About Cloud Seeding

- **Definition:** A **weather modification technique** that artificially induces rainfall by dispersing substances into clouds to enhance precipitation.
- **Mechanism:** Substances like **silver iodide, potassium iodide, dry ice (CO₂), or liquid propane** are sprayed into clouds. These act as **condensation nuclei**, facilitating droplet formation.
- **Ideal Conditions:** Requires **pre-existing clouds** with **sufficient moisture**; most effective under **tall, moist cloud formations** and **low wind speeds**.
- **Objective:** To **increase rainfall, reduce particulate matter**, and **improve air quality** via the “washout effect.”

Past Experiments in India

- **IIT Kanpur:** Conducted successful trials in 2018 and 2019 over Haryana using a **Cessna aircraft** equipped with cloud seeding flares.
- **Karnataka and Maharashtra:** Have used cloud seeding to mitigate drought (Project Varshadhare, 2017).
- **Global Practices:** Widely used in the **UAE, China, and the USA** to induce rain and suppress hailstorms.



UPSC Relevance: GS Paper 3 – Environment, Air Pollution, Science & Technology (Weather Modification), Urban Governance.



HOT Question: “Artificial rain can only provide temporary relief but not a solution.” Critically examine the scientific and policy viability of cloud seeding as an anti-pollution strategy in India.

10. Indore Tops Swachh Vayu Sarvekshan 2025; Amravati Leads Among Medium Cities



On **9th September 2025**, the **Ministry of Environment, Forest and Climate Change (MoEFCC)** organised the **Swachh Vayu Sarvekshan Awards & Wetland Cities Recognition Ceremony** in New Delhi, honouring the top-performing cities under the **National Clean Air Programme (NCAP)** and recognising two Indian cities with **international wetland accreditation**

About Swachh Vayu Sarvekshan (SVS)

Launched: 2023 by **MoEFCC** under the **National Clean Air Programme (NCAP)**.
Objective: To rank 131 non-attainment and million-plus cities based on **clean air actions, pollution reduction, and public participation**.

Assessment Criteria: 200-point matrix covering **PM10/PM2.5 levels, green cover, vehicle electrification, waste management, and citizen engagement**.

Ranking Categories: Large cities (>10 lakh), medium cities (3–10 lakh), and small cities (<3 lakh).

2025 Winners – Large City Category Medium City Category Wetland Cities Recognition

•Two Indian cities received **international accreditation** under the **Ramsar Convention’s Wetland City Network**, acknowledging **urban wetland conservation and community engagement**.

India now joins the **select list of 43 global wetland cities** recognised by **UNESCO–Ramsar**.

About NCAP

- Launched:** 2019 to reduce **PM10 and PM2.5 concentrations by 40% by 2026**.
- Coverage:** 131 non-attainment cities under the Air (Prevention and Control of Pollution) Act, 1981.
- Funding:** Performance-linked disbursement from MoEFCC based on annual air-quality targets.

Rank	City
1 Indore (200 points)	Planted 16 lakh trees, adopted 120 e-buses & 150 CNG buses, strong citizen engagement.
2 Jabalpur (199 points)	Waste-to-energy plant, large-scale green expansion, improved air monitoring.
3 Agra & Surat (Joint)	Legacy waste remediation, Miyawaki plantations, EV policy, maintained 38% green cover.

Rank	City
1 Amravati	Road infrastructure upgrades, 19-acre urban forest creation.
2 Jhansi	Large-scale greening and waste segregation projects.
3 Moradabad & Alwar	Waste management, legacy waste site remediation.



HOT Question: “Discuss the significance of the Swachh Vayu Sarvekshan initiative in strengthening India’s National Clean Air Programme and promoting sustainable urban governance.

11. Wayanad Landslide Identified as a “Grey Rhino” Disaster: A Warning on Ignored Ecological Risks



A report titled “*The Sliding Earth, Scattered Lives*” identified the **2024 Wayanad landslide** as a *grey rhino* event — a highly probable yet neglected disaster. The incident highlights the growing pattern of **foreseeable ecological crises** being ignored despite repeated scientific warnings.

About the Grey Rhino Concept

- **Definition:** A *grey rhino* event refers to a **highly probable, high-impact threat** that is clearly visible yet systematically ignored by policymakers.
- **Origin:** Coined by **Michele Wucker** in her 2016 book “*The Gray Rhino: How to Recognize and Act on the Obvious Dangers We Ignore*.”
- **Contrast with Black Swan:**
 - *Black Swan*: Rare, unpredictable, high-impact events (e.g., COVID-19, 2004 Tsunami).
 - *Grey Rhino*: Predictable, slow-building crises often neglected due to complacency or competing priorities (e.g., climate change, deforestation, financial crises).

Wayanad Landslide 2024

- **Location:** Wayanad district, Kerala – part of the ecologically fragile **Western Ghats** (UNESCO World Heritage Site).
- **Trigger:** Intense rainfall and slope destabilisation due to quarrying, deforestation, and unregulated construction.
- **Impact:** Over 300 casualties and large-scale displacement; river sedimentation and loss of soil fertility in adjoining valleys.
- **Ignored Warnings:**
 - **Kerala State Disaster Management Authority (KSDMA)** and **Gadgil Committee (2011)** reports had warned of excessive anthropogenic pressure in high-susceptibility zones.
 - Despite this, construction and encroachments continued unabated.

Examples of Grey Rhino Events

Event	Ignored Risk	Impact
2008 Global Financial Crisis	Unchecked speculative lending	Global recession
2018 Kerala Floods	Urbanisation & deforestation	Severe flooding & landslides
2023 Joshimath Sinking	Uncontrolled development	Town subsidence
2024 Wayanad Landslide	Quarrying & land mismanagement	Massive ecological loss



HOT Question: ““Distinguish between “Grey Rhino” and “Black Swan” disasters. How does the 2024 Wayanad landslide illustrate the dangers of ignoring predictable ecological risks in India’s fragile ecosystems?”

12. India Launches 'The Vulture Network' Portal in Assam to Strengthen Vulture Conservation Efforts



On the occasion of **International Vulture Awareness Day (first Saturday of September)**, India launched its **first vulture conservation portal, The Vulture Network**, in **Assam**. The portal aims to coordinate nationwide conservation efforts, facilitate data sharing, and spread awareness in regional languages.

About the Vulture Network Portal

- **Objective:** To serve as a **digital conservation and coordination platform** for researchers, forest departments, NGOs, and citizens.
- **Features:**
 - Provides **real-time information** on vulture sightings, population data, and rescue efforts.
 - Offers **outreach materials** and awareness content in **local languages** (beginning with Assamese).
 - Encourages **community participation** in reporting and monitoring vulture populations.

Status of Vultures in India

- **Diversity:** India hosts **nine species** of vultures — including:
 - *White-rumped vulture* (*Gyps bengalensis*)
 - *Slender-billed vulture* (*Gyps tenuirostris*)
 - *Red-headed vulture* (*Sarcogyps calvus*)
 - *Indian vulture* (*Gyps indicus*)
 - *Himalayan griffon*, *Egyptian vulture*, *Cinereous vulture*, *Eurasian griffon*, and *Bearded vulture*.
- **Most Threatened:**
 - *Slender-billed vulture* — ~800 mature individuals (IUCN: Critically Endangered).
 - *White-rumped* and *Red-headed vultures* are also **Critically Endangered**.
- **Ecological Role:** Nature's "sanitation workers" — prevent spread of zoonotic diseases by disposing of carcasses.

Major Threats

- **Veterinary Drugs:** NSAIDs like **diclofenac**, **ketoprofen**, and **aceclofenac** cause kidney failure in vultures feeding on treated livestock carcasses.
- **Poisoning:** Carcass poisoning, especially from pesticides and intentional poisoning of carnivores, kills large numbers of vultures.
- **Habitat Loss:** Reduction of nesting trees and safe feeding zones.
- **Slow Reproduction:** Low breeding rates limit recovery potential.



HOT Question: "Discuss the ecological importance of vultures in India and critically evaluate the effectiveness of national measures such as the Vulture Action Plan and The Vulture Network portal in preventing species extinction."

13. Eight Tigers to be Translocated to Sahyadri Tiger Reserve to Revive Western Ghats' Tiger Population

On **12th September 2025**, the **Union Environment Ministry** approved the **capture and translocation of eight tigers** from **Tadoba-Andhari and Pench Tiger Reserves** to the **Sahyadri Tiger Reserve (STR)** in **western Maharashtra**. This marks a major step in reviving tiger populations in the Western Ghats ecosystem.

About the Project

- **Approval:** Granted by the **Wildlife Division**, following a technical clearance by the **National Tiger Conservation Authority (NTCA)** in October 2023.
- **Phase 1:** Two tigresses from **Tadoba** will be translocated first, with a **soft release** scheduled by **December 2025**.
- **Conditions:** Strict veterinary protocols, minimal handling, and constant post-release monitoring.

Ecological Preparedness

- **Assessment:** The **Wildlife Institute of India (WII)** confirmed STR's readiness, citing a robust **prey base** and suitable habitat.
- **Carrying Capacity:** Studies estimate **>20 tigers** can be supported in the long term.
- **Monitoring:** Prey density to be regularly augmented and tiger movements tracked via radio collars.

About Sahyadri Tiger Reserve

- **Establishment:** Created in **2010**, covering **1,165 sq km** across **Kolhapur, Sangli, Satara, and Ratnagiri** districts.
- **Constituent Areas:** Formed by merging **Chandoli National Park** and **Koyna Wildlife Sanctuary**.
- **Current Status:** Lacked a breeding population—previous sightings were mostly of transient males.

Ecological Significance

- Strengthens tiger range connectivity across the **northern Western Ghats**, linking habitats with **Goa and Karnataka**.
- Enhances protection for **Koyna and Warna watersheds**, crucial for western Maharashtra's water security.
- Expected to catalyse ecosystem recovery, benefiting prey species and overall biodiversity.



UPSC Relevance: GS Paper 3 – Environment, Biodiversity, and Conservation; Wildlife Protection; Government Initiatives for Tiger Conservation.



HOT Question: “Discuss the ecological and administrative challenges in tiger reintroduction programmes in India. How do projects like the Sahyadri translocation enhance ecological connectivity and landscape conservation?”

14. Chhattisgarh’s Tiger Population Doubles, Signalling Ecological Recovery and Conservation Success



According to the **2025 Tiger Census**, **Chhattisgarh’s tiger count has doubled** from **17 (2022)** to **35 (2025)** – reflecting significant progress in wildlife management and habitat restoration.

Key Highlights

- **Highest Population:** The **Achanakmar Tiger Reserve** now hosts the **largest number of tigers** in the state.
- **New Reserve:** **Guru Ghasidas–Tamor Pingla**, India’s **56th Tiger Reserve (2024)**, is the **3rd largest** in the country.
- **Translocation Initiative:** The **NTCA** has approved **tiger relocation from Madhya Pradesh to Udanti–Sitanadi and Guru Ghasidas reserves** to revive depleted populations and ensure genetic diversity.

About Major Reserves

Tiger Reserve	Location	Key Feature
Achanakmar TR	Bilaspur district	High forest cover, rich prey base
Udanti–Sitanadi TR	Gariaband & Dhamtari	Corridor connectivity to Odisha
Indravati TR	Dantewada, Bijapur	Dense sal forests, Naxal-affected zone
Guru Ghasidas–Tamor Pingla TR	Surguja & Koriya	3rd largest TR in India; corridor to Madhya Pradesh

About NTCA

- **Established:** 2005 under the **Wildlife (Protection) Act, 1972**.
- **Mandate:** Oversee tiger conservation under **Project Tiger**, habitat management, population monitoring, and coordination among states.

India’s Status: As per the **2022 All-India Tiger Estimation**, India hosts **3,682 tigers**, the highest globally.



UPSC Relevance: GS Paper 3 – Environment, Biodiversity Conservation, Wildlife Governance, and Federal-level Cooperation in Conservation



HOT Question: “Critically analyse the challenges in tiger conservation in central India. How do translocation and landscape connectivity contribute to sustainable tiger population recovery?”

15. Ivory Poaching in Cameroon Causes 86% Elephant Decline, Disrupting Forest Regeneration by 68%



A recent ecological study found that **massive elephant loss due to ivory poaching** in Cameroon's tropical forests has caused a **68% drop in ebony (*Diospyros crassiflora*) regeneration**, highlighting the cascading ecological impact of megafauna decline.

Role of Elephants in Forest Ecology

- **Megafaunal Seed Dispersers:** Elephants transport large seeds over long distances, promoting **forest regeneration and species colonisation**.
- **Habitat Architects:** Through trampling and browsing, they create **canopy gaps** that allow sunlight-dependent trees to thrive.
- **Digestive Enhancement:** Fruit pulp removal in the gut increases **seed germination threefold**, while dung coating protects against **pathogens and predation**.
- **Genetic Connectivity:** By dispersing seeds across fragmented landscapes, elephants sustain **genetic diversity** and ecosystem resilience.
- **Predation Shield:** Dung-covered seeds are **8.5× less likely** to be eaten by rodents and other ground foragers.

Impact of Poaching

- **Population Collapse:** 86% decline in elephants disrupts seed dispersal networks, leaving forests dominated by shade-tolerant, slow-growing species.
- **Regeneration Loss:** Ebony regeneration reduced by **68%**, indicating forest structure changes and long-term carbon sequestration decline.
- **Carbon Sink Weakening:** Fewer elephants → fewer large hardwoods → diminished **carbon storage capacity** in African rainforests.

About the Ebony Tree (*Diospyros crassiflora*)

- **Habitat:** Congo Basin (Cameroon, Gabon).
- **Features:** Dense, jet-black hardwood; takes ~50 years to mature, 200 years to reach full size.
- **Uses:** Furniture, musical instruments, high-end crafts.
- **IUCN Status:** **Vulnerable**.
- **Ecological Dependence:** Relies heavily on elephants for seed dispersal and regeneration.



UPSC Relevance: GS Paper 3 – Environment, Ecology, Biodiversity Conservation, Human–Wildlife Conflict, Ecosystem Services.

✓ Highlights how **trophic downgrading (loss of keystone species)** alters ecosystem functions and climate regulation



HOT Question: “Discuss the ecological consequences of megafaunal extinction in tropical forests. How does the loss of elephants impact carbon storage and biodiversity resilience?”

16. Periyar Tiger Reserve Adds 12 New Species in Latest Biodiversity Survey



A comprehensive biodiversity survey at **Periyar Tiger Reserve (PTR)**, Kerala, has recorded **12 new species**, including butterflies, odonates, and bird subspecies — reaffirming PTR's status as a “living laboratory” of biodiversity in the Western Ghats.

Findings of the Survey

- **Newly Documented:** 12 new species — 8 butterflies, 2 odonates (dragonflies/damselflies), and 2 bird subspecies.
- **Butterflies (8):** *Sahyadri Grass Yellow*, *Plain Orange-tip*, *Yellowjack Sailer*, *Lankan Plum Judy*, *Banded Awl*, *Hedge Hopper*, *Small Palm Bob*, and *Indian Dart*.
- **Odonates (2):** *Sahyadri Torrent-Hawk* and *Coorg Torrent-Hawk*.
- **Birds (2):** *Bourdillon's Blackbird* and *White-throated Ground Thrush*.
- **Overall Diversity:** PTR now records **207 butterfly species** and **108 odonate species**, showing rich invertebrate diversity.

About Periyar Tiger Reserve (PTR)

- **Location:** Cardamom and Pandalam Hills, **southern Western Ghats**, Kerala–Tamil Nadu border.
- **Rivers:** Drained by **Periyar** and **Pamba** rivers.
- **Key Feature:** **Periyar Lake**, an artificial reservoir formed by the **Mullaperiyar Dam (1895)**.
- **Topography:** Hilly terrain; **Kottamala Peak (~2000 m)** is the highest point.
- **Vegetation:** Tropical evergreen, semi-evergreen, moist & dry deciduous forests, grasslands, and montane sholas.
- **Flora:** Teak, rosewood, sandalwood; 170+ medicinal plants & 145 orchid species.
- **Fauna:** Tigers, elephants, gaur, lion-tailed macaques, Malabar civets, and Nilgiri langurs.
- **Tribal Inhabitants:** Mannans, Paliyans, Uralis, and Mala-arayas — known for sustainable forest use.

Ecological Significance

- **Western Ghats Hotspot:** A UNESCO World Heritage region known for endemism and high biodiversity.
- **Indicator Species:** Butterflies and odonates reflect ecosystem health and microclimate stability.
- **Conservation Insight:** Highlights importance of continuous monitoring and habitat protection under Project Tiger and eco-development initiatives.



UPSC Relevance: GS Paper 3 – Environment, Ecology, Biodiversity, Conservation.

✓ Illustrates Western Ghats' ecological richness and India's biodiversity documentation efforts under Project Tiger and NCAP frameworks



HOT Question: “Discuss how biodiversity surveys in protected areas like Periyar Tiger Reserve contribute to conservation science and climate resilience in the Western Ghats.

17. IUCN Recognises India's First Dugong Reserve in Palk Bay as Global Marine Conservation Model



At the **IUCN World Conservation Congress 2025 (Abu Dhabi)**, India's **Palk Bay Dugong Conservation Reserve** was recognised as a **global model for marine biodiversity conservation**, highlighting its community-led seagrass restoration success.

About Dugong Conservation Reserve

- **India's First Dugong Sanctuary:** Notified by **Tamil Nadu (2022)** under the *Wildlife (Protection) Act, 1972*.
- **Location:** Covers **448 sq. km** in northern **Palk Bay**, acting as a **buffer** between the **Gulf of Mannar** and adjacent Tamil Nadu coasts.
- **Seagrass Meadows:** ~12,250 hectares of seagrass serve as feeding grounds, sequester **blue carbon**, and sustain artisanal fisheries.
- **Model Recognition:** Recognised by **IUCN** for its **community-driven bamboo-coir seagrass restoration**, offering a **low-cost, replicable model** for South Asia.

About Dugong (*Dugong dugon*)

Common Name: Sea Cow — the only **herbivorous marine mammal**.

Taxonomy: Sole surviving member of the **Dugongidae family**; related species *Steller's Sea Cow* extinct in 18th century.

Physical Traits: Cylindrical body, paddle-like flippers, and rounded snout adapted for grazing on seagrass beds.

Habitat: Prefers **warm, shallow coastal waters (<10 m)** with dense seagrass.

Diet: Consumes **30–40 kg of seagrass/day**, maintaining meadow health and sediment balance.

Lifespan & Reproduction: Lives up to **70 years** but reproduces slowly (1 calf every 3–7 years).

Distribution: Indian and Pacific Oceans — major populations in **Australia, Arabian Gulf**; in India: **Palk Bay, Gulf of Mannar, Andaman–Nicobar, Gulf of Kutch**.

Threats: Entanglement in gillnets, boat strikes, habitat loss, and poaching.

Conservation Status

IUCN: Vulnerable **CITES:** Appendix I **WPA, 1972:** Schedule I (highest protection)

Ecological Significance

- **Ecosystem Engineer:** Continuous grazing prevents algal overgrowth, improves **fish nursery** habitats, and enhances **carbon sequestration**.
- **Marine Resilience:** Healthy seagrass ecosystems improve water clarity, protect coasts, and act as carbon sinks.



HOT Question: “Discuss the ecological and economic importance of seagrass ecosystems in India's coastal biodiversity conservation, with reference to the Palk Bay Dugong Reserve.”

18. WWF-India Records Pallas’s Cat in Arunachal Pradesh – First Photographic Evidence Above 4,200 Metres



A recent **WWF-India biodiversity survey in Arunachal Pradesh** documented **six wild cat species** above 4,200 m elevation, including the **first-ever photographic evidence of the elusive Pallas’s cat**, expanding its known distribution in the Indian Himalayas.

About Pallas’s Cat (*Otocolobus manul*)

- **Common Name:** Also known as the *manul* – a small, solitary, and crepuscular wildcat species (active during dawn and dusk).
- **Distinct Features:**
 - Flattened face with high-set eyes and rounded, low-set ears.
 - Thick silvery-grey winter fur turning light brown in summer – an adaptation to extreme cold.
- **Habitat:** Prefers **rocky montane steppes** and **cold deserts** with sparse vegetation and low rainfall.
- **Microhabitats:** Utilises **rock crevices** and burrows for camouflage, predator avoidance, and thermal regulation.

Distribution

- **Global:** Found across **Central Asia, Iran, Mongolia, Tibetan Plateau, and Himalayas**.
- **In India:** Confirmed in **Ladakh, Himachal Pradesh, Sikkim**, and now **Arunachal Pradesh**, marking a significant eastward range extension.

Ecological Significance

- Acts as a **mesopredator**, controlling populations of rodents, pikas, and small birds, thus maintaining **ecological balance** in high-altitude ecosystems.

Conservation Status

Framework	Category
IUCN Red List	Least Concern
CITES	Appendix II
CMS (Bonn Convention)	Appendix II
Wildlife (Protection) Act, 1972	Schedule I (Part I) – Highest protection



UPSC Relevance: GS Paper 3 – Environment, Ecology, Biodiversity Conservation
✓ High-altitude ecosystem species, WWF field surveys, wildlife range expansion, Schedule I species significance.



HOT Question: “Discuss the ecological significance of high-altitude carnivores like the Pallas’s cat in the Himalayan ecosystem. How do climate and habitat changes threaten their survival?”

19. Mukhi Becomes India's First Native-Born Cheetah to Reach Adulthood at Kuno National Park



Mukhi, a cheetah born at **Kuno National Park (Madhya Pradesh)**, is set to become the **first India-born cheetah to reach adulthood**, marking a milestone in the **Cheetah Reintroduction Programme** launched in 2022 after the species' extinction in 1952.

Cheetah Population in India (2025)

- **Total:** 27 cheetahs — 24 in Kuno National Park, 3 in Gandhi Sagar Wildlife Sanctuary.
- **India-born Cheetahs:** 16 cubs born within the country.
- **Survival Rate:** 61% in Kuno — significantly higher than the **global average of 40%**.
- **Adulthood:** Cheetahs typically reach adulthood at **~30 months**; lifespan ~12–14 years.

Factors Enhancing Cub Survival

- **Abundant Prey Base:** Availability of *chital* and *blackbuck* supports efficient hunting and feeding.
- **Scientific Monitoring:** Radio-collaring & 3-member monitoring teams per cheetah ensure 24×7 health surveillance.
- **Habitat Advantage:** Kuno's extensive grasslands promote natural hunting and adaptive behaviour.
- **Genetic Diversity:** Phased imports from **Namibia and South Africa** maintain genetic resilience.

Challenges to Cheetah Conservation

- **Extreme Heat Stress:** High summer temperatures (45–48°C) cause dehydration & cub mortality.
- **Predator Competition:** High leopard density reduces prey and elevates inter-carnivore conflict.
- **Genetic Bottleneck:** Low diversity among imported cheetahs risks inbreeding and fertility decline.
- **Rewilding Challenge:** Transition from controlled enclosures to wild environments limits hunting adaptation.

About Kuno National Park

- Located in **Sheopur district**, Madhya Pradesh; chosen for its semi-arid grassland ecosystem.
- Originally proposed as a **second home for Asiatic lions**, later adapted for cheetah reintroduction.
- Acts as the **core site** under *Project Cheetah* — India's ambitious carnivore reintroduction initiative.



HOT Question: "Discuss the ecological and logistical challenges faced in the Cheetah Reintroduction Programme in India. How can adaptive management ensure sustainable survival of the species?"

20. Climate Change May Expand the Range of India's 'Big Four' Venomous Snakes, Heightening Snakebite Risk



A recent study titled “*Future of Snakebite Risk in India*” projects that **climate change will alter the distribution of India's four deadliest snakes**—potentially increasing exposure risk across new regions by 2050.

About India's “Big Four” Snakes

1. **Common Krait (*Bungarus caeruleus*)** – Found in plains and agricultural areas; nocturnal and highly neurotoxic.
2. **Russell's Viper (*Daboia russelii*)** – Widespread across India; hemotoxic venom causes internal bleeding.
3. **Saw-scaled Viper (*Echis carinatus*)** – Smallest yet highly aggressive; responsible for many fatal rural bites.
4. **Spectacled Cobra (*Naja naja*)** – Iconic species; neurotoxic venom causing paralysis and respiratory failure.

Together, these account for **~90% of India's 58,000 annual snakebite deaths**, nearly half the **global total**, making India the **most snakebite-affected country** worldwide.

Study Findings

- **Climate-Driven Shifts:** Warming and altered rainfall patterns could expand snake habitats northward and to higher altitudes.
- **Risk Hotspots:** Central India, the Gangetic plains, and parts of Northeast India may witness rising encounters.
- **Monsoon Influence:** Seasonal flooding and agricultural expansion amplify human–snake interaction.
- **Public Health Concern:** Antivenom stocks and rural healthcare remain inadequate to meet changing risk zones.

Government & Institutional Response

- **National Action Plan for Prevention and Control of Snakebite Envenoming (2022)** – MoHFW initiative for surveillance, treatment, and awareness.
- **WHO Classification (2021):** Snakebite designated as a **Neglected Tropical Disease (NTD)**.
- **Antivenom Policy:** India produces polyvalent antivenoms against the Big Four but lacks region-specific formulations for other species.



UPSC Relevance: GS Paper 3 – Environment, Disaster Management &

Health ✓ Climate change and vector-borne health risks

✓ Human–wildlife conflict ✓ Public health policy and rural healthcare gaps



HOT Question: “Climate change is expected to alter the geography of snakebite risk in India. Discuss the implications for public health preparedness and biodiversity management.”

21. Rare Blue Dragon Sea Slugs Spotted in Spain Amid Warming Mediterranean Waters



Blue dragon sea slugs (*Glaucus atlanticus*) were recently sighted along Spain's coast — a rare occurrence attributed to **rising Mediterranean Sea temperatures** and **increased jellyfish populations**, indicating climate-linked marine biodiversity shifts.

About Blue Dragon Sea Slug

- **Scientific Name:** *Glaucus atlanticus*
- **Common Names:** Blue sea slug, blue angel, sea swallow.
- **Appearance:** Striking blue and silver coloration; grows up to 4 cm long; soft-bodied and pelagic.
- **Grouping:** Often drifts in colonies called “**blue fleets**”, feeding and floating collectively.

Habitat & Adaptations

- **Habitat Range:** Warm tropical and subtropical waters of the **Pacific, Atlantic, and Indian Oceans**.
- **Camouflage:** Floats upside down—its blue dorsal side blends with the sea surface, while the silver underside conceals it from predators below (countershading).
- **Buoyancy Mechanism:** Retains air bubbles in its stomach to remain afloat on the ocean surface.

Venom & Feeding

- **Diet:** Preys on venomous siphonophores like the **Portuguese Man o' War** (*Physalia physalis*).
- **Venom Storage:** Stores nematocysts (stinging cells) from its prey in its cerata (finger-like appendages), making its own sting more potent than that of its prey — a unique case of **kleptocnidy** (stolen sting).
- **Trophic Role:** Helps regulate jellyfish populations in warming waters.

Ecological Significance

- **Indicator Species:** Its presence in new regions signals **marine heatwaves** and **altered ocean currents**.

Conservation Note: Though not endangered, its changing range reflects the cascading effects of **climate change on marine ecosystems**



UPSC Relevance: GS Paper 3 – Environment & Ecology

✓ Climate-induced marine species migration ✓ Marine biodiversity indicators ✓ Predator-prey adaptations (ecological interactions)



HOT Question: “Discuss how marine heatwaves and changing ocean currents influence species distribution, with reference to the Blue Dragon Sea Slug sightings in the Mediterranean.

22. Elusive Broad Scarlet Dragonfly Spotted in the Southern Western Ghats Highlands



Odonatologists have recorded the **Broad Scarlet (*Crocothemis erythraea*)** in the southern Western Ghats, marking a significant rediscovery of a species previously confined to high-altitude regions of the Himalayas.

About Broad Scarlet (*Crocothemis erythraea*)

- **Family:** Libellulidae
- **Range:** Distributed across **Europe, North Africa, and Asia**; in India, found only in the **Himalayas** and now the **southern Western Ghats**.
- **Preferred Habitat:** Cool, high-altitude **freshwater ecosystems above 550 metres**, such as montane streams and lakes.
- **Companion Species:** India has two *Crocothemis* species –
 - *C. erythraea* (highlands)
 - *C. servilia* (lowlands)

Ecological and Evolutionary Significance

- **Ice Age Relict:** The species colonised South India during the **Pleistocene epoch**, surviving in **isolated montane refuges**, making it a rare example of **paleoendemism**.
- **Ecological Indicator:** Presence of this dragonfly reflects **intact montane freshwater systems** and **stable climatic conditions**.
- **Functional Role:** Acts as a **predator of mosquitoes and small insects**, contributing to ecosystem balance and freshwater biodiversity health.

Conservation Context

- **Threats:** Habitat loss, warming-induced drying of highland wetlands, and ecological fragmentation.
- **Significance for Western Ghats:** Its survival underscores the **biogeographic link between the Himalayas and Western Ghats** and reinforces the region's global importance as a **biodiversity hotspot**.



UPSC Relevance: GS Paper 3 – Environment, Ecology & Biodiversity

Conservation ✓ Western Ghats biodiversity & endemism

✓ Climate refugia & Ice Age relicts ✓ Indicator species and freshwater ecosystems



HOT Question: “Discuss how the rediscovery of relict species like the Broad Scarlet dragonfly in the Western Ghats enhances our understanding of climate stability and montane biodiversity conservation in India.”

23. New Orchid Species *Gastrochilus pechei* Recorded for the First Time in India



A new record of the orchid species ***Gastrochilus pechei*** — earlier known only from Myanmar — has been discovered in **Vijoenagar, Arunachal Pradesh**, expanding India's floral diversity and reaffirming the region's global orchid significance.

About *Gastrochilus pechei*

- **Taxonomy:** Belongs to the *Gastrochilus* genus — a group of **monopodial orchids** with **77 species** distributed across tropical and temperate Asia.
- **Distinct Features:** Characterised by **short axillary inflorescences**, **brightly coloured flowers**, and **distinct pollinia** (pollen sacs unique to orchids).
- **Habitat:** Epiphytic (grows on trees) orchid thriving in **moist evergreen rainforests** near **riverbanks**; flowers during **September–October**.
- **Identification Challenge:** Often **misidentified** due to morphological similarity with related orchid taxa.

Significance of the Discovery

- **New National Record:** This marks the **first Indian record** of *Gastrochilus pechei*, previously confined to Myanmar.
- **Biodiversity Boost:** Increases India's *Gastrochilus* species count to **23**, with **15 found in Arunachal Pradesh** alone.
- **Ecological Value:** Orchids are **bio-indicators** of forest health, depending on intact canopy humidity and host tree diversity.
- **Conservation Context:** Discovery reinforces Arunachal's title as the **"Orchid State of India,"** home to about **60 % of India's orchid varieties**.

Regional Context

- **Vijoenagar Valley:** Part of Namdapha landscape, eastern Arunachal Pradesh — a **biodiversity frontier** bordering Myanmar; supports numerous endemic plant species.



UPSC Relevance: GS Paper 3 – Environment, Ecology & Biodiversity

Conservation ✓ Eastern Himalayas biodiversity hotspot

✓ Role of orchids as ecological indicators ✓ Cross-border species distribution & biogeographic links



HOT Question: "What does the discovery of new orchid species such as *Gastrochilus pechei* in Arunachal Pradesh reveal about the ecological and conservation importance of India's Eastern Himalayan region?"

24. NBFGR Scientists Develop Designer Clownfish for Sustainable Ornamental Aquaculture



Scientists at the **National Bureau of Fish Genetic Resources (NBFGR)**, **Lucknow**, have successfully developed **designer clownfish varieties** through selective cross-breeding to promote **community-based ornamental fish aquaculture** and reduce dependence on wild reef populations.

About the Clownfish (Anemonefish)

- **Taxonomy:** Belongs to the genus *Amphiprion*; noted for their **bright orange and white bands** and mutualistic relationship with **sea anemones**.
- **Habitat:** Found in **shallow coral reefs** of the **tropical Pacific and Indian Oceans**.
- **Indian Distribution:** **Andaman & Nicobar Islands, Lakshadweep, and Gulf of Mannar–Palk Bay**.
- **Global Range:** Extends from the **Red Sea to French Polynesia**, reaching **Japan and northern Australia**.

Unique Biological Traits

- **Symbiosis:** Gain protection from anemones' stinging tentacles while defending them from predators.
- **Sequential Hermaphrodites:** All individuals are **born male**; the **dominant male transforms into a female** when required.
- **Hierarchy:** Small social groups are led by a **dominant female**, followed by a breeding male and subordinates.
- **Ecological Role:** Recycle nutrients, deter coral predators, and sustain **reef resilience** as key **link species**.
- **Adaptation:** Adjust body size and metabolism during **marine heatwaves**, aiding survival.
- **Threats:** Overharvesting for the **aquarium trade** and **coral bleaching** from ocean warming.
- **Conservation Status:** *IUCN – Least Concern*.



UPSC Relevance: **GS Paper 3 – Biodiversity | Blue Economy | Biotech in Aquaculture** ✓ Role of NBFGR and ICAR institutes in genetic resource conservation ✓ Sustainable ornamental fish trade and marine biodiversity protection



HOT Question: “How can ornamental aquaculture innovations like designer clownfish contribute to both biodiversity conservation and rural coastal livelihoods under India’s Blue Economy framework?”

25. Two New *Aspergillus* Species Discovered in the Western Ghats



Researchers identified two **novel fungal species** — *Aspergillus dhakephalkarii* and *Aspergillus patriciawiltshireae* — from the **Western Ghats**, along with first-time regional records of *A. aculeatinus* and *A. brunneoviolaceus*. The discovery expands India's microbial biodiversity catalogue and highlights the **biotechnological potential** of native fungi.

About the *Aspergillus* Genus

- **Definition:** *Aspergillus* is a **filamentous mold genus** found across diverse ecological niches, including soil, water systems, and decaying vegetation.
- **Diversity:** Over **400 known species**, many of which are ecologically beneficial or industrially useful.
- **Habitats:** Oxygen-rich, nutrient-rich, and decomposing organic environments such as compost or forest litter.
- **Health Risks:** While most species are benign, some cause **aspergillosis, respiratory allergies, and mycotoxin contamination** in humans and animals.
- **Industrial Importance:** Used in **fermentation industries** for producing **soy sauce, sake, citric acid, and pharmaceuticals** (e.g., statins, enzymes).

About *Aspergillus niger*

- **Group:** Belongs to the *Aspergillus Nigri* complex (black-spored species).
- **Industrial Role:** The “**industrial workhorse**”, producing ~99% of global **citric acid**, used in food, beverages, and medicine.
- **Ecology:** Common contaminant in **damp interiors** and **stored fruits/vegetables**.
- **Health Aspect:** Usually non-pathogenic but **opportunistically infects** immunocompromised individuals.

Significance of Discovery

- **Biodiversity Insight:** Highlights the **Western Ghats** as a **mycological hotspot** with unexplored microbial diversity.
- **Biotechnological Potential:** Novel species may yield **enzymes, organic acids, and bioactive compounds** useful in food, pharma, or green chemistry.

Conservation Value: Underlines the ecological importance of preserving humid forest ecosystems that host rare microbial taxa



UPSC Relevance: GS Paper 3 – Science & Technology | Biodiversity & Biotechnology Applications ✓ Role of microorganisms in industrial biotechnology ✓ Indigenous biodiversity mapping in Western Ghats



HOT Question: “How can microbial discoveries like new *Aspergillus* species contribute to India's bioeconomy while ensuring biosafety and ecological sustainability?”

26. *Messor ibericus* Ants Exhibit Xenoparity – Reproducing Males of Another Species



Researchers discovered that the **Iberian harvester ant (*Messor ibericus*)** can **reproduce males of a different species, *Messor structor***, overturning traditional laws of species-specific reproduction. This rare phenomenon, termed **xenoparity**, redefines reproductive biology and evolutionary mechanisms among eusocial insects.

About the Discovery

- **Xenoparity Defined:** A reproductive process where one species produces the offspring of another species — distinct from hybridisation, where offspring share mixed traits of both parents.
- **Unique Case:** *M. ibericus* queens internally reproduce pure *M. structor* males using stored sperm — a biological anomaly never before observed in the animal kingdom.

Biological Principle

- **Normal Rule:** In ants,
 - **Males** arise from **unfertilised eggs** (maternal DNA only).
 - **Females** develop from **fertilised eggs** (maternal + paternal DNA).
- ***M. ibericus* Exception:** The queen eliminates her egg's **nuclear DNA** and replaces it with **paternal DNA** from stored *M. structor* sperm.
- **Genetic Outcome:**
 - *M. structor* males inherit **mitochondria** from the *M. ibericus* mother and **nuclear DNA** from *M. structor*, creating a mixed lineage unseen in nature.

Mechanism of Xenoparity

1. **Dual Mating:** During the nuptial flight, the queen mates with both *M. ibericus* and *M. structor* males.
2. **Sperm Storage:** Sperm is stored in a **spermatheca** (a reproductive organ for long-term sperm preservation).
3. **DNA Swap:** While laying eggs, the queen discards her own nuclear DNA and inserts *M. structor*'s sperm DNA into the egg.
4. **Foreign Male Birth:** Resulting eggs hatch into *M. structor* males, not hybrids.
5. **Colony Balance:** These foreign males fertilize *M. ibericus* queens, producing hybrid worker ants — sustaining labour and genetic diversity.



HOT Question: “How does the discovery of xenoparity in ants challenge the classical understanding of species boundaries and reproductive isolation in evolutionary biology?”

27. Two Bihar Wetlands — Gokul Jalashay and Udaipur Jheel — Designated as New Ramsar Sites



On **September 2025**, the **Ramsar Convention Secretariat** designated **Gokul Jalashay (Buxar)** and **Udaipur Jheel (West Champaran)** as new **Ramsar Sites**, taking India's total to **93 wetlands of international importance**. The move highlights Bihar's growing contribution to India's wetland conservation network under the **National Wetland Conservation Programme**.

About the Ramsar Convention

- **Adopted:** 1971, Ramsar (Iran); came into force in 1975.
- **India:** Became a signatory in 1982; designated **Chilika Lake** and **Keoladeo National Park** as the first Ramsar sites.
- **Objective:** To conserve and use wetlands sustainably, recognizing their ecological, hydrological, and socio-economic value.
- **Criteria:** Includes biodiversity richness, threatened species, hydrological functions, and cultural significance.

Newly Designated Wetlands

1. Gokul Jalashay (Buxar, Bihar)

- **Type & Area:** Oxbow lake (~448 ha) on the **southern edge of the Ganga River**.
- **Biodiversity:** Supports > 50 bird species; marshy vegetation and shrubs provide nesting grounds for waders and herons.
- **Community Link:** Sustains fishing, irrigation, and seasonal agriculture; annual community festival includes lake-cleaning rituals.
- **Ecological Role:** Acts as a flood-buffer and nutrient trap for the Ganga basin; demonstrates **human-nature co-dependence**.

2. Udaipur Jheel (West Champaran, Bihar)

- **Type & Area:** Oxbow lake (~319 ha) surrounded by dense **Udaipur Wildlife Sanctuary** forest.
- **Flora:** > 280 plant species; includes **Alysicarpus roxburghianus** (endemic).
- **Avifauna:** Wintering ground for ~35 migratory birds — notably the **Vulnerable Common Pochard (Aythya ferina)**.
- **Eco-Function:** Jamun trees (*Syzygium cumini*) around the lake act as natural water filters; vital for groundwater recharge.
- **Threats:** Unregulated fishing, pesticide-driven runoff, and agricultural encroachment.



HOT Question: “Discuss the significance of the newly designated Ramsar wetlands in Bihar in strengthening India's strategy for wetland-based climate resilience and community-linked conservation.”

28. India's Cold Desert Biosphere Reserve Added to UNESCO's World Network of Biosphere Reserves (WNBR)



At the **37th session of UNESCO's Man and the Biosphere (MAB) Programme** in Paris, the **Cold Desert Biosphere Reserve** in Himachal Pradesh's **Lahaul-Spiti** was added to the **World Network of Biosphere Reserves**, recognising its unique cold-arid Himalayan ecosystem and community-based conservation model.

About the World Network of Biosphere Reserves (WNBR)

- Created under UNESCO's **Man and the Biosphere Programme (1971)** to balance **biodiversity conservation, scientific research, and sustainable livelihoods**.
- Sites are zoned into:
 - Core Zone:** Strictly protected for conservation & research.
 - Buffer Zone:** Limited human activity & eco-tourism.
 - Transition Zone:** Sustainable use & community development.
- Global Network: **785 sites in 142 countries**, covering ~5% of Earth's land.
- With this addition, **India now has 13 sites** in WNBR.
- São Tomé & Príncipe** became the first nation with its entire territory designated as a biosphere reserve.

About Cold Desert Biosphere Reserve

- Location:** Spans ~7,770 sq. km across **Lahaul-Spiti & Kinnaur (Himachal Pradesh)** and **Leh-Kargil (Ladakh)**; one of the coldest & driest regions on Earth.
- Constituents:** Includes **Pin Valley National Park, Kibber Wildlife Sanctuary, and Chandratat Wildlife Sanctuary**.
- Elevation Range:** 3,000–6,700 m; annual precipitation < 100 mm.
- Significance:** India's **first high-altitude cold desert biosphere reserve** recognised under UNESCO.

Biodiversity

- Flora:** 732 vascular plant species (30 endemic, 157 near-endemic); willow-leaved sea-buckthorn, Himalayan birch, Persian juniper.
- Fauna:** Snow leopard, Himalayan ibex, blue sheep, Himalayan wolf, golden eagle, Himalayan snowcock.
- Adaptations:** Species evolved for low-oxygen, low-moisture, and sub-zero conditions.



UPSC Relevance: GS Paper 3 – Environment | Conservation | Biodiversity | International Conventions (UNESCO-MAB)

✓ India's 13 UNESCO Biosphere Reserves ✓ High-altitude cold desert ecosystems



HOT Question: "Explain the ecological and socio-economic significance of the Cold Desert Biosphere Reserve and assess how UNESCO's WNBR designation strengthens India's conservation framework."

29. India Pushes for Global Eco-Labeling of Lakshadweep's Tuna Fisheries



The Union Government has initiated efforts to secure **global eco-labelling certification** for **Lakshadweep's traditional pole-and-line tuna fisheries**, recognising their **low ecological footprint, artisanal character**, and **alignment with Sustainable Development Goals (SDGs) 12 and 14**.

About the Initiative

- **Objective:** To certify Lakshadweep's tuna fishery as *eco-friendly* and *socially responsible*, thereby enhancing access to premium export markets and boosting incomes of local fishers.
- **Model Fishery:** Lakshadweep's tuna fishers employ **pole-and-line** and **hand-line** methods—single-fish, low-bycatch, and fuel-efficient systems recognised globally for minimal marine impact.
- **Expected Benefits:** Improved market value, traceable supply chains, and global recognition under **Marine Stewardship Council (MSC)** or equivalent eco-labelling systems.

Eco-Labeling Framework

- **Definition:** Certification granted by an **independent agency** to products/services that meet verified **environmental and sustainability standards**.
- **Global Relevance:** Supports **UN SDG 12** (sustainable consumption & production) and **SDG 14** (life below water).
- **India's System:**
 - **Ecomark Scheme (1991):** National eco-labelling program under the **Bureau of Indian Standards (BIS)**.
 - **Eco-mark Rules 2024:** Expanded coverage to 20+ product categories, integrated with **Mission LIFE** (Lifestyle for Environment) for consumer sustainability awareness.

About Tuna Fisheries

- **Biological Traits:** Tuna are **warm-blooded, fast-swimming pelagic fish** rich in protein & omega-3 fatty acids.
- **Indian Context:**
 - Potential remains **under-harvested** despite a 32 % rise in export value in FY 2023-24.
 - **Lakshadweep & A&N Islands:** Ideal for sustainable oceanic tuna operations.
 - **PM Matsya Sampada Yojana (PMMSY):** Designated **Tuna Cluster in A&N Islands** to modernise processing & exports.
- **EEZ Context:** India's **Exclusive Economic Zone (EEZ)** extends 200 nautical miles, enabling resource rights and sustainable blue-economy development.



HOT Question: "Discuss how eco-labelling of India's traditional fisheries can promote sustainable livelihoods while aligning with the Sustainable Development Goals."

30. Tamil Nadu Launches TN-SHORE for Community-Centric Mangrove Restoration with World Bank Support



The **Tamil Nadu Coastal Restoration Mission (TN-SHORE)**, backed by the **World Bank**, introduced an **innovative model of community-driven mangrove restoration**, transferring funds directly to **village-level mangrove councils** to promote local participation, resilience, and coastal livelihood security.

About TN-SHORE

- **Implementing Agency:** Government of Tamil Nadu with World Bank technical and financial support.
- **Objective:** Restore degraded mangroves and strengthen coastal climate resilience through community ownership and nature-based solutions.
- **Innovation:** First programme in India enabling **direct fund transfer to village councils** for site selection, nursery management, and monitoring.
- **Components:**
 - Restoration of **1,000 ha** of mangroves and coastal wetlands.
 - Construction of **eco-embankments** and **bio-shields** against storm surges.
 - Integration with **disaster-risk reduction plans** under the **State Disaster Management Authority**.
 - Inclusion of women's self-help groups (SHGs) for nursery and eco-tourism livelihoods.

About Mangroves

- **Definition:** Salt-tolerant trees and shrubs growing in **estuarine and inter-tidal regions** where **freshwater and seawater meet**.
- **Ecological Roles:**
 - Buffer against cyclones and tidal surges.
 - Nursery habitat for fish, crustaceans, and birds.
 - Significant **blue-carbon sinks**, sequestering 3–4× more carbon than terrestrial forests.
 - Prevent **coastal erosion** and maintain nutrient cycling.

Mangrove Cover in India (ISFR 2023)

- **Total:** 4,991.68 sq km ($\approx 0.15\%$ of India's geographical area).
- **Change since 2021:** Net decline of **7.43 sq km**.
- **State-wise Trends:**
 - $\uparrow$ **Andhra Pradesh (+13.01 sq km)**, $\uparrow$ **Maharashtra (+12.39 sq km)**.
 - $\downarrow$ **Gujarat (–36.39 sq km)** largest loss.
- **Major Share:**
 - **West Bengal – 42.45 %** (Sundarbans),
 - **Gujarat – 23.66 %**,
 - **A&N Islands – 12.39 %**.



HOT Question: “Community participation is essential for effective ecosystem restoration. Examine how Tamil Nadu’s TN-SHORE initiative can serve as a model for climate-resilient coastal management in India.”

31. Coral Microatoll Study in Maldives Reveals Faster and Earlier Indian Ocean Sea-Level Rise



A new study using **coral microatolls** in the Maldives reconstructed a **90-year Indian Ocean sea-level record**, showing that the region's sea-level rise began earlier (late 1950s) and accelerated faster than global averages — a key insight for climate adaptation in island nations and India's coastal zones.

About Microatolls

- **Definition:** Flat, disk-shaped coral colonies growing close to the **lowest tide level**, expanding laterally once upward growth is restricted by air exposure.
- **Formation Pattern:** Upward coral growth halts when exposed during low tide, forming a circular or mushroom-like margin.
- **Indicator Role:** Their **upper surfaces record past low-tide levels**, providing long-term natural sea-level data with centimeter-level precision.

How Microatolls Reconstruct Sea-Level History

- **Outer Edge Mapping:** Measuring microatoll tops across reefs indicates historic sea-level positions.
- **Growth Bands:** Like tree rings, coral layers capture **annual variations** in sea-level and temperature.
- **Climate Triggers:** Interruptions in growth align with **El Niño–Southern Oscillation (ENSO)** and **negative Indian Ocean Dipole (IOD)** events, revealing climate linkages.
- **Lunar Influence:** Long-term growth patterns show **18.6-year tidal oscillations** tied to the lunar nodal cycle.

Key Findings of the Study

- **Early Onset:** Indian Ocean sea-level rise began **~1950s**, decades before satellite records.
- **Magnitude:** Central Indian Ocean rose **~0.3 m (1930–2019)** — higher than previous coastal estimates.
- **Acceleration:** Rise increased from **~1.5 mm/yr (1930–59)** → **~4.5 mm/yr (1990–2019)**.
- **Regional Pattern:** **Maldives & Lakshadweep** witnessed **~30–40 cm rise** in 50 years.
- **Comparative Rise:** Indian Ocean rise = **3.3 mm/yr**, exceeding global mean of **3.1 mm/yr (MoES data)**.
- **Ocean Warming:** Indian Ocean warming = **0.15°C/decade**, faster than global average of **0.11°C/decade**.



HOT Question: “Discuss how coral microatolls can serve as natural archives for reconstructing sea-level history and what their findings imply for India's coastal adaptation policies.”

32. India's Competitiveness Threatened as China Advances as a Global "Electro-State"



A recent economic analysis warned that **India's high industrial electricity costs, outdated grid efficiency, and continued coal dependence** threaten its ability to compete with China, which is emerging as a dominant "*electro-state*" – a nation whose future industries are powered by abundant, low-cost electricity.

Concept of an Electro-State

- **Definition:** An *electro-state* refers to a country where future economic growth and innovation are driven by **electricity-dependent sectors** such as **AI, electric vehicles (EVs), robotics, semiconductors, and data centers**.
- **Example:** China's heavy investment in renewables, storage, and transmission has made it a global leader in affordable, reliable electricity supply – key for sustaining its advanced industries.

India's Power Sector Landscape

- **Installed Capacity:** 476 GW (Q1 2025), generating 445 billion units.
- **Generation Mix:** ~75% coal-based, with renewables forming the fastest-growing share.
- **Transmission Losses:** Aggregate Technical and Commercial (AT&C) losses still high at **20.8%**, compared to single-digit losses in advanced economies.
- **Tariff Burden:** Industrial tariffs nearly **2× China's**, making exports less competitive.

Major Challenges

1. **Pricing Distortions:** Industrial users bear inflated tariffs to cross-subsidise residential and agricultural consumers.
2. **Subsidy Inefficiency:** Electricity subsidies (~1.3% of GDP) largely benefit **wealthier households**, not the poor.
3. **Distribution Losses:** Poor metering, fragmented billing data, and legacy infrastructure weaken efficiency.
4. **Seasonal Stress:** Peak summer demand exposes **coal supply gaps and grid congestion**.
5. **Carbon Lock-in:** Continued reliance on coal slows **energy transition and export decarbonisation**.



UPSC Relevance: GS Paper 3 – Economy, Energy Security, Infrastructure ✓ Power sector reforms & efficiency ✓ Industrial competitiveness and cost structures ✓ Energy transition and decarbonisation strategies



HOT Question: "Discuss the concept of an "*electro-state*" and evaluate India's readiness to achieve industrial competitiveness through power sector reforms and decarbonisation.

33. India's Energy Sovereignty Drive to Reduce Import Dependence and Strengthen Economic Security



India's **85% dependence on imported crude oil** and **50% on natural gas** leaves its economy exposed to global price shocks and geopolitical disruptions. Recent conflicts — such as the **Russia–Ukraine war** and **Israel–Iran standoff (2025)** — have renewed calls for achieving *energy sovereignty* through diversified and domestic energy strategies.

Why Energy Sovereignty Matters

- **Geopolitical Risks:** External conflicts threaten supply chains and energy affordability.
- **Economic Cost:** In FY 2023–24, crude and gas imports worth **\$170 billion (≈25% of total imports)** widened the **trade deficit** and **depreciated the rupee**.
- **Strategic Autonomy:** Reducing import dependence enhances resilience against global sanctions and market volatility.

Five Pillars of India's Energy Sovereignty

1. **Coal Gasification & Carbon Capture**
 - Utilises India's **150 billion tonnes of coal** to produce **syngas, methanol, hydrogen, and fertilisers**.
 - Integrating **Carbon Capture, Utilisation and Storage (CCUS)** can reduce emission intensity.
2. **Biofuels & Bioenergy**
 - **Ethanol blending** saved forex and added ₹92,000 crore to farmer incomes.
 - **SATAT Scheme** promotes **Compressed Biogas (CBG)** production, creating a circular economy with bio-manure co-products.
3. **Nuclear Power Expansion**
 - Current capacity: **8.8 GW**, stagnant for years.
 - Requires acceleration in **thorium-based reactors, Small Modular Reactors (SMRs)**, and **uranium supply partnerships**.
4. **Green Hydrogen Mission**
 - Target: **5 Million Metric Tonnes (MMT)** annual production by **2030**.
 - Focus on **domestic electrolyser manufacturing, advanced catalysts**, and **hydrogen storage** systems.
5. **Grid Balancing via Pumped Hydro Storage**
 - Stabilises renewable variability using India's hilly topography.
 - Key for integrating large-scale **solar** and **wind** generation.



UPSC Relevance: GS Paper 3 – Economy, Energy Security, Infrastructure ✓ Energy independence and import substitution
✓ Renewable integration & grid reform



HOT Question: “Energy sovereignty is central to India's economic resilience and strategic autonomy.” Discuss how India can achieve this balance between sustainability and self-reliance.

34. Ministry of Power Launches Stakeholder Mapping Survey for India Energy Stack (IES)



The **Ministry of Power** has launched a **Stakeholder Mapping Survey** to aid the development of the **India Energy Stack (IES)** – a national digital framework aimed at transforming the power sector into a transparent, data-driven, and innovation-ready ecosystem.

Objective of the Survey

- To collect data on **organisational profiles, solutions offered, and digital readiness** of utilities, energy companies, and startups.
- The responses will guide the phased rollout of the **India Energy Stack**, ensuring interoperability and sector-wide participation.

About India Energy Stack (IES)

- **Concept:** A **standardised, modular, and open-source digital infrastructure** for India's power sector, modelled on successful frameworks like **India Stack** (for digital payments).
- **Digital Identity:** Each **asset, consumer, and transaction** will receive a **unique digital ID**, allowing real-time monitoring and traceability across the power value chain.
- **Plug-and-Play Design:** Built for seamless integration by **DISCOMs, State Load Dispatch Centres (SLDCs), and system operators**, enabling flexible adoption.
- **Ecosystem Enabler:** Facilitates innovation by **startups, energy fintechs, and Virtual Power Plants (VPPs)** – entities that aggregate distributed energy resources like rooftop solar and EV chargers for grid optimisation.
- **Data Interoperability:** Encourages **machine-to-machine communication**, predictive maintenance, and data analytics for reliability and efficiency.

Expected Benefits

- **Efficiency:** Reduces power theft, billing delays, and energy losses through data transparency.
- **Consumer Empowerment:** Enables smart metering, dynamic tariffs, and demand-side management.
- **Investment Push:** Encourages private innovation in energy analytics, green finance, and distributed generation.
- **Resilience:** Builds a digitally resilient energy grid aligned with India's **Energy Transition and Net Zero 2070 goals**.



UPSC Relevance: GS Paper 3 – Infrastructure, Energy, Technology, E-Governance ✓ Digital transformation in energy governance
✓ Public-Private innovation models



HOT Question: “Digital platforms like the India Energy Stack can do for the power sector what India Stack did for financial inclusion.” Discuss.

35. WRI India Report Highlights Cities as Catalysts for India's Clean Energy Transition



A **World Resources Institute (WRI) India** report emphasised that India's cities — contributing nearly **60% of GDP** — are central to achieving the nation's **500 GW renewable capacity target (by 2030)** and **Net-Zero goal (by 2070)**, positioning them as key demand aggregators for clean energy adoption.

India's Clean Energy Commitments

- **Renewable Capacity:** 500 GW non-fossil electricity generation target by 2030.
- **Net-Zero Pledge:** To reach net-zero greenhouse-gas emissions by 2070.
- **Green Hydrogen Mission:** Targets annual production of **5 MMT by 2030** to decarbonise hard-to-abate sectors.

Key Findings of the Report

Positive Urban Practices

- **Rooftop Solar & LED Streetlights:** Cities adopting decentralised solar; potential of **200 GW** from urban PV alone.
- **Carbon Market Innovation:** *Indore* developed municipal carbon-credit consultancy under Smart City Mission.
- **E-Mobility & Efficiency:** *Pune* and *Kochi* expanding electric public transport; *Surat* uses smart monitoring for efficient municipal energy use.

Barriers to Urban Transition

- **Capacity Gaps:** Urban local bodies (ULBs) lack technical and institutional capacity for renewable integration.
- **Financing Barriers:** Limited municipal bonds and creditworthiness hinder scaling of clean-energy projects.
- **Urbanisation Pressure:** Expected **270 million new urban residents by 2040** will escalate energy demand and emissions.

Recommendations of the Report

- **Integrated Urban Planning:** Combine clean-energy action with **transport, water, and waste management**.
- **Collaborative Governance:** Forge **multi-stakeholder partnerships** between cities, states, and private players.
- **Institutional Capacity Building:** Create **city-level energy cells** and **urban energy action plans** for implementation and monitoring.



UPSC Relevance: GS Paper 3 – Energy, Urbanisation, Infrastructure, Environment ✓ Urban role in decarbonisation ✓ Sustainable city governance



HOT Question: ““India's energy transition will be won or lost in its cities.” Analyse this statement in light of WRI India's findings on urban energy governance.

36. India Targets a Fully Swadeshi Solar Value Chain by 2028 to Achieve Renewable Self-Reliance



The **Union Minister for New and Renewable Energy** announced that India will achieve **indigenous solar cell manufacturing by 2028**, completing a fully **Swadeshi solar value chain**. This milestone aligns with India's goal of **500 GW renewable capacity by 2030** and **net-zero emissions by 2070**.

Rationale for Solar Indigenisation

- **Import Resilience:** China currently supplies **~60% of solar modules and cells**, posing a strategic vulnerability.
- **Economic Security:** Indigenous manufacturing could cut a **\$30 billion annual import bill**.
- **Job Creation:** The **PLI scheme** has generated **12,000+ skilled jobs** in module and cell production.
- **Energy Demand:** India's energy requirement is projected to reach **73 exajoules by 2050**, demanding domestic solar capacity.

Achievements in Solar Expansion

- **Installed Capacity:** India crossed **100 GW solar capacity in 2025**, ranking **3rd globally** (IRENA 2025).
- **Non-Fossil Milestone:** Over **50% of installed power** now comes from non-fossil sources — achieving the **COP26 target 5 years early**.
- **Mega Projects:** Rajasthan hosts the **world's largest solar park**; a **2 GW ingot-wafer facility** signifies upstream integration.

Bottlenecks in Solar Development

- **Land Use Conflicts:** Competes with agriculture, raising **food security and ecological trade-offs**.
- **Grid Limitations:** **16.4% transmission losses** and inadequate storage infrastructure.
- **R&D Deficit:** Low innovation in **polysilicon and perovskite technologies**.
- **Cost Barriers:** **₹2.2–3.5 lakh** for rooftop systems limits mass adoption.
- **Waste Risks:** Lack of **solar panel recycling policy** may create a future e-waste burden.



UPSC Relevance: GS Paper 3 – Infrastructure, Energy, Environment, Indigenisation of Technology ✓ Renewable energy & Atmanirbhar Bharat ✓ Employment & energy security nexus



HOT Question: “Indigenising India's solar value chain is not just an environmental imperative but a strategic necessity.” Discuss with reference to recent policy interventions.

37. India Achieves Record Renewable Energy Growth — Adds 23 GW in Five Months, Fastest in the World



India added **23 GW of renewable capacity in the first five months of FY2025–26**, with plans to **double it by year-end**, marking the **world's fastest clean energy expansion**. The milestone further consolidates India's position as a global clean-energy leader.

Key Achievements in Renewable Energy

- **NDC Milestone:** India achieved **50% non-fossil electricity capacity five years ahead of the 2030 target**, becoming the only **G20 nation** to do so (Paris Agreement, 2021).
- **Installed Capacity:** India has reached **252 GW of non-fossil electricity**, surpassing the halfway mark toward the **500 GW goal by 2030**.
- **Manufacturing Leap:**
 - **Solar Module Capacity:** Expanded to **100 GW** by March 2025.
 - **PV Cell Output:** Tripled from **9 GW (2024)** to **27 GW (2025)**, accelerating solar self-reliance.
- **Rooftop Solarisation:** Over **2 million homes solarised** under **PM Surya Ghar**, advancing toward the **10 million target** — exceeding the population of entire countries like Austria or Israel.
- **Global Ranking:** India now ranks **3rd globally** in renewable energy capacity after China and the U.S. (IRENA 2025).

Drivers of Growth

- **Policy Push:** PLI Scheme for high-efficiency solar modules, **PM-KUSUM**, and **Green Energy Corridor** projects.
- **Private Sector Role:** Rapid scaling of utility-scale solar parks in Rajasthan, Gujarat, and Karnataka.
- **Domestic Manufacturing:** PLI-linked backward integration into polysilicon, ingots, and wafers.
- **Energy Transition:** Strong push for **offshore wind, rooftop solar, and battery storage systems**.

Challenges Ahead

- Grid modernisation and storage deficits.
- Land use conflicts and transmission bottlenecks.
- Financing and R&D gaps in advanced cell technologies (e.g., perovskite).



UPSC Relevance: UPSC Exam Relevance:

GS Paper 3 – Infrastructure, Energy, Environment, and Indigenisation

- ✓ Achievements under India's NDC targets
- ✓ Renewable transition and industrial growth



HOT Question: “India’s renewable energy transition demonstrates both climate leadership and industrial transformation.” Discuss the factors behind this rapid scale-up and the challenges to sustaining it.

38. PM Inaugurates World's First Green Bamboo Bioethanol Plant in Assam; ₹7,230-crore Polypropylene Project Launched

Prime Minister Narendra Modi inaugurated **India's first bamboo-based bioethanol plant** at **Golaghat, Assam**, marking the world's first such facility. He also laid the foundation for a **₹7,230-crore polypropylene plant** at **Numaligarh Refinery**, boosting India's biofuel and polymer self-reliance.

Bamboo-Based Bioethanol Plant

- **Scale & Input:** Utilises ~**5 lakh tonnes of green bamboo** annually sourced from **Assam, Arunachal Pradesh, Nagaland, and Mizoram**, creating a sustainable market for bamboo cultivation.
- **Output:** Produces **48,900 tonnes of ethanol** and **food-grade liquid CO₂** per year.
- **Economic Impact:** Expected to contribute **₹200 crore annually** to Assam's rural economy and support tribal livelihoods.
- **Partnership:** Joint venture between **Numaligarh Refinery Ltd (NRL)**, **Fortum (Finland)**, and **Chempolis OY**, showcasing Indo-Finnish clean-tech collaboration.
- **Global Significance:** The world's **first green bamboo bioethanol facility**, advancing India's 2G biofuel capability.

About Bioethanol

- **Definition:** A **renewable alcohol fuel** produced by fermenting biomass such as sugarcane, bamboo, or crop residues.
- **Uses:** Acts as a **petrol blending fuel** and **green feedstock** for chemicals and plastics.
- **Generations of Biofuels:**
 - **1G:** Food-based (sugarcane, corn)
 - **2G:** Non-food biomass (bamboo, crop waste)
 - **3G:** Algae-based
 - **4G:** Engineered biomass + CO₂ capture
- **Policy Support:**
 - **Ethanol Blending Programme (EBP)** – Target: **20% blending by 2025**.
 - **PM JI-VAN Yojana (2019):** Supports 2G bioethanol projects.
 - **SATAT Scheme:** Promotes compressed biogas (CBG) for transport.
 - **GOBARdhan Scheme:** Converts organic waste into bioenergy.

About Polypropylene Project

- **Material:** A thermoplastic polymer derived from propylene; lightweight, durable, and recyclable.
- **Applications:** Packaging, textiles, automotive components, medical devices, and household goods.
- **Economic Significance:** Supports India's **Atmanirbhar Bharat** vision by reducing polymer imports and boosting petrochemical manufacturing in the Northeast.

39. India Explores Isobutanol–Diesel Blending After Ethanol Trials Fail



The **Automotive Research Association of India (ARAI)** is evaluating the feasibility of **isobutanol–diesel blending** as ethanol–diesel trials were unsuccessful. If validated, India would become the **first country to adopt isobutanol–diesel blends** for transport fuel diversification

About Isobutanol

- **Chemical Formula:** $C_4H_{10}O$ – a four-carbon alcohol, colourless, flammable, and commonly used as a solvent in paints and coatings.
- **Feedstock:** Produced from the same biomass sources as ethanol (sugarcane juice, molasses, grains).
- **Potential:** Offers a new route to utilise India's surplus ethanol feedstock while diversifying liquid fuels.

Advantages

- **Better Blending:** Mixes more easily with diesel than ethanol, ensuring improved stability.
- **Higher Flash Point:** Less volatile and safer to store and transport than ethanol.
- **Feedstock Efficiency:** Supports rural income by expanding biofuel end-use markets.

Limitations & Challenges

- **Low Cetane Number:** Reduces ignition quality, leading to diesel knock and performance issues.
- **Additive Requirement:** Needs cetane improvers or biodiesel co-blending to enhance combustion—raising cost.
- **Engine Risk:** Blending beyond 10 % may reduce engine power and efficiency.
- **Cost Factor:** Additive and stabiliser use increases operational cost.



UPSC Relevance: UPSC Exam Relevance: GS Paper 3 – Economy | Energy | Environment | Science & Tech (Alternative Fuels)

✓ Indigenous research in low-carbon fuels ✓ Biofuel diversification for energy security



HOT Question: “Isobutanol-diesel blending could become a practical alternative to ethanol in India's biofuel strategy. Examine its economic and technical feasibility.”

40. India Launches First National Geothermal Energy Policy



The **Ministry of New and Renewable Energy (MNRE)** has introduced India's **first National Policy on Geothermal Energy** to promote clean baseload power and diversify beyond solar and wind.

About Geothermal Energy

- Geothermal energy harnesses **heat from the Earth's crust** to generate electricity or provide direct heating and cooling.
- India has **381 hot springs across 10 provinces**, including **Ladakh, Himachal Pradesh, Gujarat, and Chhattisgarh**, showing strong potential.

Key Features of the Policy

- **100% FDI permitted** in geothermal projects.
- **Fiscal Incentives:** Tax holidays, import-duty exemptions, concessional loans, and viability gap funding.
- **Long-Term Tenure:** Project support up to 30 years, extendable based on resource availability.
- **Industrial Collaboration:** Encourages joint ventures with oil, gas, and mineral firms.
- **Resource Repurposing:** Promotes reuse of **abandoned oil and gas wells** and **ground-source heat pumps** for heating/cooling.

Significance

- **Low-Carbon Power:** Emits ~99% less CO₂ than fossil fuels.
- **Energy Security:** Offers stable 24×7 renewable power, complementing intermittent solar/wind.
- **Economic Diversification:** Enables local industry participation and energy access in remote Himalayan regions.
- **Climate Commitments:** Strengthens India's **net-zero 2070** pathway.
- **Global Context:** Adds India to a 15.4 GW global geothermal market led by the US, Indonesia, and the Philippines.



UPSC Relevance: GS Paper 3 – Energy | Environment | Science & Tech | Climate Change ✓ Expanding India's renewable mix beyond solar & wind
✓ Role in achieving net-zero emissions



HOT Question: "Geothermal energy can become India's hidden baseload renewable. Discuss its potential, challenges, and policy imperatives"

41. India Inaugurates First Port-Based Green Hydrogen Pilot Project at VOC Port, Tamil Nadu

On **6th September 2025**, the **Union Minister of Ports, Shipping and Waterways** inaugurated **India's first port-based Green Hydrogen Pilot Project** at **V.O. Chidambaranar (VOC) Port**, Tamil Nadu – a key milestone in India's clean energy transition and maritime decarbonisation efforts.

About the Project

- **Location:** VOC Port, Tuticorin (Tamil Nadu).
- **Cost & Capacity:** Built at a cost of **₹3.87 crore**, with a capacity of **10 Nm³/hour** (normal cubic metre per hour).
- **Purpose:** To produce **green hydrogen** using renewable power for **street lighting** and **EV charging** within the port colony.
- **Green Methanol Initiative:** The facility supports the proposed **Coastal Green Shipping Corridor (Kandla–Tuticorin)**, envisioned as India's first **green bunkering hub** in South India.

About Green Hydrogen

- **Definition:** Hydrogen produced via **electrolysis of water** using renewable energy (solar, wind, hydro), resulting in zero carbon emissions.
- **Byproducts:** Oxygen (useful for industrial/medical purposes).
- **Applications:** Shipping fuel, refining, steelmaking, fertilisers, power storage, and mobility.

Significance of the Initiative

- **Maritime Decarbonisation:** Advances the **Harit Sagar Guidelines (2023)** for low-emission ports.
- **Energy Diversification:** Promotes green hydrogen and green methanol as **alternative maritime fuels**.
- **Regional Impact:** Makes VOC Port a **model for South Asia's green port transformation**.
- **Alignment with National Goals:** Supports the **National Green Hydrogen Mission (NGHM)** target of **5 MMT annual production by 2030**.



UPSC Relevance: GS Paper 3 – Energy | Infrastructure | Environment

✓ Port decarbonisation under National Hydrogen Mission ✓ Green maritime initiatives & shipping CO



HOT Question “Green Hydrogen can transform India's maritime sector into a clean logistics ecosystem. Evaluate the role of port-based hydrogen projects in this transition.”

42. BEE Releases Draft Corporate Average Fuel Efficiency (CAFE) Norms to Tighten Vehicle Emission Standards



The **Bureau of Energy Efficiency (BEE)** released the **draft CAFE norms (2025–2032)** to align India's vehicle emission standards with global benchmarks, reduce oil imports, and promote electric and hybrid mobility.

About BEE

- Established in **2002** under the **Energy Conservation Act, 2001**.
- Statutory body under the **Ministry of Power**, responsible for promoting energy efficiency across industries and appliances.

Corporate Average Fuel Efficiency (CAFE)

- Definition:** Average fuel efficiency target for all passenger vehicles (M1 category) sold by a manufacturer.
- Scope:** Passenger cars with up to **nine seats and $\leq 3,500$ kg weight**.
- Objective:** To lower India's **fuel import dependence** and **CO₂ emissions** through efficient engines and cleaner fuels.
- First Notified:** 2017.

Key Provisions of the Draft Norms

- Efficiency Measurement:** Expressed as **litres/100 km (petrol-equivalent)**. Formula: $[0.002 \times (W - 1170) + C]$, where W = fleet weight.
- Progressive Targets:** Constant C tightens from **3.7264 (FY28)** to **3.0139 (FY32)**, implying stricter limits.
- Small-Car Incentive:** Compact petrol cars (< 909 kg, ≤ 1200 cc, < 4 m length) get a **3 g/km CO₂ relief** (up to 9 g/km yearly).

Incentives & Flexibilities

- Super Credits:**
 - EV/Range Extender EV** = 3 vehicles
 - Plug-in Hybrid** = 2.5
 - Strong Hybrid** = 2
 - Flex-Fuel Ethanol Car** = 1.5

→ These reduce the manufacturer's average CO₂ score.
- Carbon Neutrality Factor (CNF):** Reduces tailpipe CO₂ based on fuel:
 - E20–E30 blend:** 8% reduction
 - Strong hybrids / Flex-fuel:** 22.3%
 - CNG:** 5% or notified CBG %, whichever higher.
- Emission Pooling:**
 - Up to three manufacturers can pool fleets for joint compliance.
 - A **Pool Manager** is designated under the Energy Conservation Act.



HOT Question: "Discuss how India's Corporate Average Fuel Efficiency (CAFE) norms contribute to achieving energy efficiency and emission reduction goals under its climate commitments

43. India Drafts Sustainable Aviation Fuel (SAF) Policy to Decarbonise Aviation Sector

India is preparing its first **Sustainable Aviation Fuel (SAF) Policy** with phased blending targets (1% by 2027, 2% by 2028, 5% by 2030) to align with **ICAO’s CORSIA framework (Carbon Offsetting and Reduction Scheme for International Aviation)** and achieve its **Net Zero 2070** goal.

About Sustainable Aviation Fuel (SAF)

- SAF is a **renewable, drop-in substitute for conventional jet fuel**, derived from **biomass, waste oils, or captured CO₂**.
- Compatible with existing aircraft engines and refuelling systems.
- Can **reduce lifecycle CO₂ emissions by up to 80%**, depending on the feedstock and production pathway.

Production Pathways

Type	Source	Remarks
Conventional SAF	Waste cooking oil, agricultural residues, animal fats	Readily available but limited by feedstock volume
Synthetic SAF (Power-to-Liquid)	CO ₂ + H ₂ O using renewable energy	Most sustainable, but 6–7× costlier
Sugarcane-based SAF	Syrup, molasses, bagasse (under LCA study)	Strategic for India; replicates Brazil’s ethanol model

Global Context

- The **EU, Japan, and the US** already mandate SAF blending between **2–10% by 2030**.
- India’s participation in **CORSIA (ICAO)** ensures international compliance and carbon credit opportunities.



UPSC Relevance: UPSC Exam Relevance: GS Paper 3 – Environment | Economy | Energy Security ✓ Green fuels and decarbonisation ✓ India’s Net Zero 2070 roadmap.



HOT Question: “Discuss the potential of Sustainable Aviation Fuel (SAF) in reducing India’s aviation emissions and its challenges in achieving commercial-scale deployment

44. India’s Nationwide EV Charging Rollout under PM E-DRIVE Scheme



On **26 September 2025**, the **Government of India** released operational guidelines for deploying nearly **72,300 public electric vehicle (EV) charging stations** across India under the **PM E-DRIVE** (Electric-Driven Infrastructure for Vehicle Ecosystem) scheme — a major step toward strengthening India’s EV ecosystem.

About PM E-DRIVE

- A **flagship programme** of the **Ministry of Heavy Industries** to promote electric mobility by creating a robust, accessible, and affordable national EV-charging network.

The mission aligns with **India’s target of 30% electric vehicle penetration by 2030** and supports the **FAME III roadmap** for sustainable transport.

Subsidy Framework

Location Category	Upstream Infrastructure Support	Charging Equipment Support
Government Offices, Hospitals, Residential Colonies, Educational Institutions	100 % subsidy	100 % subsidy (if free public access ensured)
High-Traffic Public Locations (Railway stations, airports, metro hubs, bus terminals, toll plazas, oil PSUs, etc.)	80 %	70 %
Commercial & Highway Sites (Malls, markets, expressways, roadside facilities)	80 %	—
Battery-Swapping / Charging Stations	80 %	—

Implementation Structure

- **Nodal Agencies:** State/UT governments will nominate nodal bodies to aggregate demand, identify priority sites, and submit proposals through a **dedicated digital portal**.
- **Project Implementation Agency (PIA):** **Bharat Heavy Electricals Ltd (BHEL)** designated to oversee site development, quality standards, and installation monitoring.
- **Funding Phases:**
 - *Tranche 1:* Sanction based on approved proposal and site readiness.
 - *Tranche 2:* Released post-commissioning and compliance verification.



HOT Question: “Discuss how the PM E-DRIVE scheme complements India’s electric mobility targets and the challenges in creating a national EV-charging network.

45. MoEFCC Exempts Uranium & Other Atomic Mineral Mining from Public Consultations



On 8 September 2025, the Ministry of Environment, Forest & Climate Change issued an office memorandum exempting **atomic, critical, and strategic mineral mining** (including uranium) from mandatory public hearings and consultations, citing national defence, security and strategic imperatives

Definitions & Context

- **Uranium:** A radioactive metal used in nuclear reactors and weapons. Exists largely as **U-238** (non-fissile) and small proportion **U-235** (fissile).
- **Atomic / Critical Minerals:** Minerals essential for nuclear, defence, electronics, renewable, and strategic sectors (e.g. thorium, rare earths).
- Under the **EIA Notification, 2006**, public consultation (public hearing) is a mandatory stage for environmental clearances of large projects.

Key Provisions of the Exemption

- Mining projects of **atomic minerals** (uranium, thorium, monazite etc.) and **critical / strategic minerals** are now exempt from public consultation and hearings.
- These projects will still undergo **central-level expert appraisal**, regardless of the lease area.
- The Ministry argues that the change is in view of **national security, defence requirements, and strategic considerations**.
- The Exemption follows formal requests from **Ministry of Defence (MoD)** and **Department of Atomic Energy (DAE)** citing the necessity for critical mineral supply chains.



UPSC Relevance: **GS Paper 2:** Governance, Rights, Federalism — conflict between Centre's strategic priorities and state/local rights; the role of public consultation in environmental clearances.



HOT Question: “Exempting public consultations from uranium and strategic mineral mining undermines participatory democracy and environmental justice. Critically examine this decision in the context of India’s constitutional and developmental priorities

46. MoEFCC Introduces Environment Audit Rules 2025 for Trust-Based Environmental Compliance



The Ministry of Environment, Forest and Climate Change (MoEFCC) notified the **Environment Audit Rules 2025**, introducing a structured third-party audit mechanism to bridge compliance gaps and promote **trust-based, data-driven environmental governance**.

Background & Context

- India's environmental monitoring has long faced challenges like **self-reporting loopholes**, inadequate inspection capacity, and limited transparency in compliance verification under laws such as the **Environment (Protection) Act, 1986**.
- The new **Environment Audit Rules 2025** mark a shift from a punitive, inspector-based model to a **trust-and-verification framework** aligned with Ease of Doing Business and green transition goals.

Key Objectives

- Strengthen Compliance:** Independent third-party audits to ensure accuracy and transparency.
- Ease of Doing Business:** Reduces compliance burden through predictable, professional oversight.
- Integration:** Aligned with **Green Credit Programme (2023)**, **Eco-mark**, and **Extended Producer Responsibility (EPR)** systems.
- Capacity Development:** Builds a national pool of **Registered Environmental Auditors (REAs)**.
- Data-Driven Oversight:** Creates digital audit trails and real-time environmental data dashboards for CPCB and MoEFCC.

Salient Features

- Environment Audit Designated Agency (EADA):**
 - Certifies and registers auditors through qualification, experience, or a **national examination**.
 - Maintains a digital registry of authorised REAs.
- Registered Environmental Auditors (REAs):**
 - Randomly allotted audit projects to ensure independence.
 - Verify compliance, Green Credit obligations, and pollution mitigation measures.
- Oversight & Governance:**
 - A **MoEFCC Steering Committee** supervises implementation and resolves operational challenges.
 - CPCB, SPCBs, and MoEFCC regional offices** retain powers of inspection, enforcement, and monitoring.



HOT Question: "The Environment Audit Rules 2025 mark a paradigm shift from inspection-driven to trust-based environmental governance. Critically evaluate how this approach may improve compliance without diluting accountability."

47. MoEFCC Revises Green Credit Programme (GCP) Norms to Emphasise Ecological Sustainability Over Tree Counts



The Ministry of Environment, Forest and Climate Change (MoEFCC) has **revised the Green Credit Programme (GCP)** guidelines for tree plantation to ensure that environmental credits reflect genuine ecological restoration rather than mere numerical tree planting.

About the Green Credit Programme (GCP)

- **Launch:** Introduced in **2023** during the **UN Climate Conference (COP28)** under the Environment (Protection) Act, 1986.
- **Nodal Agency:** Implemented by the **Indian Council of Forestry Research and Education (ICFRE)** under the MoEFCC.
- **Objective:** To create a **market-based mechanism** rewarding individuals, companies, and institutions for voluntary environmental actions such as tree plantation, water conservation, waste management, and sustainable agriculture.
- **Green Credits:** Each verified ecological action earns **“Green Credits”**, which can be used to fulfil **CSR, ESG, or environmental compliance obligations**.

Parameter	Earlier Norm	Revised Norm (2025)
Eligibility Period	Credits after 2 years of plantation	Credits after 5 years, with 40% canopy density verification
Credit Basis	Credits granted for all planted trees	Credits limited to one five-year-old surviving tree
Tradability	Fully tradable on market platforms	Non-tradable, except within holding–subsidiary entities
Reusability	Credits reusable across projects	Credits valid only once, mainly for CSR compliance
Verification	Minimal self-reporting	Third-party verification for survival rate and canopy density

Rationale Behind Revision

- Prevents **“credit inflation”** where quantity outweighed ecological value.
- Ensures **long-term survival**, biodiversity integrity, and genuine **carbon sequestration**.
- Promotes **quality of ecological outcomes** (native species, canopy restoration, soil moisture, fauna return) over **numerical planting drives**.
- Prevents misuse of tradable credits by large corporations for greenwashing.

48. India Rises to Rank 99 in UN SDG Index 2025, but Health Goals Remain Major Challenge



India has improved its position from **109 (2024)** to **99 (2025)** among **167 countries** in the **UN Sustainable Development Goals (SDG) Index**. While the country has progressed in infrastructure and service delivery, its lagging performance in **SDG 3 – Good Health and Well-being** remains a key obstacle to achieving the **2030 Agenda for Sustainable Development**.

About the SDG Index

- The **SDG Index** measures countries’ progress toward the **17 Sustainable Development Goals** adopted by all UN member states in 2015.
- It is compiled by **Sustainable Development Solutions Network (SDSN)** and the **Bertelsmann Stiftung**, tracking performance using over 100 indicators.

India’s 2025 Performance

Parameter	2024 Rank
Global Rank	109
Goals Showing Progress	Clean Energy (SDG 7), Infrastructure (SDG 9), Reduced Inequalities (SDG 10)
Goals Lagging	Health (SDG 3), Gender Equality (SDG 5), Climate Action (SDG 13)

Gaps in Health Indicators (SDG 3)

- **Maternal Mortality Ratio (MMR):** 97 per 100,000 live births (Target: ≤70).
- **Under-5 Mortality Rate:** 32 per 1,000 live births (Target: ≤25).
- **Life Expectancy:** 70 years (Target: 73.63 years by 2030).
- **Out-of-Pocket Health Spending:** 13% of consumption (Target: 7.83%).
- **Immunisation Coverage:** 93.23% (Target: 100%).



UPSC Relevance: **GS Paper 2:** Government policies, SDG 3 (Health), and role of health infrastructure in human development. **GS Paper 3:** Human capital formation, health expenditure, and inclusive growth.



HOT Question: “Despite overall SDG progress, India’s health outcomes remain weak. Critically examine how systemic reforms and behavioural interventions can close the SDG 3 gap by 2030

49. Census 2027 to Introduce Geo-Tagged Building Mapping for the First Time in India



The **Office of the Registrar General and Census Commissioner** announced that **Census 2027** will be India's first **fully geo-referenced population census**, replacing the traditional hand-drawn layouts used in 2011. The new system will enable real-time digital enumeration and precise mapping of India's residential and non-residential infrastructure

About Census 2027

- India conducts the **Census every 10 years** under the **Census Act, 1948**, making it the world's largest administrative exercise.
- The 2021 Census was postponed due to the pandemic, and the next decadal exercise is now rescheduled for **2027**.

Digital Innovations Introduced

- **Geo-Tagging of Buildings:**
Each building will receive a **unique latitude-longitude coordinate** using **GIS (Geographic Information System)** technology.
- **Geo-Referencing:**
Census maps and village/ward boundaries will be **digitally aligned to their exact positions on Earth**, replacing paper sketches.
- **Digital Layout Mapping:**
Buildings will be grouped under **geo-referenced Houselisting Blocks (HLBs)** – demarcated enumeration zones for systematic coverage.
- **Categorisation:**
Every structure will be classified as **residential, non-residential, partly residential, or landmark**, improving accuracy in housing and infrastructure data.
- **Real-Time Data Collection:**
Enumerators will use **mobile applications** for **self-enumeration, GPS validation**, and **real-time monitoring** via the **Census Management and Monitoring System (CMMS)**.



UPSC Relevance: **GS Paper 2:** Government Schemes, Technology in Governance, Census Act 1948. **GS Paper 3:** GIS applications in governance, digital infrastructure, and disaster management.



HOT Question: "Census 2027 marks a paradigm shift from manual to geo-referenced enumeration. Discuss how digital and spatial technologies can enhance governance, service delivery, and evidence-based policymaking in India

SEPTEMBER 2025

SCI & TECH

1. NISAR sends first radar images of Earth
2. India hosts International Space Conference 2025:
3. AstroSat completes 10 years
4. HAL to manufacture SSLVs — India's 100th space transfer.
5. Safeguarding satellites emerges as new space frontier.
6. NASA rover finds strongest potential biosignatures on Mars.
7. India to build first fusion power generator — SST-Bharat.
8. Small Modular Reactors planned to power AI data centres.
9. PM lays foundation for Mahi Banswara Atomic Project.
10. Astronomers detect "Extreme Nuclear Transients"
11. AI boom drives global surge in energy and water demand.
12. India to use AI in power grid for predictive resilience.
13. PM inaugurates Semicon India 2025
14. ISRO unveils "Vikram Processor" — India's indigenous chip.
15. India explores Micro-OLED tech for display manufacturing.
16. India crosses 100 crore internet users — TRAI report.
17. India's EV scheme gets no takers under SPMEPCI.
18. China's EV sector faces "involution" & self-defeating growth.
19. AI chatbots raise global ethical concerns after US suicides.
20. ICMR invites partners for AdFalcivax
21. Russia unveils Enteromix — mRNA cancer vaccine
22. Australia approves first single-dose Chlamydia vaccine
23. ICMR launches CEREB0 — handheld brain injury
24. Antibiotic misuse linked to India's mental health crisis.
25. "Nightmare bacteria" infections surge 70% in the US.
26. SN Bose Centre finds p47 protein protects cells under stress.
27. INST Mohali develops nanomaterial
28. Stanford designs world's first AI-created viral genome



1. NISAR Sends First Radar Images of Earth, Marking a Milestone in Indo–US Space Cooperation



The NASA–ISRO Synthetic Aperture Radar (NISAR) satellite has transmitted its first radar images of Earth from orbit.

About NISAR

- Full Form: NASA–ISRO Synthetic Aperture Radar.
 - Launch Date: July 30, 2025, launched by ISRO using GSLV Mk II.
 - Joint Mission: Collaboration between NASA (USA) and ISRO (India) to study dynamic changes on Earth’s surface with unprecedented accuracy.
 - Orbit: Near-polar Sun-synchronous orbit (~747 km altitude).
- Mission Life: 3–5 years (extendable).

Key Features

Component	Contribution	Capability / Purpose
L-band SAR	Provided by NASA’s Jet Propulsion Laboratory (JPL)	Detects subtle ground deformation, measures vegetation biomass, penetrates forests and soil.
S-band SAR	Developed by ISRO	Suited for crop monitoring, deforestation mapping, and disaster management in tropical conditions.
Dual-Frequency Advantage	Simultaneous use of L & S bands provides detailed, multi-scale surface data.	Enables precise observation of land deformation, glaciers, and ocean surfaces.
Antenna System	12-meter deployable reflector (the largest of its kind).	High-resolution radar imaging up to 5 metres.
All-Weather Operation	Penetrates clouds, haze, and vegetation canopy; works day and night.	Ensures continuous Earth observation in monsoon and polar regions.



UPSC Relevance: GS Paper 3: Space Technology, Environment, Disaster Management, Climate Change. **Keywords:** NISAR, NASA–ISRO Mission, Synthetic Aperture Radar, L-band, S-band, Dual-frequency Imaging, Climate Monitoring.



HOT Question Examine how the NASA–ISRO NISAR mission contributes to Earth system science and disaster management while strengthening India–US strategic space partnership.



2. India Hosts International Conference on Space 2025: Theme – “Harnessing Space for Global Progress



India hosted the International Conference on Space 2025 in New Delhi, organised by the Confederation of Indian Industry (CII), with participation from ISRO, global space agencies, and private sector leaders. The event showcased India’s emerging leadership in global space innovation and cooperation under the theme “Harnessing Space for Global Progress.”

Category	Details	Significance
Future Space Vision	India announced its roadmap to establish the Bharatiya Space Station by 2035 and land an Indian astronaut on the Moon by 2040.	Marks India’s transition from planetary exploration to sustained human space presence.
Deep Space Missions	Missions to Mars, Venus, and upcoming Gaganyaan human spaceflight reaffirmed.	Expands India’s deep-space exploration frontier.
Startup Ecosystem	Over 300 space startups working in launch vehicles, satellites, data analytics, and ground systems were showcased.	Reflects the success of India’s space liberalisation policy (2020).
Recent Milestones	Celebrated Chandrayaan-3 south pole lunar landing (2023) and the first Indian Air Force astronaut’s visit to the ISS (2025).	Symbolises India’s rise as a space power and its crewed-space credentials.
Global Cooperation	Reaffirmed partnerships: NASA (NISAR Mission), JAXA (Chandrayaan-5 lunar mission), and new collaborations with ESA and CNES on Earth observation.	Strengthens India’s role in multilateral and bilateral space frameworks.
Skill Development	ISRO to expand Centres of Excellence and outreach initiatives to train talent in AI, propulsion, robotics, and space law.	Builds human capital for India’s space economy and strategic autonomy.



UPSC Relevance: **GS** Paper 3: Science & Technology, Achievements of Indians in Space, Indigenisation, and Global Cooperation. **Keywords:** CII, ISRO, Gaganyaan, Bharatiya Space Station, Chandrayaan-5, NISAR, Space Economy, IN-SPACe.



HOT Question India’s space programme is evolving from scientific exploration to economic and strategic leadership.” Discuss with reference to India’s announcements at the International Conference on Space 2025



3. India’s AstroSat Completes a Decade: A Milestone in Multi-Wavelength Space Astronomy



AstroSat, India’s first dedicated multi-wavelength space observatory launched on 28 September 2015 by PSLV-C30 (XL) from Sriharikota, has completed 10 years of continuous operation in 2025. It has significantly advanced India’s global standing in space-based astrophysics by enabling simultaneous observation of celestial sources across multiple energy bands.

About AstroSat

- Developed by: Indian Space Research Organisation (ISRO) with participation from IUCAA, TIFR, and international partners (e.g., NASA, UK, Canada).
- Orbit: 650 km near-equatorial low-Earth orbit.
- Objective: Multi-wavelength observation of stars, galaxies, black holes, neutron stars, and supernovae to understand high-energy astrophysical processes.

Mission Management: Operated by the Mission Operations Complex (MOX) at ISTRAC, Bengaluru.

Feature	Details
Multi-Wavelength Coverage	Simultaneous data collection in Visible, Ultraviolet (UV), Low-energy X-ray, and High-energy X-ray bands.
Key Payloads	- Ultra Violet Imaging Telescope (UVIT) - Large Area X-ray Proportional Counter (LAXPC) - Cadmium-Zinc-Telluride Imager (CZTI) - Soft X-ray Telescope (SXT) - Scanning Sky Monitor (SSM)
Scientific Range	Energy detection from 0.3 to 80 keV; UV coverage of 130–320 nm.
Mission Longevity	Designed for 5 years; operational for 10+ years with excellent instrument health.



UPSC Relevance: GS Paper 3: Science & Technology – Achievements of Indians in Space Research. **Keywords:** *AstroSat, Multi-Wavelength Observatory, UVIT, LAXPC, CZTI, ISRO Astronomy Mission, PSLV-C30*



HOT Question AstroSat marked India’s transition from planetary exploration to cosmic exploration.” Evaluate its scientific contributions and their global significance



4. India’s 100th Space Technology Transfer: HAL to Manufacture Small Satellite Launch Vehicles (SSLVs)



On 10th September 2025, India reached a major milestone with its 100th space technology transfer agreement, under which Hindustan Aeronautics Limited (HAL) will independently produce Small Satellite Launch Vehicles (SSLVs). The agreement was jointly signed by ISRO, NSIL, IN-SPACe, and HAL, marking a new era of industry-led space manufacturing in India.

About the Agreement

- **Facilitating Body:** The transfer was enabled by the Indian National Space Promotion and Authorisation Centre (IN-SPACe) – the nodal agency promoting private sector participation in India’s space ecosystem.
- **Signatories:** ISRO, NewSpace India Limited (NSIL), IN-SPACe, and HAL.
- **Technology Transfer Period:** 24 months – during which ISRO will provide HAL with comprehensive SSLV design, training, technical guidance, and commercial production support.
- **Mission Commitment:** HAL will execute two SSLV missions under ISRO’s supervision before taking up independent domestic and global production.

Parameter	Details
Developer	ISRO’s Vikram Sarabhai Space Centre (VSSC)
Stages	Three solid-propellant stages + Liquid Velocity Trimming Module (VTM)
Payload Capacity	10–500 kg to Low Earth Orbit (LEO)
Launch Time	Can be assembled and launched in under 72 hours, offering rapid response capability
Objective	To provide on-demand, cost-effective access to space for small satellites and startups



UPSC Relevance: GS Paper 3: Science & Technology – Indigenisation, Space Industrialisation, Public-Private Collaboration.
Keywords: SSLV, HAL, IN-SPACe, NSIL, ISRO, Technology Transfer, Atmanirbhar Bharat, Indian Space Policy 2023



HOT Question The HAL–ISRO SSLV agreement symbolises India’s shift from a state-driven to an industry-driven space economy.” Discuss the implications for India’s space commercialisation strategy.



5. Safeguarding India’s Satellites: The Next Frontier in Space Security



A near-collision between an Indian satellite and a foreign spacecraft in 2024 exposed India’s orbital vulnerabilities, triggering ISRO’s comprehensive satellite protection plan.

Why Safeguarding Satellites Matters

Dimension	Key Insight
National Security	Military satellites enable surveillance, navigation & reconnaissance—vital for border management and real-time defence intelligence.
Economic Backbone	India’s \$8.4 billion space economy contributes ₹20,000 crore annually; disruptions can cause \$23.6 million loss/day per 10 million people.
Public Safety	Weather & communication satellites support IMD forecasts, aviation, agriculture, and disaster protocols.
Strategic Autonomy	NavIC ensures independence after GPS denial during the Kargil war revealed critical dependency risks.
Global Standing	Responsible space operations enhance India’s credibility in IADC & COPUOS forums.

International Frameworks

- **IADC – Technical consortium of global space agencies; coordinates debris research and mitigation norms.**
- **COPUOS – UN committee that shapes treaties & guidelines for peaceful space use.**

India’s Satellite Safeguarding Architecture

Initiative	Function
IS4OM (Bengaluru)	24×7 orbital tracking, collision alerts, and coordinated manoeuvres.
Project NETRA	Radar–telescope network for debris detection; multi-object radar active at Sriharikota.
NavIC Authentication	Secure navigation signals to prevent spoofing.
Aditya-L1	Space-weather observatory providing early solar storm warnings.
Debris-Free 2030 Pledge	India’s commitment at IADC to ensure all missions end responsibly.
Bodyguard Satellites (Concept)	Escort satellites with LiDAR to monitor and neutralize hostile approaches.



UPSC Relevance: GS Paper 3: Space Security, Dual-use Technology, Cyber Resilience. Prelims Focus: IS4OM, Project NETRA, Aditya-L1, NavIC Authentication, Debris-Free 2030



6. NASA's Perseverance Rover Detects Strongest Potential Biosignatures on Mars



NASA announced that its **Perseverance rover** has discovered **the strongest potential biosignatures yet on Mars** within a rock formation named **Cheyava Falls**, located in **Sapphire Canyon** near Jezero Crater. The findings suggest a possible record of ancient biological activity on the Martian surface, strengthening evidence of past habitability.

Key Findings

- **Rock Studied:** *Cheyava Falls* rock in *Sapphire Canyon*, a sedimentary formation in **Neretva Vallis valley**, identified in **2024**.
- **Detected Features:**
 - **Organic carbon molecules** — carbon-based compounds essential for life.
 - **Phosphate minerals** — key to energy transfer in biological systems (like ATP on Earth).
 - **Mottled, “leopard-spot” textures** and **black poppy seed-like nodules** — potentially biogenic sedimentary patterns.
 - **Electron-transfer minerals** — such as iron and manganese oxides, enabling redox reactions crucial for microbial metabolism.
- **Geological Context:** The rock likely formed through **ancient Martian water flow**, later altered by sulphate-rich fluids that preserved biosignature-like imprints.

About Biosignatures

- **Definition:** Physical structures, chemical compounds, or isotopic patterns that provide scientific evidence of **past or present life**.
- **Examples on Earth:** Microbial **stromatolites**, **fossilised organic films**, and **carbon isotopic fractionation**.

Significance: Presence of organics + phosphate + texture alignment strengthens the *biogenic plausibility chain* for life traces.



UPSC Relevance: **GS Paper 3:** Awareness in Space Missions, Astrobiology, and Technological Developments. **Keywords:** *Perseverance Rover, Biosignature, Jezero Crater, Cheyava Falls, Phosphate Minerals, Organic Carbon, Mars Sample Return*



HOT Question The search for biosignatures on Mars is as much about understanding early Earth as it is about finding alien life.” Discuss in the context of NASA’s recent Perseverance discoveries



7. India to Build Its First Fusion Electricity Generator – SST-Bharat



Researchers have proposed a plan to construct **India’s first fusion-based electricity generator**, called **Steady-State Superconducting Tokamak-Bharat (SST-Bharat)**. The project marks a crucial step toward achieving controlled **nuclear fusion**, a clean and sustainable energy source that mimics the power generation process of the Sun

Understanding Fusion vs. Fission

Aspect	Fusion	Fission
Process	Combines light atomic nuclei (e.g., deuterium + tritium) to form a heavier one	Splits heavy nuclei (e.g., uranium-235) into smaller fragments
Energy Output	Enormous – 4× higher than fission for same fuel mass	High, but limited by critical mass
Waste	Minimal, low-radioactive	High-level radioactive waste
Safety	Intrinsically safe – reaction stops if control is lost	Meltdown risk if uncontrolled
Fuel Source	Hydrogen isotopes, abundant in water	Uranium, limited and mined

About SST-Bharat

- **Type:** Fusion-Fission Hybrid Tokamak Reactor
- **Target Output:** 130 MW with an energy gain factor (Q) of 5 (output/input power ratio).
- **Long-Term Goal:** Demonstrate a **commercial-scale fusion reactor** by 2060 with Q = 20 and 250 MW output.
- **Core Concept:** Magnetically confined plasma using **superconducting coils** for continuous (steady-state) operation.



UPSC Relevance: GS Paper 3: Science & Tech – Energy, Indigenisation, and R&D in clean technologies. **Keywords:** SST-Bharat, Tokamak, Fusion-Fission Hybrid, Aditya-U, SST-1, ITER, Plasma Confinement, U-233 from Thorium



HOT Question Fusion energy represents the Holy Grail of clean power, but India’s SST-Bharat adopts a hybrid pathway.” Explain how this strategy balances scientific ambition with practical feasibility.



8. India Plans Small Modular Reactors (SMRs) to Power AI-Driven Data Centres



The Government of India is considering the use of **Small Modular Reactors (SMRs)** to meet the rapidly rising **energy demand of data centres**, particularly those driven by **Artificial Intelligence (AI)** and cloud computing.

About Small Modular Reactors (SMRs)

- **Definition:** Compact nuclear reactors of **30–300 MWe** capacity per unit.
- **Design Features:** Modular construction, passive safety systems, underground siting, and load-following flexibility.
- **Advantages:**
 - Lower upfront cost and shorter build time than large reactors.
 - Can be factory-assembled and deployed in clusters.

Ideal for **off-grid, industrial**, or **data-centre** applications requiring uninterrupted power.

Need for Nuclear Power in Data Centres

- **Explosive Demand:**
 - Global data-centre electricity use may **double by 2026** (IEA).
 - India's market already **\$10 billion**, expected capacity **1.8 GW by 2027**.
- **High Energy Costs:** Power forms **≈65 %** of total operating expenses; each 1 MW setup costs ₹ 60–70 crore.
- **AI Workload Surge:** AI training and inference need 3–5× more electricity than conventional workloads.
- **Limits of Renewables:** Solar / wind intermittency and storage constraints make **nuclear a stable baseload** source.



UPSC Relevance: **GS Paper 3:** Infrastructure → Energy | Science & Tech → Nuclear Energy | Economy → Digital Infrastructure.

Keywords: SMR, Atomic Energy Act, Nuclear Energy Mission, AI Data Centres, Energy Security, Atmanirbhar Bharat



HOT Question Small Modular Reactors could bridge the gap between India's digital expansion and its clean-energy ambitions." Examine with reference to data-centre energy demand



9. PM Modi Lays Foundation Stone for Mahi Banswara Atomic Power Project, Rajasthan



Prime Minister **Narendra Modi** laid the foundation stone for the **Mahi Banswara Atomic Power Project** near **Mahi Dam in Rajasthan**, marking a major milestone in India’s push toward **nuclear energy expansion** and **energy security**.

About the Mahi Banswara Project

- **Type:** Nuclear Power Project with **four 700 MW Pressurised Heavy Water Reactors (PHWRs)**
- **Total Capacity:** **2,800 MW**
- **Location:** Near **Mahi Dam**, Banswara district, Rajasthan
- **Project Developer:**
 - **Anushakti Vidhyut Nigam Limited (ASHVINI)** – a **joint venture of NPCIL & NTPC**.
- **Construction Model:**
 - Built under the **“Fleet Mode” initiative**, involving the simultaneous construction of **ten identical 700 MW PHWRs** across India.

Objective: Strengthen India’s indigenous nuclear capabilities and accelerate progress toward the **100 GW Nuclear Energy Mission (by 2047)**.

About PHWRs (Pressurised Heavy Water Reactors)

Parameter	Details
Fuel	Natural uranium
Coolant & Moderator	Heavy water (deuterium oxide)
Design	Indigenous, based on CANDU-type (Canada Deuterium Uranium)
Advantages	Uses unenriched fuel, high safety standards, and local technology
Output	700 MW per unit (India’s most advanced reactor series)



UPSC Relevance: **GS Paper 3:** Energy | Science & Tech | Infrastructure Development. **Keywords:** *Mahi Banswara Atomic Project, PHWR, ASHVINI, NPCIL, Fleet Mode, Nuclear Energy Mission 2047.*



HOT Question Fleet-mode nuclear construction is central to India’s energy transition strategy.” Explain its advantages and role in the Mahi Banswara Atomic Power Project



10. Astronomers Discover “Extreme Nuclear Transients” – Universe’s Most Powerful Explosions Since the Big Bang



Astronomers have identified **Extreme Nuclear Transients (ENTs)** – rare, ultra-energetic cosmic explosions – as the most powerful events ever observed since the **Big Bang**, surpassing even **gamma-ray bursts (GRBs)** in magnitude and longevity.

About Transients in Astronomy

- **Transients:** Celestial objects that undergo **sudden and dramatic brightness variations** over short timescales.
- **Contrast:** Unlike permanent luminous bodies such as stars, transients appear, flare, and fade – e.g., **supernovae**, **novae**, and **GRBs**.

About Extreme Nuclear Transients (ENTs)

- **Definition:** ENTs are **catastrophic explosions** that occur when **supermassive black holes** at galactic centres **completely tear apart massive stars**.
- **Formation Process:**
 - A star $\geq$ **3 times the Sun’s mass** approaches a galactic-centre black hole.
 - The star is **spaghettified** by extreme tidal forces.
 - Stellar material forms an **accretion disk**, emitting radiation across the electromagnetic spectrum.
- **Energy Scale:**
 - Releases energy comparable to **hundreds of Suns** shining for an entire year – far exceeding typical **gamma-ray bursts (GRBs)**.
- **Emission Duration:**
 - ENTs remain luminous for **decades**, as the star’s gas spirals inward and continues radiating.
- **Scientific Importance:**
 - Helps detect **hidden or dormant black holes**.
 - Offers insights into **galaxy evolution**, **black-hole feeding mechanisms**, and **early-universe energy dynamics**.



UPSC Relevance: **GS Paper 3:** Science & Technology – Space Research & Discoveries. **Keywords:** *Extreme Nuclear Transients, Gamma-Ray Bursts, Tidal Disruption Events, Black Holes, Spaghettification, Transient Astronomy.*



HOT Question Extreme Nuclear Transients have redefined our understanding of high-energy cosmic phenomena.” Explain how they differ from Gamma-Ray Bursts and Tidal **Disruption Events**.



11. Artificial Intelligence (AI) Driving a Global Surge in Energy and Water Consumption



While **Artificial Intelligence (AI)** revolutionises industries and public services, its **rising computational intensity** is dramatically increasing **electricity and water consumption**, triggering concerns over **climate sustainability and energy security**.

Rising Energy Burden

- **Global Scale:**
 - As per the **International Energy Agency (IEA)**, global **data centre electricity demand** is expected to **more than double to 945 TWh by 2030**, with AI being the key driver.
 - Data centres already consume **1–2% of global electricity**, projected to rise to **3–4% by 2030**, comparable to Japan's entire consumption.
- **India Context:**
 - India's data centre power demand will rise from **1.2 GW (2024) → 4.5 GW (2030)**, driven by AI workloads, 5G, fintech, and cloud computing.
 - States like **Maharashtra, Tamil Nadu, and Telangana** are emerging as key hubs.
- **Water Footprint:**
 - **Freshwater use for server cooling** is a growing ecological concern – large AI data farms rely on **evaporative cooling systems**, often in **water-stressed regions**.
 - Example: A single **ChatGPT-style query** can consume **up to 500 ml of water** indirectly for data centre cooling.

Cooling & Infrastructure Challenges

- **Heat Management:** High AI workloads in GPU clusters require liquid cooling, which increases both **energy use for chillers** and **freshwater withdrawal**.

Sustainability Gap: Many AI data hubs still depend on **coal-dominated grids**, limiting the carbon neutrality of “green AI” claims



UPSC Relevance: GS Paper 3: Energy | Environment | Science & Technology | Infrastructure

Keywords: AI Energy Demand, Data Centres, Smart Grid, Cooling Water, IEA, Net Zero, Sustainable AI.



HOT Question AI may accelerate digital progress but risks derailing environmental sustainability.” Examine how India can reconcile AI-driven growth with its energy and **climate commitments**.



12. India to Deploy Artificial Intelligence in National Electricity Grid for Predictive Reliability and Cyber-Resilience



The Government of India has announced the **integration of Artificial Intelligence (AI)** into the **National Electricity Grid** to strengthen **predictive reliability, cybersecurity, and market transparency**, marking a major step towards **smart, self-healing power infrastructure**.

About India’s National Electricity Grid

- **Largest in the World:** India’s grid is the **world’s largest synchronously interconnected power system**, integrating **five regional grids**—Northern, Western, Southern, Eastern, and North–Eastern.
- **One Nation, One Frequency:** Operates uniformly at **50 Hz**, ensuring stable national transmission and energy sharing.
- **Governance:** Managed by **Grid-India (formerly POSOCO)** through the **National, Regional, and State Load Despatch Centres (NLDC, RLDCs, SLDCs)** under the **Electricity Act, 2003**.
- **Cross-Border Links:**
 - **Synchronous:** Bhutan
 - **Asynchronous:** Nepal, Bangladesh, MyanmarEnables **regional energy trade and grid stability** under the **South Asian power pool**.

Critical Infrastructure: Designated as **Critical Information Infrastructure (CII)**—essential for national energy security, economic stability, and climate goals.

Potential Functions of AI in the Grid

Function	AI Application	Expected Outcome
Predictive Maintenance	Analyses real-time sensor & equipment data to predict failures	Reduces outages, increases asset lifespan
Cyber Defence	Detects anomalies in SCADA/EMS systems to prevent cyberattacks	Strengthens cyber-resilience & response
Market Surveillance	Tracks power trade patterns to identify manipulation or insider activity	Enhances market transparency
Renewable Integration	Forecasts solar/wind patterns, optimises dispatch & load balancing	Stabilises renewable-heavy grid
Cascade Prevention	Detects overloads and auto-isolates faults in real-time	Prevents large-scale blackouts



HOT Question Artificial Intelligence in the national electricity grid can transform India’s power reliability, but raises new governance and security challenges.” Discuss



13. PM Modi Inaugurates Semicon India 2025 – Positioning India as a Global Semiconductor Hub



On **2 September 2025**, Prime Minister Narendra Modi inaugurated **Semicon India 2025** at *Yashobhoomi, New Delhi*, a three-day summit attended by **20,000+ delegates from 40 countries**, signalling global trust in India’s semiconductor ambitions.

Semicon India 2025 Highlights

- **Global Participation:** CEOs of leading chipmakers, policymakers, and innovators joined the conference, affirming investor confidence in India’s digital economy.
- **Economic Momentum:** India recorded **7.8 % GDP growth** (Apr–Jun 2025), reinforcing its rise toward becoming the **world’s 3rd-largest economy**.
- **PM’s Message:**
“Oil was black gold; chips are digital diamonds.”
Semiconductors will define the **21st-century economy**, with the global market expected to **exceed \$1 trillion** by 2030.
- **Investment Impact:** The **Semicon India Programme (2021)** has attracted **\$18 billion** in projects by **CG Power, Kaynes, Micron, and Tata Group**, with multiple **fab approvals under process**.

India Semiconductor Mission (ISM)

Component	Key Details
Launch Year	2021 under MeitY – to build a “chip-to-product” ecosystem
PLI Scheme	₹76,000 crore outlay (₹65,000 crore committed)
Design Linked Incentive (DLI)	23 chip-design projects sanctioned
Fabs & Units	5 semiconductor plants under construction
OSAT Facility	Pilot Outsourced Semiconductor Assembly & Test (OSAT) plant at Sanand, Gujarat
Vision 2047	Achieve semiconductor self-reliance and emerge as a trusted supply-chain partner



UPSC Relevance: **GS Paper 3:** Science & Technology | Economy | Infrastructure | Industrial Policy
Keywords: *Semicon India 2025, India Semiconductor Mission, Vikram Chip, PLI & DLI Schemes, OSAT Facility, Digital Diamonds.*



HOT Question India’s semiconductor initiative is both an industrial strategy and a statement of technological sovereignty.” Discuss the economic and geopolitical dimensions of Semicon India 2025.



14. PM Modi Unveils India’s First Indigenous Semiconductor Chip – “Vikram Processor” by ISRO



During **Semicon India 2025** (2–4 September, Yashobhoomi, New Delhi), **Prime Minister Narendra Modi** unveiled **India’s first indigenous semiconductor chip**, the “**Vikram Processor**,” marking a key step toward **semiconductor self-reliance** and **strategic technology sovereignty**.

About the Vikram Chip

- **Developer:** Indian Space Research Organisation (ISRO).
- **Type:** **32-bit semiconductor processor**, fully designed and manufactured in India.
- **Qualification:** Certified for **launch vehicle operational conditions** – vibration, radiation, and temperature resistance.
- **Significance:**
 - Enables **indigenous avionics systems** in launch vehicles, satellites, and robotics.
 - Represents India’s entry into **strategic-grade chip fabrication** – a foundation for *Atmanirbhar Bharat* in electronics and space technology.

“Oil was black gold; chips are digital diamonds.” – PM Modi at Semicon India 2025

India’s Semiconductor Mission (ISM) – Overview

Feature	Details
Launch Year	2021 (under Ministry of Electronics & IT – MeitY)
Objective	Build a “Chip-to-Product” ecosystem and position India as a global semiconductor hub
PLI Scheme	₹76,000 crore package; ₹65,000 crore already committed
DLI Scheme	23 indigenous chip-design projects approved
Fabs Under Construction	5 fabrication units across Gujarat, TN, and Karnataka
OSAT Facility	Pilot Outsourced Semiconductor Assembly & Test unit launched in Sanand, Gujarat (2025)



UPSC Relevance: **GS Paper 3:** Science & Tech | Space | Industry | Economy
Keywords: *Vikram Processor, ISRO Chip, Semicon India 2025, India Semiconductor Mission, PLI & DLI Schemes, OSAT Facility.*



HOT Question The unveiling of ISRO’s Vikram Processor marks more than a scientific achievement—it signifies India’s strategic autonomy in the semiconductor domain.” Elaborate.



15. India Explores Micro-OLED Technology for Its First Display Fabrication Plant



The **Ministry of Electronics and Information Technology (MeitY)** is considering **Micro-Organic Light Emitting Diode (Micro-OLED)** technology as the foundation for **India’s first display fabrication plant**, aiming to strengthen indigenous electronics manufacturing and reduce import dependence.

About Micro-OLED Technology

- **Concept:** Combines OLED chemistry with **micro-fabrication** to produce miniature, self-emissive displays.
- **Pixel Design:** Each light emitter is directly mounted on a **silicon chip**, achieving extremely high pixel density.
- **Resolution:** Displays can exceed **4000 pixels per inch (ppi)** — suitable for near-eye, precision optics.
- **Limitation:** The silicon base restricts flexibility and transparency, confining its use to compact, high-end devices.
- **Applications:** AR/VR headsets, camera viewfinders, defence optical systems, and wearable micro-displays.
- **Challenges:**
 - High heat generation
 - Emitter ageing and burn-in
 - Complex, expensive fabrication process

About OLED Technology

Feature	Details
Mechanism	Uses organic layers between electrodes that emit light when electric current passes through
Nature	Self-emissive – each pixel produces its own light (no backlight required)
Advantages	True blacks, high contrast, wider viewing angles, thin form factor
Limitations	Organic material degradation causes burn-in and shorter lifespan



UPSC Relevance: **GS Paper 3:** Science & Tech | Manufacturing | Economy
Keywords: *Micro-OLED, OLED, Display Fabrication, MeitY, AR/VR Optics, Atmanirbhar Electronics, Semiconductor Ecosystem.*



HOT Question India’s interest in Micro-OLED fabrication reflects a shift from electronic assembly to advanced display innovation.” Discuss the opportunities and challenges of establishing a Micro-OLED ecosystem in India



16. India Crosses 100 Crore Internet Subscribers – TRAI Report (March–June 2025)



According to the latest **Telecom Regulatory Authority of India (TRAI)** report released by the **Ministry of Communications**, India’s internet subscriber base **surpassed the 100-crore mark** for the first time, marking a historic milestone in digital connectivity under the *Digital India* initiative.

Key Highlights of the TRAI Report

Indicator	Details (March–June 2025)
Total Internet Subscribers	100.28 crore, up from 96.91 crore — a 3.48 % growth
Broadband Users	97.97 crore (≈ 98 %) of total subscribers
Wireless Internet Users	95.81 crore, showing dominance of mobile broadband
Urban–Rural Split	Urban – 57.94 crore • Rural – 42.33 crore → narrowing digital divide
Average Monthly Data Use	24.01 GB per user, reflecting India’s high mobile-data consumption
Mobile User Growth	+0.52 %, sustaining steady telecom expansion

Significance of the Milestone

- **Digital Inclusion:** Expanding rural penetration signals progress in **BharatNet** and **PM-WANI** rural Wi-Fi missions.
- **Economic Multiplier:** Greater connectivity enhances **e-commerce, fintech, tele-education, and e-governance** reach.
- **Affordable Data Revolution:** Competitive pricing by private telecoms and state fibre-optic expansion continue to drive usage.
- **Global Standing:** India now has the **world’s second-largest internet base** after China, reinforcing its digital-economy potential.



UPSC Relevance: **GS Paper 3:** Economy | Infrastructure | Science & Tech
Keywords: *TRAI 2025 Report, Digital India, BharatNet, Internet Penetration, Telecom Infrastructure.*



HOT Question Crossing one billion internet subscribers reflects both India’s digital progress and its policy challenges.” Discuss how connectivity growth influences inclusion and governance outcomes



17. India's EV Push Stalls: No Applicants Under the SPMEPCI Scheme (June 2025)



Three months after its launch, the **Scheme for Promotion of Manufacturing of Electric Passenger Cars in India (SPMEPCI)** — aimed at attracting global EV manufacturers through duty concessions — has received **no applications**, reflecting weak industry response despite generous incentives.

About SPMEPCI

- **Launch:** June 2025 by the **Ministry of Heavy Industries**.
- **Objective:** Encourage global automakers to invest in local manufacturing of electric passenger vehicles in India.
- **Duty Concession:** Import of **up to 8,000 EVs per year** at **15% duty**, compared to the existing 70–100%.
- **Investment Requirement:**
 - Minimum ₹4,150 crore investment in domestic manufacturing.
 - **Bank guarantee** of an equal amount to ensure compliance.
- **Localisation Targets:**
 - **25% Domestic Value Addition (DVA)** within **3 years**.
 - **50% DVA** within **5 years**.
- **Duration:** Five years, or until the localisation and investment milestones are achieved.

Reasons for Weak Industry Response

- **FTA Dependencies:**
 - Automakers are awaiting **Free Trade Agreement (FTA)** outcomes with **U.S., UK, and EU**, which may offer broader tariff benefits.
 - Example: **India–UK FTA** proposes ~10% duty for luxury/premium vehicles, making SPMEPCI less attractive.
- **High Investment Threshold:** ₹4,150 crore viewed as steep amid uncertain premium EV demand (above \$35,000 price bracket).
- **Tesla's Withdrawal:** Despite initial talks, **Tesla** halted engagement and began opening **showrooms for imported EVs** instead.
- **Exclusion of Prior Investors:** Earlier EV projects (e.g., Vietnam's **VinFast** ₹500 crore Thoothukudi plant) are ineligible as they predate the scheme's notification.

Market Size Constraint: India's luxury EV segment remains nascent, with limited charging infrastructure and weak high-end demand.



HOT Question India's SPMEPCI scheme highlights the paradox between localisation ambitions and market pragmatism." Analyse the policy's shortcomings and suggest reforms to attract global EV manufacturers.



18. China’s EV Sector Faces “Involution” – A Case of Self-Defeating Growth



China, the **world’s largest electric vehicle (EV) market**, is facing a severe industry crisis termed “**involution**” – where excessive competition and overproduction have triggered price wars, eroding profitability and destabilising the global EV landscape.

What is Involution?

- **Definition:** *Involution* refers to a **self-defeating cycle** where firms, instead of innovating, engage in **hyper-competition** that lowers margins and degrades industry health.
- **EV Sector Context:** In China, automakers are selling EVs **below production cost**, prioritising market share over sustainability.
- **Outcome:** Rising output and falling prices coexist with mounting financial stress across the industry.

Factors Driving Involution in China’s EV Industry

Factor	Explanation
Trade Barriers	The U.S. imposed 100% tariffs on Chinese EVs (2024); EU and others introduced anti-dumping duties, restricting export markets.
Domestic Oversupply	Blocked exports led to intensified competition in the home market, oversaturating supply.
Aggressive Price Wars	Companies slash prices to maintain sales, leading to loss-making operations even for top brands.
Policy Saturation	Early government subsidies (2015–2022) spurred excessive capacity creation without demand alignment.
Technological Arms Race	Firms over-invest in battery R&D to differentiate, increasing debt without guaranteed returns.



UPSC Relevance: **GS Paper 3:** Economy | Industry | Environment | International Trade **Keywords:** *Involution, EV Sector, China, Global Supply Chains, FAME Scheme, PLI Scheme, Trade Protectionism.*



HOT Question China’s EV involution reveals the perils of overcapacity in strategic green industries. Discuss how India can learn from this crisis to build a sustainable electric mobility ecosystem



19. AI Chatbots and the Ethics of Responsibility – U.S. Suicides Renew Global Concerns



Recent **U.S. lawsuits** have linked **generative AI chatbots** (like ChatGPT and others) to suicides, reviving debates on **child safety, digital autonomy, and corporate accountability** in artificial intelligence systems.

About Generative AI Chatbots

- These tools simulate **human-like dialogue** using **large language models (LLMs)** trained on massive datasets.
- Examples include **ChatGPT, Claude, and Gemini**, capable of producing coherent responses, advice, and emotional interactions.

Associated Risks

Risk Area	Ethical Concern
Justice & Vulnerability	Center for Countering Digital Hate (CCDH) found 53% of harmful prompts produce dangerous outputs – violating fairness and safety principles.
Manipulation Risk	AI systems blur free will and exploit emotional dependency, raising consent and exploitation concerns.
AI Psychosis	Overreliance can cause social withdrawal, delusions, and detachment – termed AI psychosis.
Consciousness Illusion	Portraying AI as “self-aware” misleads users into emotional attachment.
Creativity Suppression	Overuse curbs critical thinking and independent reasoning, especially in students.

EPIC UPSC Classes



UPSC Relevance: **GS Paper 4:** Ethics, Human Values, Technology and Society. **GS Paper 3:** Science & Technology, Cyber Ethics, AI Governance
Keywords: *AI Ethics, Responsible AI, Child Safety, Cognitive Autonomy, UNESCO Guidelines, NITI Aayog Responsible AI*



HOT Question Generative AI chatbots have blurred the line between technology and emotional dependency. Examine the ethical challenges they pose to autonomy and mental health.”



20. ICMR Invites Partners to Commercialise AdFalcivax – India’s First Indigenous Dual-Stage Malaria Vaccine



The **Indian Council of Medical Research (ICMR)** has invited industry partners to commercialise **AdFalcivax**, India’s **first indigenous recombinant multi-stage malaria vaccine** targeting *Plasmodium falciparum*. The vaccine represents a major step toward **malaria elimination and bio-innovation self-reliance**.

About AdFalcivax

Feature	Details
Type	Recombinant chimeric malaria vaccine targeting Plasmodium falciparum.
Developed by	ICMR–National Institute of Malaria Research (NIMR) in collaboration with Bharat Biotech.
Production Host	Lactococcus lactis — a food-grade bacterium commonly used in dairy fermentation.
Dual-Stage Targeting	Combines pre-erythrocytic (liver) and sexual (blood-mosquito) stage antigens — protects humans and blocks mosquito transmission.
Chimeric Structure	Fuses antigenic parts from multiple parasite life-cycle stages into one composite vaccine.
Recombinant Technology	Involves combining DNA from different organisms to produce specific parasite antigens.
Thermal Stability	Retains full potency for up to nine months at ambient tropical temperatures — a key advantage for rural delivery.
Goal	To block infection in humans and interrupt transmission within the mosquito vector — a “dual protection” approach.

Life Cycle Stages Targeted

- **Pre-Erythrocytic Stage:** Parasites enter and multiply inside **liver cells** after a mosquito bite.
- **Sexual Stage:** Parasites develop in **human blood** and are later transmitted to mosquitoes, sustaining transmission cycles.



UPSC Relevance: **GS Paper 3:** Science & Tech | Health | Biotechnology | Public Health, **Keywords:** *AdFalcivax, Plasmodium falciparum, Recombinant Vaccine, Dual-Stage Targeting, ICMR NIMR, WHO HBHI.*



HOT Question Discuss how AdFalcivax represents a paradigm shift in India’s malaria elimination strategy. Examine its dual-stage design and implications for global vaccine equity.



21. Russia Unveils Enteromix – mRNA Cancer Vaccine with Reported 100% Efficacy in Trials



Russian scientists announced the success of **Enteromix**, an **mRNA-based personalised cancer vaccine** that reportedly achieved **100% efficacy** in early trials against colorectal cancer – one of the world’s most prevalent malignancies.

About Enteromix

Feature	Details
Type	mRNA-based therapeutic cancer vaccine
Mechanism	Uses modified messenger RNA (mRNA) to instruct human cells to produce tumour-specific antigens that trigger immune destruction of cancer cells.
Viral Support	Employs four non-pathogenic viruses to target malignant cells and activate immune responses.
Personalisation	Vaccine design is based on genetic analysis of individual tumours, creating patient-specific formulations.
Primary Target	Focused on colorectal cancer, the 3rd most common cancer globally.
Therapeutic Advantage	Enables safe, repeatable administration, enhancing immunity without risk of viral replication.
Trial Limitations	Claims of 100% efficacy are based on small sample size and lack peer-reviewed verification.
Next Steps	Larger Phase 3 clinical trials and international validation required before global deployment.

What is mRNA?

- **mRNA (messenger RNA):** A single-stranded molecule carrying **genetic instructions** from DNA to ribosomes for **protein synthesis**.

In vaccines, synthetic mRNA encodes specific antigens – **triggering immune protection** without introducing live pathogens.

How mRNA Vaccines Work

1. **Delivery:** Synthetic mRNA is encapsulated in **lipid nanoparticles** for cellular entry.
2. **Expression:** Once inside, **ribosomes** read mRNA to produce **antigen proteins**.
3. **Activation:** These antigens appear on cell surfaces, prompting **antibody and T-cell responses**.
4. **Memory Formation:** **Memory lymphocytes** ensure faster immune response on future exposure.



HOT Question mRNA vaccine technology, first developed for infectious diseases, is now revolutionising cancer therapy. Discuss its scientific principles, potential, and challenges for equitable access



22. Australia Approves World’s First Single-Dose Vaccine for Koalas Against Chlamydia



Australia became the first country to approve a **single-dose chlamydia vaccine** for **koalas (Phascolarctos cinereus)**, a milestone in wildlife disease management and conservation. The vaccine reduces **koala mortality by 65%**, addressing one of the biggest threats to the marsupial’s survival.

About the Chlamydia Vaccine

Feature	Details
Developer	Researchers from the University of the Sunshine Coast (USC), supported by the Australian government.
Type	Single-dose recombinant vaccine providing long-term protection against Chlamydia pecorum.
Mechanism	Triggers immune response to block bacterial colonisation in reproductive and urinary tracts.
Impact	Reduces infertility, eye infections, and deaths — expected to stabilise wild koala populations.
Conservation Relevance	Complements reforestation and habitat protection efforts under Australia’s Koala Recovery Plan (2022–2032).

Understanding Chlamydia



Aspect	Human Form	Koala Form
Causative Agent	Chlamydia trachomatis	Chlamydia pecorum
Transmission	Sexual contact	Direct contact, mother-to-joeys feeding
Symptoms	Urinary tract infection, eye disease, infertility	Urinary & eye infections, infertility, blindness
Treatment Challenge	Antibiotics effective	Antibiotics kill gut bacteria vital for digesting eucalyptus, causing starvation
Impact on Population	Public health concern	Affects up to 70% of wild koalas in some areas



UPSC Relevance: UPSC Relevance:

GS Paper 3: Environment | Biodiversity | Conservation | Science & Tech in Ecology, **Keywords:** Koala Vaccine, Chlamydia pecorum, Marsupials, Wildlife Disease, Conservation Biotechnology, IUCN Endangered.



HOT Question

Discuss how wildlife disease management through biotechnology, such as the koala chlamydia vaccine, can complement traditional conservation strategies in the Anthropocene era.



23. ICMR Launches CEREBO — India’s First Handheld, Non-Invasive Diagnostic Device for Brain Injury Detection



The **Indian Council of Medical Research (ICMR)** unveiled **CEREBO**, a revolutionary handheld, radiation-free device capable of **detecting traumatic brain injuries (TBI)** such as internal bleeding **within 60 seconds** using **near-infrared spectroscopy (NIRS)** and **machine learning** algorithms.

About CEREBO

Feature	Details
Developer	Indian Council of Medical Research (ICMR)
Technology Used	Near-Infrared Spectroscopy (NIRS) + Machine Learning
Function	Detects intracranial bleeding non-invasively by measuring changes in optical absorption of haemoglobin.
Diagnostic Speed	Provides results in under one minute.
Output Format	Colour-coded interface — Red (bleed detected), Green (normal).
Safety	Radiation-free, suitable for infants and pregnant women.
Deployment Potential	Ambulances, rural clinics, emergency rooms, trauma centres, and military medical units.
Affordability	Designed as a low-cost alternative to CT/MRI scans, improving early diagnosis in low-resource settings.

Significance

- **Accessibility:** Enables point-of-care brain injury screening in areas lacking imaging infrastructure.
- **Time-Sensitive Care:** Rapid triage reduces delay in life-saving neurosurgical interventions.
- **Public Health Impact:** Can significantly cut mortality from **road accidents** — a major cause of TBIs in India.
- **Innovation Benchmark:** Reflects India’s emerging capacity for **AI-integrated medical devices**.



UPSC Relevance: **GS Paper 3:** Science & Tech | Health | AI in Medicine | Public Health
Keywords: CEREBO, ICMR, Near-Infrared Spectroscopy, Machine Learning in Healthcare, Non-Invasive Diagnostics, Traumatic Brain Injury.



HOT Question “AI-assisted non-invasive diagnostics like ICMR’s CEREBO can transform India’s public health infrastructure.” Discuss with reference to affordability and accessibility challenges in healthcare delivery



24. India’s Rising Mental Health Crisis Linked to Antibiotic Overuse and Gut-Brain Axis Disruption



New studies have highlighted a strong link between **antibiotic overuse** and **mental health disorders** in India, as excessive antibiotic use disrupts the **gut microbiome**, impairing the **gut-brain axis** that governs mood, cognition, and emotional stability.

Gut-Brain Axis Connection

- The **gut-brain axis** is a **bi-directional communication network** linking the gastrointestinal system and the central nervous system through **neural (vagus nerve), hormonal, and immune pathways**.
- **Gut microbiota** produce mood-regulating neurotransmitters like **serotonin, dopamine, and GABA**.

Disruption of this ecosystem—via antibiotics, diet, or infection—can cause **neuroinflammation, depression, and anxiety**.

Concerns in India

Concern	Details
Antibiotic Consumption	India ranks among the world’s largest consumers of antibiotics, largely due to OTC sales and weak regulation.
Unapproved Drugs	A 2022 Lancet study found nearly 50% of antibiotics consumed in India were unapproved combinations, aggravating AMR.
Low Awareness	People often use antibiotics for viral illnesses, unaware of gut and mental health impacts.
Systemic Pressure	Fee-for-service models, pharmacy incentives, and patient demand drive unnecessary prescriptions.



UPSC Relevance: **GS Paper 2:** Health | Government Policy | Social Justice
GS Paper 3: Science & Tech | Biotechnology | AMR, *Antibiotic Overuse, Gut-Brain Axis, Antimicrobial Resistance, Mental Health, Microbiome, INSAR, CDSCO, Ayushman Bharat, Probiotics.*



HOT Question The gut-brain axis represents the next frontier in public health. Discuss how antibiotic overuse and weak regulation in India have created a dual crisis of antimicrobial resistance and mental health burden



25. “Nightmare Bacteria” Infections Surge by 70% in the United States (2019–2023)



The U.S. Centers for Disease Control and Prevention (CDC) has reported a **70% rise in infections caused by “nightmare bacteria”**—highly drug-resistant microbes—between **2019 and 2023**, signalling a growing global antimicrobial resistance (AMR) crisis.

About Nightmare Bacteria

Aspect	Details
Definition	Bacterial strains that have developed resistance to nearly all available antibiotics, rendering most treatments ineffective.
Main Types	Carbapenem-Resistant Enterobacteriaceae (CRE), drug-resistant Pseudomonas aeruginosa, and Klebsiella species.
CRE Examples	Escherichia coli (E. coli) and Klebsiella pneumoniae — both capable of acquiring the NDM (New Delhi Metallo-β-Lactamase) gene.
NDM Enzyme Function	The NDM enzyme destroys carbapenems, a class of “last-resort” antibiotics.
Resistance Mechanism	Bacteria share resistance genes via plasmids, enabling rapid cross-species spread in hospitals and communities.

Epidemiology

Region	Status
South Asia	Endemic zones include India and Pakistan, where NDM-producing bacteria are widespread.
Europe	Increasing prevalence in Southern and Eastern Europe due to medical tourism and cross-border healthcare.
United States	70% increase in CRE and NDM-positive infections from 2019–2023.
India’s Context	India remains a global hotspot for AMR, partly due to antibiotic overuse and poor hospital sanitation.



UPSC Relevance: **GS Paper 2:** Health | Government Policies | Global Health Governance. **GS Paper 3:** Science & Tech | Biotechnology | Disease Control | AMR. **Keywords:** *Nightmare Bacteria, CRE, NDM Gene, Carbapenem Resistance, AMR, Hospital-Acquired Infection, WHO Priority*



Pathogens

HOT Question The rise of ‘nightmare bacteria’ highlights the limits of modern medicine in the face of antimicrobial resistance.” Discuss India’s role and responsibilities in combating global AMR



26. SN Bose Centre Discovers p47 Protein’s “Mechanical Chaperone” Role in Protecting Cells Under Stress



A groundbreaking study by researchers at the S. N. Bose National Centre for Basic Sciences (SNBNCBS), Kolkata – an autonomous institute under the Department of Science and Technology (DST) – has discovered a new protective role of the protein p47, revealing its function as a “mechanical chaperone” that helps maintain protein stability under mechanical stress.

Aspect	Details
Protein Studied	p47, previously known as a cofactor of p97 (also called VCP – Valosin-containing protein).
New Role Identified	Functions independently as a mechanical chaperone, protecting and refolding proteins exposed to continuous physical pulling forces.
Traditional Role	Earlier known for assisting in protein degradation, membrane fusion, and trafficking within cells.
Experimental Method	Researchers used single-molecule magnetic tweezers to simulate mechanical stress at the cellular level.
Observed Function	p47 binds to mechanically stretched proteins, preventing their misfolding and aiding refolding, similar to canonical chaperones like Hsp70 or GroEL.
Novelty	p47 is the first cofactor protein with single-molecule evidence of autonomous mechanical chaperone-like behaviour.

Mechanical Chaperones

- **Definition:** Proteins that **prevent mechanical unfolding** or assist refolding of substrate proteins under **mechanical stress** (e.g., cytoskeletal tension, blood flow, muscle contraction).
- **Difference from Chemical Chaperones:** Traditional chaperones stabilize proteins chemically (via hydrophobic or ATP-driven interactions), whereas **mechanical chaperones** act under **physical pulling or strain conditions**.

Single-Molecule Magnetic Tweezers

- Technique to **apply controlled mechanical force** to single biomolecules.

Helps study **folding–unfolding transitions** of proteins and identify **force-dependent biochemical functions**.



UPSC Relevance: GS Paper 3: Science & Tech | Biotechnology | Indian Scientific Institutions. **Keywords:** p47 Protein, Mechanical Chaperone, SN Bose Centre, Protein Folding, Biophysics, Magnetic Tweezers, DST India.



HOT Question The discovery of the mechanical chaperone role of p47 expands the frontiers of cellular mechanobiology.” Discuss its implications for understanding protein stability and therapeutic innovation.



27. INST Mohali Scientists Develop Brain-Interactive Nanomaterial for Non-Invasive Neurological Therapy



In **September 2025**, scientists at the **Institute of Nano Science and Technology (INST), Mohali** — an autonomous institute under the **Department of Science and Technology (DST)** — announced the discovery of a **nanomaterial that directly interacts with neurons**, paving the way for **non-invasive treatment of brain disorders** such as Parkinson’s disease.

The Breakthrough Nanomaterial

Aspect	Details
Material Identified	Graphitic Carbon Nitride ($g-C_3N_4$) — a semiconductor-like, carbon-based nanomaterial.
Unique Capability	Naturally interacts with neurons to support growth, maturation, and communication.
Key Finding	$g-C_3N_4$ can modulate neuronal activity without external magnetic, electric, or optical stimulation — a first in brain science.
Smart Behaviour	Functions as a bioelectronic “smart switch”:
– Turns “on” under negative membrane potential to activate neurons.	
– Turns “off” under positive potential to prevent overstimulation or fatigue.	

Mechanism of Action

Biological Interface	Effect
Electric Field Generation	The material produces tiny local electric fields in sync with brain activity.
Neuronal Activation	These fields activate calcium ion (Ca^{2+}) channels, enhancing communication between neurons.
Neurochemical Impact	Boosts dopamine levels in lab-grown neurons — crucial for motor control and mood regulation.
Neuroprotection	In Parkinson’s disease models, it reduced misfolded α -synuclein proteins, mitigating neurodegeneration.



UPSC Relevance: **GS Paper 3:** Science & Technology | Biotechnology | Health Innovations | Nanoscience **Keywords:** *Graphitic Carbon Nitride ($g-C_3N_4$), Nanoneuroscience, Non-Invasive Brain Therapy, Neurodegeneration, Parkinson’s Disease, DST, INST Mohali.*



HOT Question The discovery of graphitic carbon nitride as a neuron-interactive nanomaterial could redefine the future of brain medicine.” Explain the scientific and therapeutic significance of this breakthrough in India’s S&T landscape



28. Stanford Creates World’s First AI-Designed Viral Genome to Kill Bacteria



Researchers at **Stanford University** have created the **world’s first AI-designed viral genome** capable of infecting and killing bacteria — marking a revolutionary leap in **synthetic biology and AI-driven genetic engineering**.

About the Discovery

Aspect	Details
Model Used	Evo, an AI model trained on nearly 2 million viral genomes, generated thousands of new viral DNA sequences.
Test Virus	Bacteriophage ΦX174 — a virus that infects E. coli. It has a small, circular genome and was the first virus to have its genome fully sequenced (1977) and synthetically recreated (2003).
AI Breakthrough	The AI model successfully designed synthetic bacteriophages that can target and kill antibiotic-resistant bacteria, demonstrating AI’s biomedical design potential.
Scientific Leap	Marks a transition from reading DNA (sequencing) and building DNA (synthesis) to designing DNA (AI-guided creation).

About Bacteriophages

Feature	Description
Definition	Viruses that infect and multiply within bacteria.
Structure	Composed of a protein capsid enclosing double-stranded DNA or RNA.
Therapeutic Use	Phage therapy is an emerging alternative to antibiotics, particularly against multi-drug resistant (MDR) pathogens.
ΦX174	A model phage infecting E. coli; compact, well-understood, and ideal for synthetic biology experiments.



UPSC Relevance: **GS Paper 3:** Science & Tech | Biotechnology | Artificial Intelligence | Health **Keywords:** *AI-Designed Viral Genome, Bacteriophage ΦX174, Evo Model, Synthetic Biology, Antibiotic Resistance, Biosecurity.*



HOT Question AI-designed genomes mark the convergence of artificial intelligence and synthetic biology. Discuss the opportunities and ethical challenges this poses for global biosecurity



SEPTEMBER 2025

GEOGRAPHY

DISASTER Management

1. 'Desert Solidification' enables wheat farming in Rajasthan.
2. IIT Indore-ICIMOD study maps Gangotri's hydrological shifts.
3. Himalayan states face near-daily climate disasters in 2025.
4. Avalanche at Siachen base kills three Indian soldiers.
5. India witnesses total lunar eclipse – "Blood Moon."
6. 2025 monsoon ends early with 7% excess rainfall.
7. Punjab floods worsen due to man-made factors.
8. CPCB report shows slight drop in polluted rivers.
9. Scientists extract 50,000 litres of water from ocean aquifer.
10. UNESCO adds 7 Indian sites; Sarnath nominated for 25–26.
11. Almatti dam height plan reignites Krishna water dispute.
12. NITI Aayog launches roadmap for self-reliance in pulses.
13. India aims for global tea leadership at 2025 convention.
14. Great Nicobar Project

EDUCASIUM IAS Academy
EPIC UPSC Classes

1. Solidification' Technology Enables Wheat Cultivation on Rajasthan's Desert Land



Researchers in Rajasthan have successfully used 'solidification' technology to grow wheat on desert land – a pioneering step toward reclaiming arid regions and combating desertification, one of India's most pressing environmental challenges.

About Desertification

- Definition: Desertification is the gradual process by which fertile land in arid or semi-arid regions becomes barren and unproductive due to climate change, deforestation, overgrazing, and unsustainable agriculture.
- Extent in India: About 30% of India's total geographical area is degraded, and nearly 25% faces desertification (ISRO's *Desertification and Land Degradation Atlas*).
- Hotspot Region: Rajasthan alone contributes over 23% of India's desertified land (MoEFCC), primarily across Thar Desert districts like Jaisalmer, Barmer, and Bikaner.

About 'Solidification' Technology

- Concept: The process transforms desert sand into fertile soil by using bioformulations of natural polymers and beneficial microorganisms.
- Mechanism:
 - Cross-Linking: Natural polymers bind loose sand particles into a soil-like structure.
 - Moisture Retention: The composite retains water and nutrients, improving microbial activity.
 - Fertility Boost: The stabilised substrate supports root penetration and nutrient cycling, making desert lands cultivable.
- Output: Demonstrated successful wheat cultivation in previously uncultivable desert plots.

Keywords

- Bioformulation: Natural mixture of polymers and microorganisms that enhances soil fertility.
- Natural Polymers: Plant or microbe-derived compounds that bind soil and improve water retention.
- Solidification: Conversion of sandy substrates into arable land through biological binding agents.



UPSC Relevance: GS Paper 1: Geography – Landforms, Arid and Semi-Arid Ecosystems. GS Paper 3: Environment, Climate Change, Sustainable Agriculture, Land Degradation Neutrality (LDN). Prelims: UNCCD, ISRO's Desertification Atlas, Bioformulation technology.



HOT Question "Technological interventions like solidification offer hope against desertification but also raise ecological and socio-economic challenges. Discuss how science-based restoration can align with local livelihoods and ecosystem resilience in India's drylands."

2. IIT Indore–ICIMOD Study Reveals Major Hydrological Shifts in Gangotri Glacier System Since 1980



A recent collaborative study by IIT Indore and the International Centre for Integrated Mountain Development (ICIMOD), Kathmandu found that the Gangotri Glacier System (GGS) – the main source of the Ganga River – has undergone significant hydrological changes over the past four decades, indicating major impacts of climate change on Himalayan water systems.

About the Gangotri Glacier System (GGS)

- One of the largest glaciers in the Himalayas, located in Uttarkashi district, Uttarakhand, forming the headwaters of the Bhagirathi–Ganga River.
- Origin: Northern slopes of the Chaukhamba massif (~7,000 m) in the Central Garhwal Himalayas.
- Snout: Terminates at Gaumukh, a sacred site and the visible source of the Bhagirathi River.
- Composition: Formed of granitic and metamorphic rocks – granite, gneiss, and schist.
- Tributaries: Includes Raktavarn, Chirbas, and other smaller glaciers.
- Debris Cover: Around 20% of the glacier surface is debris-laden, slowing overall melt but creating uneven retreat patterns.

Key Findings of the GGS Discharge Study

- Mean Annual Discharge: ~28 m³/s, with peak flows in July.
- Shift in Peak: Earlier peak (from August → July) attributed to reduced snowfall and early snowmelt since the 1990s.
- Decadal Increase: Discharge rose by 7.8% between 1991–2000 and 2001–2010, reflecting enhanced glacier melt.
- Water Source Contribution:
 - Snowmelt – 64%
 - Glacier melt – 21%
 - Rainfall – 11%
 - Baseflow – 4%
- Reduced Snowmelt Share: Despite higher temperatures, snowfall decline (~10%) led to reduced snowmelt contribution.



UPSC Relevance: GS Paper 1: Physical Geography – Glacial Landforms, Himalayan Hydrology. GS Paper 3: Climate Change, Water Security, Disaster Management (floods & droughts). Prelims: Gangotri Glacier features, ICIMOD, Cryosphere terms, and Ganga Basin hydrology.



HOT Question “Discuss how changing hydrology in the Himalayan glaciers like Gangotri can simultaneously heighten flood risks and aggravate long-term water scarcity across the Indo-Gangetic plains

3. Himalayan States Record Near-Daily Disasters in 2025, Exposing Mounting Climatic and Developmental Risks



In 2025, all 13 Himalayan states and Union Territories faced near-daily climate-induced disasters — including cloudbursts, flash floods, and landslides — causing severe loss of life and infrastructure damage. This underscores the Himalayan region's growing fragility under combined pressure from climate change and unplanned development.

Hazard Landscape and Trends

- **Rising Disaster Frequency:** Disaster days rose from 63% (2022) to 70% (2024), marking a 10% surge in just two years.
- **Major Incidents (2024):**
 - Sikkim: Glacial Lake Outburst Flood (GLOF) devastated hydropower projects and displaced thousands.
 - Uttarkashi (Dharali–Harsil): Floods submerged markets and altered the Bhagirathi's course.
 - Mandi (Himachal Pradesh): Received ~20× normal rainfall, destroying roads and entire villages.
- **Trend:** Increasing frequency, intensity, and spread of hydro-meteorological events across the Himalayan arc.

Causes of Himalayan Disasters

A. Climatic Drivers

- **Climatic Anomalies:** Early monsoons and intensified western disturbances are increasing short-duration, high-intensity rainfall.
- **Orographic Amplification:** Warming in the Arctic and Tibetan Plateau enhances moisture circulation and cloudburst potential in steep Himalayan terrains.
- **Atmospheric Warming:** Rising temperatures heighten moisture-holding capacity, triggering erratic rainfall.
- **Soil Instability:** Fragile lithology, low water retention, and deforestation worsen landslide risks.

B. Anthropogenic Factors

- **Unregulated Construction:** Riverbed encroachment, slope cutting, and weak retaining structures amplify disaster impacts.
- **Ignored Warnings:** Earlier floods (2013, 2018) in Uttarkashi were not followed by structural mitigation.
- **Policy Myopia:** Infrastructure and tourism projects often prioritised over ecological sustainability.
- **Mapping Deficits:** Lack of micro-level hazard zoning left populations in active landslide and flood zones.



HOT Question “The increasing frequency of Himalayan disasters reflects the intersection of climate change and policy failure. Examine the causes and suggest a framework for climate-resilient Himalayan development

4. Avalanche Strikes Indian Army Base Camp in Siachen Glacier, Killing Three Soldiers



An **avalanche** struck an **Indian Army base camp** in the **Siachen Glacier, Ladakh**, leading to the tragic death of three soldiers. The incident highlights the **extreme environmental risks** and **operational challenges** faced by troops stationed in the **world's highest battlefield**.

About Avalanches

- **Definition:** A sudden, rapid downslope movement of snow, ice, rocks, or debris triggered by natural or anthropogenic causes.
- **Triggers:**
 - Heavy snowfall increasing the load on slopes
 - Rapid temperature changes weakening snow layers
 - Vibrations from earthquakes, artillery fire, or movement
- **Types:**
 - **Snow Avalanches:** Can be dry (powder snow) or wet (slab avalanches) involving cohesive snow layers.
 - **Rock Avalanches:** Large rock masses breaking away from steep cliffs.
 - **Ice Avalanches:** Occur in glaciated regions when ice blocks detach and slide downhill.
 - **Debris Avalanches:** Contain soil, boulders, and other materials moving rapidly downslope.
- **Vulnerability:** High-altitude military bases, roads like Zoji La and Rohtang, and glacial zones are particularly prone.

About Siachen Glacier

- **Location:** Eastern **Karakoram Range**, Himalayas; **between Saltoro Ridge (west) and Karakoram Range (east)**.
- **Extent:** Around **76 km long**, making it **the world's second-longest non-polar glacier**.
- **Strategic Significance:**
 - Lies near the **India–Pakistan–China tri-junction**.
 - India maintains permanent posts to control the Saltoro Ridge against Pakistan's claims.
 - Serves as a **high-altitude military outpost** ensuring India's strategic depth in Ladakh.
- **Geological Context:** Located south of the **Karakoram watershed divide**, separating the **Eurasian and Indian tectonic plates** — often called the “**Third Pole**” due to its vast ice reserves.
- **Climate & Terrain:**
 - Altitude: Above **20,000 feet**
 - Temperature: As low as **–60°C**
 - Oxygen: Only **30–40%** of sea-level concentration
- **Hydrological Role:** Source of the **Nubra River**, which joins the **Shyok River**, feeding into the **Indus Basin** — vital for India's and Pakistan's water systems.

5. India Witnesses Total Lunar Eclipse — “Blood Moon” on 7–8 September 2025



On **7–8 September 2025**, India observed a **total lunar eclipse**, popularly known as a “**Blood Moon**.” The phenomenon captivated skywatchers nationwide and offered opportunities for **astronomy outreach and education**.

About Lunar Eclipse

- **Definition:** A lunar eclipse occurs when **Earth passes between the Sun and the Moon**, blocking sunlight and casting its shadow on the lunar surface.
- **Types of Eclipses:**
 - **Total:** The Moon fully enters Earth’s umbra (shadow).
 - **Partial:** Only a portion of the Moon passes through the umbra.
 - **Penumbral:** The Moon traverses the outer part of the Earth’s shadow, causing subtle dimming.
- **Visibility:** Unlike a solar eclipse, **lunar eclipses are safe to watch** with the naked eye and can be observed from anywhere on the night side of Earth.

Why the Moon Appears Red — The “Blood Moon”

- **Rayleigh Scattering:** Earth’s atmosphere scatters **shorter blue wavelengths** more than **longer red/orange wavelengths**.
- During totality, sunlight refracted through Earth’s atmosphere **illuminates the Moon with reddish light**, producing the coppery hue.
- **Same Principle:** Responsible for **blue skies and red-orange sunsets**.

Scientific and Cultural Significance

- **Astronomical Relevance:** Offers valuable data on **Earth’s atmospheric composition and dust levels**.
- **Public Engagement:** Encourages **astronomy education, citizen science participation**, and **astro-tourism**.
- **Cultural Symbolism:** Historically viewed as an omen in many cultures; modern interpretations emphasise **scientific curiosity** and **natural beauty**.



UPSC Relevance: **GS Paper 1 (Geography):** Celestial phenomena, Earth–Moon–Sun system. **GS Paper 3 (Science & Tech):** Science communication and space awareness.



HOT Question “Explain the scientific basis of the ‘Blood Moon’ phenomenon. How can celestial events like lunar eclipses be leveraged to promote scientific literacy and citizen engagement in India?”

6. India's 2025 Monsoon Ends Early with 7% Excess Rainfall, Reflecting "Weather Variability as the New Normal"



The **2025 southwest monsoon**, which arrived early, is **retreating prematurely** with **7% excess rainfall**, underscoring India's growing **climate variability** and its far-reaching impacts on agriculture, food security, and disaster management.

Monsoon 2025 Overview

- **Early Onset & Retreat:** The 2025 monsoon began ahead of schedule and is withdrawing earlier than average, signalling increasing **intra-seasonal fluctuations**.
- **Excess Rainfall:** National rainfall was **7% above the long-period average (LPA)**, though unevenly distributed across regions.

Reservoir Levels: The **Central Water Commission (CWC)** reported that major reservoirs are **84% full**, higher than previous years — ensuring irrigation support but increasing flood risks.

Economic & Agricultural Implications

- **Food Security Boost:** Wheat output is projected at **117 million tonnes**, aided by early cooling that benefits **rabi crops** like wheat, barley, and mustard.
- **Farm Income & Exports:** **Agricultural exports grew 9% (April–July 2025)**, strengthening rural incomes; however, heavy rains and flooding reduced yields of perishables.

Inflation Risks: Post-harvest rainfall and crop spoilage may fuel **food inflation**, especially for vegetables and oilseeds

Climate and Disaster Concerns

- **Natural Disasters:** Intense rainfall events triggered floods and landslides across multiple states, indicating a **new hydrological normal**.
- **Regional Impacts:** Cold waves in **Kutch (Gujarat)** and frost threats pose localized risks despite early winter benefits in the north.
- **Climate Variability:** The dual pattern of excess rainfall and early retreat exemplifies **climate change-induced monsoon instability**.



HOT Question "The Indian monsoon has become increasingly erratic, alternating between floods and droughts within the same season. Discuss its implications for food security and disaster management, suggesting adaptive strategies"

7. Punjab Floods 2025: Man-Made Factors Exacerbate North India's Intensifying Flood Cycle



The **2025 Punjab floods**, reminiscent of the catastrophic **1988 floods**, have re-emerged as a warning of how **human-induced changes and climate anomalies** are amplifying monsoon disasters across North India. The event reflects a structural crisis in flood governance, basin management, and land-use planning.

Evolving Flood Patterns in North India

- **Monsoon Shifts:** IMD data since 2020 shows a **transition from steady rains to short, intense downpours**, amplifying flood risk.
- **Increased Frequency:** Flood recurrence intervals have shrunk to **2–3 years**, compared to the historical **5–10-year cycles**.
- **Geographical Spread:** Flood-prone areas have expanded from the **Sutlej-Beas plains** to the **Ghaggar-Yamuna** basin.
- **Prolonged Season:** Flood durations now last **20–25 days longer** than average.
- **Compound Floods:** Multiple river systems — **Sutlej, Ravi, and Beas** — increasingly overflow together, overwhelming basin capacity.

Natural and Environmental Determinants

- **Rapid Runoff:** Steep **Sutlej-Ravi catchments** and snowmelt channels accelerate downstream flooding.
- **Alluvial Plains:** Fine-textured **Ganga-Yamuna soils** impede percolation, leading to surface inundation.
- **Convective Storms:** **Shivalik hills** in Himachal Pradesh funnel intense rainfall into tributaries.
- **Glacial Contribution:** Periodic **Glacial Lake Outburst Floods (GLOFs)** from Uttarakhand add sudden discharge.
- **Western Disturbances:** Late-season precipitation in **Jammu & Kashmir** sustains basin saturation.



UPSC Relevance: **GS Paper 1:** Physical Geography — Monsoon variability, river systems, and flood geomorphology. **GS Paper 3:** Disaster Management — Preparedness, mitigation, and resilience strategies.



HOT Question “North India's floods are increasingly man-made rather than natural. Analyse how land-use change, deforestation, and poor governance have transformed flood patterns, and suggest long-term resilience strategies”

8. CPCB Report 2023 Shows Marginal Decline in India's Polluted River Stretches



The **Central Pollution Control Board (CPCB)** released its 2023 river pollution assessment, revealing only a **modest improvement** in water quality, with polluted river stretches (PRS) reducing from **311 in 2022 to 296 in 2023**, underscoring persistent challenges in wastewater management and enforcement.

Assessment Framework

- **Parameter:** CPCB assesses river water quality biannually using **Biological Oxygen Demand (BOD)** — an indicator of organic pollution.
- **Norm:** Rivers with **BOD > 3 mg/L** exceed the outdoor bathing standard, indicating unsafe and contaminated waters.
- **Polluted River Stretch (PRS):** A river segment is classified as polluted if **two consecutive sites** register BOD levels above 3 mg/L.
- **Priority Classification:**
 - **Priority 1:** BOD > 30 mg/L (severely polluted)
 - **Priority 2–5:** Gradually lower pollution from **20 mg/L to 3 mg/L**

Performance Measure: A shift of stretches from higher to lower priority categories signals progress in restoration

Key Findings

- **National Overview:** India has **296 polluted river stretches** across **271 rivers**—a marginal improvement from 2022.
- **Top Polluted States:**
 - **Maharashtra:** 54 PRS (highest)
 - **Kerala:** 31 PRS
 - **Madhya Pradesh & Manipur:** 18 each
- **Critical Hotspots:** **Tamil Nadu, Uttar Pradesh, and Uttarakhand** each have five **Priority-1** stretches needing urgent mitigation.
- **Improvement Pattern:** Priority-1 stretches fell from **45 → 37**, and Priority-4 from **72 → 45**, reflecting modest gains.
- **Persistently Polluted Rivers:** **Yamuna (Delhi), Sabarmati (Ahmedabad), Chambal, Tungabhadra, and Gomti** remain critically affected.



HOT Question “Despite numerous river rejuvenation programs, India’s water quality remains stagnant. Examine the reasons for limited success of CPCB-led interventions and suggest a multi-tiered strategy for sustainable river restoration.”

9. Scientists Extract 50,000 Litres of Freshwater from Atlantic Ocean's Offshore Aquifer



In a first-of-its-kind **systematic undersea drilling campaign**, scientists successfully extracted nearly **50,000 litres of freshwater** from beneath the **Atlantic Ocean**, offering a potential new frontier for addressing global water scarcity through **offshore aquifers** — hidden freshwater reserves beneath the sea floor

About Offshore Aquifers

- **Definition:** Offshore or submarine aquifers are **freshwater reserves stored in porous rocks and sediments beneath the ocean floor**, often extending **up to 90 km from coastlines**.
- **Formation Origins:**
 - **Ice Age Hypothesis:** Rainwater infiltrated coastal sediments during **glacial periods**, when sea levels were lower.
 - **Onshore Connectivity:** Many are **hydrologically linked** with land-based aquifers, receiving recharge through subsurface flow.

Protection Layer: A **clay-rich, impermeable cap** traps lighter freshwater below saline layers, preserving it for millennia.

Significance for Global and National Water Security

- **Potential Reservoirs:** Offshore aquifers may **hold more water than major continental aquifers**, particularly vital for **arid coastal nations**.
- **UN Warning:** As per **UN 2023 Water Report**, global freshwater demand could exceed supply by **~40% by 2030**.
- **Strategic Role:** These aquifers could become **emergency freshwater sources** for coastal cities during droughts and groundwater depletion.
- **Climate Resilience:** Offer **natural buffers** amid erratic monsoons, glacial retreat, and salinisation of coastal wells.



UPSC Relevance: **GS Paper 1:** Geographical features, hydrology, and oceanic processes. **GS Paper 3:** Resource conservation, water scarcity, sustainable development, and climate adaptation.



HOT Question “Submarine freshwater aquifers may redefine future water geopolitics but pose ecological and governance challenges. Discuss their potential and sustainability in addressing global freshwater scarcity.”

10. UNESCO Adds 7 New Indian Sites to Tentative World Heritage List; India Nominates Sarnath for 2025–26



On **12th September 2025**, **UNESCO** added **seven new Indian sites** to its **Tentative List of World Heritage Sites**, reflecting India’s expanding recognition of **geo-heritage and natural diversity**. With these additions, India’s overall UNESCO heritage tally stands at **69 sites — 49 Cultural, 17 Natural, and 3 Mixed**. Additionally, India has **officially nominated Sarnath (Uttar Pradesh)** for **World Heritage inscription (2025–26)**.

About the UNESCO Tentative List

Aspect	Details
Definition	A preliminary inventory of sites that a nation intends to nominate for the World Heritage List.
Mandate	Required under Operational Guidelines of the 1972 World Heritage Convention.
Process	Sites must remain on the Tentative List for at least one year before formal nomination.
Objective	To ensure sites demonstrate Outstanding Universal Value (OUV), integrity, and effective protection measures.

New Indian Sites Added to UNESCO Tentative List (2025)

No.	Site & State
1. Deccan Traps, Maharashtra (Panchgani & Mahabaleshwar)	Basaltic lava flows from volcanic eruptions ~65 million years ago marking the Cretaceous–Paleogene extinction boundary, crucial for studying Earth’s climatic transitions.
2. Natural Heritage of Tirumala Hills, Andhra Pradesh	Biodiversity hotspot of the Eastern Ghats, combining sacred geography (Tirumala Temple) with endemic flora and rare geological features.
3. Geological Heritage of St. Mary’s Island Cluster, Karnataka	Features unique columnar basalt formations, offering evidence of India–Madagascar continental drift (88 million years ago).
4. Meghalayan Age Caves, East Khasi Hills, Meghalaya	Record Holocene Epoch monsoonal evolution; contain rare speleothems defining the “Meghalayan Age” (Global Chronostratigraphic Unit, 2018).
5. Naga Hill Ophiolite, Nagaland (Kiphire)	Represents exposed oceanic crust (ophiolite) — direct proof of the Tethys Ocean closure and India–Eurasia collision.
6. Erra Matti Dibbalu, Andhra Pradesh (Visakhapatnam)	Known as Red Sand Dunes, formed by Late Pleistocene sea-level oscillations — a proposed UNESCO Geoheritage site.
7. Natural Heritage of Varkala, Kerala	Renowned Cenozoic sedimentary cliffs and marine terraces, showcasing tectonic uplift and coastal evolution of the western coast.

India's UNESCO Heritage Profile (as of 2025)

Category	Count
Cultural Sites	49
Natural Sites	17
Mixed Sites (Cultural + Natural)	3
Total	69

- **10 km northeast of Varanasi (U.P.).**
- Site of **Gautama Buddha's first sermon** — **"Dhammachakkappavattana"** — marking the founding of the **Buddhist Sangha**.
- Known as **Rishipatana, Mrigadava, or Saranganatha (Lord of the Deer)**.



UPSC Relevance: **GS Paper 1:** Indian Culture | Art & Architecture | Buddhism | UNESCO & Cultural Policy **GS Paper 3:** Environment | Conservation | Geoheritage | Sustainable Tourism **Keywords:** *UNESCO Tentative List, Sarnath Nomination, Deccan Traps, Meghalayan Age, Trimmata Hills, Lion Capital, Geoheritage, World Heritage Convention*



HOT Question "UNESCO's recognition of India's geoheritage marks a new phase where natural science meets cultural identity"

11. Karnataka's Plan to Raise Almatti Dam Height Rekindles Krishna Water Dispute



Karnataka's proposal to **increase the height of the Almatti Dam** has revived tensions among riparian states — Maharashtra, Telangana, and Andhra Pradesh — over **Krishna River water sharing**. The move contradicts the **Supreme Court's earlier order**, which fixed the dam's **Full Reservoir Level (FRL)** and maintained a stay on any structural modifications.

Background: The Krishna Water Dispute

- The **Krishna River** originates near Mahabaleshwar in Maharashtra and flows through **Karnataka, Telangana, and Andhra Pradesh**, covering nearly 1,400 km before joining the Bay of Bengal.
- The dispute dates back to **1951**, concerning equitable water sharing among riparian states.
- **KWDT-I (1969)** led by Justice Bachawat allocated water among the three states based on 75% dependability.

KWDT-II (2010), headed by Justice Brijesh Kumar, further reallocated water and defined state-wise usage limits, but its implementation remains legally contested.

About Almatti Dam

- **Location:** Situated in **Bagalkot district, Karnataka**, across the **Krishna River**.
- **Project:** Part of the **Upper Krishna Project (UKP)**, crucial for irrigation and hydropower in north Karnataka.
- **Current FRL: 519.6 metres** above mean sea level (as fixed by the Supreme Court).
- **Karnataka's Proposal:** To raise the FRL to **524.26 metres**, citing surplus water that flows into the sea unused.

Opposition: Andhra Pradesh and Telangana argue the proposal violates the Supreme Court's stay and alters downstream allocations fixed by **KWDT-II**



UPSC Relevance: GS Paper 2: Inter-State River Water Disputes, Federalism, Role of Judiciary.
GS Paper 3: Water Resource Management, Environmental Governance.



HOT Question “The recurring disputes over the Krishna River highlight the limitations of India's inter-state water dispute mechanisms. Critically examine the role of tribunals and the Supreme Court in ensuring equitable water sharing.”

12. NITI Aayog Unveils Roadmap for Self-Reliance in Pulses under Mission Atmanirbharta



In September 2025, **NITI Aayog released a report titled “Strategies and Pathways for Accelerating Growth in Pulses towards the Goal of Atmanirbharta”**, proposing a detailed plan to make India **self-sufficient in pulses** by 2030 and beyond. The roadmap aims to reduce import dependence and enhance productivity through region-specific interventions and technology adoption.

Background

- India is the **world’s largest producer, consumer, and importer** of pulses.

Despite production gains, imports still bridge domestic demand–supply gaps due to climatic sensitivity and regional imbalances.

Key Findings

- Production Growth:** Output rose from **16.35 MT (2015–16)** to **26.06 MT (2022–23)** – a **59.4% increase**.
- Productivity Improvement:** Yield surged **38%**, driven by improved seeds and agronomic practices.
- Import Dependence:** Imports dropped from **29% to 10.4%** during the same period.
- Major Contributors:** Madhya Pradesh, Maharashtra, and Rajasthan produce **~55%** of India’s pulses.
- Climate Challenge:** About **80% of production is rain-fed**, making yields vulnerable to monsoon variability.

Mission Atmanirbharta in Pulses

- Duration:** 6-year programme focusing on **pigeonpea, black gram, and lentil**.
- Targets:**
 - Domestic supply to reach **30.59 MT by 2030**.
 - Long-term vision of **45.79 MT by 2047**.



UPSC Relevance: GS Paper 3: Agriculture, Food Security, Government Policies, Inclusive Growth.

Prelims: Major crops, NITI Aayog initiatives, agricultural productivity trends.



HOT Question “Discuss the role of pulses in achieving India’s nutritional security and sustainable agriculture goals. How can NITI Aayog’s roadmap for Atmanirbharta address climatic and regional constraints?”

13. India Eyes Global Tea Leadership at the India International Tea Convention 2025



At the **India International Tea Convention (2025)**, policymakers and industry leaders emphasised India's potential to become a **global tea superpower**, supported by its vast domestic base and strategic export opportunities.

India's Tea Landscape

- **Global Position:** India is the **second-largest producer and consumer** of tea after China.
- **Major Growing Regions:** Assam, West Bengal, Tamil Nadu, and Kerala account for nearly **95% of production**.
- **Domestic Consumption:** Currently **840 g per capita annually**, projected to cross **1 kg**, enough to absorb full domestic output.

Opportunities for India

- **Quality-Driven Exports:** Upgrading quality and branding (like Sri Lanka's Ceylon Tea) can raise **realisation per kg**.
- **New Markets:** India aims to expand beyond traditional buyers (Russia, UK, Iran) into **South America and Africa**.

Domestic Expansion: Rising incomes and café culture offer scope for **value-added tea products** (herbal, organic, ready-to-drink).

Institutional Mechanism – Tea Board of India

- **Constitution:** Statutory body under the **Tea Act, 1953**, under the **Ministry of Commerce & Industry**.
- **Composition:** 31 members, reconstituted every three years.
- **Functions:**
 - Promote financial & technical assistance to growers.
 - Conduct market surveys & R&D in tea processing.
 - Implement welfare schemes for plantation workers.



UPSC Relevance: GS Paper 3: Agriculture, Inclusive Growth, Export Promotion, Industrial Policy.

Prelims: Statutory Bodies, Tea Act 1953, Commodity Boards of India



HOT Question *"India is a tea giant by volume but not by value. Examine the structural reforms needed to enhance India's global competitiveness in the tea industry."*

14. The Great Nicobar Project: Balancing Strategic Connectivity with Indigenous and Ecological Safeguards



The **₹72,000-crore Great Nicobar Project**, proposed as a strategic Indo-Pacific connectivity hub, faces criticism over **tribal displacement, biodiversity loss, and legal non-compliance**, raising questions about sustainable development in ecologically fragile zones.

About the Project

- **Location:** Great Nicobar Island, close to the **Malacca Strait**, one of the world's busiest maritime chokepoints.
- **Components:**
 - **International Container Transshipment Terminal (ICTT)** at Galathea Bay.
 - **Greenfield airport, township, and 450 MVA gas-solar hybrid power plant.**
 - Additions: Cruise terminal, shipbreaking yard, and coastal corridor.
- **Extent:** Encompasses **16,610 hectares**, including **84 sq. km of denotified tribal reserves.**
- **Implementation:** Conceived by **NITI Aayog**, executed by **ANIIDCO (Andaman & Nicobar Islands Integrated Development Corporation Ltd.)** under a 30-year plan.

Key Concerns

- **Tribal Rights:** The project denotifies sections of **Shompen and Nicobarese PVTG (Particularly Vulnerable Tribal Groups)** reserves, threatening livelihoods and cultural continuity.
- **Legal Violations:** Alleged bypassing of the **Forest Rights Act (FRA) 2006**, denying Gram Sabha consent.
- **Ecological Threats:** Felling of **~9 lakh trees** endangers **coral reefs, nesting turtles, and rainforests** within a **UNESCO Biosphere Reserve.**
- **Seismic Risk:** Situated in a **Zone-V (high-risk)** earthquake region vulnerable to tsunamis.
- **Governance Gap:** Weak **Environmental Impact Assessment (EIA)** and diluted **Coastal Regulation Zone (CRZ)** norms undermine transparency.



UPSC Relevance: GS Paper 1: Tribal groups and their geographical distribution.

GS Paper 2: Governance, Rights of Indigenous Communities, Environmental Legislation.



HOT Question “Development in ecologically sensitive areas like Great Nicobar challenges India’s commitment to both environmental protection and tribal rights. Critically evaluate.”

SEPTEMBER 2025

HEALTH & Nutrition

1. Lancet study flags rising NCD deaths in India.
2. UNICEF warns of growing childhood obesity in India.
3. DC study warns Chagas disease may spread in U.S.
4. WHO adds GLP-1 drugs for diabetes and obesity.
5. India observes 5th Pharmacovigilance Week for drug safety.
6. WHO lifts Mpox emergency status after major decline.
7. WHO reaffirms vaccine safety, dismisses autism link.
8. Vultures vital for ecosystem balance and public health.
9. Insurance-led health coverage lessons from PM-JAY.
10. Bihar inaugurates Purnea Airport with prefab cabins.
11. FAO report lauds India's diet access
12. Onion price crash triggers protests in Maharashtra.
13. SC reconsiders minority exemption under RTE Act.
14. Gyan Bharatam Mission launched to digitise manuscripts.
15. Educating women key to Viksit Bharat@2047 vision.
16. Himachal becomes India's 5th fully literate region.
17. India to conduct first fully digital Census 2027.
18. India launches all-women tri-service circumnavigation.
19. APEDA launches BHARATI to boost agri-food exports.
20. Moran community blocks Assam highways over ST demand.
21. "Adi Sanskriti" digital university launched for tribal culture.
22. "Adi Vaani" AI tool launched for tribal languages.
23. PM launches Adi Karmayogi for tribal leadership.
24. BharatNet highlights local gaps in digital inclusion.
25. Govt mandates Acoustic Alert Systems for EV safety.
26. Govt launches National Initiative on Water Security.
27. EAC reopens Sawalkote Dam clearance after treaty pause.
28. Oju hydro project in Arunachal
29. Educate Girls wins 2025 Ramon Magsaysay Award.
30. Mohanlal to receive Dadasaheb Phalke Award 2023.
31. Booker Prize 2025 announced.
32. India marks International Sign Language Day 2025.
33. Bathukamma festival celebrates Telangana's floral heritage.
34. Konkan glyphs dated 24,000 years – world's oldest.



1. Lancet Study Flags Rising Non-Communicable Disease (NCD) Mortality in India (2001–2019)



A *Lancet* study (2001–2019) revealed that while most countries recorded declining deaths from non-communicable diseases (NCDs), India has seen a **rising trend in NCD mortality**, particularly among middle-aged and elderly populations, underscoring gaps in preventive healthcare and lifestyle regulation.

About Non-Communicable Diseases (NCDs)

- **Definition:** Chronic, non-infectious diseases of long duration, such as **cardiovascular diseases, cancers, chronic respiratory diseases, and diabetes**—collectively known as the “*big four*” NCDs.
- **Share in Mortality:** In India, NCDs caused **61.8% of total deaths in 2016**, up from **37.9% in 1990** (IHME Global Burden of Disease data).

Key Findings of the Lancet Study

- **Global Trend:** ~80% of countries saw reduced NCD deaths; however, the pace slowed post-2010.
- **India's Case:**
 - Rising mortality among **women above 40** and **men above 55**.
 - NCD-related death probability **increased**, diverging from global progress.

Economic Burden: NCDs consume **over 75% of India's health expenditure**, straining household finances

Reasons for India's NCD Surge

- **Lifestyle Transition:** Increased smoking, alcohol use, processed/junk food intake, and sedentary lifestyles.
- **Healthcare Gaps:** Low preventive coverage—weak screening for hypertension, diabetes, and cancer.
- **Nutrition Imbalance:** Urban diets high in sugar, salt, and fat.
- **Awareness Deficit:** Inadequate health education and late detection.
- **Gender Disparity:** Rising NCD risk among women due to delayed diagnosis and socio-economic factors.



UPSC Relevance: GS Paper 2 & 3 – GS Paper 2: Government health policies, issues in health delivery systems. **GS Paper 3:** Human resource development, inclusive growth, and public health expenditure.



HOT Question: “Despite economic progress, India faces a rising burden of non-communicable diseases. Discuss the socio-economic and systemic causes behind this trend and suggest measures for prevention and control.”



2. UNICEF 2025 Report Warns of Rising Childhood and Adolescent Obesity in India



A UNICEF report (2025), analysing National Family Health Survey (NFHS) data (2006–2021), found that childhood and adolescent obesity in India has sharply increased. It warns that India could account for **11% of the global obesity burden by 2030**, while still facing persistent undernutrition and anaemia challenges.

Key Findings of the UNICEF Report

- **Childhood Obesity:** Number of overweight children under five **more than doubled (2006–2021)**.
- **Stunting:** **36%** of under-five children are stunted.
- **Diet Quality:** Only **11%** of breastfed children (6–23 months) receive an adequate diet.
- **Anaemia:** **57%** of women aged 15–49 are anaemic, reflecting intergenerational nutrition deficits.
- **Maternal Link:** Poor maternal diets transmit nutritional disadvantages to children.

Causes of Rising Obesity

- **Dietary Transition:** Shift to **ultra-processed foods** high in sugar, salt, and trans fats.
- **Sedentary Urban Lifestyle:** Reduced physical activity among youth due to digital lifestyles and lack of fitness spaces.
- **Socio-Cultural Factors:** Unequal food distribution in households — “women eat last and least.”
- **Economic Inequality:** Poor households consume **cheap, calorie-dense but nutrient-poor foods**.

Government Interventions

- **Policy Initiatives:**
 - *Fit India Movement* – promotes physical activity.
 - *Eat Right India* – food safety & healthy eating awareness.
 - *POSHAN Abhiyaan 2.0* – comprehensive nutrition mission.
 - *Saksham Anganwadi* – focus on maternal and child health.
- **Community Outreach:** Take-home rations, fortified foods, iron–folic acid supplements, and BMI monitoring.
- **Behavioural Nudges:** Schools/offices display sugar and oil consumption boards.



HOT Question: “India faces a double burden of malnutrition — undernutrition and obesity. Examine the social and economic drivers of this paradox and suggest policy solutions.”



3. DC Study Warns Chagas Disease May Be Endemic in the United States



A CDC (Centers for Disease Control and Prevention)-published study has warned that **Chagas disease**, once confined to Latin America, may now be **endemic in parts of the United States**, signalling the northward spread of tropical vector-borne diseases due to globalisation and climate change

About Chagas Disease

- **Scientific Name:** American Trypanosomiasis
- **Causative Agent:** *Trypanosoma cruzi*, a protozoan parasite transmitted primarily by **triatomine insects** (also called *kissing bugs* or *vampire bugs*).
- **Discovery:** Identified by Carlos Chagas in 1909 in Brazil.
- **Endemic Range:** Traditionally confined to **21 Latin American countries**, it affects **over 7 million people globally**, but is spreading northwards.
- **WHO Status:** Listed as a **Neglected Tropical Disease (NTD)** since 2005.

Transmission Routes

- **Vector-Borne:** Through faeces of infected triatomine bugs deposited near bite wounds.
- **Other Routes:** Contaminated food, mother-to-child transmission, organ transplantation, and blood transfusion.

Treatment & Prevention

- **Drugs:** Benznidazole and Nifurtimox – most effective during the acute phase.
- **Preventive Measures:**
 - Vector control through housing improvements and insecticide spraying.
 - Blood & organ donor screening.
 - Awareness programs in high-risk areas.



UPSC Relevance: **GS Paper 2:** Health, Disease Control, International Health Cooperation (WHO & CDC). **GS Paper 3:** Science & Technology – Role of Biotechnology in Public Health.



HOT Question: “Vector-borne diseases are no longer limited by geography. Discuss how climate change and globalisation are altering the epidemiology of tropical diseases such as Chagas.”



4. WHO Adds GLP-1 Class Drugs to the Essential Medicines List for Diabetes &



The **World Health Organization (WHO)** has added **GLP-1 receptor agonists** to its *Essential Medicines List (EML)*, recognising their effectiveness in treating **type-2 diabetes and obesity**, which together affect over **800 million people globally**.

About GLP-1 Drugs

- **Full Form:** *Glucagon-Like Peptide-1 Receptor Agonists*
- **Function:** Mimic the natural GLP-1 hormone to stimulate **insulin release, suppress appetite, slow gastric emptying, and reduce blood sugar**.
- **Examples:** Semaglutide, Liraglutide, Dulaglutide.
- **Beneficiaries:** Adults with type-2 diabetes, obesity, or cardiovascular/kidney complications.
- **Global Concern:** Despite proven efficacy, **high costs** limit access in **low- and middle-income countries**.

About the WHO Essential Medicines List

- **Purpose:** Identifies *priority medicines* to meet key health needs based on **safety, effectiveness, and affordability**.
- **Update Cycle:** Revised every two years by the **WHO Expert Committee on Essential Medicines**.
- **Policy Role:** Guides national health systems and procurement frameworks.

India's Essential Medicines Framework

- **Regulatory Basis:** Medicines listed in *Schedule I* of the **Drugs (Prices Control) Order, 2013** are under price control by **NPPA**.
- **National List of Essential Medicines (NLEM):** Updated periodically by the **Ministry of Health and Family Welfare** (last in 2022).
- **Public Access:** Affordable supply ensured via **Pradhan Mantri Jan Aushadhi Pariyojana (PMBJP)** stores.



UPSC Relevance: **GS Paper 2:** Health Policy, WHO's Role, India's Essential Drug Pricing Mechanisms. **GS Paper 3:** Biotechnology in Healthcare, Inclusive Growth, and SDG 3 (Good Health & Well-being).



HOT Question: "Discuss how the inclusion of GLP-1 drugs in the WHO Essential Medicines List may influence global and Indian health policy in addressing diabetes and obesity."



5. India Observes 5th National Pharmacovigilance Week to Promote Patient Safety and Drug Monitoring



The Indian Pharmacopoeia Commission (IPC), acting as the National Coordination Centre for the Pharmacovigilance Programme of India (PvPI), organised the 5th National Pharmacovigilance Week to encourage greater patient involvement and a culture of curiosity in reporting adverse drug reactions (ADRs).

About Pharmacovigilance

- **Definition:** Pharmacovigilance is the science of detecting, assessing, and preventing adverse effects or any other drug-related problems.
- **Objective:** To ensure that the benefits of medicines outweigh their risks by identifying, analysing, and reporting Adverse Drug Reactions (ADRs).
- **India's Global Role:** India now ranks among the top global contributors in ADR reporting as per the Drugs Controller General of India (DCGI).

Key Highlights of the 5th National Pharmacovigilance Week

- **Theme:** Promoting patient participation and strengthening the culture of drug safety monitoring.
- **Awards:**
 - *Patient Safety Excellence Award:* ADR Monitoring Centre, Varanasi.
 - *Patient Connect Award:* Mr. Delli Kumar T., Andhra Pradesh.
- **Focus:** Encouraged patients, healthcare professionals, and pharma institutions to report ADRs through the PvPI mobile app and helplines.

About the Indian Pharmacopoeia Commission (IPC)

- **Nature:** An autonomous institution under the Ministry of Health & Family Welfare.
- **Core Functions:**
 - Sets standards for the purity, strength, and quality of drugs and formulations in India.
 - Publishes the Indian Pharmacopoeia (IP) — the official reference for drug standards.
 - Publishes the National Formulary of India (NFI) — detailing monographs on drug substances, dosage forms, and ingredients for uniform quality.

Role in Pharmacovigilance: Serves as the National Coordination Centre (NCC) for the Pharmacovigilance Programme of India (PvPI), launched in 2010.



HOT Question: “Discuss the role of the Indian Pharmacopoeia Commission in ensuring drug safety and public health through pharmacovigilance.”

6. WHO Lifts Public Health Emergency Status for Mpox in Africa after Steep Fall in Cases



On **6th September 2025**, the **World Health Organization (WHO)** announced that the spread of **mpox (monkeypox)** in Africa no longer constitutes a **Public Health Emergency of International Concern (PHEIC)**, following the advice of its Emergency Committee

Key Developments

- **Decline in Transmission:** Significant reduction in cases and deaths was recorded in the **Democratic Republic of Congo, Burundi, Sierra Leone, and Uganda**, showing effective containment.
- **Enhanced Preparedness:** Countries have improved **disease surveillance, vaccination coverage, and diagnostic capabilities**, leading to better outbreak response.
- **Continental Status:** While WHO lifted the global PHEIC, the **Africa CDC** continues to treat mpox as a **continental emergency** due to sporadic surges in **Ghana, Kenya, Zambia, Liberia, and Tanzania**.
- **Vulnerable Groups:** The disease still disproportionately affects **children and people living with HIV**, necessitating sustained surveillance and community awareness.

About Mpox (Monkeypox)

- **Nature:** A **viral zoonotic disease** caused by the **mpox virus**, related to the smallpox virus.
- **Symptoms:** Fever, headache, muscle pain, swollen lymph nodes, and pustular rash; most recover within 2–4 weeks.
- **Transmission:** Through close contact with infected people, animals, or contaminated materials.
- **Global Spread:** Since **May 2022**, mpox spread to **100+ countries**, prompting WHO to declare it a **PHEIC in August 2024**.
- **Treatment & Prevention:** Supportive care, antiviral *tecovirimat*, isolation, and vaccination (using *MVA-Bavarian Nordic* vaccine) form the main control strategies.



UPSC Relevance: **GS Paper 2:** Global health governance, WHO's role, international disease surveillance. **GS Paper 3:** Science & Tech in health, emerging viral diseases, public health management



HOT Question: “Evaluate the significance of WHO's PHEIC mechanism in global pandemic preparedness, using the case of mpox as an example



7. WHO Reaffirms Vaccine Safety, Dismisses Link Between Vaccines or Paracetamol in Pregnancy and Autism



The **World Health Organization (WHO)** has dismissed misinformation linking vaccines or paracetamol use during pregnancy to **Autism Spectrum Disorder (ASD)**, reaffirming the scientific consensus that vaccines are safe and critical for maternal and child health.

About Autism Spectrum Disorder (ASD)

- **Definition:** ASD is a neurodevelopmental disorder marked by difficulties in social communication, restricted interests, and repetitive behaviours. It appears before age 3 and persists lifelong.
- **Causes:** Arises from **genetic susceptibility** (e.g., family history, older parental age) interacting with **environmental factors** (e.g., prenatal pollution, premature birth), but **no causal link exists with vaccines or paracetamol**.
- **Co-morbidities:** Frequently associated with **epilepsy, anxiety, and sleep disorders**, requiring integrated medical and psychosocial care.
- **Treatment:** No cure, but **early behavioural, speech, and occupational therapy** significantly improves outcomes and social integration.
- **Prevalence:** Globally affects **~1 in 100** children (WHO); Indian estimates range between **1 in 68 to 1.12%** among children aged 2–9.

India's Policy Framework for ASD

- **Legal Protection:**
 - *Rights of Persons with Disabilities Act, 2016* — recognises autism among 21 disabilities with entitlements to education, employment, and social security.
 - *National Trust Act, 1999* — provides legal guardianship and lifelong care for persons with autism and similar disabilities.
- **Early Intervention & Support:**
 - *DISHA Scheme* — offers early intervention and school readiness for children aged 0–10.

Sahyogi Scheme — trains Care Associates to support families and provide community-based assistance.



HOT Question: “Discuss India’s policy and legal framework for Autism Spectrum Disorder (ASD) and the significance of early intervention in ensuring inclusive development.”



8. Vultures as Keystone Scavengers: Guardians of Ecosystem and Public Health Resilience



Vultures have re-emerged as a focus of India's *One Health* and biodiversity policy discourse, as their ecological services directly curb zoonotic spillovers, reduce rabies transmission, and support public health resilience.

Public Health Roles

- **Zoonotic Shield:** Vultures consume carcasses rapidly, halting pathogen proliferation and blocking zoonotic transmission chains.
- **Rabies Control:** By reducing carrion, they check feral dog populations and indirectly lower rabies incidence.
- **Pathogen Neutralisers:** Their highly acidic stomach juices destroy anthrax, brucella, and botulinum spores.
- **Disease Surveillance:** Clustered carcass foraging provides indicators for passive disease monitoring in *One Health* frameworks.

Ecological and Agricultural Roles

- **Nutrient Cycling:** Accelerate decomposition and return biomass to soils.
- **Agro Health:** Prevent eutrophication and pest proliferation from decaying carcasses.
- **Emission Reduction:** Scavenging curbs methane and nitrous oxide release from anaerobic decay.
- **Bio-Indicators:** Declines signal ecological imbalance and contamination across food webs.

Key Threats

- **Drug Toxicity:** *Diclofenac* residues in livestock carcasses caused >95% decline since 1990s.
- **Infrastructure Risk:** Electrocution and collision along power lines on migratory routes.
- **Habitat Loss:** Quarrying and unregulated infrastructure projects destroy nesting cliffs.
- **Carcass Scarcity:** Shift to livestock burial and competition with feral dogs reduce food.

Weak Funding: Limited integration with disease surveillance or climate adaptation budgets.



HOT Question: "Discuss how the conservation of vultures contributes to both ecosystem stability and public health security in India."



9. Insurance–Led Universal Health Coverage: Lessons from PM–JAY and State Health Insurance Programmes



Recent data reveal that despite nearly 80% population coverage under PM–JAY and State Health Insurance Programmes (SHIPs), India's progress toward equitable *Universal Health Coverage (UHC)* remains hindered by low utilisation, private bias, and weak financial accountability.

Current Landscape of Public Health Insurance

- **Expanding Reach:** PM–JAY and SHIPs now cover ~80% of citizens, with a combined outlay of ₹28,000 crore in FY 2023–24.
- **Utilisation Gap:** Only 35% of insured patients accessed benefits despite wide enrolment.
- **Public–Private Divide:** Public hospitals form 51% of empanelled facilities but receive only one-third of total payouts.
- **Spending Growth:** State insurance budgets rose 8–25% annually since 2018.

Significance of Insurance Expansion

- **Equity Tool:** Reduces social disparities in healthcare access.
- **System Efficiency:** Risk pooling promotes hospital infrastructure and timely care.
- **Economic Impact:** Mitigates catastrophic health expenditure and aids poverty reduction.
- **Social Contract:** Reinforces healthcare as a right-based public service rather than a privilege.

Structural Challenges

- **Private Capture:** Majority of public funds diverted to private, profit-seeking hospitals with minimal regulation.
- **Neglect of Primary Care:** Focus on costly hospitalisation over preventive and outpatient services.
- **Delayed Reimbursements:** Pending PM–JAY dues (~₹12,161 crore) undermine hospital participation.
- **Discrimination:** Private hospitals often deny treatment to insured patients; public hospitals prioritise them.
- **Fraudulent Claims:** Over 3,200 hospitals flagged for misuse and false billing.



HOT Question: “Critically evaluate how the design and implementation of PM–JAY and State Health Insurance Programmes influence India's path towards Universal Health Coverage.”



10. Bihar Inaugurates Purnea Airport Under UDAN Using Prefabricated Porta Cabins



In September 2025, Bihar inaugurated its fourth civilian airport at **Purnea**, built using prefabricated **porta cabins** under the **UDAN** regional connectivity scheme to expand low-cost aviation infrastructure

About UDAN:

Launched in 2016 by the **Ministry of Civil Aviation**, *Ude Desh Ka Aam Nagrik (UDAN)* aims to make air travel affordable and enhance regional connectivity by subsidising flight operations between unserved and underserved airports. It operates as a **Centrally Sponsored Scheme** with viability-gap funding shared by the Centre and States (80:20; 90:10 for NE & Hill States).

About Purnea Airport:

- Fourth civilian airport of Bihar after Patna, Gaya, and Darbhanga.
- Constructed using **prefabricated porta cabins**—factory-made modular units of steel and polyurethane foam—assembled on-site to reduce construction time and cost.
- **Advantages:** quick deployment, modular scalability, minimal land requirement, and cost efficiency.
- **Limitations:** lower durability, smaller passenger capacity, limited amenities, and less aesthetic appeal.
- **Previous Examples:** Similar terminals were used at **Shirdi (Maharashtra)**, **Hubballi & Kalaburagi (Karnataka)**, and **Chitrakoot (Uttar Pradesh)**.

Significance:

- Strengthens Bihar's regional air connectivity and tourism potential.
- Demonstrates India's **low-carbon, rapid-infrastructure** capability.
- Aligns with **PM Gati Shakti** and **National Infrastructure Pipeline** goals for multimodal integration.

Keyword Concepts:

- **Polyurethane:** lightweight synthetic polymer with high insulation value.
- **Prefabrication:** off-site manufacturing of building components for rapid on-site assembly.



HOT Question: “Critically analyse how modular and prefabricated technologies under schemes like UDAN can accelerate infrastructure delivery while maintaining sustainability and service quality.”



11. FAO Report Highlights India's Progress in Access to Healthy Diets but Calls for Greater Food Diversification



The **FAO (Food and Agriculture Organization)** reported that the share of Indians unable to afford a healthy diet fell sharply from **74.1% in 2021 to 40.4% in 2024**, showing significant improvement in dietary affordability but underscoring the continued need for **diversified food production** and nutritional security.

About Food Diversification:

Food diversification refers to expanding agricultural production beyond staple cereals (rice, wheat) to include **pulses, fruits, vegetables, livestock, dairy, and fisheries**—thereby ensuring nutritional balance, economic stability, and ecological sustainability.

Need for Diversification:

- **Nutrition Security:** As per **NFHS-5 (2019–21)**, 35.5% of Indian children under five are stunted and **57% of women are anaemic**, reflecting unbalanced diets dominated by cereals.
- **Farmer Security:** Dependence on rice and wheat exposes farmers to **price volatility**; diversification into pulses, oilseeds, and horticulture stabilises farm incomes.
- **Livelihood Generation:** High-value crops and allied sectors (dairy, poultry, fisheries) promote **rural employment**, especially empowering women through local enterprises.
- **Climate Resilience:** Nearly **29.77% of India's land is degraded (ISRO-SAC, 2021)**; pulses, millets, and oilseeds offer **drought-tolerant, low-input** alternatives suited to stressed ecosystems.
- **Sustainability & SDGs:** Promotes **SDG 2 (Zero Hunger)** and **SDG 13 (Climate Action)** by improving diet quality and ecosystem resilience.

Government Initiatives Supporting Diversification:

- **National Mission on Edible Oils–Oil Palm (NMEO–OP)**
- **National Food Security Mission (NFSM – Pulses, Millets)**
- **Mission for Integrated Development of Horticulture (MIDH)**
- **PM Matsya Sampada Yojana** – for blue economy and fisheries growth.
- **2023 – International Year of Millets** – global push for resilient, nutritious grains.



HOT Question: “Discuss how agricultural diversification can simultaneously address malnutrition, farmer distress, and climate vulnerability in India.”



12. Onion Price Crash Sparks Protests in Maharashtra Amid Export Curbs and Buffer Stock Sales



In September 2025, farmers in **Maharashtra** launched protests after **onion prices fell below production costs**, triggered by repeated **export restrictions** and the government's **buffer stock sales**. The price slump has revived the debate on market reforms, crop diversification, and the ethics of export bans in perishable commodities

About Onion:

- A **temperate bulb crop**, mainly cultivated during the **rabi season**, but also grown in **kharif** and **late kharif** seasons.
- Grows well in **deep, friable, fertile sandy loam or alluvial soils** with good drainage.
- Indian onions include **red, white, yellow, and shallot** varieties — white onions are costlier and primarily exported.

Production in India:

- **Global Rank:** India is the **second-largest producer** after China.
- **Major Producing States:** Maharashtra (leading), followed by **Madhya Pradesh, Karnataka, Gujarat, and Rajasthan**.
- **Key Export Destinations:** Bangladesh, Sri Lanka, Malaysia, and UAE.

Crisis Context (2024–25):

- **Export Collapse:** Exports dropped **32%** — from **17.17 lakh tonnes (2023–24)** to **11.65 lakh tonnes (2024–25)** — due to **frequent export bans, minimum export prices (MEPs), and stock release policies**.
- **Buffer Stock Impact:** The government's decision to release onion stocks from its **Lifeline Procurement Programme** depressed market prices further.
- **Price–Cost Gap:** Market rates fell below the average **₹10–12/kg cost of production**, leaving farmers unable to recover input costs.



HOT Question: “Frequent export bans on essential commodities like onions undermine both farmer incomes and India’s trade credibility. Critically examine the balance between food inflation management and agricultural income stability”



13. Supreme Court Reconsiders *Pramati* Ruling on Minority Exemption from Right to Education Act



In September 2025, the Supreme Court began reviewing its *Pramati Educational & Cultural Trust v. Union of India* (2014) judgment that exempted minority-run schools—both aided and unaided—from the Right to Education (RTE) Act 2009, reigniting debate over balancing **child-centric educational rights (Article 21A)** with **minority autonomy (Article 30)**.

Right to Education (RTE) Act 2009:

- Enforces **Article 21A**, guaranteeing free and compulsory education for children aged 6–14.
- Section 12(1)(c)**: Requires unaided private schools to reserve **25% seats** for disadvantaged children, reimbursed by the State.
- Ensures **teacher eligibility**, **pupil–teacher ratio**, and bans **capitation fees**, **screening tests**, and **corporal punishment**.

About the *Pramati* Ruling (2014):

- A **five-judge bench** held that RTE obligations **cannot apply to minority institutions**, as they might alter their minority character.
- Extended exemption to both **aided and unaided** minority schools.
- Upheld constitutionality of Articles 21A and 15(5) but clarified the State's duty under Article 21A **does not override** minority rights under Article 30.

Constitutional Provisions Involved:

- Article 21A**: Right to free and compulsory education (86th CAA).
- Article 30(1)**: Minorities' right to establish and administer educational institutions.
- Article 15(5)**: Enables reservations in private educational institutions for disadvantaged classes (93rd CAA).

Arguments for Exclusion:

- Protects **minority autonomy** in admissions and management.
- Prevents dilution of cultural or linguistic character.
- Avoids disproportionate compliance burden on small institutions.
- Supported by earlier judgments like *T.M.A. Pai Foundation* (2002).



UPSC Relevance: GS Paper 2 – Polity & Governance:

Fundamental Rights, Minority Rights, Right to Education, Judicial Review, Balancing Autonomy and Equality.



HOT Question: “How can India reconcile the constitutional right to free and compulsory education with the autonomy granted to minority institutions under Article 30? Discuss in light of the Supreme Court’s reconsideration of the *Pramati* judgment”



14. Gyan Bharatam Mission Launched to Digitise and Revive India's Manuscript Heritage

The **first Gyan Bharatam International Conference on "Reclaiming India's Knowledge Legacy through Manuscript Heritage"** marked the launch of the **Gyan Bharatam Mission** and the **Gyan Bharatam Portal** under the Ministry of Culture, aiming to preserve, digitise, and promote India's vast manuscript tradition.

About the Gyan Bharatam Mission

- A **national initiative** under the Ministry of Culture to **survey, document, and digitise over one crore manuscripts** preserved across universities, museums, libraries, and private collections.
- Establishes a **National Digital Repository of Indian Knowledge Systems (IKS)** for open global access.
- Encourages **public participation** through partner programmes and the **Gyan-Setu AI Challenge**, integrating technology with heritage preservation.

Key Objectives:

- **Conservation:** Prevent degradation of manuscripts through modern preservation and documentation methods.
- **Digitisation:** Standardise formats for high-resolution digital access and scholarly collaboration.
- **Integration:** Revive ancient texts as resources for **education, research, innovation, and cultural diplomacy**.

Significance:

- Upholds **Article 51A(f)** of the Constitution, recognising the duty to preserve India's composite cultural heritage.
- Reinforces **NEP 2020's vision** of integrating Indian Knowledge Systems (IKS) into modern education.
- Promotes **digital diplomacy** by showcasing India's intellectual heritage on a global platform.



UPSC Relevance: **GS Paper 1 – Indian Culture:** Preservation of ancient manuscripts, digitisation efforts, and promotion of Indian Knowledge Systems. **GS Paper 2 – Governance:** Role of digital platforms and constitutional duties in heritage preservation.



HOT Question: "Digitisation of manuscripts can bridge the gap between India's cultural heritage and modern knowledge systems." Discuss the role of the Gyan Bharatam Mission in this context



15. Educating Women: The Cornerstone of Viksit Bharat@2047 – Continuing Savitribai Phule's Legacy



Building on **Savitribai Phule's 19th-century reforms**, the Government has reiterated that **women's education** remains pivotal to achieving **Viksit Bharat@2047**, emphasising gender equity, economic growth, and democratic deepening.

Historical Context:

- **Savitribai Phule (1848)** – India's first female teacher, established the first girls' school in Pune with Jyotirao Phule, challenging caste and gender hierarchies.
- Her legacy underpins modern gender-inclusive educational reforms under **NEP 2020**, **Beti Bachao Beti Padhao**, and **Samagra Shiksha**.

Why Educating Women Matters:

- **Economic Impact:** Equal female participation could add **\$700 billion** to India's GDP. (McKinsey)
- **Health Outcomes:** Education reduces maternal and infant mortality; improves nutrition and family planning.
- **Democratic Dividend:** Women's literacy strengthens civic participation and inclusive governance.
- **Role Model Effect:** Female teachers boost girls' enrolment and aspirations in rural areas.
- **Global Alignment:** Fulfils **SDG 4 (Education)** and **SDG 5 (Gender Equality)** commitments.

Progress So Far:

- **Literacy Growth:** Female literacy rose from 8.86% (1951) → 70.3% (2021).
- **Higher Education:** Women's university enrolment grew **26% (2023–24)** vs. **3.6% for men**.
- **Teacher Representation:** Women form **54.2% of teachers**, with most recruits since 2014 being female.
- **Retention:** Foundational level – 98.9%; Preparatory – 92.4% (UDISE+ 2024–25).



UPSC Relevance: GS Paper 1 – Indian Society: Women's empowerment through education. GS Paper 2 – Governance: NEP 2020, gender budgeting, & inclusive education reforms



HOT Question: "Women's education is not only a matter of equality but also of national progress." Discuss in light of India's vision for Viksit Bharat@2047



16. Himachal Pradesh Becomes India's 5th Fully Literate Region under ULLAS Scheme



Himachal Pradesh has been declared India's 5th "fully literate" region, joining **Ladakh, Goa, Mizoram, and Tripura**, after achieving **over 95% adult literacy** among individuals aged 15 years and above under the **Understanding Lifelong Learning for All in Society (ULLAS)** scheme.

How a State Achieves Full Literacy

- **Enumeration:** Door-to-door surveys identify non-literate adults for ULLAS enrolment.
- **Instruction:** Volunteers teach adults up to **Class 3-level** reading, writing, and arithmetic.
- **Assessment:** Candidates undertake the **Foundational Literacy and Numeracy Assessment Test (FLNAT)**.
- **Certification:** Successful learners receive certificates from the **National Institute of Open Schooling (NIOS)**, officially recognised as literate.

About Literacy in India

- **Census Definition:** Aged **7+**, able to read and write with understanding in any language.
- **Functional Literacy:** Expands beyond reading/writing to include **digital, financial, and health literacy**.
- **NIPUN Bharat:** Targets **Grade 3 literacy by 2027**, revised from 2025.
- **NEP 2020 Goal:** Achieve **100% youth and adult literacy by 2030**, supported through ULLAS.

Literacy Trends in India

- **Overall Literacy:** Rose from **74.04% (2011)** to **80.9% (2024)**.
- **Gender Gap:** Male – **87.2%**; Female – **74.6%**.
- **Urban–Rural Divide:** Urban – **88.9%**, Rural – **77.5%**.
- **Regional Patterns:** Top – Mizoram, Lakshadweep, Nagaland; Bottom – Andhra Pradesh, Bihar, MP.
- **Adult Education Impact:** ULLAS enrolled **~2.43 crore adults**, with **~90% pass rate in FLNAT**.

About the ULLAS Scheme

- **Full Form:** *Understanding Lifelong Learning for All in Society*.
- **Nodal Ministry:** Ministry of Education (Centrally Sponsored).
- **Duration:** 2022–2027 under the *New India Literacy Programme*.
- **Target Group:** Adults aged **15+** lacking formal education.
- **Five Pillars:** Foundational literacy, life skills, basic education, vocational education, continuing learning.
- **Implementation Model:** Volunteer-based *Kartavya Bodh* civic approach.
- **Digital Support:** Learning content delivered via **DIKSHA Portal (NCERT)**.
- **Certification:** Conducted by **NIOS** through FLNAT.



HOT Question: "Discuss how adult literacy programmes like ULLAS contribute to inclusive human development and social empowerment in India."



17. India to Conduct Its First Fully Digital Census in 2027



The **Registrar General and Census Commissioner of India (RGI)** announced that the **Census 2027** will be India's **first fully digital and paperless census**, replacing manual methods with smartphone-based apps, enabling **real-time data collection and processing** for faster, more accurate results.

About Digital Census 2027

- **Digital Enumeration:** Enumerators will use **Android/iOS-based mobile apps** in English and regional languages for direct data upload, eliminating delays in manual tabulation.
- **Self-Enumeration:** Citizens can voluntarily fill their details via a **secure online portal or mobile app**, integrating Aadhaar authentication and OTP-based verification.
- **Geo-Tagging & GIS Mapping:** Every **residential and non-residential building** will be geo-tagged with latitude-longitude coordinates, ensuring spatial accuracy and addressing past gaps in **vacancy and rural-urban classification**.
- **Hybrid Backup:** Limited paper forms will be used where required (connectivity or device issues), with data later digitised to ensure **zero duplication**.
- **Data Integration:** Census data will align with other national databases like the **National Population Register (NPR)** for seamless demographic analytics.

Significance of a Digital Census

- **Efficiency:** Faster processing and reduced human error through digital entry validation.
- **Transparency:** Real-time monitoring via the **Census Management and Monitoring System (CMMS)**.
- **Policy Impact:** Enables data-driven welfare targeting for schemes like **PM Awas Yojana, Jal Jeevan Mission, and Ayushman Bharat**.
- **Cost & Time Saving:** Digital tools reduce printing, logistics, and manual verification costs.
- **Data Security:** Encrypted transmission and central data storage enhance confidentiality.

Census Overview

- The **Census of India**, conducted every ten years, is governed by the **Census Act, 1948**.
- The last completed census was **2011**; the **2021 Census was postponed** due to the COVID-19 pandemic.
- India's census data forms the backbone for planning, policymaking, and fiscal allocations under the **Finance Commission** etc.,



HOT Question: "Discuss how India's first digital census can transform data-driven governance and address limitations of previous censuses"



18. India Launches World's First All-Women Tri-Service Global Circumnavigation Expedition — Samudra Pradakshina



On **11 September 2025**, Defence Minister **Rajnath Singh** virtually flagged off the **Samudra Pradakshina** expedition from the **Gateway of India, Mumbai**. It marks the **world's first circumnavigation by an all-women team** drawn from the **Army, Navy, and Air Force**, showcasing gender inclusion and self-reliance in defence.

About Samudra Pradakshina Expedition

- **Composition:** 10 women officers representing all three armed forces.
- **Vessel:** Indian Army Sailing Vessel (IASV) *Triveni* — a **50-foot indigenously built yacht** from **Puducherry**, symbolising *Aatmanirbhar Bharat*.
- **Route & Duration:**
 - ~**26,000 nautical miles, nine-month** voyage on an **easterly route**.
 - Will **cross the Equator twice** and round the **three great Capes** — *Cape Leeuwin (Australia), Cape Horn (South America), and Cape of Good Hope (Africa)*.
 - Scheduled completion: **May 2026**, returning to Mumbai.
- **Objective:** Promote **women empowerment, maritime awareness, adventure sports, and jointness among the tri-services**.
- **Support:** Planned and executed by the **Army Adventure Wing**, in coordination with the **Indian Navy's Ocean Sailing Node**.

Significance

- **Global First:** First tri-service all-women circumnavigation — a milestone in gender integration within defence forces.
- **Strategic Diplomacy:** Strengthens India's **soft-power projection** and **blue-water naval image**.
- **Technological Pride:** Highlights indigenous yacht-building and seamanship capabilities.
- **Historical Continuity:** Builds on the Navy's earlier success of the all-women INS *Tarini* voyage (*Navika Sagar Parikrama, 2017–18**).

Keywords: *Aatmanirbhar Bharat, Maritime Security, Gender Empowerment, Circumnavigation, Jointness in Defence.*



UPSC Relevance: GS Paper 3 – Defence, Internal Security & Technology:

Indigenous capability, women in armed forces, maritime diplomacy.

GS Paper 2 – Social Empowerment: Gender inclusion in traditionally male domains



HOT Question: “Discuss the strategic and societal significance of India's “Samudra Pradakshina” expedition in advancing women empowerment and self-reliance in defence



19. APEDA Launches BHARATI Initiative to Boost Agri-Food Exports to \$50 Billion by 2030

The **Agricultural and Processed Food Products Export Development Authority (APEDA)** has launched the **BHARATI (Bharat's Hub for Agri-tech, Resilience, Advancement and Incubation for Export Enablement)** initiative under the **Ministry of Commerce and Industry** to promote **agri-food innovation and export competitiveness**.

About BHARATI Initiative

- **Objective:** To achieve **\$50 billion in agri-food exports by 2030** through technology-driven innovation, value addition, and global market access.
- **Implementing Agency:** **APEDA**, functioning under the **Department of Commerce**.
- **Startup Cohort:** Aims to **train and incubate 100 agri-food startups** in product design, quality assurance, export documentation, and global certification compliance.
- **Focus Areas:**
 - **GI-tagged & AYUSH-linked products** for niche export markets.
 - **AI-based quality inspection systems** and **IoT-enabled cold-chain logistics** to reduce post-harvest losses.
 - **Sustainability & Traceability:** Use of digital ledgers for transparent supply chains aligned with global ESG norms.

Significance

- **Export Diversification:** Expands India's footprint beyond traditional commodities to high-value processed and wellness foods.
- **Startup Ecosystem:** Strengthens agri-innovation and rural entrepreneurship, supporting *Viksit Bharat @ 2047*.
- **Technology Integration:** Enhances resilience against climate shocks and market volatility through precision logistics and predictive analytics.
- **GI Promotion:** Enhances branding of regional specialties, boosting rural livelihoods and cultural economy.

About APEDA

- Established in **1986** under the **APEDA Act**, it promotes **export of scheduled agricultural and processed food products**.
- Functions include export promotion, quality control, infrastructure support, and market intelligence.

Keywords

Agri-exports, GI products, Startup India, IoT cold storage, AI quality testing, value addition.



HOT Question: "How can initiatives like APEDA's BHARATI contribute to achieving India's \$50 billion agri-export target by 2030? Examine the role of technology and startups in this transformation."



20. Moran Community Launches Economic Blockade in Assam Demanding Scheduled Tribe Status



The **Moran community** in **Tinsukia district, Assam**, launched an **economic blockade** demanding **Scheduled Tribe (ST) recognition** under the Constitution. The community asserts that such recognition is crucial for socio-economic upliftment and representation.

About the Moran Community

- **Ethnic Origin:** Indigenous to **Upper Assam** and **parts of Arunachal Pradesh**, belonging to the **Tibeto-Burman Kachari ethnolinguistic family** that includes **Bodos, Dimasas, and Chutias**.
- **Language:** Their native **Moran language**, once close to Dimasa, is now extinct; **Assamese** is widely spoken.
- **Religion & Culture:** Initially animistic, they later embraced **Neo-Vaishnavism**, worshipping through **satras (monastic institutions)** and **namghars (village prayer halls)**.
- **Historical Role:**
 - The Morans played a major part in the **Moamoria Rebellion (1769–1805)**, a socio-religious uprising against the **Ahom monarchy** that weakened its control.
 - Historically contributed to tea plantation labour and agrarian culture in Upper Assam.

Demand for ST Status

- **Current Status:** Classified as an **OBC (Other Backward Class)** in Assam.
- **Rationale for Inclusion:**
 - Ethnic and linguistic roots align with **indigenous tribal groups**.
 - Socio-economic backwardness and lack of political representation.
 - Cultural assimilation has eroded traditional identity without adequate constitutional safeguards.
- **Legal & Administrative Context:**
 - **ST status** is governed by **Article 342** of the Constitution; the **President**, in consultation with the **Governor**, specifies tribes for each state.
 - Any modification requires **Parliamentary approval**.

Recent Context

- Assam has seen similar agitations by other communities such as **Tai Ahom, Motok, Chutia**, and **Koch-Rajbongshi**, seeking ST recognition to access affirmative action benefits.

Keywords

Ethnic identity, Scheduled Tribe demand, Moamoria Rebellion, Article 342, Kachari group, Neo-Vaishnavism.



HOT Question: “Examine the constitutional and socio-cultural basis for the demand of Scheduled Tribe status by communities like the Morans in Assam. How can such recognitions be balanced with social equity and administrative feasibility?”



21. “Adi Sanskriti” — World’s First Digital University for Tribal Culture Launched by Ministry of Tribal Affairs



On **10th September 2025**, the **Ministry of Tribal Affairs** launched the beta version of “Adi Sanskriti”, a first-of-its-kind **digital learning and livelihood platform** for tribal culture during the *National Conference on Adi Karmayogi Abhiyan* at **Bharat Mandapam, New Delhi**

About “Adi Sanskriti” Platform

- **Objective:** To digitally preserve, promote, and monetise India’s diverse tribal art, culture, and heritage while expanding livelihood opportunities.
- **Structure:**
 1. **Adi Vishwavidyalaya:** Offers **45 immersive online courses** on tribal **dance, painting, crafts, music, folklore, and rituals**, integrating traditional pedagogy with digital delivery.
 2. **Adi Sampada:** A **digital socio-cultural repository** housing over **5,000 curated resources**—paintings, dance forms, textiles, artefacts, oral histories, and community livelihoods.
 3. **Adi Haat:** A **marketplace** integrated with **TRIFED** (Tribal Cooperative Marketing Development Federation of India), enabling **direct e-commerce access** for tribal artisans to global buyers.

Significance

- **Cultural Preservation:** Digitally documents intangible tribal heritage threatened by modernisation and migration.
- **Livelihood Promotion:** Provides global market access for **tribal artisans**, supporting *Aatmanirbhar Bharat* and *Vocal for Local*.
- **Education Inclusion:** Empowers tribal youth through **digital literacy and cultural entrepreneurship**.
- **Policy Alignment:** Complements initiatives like **TRI (Tribal Research Institutes)**, **Digital India Mission**, and **NEP 2020’s Indian Knowledge Systems (IKS)** integration.

Institutional Linkages

- **TRIFED:** Ensures fair trade and branding of tribal products via *Van Dhan* and *Adi Haat*.
- **National Education Policy 2020:** Encourages inclusion of indigenous knowledge in mainstream curricula.
- **Adi Karmayogi Abhiyan:** Builds capacity of tribal welfare officers and digital educators for inclusive governance.



HOT Question: “Discuss how initiatives like “Adi Sanskriti” can integrate digital technology with cultural preservation and tribal livelihood generation in India.



22. “Adi Vaani” — India’s First AI-Powered Translator for Tribal Languages Launched (Beta Version)



On **30th August 2025**, the **Government of India** announced the launch of the **Beta Version of “Adi Vaani”**, India’s **first AI-powered tribal language translator**, developed under the **Ministry of Tribal Affairs**. The tool aims to bridge communication gaps between **tribal and non-tribal communities**, promoting **linguistic inclusion** and **cultural preservation**.

About Adi Vaani

- **Nature:** AI-based translation platform dedicated to **tribal and indigenous languages** of India.
- **Developer:** **Ministry of Tribal Affairs**, under the **Janjatiya Gaurav Varsh** initiative.
- **Objective:** To preserve endangered tribal languages, facilitate inclusive communication, and empower tribal communities digitally.
- **Technology:** Uses **Natural Language Processing (NLP)** and **Machine Learning (ML)** to interpret speech and text across multiple tribal dialects.
- **Integration:** Expected to be integrated with **Adi Sanskriti platform** and **Digital India Mission** for cross-platform translation and e-learning access.

Significance

- **Linguistic Inclusion:** Enables real-time translation, bridging communication gaps in administration, education, and healthcare delivery.
- **Cultural Preservation:** Digitally archives tribal oral traditions and folk expressions, helping document **India’s intangible cultural heritage**.
- **Empowerment:** Facilitates participation of tribal populations in governance, markets, and digital ecosystems.
- **Constitutional Relevance:** Upholds **Article 29** (protection of cultural and linguistic rights) and reinforces India’s **“Unity in Diversity”** ethos.
- **Policy Alignment:** Supports **NEP 2020** (multilingual education), **Digital India**, and **Janjatiya Gaurav Varsh** objectives.

Janjatiya Gaurav Varsh Initiative

- Launched to commemorate **75 years of India’s Independence**, highlighting the contributions of **tribal heroes** and promoting **tribal heritage and empowerment** through technology and education.



UPSC Relevance: GS 2 – Governance: E-governance and inclusive communication in tribal regions. GS 3 – S&T & Society: Application of AI for social equity and cultural preservation.



HOT Question: “Artificial Intelligence is increasingly being used as a cultural bridge. Discuss how Adi Vaani exemplifies the role of technology in linguistic inclusion and tribal empowerment in India.”



23. PM Modi Launches Adi Karmayogi Abhiyan – World's Largest Tribal Grassroots Leadership Initiative

On **September 2025**, Prime Minister Narendra Modi launched the **Adi Karmayogi Abhiyan** as part of the **Janjatiya Gaurav Varsh** celebrations under *Azadi Ka Amrit Mahotsav*. The mission aims to institutionalise **grassroots tribal leadership**, ensuring responsive governance, participatory planning, and inclusive development across tribal-dominated regions.

About Adi Karmayogi Abhiyan

- **Nature:** A national movement for **tribal capacity-building and leadership training**, combining governance innovation and technology-driven inclusion.
- **Scale:** Targets **11 crore citizens** in **1 lakh villages** across **30 States and UTs**, making it the world's largest tribal grassroots leadership campaign.
- **Philosophy:** Embodies *Seva (Service)*, *Samarpan (Dedication)*, and *Sankalp (Commitment)* to ensure last-mile delivery and self-governance in tribal regions.

Key Components

1. **Participatory Governance:**
 - Villages to co-create **"Tribal Village Vision 2030"** through community walks, group discussions, and need-gap analyses.
 - Ensures **bottom-up planning** aligned with *Gram Swaraj* and *Mission Antyodaya* principles.
2. **Technology Enablement:**
 - Launch of **Adi Vaani App**, India's first **AI-based tribal language translator** (initially supporting 4 tribal languages).
 - Facilitates seamless communication between officials and tribal citizens.
3. **Adi Sewa Parv:**
 - A **fortnight-long campaign** in tribal-dominated villages to draft Vision 2030 Action Plans, linking schemes like:
 - *Dharti Aaba Janjatiya Gram Utkarsh Abhiyan 2.0*
 - *Pradhan Mantri Janjati Adivasi Nyaya Maha Abhiyan (PM-JANMAN)*
4. **Youth and Leadership Engagement:**
 - **Adi Sahyogi:** Mobilises village youth to act as change agents in Vision 2030 formulation.
 - **Adi Karmayogi Student Chapters:** To be launched in **IITs, IIMs, AIIMS, and central universities** for interdisciplinary tribal governance learning.
 - **Adi Karmayogi Fellowship:** Deploys young professionals to tribal areas for inclusive governance models and scalable solutions.

About Janjatiya Gaurav Varsh

- Initiated in **2021–22** under **Azadi Ka Amrit Mahotsav** to commemorate tribal leaders' contributions to India's freedom movement.
- Aims to foster **awareness, dignity, and integration** of tribal heritage into India's development narrative.



24. BharatNet Mission Exposes Infrastructure–Benefit Gap, Calls for Local, Outcome–Driven Digital Inclusion Models



India's flagship **BharatNet** rural broadband project, despite achieving massive optical-fibre coverage, continues to face operational bottlenecks. The programme underscores the need for **district-level ownership, accountability, and service-based models** to transform infrastructure into meaningful digital access.

About BharatNet

- **Origin:** Approved in 2011 as the *National Optical Fibre Network (NOFN)*; renamed **BharatNet** in 2015 under the **Ministry of Communications**.
- **Objective:** Provide **affordable broadband connectivity** to all **Gram Panchayats (GPs)** through optical fibre.
- **Implementation:**
 - **Phase I (2014–17):** Connected 1 lakh GPs.
 - **Phase II:** Target 1.5 lakh GPs – partially complete.
 - **Phase III (2023 Amendment):** Aims to connect **all 2.5 lakh GPs** with a hybrid tech model.
- **Execution:** Initially handled by **Bharat Broadband Network Ltd (BBNL)**; now merged with and managed by **BSNL**.

Achievements

- **World's Largest Rural Broadband Network:** 2,18,347 GPs covered; 42.13 lakh km Optical Fibre Cable laid.
- **FTTH Reach:** 12.2 lakh rural households connected via **Fibre-to-the-Home (FTTH)**.
- **Wi-Fi Hotspots:** 1.04 lakh community hotspots operational for last-mile connectivity.



UPSC Relevance: **GS 2 – Governance:** E-governance, digital inclusion, service delivery. **GS 3 – Infrastructure & Technology:** ICT, rural connectivity, innovation in public delivery



HOT Question: “India’s digital divide is less about connectivity and more about accountability.” Analyse in the context of the BharatNet programme.



25. India Mandates Acoustic Vehicle Alerting Systems for Electric Vehicles to Enhance Pedestrian Safety

The **Ministry of Road Transport and Highways (MoRTH)** has amended the **Central Motor Vehicles Rules (CMVR)** to make **Acoustic Vehicle Alerting Systems (AVAS)** mandatory for both new and existing electric and hybrid vehicles to improve pedestrian safety, especially at low speeds

Background & Need

- **Silent Hazard:** Unlike conventional vehicles, **electric vehicles (EVs)** produce minimal sound at low speeds, posing risks to pedestrians—particularly children, elderly, and visually impaired persons.
- **Global Context:** Similar mandates exist under **UN Regulation No. 138**, adopted by the EU, Japan, and the US for low-noise EVs.

About AVAS

- **Definition:** An **Acoustic Vehicle Alerting System (AVAS)** is an inbuilt electronic sound-emitting device that produces artificial noise to signal an approaching electric or hybrid vehicle.
- **Speed Range:** Automatically activates between **0–20 km/h**, when EVs are nearly silent.
- **Sound Design:** Emits a continuous, low-volume, non-intrusive sound that mimics conventional vehicle noise.
- **Deactivation:** Above **20 km/h**, natural tyre and aerodynamic noises are sufficient, so AVAS switches off automatically.
- **Categories Covered:**
 - **M Category:** Passenger vehicles (cars, buses).
 - **N Category:** Goods vehicles (trucks, e-carts, e-rickshaws).

Implementation Timeline

- **New Models:** Mandatory from **October 2026**.
- **Existing Models:** Must comply by **October 2027**.

Significance

- **Pedestrian Safety:** Reduces silent collisions and improves safety in crowded and residential zones.
- **Inclusivity:** Supports **Accessible India Mission (Sugamya Bharat Abhiyan)** by aiding visually impaired pedestrians.
- **Global Standards:** Aligns India's EV safety regulations with **UNECE R138** norms, strengthening export readiness for Indian EVs.



HOT Question: “Electric mobility must not come at the cost of pedestrian safety.” Discuss how India’s new AVAS regulation balances innovation with inclusivity.



26. Government Launches National Initiative on Water Security to Integrate Rural Water Management Schemes



The Government of India launched the **National Initiative on Water Security (NIWS)** in New Delhi to promote sustainable water management across rural India, integrating existing schemes such as **MGNREGA**, **Jal Shakti Abhiyan**, and **Pradhan Mantri Krishi Sinchai Yojana (PMKSY)**.

About the Initiative

- **Objective:** To ensure *scientific, equitable, and sustainable* water use through local conservation, groundwater recharge, and climate-resilient planning.
- **Implementing Ministries:** Jointly implemented by the **Ministries of Rural Development, Agriculture & Farmers' Welfare**, and **Jal Shakti**.
- **Legal Backing:** The **MGNREGA (2005)** has been amended to prioritise water conservation projects in all rural blocks.

Fund Allocation under MGNREGA (2025 Amendment)

Block Category	Allocation for Water Conservation
Over-exploited blocks	65% of total MGNREGA funds
Semi-critical blocks	40%
Water-sufficient blocks	30%

Significance

- **Water Stress in India:** Nearly **600 million Indians** experience *high to extreme water stress* (NITI Aayog – CWMI).
- **Groundwater Dependence:** India extracts **~25% of global groundwater**, making local conservation essential.
- **Employment Linkage:** MGNREGA creates rural livelihoods while regenerating water resources.



UPSC Relevance: **GS 3 – Environment & Agriculture:** Water security, sustainable resource use. **GS 2 – Governance:** Convergence of ministries for integrated rural development



HOT Question: “Discuss how convergence between MGNREGA and water-focused ministries under the National Initiative on Water Security can address India’s dual challenges of water stress and rural livelihood security.



27. EAC Reviews Environmental Clearance for Sawalkote Dam Following Suspension of Indus Waters Treaty



After India suspended the **Indus Waters Treaty (IWT)** in 2025 amid escalating transboundary water tensions, the **Expert Appraisal Committee (EAC)** of the Ministry of Environment, Forest and Climate Change began reviewing the **environmental clearance** for the **1,856 MW Sawalkote Hydroelectric Project** on the **Chenab River** in Jammu & Kashmir.

About the Sawalkote Hydroelectric Project

- **Location:** Ramban District, Jammu & Kashmir, on the **Chenab River**, a key tributary of the Indus.
- **Type:** *Run-of-the-river* project with a **concrete gravity dam** and **550 MCM reservoir**.
- **Capacity:** 1,856 MW (largest in J&K); expected annual generation of ~7,000 million units.
- **Executing Agency:** **NHPC Limited**; project divided into **two phases**.
- **History:** Conceived in the 1980s; delayed due to IWT restrictions and ecological concerns.

Significance

- **Energy Security:** Will help meet J&K's winter power deficit and contribute to India's northern grid.
- **Strategic Leverage:** Enhances India's **upper riparian control** over the Chenab—vital after IWT suspension.
- **Water Management:** Regulates Chenab flow, mitigating downstream floods and aiding irrigation.
- **Regional Growth:** Supports Make in India & Aatmanirbhar Bharat through local infrastructure jobs.



UPSC Relevance: **GS 2:** India–Pakistan relations; implications of IWT suspension. **GS 3:** Environmental clearance, hydro projects, forest diversion, seismic risks, and energy security.



HOT Question: “India’s hydropower development in Jammu & Kashmir reflects both environmental vulnerability and strategic necessity.” Discuss in the context of the Sawalkote Hydroelectric Project and the Indus Waters Treaty.



28. Oju Hydroelectric Project in Arunachal Pradesh Receives Environmental Clearance Recommendation



The **Union Ministry of Environment, Forest and Climate Change (MoEFCC)** has recommended **environmental clearance** for the **2,220 MW Oju Hydroelectric Project**, the largest approved hydropower project in the **Subansiri River basin**.

About the Project

- **Location:** Subansiri River, ~5 km downstream of Redi village, Taksing block, Arunachal Pradesh.
- **Capacity:** Total of **2,220 MW** — *2,100 MW from the main powerhouse and 120 MW from the dam-toe plant.*
- **Developer:** **Oju Subansiri Hydro Power Corporation Pvt. Ltd.**
- **Type:** *Run-of-the-river* hydroelectric project with dam and reservoir infrastructure.
- **Scale:** Will be the *largest hydro project in the Subansiri basin* by capacity, surpassing the 2,000 MW Lower Subansiri project.

Concerns and Criticism

- **Outdated Assessments:** Assam-based experts flagged that the **Cumulative Impact Assessment (CIA)** and **carrying capacity studies** of the Subansiri basin, last conducted in **2014**, are outdated and exclude newer projects.
- **Ecological Risks:** Successive projects on the same river could disrupt aquatic biodiversity, affect **fish migration**, and harm **downstream floodplain ecology** and riverine livelihoods.
- **Geological & Seismic Concerns:** The project lies in a **high-seismic Himalayan zone**, increasing risk of landslides and dam instability.
- **Geopolitical Sensitivity:** Located close to the **India–China border**, it adds strategic value for upper-riparian control but demands environmentally cautious execution.
- **Social Concerns:** Indigenous communities depend on river resources; cumulative projects may reduce flow and alter sediment regimes.



HOT Question: “Critically examine how cumulative hydropower development in the Eastern Himalayas, particularly in the Subansiri basin, poses ecological and geopolitical challenges for India’s energy strategy.”



29. Educate Girls Becomes First Indian Organisation to Win the Ramon Magsaysay Award 2025



The **Foundation to Educate Girls Globally (Educate Girls)** became the **first Indian organisation** to receive the **Ramon Magsaysay Award 2025**, for its large-scale community-driven campaign empowering girls through education in rural India.

About Educate Girls

- **Founded:** 2007 by **Safeena Husain**, headquartered in Mumbai.
- **Mission:** To bridge gender and literacy gaps by enrolling and retaining out-of-school girls in rural and tribal India.
- **Approach:**
 - Uses data-driven community volunteers (*Team Balika*) to identify and re-enrol out-of-school girls.
 - Operates in over **20,000 villages** across Rajasthan, Madhya Pradesh, and Uttar Pradesh.
 - Integrates remedial learning programs to improve foundational literacy and numeracy.
- **Impact:** Over **1.8 million girls enrolled** and **2.3 million children benefited** through improved learning outcomes.
- **Innovations:** First in the education sector to issue **Development Impact Bonds (DIBs)** – results-based funding linked to measurable learning gains.

About the Ramon Magsaysay Award

- **Established:** 1957 by the Rockefeller Brothers Fund in memory of **Ramon Magsaysay**, the 7th President of the Philippines.
- **Nature:** Recognises **exemplary leadership, public service, and community transformation** in Asia – often called *Asia's Nobel Prize*.
- **Award Categories:** Government service, public service, community leadership, journalism, peace, and international understanding.
- **2025 Laureates:**
 - **Educate Girls (India)** – for social empowerment through education.
 - **Shaahina Ali (Maldives)** – for community health service.
 - **Flaviano Antonio L. Villanueva (Philippines)** – for humanitarian public service.
- **Notable Indian Recipients:** Vinoba Bhave (1958), Mother Teresa (1962), Verghese Kurien (1963), Bezwada Wilson (2016), and Dr. R. Ravi Kannan (2023).



HOT Question: “Discuss how NGOs like Educate Girls contribute to achieving inclusive and equitable quality education in rural India. Evaluate the role of impact-based funding in ensuring accountability in social welfare programmes.”



30. Actor Mohanlal to Receive the Dadasaheb Phalke Award 2023



The Government of India announced that **veteran Malayalam actor Mohanlal Viswanathan Nair** will be conferred the **Dadasaheb Phalke Award 2023**, India's highest honour in cinema, at the **71st National Film Awards ceremony**.

About the Recipient

Mohanlal Viswanathan Nair is an acclaimed actor, producer, playback singer, and film distributor from Kerala.

He has acted in over **400 films** across Malayalam, Tamil, Telugu, and Hindi cinema.

Known for versatility, he has portrayed roles ranging from intense dramas to comedies and thrillers.

Major Awards:

Padma Shri (2001) and **Padma Bhushan (2019)** for contributions to Indian cinema.

Five National Film Awards and numerous state and international recognitions.

Notable films include *Bharatham*, *Vanaprastham*, *Kireedam*, *Drishyam*, and *Iruvar*.

About the Dadasaheb Phalke Award

Instituted: 1969, by the **Government of India** under the **Directorate of Film Festivals**, Ministry of Information & Broadcasting.

Purpose: To honour outstanding contribution to the growth and development of Indian cinema.

Named After: *Dadasaheb Phalke*, regarded as the **Father of Indian Cinema**, who directed *Raja Harishchandra* (1913) — India's first full-length feature film.

First Recipient: Devika Rani (1969).

Components: **Swarna Kamal (Golden Lotus) medallion**, **Shawl**, **Cash prize of ₹10 lakh**

Previous Recipients: Waheeda Rehman (2021), Asha Parekh (2020), Rajinikanth (2019), Amitabh Bachchan (2018).



HOT Question: "Discuss how national film awards like the Dadasaheb Phalke Award contribute to promoting regional languages and preserving India's cinematic diversity."



31. Booker Prize 2025



- Kiran Desai, who previously won the Booker Prize in 2006, has been shortlisted for the Booker Prize 2025 for her novel 'The Loneliness of Sonia and Sunny'.
- The Booker Prize is a renowned global literary award given annually to writers of any nationality for the best English fiction novel published in the UK or Ireland.
- It was referred to as the "Man Booker Prize" until 2019, when it was changed to "The Booker Prize."
- The UK-based Booker Prize Foundation manages and funds the award; they also present the International Booker Prize annually for the best fiction translated into English.
- Prize Money: The winner gets a £50,000 cash prize and international publishing recognition.
- Notable Winners: The first winner of Indian origin was V. S. Naipaul, while the first Indian citizen to win was Arundhati Roy.

32. Sign Language Day 2025



On 23rd September 2025, the Indian Sign Language Research and Training Centre (ISLRTC) is organising a programme in New Delhi to celebrate 'Sign Language Day – 2025', in line with the United Nations' declaration of this date as the International Day of Sign Languages. The day aims to raise awareness about the importance of sign language in ensuring the human rights of persons who are Deaf and promoting their social inclusion and equality. This year's theme, 'No Human Rights Without Sign Language Rights', highlights the critical role of sign language in guaranteeing dignity, accessibility, and full participation in society for Deaf individuals. The celebration will include programmes and initiatives designed to educate the public and policymakers about sign language rights and accessibility measures. ISLRTC, under the Department of Empowerment of Persons with Disabilities (Ministry of Social Justice and Empowerment, Govt of India), leads efforts to promote research, training, and awareness related to Indian Sign Language across the country.



33. Bathukamma Festival

Telangana's Bathukamma Enters Guinness World Records

- Context (TH): On 29 September 2025, Hyderabad's Saroornagar Stadium witnessed Bathukamma festivities that set two Guinness World Records.
- Key Highlights:
 - Largest Floral Installation: A 63.11-foot Bathukamma was created, weighing 10.7 tonnes of flowers, in 11 layers.
 - Synchronised Dance Performance: Around 1,354 women performed in synchronised concentric circles around the floral goddess.

34. Konkan Coast Geoglyphs May Be Among World's Oldest, Dating Back 24,000 Years

The **prehistoric geoglyphs of the Konkan coast**, nominated for **UNESCO World Heritage status**, are now estimated to be **up to 24,000 years old**, based on new archaeological findings from **Koloshi caves**, placing them among the **oldest rock art traditions globally**.

- **Definition:** Geoglyphs are **large ground designs** created by arranging or removing stones, soil, or vegetation to form images visible from above.
- **Purpose:** Often served **ritual, astronomical, or symbolic functions** for early human communities.
- **Global Parallels:** Comparable to **Peru's Nazca Lines**, **Chile's Atacama Giant**, and **California's Blythe Intaglios**.
- **Revised Dating:** Initially dated to ~10,000 years, new evidence from **Koloshi cave layers (38,000 years old)** suggests much older human activity, possibly linking geoglyphs to the **Late Pleistocene**.
- **Extinct Fauna Depictions:** Carvings of **rhinoceros and hippopotamus** indicate a prehistoric environment distinct from modern-day Konkan ecology.
- **Sites Identified:**
 - **Maharashtra:** Kasheli, Barsu, Jambharun, Ukshi, Rundhye Tali, Devache Gothane, Devi Hasol, Kudopi.
 - **Goa:** Phansaymal.

