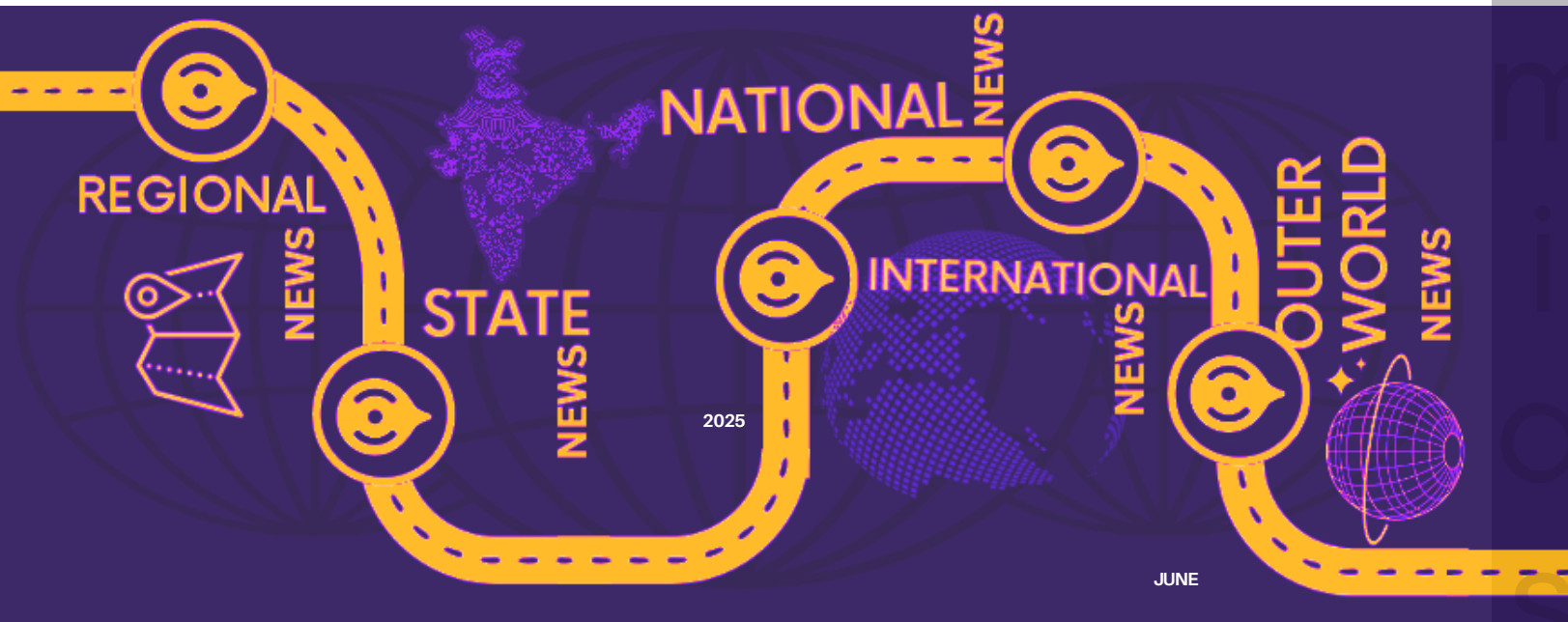


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PREFACE

Welcome to our monthly current affairs magazine! We are thrilled to provide you with the latest information and updates on the most important events that happened in our country and around the world in the month of MARCH 2026. Our magazine is designed to help you prepare for competitive examinations like UPSC and other State PSC Exams, and we hope that you will find it informative, engaging, and useful.

In this magazine, you will find a wide range of topics covering current affairs, including politics, economics, sports, science and technology, and many more. Our team of writers and editors work hard to bring you the most accurate and up-to-date information, so you can stay informed and prepared for any competitive exam. We understand that preparing for competitive exams can be a daunting task, but we are here to make it easier for you. Our magazine is designed to be easy to read and understand, with clear and concise articles that will help you stay on top of the latest news and events.

We believe that knowledge is power, and we are committed to helping you achieve your goals. Whether you are preparing for a government job, entrance exam, or any other competitive exam, our magazine will provide you with the information and insights you need to succeed.

Thank you for choosing our magazine, and we hope that you find it helpful and informative.

ACKNOWLEDGMENTS

We extend our heartfelt gratitude and appreciation to the exceptional team of content developers who have played a pivotal role in shaping our UPSC Current Affairs Magazine. Your unwavering dedication, extensive research, and commitment to delivering high-quality content have been instrumental in making this publication a trusted resource for our readers.

Your relentless pursuit of current affairs, profound understanding of complex issues, and the ability to distil them into informative, concise, and engaging articles have set a benchmark in the field of competitive examination preparation.

We are proud to have a team that goes above and beyond, ensuring that our readers are well-informed and well-prepared for the UPSC examinations. Your exceptional contributions are the driving force behind our magazine's success.

Thank you for your hard work, expertise, and passion for delivering top-notch content. Your efforts have not only enriched our magazine but have also played a significant role in the educational journey of countless aspiring civil servants.

We look forward to continuing this remarkable journey of knowledge dissemination with your continued support and excellence.

With deep appreciation,

EKAM IAS ACADEMY

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POLITY AND GOVERNANCE

JUDICIARY

MENSTRUAL HEALTH AND HYGIENE (MHH) AS A FUNDAMENTAL RIGHT

SOURCE: THE HINDU

Why in News?

In *Dr. Jaya Thakur v. Union of India (2026)*, the Supreme Court of India recognised Menstrual Health and Hygiene (MHH) as part of the Right to Life and Dignity under Article 21.

What Did the Supreme Court Hold?

1. Article 21 – Right to Life, Dignity and Bodily Autonomy

- The Court held that denial of menstrual facilities subjects girls to **stigma, humiliation, and exclusion**, violating their dignity.
- Menstrual health is linked to **privacy, reproductive rights, and bodily autonomy**.
- Forced absenteeism or dropout due to lack of facilities was termed a **constitutional failure**.

The Court clarified that Article 21 protects not just survival, but a **life lived with dignity**.

2. Article 14 – Substantive Equality

- Treating everyone identically ignores biological realities.
- Failure to address menstrual needs creates **structural discrimination**.
- True equality requires proactive measures to remove gender-based disadvantages.

3. Right to Education (RTE Act, 2009)

- “Free education” must be **materially enabling**, not merely fee-free.
- Cost of sanitary products and absence of toilets are financial and infrastructural barriers.
- Separate, functional toilets are now seen as a **substantive constitutional requirement**, not just administrative guidelines.

Directions Issued by the Supreme Court

1. Free Sanitary Products

- All schools (government and private) must provide **free oxo-biodegradable sanitary napkins** via vending machines.

2. Menstrual Hygiene Management (MHM) Corners

- Schools must establish emergency support corners with spare uniforms, innerwear, and disposal bags.

3. Functional Sanitation Infrastructure

- Gender-segregated toilets with **running water and soap** must remain operational at all times.

4. Safe Waste Disposal

- Menstrual waste must be handled as per **Solid Waste Management Rules** with environmentally compliant systems.

5. Monitoring & Accountability

- District Education Officers to conduct inspections.
- Anonymous student feedback surveys mandated.
- Oversight by **National Commission for Protection of Child Rights (NCPCR)** and State CPCRs.

6. Male Sensitisation & Curriculum Reform

- **NCERT and SCERTs** to integrate gender-responsive modules.
- Teachers (male and female) to undergo training.
- Boys to be educated to reduce stigma and harassment.

Significance of Recognising MHH as a Fundamental Right

1. Emergence of “Biological Citizenship”

- Recognises that women face a **biological burden** requiring state support.
- Moves from **negative liberty** (non-interference) to **positive obligation** (provision of facilities).

2. Strengthening Substantive RTE

- NFHS-5 (2019–21) shows about **77% of young women (15–24) use hygienic methods**, leaving nearly one-fourth deprived.
- Dropouts increase after puberty due to menstrual challenges.
- The judgment addresses **menstrual poverty** as an educational barrier.

3. Socio-Legal Transformation

- Uses law as a tool for social reform.
- Aims to dismantle taboos and create a supportive school environment.

Existing Government Initiatives

1. Scheme for Promotion of Menstrual Hygiene

- Targets adolescent girls aged 10–19.
- Focus on awareness, affordable products, and safe disposal.

2. PMBJP (Janaushadhi) Scheme

- Provides 'Suvidha' napkins at ₹1 per pad.
- Over 96 crore pads sold by late 2025.

3. ASHA Network

- Distributes subsidised packs and conducts community awareness sessions.

4. Samagra Shiksha & Swachh Bharat Mission

- Support installation of vending machines, incinerators, and sanitation infrastructure.

Challenges in Implementation

1. Infrastructure Gaps

- Toilets lack water, maintenance, and cleaning staff.
- Vending machines may remain non-functional without O&M budgets.

2. Financial Constraints

- Scaling free provision nationwide requires significant recurring funds.
- Risk of crowding out other education expenditures.

3. Waste Disposal Concerns

- Incinerator misuse may cause environmental harm.
- Need for standardized protocols.

4. Social Stigma

- Persistent taboos undermine effectiveness.
- Students may hesitate to provide honest feedback.

Measures to Strengthen Implementation

- **Inclusive Policy Design:** Recognise needs of **trans-men and non-binary individuals** who menstruate.
- **SHG-Based Production:** Engage **Self-Help Groups (SHGs)** for local manufacturing of biodegradable pads.
- **Water Assurance:** Link school sanitation to **Jal Jeevan Mission** for uninterrupted water supply.
- **Privacy-First Infrastructure:** Ensure internal locks, privacy screens, mirrors, and disposal bins.
- **DBT Alternative:** In supply-deficit areas, provide targeted cash support for product purchase.
- **Standardised Procurement:** Ensure compliance with **biodegradability standards** to prevent plastic-heavy products.

Conclusion

The Supreme Court's ruling elevates menstrual health from welfare to a **constitutional guarantee rooted in dignity and equality**. Its real impact will depend on sustained funding, infrastructure reform, and social transformation to ensure that **no girl's education is disrupted by a natural biological process**.

LEGISLATURE

SUBSTANTIVE MOTION IN LOK SABHA AND PARLIAMENTARY PROCEDURES

SOURCE: INDIAN EXPRESS

Why in News?

A notice has been given by MP **Nishikant Dubey** seeking to move a **substantive motion** against the Leader of the Opposition in the Lok Sabha for allegedly misleading the House.

What is a Substantive Motion?

- A **Substantive Motion** is an independent and self-contained proposal placed before the House.
- It is not dependent on any other motion or agenda item.
- Once adopted, it reflects the **official decision** of the House.

Admission and Procedure

- Must be submitted with prior notice.
- Can be moved only by the member who has given notice (except when a Minister authorises another Minister to move it on their behalf).
- Its admission depends entirely on the **Speaker's discretion**.
- If admitted, it may be:
 - Debated in the House.
 - Put to vote.
 - Referred to a committee for examination.

Significance

- Compels the House to formally deliberate and take a position.
- Represents escalation from political rhetoric to procedural accountability.
- Strengthens **legislative oversight**.

Types of Substantive Motions

Substantive motions include:

- **No-Confidence Motion**
- **Confidence Motion**
- Motions for **removal of constitutional authorities**
- Policy-related resolutions
- Election or removal of presiding officers

These motions directly impact governance and political stability.

Difference Between Substantive, Substitute, and Subsidiary Motions

Basis of Comparison	Substantive Motion	Substitute Motion	Subsidiary Motion
Nature	An independent and self-contained proposal placed before the House.	A motion moved in substitution of an original motion .	A motion that is dependent on or arises out of another motion .
Purpose	Seeks a clear and binding decision of the House.	Offers an alternative formulation or decision to the original motion.	Aims to modify, delay, or influence the main motion.
Independence	Complete in itself; not linked to other business.	Dependent on the existence of the original motion.	Cannot exist independently; tied to the main motion.
Effect if Adopted	Becomes the formal will or opinion of the House.	Replaces the original motion entirely.	Alters the course or handling of the main motion but does not replace it.
Notice Requirement	Prior notice required ; usually moved only by the member who gave notice.	Notice governed by rules; any member may move, subject to admissibility.	Generally moved during discussion of the main motion as per rules.
Examples	No-Confidence Motion, Removal Motion, Policy Resolution.	Alternative resolution replacing a policy motion.	Amendment Motion, Adjournment of Debate, Closure Motion.
Role of Speaker	Decides admissibility and manner of discussion.	Determines whether it is in order and admissible.	Ensures procedural correctness and prevents misuse.

Role of the Speaker

In all three cases, the **Speaker of the Lok Sabha** exercises authority to:

- Decide admissibility.
- Prevent misuse.
- Maintain decorum and procedural discipline.

Other Important Parliamentary Motions

Parliament uses various motions to ensure debate and accountability:

Adjournment Motion

- Suspends regular business to discuss urgent public issues.
- Seen as a strong tool of opposition oversight.

Calling Attention Motion

- Member draws a Minister's attention to urgent matters.
- Minister responds; no voting involved.

Privilege Motion

- Raised when parliamentary privileges are allegedly breached.
- May be referred to the **Committee of Privileges**.

No-Confidence Motion

- Tests majority support of the Council of Ministers.
- If passed, government must resign.
- As per rules, requires support of at least **50 members** to be admitted.

Motion of Thanks

- Expresses gratitude for the President's Address under **Article 87**.
- Its passage indicates political support for the government.

Removal and Impeachment Motions

- Removal of Speaker/Deputy Speaker requires majority.
- Impeachment of judges under **Article 124(4)** requires special majority.

Expulsion and Vacancy Motions

- Used in cases of misconduct or prolonged absence.
- Reflect Parliament's disciplinary authority.

Parliamentary System of Governance in India

India follows the **Parliamentary form of government**, inspired by the British model and embedded in the Constitution.

It is a democratic system where the **executive derives legitimacy from the legislature** and remains accountable to it.

Key Features

1. Dual Executive

- **President** – Constitutional head.
- **Prime Minister** – Real executive authority.

2. Collective Responsibility

- Under **Article 75(3)**, the Council of Ministers is collectively responsible to the Lok Sabha.

- Loss of majority leads to resignation of the entire government.

3. Fusion of Powers

- Executive members are drawn from the legislature.
- Ensures coordination but reduces strict separation.

4. Leadership of Prime Minister

- PM heads the Cabinet and leads the majority party or coalition.

5. Provision for Alternative Government

- If the ruling party loses confidence, the opposition may form government, ensuring continuity.

Advantages of Parliamentary System

- **Responsiveness** – Government can be replaced if it loses majority.
- **Flexibility** – Adaptable to changing political dynamics.
- **Efficiency** – Majority governments can pass legislation smoothly.
- **Accountability** – Frequent debates, question hour, and motions ensure oversight.

Disadvantages

- **Executive Dominance** – Strong majority may marginalise opposition.
- **Instability** – Coalition governments may collapse due to shifting alliances.
- **Limited Separation of Powers** – Legislature may not effectively check executive in majority scenarios.

Conclusion

A **Substantive Motion** is a powerful parliamentary device that enables the Lok Sabha to express its formal and binding opinion on significant matters.

Its use reinforces accountability within India's **parliamentary democracy**, where the executive remains answerable to the legislature.

EXECUTIVE

GOVERNOR'S ADDRESS AND THE DEBATE ON DISCRETION

SOURCE: INDIAN EXPRESS

Why in News?

The **Governor of Tamil Nadu** recently walked out of the State Assembly during his annual address, while the **Governor of Kerala** reportedly omitted certain portions of the prepared speech.

Constitutional Framework Governing the Governor

1. Article 176 – Special Address

- Mandates the Governor to address the Legislative Assembly (or both Houses in bicameral States) at the commencement of the first session each year.
- The address explains the “**causes of summons**” and reflects the **policy priorities of the elected government**, not the Governor’s personal views.

2. Article 175 – Right to Address and Send Messages

- Empowers the Governor to address the Legislature and send messages on Bills.
- However, this is part of executive functioning and is generally subject to **aid and advice**.

3. Article 163 – Aid and Advice

- The Governor must act on the **aid and advice of the Council of Ministers**, except where the Constitution explicitly grants discretion.
- Discretionary powers are limited and specifically defined.

Constituent Assembly Vision

The Governor was conceived as a **neutral constitutional head**, not an independent power centre.

Dr. B.R. Ambedkar clarified that the Governor has “**no functions which he can discharge by himself.**”

Judicial Interpretation of Governor’s Role

Shamsher Singh v. State of Punjab (1974)

- A seven-judge bench held that the Governor is a **constitutional head** and must act on ministerial advice in almost all matters.

Nabam Rebia v. Deputy Speaker (2016)

- The Supreme Court ruled that discretionary powers are **limited and cannot be expanded by interpretation**.

State of Tamil Nadu v. Governor (2024)

- The Court emphasized that the Governor cannot use discretion to **stall or undermine the elected government’s functioning**.

These rulings reinforce that the Governor’s role is **ceremonial and supervisory**, not political.

Arguments Supporting Limited Discretion

- **Oath under Article 159:** The Governor must protect and defend the Constitution and may object if the speech violates constitutional values.
- **Constitutional Silence:** Articles 175 and 176 do not explicitly require verbatim reading of the speech.
- **Union Representative Role:** The Governor acts as a constitutional link between the Centre and State.
- **Institutional Consistency:** If the speech contradicts earlier constitutional positions taken by the Governor, concerns may arise.

Arguments Against Discretion

- **Primacy of Elected Government:** Under parliamentary democracy, executive accountability lies with the elected government, not the Governor.
- **Nature of the Address:** The speech represents **government policy**, not personal endorsement by the Governor.
- **Federal Concerns:** Unilateral omissions or walkouts may be viewed as interference by a centrally appointed authority in State matters.
- **Threat to Responsible Government:** Allowing discretion could create a parallel executive authority, weakening democratic norms.
- **Judicial Remedy Exists:** If any content is unconstitutional, the matter can be addressed through **judicial review**, not unilateral refusal.

Committee Recommendations

Sarkaria Commission (1988)

- Recommended that Governors must remain politically neutral and not act as agents of the Centre.

Punchhi Commission (2007)

- Suggested limiting Governors strictly to constitutional roles to avoid political controversies.

Way Forward

- **Codify Conventions:** Parliamentary conventions, similar to the British system where the Monarch reads the government's speech without deviation, should be strictly followed.
- **Judicial Clarification:** The Supreme Court may issue declaratory guidelines clarifying the **non-discretionary nature** of the address.
- **Constitutional Training:** Orientation programs for Governors on federal principles and constitutional conventions.
- **Institutional Dialogue:** Pre-session consultation between Chief Minister and Governor to avoid public disputes.
- **Time-bound Communication:** If objections exist, they should be formally communicated within a fixed timeframe.

Conclusion

The Constitution, judicial precedents, and parliamentary conventions clearly limit the Governor's discretion in Assembly addresses. Upholding the **primacy of the elected government** while preserving constitutional balance is essential to maintain India's federal and democratic framework.

POLICIES/SCHEMES/ACTS/REPORTS/ COMMITTEES IN NEWS

KERALA NATIVITY CARD BILL, 2026

SOURCE: PIB

Why in News?

The **Kerala Legislative Assembly** has referred the *Kerala Nativity Card Bill, 2026* to the Subject Committee on Land Revenue and Devaswom for detailed scrutiny.

Background and Context

- The proposal received **in-principle approval** from the State Cabinet in December 2025.
- The Revenue Department, in consultation with the Law Department, drafted the legislation.
- The move comes during ongoing national discussions around **electoral roll verification, migration, and documentation standards**.
- At present, nativity certificates are granted based on **government orders**, not through an enacted law.

What is the Nativity Card?

- A **permanent identity document** certifying an individual as a native of Kerala.
- Based on the existing nativity certificate system but with enhanced legal validity.
- Will contain the beneficiary's **photograph and official details**.
- Intended to function as an **authoritative proof** of nativity for administrative purposes.

Unlike temporary certificates issued for specific needs, this card aims to serve as a **long-term consolidated document**.

Objectives of the Bill

1. Legal Validity

- Provide statutory backing instead of relying on executive instructions.
- Ensure **uniform standards and legal certainty**.

2. Administrative Efficiency

- Reduce repetitive documentation requirements.
- Maintain systematic records at the **taluk level**.
- Improve digitisation and verification processes.

3. Access to Welfare

- Serve as proof for availing **State government schemes and benefits**.
- Act as a reliable beneficiary identification document.

4. Cultural and Identity Assertion

- Promote a sense of belonging as both **Indian citizens and Keralites**.

Eligibility Criteria

The Bill defines a 'native' as:

- A person **born in Kerala** who has not acquired foreign citizenship.
- A person with at least one **Kerala-born ancestor**, provided they retain Indian citizenship.
- A person born outside Kerala whose parents or ancestors temporarily migrated for employment or livelihood reasons and have not taken foreign nationality.

Ineligibility

- Individuals who have voluntarily renounced **Indian citizenship**.
- If a cardholder later acquires foreign citizenship, the card automatically becomes **invalid**.

This ensures alignment with **citizenship laws under the Constitution of India**.

Application and Administrative Process

Application Authority

- Applications must be submitted in prescribed format.
- The **Tahsildar** is the competent authority to approve or reject applications.

Procedure

- Submission of required documents and payment of a notified fee.
- Applications must be processed within a defined time limit.
- A register of issued cards will be maintained at the taluk office.

Corrections and Duplicate Cards

- Applicants may request updates with supporting evidence.
- Duplicate cards may be issued in cases of loss or damage.

Grievance Redressal Mechanism

The Bill introduces a **multi-layered appellate structure**:

1. **First Appeal** – To the Revenue Divisional Officer (RDO) against Tahsildar's order.
2. **Revision Petition** – Before the District Collector.

The Collector may confirm, modify, or set aside the decision after granting the applicant an opportunity to be heard. This structure strengthens **procedural fairness**.

Penal Provisions

- Providing false information may attract:
 - Imprisonment up to **three months**, or

- Fine up to **₹5,000**, or
- Both.

This provision aims to prevent misuse and ensure credibility of documentation.

Constitutional and Governance Dimensions

1. Federalism Concerns

- **Citizenship** is listed under the **Union List (Entry 17)**.
- However, **residency, land records, and welfare administration** fall under State powers.
- The Bill raises debate over the extent to which States can regulate identity documentation without encroaching upon Union jurisdiction.

2. Administrative Reform

- Encourages **digitisation and database integration**.
- Standardises eligibility and procedural norms.
- May reduce bureaucratic delays in service delivery.

3. Socio-Political Implications

- Introduced amid national debates around **identity verification and migration**.
- Could influence future discussions on **domicile policies and targeted welfare schemes**.
- Needs careful implementation to avoid perceptions of exclusion or discrimination.

Implementation Roadmap

- After passage by the Assembly, the Bill requires the **Governor's assent**.
- Detailed **rules and procedures** will be framed.
- Software systems and administrative infrastructure will be developed.
- The State aims to operationalise the scheme before the end of its current tenure.

Challenges

- Possible legal scrutiny regarding overlap with **citizenship law**.
- Risk of administrative burden at the grassroots level.
- Concerns about duplication with existing documents like **Aadhaar and voter ID**.
- Need to ensure inclusivity and prevent bureaucratic harassment.

Way Forward

- Clear separation between **citizenship status** and **state-level nativity recognition**.
- Integration with digital governance platforms.
- Transparent guidelines and awareness campaigns.
- Periodic review to prevent misuse or exclusion.

Conclusion

The Kerala Nativity Card Bill, 2026 seeks to formalise nativity identification through a **clear legal framework** and improve welfare delivery efficiency. While primarily administrative in intent, its constitutional and federal dimensions require careful balancing to ensure inclusivity and harmony with national citizenship laws.

WELFARE AND DEVELOPMENT SCHEMES FOR SCHEDULED TRIBES IN ODISHA

SOURCE: PIB

Why in News?

The Union Minister for Tribal Affairs, Shri Jual Oram, informed the Rajya Sabha that Odisha has a Scheduled Tribe (ST) population of **95.9 lakh (Census 2011)**. The statement has renewed focus on tribal welfare initiatives in one of India’s most tribal-populated states.

Major National Missions Benefiting Tribals in Odisha

1. Dharti Aaba Janjatiya Gram Utkarsh Abhiyan

- A convergence-based programme covering **63,000+ tribal villages** across India.
- Focus areas:
 - Health and nutrition
 - Education and Anganwadi services
 - Livelihood creation
 - Infrastructure saturation
- Budget outlay: Approximately **₹79,000 crore** (Centre and States combined).
- Aims to uplift over **5 crore tribal citizens** in a time-bound manner.

2. Pradhan Mantri Janjati Adivasi Nyaya Maha Abhiyan (PM-JANMAN)

- Special mission for **Particularly Vulnerable Tribal Groups (PVTGs)**.
- Focus on:
 - Housing
 - Drinking water and sanitation
 - Education and healthcare
 - Road and telecom connectivity
 - Electrification and sustainable livelihoods
- Time frame: **3 years** for saturation approach.
- Particularly relevant for Odisha, which has the **highest number of PVTGs in India (13 groups)**.

3. Pradhan Mantri Janjatiya Vikas Mission (PMJVM)

Implemented through the TRIFED.

- Promotes **tribal entrepreneurship** and value addition of **Minor Forest Produce (MFP)**.
- Components:
 - Minimum Support Price (MSP) for MFP
 - Development of value chains
 - Marketing support
- Establishment of **Van Dhan Vikas Kendras (VDVKs)** for processing and packaging.
- Enhances income of forest-dependent tribal households.

Education-Focused Initiatives

4. Eklavya Model Residential Schools (EMRS)

- Residential schools for tribal students, started in 2018-19.
- Aim: Provide quality education equivalent to Navodaya Vidyalayas.
- Target: **728 EMRS schools nationwide**, benefiting about **3.5 lakh students**.
- One EMRS in each block with:
 - **50% ST population**
 - **At least 20,000 tribal persons**
- Many schools funded under **Article 275(1)** grants.

5. Pre-Matric Scholarship (Classes IX–X)

- Income ceiling: ₹2.5 lakh per annum.
- Monthly assistance for day scholars and hostellers.
- Funding pattern:
 - **75:25 (Centre:State)**
 - **90:10 for NE/Hill States**
 - **100% Central for UTs without legislature**

6. Post-Matric Scholarship

- Covers tuition fees and maintenance allowance.
- Income ceiling: ₹2.5 lakh annually.
- Encourages higher education among ST youth.

Financial and Institutional Support

7. Grants under Article 275(1)

- 100% Central grants.
- Supports infrastructure in **Scheduled Areas**.
- Focus sectors:
 - Education
 - Health
 - Drinking water
 - Skill development

8. Special Central Assistance to Tribal Sub-Scheme (SCA to TSS)

- Operational since 1977 (earlier TSP).
- Bridges developmental gaps in tribal-majority regions.
- Supplements state and central schemes.

9. Development Action Plan for Scheduled Tribes (DAPST)

- Strategy ensuring dedicated allocation for tribal development.
- Around **40+ Ministries/Departments** earmark funds annually.
- Covers:
 - Roads
 - Irrigation
 - Housing
 - Electrification
 - Employment generation

10. National Scheduled Tribes Finance and Development Corporation (NSTFDC)

National Scheduled Tribes Finance and Development Corporation

- Apex financial institution for ST entrepreneurship.
- Provides concessional loans and skill support.
- Registered under Section 8 of the Companies Act, 2013.

Key Focus Areas in Odisha

- **Livelihood diversification** through MFP and forest-based economy.
- Educational expansion via EMRS network.
- Infrastructure development in **Scheduled Areas under Fifth Schedule**.
- Targeted support for **PVTGs**, where Odisha plays a leading role.

Conclusion

With a significant tribal population, Odisha remains central to India’s tribal development agenda. Effective implementation, convergence of schemes, and community participation are essential to ensure **inclusive growth and empowerment** of tribal communities.

INSTITUTIONS IN NEWS

ARBITRATION COUNCIL OF INDIA (ACI)

SOURCE: THE HINDU

Why in News?

The **Supreme Court of India** has sought the Union Government’s response on a plea demanding the establishment of the **Arbitration Council of India (ACI)**.

What is the Arbitration Council of India?

Legal Basis

- Established under **Part IA (Sections 43A–43M)** of the **Arbitration and Conciliation Act, 1996**.

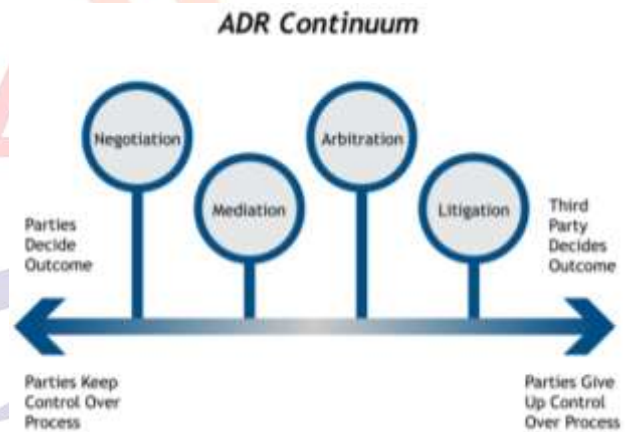
- Inserted through the **2019 Amendment Act**, based on recommendations of the **Justice B.N. Srikrishna Committee (2017)**.

Composition

- **Chairperson:** Appointed by the Central Government in consultation with the **Chief Justice of India (CJI)**. Eligible persons include former Supreme Court judges, High Court judges, or eminent arbitration experts.
- **Members:** Arbitration practitioners, academicians, and ex officio government officials.

Mandate & Functions

- **Grading of arbitral institutions** based on infrastructure and performance.
- **Accreditation of arbitrators** to ensure professional standards.
- Maintain a **repository of arbitral awards**.
- Promote **Alternative Dispute Resolution (ADR)** mechanisms like mediation and conciliation.
- Frame policies for uniform norms in arbitration practice.



Key Concerns Regarding ACI

1. Independence Issues

- Significant role of the government in appointments raises questions about autonomy.
- Since the **government is the largest litigant in India**, neutrality of a regulator dominated by government nominees is debated.

2. Regulatory Overreach

- Accrediting multiple arbitral institutions may dilute quality.
- Countries like Singapore and Hong Kong rely on strong, independent institutions rather than a central regulator.

3. Limited Global Appeal

- Exclusion of foreign legal professionals from accreditation reduces India’s competitiveness as an international arbitration seat.

Draft Arbitration and Conciliation (Amendment) Bill, 2024

Redefines “**arbitral institution**” as any body conducting arbitration under its own rules, removing the earlier requirement of court designation.

- Empowers arbitral institutions to:
 - Extend timelines for awards.
 - Reduce arbitrator fees in case of delays caused by tribunals.
 - Appoint substitute arbitrators.
- Introduces **Section 9-A**, allowing interim measures through **emergency arbitrators** after commencement but before tribunal formation.
- Modifies the 90-day timeline for commencing arbitration — now counted from the date of filing for interim relief rather than court order date.
- Curtails excessive court intervention during arbitration proceedings.

Significance of Constituting ACI

- Promotes **standardisation and credibility** in arbitration.
- Reduces court backlog and enhances **Ease of Doing Business**.
- Strengthens India’s ambition to become a **global arbitration hub** comparable to Singapore and London.

Conclusion

The constitution of the **Arbitration Council of India** is vital for strengthening institutional arbitration and improving investor confidence. Ensuring its **independence and professionalism** will determine whether India can emerge as a credible global arbitration destination.

GOVERNANCE

FREEBIES VS WELFARE STATE – FISCAL RESPONSIBILITY DEBATE

SOURCE: THE HINDU

Why in News?

Recently, the **Supreme Court of India** made strong remarks on the rising trend of **freebie culture** while hearing a plea related to free electricity schemes in Tamil Nadu.

What are Freebies?

- **Freebies** refer to goods or services distributed either free of cost or at highly subsidised rates, often without strict targeting.

- These may include:
 - Free electricity or water
 - Free food grains
 - Distribution of laptops, bicycles, consumer goods
 - Unconditional cash transfers
- Such schemes are frequently announced during elections by parties like the Dravida Munnetra Kazhagam and others as part of **electoral promises**.
- Unlike structured welfare, freebies are often **short-term and politically driven**.



Key Observations by the Supreme Court

- The **Supreme Court of India** cautioned that excessive free schemes can:
 - **Weaken state finances**
 - Divert funds from **capital expenditure**
- Many states are already running **revenue deficits**, yet continue expanding free schemes.
- The Court emphasised the need to:
 - Distinguish between **genuine beneficiaries** and those who can afford to pay.
 - Avoid policies that may harm **work culture and productivity**.
- It suggested shifting focus toward **employment creation** instead of universal giveaways.

Fiscal Context: Why the Concern?

- India’s combined **fiscal deficit (Centre + States)** remains high post-pandemic.
- Several states have **debt-to-GSDP ratios exceeding 30–35%**, raising sustainability concerns.
- Rising expenditure on subsidies reduces fiscal space for:
 - Infrastructure
 - Education
 - Healthcare
 - Capital investment
- The **FRBM (Fiscal Responsibility and Budget Management) framework** aims to ensure debt

sustainability, but state-level fiscal pressures are rising.

Issues Associated with Freebies

1. Fiscal Stress

- Free schemes increase **revenue expenditure** without generating assets.
- Leads to higher borrowing and interest burden.
- Reduces capacity for productive investment.

2. Distortion of Economic Priorities

- Funds shift from **long-term growth sectors** to short-term consumption.
- Capital expenditure multiplier effect (around 2.5–3 times) is lost.

3. Moral Hazard

- Continuous handouts may:
 - Reduce incentive to work
 - Encourage dependency
- Particularly concerning in the context of unemployment.

4. Political Populism

- Competitive populism leads to a “**race to the bottom**”.
- Election promises focus on immediate benefits instead of structural reforms.

5. Poor Targeting

- Benefits sometimes reach:
 - Middle-class households
 - Commercial users
- This leads to **leakages and inefficiency**.

Arguments in Favour of Freebies

Social Justice

- Freebies provide immediate relief to vulnerable sections against **poverty, inflation, and economic shocks**, aligning with the Directive Principles under Articles 38 and 39 that promote redistributive justice.

Human Development

- Subsidies on food, education, and healthcare improve **nutrition, literacy, and health indicators**, contributing to long-term human capital formation.

Demand Stimulation

- Since poorer households spend a larger share of their income, cash transfers and subsidies help **boost consumption and stimulate local economic activity**.

Political Legitimacy

- Welfare promises reflect democratic choice, as elected governments are accountable to citizens’ needs and policy preferences.

Difference Between Welfare and Freebies

Aspect	Welfare Measures	Freebies
Objective	Long-term empowerment	Short-term relief
Targeting	Targeted and means-tested	Often universal
Impact	Improves productivity	Limited productivity gains
Example	Skill development, healthcare	Free gadgets, unlimited power

- Welfare schemes build **human capital**.
- Freebies focus on **consumption support** without structural transformation.

Way Forward

Targeted Subsidies through DBT

- Using **Direct Benefit Transfer (DBT)** ensures subsidies reach only genuine beneficiaries directly in their bank accounts, reducing leakages and improving efficiency through Aadhaar-based identification.

Employment-Centric Growth

- Promoting **MSMEs, labour-intensive industries, and skill development** creates sustainable jobs, thereby reducing long-term dependence on free handouts.

Strengthening Fiscal Discipline

- Strict adherence to **FRBM norms** and transparent reporting of off-budget borrowings and contingent liabilities ensures sustainable public finances and prevents debt accumulation.

Role of Election Commission of India

- The Election Commission of India can enhance transparency by mandating disclosure of the fiscal cost of electoral promises in party manifestos.

Invest in Productive Welfare

- Prioritising spending on **education, healthcare, and infrastructure** builds human capital and generates long-term economic growth rather than short-term consumption benefits.

Power Sector Reforms

- Rational tariff pricing and reduction of **AT&C losses** improve financial viability of DISCOMs and reduce the recurring burden of electricity subsidies.

Conclusion

The Supreme Court’s remarks underline the urgent need to balance **compassionate governance** with **financial discipline**. India must shift from indiscriminate freebies to **empowerment-driven welfare** that promotes jobs, productivity, and sustainable growth.

DEBATE ON BANNING SOCIAL MEDIA FOR CHILDREN

SOURCE: THE HINDU

Why in News?

A tragic incident in Ghaziabad, Uttar Pradesh, involving the death of three minor sisters following a conflict over mobile phone use has intensified debate on banning **social media for children under 16**.

Background of the Incident

- The Ghaziabad case involved three sisters who reportedly jumped from a residential building after their father confiscated their phones.
- Initial reports suggested **digital addiction**, but investigations later pointed to **family stress and emotional distress**.
- The tragedy triggered national discussions on:
 - Gaming and social media dependency
 - Exposure to foreign digital cultures
 - Lack of parental supervision
- Experts argue that isolated incidents should not lead to **overbroad censorship policies**.

Social Media Landscape in India

India is a key digital market for global platforms:

- **Instagram and Facebook** each have over **400 million users** in India.
- **Snapchat** has more than **200 million users**, its largest market globally.
- **X (formerly Twitter)** has over **20 million users**.
- Although revenue per user is lower than in the US, India represents a **high-growth digital economy** with millions yet to come online.

Status of India's Digital Economy

- Digital economy contributed nearly **12% of GDP (2022–23)**, amounting to over ₹30 lakh crore.
- Employs about **14–15 million workers**, with productivity significantly higher than traditional sectors.
- Sectoral share:
 - ICT and digitally enabling industries – ~8% of GVA
 - Platforms and intermediaries – ~2%
 - Digitalisation of traditional sectors – ~2%
- Expected to reach **20% of GVA by 2030**, driven by AI, cloud services, and Global Capability Centres (GCCs).

Thus, any blanket ban could affect India's **digital innovation ecosystem**.

Existing Legal Framework

1. Information Technology Act, 2000

- Core law governing cyber activities and intermediary liability.

2. IT Rules, 2021

- Mandates grievance redressal officers and content removal timelines.

3. Section 79 (Safe Harbour)

- Protects intermediaries if due diligence is followed.

4. Digital Personal Data Protection Act, 2023

- Introduces parental consent for children's data processing, but concerns exist over enforceability.

5. Indian Penal Code Provisions

- Used for offences like defamation, obscenity, and hate speech.

Global Context

- **Australia** became the first country to legislate a ban on social media for under-16s with age verification mandates.
- **Spain** has announced plans for similar restrictions.
- Countries like France and the UK are exploring regulatory options.
- However, critics view these measures as **reactive and difficult to enforce**.

Why a Ban May Not Work in India

1. Technically Weak Enforcement

- Age-based bans are easily bypassed through **VPNs or false declarations**.

2. Migration to Riskier Spaces

- Restricting regulated platforms may push children to **unmonitored digital environments**.

3. Privacy and Surveillance Risks

- Mandatory age verification may link accounts with government IDs, raising concerns about **mass surveillance**.

4. Digital Divide and Gender Impact

- Only about **one-third of Indian women** report internet usage (NSS data).
- Blanket bans may disproportionately affect **girls and marginalised youth** who use digital spaces for education and mobility.

5. Ignoring Adolescent Development

- Social media can serve as a **support network**, especially for rural, queer, or differently-abled youth.

6. Democratic Deficit

- Policies are often framed without consulting young people themselves.

Alternative Policy Approach

- **Duty of Care Obligations:** Impose stronger accountability on platforms to protect minors.
- **Independent Digital Regulator:** Enforcement by an expert body rather than purely bureaucratic control.
- **Strengthening Digital Literacy:** Promote awareness among parents, teachers, and children.
- **Research and Data:** Public funding for longitudinal studies on digital well-being.
- **Youth Participation:** Involve adolescents in shaping digital policies.
- **Consistent Regulation:** Extend oversight to AI chatbots and emerging technologies.

Conclusion

Instead of blanket bans, India needs a balanced framework that protects children while respecting digital rights and economic growth. A **responsible, research-driven, and participatory regulatory model** is more effective than reactive censorship.

PRELIMS POINTERS IN NEWS

VIBRANT VILLAGES PROGRAMME PHASE II (VVP-II)

SOURCE: THE HINDU

Why in News?

The Union Home Minister recently launched **VVP-II**, covering 1,954 strategic border villages. The scheme aims to strengthen infrastructure and security in frontier regions.



About Vibrant Villages Programme (VVP)

The **Vibrant Villages Programme (VVP)** is a **100% centrally funded scheme** under the Ministry of Home Affairs. Phase I began in 2023 focusing on villages along the China border, while Phase II expands coverage to additional borders.

Objectives

- Promote **holistic development** of border villages.

- Improve **infrastructure, livelihoods and connectivity.**
- Enhance **national integration and security awareness.**

Coverage and Allocation

- Covers villages along **Pakistan, Nepal, Bangladesh, Bhutan and Myanmar** borders.
- Includes states such as Arunachal Pradesh, Ladakh, Punjab, Rajasthan and others.
- Approximately **₹3 crore per village** allocated.
- Duration from **2024–25 to 2028–29.**

Strategic Importance

- Reduces migration from border areas.
- Encourages residents to act as the **“eyes and ears”** of security forces.
- Strengthens frontier development and national cohesion.

NIGRANI APP AND HAJJ MODERNISATION INITIATIVES

SOURCE: THE HINDU

Why in News?

The NIGRANI App, Hajj Wrist Band and AI Chatbots were launched during the National Chintan Shivir at Nalanda University. These initiatives aim to enhance governance transparency and improve pilgrim services.



NIGRANI App

- Launched under the **Pradhan Mantri Jan Vikas Karyakram (PMJVK).**
- PMJVK is implemented in **Minority Concentration Areas** to create socio-economic infrastructure.
- The app enables **real-time monitoring, transparency and Centre–State coordination.**
- Tracks project progress and reduces implementation delays.

Hajj Wrist Band

- Provided free to all registered Indian pilgrims.

- Special focus on **elderly and vulnerable pilgrims**.
- Features include **GPS-based tracking, SOS alerts, prayer schedule integration and basic health monitoring**.

AI Chatbots

- Offer real-time guidance on travel, accommodation and religious procedures.

- Enhance service delivery and reduce confusion during pilgrimage.

Significance

- Strengthens digital governance.
 - Improves safety and service efficiency.
- Promotes inclusive development and accountability.

SUB-CLASSIFICATION OF SC/STS AND EXTENSION OF CREAMY LAYER PRINCIPLE

Why in News?

The **Supreme Court of India** recently asked the Union Government to submit an action-taken report on implementing its 2024 judgment permitting **sub-classification within Scheduled Castes (SCs)** and extending the **creamy layer principle**.

Background of the Verdict

1. E.V. Chinnaiah v. State of Andhra Pradesh

- The Court held that SCs form a **homogeneous class** under Article 341.
- States were barred from creating sub-categories within the Presidential List.
- Result: All SC communities were treated equally for reservation purposes.

2. State of Punjab v. Davinder Singh

- A larger Bench overruled the 2004 view.
- It upheld the validity of **sub-classification within SCs/STs**.
- Emphasised that **equitable distribution** of benefits is part of equality.
- Suggested that the **creamy layer exclusion** can be applied to SCs/STs to prevent advanced sections from cornering benefits.

- **Article 338** – National Commission for Scheduled Castes (NCSC).
- **Article 338A** – National Commission for Scheduled Tribes (NCST).
- **Article 46 (DPSP)** – Promotion of educational and economic interests of SCs/STs.
- **Article 341 & 342** – Presidential notification of SC/ST lists.

Presidential List of Scheduled Castes

- Under **Article 341**, the President notifies SC communities state-wise.
- Parliament alone can amend the list.
- SC status is **state-specific**; a caste recognised in one state may not be SC in another.
- The Constitution (Scheduled Castes) Order, 1950 restricts SC recognition to **Hindus, Sikhs, and Buddhists**.
- The inclusion of **Dalit Christians and Dalit Muslims** remains a pending legal and policy debate (2024–26).
- No SC community has been notified in **Arunachal Pradesh and Nagaland**.

Unlike SCs, **Scheduled Tribes have no religion restriction**.

Sub-Categorisation and Creamy Layer – Concept

Sub-Categorisation

- Division within SC/ST categories to prioritise the **most backward sub-groups**.
- Aims to correct **intra-group inequality**.
- Already practiced among OBCs at Central and State levels.

Creamy Layer Principle

- Excludes relatively advanced members from reservation.
- Introduced following the Indra Sawhney v. Union of India judgment.
- Current income ceiling for OBC creamy layer: **₹8 lakh per annum** (subject to periodic review).

Constitutional Framework for SC/ST Protection

Fundamental Rights

- **Article 15(4) & 15(5)** – Special provisions in education, including private institutions.
- **Article 16(4)** – Reservation in public employment.
- **Article 17** – Abolition of **untouchability**.
- **Article 23** – Prohibition of forced labour.

Political Representation

- **Articles 330 & 332** – Reserved seats in Parliament and State Assemblies.
- **Article 334** – Periodic extension of political reservation (extended up to 2030).

Institutional Safeguards

- Debate: Whether economic advancement negates **social stigma** in SC/ST context.

Doctrine of Equality and Classification

Doctrine of Equality (Article 14)

- Equality before law.
- Allows affirmative action for disadvantaged groups.

Doctrine of Reasonable Classification

- Classification is valid if:
 - Based on intelligible differentia.
 - Has rational nexus with objective.
- Recent judgment interprets sub-classification as a tool to achieve **real equality**, not violate it.

Challenges in Implementation

- **Constitutional Limits:** Since only **Parliament** can amend the Presidential List under Article 341, states have limited authority in restructuring SC categories.
- **Data Deficiency:** Absence of updated and reliable **caste-wise socio-economic data** makes it difficult to justify sub-classification with measurable evidence.
- **Inter-State Variations:** A particular sub-caste may be relatively advanced in one state but severely deprived in another, complicating uniform classification.
- **Creamy Layer Complexity:** SC/ST backwardness stems mainly from **historical social discrimination**, which may not be adequately captured through economic criteria alone.
- **Risk of Political Misuse:** Sub-classification debates may be exploited for **vote-bank politics** rather than genuine social justice.
- **Administrative Challenges:** Weak verification mechanisms can enable fraudulent acquisition of **non-creamy layer certificates**.
- **Social Harmony Concerns:** Creating internal categories may intensify caste identities and affect **community unity**.

What Lies Ahead?

- Ensure that existing schemes effectively reach the **most marginalised** first.
- Undertake a **comprehensive caste survey** for data-driven policy.
- Frame objective criteria balancing **social and economic indicators**.
- Avoid politicisation and ensure transparency.
- Protect community cohesion while pursuing targeted justice.

Conclusion

The Supreme Court's 2024 verdict marks a shift toward **substantive equality** by recognising internal disparities within SC/ST communities. Effective implementation must balance **constitutional safeguards, data-based policy, and social harmony** to ensure justice reaches the truly deprived.

INTERNATIONAL RELATIONS

INDIA RELATIONS WITH MAJOR NATIONS

INDIA-EU FREE TRADE AGREEMENT (FTA)

SOURCE: THE HINDU

Why in News?

India and the **European Union (EU)** have completed negotiations for a comprehensive **Free Trade Agreement (FTA)**, marking a major breakthrough in bilateral economic ties.

Key Highlights of the India-EU FTA

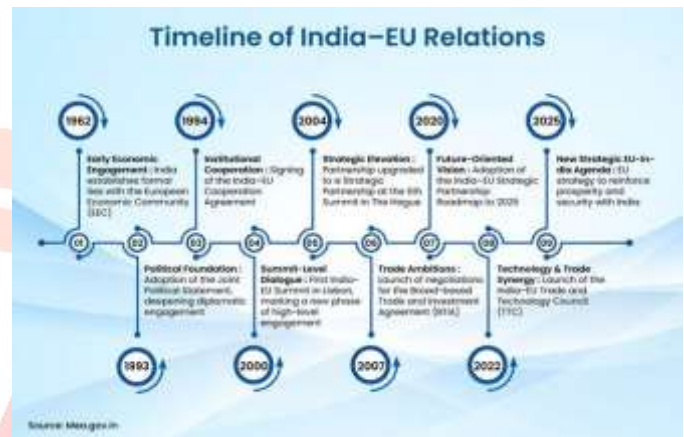
1. EU's Commitments to India

- **Extensive Market Access:** The EU will eliminate tariffs on about **97% of tariff lines**, covering nearly **99% of India's exports by value**.
- **Boost to Labour-Intensive Sectors:** Zero-duty access for textiles, leather, footwear, marine products, gems & jewellery, toys and sports goods (earlier facing 4–26% tariffs).
- **Services Liberalisation:** Binding commitments in **144 services subsectors** including IT, digital services, education, professional and business services.
- **Agricultural Access:** Preferential entry for selected agri and processed food products, enhancing value-added exports.
- **Mobility Framework:** Facilitates temporary movement of professionals such as intra-corporate transferees and contractual service suppliers.
- **Standards Cooperation:** Improved coordination on **Sanitary and Phytosanitary (SPS)** and **Technical Barriers to Trade (TBT)** to reduce hidden trade barriers.

2. India's Commitments

- **Calibrated Tariff Reduction:** India will reduce tariffs on about **92% of tariff lines**, covering 97% of EU exports, while protecting sensitive sectors like dairy and poultry.
- **Gradual Opening in Automobiles and Wines:** Phased liberalisation to safeguard domestic MSMEs.

- **Opening of 100+ Services Subsectors:** Telecom, finance, maritime, environmental and professional services opened to EU players.
- **Balanced IPR Regime:** Reaffirmed **TRIPS-compliant** framework while protecting generic medicines and traditional knowledge.
- **Flexible Rules of Origin:** MSME-friendly provisions allowing self-certification and alignment with global value chains.



Significance of the Agreement

1. Geoeconomic Diversification

- Supports the **China-plus-one** strategy by positioning India as a reliable manufacturing hub.
- Creates a democratic “rules-based” economic zone amid global trade fragmentation.

2. Enhanced Competitiveness (Brussels Effect)

- Compliance with EU standards will upgrade Indian manufacturing quality.
- Improved global credibility of Indian products in markets like the US and Japan.

3. Strategic Weight

- Links the **world's fourth-largest economy (India)** with the **second-largest economic bloc (EU)**.
- Together account for roughly **25% of global GDP and one-third of world trade**.

4. Green and Digital Transformation

- Encourages cooperation in **AI, semiconductors, clean energy, and green technologies**.
- Promotes secure digital trade and data governance standards.

Key Concerns and Challenges

1. Regulatory Barriers

- EU environmental and labour standards may act as **Non-Tariff Barriers (NTBs)**.

2. Carbon Border Adjustment Mechanism (CBAM)

- From 2026, carbon-intensive exports like steel and aluminium may face additional levies, reducing competitiveness.

3. EU Deforestation Regulation (EUDR)

- Compliance burden on small farmers to ensure traceability of commodities.

4. Corporate Sustainability Due Diligence Directive (CSDDD)

- Mandatory value-chain audits from 2027; concerns over data sensitivity.

5. Tariff Asymmetry

- EU tariffs on Indian goods were already low (3–4% average), whereas India’s were higher (10–12%).
- Gains may be relatively uneven.

6. Competition

- Countries like Bangladesh and Vietnam already enjoy preferential EU access.

Way Forward

- **Address Asymmetry:** Maximise gains in services and professional mobility.
- **Seek Fair Carve-outs:** Negotiate transitional flexibility under CBAM and EUDR.
- **Institutional Dialogue:** Establish rapid dispute-prevention mechanisms.
- **Strategic Integration:** Align FTA with IMEC and Indo-Pacific cooperation.
- **Strengthen Domestic Capacity:** Upgrade MSMEs to meet global sustainability standards.

Conclusion

The India–EU FTA is a landmark step in India’s trade diplomacy with strong economic and strategic potential. Its long-term success depends on managing regulatory challenges, ensuring fairness, and leveraging services and technology cooperation for balanced growth.

INDIA–CANADA RELATIONS

SOURCE: PIB

Why in News?

India and Canada have revived bilateral ties through high-level engagements in January 2026 after a period of diplomatic strain.

Key Highlights of Recent High-Level Engagements (2026)

1. Energy Cooperation

- Relaunch of the **Canada–India Ministerial Energy Dialogue (CIMED)** during India Energy Week 2026.

- Focus on diversified supplies of **LNG, LPG, crude oil**, and collaboration in **hydrogen production, carbon capture, and sustainable aviation fuels**.
- Proposal for a **10-year uranium supply agreement** to strengthen India’s nuclear energy capacity.

2. Food Security

- Canada supplies nearly **25% of India’s Muriate of Potash (MOP)** imports.
- Commitment to remain a stable fertilizer supplier amid global disruptions.
- Canada pledged to match investments made by Indian firms in its natural resource sector.

3. Critical Minerals & Clean Mobility

- Cooperation in **Lithium, Cobalt, Graphite, and Rare Earth Elements (REEs)** for EV and battery manufacturing.
- Plans for collaboration in **Advanced Chemistry Cell (ACC)** production and battery R&D.
- Announcement of the first **Canada–India Critical Minerals Dialogue (March 2026, Toronto)** to ensure resilient supply chains.

4. Trade & Investment

- Commitment to fast-track negotiations on the **Comprehensive Economic Partnership Agreement (CEPA)**.
- Target to double bilateral trade to **USD 50 billion by 2030** (current trade approx. USD 30–31 billion in 2024).



India–Canada Bilateral Relations

Historical Background

- Diplomatic ties established in **1947**.
- India’s Constitution drew inspiration from Canada’s **federal structure with strong Centre**.
- Relations elevated to a **Strategic Partnership in 2015**.

Economic Relations

- India is Canada’s **7th largest trading partner (2024)**.
- Major Canadian exports: fertilizers, mineral fuels, wood pulp.
- Major Indian exports: pharmaceuticals, machinery, electronics, iron & steel products.

Diaspora Link

- Canada hosts over **1.8 million people of Indian origin**, acting as a “living bridge” between both nations.

Technology & Innovation

- Cooperation under the **Science and Technology Cooperation Agreement (2005)**.
- ISRO and the Canadian Space Agency collaborate in satellite launches.

Security Cooperation

- Institutional frameworks include:
 - **Joint Working Group on Counter-Terrorism (1997)**
 - **Extradition Treaty (1987)**
 - **Mutual Legal Assistance Treaty (1994)**

Major Challenges in Relations

1. Khalistan Issue

- Allegations of extremist elements operating from Canadian soil.
- India raises concerns over **terror financing, gang networks, and separatist propaganda**.
- Canada emphasizes freedom of expression, leading to diplomatic friction.

2. Trade Barriers

- High tariffs on agriculture and textiles.
- Non-tariff barriers including **SPS norms and regulatory standards**.

3. Digital & Data Governance Differences

- India’s **data localization norms** pose challenges for Canadian tech firms.

4. Geopolitical Divergence

- Canada’s Indo-Pacific focus emphasizes human rights and de-risking.
- India prioritizes maritime security and balancing regional influence.

Measures to Strengthen Relations

1. Diplomatic Recalibration

- Establish a **Bilateral Security Dialogue at NSA level**.
- Create a **2+2 Ministerial Dialogue** for strategic coordination.

2. Intelligence & Legal Cooperation

- Strengthen counter-terror coordination.

- Ensure effective use of Extradition and MLAT frameworks.

3. Diaspora Engagement

- Promote cultural diplomacy and Track-II dialogue.
- Encourage film co-production and educational exchanges.

4. Economic & Technological Integration

- Mutual recognition of professional qualifications.
- Promote Canada as a testing ground for India’s **Digital Public Infrastructure (DPI)**.
- Encourage Canadian investment in **GIFT City** and sustainable mining projects.

Conclusion

The 2026 reset signals a pragmatic shift toward cooperation driven by energy security and supply chain resilience. Sustained dialogue, mutual trust, and balanced security cooperation are essential to transform India–Canada ties into a stable, forward-looking strategic partnership.

INDIA RELATIONS WITH OTHER NATIONS

INDIA–FRANCE SPECIAL GLOBAL STRATEGIC PARTNERSHIP

SOURCE: INDIAN EXPRESS

Why in News?

President Emmanuel Macron’s recent India visit upgraded bilateral ties to a **Special Global Strategic Partnership**.

Historical Evolution of Relations

1. Early Engagement (1947–1998)

- Cordial ties post-independence with cooperation in **space and civil nuclear energy**.
- France respected India’s **independent foreign policy**, including during the Cold War.

2. Strategic Partnership (1998)

- France became the **first Western country** to establish a Strategic Partnership with India after Pokhran-II nuclear tests.
- Expanded defence dialogue and political trust.

3. Institutional Deepening (2006–2018)

- **Defence Cooperation Agreement (2006)** operationalised military collaboration.
- **Civil Nuclear Agreement (2008)** enabled peaceful nuclear commerce.

- **Reciprocal Logistics Support Agreement (2018)** enhanced naval access to bases in the Indian Ocean.

4. Special Global Strategic Partnership (2023–present)

- Broadened scope to **Indo-Pacific security, AI, space missions (TRISHNA, Gaganyaan), green energy, and innovation ecosystems.**
- Anchored in a long-term vision leading up to India’s centenary of independence in 2047.

Key Pillars of the Special Partnership

1. Diplomatic and Institutional Mechanisms

- Formal elevation of ties with an **Annual Foreign Ministers’ Dialogue** for monitoring progress.
- Alignment on **Indo-Pacific stability** and multilateral reforms.

2. Defence and Security Cooperation

- Joint venture between BEL and Safran for local manufacturing of **HAMMER precision-guided munitions.**
- Deployment of liaison officers in respective land forces.
- Regular exercises: **Varuna (Navy), Garuda (Air Force), Shakti (Army).**
- High Committee on Defence Cooperation (HCDC) supervises military-industrial ties.

3. Technology and Space Collaboration

- Cooperation between ISRO and CNES.
- Joint missions like **TRISHNA climate satellite** and support for **Gaganyaan human spaceflight mission.**
- Launch of Indo-French Centres for **Digital Sciences and AI in Health (AIIMS Delhi).**

4. Economic and Trade Relations

- Bilateral trade stands at around **USD 15–16 billion (2023–24).**
- France is among India’s leading EU investors, with cumulative FDI exceeding **USD 10 billion.**
- Amendment to the **Double Taxation Avoidance Agreement (DTAA)** to ease investment flows.
- Five-year Schengen visas for Indian Master’s graduates enhance professional mobility.

5. Energy and Climate Action

- Collaboration on **Jaitapur Nuclear Power Project**, Small Modular Reactors (SMRs), and Advanced Modular Reactors (AMRs).
- Joint leadership in the International Solar Alliance.
- Focus on **green hydrogen and renewable energy transition.**

6. People-to-People and Innovation Links

- Around **1.2 lakh Indians** reside in France.

- India-France Year of Innovation (2026) to promote startup and R&D partnerships.
- Postal and digital payment integration (NPCI–Lyra collaboration).



Major Challenges

1. **Nuclear Liability Issues:** India’s Civil Liability for Nuclear Damage Act (2010) raises supplier concerns, delaying Jaitapur progress.
2. **Geopolitical Differences:** Divergences on the Russia-Ukraine war and West Asian crises.
3. **Trade Irritants:** EU SPS standards and unresolved GI issues (e.g., basmati).
4. **India–EU FTA Stalemate:** The BTIA negotiations, ongoing since 2007, remain unresolved.
5. **IPR Concerns:** French firms highlight gaps in intellectual property enforcement.

Way Forward

- **Strengthen Indo-Pacific coordination** through joint patrols and maritime domain awareness.
- Expand **defence co-production and R&D**, especially via initiatives like FRIND-X.
- Accelerate **green and climate partnerships**, including hydrogen value chains.
- Deepen cooperation in **AI, quantum computing, cybersecurity, and space technologies.**
- Resolve trade bottlenecks and push momentum in India–EU FTA talks.

Conclusion

The India–France Special Global Strategic Partnership reflects a shared commitment to **strategic autonomy, innovation, and Indo-Pacific stability.** By expanding defence, technology, and green cooperation, both nations contribute to shaping a **resilient and multipolar global order.**

INDIA–BRAZIL STRATEGIC PARTNERSHIP

SOURCE: THE HINDU

Why in News?

The President of Brazil paid a State Visit to India in February 2026, leading to major agreements in digital cooperation, defence, energy transition and critical minerals.



Key Outcomes of the 2026 State Visit

1. Reaffirmation of Strategic Partnership

Both sides reaffirmed the 2006 Strategic Partnership and the five pillars outlined in the 2025 Brasilia Joint Statement:

- **Defence and security**
- **Food and nutritional security**
- **Energy transition and climate action**
- **Digital transformation and emerging technologies**
- **Industrial partnerships in strategic sectors**

2. Digital and AI Cooperation

- Launch of the **India–Brazil Digital Partnership for the Future**.
- Welcome to the **Open Planetary Intelligence Network (OPIN)** for climate data collaboration.
- Emphasis on leveraging **Digital Public Infrastructure (DPI)** for inclusive development.
- Support for multilateral AI governance frameworks, including UN and UNESCO initiatives.
- Cooperation aligned with BRICS discussions on **global AI governance standards**.

3. Trade and Investment Expansion

- Bilateral trade reached approximately **USD 15.21 billion (2025)**, a growth of over 25%.
 - Indian exports: ~USD 8.35 billion
 - Imports from Brazil: ~USD 6.85 billion

- New trade target set at **USD 30 billion by 2030**.
- Agreement to expand the **India–MERCOSUR Preferential Trade Agreement (PTA)**.
- Signing of MoU on **Mutual Recognition of Electronic Certificates of Origin**.
- Commitment to address **non-tariff barriers and anti-dumping issues**.
- Brazil remains India’s **largest trading partner in Latin America and the Caribbean region**.

4. Critical Minerals and Mining Cooperation

- MoU signed on **rare earth elements and critical minerals**.
- Cooperation in mining for the **steel and clean energy supply chains**.
- Supports diversification of supply chains amid global resource competition.

5. Defence and Security Cooperation

- Defence Cooperation Agreement (2003) operationalised via **Joint Defence Committee**.
- 2+2 Political-Military Dialogue launched in 2024.
- Trilateral MoU involving **Mazagon Dock Ltd** for maintenance of **Scorpene-class submarines**.
- Scope to expand joint defence production and maritime security collaboration.

6. Energy Transition and Climate Action

- Appreciation for Brazil hosting **COP30 (Belém, 2025)**.
- Support for the **Tropical Forests Forever Facility (TFFF)** initiative.
- Commitment to the *“Belém 4x Pledge on Sustainable Fuels”* to quadruple sustainable fuel usage by 2035.
- Cooperation through:
 - Global Biofuel Alliance
 - International Solar Alliance

India’s **National Biofuel Policy** and Brazil’s **RenovaBio Programme** share blending and decarbonisation goals.

7. Multilateral and G4 Cooperation

- Coordination within **BRICS, G20, and G4** grouping.
- Joint demand for **UN Security Council reform** through text-based negotiations.
- Advocacy for democratisation of global institutions like the WTO.

Challenges in India–Brazil Relations

1. **Geographical Distance (14,000+ km)** – High logistics costs and absence of direct connectivity.
2. **Trade Composition** – Heavy reliance on primary commodities (oil, sugar, soybean oil), limiting intra-industry depth.

3. **China Factor** – China remains Brazil’s largest trading partner, creating competitive imbalance.
4. **Limited Defence Depth** – Compared to India’s ties with Russia, France or the US, defence engagement with Brazil remains modest.
5. **NSG Divergence** – Brazil’s position on Nuclear Suppliers Group reforms occasionally differs from India’s expectations.

Way Forward

- **Diversify Trade Basket** toward IT services, pharmaceuticals, aerospace, and green technologies.
- Establish **direct maritime corridor and air connectivity** between India and São Paulo.
- Promote joint R&D in **AI, semiconductors, biofuels, and critical minerals**.
- Institutionalise defence industrial cooperation through co-development projects.
- Expand **academic, language, and cultural exchanges** to deepen societal understanding.
- Strengthen coordinated action in **BRICS, G20, ISA, GBA, CDRI, and UN reforms**.

Conclusion

The 2026 State Visit marks a new phase in the India–Brazil Strategic Partnership, driven by **digital innovation, clean energy, and multipolar diplomacy**. By addressing trade and connectivity gaps, both nations can emerge as stronger **Global South leaders shaping a fairer global order**.

GLOBAL ISSUES

INDIA AND THE GAZA BOARD OF PEACE

SOURCE: THE HINDU

Why in News?

India attended, as an **observer**, the first meeting of the U.S.-led *Board of Peace* in Washington, D.C. The initiative seeks to design a long-term **post-conflict governance and reconstruction framework for Gaza** beyond temporary ceasefires.

About the Board of Peace

1. Concept and Vision

- Envisaged as a **high-level political platform** to stabilise Gaza after the ongoing Israel–Hammas conflict.

- Moves beyond short-term truce management toward **institutional rebuilding and governance transition**.
- Presented as a “new model” that may later be applied to other global conflict zones.

2. Core Mandates

- **Governance Transition:** Support formation of a lawful, accountable administrative structure in Gaza to prevent a power vacuum.
- **Reconstruction Financing:** Coordinate international funding, ensure transparent disbursement, and mobilise sustained multi-year resources.
- **Security Stabilisation:** Create conditions for civil order without necessarily deploying multinational troops.

3. Structure and Design

- Proposed **top-tier membership limited to Heads of State/Government**, indicating concentrated political authority.
- Architected under U.S. leadership, reportedly aligned with former U.S. President Donald Trump’s diplomatic approach.
- India holds **observer status**—allowed to participate in discussions but without voting rights.

Broader Implications for Global Governance

1. Shift from Multilateralism

- Such mechanisms may bypass the United Nations, weakening established collective security norms.
- Similar precedents include NATO’s Kosovo intervention (1999), conducted without explicit UN Security Council approval.

2. Rise of Minilateral Platforms

- Flexible coalitions such as Quad and I2U2 Group show a trend toward **issue-based alliances** outside formal UN frameworks.

3. Power Asymmetry

- Dominant countries may shape outcomes, marginalising local stakeholders—an issue witnessed during the Afghanistan peace negotiations.

4. Norm Contestation

- Divergent interpretations of **sovereignty, humanitarian intervention, and external governance** could fragment global norms.

Strategic Significance for India

1. Energy and Diaspora Security

- West Asia accounts for nearly **60% of India’s crude oil imports**.

- Around **8–9 million Indians** reside in the Gulf region; instability may affect remittances and safety.

2. Maritime and Trade Interests

- Conflict threatens the **Red Sea–Suez Canal corridor**, critical for India’s trade with Europe.
- Disruptions increase freight costs and affect projects like the **India–Middle East–Europe Economic Corridor (IMEC)**.

3. Diplomatic Credibility

- India maintains working relations with Israel, Palestine, the U.S., Iran, and Arab states.
- Participation underscores India’s image as a **trusted, balanced interlocutor**.

4. Moral and Normative Role

- India supports a **two-state solution** and humanitarian access.
- Engagement aligns with its **“Vishwabandhu”** vision and advocacy for the **Global South**.

Key Concerns from India’s Perspective

- **UN Legitimacy:** Parallel structures risk undermining UN-centred multilateralism, which India consistently upholds.
- **Local Representation:** Sustainable peace requires meaningful Palestinian participation.
- **Mandate Expansion:** Expanding beyond Gaza may dilute focus and complicate consensus.
- **Military Involvement:** India prefers humanitarian and reconstruction roles over troop commitments in non-UN missions.

Way Forward

- **Anchor within UN Framework:** Advocate formal linkage with the UN to reinforce legitimacy.
- **Promote Inclusive Governance:** Ensure Palestinian voices are central to reconstruction efforts.
- **Restrict Scope:** Maintain clarity that the Board’s focus remains Gaza-specific.
- **Civilian Contribution:** Offer humanitarian relief, infrastructure development, and capacity-building—similar to India’s developmental engagement in Afghanistan.
- **Balanced Diplomacy:** Continue calibrated engagement with all stakeholders while reaffirming support for a negotiated two-state solution.

Conclusion

India’s observer role in the Gaza Board of Peace reflects a calibrated blend of **strategic prudence and humanitarian commitment**. Anchoring engagement in **multilateral norms**

and **inclusive governance** can enhance India’s credibility as a responsible global actor.

PRELIMS POINTERS IN NEWS

INDIA AND INTERNATIONAL ENERGY AGENCY (IEA) MEMBERSHIP PROGRESS

SOURCE: THE HINDU

Why in News?

The International Energy Agency (IEA) welcomed progress on India’s request for **full membership** at its recent ministerial meeting in Paris. India is currently an **Association Country**.



About International Energy Agency (IEA)

- The **International Energy Agency (IEA)** was established in 1974 in response to the global oil crisis.
- Headquartered in Paris, it functions as an autonomous intergovernmental organisation focusing on **energy security, economic growth, and sustainability**.

Core Objectives (3 Es)

- **Energy Security** – Coordinated response to oil supply shocks.
- **Economic Development** – Reliable and affordable energy access.
- **Environmental Sustainability** – Clean energy transitions.

Key Functions

- Publishes globally respected reports such as:
 - **World Energy Outlook**
 - **Oil Market Report**
- Coordinates emergency oil stock releases.
- Monitors **critical minerals** needed for energy transition.
- Analyzes global energy trends including AI-driven energy demand.

Membership Status

- 32 member countries (primarily OECD members).
- India became an Association Country in 2017.
- Full membership would require meeting oil stockholding obligations.

Strategic Importance for India

- Greater voice in global energy governance.
- Access to high-quality data and policy frameworks.
- Support in clean energy transition.
- Strengthened role in discussions on **Net Zero** pathways.

FORGE INITIATIVE (CRITICAL MINERALS FRAMEWORK)

SOURCE: THE HINDU

Why in News?

India has extended its support to the newly launched **FORGE Initiative** at the Critical Minerals Ministerial held in Washington DC in February 2026. The initiative aims to reduce supply chain risks in critical minerals vital for clean energy and strategic industries.



FORGE Initiative

- The **FORGE (Forum on Resource and Geostrategic Engagement)** Initiative is a new **multilateral framework on critical minerals**, succeeding the US-led **Mineral Security Partnership (MSP)**.
- It seeks to strengthen global cooperation in securing resilient and diversified mineral supply chains.

Background and Need

- Critical minerals such as **lithium, cobalt, nickel and rare earth elements** are essential for **electric vehicles (EVs), renewable energy systems, semiconductors, defence equipment and battery storage**.
- Global supply chains are highly concentrated, with limited producers and processors dominating the market.
- Geopolitical tensions and export restrictions have heightened concerns over **resource security**.

Objectives

- **Diversify supply chains** and reduce overdependence on a few countries.
- Promote **responsible and sustainable mining practices**.
- Enhance transparency in mineral sourcing and processing.
- Facilitate policy and project-level cooperation among member states.

Participation

- Over **50 countries**, including India, the United States, the European Union, Japan and Australia.
- Focus on both resource-rich and technology-intensive economies.

Importance for India

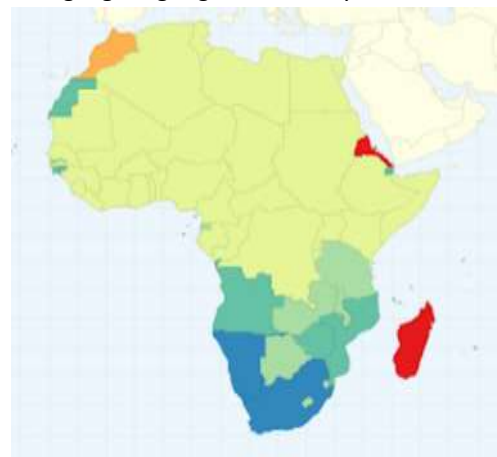
- India imports a significant portion of its **lithium and rare earth requirements**.
- Supports domestic programmes such as the **National Critical Minerals Mission (NCMM)** and proposed **Rare Earth Corridors**.
- Strengthens India's **Net Zero by 2070** strategy.
- Enhances supply security for EVs and renewable energy expansion.

AFRICAN UNION (AU)

SOURCE: INDIAN EXPRESS

Why in News?

The African Union condemned a drone attack by the M23 armed group on Kisangani airport in DR Congo. The AU stated that such actions may amount to an act of terrorism, highlighting regional security concerns.



About African Union

- The **African Union (AU)** is a continental organisation founded in **2002**, replacing the **Organisation of African Unity (OAU)**. It aims to promote unity,

peace, economic development and integration across Africa.

Establishment and Structure

- Constitutive Act signed in **2000 (Lomé, Togo)**; came into force in 2001.
- Headquarters: **Addis Ababa, Ethiopia**.
- Membership: **55 African countries**.

Key Organs

- **Assembly of Heads of State and Government** – Supreme decision-making body.
- **African Union Commission (AUC)** – Administrative arm.
- **Peace and Security Council (PSC)** – Manages conflicts and peacekeeping.
- **Pan-African Parliament (PAP)** – Advisory legislative body.
- **ECOSOCC** – Ensures civil society participation.
- **African Peer Review Mechanism (APRM)** – Governance monitoring.

Agenda 2063

- Long-term development blueprint adopted in 2015.
- Focus on **economic integration, high-speed rail network, free movement of people, and sustainable development**.

Role in Conflict Resolution

- Engages in mediation and peace operations.
- Supports democratic transitions and counter-terrorism initiatives.

COMMISSION FOR SOCIAL DEVELOPMENT (CSOCD)

SOURCE: THE HINDU

Why in News?

India reaffirmed its commitment to inclusive social development at the 64th Session of the Commission for Social Development.



Commission for Social Development (CSocD)

- The **Commission for Social Development (CSocD)** is a functional commission of the **United Nations Economic and Social Council (ECOSOC)**.

- Established in **1946**, it provides global policy guidance on social development.

Mandate and Functions

- Advises UN member states on **poverty reduction, employment, ageing, disability and social inclusion**.
- Oversees follow-up to the **1995 Copenhagen Declaration on Social Development**.
- Reviews progress on **Sustainable Development Goals (SDGs)** related to social equity.

Composition

- 46 members elected by ECOSOC for four-year terms.
- Meets annually at the UN Headquarters in New York.

India's Role

- Chaired the 62nd Session in 2024.
- Advocates inclusive growth, digital public infrastructure and women-led development.

LEAGUE OF ARAB STATES (ARAB LEAGUE)

SOURCE: TIMES OF INDIA

Why in News?

India's External Affairs Minister met the Secretary-General of the Arab League to enhance cooperation. The discussions covered political, economic and cultural collaboration.



League of Arab States (LAS)

- The **League of Arab States (LAS)**, founded in **1945**, is a regional organisation of Arab countries in the Middle East and Africa. It promotes political coordination and regional solidarity.

Key Features

- Headquarters: **Cairo, Egypt**.
- Members: **22 Arab countries**.
- Official language: Arabic.
- Observer status: India, Brazil, Eritrea and Venezuela.

Objectives

- Strengthen political, economic and cultural ties.
- Resolve disputes among members.
- Coordinate development strategies.

India-Arab League Relations

- Cooperation in **energy security, trade, diaspora welfare and counter-terrorism.**
- Gulf region remains vital for India’s oil imports and remittances.

EURO ZONE (EURO AREA)

SOURCE: THE HINDU

Why in News?

Bulgaria adopted the euro as its official currency on 1 January 2026, becoming the 21st member of the Euro Zone.



About Euro Zone

- The **Euro Zone**, also known as the **Euro Area**, is a monetary union of European Union (EU) countries that use the **euro as their sole legal tender.**
- It represents one of the most advanced forms of economic integration in the world under the framework of the **Economic and Monetary Union (EMU).**

Historical Evolution

- The foundation of the Euro Zone lies in the **Maastricht Treaty (1992)**, which formally created the European Union and laid down the roadmap for a **single currency and unified monetary policy.**
- The euro was introduced for electronic transactions in **1999** and physical notes and coins were circulated in **2002.**

- Bulgaria’s entry in 2026 marks continued expansion of the common currency bloc.

Membership and Structure

- Total Members (2026): **21 countries.**
- Non-euro EU members: Czech Republic, Denmark, Hungary, Poland, Romania and Sweden (most are legally committed to adopt the euro in future).
- Headquarters of monetary authority: **Frankfurt, Germany (European Central Bank – ECB).**

Institutional Framework

Eurosystem

- Comprises the **European Central Bank (ECB)** and national central banks of euro-area countries.
- Responsible for maintaining **price stability.**

Eurogroup

- Informal gathering of finance ministers of euro countries.
- Coordinates economic and fiscal policies.

European Stability Mechanism (ESM)

- Permanent financial assistance mechanism created in 2012.
- Provides bailout support during sovereign debt crises.

Maastricht Convergence Criteria

Countries must satisfy strict economic conditions before joining:

- **Inflation control** within 1.5 percentage points of best-performing EU states.
- **Fiscal deficit** below 3% of GDP.
- **Public debt** below 60% of GDP or declining sustainably.
- Participation in **Exchange Rate Mechanism (ERM II)** for at least two years without major instability.

Significance of the Euro Zone

- Enhances **trade integration** and reduces currency exchange risks.
- Strengthens Europe’s global economic influence.
- Promotes macroeconomic discipline among members.

E-PRODUCTION INVESTMENT BUSINESS VISA (E-B-4 VISA)

SOURCE: THE HINDU

Why in News?

India introduced the **e-Production Investment Business Visa (e-B-4)** to ease entry of foreign professionals engaged in production-linked activities.

The reform supports India's expanding manufacturing and investment ecosystem.



About e-B-4 Visa

- The **e-B-4 Visa** is a fully digital business visa introduced by the **Department for Promotion of Industry and Internal Trade (DPIIT)** under the Ministry of Commerce and Industry.
- It aims to simplify visa procedures for foreign professionals involved in manufacturing, installation and investment-related operations.

Key Features

- **Completely online application process**, reducing physical paperwork.
- Validity of stay up to **six months**.
- Sponsorship letter generated digitally through the **National Single Window System**.

- Final approval by the **Ministry of External Affairs (MEA)** and **Ministry of Home Affairs (MHA)**.
- Processing timeline of around **45–50 days**.

Eligible Activities

- Installation and commissioning of industrial equipment.
- Production ramp-up and factory setup.
- ERP systems and supply chain integration.
- Technical training and knowledge transfer.
- Senior management and executive visits.

Significance

- Strengthens **Ease of Doing Business**.
- Facilitates smoother implementation of foreign direct investment projects.
- Supports India's integration into global supply chains.
- Encourages technology transfer and industrial capacity building.

Concerns and Safeguards

- Security clearances remain mandatory to protect national interests.
- Ensures digital tracking and documentation transparency.
- Balances investment facilitation with regulatory oversight.

INDIA-UAE ECONOMIC CORRIDOR

Why in News?

India and the United Arab Emirates have accelerated implementation of the **Comprehensive Economic Partnership Agreement (CEPA)**, surpassing the initial trade target well ahead of schedule.

Current Status of the Corridor

1. Trade Expansion

- CEPA (signed in 2022) aimed for **USD 100 billion trade by 2030**, reportedly achieved much earlier than anticipated.
- A revised target of **USD 200 billion by 2032** signals confidence in sustained growth.
- **Non-oil trade** rose to nearly **USD 65 billion**, growing around 15–20% annually, reflecting diversification beyond hydrocarbons.

2. Investment Flows

- Since 2000, UAE investments in India exceed **USD 22 billion**, spanning infrastructure, renewable energy, and fintech.

- Indian investments in the UAE stand at about **USD 15–16 billion**, especially in construction, hospitality, and services.
- Sovereign funds such as Mubadala Investment Company and Abu Dhabi Investment Authority have expanded their India exposure, including operations in GIFT City.

3. Diaspora Connectivity

- Nearly **3.5–5 million Indians** reside in the UAE, forming the backbone of remittance and business networks.
- Strong aviation links—over **1,000 weekly flights**—facilitate trade and tourism.

Strategic Significance

1. Sectoral Diversification

- The corridor now includes **advanced manufacturing, electric mobility, financial services, and logistics hubs**.

- Example: Reliance–TA’ZIZ low-carbon chemicals project (~USD 2 billion); electric bus production expansion by Ashok Leyland.

2. Financial Integration

- Emirates NBD’s investment in Indian banking marked one of the largest foreign banking entries.
- DP World has committed around **USD 5 billion** for Indian ports, warehousing, and multimodal logistics parks.

3. Regional Gateway Role

- Initiatives like **Bharat Mart (Dubai)** aim to serve markets in **Africa, West Asia, and Eurasia**, potentially doubling India’s exports to these regions.
- Complements India’s role in emerging connectivity frameworks like IMEC.

Key Pillars of Bilateral Cooperation

1. Policy Architecture

- CEPA removed tariffs on nearly **90% of tariff lines**, easing goods trade.
- The **Bilateral Investment Treaty (2024)** enhances investor protection and dispute resolution certainty.

2. Energy Security

- Abu Dhabi National Oil Company signed multi-billion-dollar LNG supply agreements with Indian refiners like Indian Oil and HPCL.
- Expanding collaboration in **green hydrogen and renewables**.

3. Technology and Digital Partnership

- Cooperation in **AI, fintech, and data centres**.
- India to host the **Global South AI Summit (2026)** with UAE participation.
- Collaboration in digital public infrastructure and payment systems.

4. Long-Term Capital Commitment

- UAE sovereign wealth funds investing in **healthcare, renewable energy, and startups**.
- Growing fintech presence in GIFT City enhances cross-border financial flows.

Challenges in the Corridor

1. **Geopolitical Volatility:** West Asian tensions may affect investor confidence.
2. **Regulatory Differences:** Labour laws, taxation, and compliance norms need harmonisation.
3. **Skill and Technology Gaps:** AI and advanced manufacturing demand skilled manpower and digital infrastructure.

4. **Export Concentration Risk:** Overdependence on a few sectors may increase vulnerability to global shocks.

Way Forward

- **Broaden Sectoral Base:** Expand cooperation in AI, biotech, renewable energy, and healthcare.
- **Strengthen Legal Alignment:** Simplify compliance and harmonise regulatory standards.
- **Capacity Building in Africa:** Joint skill and digital projects to expand the corridor’s global footprint.
- **Innovation-Led Growth:** Position the corridor as a **Global South model** for technology-driven development.

Conclusion

The India–UAE corridor demonstrates how **strategic alignment and economic trust** can transform regional partnerships into global growth engines. By prioritising diversification and innovation, both nations can build a **resilient and future-ready economic alliance**.

ECONOMY

BANKING AND FINANCIAL INTERMEDIARIES

CONSUMER CONFIDENCE AND SUSTAINABILITY OF DEMAND IN INDIA

SOURCE: PIB

Why in News?

Recent tax rationalisation and lower inflation have strengthened short-term consumption trends in India. However, rising household debt and uneven income growth raise concerns about the long-term sustainability of consumer confidence.

Factors Supporting Consumer Confidence

1. Policy-Led Disinflation

- Retail inflation fell sharply in 2025, with headline CPI touching historically low levels (around **1% range in late 2025**).
- Lower GST rates reduced prices of several goods and services.
- During the 2025 festive season, demand for **consumer durable loans increased significantly**, indicating improved spending appetite.

2. Rural Wage Recovery

- Real rural wage growth turned positive (around **4% in early 2025–26**) after stagnation in previous years.
- Decline in rural inflation (near **2–3%**) improved purchasing power.
- Nominal rural wage growth also showed moderate improvement.

3. Urban Income Trends

- Corporate staff cost growth (proxy for urban wages) recorded real gains due to low inflation.
- Service sector expansion and formal employment growth supported urban consumption.

4. Monetary Policy Support

- The RBI implemented cumulative rate cuts (around **100–125 basis points in 2025**).
- Transmission of lower lending rates is boosting housing, auto, and personal loans.

RBI's Consumer Confidence Survey (CCS)

- Conducted bi-monthly by the **Reserve Bank of India (RBI)**.

- Measures perceptions on:
 - **General economic situation**
 - **Employment conditions**
 - **Price levels/inflation**
 - **Household income**
 - **Spending intentions**
- Covers major urban centres; complemented by a **Rural Consumer Confidence Survey (RCCS)**.
- Helps policymakers assess **aggregate demand trends** and calibrate monetary policy.

Concerns Regarding Sustainability of Consumer Confidence

1. Rising Household Debt

- Household financial liabilities rose significantly post-pandemic, touching over **6% of GDP in recent years**, before moderating slightly.
- Growth in personal loans has outpaced wage growth.
- Higher EMIs reduce disposable income for discretionary spending.

2. Weak Income Fundamentals

- Recent real wage gains are largely due to **low inflation**, not strong productivity-driven income growth.
- Urban nominal wages have remained relatively stagnant.
- If food prices decline sharply, farm incomes may weaken, affecting rural demand.

3. K-Shaped Recovery

- High-income groups drive premium consumption (luxury goods, travel, electronics).
- Lower- and middle-income groups face income stagnation.
- This narrows the mass consumer base and limits broad-based demand expansion.

4. Declining Savings Buffer

- Household financial savings as a percentage of GDP have declined compared to pre-pandemic levels.
- Increased reliance on credit-financed consumption raises vulnerability during shocks.

5. Structural Shifts in Consumption

- Rising health expenditures and spending on ultra-processed goods indicate stress and lifestyle changes.
- Reduced share of spending on education may impact future human capital formation.

Steps Needed for Sustainable Consumer Confidence

1. Strengthen Income Growth

- Promote **labour-intensive manufacturing and exports**.
- Encourage productivity-linked wage growth.
- Improve agricultural value chains beyond MSP dependence.

2. Rebuild Household Financial Stability

- Incentivize **long-term financial savings** with positive real returns.
- Enforce macroprudential regulations on unsecured lending.
- Expand health insurance and pension coverage to reduce precautionary savings.

3. Maintain Price Stability

- Ensure stable and predictable inflation, particularly in food prices.
- Avoid abrupt tax policy changes to support long-term planning.

4. Promote Inclusive Growth

- Support MSMEs with easier credit access.
- Invest in rural infrastructure to bridge urban–rural income gaps.
- Address inequality to prevent a prolonged **K-shaped recovery**.

5. Balanced Fiscal Strategy

- Combine capital expenditure with **human capital investment** (health, education, skilling).
- Maintain fiscal prudence to retain space for counter-cyclical interventions.

Conclusion

Recent policy measures and low inflation have temporarily boosted consumer sentiment in India. For consumption-led growth to remain durable, India must ensure **stable incomes, reduced debt vulnerability, and inclusive economic expansion**.

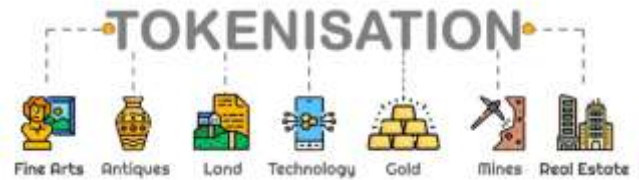
FINANCIAL ASSET TOKENISATION

SOURCE: INDIAN EXPRESS

Why in News?

While India’s **Digital Public Infrastructure (DPI)** has transformed payments and financial inclusion, credit penetration remains shallow. Policymakers are now exploring **financial asset tokenisation** as a reform to improve credit depth and enforceability.

Types of Assets Tokenization



What is Financial Asset Tokenisation?

- **Financial Asset Tokenisation** refers to the digital representation of ownership rights or financial claims (such as bonds, receivables, and fund units) on a **programmable ledger**.
- It converts traditional financial instruments into **transferable, pledgeable, and enforceable digital tokens**.
- These tokens embed rules regarding settlement, ownership transfer, and servicing.

Thus, assets move from being passive records to becoming **programmable financial claims**.

About the Credit System

The **credit system** comprises institutional and non-institutional mechanisms through which loans are supplied to agriculture, industry, MSMEs, and households.

Objectives

- Mobilise savings into productive investments.
- Ensure affordable credit access.
- Reduce dependence on informal lenders.
- Promote balanced regional growth.

Issues in India’s Credit System

1. Low Credit Depth

- Domestic bank credit to the private sector is around **50–55% of GDP**, lower than advanced economies.
- Indicates underdeveloped financial intermediation.

2. MSME Credit Gap

- Formal sector meets only a fraction of MSME demand.
- Estimated credit gap exceeds **₹70–80 lakh crore** despite priority sector lending norms.

3. Structural Bottlenecks

- Fragmented asset registries.
- Slow collateral enforcement.
- Lengthy settlement cycles.

4. Data Without Collateral

- DPI enables cash-flow visibility via Account Aggregator.
- However, verified data cannot easily become **legally enforceable collateral**.

5. Static Asset Records

- Digital records remain informational.

- They lack programmability, leading to delays and disputes.

How Tokenisation Can Strengthen the Credit System

1. Programmable Ownership

- Embeds legal rights directly into the digital asset.
- Enhances lender confidence and enforceability.

2. Faster Settlement

- Settlement and servicing become automated features.
- Reduces transaction costs and improves liquidity.

3. Reduced Information Asymmetry

- Integration with DPI improves underwriting quality.

Enables real-time verification.

4. Continuous Monitoring

- Assets can be tracked dynamically.
- Improves risk assessment and reduces defaults.

5. MSME Credit Enhancement

- Tokenised receivables linked with platforms like ONDC can reflect real-time business flows.
- Makes receivables more easily pledgeable.

Way Forward

1. B2B First Approach

- Begin with tokenisation of corporate bonds and trade receivables before retail expansion.

2. Regulatory Sandbox

- Joint sandbox under **Securities and Exchange Board of India (SEBI)** and **International Financial Services Centres Authority (IFSCA)**.
- Conduct phased pilots with controlled exposure.

3. Custody and Legal Safeguards

- Mandate licensed custodians.
- Establish insolvency and fraud recovery protocols.

4. Tax Clarity

- Differentiate between asset-backed tokens and speculative crypto-assets.
- Ensure neutral tax treatment for tokenised securities.

5. Legal Harmonisation

- Align tokenisation with Contract Act, Companies Act, and insolvency laws.

Conclusion

Financial asset tokenisation can convert India's strong digital infrastructure into a deeper and more efficient credit ecosystem.

With prudent regulation and phased implementation, it can unlock **greater credit access, especially for MSMEs**, while maintaining financial stability.

FISCAL POLICY AND BUDGETING

CAPITAL GOODS SECTOR IN UNION BUDGET 2026-27

SOURCE: PIB

Why in News?

The **Union Budget 2026-27** has announced a significant increase in **public capital expenditure** along with targeted schemes to strengthen the capital goods sector.

Key Budget Announcements for Capital Goods

1. Higher Public Capital Expenditure

- Public capital expenditure increased to about **₹12.2 lakh crore** for FY 2026-27.
- Government capex has expanded more than four times compared to FY18 levels, reflecting sustained emphasis on **infrastructure-led growth**.
- Higher capex is expected to **crowd in private investment**, stimulate demand for machinery, and enhance productive capacity.

2. Manufacturing Capacity Enhancement

- Proposal to establish **Hi-Tech Tool Rooms** by Central Public Sector Enterprises.
- These centres will provide **digitally enabled design, testing, prototyping, and precision manufacturing** facilities at affordable cost.
- Introduction of a **Construction and Infrastructure Equipment Scheme** to promote domestic production of advanced machinery.

3. Container Manufacturing Push

- Announcement of a **₹10,000 crore Container Manufacturing Scheme** over five years.
- Objective: Develop a globally competitive container ecosystem to reduce import dependence.
- Expected to strengthen **logistics efficiency and export competitiveness**.

4. Support for Toll and Electronics Manufacturing

- Five-year income tax exemption for non-resident entities supplying capital goods to toll manufacturers in bonded zones.
- Additional tax incentives for foreign suppliers supporting electronics manufacturing.
- Benefits applicable up to **tax year 2030-31**, reducing capital costs and encouraging global supply chain integration.

5. Energy Transition and Critical Minerals

- Extension of **customs duty exemptions** on capital goods used in lithium-ion battery cell manufacturing.
- Customs relief for machinery required in **critical mineral processing**.
- Supports India's push toward **battery storage systems, renewable energy, and strategic mineral security**.

Significance of the Capital Goods Sector

1. High Multiplier Effect

- Public capex generates strong spillovers, with estimated multipliers of **2.5–3.5 times** in overall economic output.

2. Backbone of Manufacturing

- Supplies machinery to automobiles, textiles, electronics, mining, agriculture, and infrastructure sectors.
- Essential for achieving **Make in India** goals.

3. Technology Diffusion

- Facilitates adoption of **automation, robotics, AI, IoT**, and advanced engineering systems across industries.

4. Strategic Importance

- Critical for renewable energy plants, EV batteries, semiconductor manufacturing, and defence equipment.

5. Employment Generation

- Skill-intensive sector generating jobs in engineering, fabrication, technical services, and design.

Policy Support Framework

1. Make in India Initiative

- Promotes domestic production of capital goods to reduce import dependence.

2. National Capital Goods Policy, 2016

- Roadmap to increase domestic production and exports while improving technological depth.

3. Capital Goods Scheme (Phase I & II)

- Focus on technology development, skill enhancement, testing facilities, and industry-academia collaboration.

4. Production Linked Incentive (PLI) Schemes

- Boost demand for advanced machinery in sectors such as automobiles, batteries, electronics, and renewable energy.

Challenges Facing the Sector

1. **Inverted Duty Structure** – Higher duties on raw materials than finished goods increase domestic production costs.

2. **Technology Gap & Low R&D** – Limited indigenous innovation restricts high-precision manufacturing capability.
3. **High Logistics Costs** – Elevated freight and port inefficiencies reduce global competitiveness.
4. **Fragmented MSME-Dominated Structure** – Limits economies of scale and access to affordable finance.
5. **Dependence on Government Capex** – Growth closely tied to fiscal cycles, making the sector vulnerable to tightening.

Measures Required

- **Expand Hi-Tech Tool Rooms and Common Facility Centres** to provide MSMEs access to advanced “mother machinery.”
- Promote indigenous production of advanced infrastructure equipment such as **tunnel-boring machines and heavy industrial systems**.
- Reduce cost of capital through easier credit and fiscal support.
- Strengthen **R&D ecosystems and Centres of Excellence** for technology upgradation.
- Improve logistics infrastructure and domestic container manufacturing to lower supply chain costs.

Conclusion

The Union Budget 2026–27 strengthens the capital goods sector as a foundation of **investment-driven and technology-led growth**.

Sustained public capex and structural reforms can transform the sector into a driver of **industrial competitiveness and long-term economic resilience**.

FISCAL POLICY AND ANNUAL FINANCIAL STATEMENT 2026–27

SOURCE: PIB

Why in News?

The **Annual Financial Statement (Union Budget 2026–27)** was recently presented by the Union Finance Minister.

What is Fiscal Policy?

- Use of **government spending and taxation** to manage aggregate demand, output, employment, and price stability.
- Based on **Keynesian principles**, which support active state intervention during economic fluctuations.

Administration

- Formulated by the **Union Government**, mainly through the Finance Ministry.
- Works alongside **monetary policy** (managed by the RBI) to stabilise the economy.

Tools

1. **Government Expenditure** – Infrastructure, subsidies, welfare schemes.
2. **Taxation** – Direct taxes (income, corporate) and indirect taxes (GST, customs).

Types

- **Expansionary Fiscal Policy** – Higher spending or lower taxes during slowdown.
- **Contractionary Fiscal Policy** – Lower spending or higher taxes during inflationary phases.

Direction of Fiscal Policy in India

Fiscal Rules Framework

- Guided by the Fiscal Responsibility and Budget Management Act, 2003 (FRBM Act).
- Originally targeted a **fiscal deficit–GDP ratio** and aimed to reduce public debt to **40% of GDP (Centre)**.

Recent Modifications

1. **Debt–GDP Ratio as Primary Anchor**
 - The government has shifted focus from fiscal deficit targeting to a **medium-term debt target**.
2. **Revised Debt Target**
 - Combined Centre’s debt projected at around **50% of GDP by 2030–31**, providing more flexibility compared to earlier FRBM norms.

Fiscal Position in Budget 2026–27

Deficit Targets

- Fiscal deficit reduced from **4.4% (FY26 RE)** to around **4.3% (FY27 BE)**.
- Primary deficit also marginally reduced.
- Strategy continues gradual **fiscal consolidation** initiated post-pandemic.

Revenue and Expenditure Trends

- **Non-debt receipts–GDP ratio** projected to fall to around **9.3%**, partly due to moderation in indirect tax growth.
- **Total expenditure–GDP ratio** reduced from 13.9% to about **13.6%**.
- **Capital Expenditure–GDP ratio** maintained near **3.1%**, reflecting continued infrastructure push.
- Adjustment achieved mainly by compressing **revenue expenditure**.

Development Expenditure

- Share of **development expenditure** (social + economic services) reduced from about 6.1% to **5.7% of GDP**.
- Notable moderation in spending on **rural development and agriculture**, especially revenue components like rural employment.

Implications of Current Fiscal Strategy

1. Shift Toward Capital-Led Growth

- Continued prioritisation of **infrastructure and asset creation**.
- Capital spending has higher multiplier effects compared to revenue expenditure.

2. Debt Sustainability Focus

- Targeting debt ratio enhances long-term macroeconomic credibility.
- Provides flexibility compared to strict deficit-only targeting.

3. Compression of Welfare Expenditure

- Fiscal adjustment burden falls disproportionately on **development spending**.
- May affect rural demand and social sector outcomes.

Major Concerns

1. Limited Investment Stimulus

- Corporate investment remains cautious amid global uncertainties.
- Fiscal policy provides limited additional incentives for **private sector capex expansion**.

2. Distributional Concerns

- Reduction in rural and agricultural allocations raises concerns about **inclusive growth**.
- Corporate tax–GDP ratio remains broadly stable compared to pre-pandemic levels, raising questions on equity in fiscal adjustment.

3. Revenue Constraints

- Slower growth in indirect taxes and GST may restrict fiscal room in coming years.

Way Forward

- Balance **fiscal prudence with inclusive growth**, ensuring rural and social spending are not disproportionately reduced.
- Broaden tax base and improve compliance to enhance **non-debt receipts**.
- Encourage private investment through regulatory reforms and credit support.
- Maintain high-quality capital expenditure while strengthening **human capital investment**.

Conclusion

India’s fiscal policy in 2026–27 reflects a cautious path toward **debt sustainability and macroeconomic stability**. However, ensuring that fiscal consolidation does not undermine **inclusive growth and investment revival** remains crucial.

AGRICULTURE AND ALLIED

COOPERATIVE-LED WHITE REVOLUTION 2.0

SOURCE: THE HINDU

Why in News?

The Union Government has launched **Cooperative-led White Revolution 2.0** to expand dairy cooperatives and enhance rural livelihoods.

Historical Background

Institutional Foundation

- Establishment of the National Dairy Development Board (NDDB) in 1965 laid the groundwork for organised dairy development.
- Led by Verghese Kurien, India adopted the **Anand cooperative model**.

White Revolution (Operation Flood)

- Launched in 1970, transformed India from a milk-deficit nation to the **world’s largest milk producer by 1998**.
- Built a nationwide network of dairy cooperatives ensuring fair prices to farmers.

White Revolution 2.0 represents a modern extension with a **gender focus and infrastructure expansion strategy**.

India’s Leadership in Milk Production

- **Global Rank:** India contributes over **25% of global milk production**, ranking first worldwide.
- **Record Output:** Milk production reached around **239–240 million tonnes (2023–24)**.
- **Decadal Growth:** Output increased by more than **60%** since 2014–15.
- **Growth Rate:** Annual growth of about **5–6%**, higher than the global average (~2%).
- **Per Capita Availability:** Around **470 grams per person per day**, above the global average (~320 grams).

This growth highlights dairying as a stable and inclusive sector compared to crop agriculture.

Key Features of White Revolution 2.0

1. Procurement Expansion

- Targets **50% increase in cooperative milk procurement** in five years.
- Procurement expected to rise from about **660 lakh kg/day to 1,007 lakh kg/day by 2028–29**.

2. Institutional Expansion

- Establishment of **75,000 new Dairy Cooperative Societies (DCSs)** in uncovered villages.
- Strengthening around **46,000 existing DCSs, M-DCSs, and M-PACS**.

3. Funding Framework

- Implemented under **National Programme for Dairy Development (NPDD) 2.0** by the Department of Animal Husbandry and Dairying.

4. Infrastructure Modernisation

- Installation of **Automatic Milk Collection Units (AMCU)** and **Data Processing Milk Collection Units (DPMCU)**.
- Provision of milk testing laboratories and bulk milk coolers to reduce spoilage and improve quality.

5. Women-Centric Approach

- Nearly **70% of dairy workforce are women**.
- Emphasis on women’s participation in cooperative governance and income control.

Key Drivers of India’s Dairy Growth

1. Cooperative Network

- Around **1.7 lakh Dairy Cooperative Societies** facilitate organised procurement and marketing.

2. Rising Domestic Demand

- Urbanisation and income growth have boosted consumption of milk and value-added products.

3. Technological Adoption

- Quality testing, chilling infrastructure, and digital payments improve transparency.

4. Genetic Improvement

- Schemes like Rashtriya Gokul Mission promote breed improvement.
- Crossbred cattle yield around **8–9 kg per day**, improving productivity.

Socio-Economic Importance

Rural Income Source

- Dairy provides **regular cash flow**, unlike seasonal crops.
- Supports livelihoods of nearly **8.5 crore people**.

Women Empowerment

- Participation enhances **financial inclusion and decision-making power**.

Nutritional Security

- Milk contributes to **protein and micronutrient intake**, reducing malnutrition.

Economic Contribution

- Dairy accounts for nearly **40% of agriculture and allied sector output** (approx. ₹11–12 lakh crore value).

Supporting Government Initiatives

- National Programme for Dairy Development (NPDD)
- National Livestock Mission (NLM)
- Animal Husbandry Infrastructure Development Fund (AHIDF)
- Livestock Health and Disease Control Programme (LHDCP)

Challenges

1. **Coverage Gaps:** States like West Bengal, Assam, Odisha, and parts of Northeast have low cooperative penetration (<10%).
2. **Infrastructure Deficit:** Lack of chilling and testing facilities causes post-harvest losses.
3. **Unorganised Market Dominance:** Nearly two-thirds of milk sold outside cooperatives, leading to price volatility.
4. **Climate Stress:** Heat waves and fodder shortages reduce productivity.
5. **Gender Barriers:** Limited access to credit and training for women despite high participation.

Way Forward

- Promote **climate-resilient dairying** with improved fodder and water management.
- Encourage **women-led dairy cooperatives** with targeted credit support.
- Expand value-added production like cheese, ghee, yoghurt for export growth.
- Improve veterinary services and breed improvement programmes.
- Increase cooperative penetration in under-covered states through region-specific plans.

Conclusion

White Revolution 2.0 has the potential to become India's **second dairy transformation**, driven by cooperatives and women's leadership. If supported by infrastructure and climate resilience, it can ensure **inclusive rural prosperity and nutritional security**.

INDUSTRY AND INDUSTRIAL POLICIES

BIOPHARMA AT THE CORE OF INDIA'S PHARMACEUTICAL STRATEGY

SOURCE: THE HINDU

Why in News?

The Union Budget 2026–27 has prioritised **biopharma and biologic medicines**, signalling a strategic shift from traditional generics to advanced biotechnology-driven therapies.

What is Biopharma?

- **Biopharmaceuticals** are medicines developed using **living cells or biological systems** rather than chemical synthesis.
- They rely on biotechnology to produce therapeutic substances.

How They Work

- Manufactured using:
 - Human or animal cells
 - Microorganisms such as bacteria and fungi
- Designed to act on **specific disease pathways**, not merely symptoms.
- Typically administered via **injection or infusion** due to their complex molecular structure.

Examples

- Insulin
- Monoclonal antibodies (for cancer, arthritis)
- Vaccines
- Biosimilars
- Cell and gene therapies

These medicines are crucial in treating complex conditions like **cancer, diabetes, autoimmune diseases, and rare disorders**.

India's Current Position in Biopharma

Global Standing

- India is known as the **"Pharmacy of the World"**, supplying nearly **20% of global generic medicines**.
- 3rd largest producer by volume and 11th by value globally.
- Largest supplier of affordable vaccines worldwide.

Market Size

- Pharmaceutical turnover crossed **₹4.7 lakh crore in FY 2024–25**, growing at around 9–

10% annually. Biologics form a growing share of high-value exports.

- India aims to capture **5% of the global biopharma market**.

Strategic Importance

- Rising burden of **non-communicable diseases (NCDs)** demands advanced therapies.
- Reducing import dependence in biologics is a national priority.

Key Budget Announcements (2026–27)

1. Biopharma SHAKTI Initiative

- ₹10,000 crore outlay over five years.
- Focus on:
 - End-to-end ecosystem for biologics
 - Domestic R&D and manufacturing
 - Biosimilar competitiveness

2. Strengthening NIPER Network

- 3 new **National Institutes of Pharmaceutical Education and Research (NIPERs)**.
- Upgradation of 7 existing institutes.
- Aim: Build skilled workforce in research, manufacturing, and regulation.

3. Expansion of Clinical Trial Infrastructure

- 1,000+ accredited clinical trial sites.
- Enhance India's position as a global research hub.
- Ensure ethical and globally compliant standards.

4. Regulatory Reforms

- Strengthening the **Central Drugs Standard Control Organisation (CDSCO)**.
- Faster approval timelines aligned with international norms.
- Recruitment of specialised scientific personnel.

Major Government Initiatives Supporting Biopharma

1. National Biopharma Mission (NBM) – Innovate in India (i3)

- The mission aims to strengthen India's **biopharmaceutical innovation ecosystem** by supporting development of vaccines, bio-therapeutics, and diagnostics.
- Implemented by BIRAC, it promotes industry-academia collaboration and has funded over 100 translational research projects.

2. BIRAC Innovation Ecosystem

- Established in 2012, BIRAC nurtures biotech startups through grants like **BIG, SEED, and LEAP**, covering early-stage to commercialisation support.
- With 90+ bio-incubation centres, it builds a strong pipeline of innovation and entrepreneurship.

3. Manufacturing Strengthening (PLI & Bulk Drug Parks)

- The PLI scheme and Bulk Drug Parks initiative aim to reduce India's **import dependence on APIs and key raw materials**.
- They enhance domestic manufacturing capacity, strengthen MSMEs, and improve supply chain resilience.

4. Promotion of Research & Innovation in Pharma-MedTech (PRIP)

- Launched in 2023, PRIP supports R&D in **new drugs, biosimilars, complex generics, and precision medicine**.
- It fosters industry-academia collaboration through Centres of Excellence at NIPERs and other institutions.

5. BioE3 Policy

- The BioE3 Policy promotes **biomanufacturing, Bio-AI integration, and sustainable biotechnology** to drive next-generation growth.
- It focuses on strategic sectors such as smart proteins, climate-resilient agriculture, and carbon capture technologies.

6. Bio-RIDE Scheme (2024)

- Bio-RIDE supports **biotechnology research, innovation, and entrepreneurship development** through funding and institutional support.
- It encourages industry-academia partnerships and strengthens sustainable biofoundry infrastructure.

Challenges Ahead

- High R&D costs and long gestation periods.
- Skilled workforce shortages.
- Need for stronger intellectual property protection.
- Ensuring affordability of high-cost biologics.
- Global competition from the US, EU, and China.

Way Forward

- Encourage public-private partnerships.
- Expand regulatory science capacity.
- Promote indigenous manufacturing of raw materials.
- Enhance export competitiveness.
- Ensure equitable patient access through pricing policies.

Conclusion

The Budget 2026–27 marks a decisive move toward building a **globally competitive biopharma ecosystem** in India. With sustained policy support and innovation, India can emerge as a leader in **advanced biologics while ensuring affordable healthcare access**.

INFRASTRUCTURE

INDIA'S CIVIL AVIATION SECTOR

SOURCE: THE HINDU

Why in News?

India's civil aviation sector witnessed major disruptions in 2025, including the Ahmedabad crash and widespread flight cancellations and delays.

Current State of India's Commercial Aviation

1. Market Size and Traffic

- India is the **third-largest domestic aviation market** globally.
- Annual passenger traffic has crossed **350 million**, projected to reach **700+ million by 2030**.
- India accounts for nearly **4% of global air traffic**.

2. Fleet and Infrastructure

- Over **840 commercial aircraft** in operation.
- Operational airports increased from **74 (2014)** to about **160+ in 2025**.
- Target: **350–400 airports by 2047** under long-term infrastructure vision.
- Expansion to Tier-2 and Tier-3 cities under the **UDAN scheme**.

3. Investment and Policy Support

- **100% FDI** allowed in greenfield airports.
- 74% FDI in brownfield airports (automatic route).
- Tax incentives for airport infrastructure.
- New airlines such as Shankh Air, Al Hind Air, and FlyExpress received NOCs to boost competition.

Market Structure: The Duopoly Concern

- The domestic market is dominated by:
 - **IndiGo** – ~63–65% market share.
 - ****Air India Group** – ~27–28%.
- Together, they control nearly **90% of domestic traffic**.
- IndiGo operates as the sole carrier on over **60% of routes**, affecting fare stability and connectivity.
- Disruptions in these carriers reduce overall capacity rather than redistributing passengers.

Key Challenges in the Aviation Sector

1. Operational Failures

- The 2025 disruptions exposed fragile scheduling systems.
- Reliance on schedule exemptions instead of strict regulatory enforcement.

2. Pilot Shortage

- Global norm: 18–20 pilots per aircraft.
- IndiGo's ratio: around **14 pilots per aircraft**.
- Estimated requirement:
 - 7,000 pilots (2024–26).
 - 25,000–30,000 over the next decade.
- DGCA issued around **5,700 CPLs (2020–24)**, indicating supply gap.

3. Training Bottlenecks

- Limited simulators and trainer availability.
- High training costs make pilot supply inelastic.
- Temporary reliance on foreign pilots (over 200 short-term approvals in 2025).

4. Regulatory Capacity Issues

- Nearly half of technical posts in the **Directorate General of Civil Aviation** remain vacant.
- 19 safety violation notices issued in late 2025 for:
 - FDTL breaches
 - Quality lapses
 - Expired emergency equipment

5. ATF Price Volatility

- Aviation Turbine Fuel prices linked to global crude and the US dollar.
- Fuel accounts for **35–40% of airline operating costs**.
- High state-level taxes add burden.

6. Lack of Spare Crew Capacity

- Global airlines maintain 20–25% spare crew.
- Indian airlines operate at near full utilisation, causing cascading disruptions.

7. Past Airline Failures

- Paramount Airways, Kingfisher Airlines, Jet Airways, Go First.
- Causes:
 - Intense price competition
 - Poor financial management
 - Weak regional demand

Emergence of New Players: Opportunity or Risk?

- New entrants aim to improve **regional connectivity**.
- Without structural reforms, new airlines may inherit systemic weaknesses.
- Need for:
 - Preferential slot allocation
 - Financial stability checks
 - Infrastructure readiness

Way forward

1. Strengthening Regulatory Oversight

- Fill DGCA vacancies.
- Shift from reactive crisis management to preventive supervision.

2. Pilot Ecosystem Reform

- Expand training institutes and simulators.
- Incentivise domestic pilot training.

3. ATF Rationalisation

- Consider GST inclusion or tax rationalisation.
- Encourage fuel hedging mechanisms.

4. Promote Healthy Competition

- Support regional airlines under **UDAN**.
- Reduce excessive market concentration.

5. Infrastructure Synchronisation

- Ensure airport expansion aligns with airline capacity growth.

Conclusion

India’s aviation sector is poised for massive growth, but unchecked expansion without institutional reform risks recurring crises. Strengthening **regulation, competition, and human resource capacity** is essential to convert growth into sustainable progress.

PRELIMS POINTERS IN NEWS

TRADITIONAL KNOWLEDGE DIGITAL LIBRARY (TKDL)

SOURCE: THE HINDU

Why in News?

Brazil’s National Institute of Industrial Property (INPI) has signed a cooperation arrangement with CSIR to access India’s **Traditional Knowledge Digital Library (TKDL)**.



What is TKDL?

- A **digital repository of prior art** related to Indian traditional systems of medicine.
- Documents formulations from:
 - **Ayurveda**
 - **Unani**
 - **Siddha**
 - **Sowa Rigpa**
 - **Yoga**

- Converts traditional knowledge from Sanskrit, Arabic, Persian, Tamil and other languages into structured formats aligned with modern patent classification systems.

Unique Features

- Available in **five international languages** – English, French, German, Japanese, and Spanish.
- Structured as searchable patent-compatible data.
- Shared with patent offices under **Non-Disclosure Agreements (NDAs)**.
- With Brazil’s inclusion, **18 patent offices globally** now have access.

Significance

- Prevents **erroneous patent grants** (e.g., turmeric, neem cases in the past).
- Strengthens India’s defensive intellectual property strategy.
- Supports partner countries in improving novelty examination.
- Acts as a global model for traditional knowledge protection.

URBAN CHALLENGE FUND (UCF)

SOURCE: INDIAN EXPRESS

Why in News?

The Union Cabinet has approved a **₹1 lakh crore Urban Challenge Fund** to promote market-driven urban infrastructure. The scheme aims to strengthen cities as engines of economic growth.



Objectives

- Promote **urban mobility and productivity**.
- Support creative redevelopment and urban renewal.
- Upgrade **water supply, sewerage, and waste management** systems.

Funding Model (25-50-25)

- 25% Central assistance.

- 50% mobilised through municipal bonds, loans, or PPPs.
- 25% from State/Urban Local Body sources.

Total projects worth ₹4 lakh crore are expected.

Special Provisions

- ₹5,000 crore credit guarantee scheme for NE and smaller cities.
- Central guarantee up to ₹7 crore or 70% of loan.
- Challenge-based project selection ensures competitiveness.

Significance

- Encourages fiscal discipline and private participation.
- Strengthens financial autonomy of urban local bodies.
- Supports climate-responsive urbanisation.

LEAD BANK SCHEME

SOURCE: INDIAN EXPRESS

Why in News?

The Reserve Bank of India has issued draft revised guidelines to strengthen district-level coordination under the **Lead Bank Scheme (LBS)**. The move aims to enhance credit flow to priority sectors and improve rural development outcomes.



About Lead Bank Scheme

- The **Lead Bank Scheme**, launched in **1969** by **RBI**, was designed to correct regional imbalances in banking and improve rural credit delivery.
- It assigns a specific bank as the “Lead Bank” for each district to coordinate banking and development activities.

Historical Background

- **Gadgil Committee (1969)** recommended an “Area Approach” to tackle weak rural credit penetration.
- **Nariman Committee (1969)** endorsed district-level banking leadership.

- **Usha Thorat Committee (2009)** reaffirmed the importance of LBS in expanding **Priority Sector Lending (PSL)**.

Institutional Framework

- **National Level** – RBI oversees administration and bank allocation.
- **State Level** – State Level Bankers’ Committee (SLBC) aligns state policies with banking priorities.
- **District Level** – District Consultative Committee (DCC) and District Level Review Committee (DLRC) prepare and monitor the **District Credit Plan (DCP)**.
- **Block Level** – Block Level Bankers’ Committee (BLBC) ensures grassroots coordination.
- **Lead District Manager (LDM)** manages implementation.

Objectives and Targets

- Bridge rural credit gaps and promote inclusive growth.
- Achieve **60% Credit-Deposit (CD) ratio** in rural and semi-urban areas.
- Ensure **100% financial inclusion** and banking access.

Significance

- Expands banking services in underserved areas.
- Supports schemes like **PMJDY, MUDRA, Stand Up India, PMJJBY, PMSBY, and Atal Pension Yojana**.
- Strengthens coordinated rural development through institutional planning.

RARE-EARTH PERMANENT MAGNETS (REPMS)

SOURCE: TIMES OF INDIA

Why in News?

The Union Mines Minister announced that India will begin **rare-earth magnet production by 2026** and establish critical mineral parks in four states. The move aims to strengthen India’s strategic and industrial autonomy.



Key Characteristics

- **High magnetic strength** due to unpaired electrons.
- **High coercivity**, meaning strong resistance to demagnetization.
- **High energy density**, allowing compact yet powerful magnets.

Types

- **Neodymium-Iron-Boron (Nd-Fe-B)** – Strongest magnets, widely used in EV motors.
- **Samarium-Cobalt (Sm-Co)** – More temperature-resistant.
- Dysprosium and praseodymium enhance performance and thermal stability.

Manufacturing Process

- Mining minerals like **bastnäsite and monazite**.
- Alloying with iron, boron or cobalt.
- Sintering and magnetizing to create permanent magnets.

Strategic Importance

- Critical for **EVs, renewable energy, aerospace, defence and electronics**.
- Critical mineral parks to be set up in **Odisha, Andhra Pradesh, Maharashtra and Gujarat**.
- Supports **Atmanirbhar Bharat** and reduces import dependence.

INCOME TAX DEPARTMENT'S NUDGE CAMPAIGN

SOURCE: INDIAN EXPRESS

Why in News?

The Income Tax Department's **NUDGE campaign** has led to ₹8,800 crore in additional tax compliance. The initiative uses behavioural insights and data analytics to promote voluntary compliance.



About NUDGE campaign

NUDGE (Non-intrusive Usage of Data to Guide and Encourage) is a data-driven initiative launched in 2024 to

improve tax compliance without aggressive enforcement. It aims to build a **trust-based, non-adversarial tax system**.

Phases

- **NUDGE 1.0 (2024)** – Focused on general compliance.
- **NUDGE 2.0 (2025)** – Targeted foreign assets and undisclosed foreign income.

Key Features

- Uses emails, SMS, and e-verification for targeted communication.
- Focus on high-risk taxpayers with income above ₹12 lakh.
- Operates under the **SAKSHAM Framework**:
 - Sankalan (Data compilation)
 - Anusandhan (Analysis)
 - Kriyanvyan (Targeting)
 - Sampark (Communication)
 - Hastak (Facilitation)
 - Adhikaar (Return revision opportunity)
 - Mulyankan (Assessment)

Impact

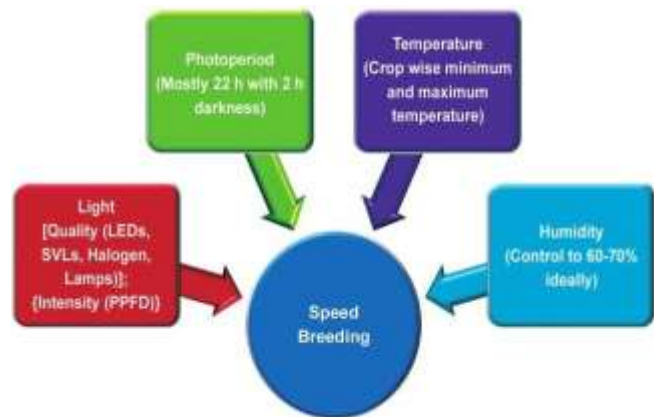
- 60% of 1.11 crore respondents were non-filers who regularised returns.
- Refund claim errors reduced by ₹1,750 crore.
- Reduced need for mass scrutiny.

SPEED BREEDING FOR CLIMATE-RESILIENT CROPS

SOURCE: TIMES OF INDIA

Why in News?

Scientists are increasingly using **speed breeding techniques** to develop climate-resilient crop varieties in response to erratic rainfall, heat waves, and emerging pests. The method significantly reduces the time required to release improved crop varieties.



Need for Speed Breeding

- Conventional breeding takes **10–14 years** from trait selection to variety release.
- Climate change is increasing **heat stress, drought, floods, and pest outbreaks**.
- Delayed release of varieties makes them outdated by the time farmers adopt them.
- Growing population demands faster development of **high-yielding and stress-tolerant crops**.

Mechanism

- Extended **photoperiod (up to 22 hours of light per day)**.
- Controlled temperature and humidity in growth chambers or greenhouses.
- Adjustment of light intensity and spectrum using LED technology.
- Use of plant growth regulators to hasten flowering and seed maturity.
- High-density planting to optimise space and selection efficiency.

For example, rice can flower in **around 60 days instead of 130–140 days** under controlled conditions.

Advantages

- Rapid development of **drought-tolerant, flood-resistant, and pest-resistant varieties**.
- Reduces cost and time of breeding programs.
- Enhances genetic gain per unit time.
- Strengthens food security under climate stress.

Challenges

- Requires controlled infrastructure and electricity supply.
- May not fully replicate field conditions.
- High initial investment costs.

SALEM SAGO

SOURCE: THE HINDU

Why in News?

APEDA facilitated the export of GI-tagged **Salem Sago** to Canada. This strengthens India’s agri-export footprint.



About Salem Sago

Salem Sago, locally known as *Javvarisi*, is a starch-based product made from tapioca roots in Tamil Nadu.

Production Process

- Extracted from wet starch of tapioca roots.
- Processed into small pearl-like granules.
- Secured **GI tag in 2023**.

Uses

- Widely used in food products.
- Industrial uses in paper, textiles, cosmetics, and pharmaceuticals.

Tapioca Cultivation

- Grown in tropical humid climates.
- Requires well-drained red lateritic soils.
- Cultivated up to 1,000 metres elevation.

Significance

- Boosts rural employment.
- Promotes value addition and export diversification.

RAILWAY ELECTRIFICATION IN INDIA

Why in News?

Indian Railways has electrified nearly **99% of its Broad Gauge network**, making it one of the most electrified rail systems globally.

Current Status of Railway Electrification

Network Coverage

- Total Broad Gauge network: ~70,000 route-km.
- Electrified: ~69,400 route-km (~99%).
- Remaining 0.8% spread across a few states.
- Around **25 States/UTs fully electrified**.

Acceleration in Pace

- 2004–14: ~1.4 km/day.
- 2019–25: Over **15 km/day**.
- Nearly **47,000 route-km electrified after 2014**, reflecting mission-mode execution.

Key Facts about Indian Railways

Extensive Reach

- Over **68,000 km of track**, 4th largest globally (after the US, Russia, and China).
- Backbone of passenger and freight movement.

Passenger Traffic

- Serves about **23 million passengers daily**.

- Connects remote regions with economic centres.

Freight Performance

- FY25 freight loading crossed **900 million tonnes**, with steady growth in container traffic.
- Plays a crucial role in coal, cement, food grains, and industrial logistics.

Rail Safety

- Consequential accidents reduced significantly over the past decade.
- Majority of accidents still linked to **human error**, indicating need for automation.

Technological Innovations Driving Electrification

Mechanised Foundations

- Use of auger-based systems reduced time and manual labour.

Automatic Wiring Trains

- Enabled faster installation of overhead catenary systems.

Standardisation

- Adoption of **25 kV AC electrification** nationwide ensures seamless locomotive movement and interoperability.

Strategic Significance

1. Energy Security

- Reduced reliance on imported diesel.
- Electric traction is around **70% cheaper per km** compared to diesel.

2. Cost Efficiency

- Annual fuel savings estimated at **₹2,000–2,500 crore**.
- Improved operating ratio and financial sustainability.

3. Emission Reduction

- Significant reduction in diesel-related CO₂ emissions.
- Supports India's **Net Zero by 2070** commitment.

4. Renewable Integration

- Installed renewable capacity (solar + wind) crossed **900 MW** by 2025.
- Growing share used for traction power.

5. Operational Efficiency

- Electric locomotives offer:
 - Higher hauling capacity
 - Better acceleration
 - Faster freight turnaround

6. Global Position

- India now ranks among the most electrified rail systems worldwide, surpassing several developed nations in percentage coverage.

Challenges in Railway Electrification

1. Stranded Diesel Assets

- Many serviceable diesel locomotives risk becoming economically redundant.

2. Carbon Source Shift

- Electricity still largely generated from **coal-based power plants**, shifting emissions upstream.

3. Grid Dependency

- Full electrification increases vulnerability to **grid failures or natural disasters**.

4. Maintenance of OHE

- High-voltage Overhead Equipment in difficult terrains (Himalayas, North-East) is prone to disruption.

5. Safety Gaps

- Increased speeds without proportionate safety upgrades.
- Frequent cattle run-overs damage OHE and disrupt services.

Way Forward

1. Deepen Renewable Integration

- Expand Round-the-Clock renewable power agreements.
- Install solar panels on railway land and station rooftops.

2. Repurpose Diesel Assets

- Export surplus locomotives to developing countries.
- Convert into shunting engines or dual-mode units.

3. Promote Head-On-Generation (HOG)

- Standardise HOG technology to eliminate diesel generator coaches.

4. Build Strategic Redundancy

- Deploy **dual-mode locomotives** in border and sensitive regions.

5. Leverage Open Access Power

- Procure cheaper electricity directly from producers.
- Reduce dependence on high-tariff state distribution companies.

6. Strengthen Safety Infrastructure

- Expand automatic signalling systems.
- Improve fencing and anti-collision technologies.

Conclusion

Near-total electrification marks a historic milestone for Indian Railways, enhancing **efficiency, sustainability, and energy security**. The next phase must focus on renewable integration, safety upgrades, and resilient infrastructure to ensure long-term gains.

HISTORY

PRELIMS POINTERS IN NEWS

DEVNIMORI RELICS OF LORD BUDDHA

SOURCE: THE HINDU

Why in News?

India organised the first-ever public exposition of the Devnimori Buddha relics in Sri Lanka.



Devnimori archaeological site

The Devnimori archaeological site in Gujarat dates back to the early centuries CE and reflects the spread of Buddhism in western India.

Historical Background

- Excavations were first carried out in **1957–59** by archaeologists under the Archaeological Survey of India.
- The site contains remains of a **Buddhist stupa, monastery (vihara), and sculptural fragments**.
- The findings indicate that Buddhism flourished in Gujarat during the post-Mauryan and early Gupta periods.
- The inscriptions found at the site are in **Brahmi script and Sanskrit**, reflecting early literary traditions.

Key Archaeological Discoveries

1. Relic Casket

- Made of **green schist stone**.
- Discovered inside the stupa structure.
- Inscribed in Brahmi script with the phrase interpreted as referring to the **“abode of the bodily relics of the Buddha.”**
- Confirms the sacred nature of the site.

2. Copper Container

- Contained **ashes, silk fragments, and beads**.

- Suggests ritualistic preservation of relics in accordance with Buddhist traditions.

3. Gold-Coated Miniature Bottle

- An amphora-like structure made of **silver-copper alloy with gold coating**.
- Indicates craftsmanship and long-distance cultural exchanges.

Religious and Cultural Significance

- Demonstrates the **geographical expansion of Buddhism** into western India.
- Reflects the patronage of Buddhist institutions during early historical periods.
- Highlights Gujarat’s role in ancient **trade networks**, which may have aided the spread of Buddhist ideas.

Diplomatic Significance

- The exposition in Sri Lanka strengthens **India–Sri Lanka civilisational ties**, as Sri Lanka has deep Buddhist roots.
- Supports India’s **Act East and Neighbourhood First policies** through cultural engagement.
- Reinforces India’s position as the **custodian of key Buddhist heritage sites**.

NANEGHAT CAVES

SOURCE: THE HINDU

Why in News?

Pune Police recently booked a person for illegal construction near the historic **Naneghat Caves** under the AMASR Act. The case has renewed focus on heritage protection and regulated development near ancient monuments.



Historical and Architectural Significance

- Associated with the **Satavahana rulers**, who controlled trade routes linking the western coast to the Deccan plateau.

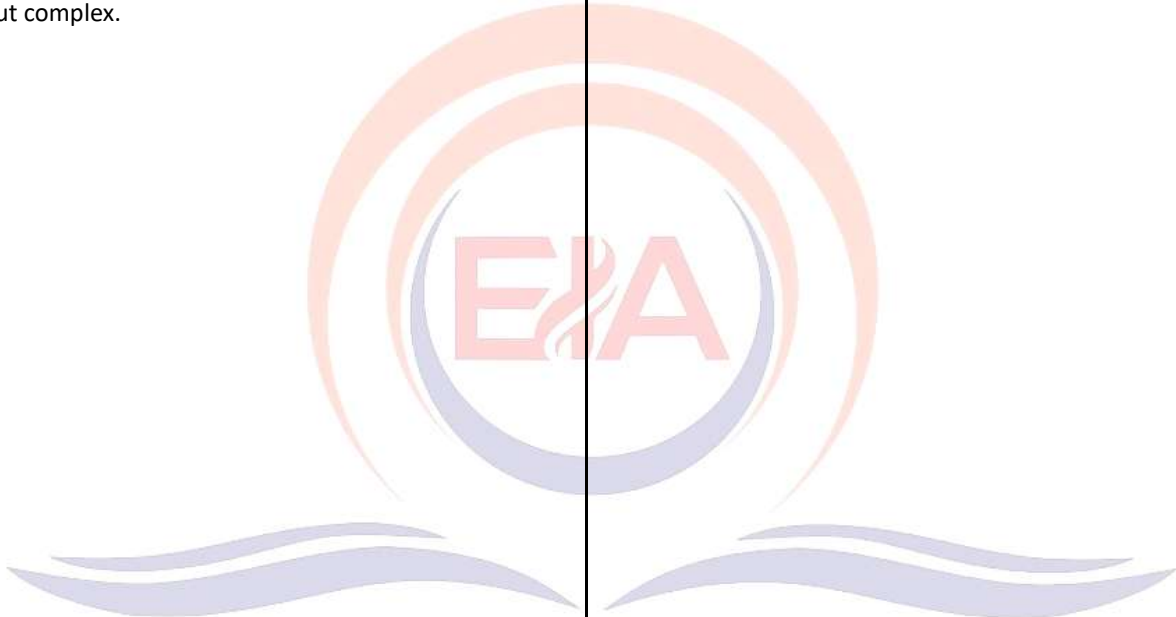
- Features **early Brahmi inscriptions**, providing insights into ancient taxation and trade systems.
- Served as a **toll collection point** along the Kalyan–Junnar trade route.
- Rock-cut caves were used for meditation by Buddhist, Jain and Ajivika sects.

Archaeological Importance

- Excavations reveal evidence of **Indo-Roman trade links**.
- Managed by the **Archaeological Survey of India (ASI)**.
- Construction within **200 metres** of the protected boundary is prohibited under the **AMASR Act, 1958**.

Associated Sites in Junnar

- **Shivneri Fort**, birthplace of Chhatrapati Shivaji.
- **Lenyadri Caves**, part of an important Buddhist rock-cut complex.



GEOGRAPHY

PRELIMS POINTERS IN NEWS

LAKE BAIKAL

SOURCE: THE HINDU

Why in News?

Seven tourists recently died after a vehicle broke through frozen ice on **Lake Baikal** in Siberia. The incident has drawn attention to the lake's unique geography and fragile ecosystem.

About Lake Baikal

Lake Baikal, located in **southern Siberia, Russia**, is widely regarded as the **oldest and deepest freshwater lake in the world**. It is a globally significant ecological and geological landmark.



Geographical Features

- Estimated age of **20–25 million years**, making it the oldest existing freshwater lake.
- Surface area of about **31,700 sq. km**, among the largest freshwater lakes globally by area.
- Maximum depth of **1,642 metres**, making it the deepest lake in the world.
- Holds nearly **20% of the world's unfrozen surface freshwater reserves**.
- Formed in a **continental rift zone**, with sediments extending several kilometres below the lake bed.
- Drained by over **300 rivers**, including Selenga and Barguzin, but has only one outlet – the **Angara River**.

Climate and Hydrology

- Surface freezes between **January and May**, enabling seasonal ice transport.

- Moderating effect on surrounding Siberian climate.

Ecological Importance

- Known as the **“Galapagos of Russia”** due to high endemism.
- Home to over **3,500 species**, many found nowhere else, including the Baikal seal.
- Declared a **UNESCO World Heritage Site in 1996**.

Human and Cultural Aspects

- Inhabited by the **Buryat community**, who follow Tibetan Buddhism.
- Fishing, tourism, and livestock rearing are major livelihoods.

RAPTI RIVER AND NGT DIRECTION

SOURCE: INDIAN EXPRESS

Why in News?

The National Green Tribunal directed Uttar Pradesh authorities to restore the Suav tributary's classification from a “drain” to a “river.” The decision reinforces the legal recognition of natural water bodies.



Geographical Features

- Originates near **Rukumkot in Nepal's Mahabharat range** at around 3,000 metres elevation.
- Flows through Nepal before entering **eastern Uttar Pradesh**.
- Basin includes mountainous terrain and Tarai plains.
- Major tributaries include **Burhi Rapti and Rohini**.

Ecological and Climatic Characteristics

- Temperate climate in upper basin and subtropical climate in plains.

- Prone to seasonal flooding in eastern Uttar Pradesh.

National Green Tribunal (NGT)

- Established under the **NGT Act, 2010**.
- Specialised environmental court guided by **natural justice principles**.
- Mandated to dispose of cases within six months.
- Principal bench in **New Delhi**, with regional benches in Bhopal, Pune, Kolkata, and Chennai.

Significance of Ruling

- Prevents administrative downgrading of rivers.
- Ensures environmental protection and proper conservation planning.

KOLE WETLANDS

SOURCE: THE HINDU

Why in News?

A recent scientific survey in Kerala's **Kole Wetlands** documented 12 species of pygmy grasshoppers. The study highlights the wetland's biodiversity richness.



About Kole Wetlands

The **Kole Wetlands**, located in **Thrissur and Malappuram districts of Kerala**, are among India's largest Ramsar-listed wetlands and important bird habitats.

Geographical Features

- Low-lying wetland system covering extensive paddy fields.
- Subject to seasonal saltwater ingress.
- Managed through bunds and drainage for cultivation.

Ecological Importance

- Part of the **Central Asian Flyway** for migratory birds.
- Recognised as an **Important Bird Area (IBA)**.
- Ramsar site since **2002**.
- Supports diverse flora, insects, and aquatic fauna.

Economic Importance

- Known for high paddy productivity.

- "Kole" means **bumper yield** in Malayalam.

Threats

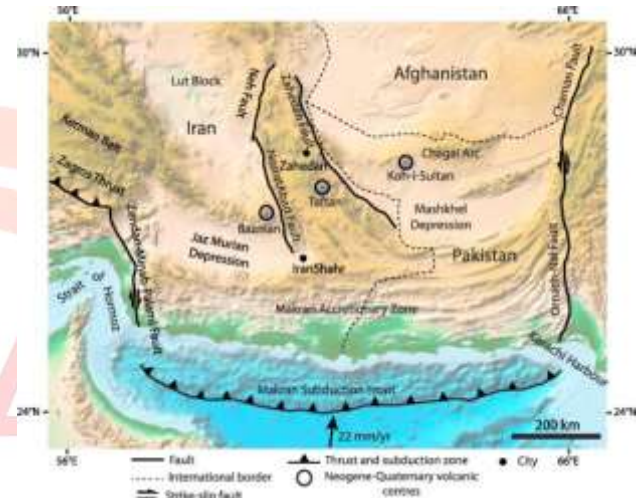
- Urbanisation and land conversion.
- Pollution and invasive species.

TAFTAN VOLCANO

SOURCE: THE HINDU

Why in News?

Scientists recorded a 9 cm uplift in Iran's **Taftan Volcano**, indicating active geothermal processes. The development highlights ongoing tectonic activity in the region.



Taftan Volcano

Taftan is a **stratovolcano** in southeastern Iran near Pakistan. It is the only active volcano in the Makran volcanic arc.

Geological Features

- Elevation of about **4,000 metres**.
- Two summits: **Narkuh and Matherkuh**.
- Contains active **fumaroles** emitting sulphur gases.
- Formed due to subduction of the **Arabian Plate beneath the Eurasian Plate**.

Activity Status

- No recorded eruptions in human history.
- Estimated last major eruption around **700,000 years ago**.

Significance

- Indicates tectonic and geothermal activity.
- Important for seismic monitoring in the region.

ENVIRONMENT

BIODIVERSITY AND CONSERVATION

THE CHANGING LANDSCAPE OF ECOLOGY RESEARCH

SOURCE: TIMES OF INDIA

Why in News?

Recent discussions highlight how **Artificial Intelligence (AI), remote sensing, and big data analytics** are transforming ecological research. Traditional field-based ecology is increasingly being complemented—and sometimes replaced—by **technology-driven approaches**.

Traditional Field-Based Ecology

Classical ecological research relied on:

- Direct field surveys and specimen collection.
- Long-term ecosystem monitoring.
- Close observation of species interactions and habitat conditions.

Strengths

- Context-rich insights into ecological processes.
- Better understanding of local biodiversity.
- Development of ecological intuition and conservation ethics.

Limitations

- Time-intensive and resource-heavy.
- Restricted to specific geographic areas.
- Potential disturbance to fragile ecosystems.

Drivers of the Technological Shift

1. Explosion of Ecological Data

- Over **one billion natural history specimens** digitised globally.
- Citizen science platforms like **iNaturalist** and **eBird** generate large biodiversity datasets.
- Continuous data from:
 - Satellites
 - Drones
 - Camera traps
 - Acoustic sensors
 - eDNA sampling

This has created a data-rich environment suitable for computational analysis.

2. Role of Artificial Intelligence

- Automated species identification through image recognition.
- Habitat mapping using satellite imagery.
- Predictive modelling of:
 - Species distribution
 - Phenological shifts
 - Biodiversity loss under climate change

Tasks that once required years of fieldwork can now be scaled rapidly using algorithms.

Advantages of Technology-Driven Ecology

Scientific and Operational Gains

- High-resolution data across large spatial and temporal scales.
- Reduced human interference in sensitive habitats.
- Monitoring of inaccessible regions (deep oceans, rainforests, polar zones).
- Continuous, real-time ecological tracking.

Efficiency and Academic Benefits

- Faster hypothesis testing.
- Large datasets enable global comparative studies.
- Encourages interdisciplinary collaboration among ecologists, data scientists, and climate experts.
- Aligns with modern research ecosystems prioritising timely outputs.

Challenges and Concerns

1. Loss of Ecological Intuition

- Reduced field exposure leads to an **“extinction of experience”**.
- Weakens ethical engagement with conservation.

2. Data Bias and Model Limitations

- Sampling bias due to uneven geographic coverage.
- AI models risk misclassification without field validation.
- Algorithms may miss local ecological nuances.

3. Over-Reliance on Technology

- Computational tools cannot fully substitute on-ground ecological insight.
- Complex ecosystems require contextual understanding.

4. Inequality in Access

- Advanced tools demand high financial and technical resources.
- Developing, biodiversity-rich countries may face capacity gaps.

5. Division of Labour

- Ecology has become highly specialised.
- Not all ecologists can be field naturalists and data scientists simultaneously.

Way Forward

1. Integrative Approach

- Combine field-based ecology with AI-driven methods.
- Promote hybrid research models.

2. Capacity Building

- Strengthen training in **computational ecology and data literacy**.
- Support institutions in developing countries.

3. Ethical Frameworks

- Embed conservation values into technology-led research.
- Ensure responsible use of ecological data.

4. Open Access with Safeguards

- Encourage open ecological datasets.
- Protect sensitive habitat information from misuse.

Conclusion

The integration of AI and big data is redefining ecological research, offering unprecedented scale and precision. However, balancing **technological innovation with field-based ecological wisdom** is essential for sustainable conservation outcomes.

WETLANDS AS A NATIONAL PUBLIC GOOD

SOURCE: THE HINDU

World Wetlands Day 2026 was observed on February 2 under the theme **“Wetlands and Traditional Knowledge: Celebrating Cultural Heritage”**.

What Are Wetlands?

- **Wetlands are areas** where water covers the soil or is present near the surface for long periods, creating conditions for special plants, animals, and microorganisms.

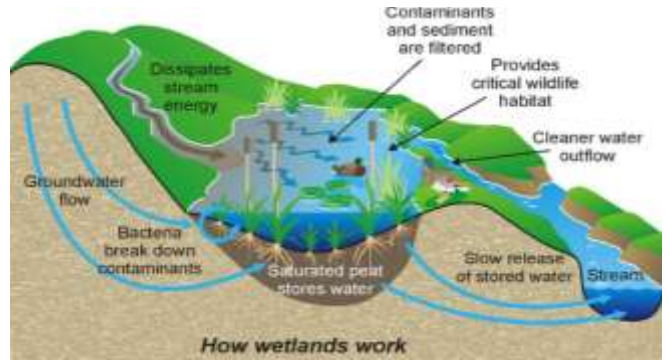
Types:

- **Freshwater wetlands** – lakes, rivers, marshes, ponds.
- **Coastal wetlands** – mangroves, lagoons, estuaries.
- **Man-made wetlands** – reservoirs, tanks, rice paddies.

Functions:

- Natural water filters (purify water).
- Flood buffers (absorb excess rainwater).

- Carbon sinks (store carbon, mitigating climate change).
- Biodiversity hotspots (home to migratory birds, fish, amphibians).



India's Position in Wetlands

- **Global Commitment:** India joined the **Ramsar Convention in 1982**, pledging to conserve and use wetlands wisely.
- **Ramsar Sites:** As of 2026, India has **98 Ramsar wetlands of international importance**, covering diverse ecosystems from Himalayan high-altitude lakes to coastal mangroves.
- **Global Standing:** India is among the **top countries in Ramsar site numbers**, reflecting its ecological diversity and conservation efforts.
- **Threats:** Despite recognition, nearly **40% of wetlands have disappeared in the last three decades** due to urbanisation, pollution, and land conversion.
- **Recent Additions (2026):**
 - **Patna Bird Sanctuary (Uttar Pradesh)** – important for migratory birds.
 - **Chhari-Dhand (Gujarat)** – supports flamingos and other waterfowl.

Traditional Importance

- **Tamil Nadu:** Ancient irrigation tanks (*kulams*) supported paddy cultivation.
- **Kerala (Wayanad):** *Kenis* (shallow wells) provided drinking water and cultural value.
- **Andhra Pradesh (Srikakulam):** Wetlands sustained traditional fishing livelihoods.
- Wetlands have historically been **ecology + economy + heritage**, vital for community wellbeing.

Challenges in India

- **Loss of Wetlands:** Nearly **40% vanished in 30 years**, and half of the remainder show degradation.
- **Encroachment & Land Conversion:** Wetlands replaced by real estate, roads, and infrastructure.
- **Pollution:** Sewage, industrial effluents, and agricultural runoff cause eutrophication.

- **Coastal Pressures:** Sea-level rise, cyclones, and tourism threaten mangroves and lagoons.
- **Weak Institutions:** State wetland authorities face staff shortages, poor training, and limited funds.

Policy Framework

- **Wetlands Rules, 2017:** Provide legal basis for identification and management.
- **NPCA Guidelines:** Push for structured planning and monitoring.
- **CRZ Regulations:** Protect coastal wetlands.
- **Ramsar Sites:** India has **98 Ramsar wetlands**, offering global recognition and responsibility.

Way forward

- **Boundary Notification** – Demarcate wetlands with maps, grievance redress, and community participation.
- **Wastewater Treatment** – Ensure treated inflows; wetlands cannot replace sewage plants.
- **Catchment Protection** – Restore feeder channels, regulate extraction, and prevent dumping.
- **Disaster Risk Reduction** – Treat mangroves, floodplains, and mudflats as natural buffers.
- **Capacity Building** – Launch national training missions for wetland managers in hydrology, ecology, GIS, and law.

Conclusion

Wetlands are vital for India’s ecology, economy, and resilience, yet face severe degradation. Aligning **science, policy, and community wisdom** is essential to restore them as thriving ecosystems.

CLIMATE CHANGE AND POLLUTION

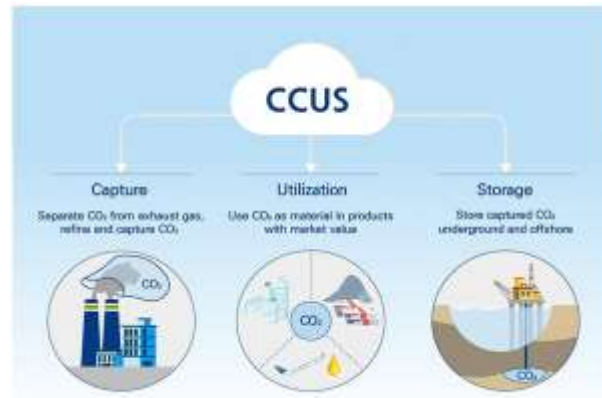
CARBON CAPTURE, UTILIZATION AND STORAGE (CCUS) AND INDIA’S STEEL TRANSITION

SOURCE: INDIAN EXPRESS

Why in News?

The Prime Minister highlighted the importance of **Carbon Capture, Utilization and Storage (CCUS)** for decarbonising heavy industries, especially steel.

The **Union Budget 2026–27** has allocated **₹20,000 crore** for a dedicated CCUS scheme, signalling a shift toward large-scale deployment.



What is CCUS?

According to the International Energy Agency (IEA), CCUS refers to a group of technologies that capture **carbon dioxide (CO₂)** from industrial or energy facilities and either utilize it or store it permanently underground.

Three-Step Process

1. Capture

- CO₂ is separated from industrial exhaust gases using solvents, membranes or solid absorbents.
- Applicable in thermal power plants, steel furnaces, cement kilns and refineries.

2. Transport

- Captured CO₂ is compressed and transported through **pipelines, ships or tankers** to utilization or storage sites.

3. Utilization and Storage

- **CCU (Utilization):** CO₂ converted into urea, methanol, synthetic fuels, chemicals or used in concrete curing.
- **CCS (Storage):** CO₂ injected into deep geological formations such as depleted oil fields or saline aquifers for permanent sequestration.

Why is CCUS Crucial for India?

1. Decarbonising Hard-to-Abate Sectors

- Cement releases CO₂ during limestone calcination.
- Steel production via blast furnaces emits large process emissions.
- CCUS is currently the only scalable solution without shutting down production.

2. Supporting India’s Steel Ambitions

- India is the **2nd largest crude steel producer** globally, producing around **150–155 million tonnes (FY25)**.
- Under the National Steel Policy 2017:
 - Target: **300 MT capacity by 2030–31**
 - Vision: **500 MT by 2047**
- Steel accounts for nearly **10–12% of India’s total GHG emissions**.

- While green hydrogen-based steel is the future, CCUS enables immediate **low-carbon steel production** using existing plants.

3. Energy Security

- Coal accounts for roughly **55% of India's primary energy mix**.
- Immediate coal phase-out is impractical.
- CCUS reduces emissions while maintaining energy reliability.

4. Export Competitiveness

- Mechanisms like the EU's **Carbon Border Adjustment Mechanism (CBAM)** penalize carbon-intensive exports.
- Low-carbon steel with CCUS safeguards Indian exports.

5. Asset Protection

- India's steel plants are relatively young.
- CCUS prevents them from becoming **"stranded assets"**.

India's Policy Initiatives on CCUS

1. Budgetary Support (2026–27)

- ₹20,000 crore allocated over five years.
- Focus sectors: Power, Steel, Cement, Refineries and Chemicals.

2. Policy Framework

- NITI Aayog proposed **Viability Gap Funding (VGF)**.
- Promotion of **CCUS clusters in Gujarat and Odisha**.

3. Green Steel Taxonomy

- Steel emitting less than **2.2 tCO₂e per tonne** classified as *Green Steel*.
- Star-rating system (3–5 stars) incentivizes adoption.

4. R&D Support

- Department of Science and Technology roadmap (2025–2045).
- National Centres of Excellence at **IIT Bombay and JNCASR Bengaluru**.

5. Mission Innovation Challenge

- International collaboration with 20+ countries for breakthrough CCUS technologies.

Challenges in Scaling CCUS

1. High Costs

- Raises electricity cost by 60–80%.
- Steel and cement production become more expensive.

2. Energy Penalty

- Capture systems consume 15–25% of plant energy.

3. Infrastructure Deficit

- No dedicated CO₂ pipeline network.
- Land acquisition complexities.

4. Geological Constraints

- Estimated storage potential: **500–1000 GT**, largely in Deccan basalt.
- Basalt storage is technically more complex.
- Risk of leakage or minor seismic disturbances.

5. Regulatory Vacuum

- No clarity on long-term liability for storage sites.
- Absence of strong carbon pricing mechanism.

6. Limited Utilization Market

- Current CO₂ usage demand is small relative to emissions volume.
- Methanol or green fuel production requires **Green Hydrogen**, still nascent.

Way Forward

- **Cluster-Based Approach:** Develop industrial hubs sharing CO₂ transport and storage facilities.
- **Strengthen Carbon Markets:** Integrate CCUS into India's **Carbon Credit Trading Scheme (CCTS)**.
- **Performance-Linked Incentives:** Introduce PLI-style incentives for carbon capture equipment.
- **Tax Credit Model:** Adapt US-style **"45Q" tax credits** for each tonne of CO₂ stored.
- **Focus on CCU:** Promote CO₂-to-methanol, green urea and building materials.
- **Safety Standards:** Bureau of Indian Standards to issue guidelines for monitoring and verification.

Conclusion

CCUS is a **strategic bridge technology** for India's industrial decarbonisation and Net Zero 2070 pathway. By combining policy support, carbon markets, and innovation, India can transform carbon management into a **new green industrial opportunity**.

FOREST CONSERVATION

FORESTS IN INDIA: EMERGING ECOLOGICAL PRESSURES AND POLICY CHALLENGES

SOURCE: THE HINDU

Why in News?

India's forests are under increasing stress due to large infrastructure projects, rising forest fires, invasive species, and monoculture plantations. Recent developments such as the clearance of the **Great Nicobar mega project** have

reignited debates on balancing development and conservation.

Major Challenges Facing Forests

1. Forest Diversion for Development Projects

- Between 2020 and 2025, nearly **1 lakh hectares** of forest land were diverted for mining, highways, railways, and energy projects.
- The **Great Nicobar Project** involves diversion of dense tropical rainforest for ports, airports, and urban infrastructure.
- Compensatory afforestation is often undertaken in ecologically different regions (e.g., Aravallis), raising concerns about **ecological equivalence**.
- Mangrove loss in coastal infrastructure projects threatens fragile ecosystems.
- While projects may have strategic or economic importance, long-term impacts on **carbon storage and endemic biodiversity** remain serious concerns.



2. Forest Fires

- Around **54% of India's forest area** is prone to occasional fires.
- Over **2 lakh fire incidents** were recorded during recent fire seasons.
- Fire seasons are extending beyond summer into winter, especially in Himalayan states.

Key Causes:

- Pine needle accumulation.
- Collection of forest produce (tendu, mahua).
- Shifting cultivation (jhum).
- Climate change: rising temperatures, erratic rainfall, lightning.

Impacts:

- Loss of biodiversity.
- Soil erosion and habitat destruction.
- Air pollution and carbon emissions.
- Adverse effects on forest-dependent communities.

3. Invasive Alien Species

- Invasive species are among the top global drivers of biodiversity loss.
- **Lantana camara** has spread across forest areas, including tiger reserves.
- **Prosopis juliflora** has altered ecosystems in arid and semi-arid regions.

Consequences:

- Suppression of native species.
- Increased fire vulnerability.
- Disruption of grazing patterns and livelihoods.

4. Monoculture Plantations

- Plantation drives often prioritise species like eucalyptus, pine, and teak.
- These species:
 - Store less carbon compared to natural forests.
 - Are more vulnerable to pests and fires.
- Native broadleaf species (e.g., oak) enhance moisture retention and biodiversity.
- Monocultures compromise **ecological resilience** and ecosystem services.

Evolution of Forest Governance in India

Colonial Phase

- **Forest Acts of 1865 and 1878** established state control.
- **Indian Forest Act, 1927** consolidated restrictive provisions.

Post-Independence

- **Wildlife Protection Act, 1972** created protected areas.
- **Forest (Conservation) Act, 1980** regulated diversion of forest land.

Shift Towards Participation

- **National Forest Policy, 1988** recognised community participation.
- Promoted **Joint Forest Management (JFM)**.
- Target: 33% forest/tree cover.

Forest Rights Act, 2006

- Recognised rights of Scheduled Tribes and forest dwellers.
- Empowered Gram Sabhas in conservation decisions.

Recent Amendments (2023)

- Amendments to the Forest (Conservation) Act aim to streamline clearances.

Concerns exist regarding exemptions in border and strategic areas.

Climate Commitments and Carbon Sink

- Under its Nationally Determined Contributions (NDCs), India aims to create an additional **2.5–3 billion tonnes of CO₂ equivalent carbon sink by 2030**.
- Forest conservation and quality afforestation are crucial.
- Frequent fires, land diversion, and monocultures threaten carbon stability.

Way Forward

1. Advanced Fire Management

- Satellite monitoring and early-warning systems.
- Community-based fire brigades.
- Real-time response mechanisms.

2. Control of Invasive Species

- Scientific mapping and phased removal.
- Restoration using native species.

3. Promote Native Afforestation

- Mixed-species plantations.
- Focus on ecosystem restoration, not just tree numbers.

4. Strengthen Community Participation

- Empower Gram Sabhas under FRA.
- Revitalise Joint Forest Management.

5. Balanced Development Planning

- Rigorous Environmental Impact Assessments (EIA).
- Transparent decision-making.

6. Technological Monitoring

- GIS-based ecological tracking.
- High-resolution satellite data for forest health monitoring.

Conclusion

India’s forests stand at a crucial turning point, facing pressures from development and ecological degradation. Sustainable management rooted in **scientific planning, community participation, and climate commitments** is essential to safeguard these vital ecological assets for future generations.

GLOBAL AGREEMENTS AND EFFORTS

STATE OF FINANCE FOR NATURE 2026 – UNEP REPORT

SOURCE: THE HINDU

Why in News?

The **United Nations Environment Programme (UNEP)** has released its flagship report titled *State of Finance for Nature 2026*.

Key Findings of the Report

1. Scale of Nature-Negative Finance

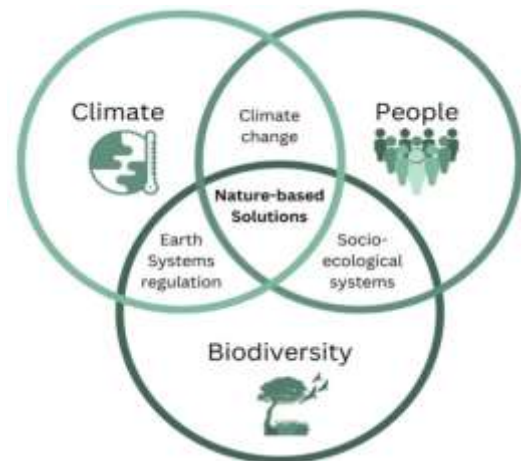
- Global investments harming nature reached approximately **USD 7.3 trillion in 2023** (about **7% of global GDP**).
- The **private sector contributes nearly USD 4.9 trillion**, mainly in fossil fuels, mining, energy and industrial materials.
- Governments provide around **USD 2.4 trillion annually as environmentally harmful subsidies (EHS)** — especially fossil fuel subsidies, unsustainable farm inputs and water mispricing.
- Such subsidies **artificially lower the cost of environmental damage**, making conservation less competitive.

2. Nature-Positive Finance Remains Limited

- Investments in **Nature-based Solutions (NbS)** stood at roughly **USD 220 billion annually**.
- The ratio between destructive and protective spending is approximately **30:1**, reflecting an unsustainable trajectory.
- Although biodiversity spending increased by around **10–12% between 2022 and 2023**, the gap remains massive.

3. Financing Gap

- Around **90% of NbS finance comes from public sources**; private participation is minimal (10%).
- To meet global targets by 2030, annual NbS funding must rise to about **USD 571 billion**, nearly **2.5 times current levels**.



Nature-Based Solutions (NbS)

NbS are actions to protect, restore and sustainably manage ecosystems in ways that address societal

challenges such as **climate change, food security and disaster risk**, while also enhancing biodiversity.

Examples

- **Mangrove restoration:** Protects coastlines + absorbs carbon.
- **Agroforestry:** Improves farm productivity + enhances soil health.
- **Urban green spaces:** Reduce heat island effect + improve air quality.

NbS are often **cost-effective alternatives to grey infrastructure** and deliver multiple co-benefits.

Implications for India

1. Subsidy Paradox

- Large subsidies on fertilizers, electricity for groundwater pumping and fossil fuels encourage ecological degradation.
- Spending on conservation remains comparatively low.

2. Public Finance Burden

- Programs like **CAMPA, Green India Mission, and MISHTI** are largely government-funded.
- Limited private capital participation increases fiscal pressure.

3. High Nature Dependency

- Over **50% of India's workforce depends on agriculture and allied sectors.**
- Ecosystem collapse (soil fertility, water availability, pollination) could destabilize economic growth.

4. Green Taxonomy Gap

- India is still formalizing its **Green Taxonomy framework.**
- Lack of clarity allows mislabeling of projects as sustainable.

5. Federal Coordination Issues

- Environmental commitments are made at the Centre, but implementation rests with States.
- States often prioritize mining or real estate for revenue.

Measures to Scale NbS Finance

1. Nature Transition X-Curve

- Simultaneously phase out **harmful subsidies** and scale up **nature-positive investments.**
- Redirect capital from destructive to regenerative activities.

2. Pricing Environmental Costs

- Introduce **carbon pricing, ecological levies or nature liability mechanisms.**
- Internalize environmental externalities.

3. Mandatory Nature Disclosures

- Align with **TNFD (Taskforce on Nature-related Financial Disclosures).**
- Companies should disclose nature dependence and impact.

4. Innovative Financial Instruments

- Expand **Green Bonds, Sustainability-linked Loans and Biodiversity Credits.**
- Use development banks to provide **first-loss guarantees.**

5. Standardized Biodiversity Metrics

- Develop measurable indicators such as ecosystem integrity indices to enhance transparency.

6. Policy Integration

- Align Finance, Agriculture, and Energy policies with the **Kunming-Montreal Global Biodiversity Framework** and climate commitments.

Conclusion

The UNEP report highlights that current financial systems are structurally biased toward environmental destruction. For India, shifting towards a **nature-positive growth pathway** through subsidy reform, green finance, and private capital mobilization is essential to secure ecological stability and long-term economic prosperity.

COP30 – CLIMATE JUSTICE, AGRICULTURE AND FINANCE FAULT LINES

SOURCE: THE HINDU

Why in News?

COP30 was held in **Belém, Brazil**, in the Amazon region, highlighting ecological fragility and indigenous concerns. The summit exposed deep divides over **fossil fuel phase-out, climate finance, and agricultural emissions**, especially impacting developing countries like India.

Contradictions at COP30

1. Fossil Fuel Ambiguity

- Countries reiterated intent to “transition away” from fossil fuels.
- However, no binding timeline for **complete phase-out** was adopted.
- Developed nations resisted stronger language despite scientific urgency.

2. Adaptation Finance Gap

- Developing countries demanded clear, quantified commitments.
- No measurable **Global Goal on Adaptation finance** was finalised.

- Adaptation received rhetorical support but lacked enforceable targets.

3. Voluntary Agricultural Reporting

- New guidelines on agricultural emissions introduced.
- Reporting remains **voluntary**, but signals future obligations.
- Reflects shift toward expanding mitigation beyond energy and industry.

These contradictions underline continuing **power asymmetries in global climate governance**.

Agriculture: A New Climate Battleground

Though not a formal agenda item, agriculture became a contentious issue.

Why Agriculture is Under Scrutiny

- **Methane emissions** from livestock and paddy cultivation.
- **Nitrous oxide emissions** from fertiliser use.
- Pressure from developed countries to integrate agriculture into mitigation targets.

Implications for India

- Agriculture employs nearly **45–50% of India's workforce**.
- Dominated by **small and marginal farmers**.
- Livestock plays economic, cultural, and ecological roles in rural systems.
- Blanket methane reduction targets could hurt farmer incomes.

India resisted binding methane commitments, protecting its **policy space for food security and rural livelihoods**.

Climate Finance: The Persistent Divide

Climate finance remained the sharpest fault line.

Developing Countries' Demand

- Annual funding of **USD 300–400 billion by 2030** for adaptation.
- More grant-based and predictable funding mechanisms.

Outcome

- Agreement only “encouraged” donors to scale up support.
- The **Loss and Damage Fund** remains underfunded.
- Developed countries promoted **private and blended finance**, shifting risk to developing economies.

Why It Matters for India

Climate adaptation requires sustained public investment in:

- **Micro-irrigation and watershed development**
- **Soil health and agro-ecology**
- **Climate-resilient seeds**

• Rural extension and forecasting systems

Without concessional finance, India faces a widening **adaptation deficit**.

India's Strategy at COP30

Three Core Priorities

1. Secure stronger climate finance commitments.
2. Protect development and agricultural policy autonomy.
3. Ensure voluntary reporting in agriculture.

Achievements

- Inclusion of references to **food security and rural livelihoods** in the final text.
- Prevention of binding methane reduction targets.
- Retention of voluntary agricultural reporting.

Limitations

- No breakthrough on binding finance targets.
- Continued uncertainty over developed countries' obligations.
- Domestic challenges like groundwater depletion, heat stress, and rural distress constrain India's negotiating strength.

Revival of Climate Justice Discourse

COP30 witnessed renewed emphasis on **climate justice**, led by Brazil, Indigenous groups, and the G77+China bloc.

Amazon as a Symbol

- Highlighted land dispossession, deforestation, and resource exploitation.
- Exposed unequal historical responsibility for emissions.

These concerns resonate with India's **tribal and forest-dependent communities**, who face similar vulnerabilities.

Climate justice discourse challenged purely technocratic solutions and stressed **equity, historical responsibility, and inclusive transition**.

What Lies Ahead?

- Climate justice must translate into **finance, technology transfer, and regulatory equity**.
- Agriculture must be addressed through **sustainable intensification**, not coercive emission cuts.
- Developed nations must align commitments with their historical emissions.

For India, climate justice is inseparable from the future of **small farmers, rural employment, and food security**.

Conclusion

COP30 exposed the widening gap between climate ambition and climate equity. For India, achieving climate justice requires both stronger global finance commitments and a transformative, farmer-centric domestic strategy.

DISASTER MANAGEMENT

TIDAL FLOODING DECLARED A STATE-SPECIFIC DISASTER IN KERALA

SOURCE: THE HINDU

Why in News?

The Government of Kerala has officially classified **tidal flooding** caused by sea-level rise and high tides as a **State-specific disaster**. The decision enables financial assistance and institutional response under the Disaster Management framework.

What are Tidal Floods?

- Also known as **“sunny day flooding”** or **nuisance flooding**.
- Occur when exceptionally high tides temporarily inundate low-lying coastal areas.
- Not caused by cyclones or heavy rainfall.

Causes

- High astronomical tides (especially during full and new moons).
- Rising sea levels due to climate change.
- Coastal storms and adverse weather conditions.

Characteristics

- Occur even in calm weather.
- Happen twice daily with tidal cycles.
- Increasing in frequency globally.

Impacts

- Flooded roads and houses.
- Drainage overflow.
- Infrastructure deterioration.
- Saline water intrusion.

Tidal Flooding in Kerala

Kerala’s coastline along the **Arabian Sea** is highly vulnerable due to:

- Nine coastal districts experiencing regular tidal inundation.
- Areas like **Vypin, Chellanam, Edakochi, Perumbadappu, and Kumbalangi** facing repeated seawater ingress.
- Seawater entering inland through rivers, canals, and backwaters.

Unlike storm surges, tidal flooding:

- Occurs regularly.
- Intensifies during **spring tides**.
- Has become more severe due to sea-level rise.



Legal Basis for Declaration

Disaster Management Act, 2005

- Section 2(d) defines disaster as a natural phenomenon causing substantial loss of life, property, or livelihood.

Kerala’s Justification

- Though tidal rise is a natural process, its recurring damage to life and livelihood meets the statutory criteria.
- Declaring it a **State-specific disaster** enables access to **State Disaster Response Fund (SDRF)** assistance.

Geographic and Topographic Vulnerability

Kerala’s physiography amplifies tidal impacts:

1. Low-Lying Terrain

- Regions like **Kuttanad (Alappuzha)** lie below sea level.

2. Minimal Elevation

- Kochi is barely above mean sea level.

3. Dense Water Network

- Rivers and backwaters facilitate inland seawater movement.

4. Narrow Coastal Belt

- High population density in vulnerable zones.

These factors make Kerala more susceptible compared to some other coastal states.

Socio-Economic Impacts

Tidal flooding affects nearly **10% of Kerala’s population**.

Livelihood Disruption

- Fisherfolk and coastal farmers suffer income losses.
- Salinity affects agriculture and aquaculture.

Infrastructure Damage

- Roads, houses, and utilities frequently damaged.

Public Health Concerns

- Stagnant saline water increases disease risk.

Chronic Vulnerability

- Unlike monsoon floods, tidal flooding can occur year-round.

Climate Change Context

- Global sea levels have risen by about **20 cm since 1900**.
- Rising temperatures increase ocean expansion and glacial melt.
- Coastal erosion and extreme weather amplify impacts.

Kerala’s move recognises tidal flooding as part of the broader **climate adaptation challenge**.

Other State-Specific Disasters in Kerala

Kerala has previously declared:

- Coastal erosion
- Lightning
- Heatwaves
- Human-wildlife conflict
- Strong winds and soil piping

In 2025, a shipwreck incident off Kerala’s coast was also declared a State-specific disaster due to environmental risks. This reflects Kerala’s proactive use of disaster law to manage emerging risks.

Significance of the Decision

1. Financial Relief

- Enables SDRF compensation for victims.

2. Policy Innovation

- Sets precedent for other coastal states.

3. Institutional Recognition

- Integrates slow-onset climate hazards into disaster frameworks.

4. Improved Preparedness

- Encourages data collection and risk mapping.

What Needs to Be Done?

1. Integrated Coastal Zone Management (ICZM)

- Strengthen coastal defenses.
- Restore mangroves.
- Regulate coastal construction.

2. Scientific High Tide Line (HTL) Mapping

- Update coastal regulation zones using GIS tools.

3. Drainage Improvement

- Desilt rivers and improve backwater flow.

4. Climate-Resilient Urban Planning

- Incorporate sea-level projections in infrastructure design.

5. Community-Based Preparedness

- Train local communities.
- Improve early warning systems.

Conclusion

Kerala’s recognition of tidal flooding as a State-specific disaster reflects **climate-sensitive and forward-looking governance**. As sea levels continue to rise, such adaptive

strategies may become essential for safeguarding India’s vulnerable coastal populations.

PRELIMS POINTERS IN NEWS

CONTARINIA ICARDIFLORES – NEW JASMINE PEST

SOURCE: INDIAN EXPRESS

Why in News?

Scientists at **ICAR–Directorate of Floricultural Research (Pune)** have identified a new blossom midge species, *Contarinia icardiflores*, affecting jasmine crops. The pest is causing bud damage and yield losses in key floriculture regions of India.



Key Biological Features

- A tiny fly measuring about **1.5–2 mm**, making detection difficult.
- Females lay eggs inside unopened flower buds.
- Larvae feed within buds, causing **swelling, discoloration, rotting, and premature bud drop**.
- Rapid life cycle of **16–21 days**, enabling multiple generations in a season.
- Thrives in warm and humid climatic conditions.

Because damage occurs inside buds, infestations are often noticed only after visible crop loss.

Scientific Identification

- Morphologically similar to other blossom midges.
- Confirmed as a distinct species using **molecular tools such as mitochondrial COI gene sequencing**.
- Accurate identification helps in targeted pest management and monitoring.

Economic Significance

- Directly affects the **marketable flower buds**, reducing yield and quality.
- Impacts domestic flower markets and fragrance industries.

- Repeated outbreaks can significantly reduce seasonal earnings for small farmers.

Management Measures

- **Early surveillance** and regular field monitoring.
- Adoption of **Integrated Pest Management (IPM)** practices.
- Removal and destruction of infested buds.
- Exploration of **eco-friendly biological control methods** to reduce pesticide dependence.

WHITE-EYED POCHARD (AYTHYA NYROCA)

SOURCE: THE HINDU

Why in News?

The White-eyed Pochard has recently been reported in winter wetland surveys in parts of northern and western India. Its sighting has revived discussion on wetland conservation and protection of migratory waterbirds.



Key Identification Features

- Adults show a **deep chestnut (ferruginous) head, breast and flanks.**
- Breeding males possess a striking **white iris**, while females and juveniles have darker eyes.
- A **bright white undertail patch** is clearly visible even while swimming.
- During flight, a **broad white wing bar** contrasts with darker upperparts.

These field markers help distinguish it from similar species like the Tufted Duck or Common Pochard.

Habitat and Distribution

- Prefers **shallow, well-vegetated wetlands**, marshes, oxbow lakes and reed-lined water bodies.
- Winters in parts of **South Asia, including India**, especially in northern plains.
- Avoids large open waters and prefers dense aquatic vegetation.

Behaviour and Diet

- It is **omnivorous**, feeding on aquatic plants, seeds, mollusks and small fish.

- Uses both **diving and dabbling (upending)** feeding techniques.
- Generally seen in small groups, though it may join mixed flocks in winter.
- Builds concealed nests near water or in floating reed beds.

Conservation Status

- Listed as **Near Threatened** by the IUCN.
- Faces threats from **wetland degradation, pollution, human disturbance and hybridization.**

VELI-AKKULAM ESTUARY

SOURCE: THE HINDU

Why in News?

A recent study by the University of Kerala has reported serious ecological degradation in the **Veli-Akkulam estuary**. The decline is linked to invasive species, eutrophication, and prolonged water stagnation.



Geographical and Hydrological Features

- Divided into **Veli Lake (western side)** and **Akkulam Lake (eastern side)** by an embankment.
- Connected through a narrow channel and linked to nearby estuaries via the **T.S. Canal.**
- Main inflow comes from rainfall and streams such as **Kannamoola, Kulathur and T.S. Canal.**
- Outflow is irregular because the sandbar opens only a few times annually.
- This limited exchange leads to prolonged **water stagnation.**

Key Ecological Concerns

- Increased **eutrophication** due to nutrient accumulation.
- Rapid spread of invasive species such as **Mozambique tilapia, Nile tilapia, Amazon suckermouth catfish and African catfish.**
- Earlier infestation by **water hyacinth** further disrupted water flow.
- Decline of native fish like **Karimeen (Pearl spot).**

The ecosystem has shifted from a balanced trophic structure to a **detritus-driven system** with weak energy transfer.

Impacts

- Loss of biodiversity and native fish stocks.
- Deterioration of water quality.
- Threat to local livelihoods dependent on fisheries.

Recommendations

- **Invasive species control and native species restoration.**
- Improved **wastewater treatment and pollution control.**
- Long-term scientific monitoring and adaptive wetland management.

LOGGERHEAD TURTLE AND CLIMATE CHANGE

SOURCE: THE HINDU

Why in News?

Scientists have observed that global warming is affecting loggerhead turtles in multiple ways. Changes in ocean productivity and rising temperatures are impacting their survival and reproduction.



About Loggerhead turtle

The **Loggerhead turtle (Caretta caretta)** is the world's largest hard-shelled sea turtle. It is a long-lived marine species known for its powerful jaws and extensive ocean migrations.

Climate Change Impacts

- Reduced ocean productivity lowers food availability for these **capital breeders**.
- Rising sea levels erode nesting beaches.
- Higher nest temperatures produce more females, disturbing **sex ratios**.
- Females now breed less frequently and lay fewer eggs.
- Changes in ocean currents affect migration and hatchling dispersal.

Biological Features

- Primarily carnivorous, feeding on crabs and mollusks.

- Exhibit **natal homing**, returning to birth beaches.
- Possess magnetic navigation ability.
- Lifespan often exceeds 70 years.

Conservation Status

- Listed as **Vulnerable** by IUCN.
- Major threats include bycatch, pollution, plastic ingestion and coastal lighting.

KUNO NATIONAL PARK AND PROJECT CHEETAH

SOURCE: THE HINDU

Why in News?

A South African cheetah named Gamini recently gave birth to three cubs in **Kuno National Park**, increasing India's cheetah population to 38. The development marks progress in India's ambitious reintroduction programme.



Ecological Features

- Dominated by **tropical dry deciduous forests and grasslands**.
- Key river: **Kuno River**, a tributary of the Chambal.
- Vegetation includes **Kardhai, Salai, and Khair trees**.

Faunal Diversity

- Herbivores: Chital, Sambar, Nilgai, Blackbuck, Gaur.
- Carnivores: Leopard, Dhole, Indian Wolf, Striped Hyena.
- Other species: Sloth bear, civets, langurs and mongooses.

Project Cheetah

- Launched in **September 2022** with cheetahs translocated from Namibia and South Africa.
- Implemented by **NTCA** with assistance from the Cheetah Conservation Fund.
- Aims to establish a **self-sustaining cheetah population** in India.

Significance

- Restores a species declared extinct in India in 1952.
- Enhances grassland ecosystem conservation.
- Promotes eco-tourism and biodiversity awareness.

OFF-SEASON TULIP BLOOMING IN KASHMIR

SOURCE: THE HINDU

Why in News?

For the first time, tulips bloomed in December in Kashmir, months before their natural season. This was achieved through scientific bulb programming techniques.



About Tulips

- Tulips (**Genus: Tulipa**) are spring-blooming perennial bulbous plants native to Central Asia.
- Scientists at **SKUAST Srinagar** have successfully induced off-season flowering.

Scientific Breakthrough

- **Bulb Programming** – Controlled manipulation of temperature, light, and growth stages.
- **Forcing Techniques** – Inducing early flowering through environmental and chemical regulation.

Significance

- Boosts **floral tourism** beyond spring season.
- Aligns flower supply with festive demand (Christmas, New Year, Valentine’s Day).
- Encourages year-round floriculture.
- Reduces reliance on imported bulbs.

HAIR-CRESTED DRONGO SIGHTING IN TAMIL NADU

SOURCE: TIMES OF INDIA

Why in News?

The **Hair-crested Drongo (Dicrurus hottentottus)** was sighted for the first time near Madurai. The observation highlights regional biodiversity shifts.



About Hair-crested Drongo

- The Hair-crested Drongo belongs to the **Dicruridae family** and inhabits evergreen and moist deciduous forests across South and Southeast Asia.

Identification Features

- Glossy black plumage with metallic sheen.
- Distinct hair-like crest feathers.
- Lyre-shaped tail with upward curls.
- Highly vocal and skilled mimic.

Ecological Role

- Acts as a **biological pest controller**.
- Assists pollination through nectar feeding.

Conservation Status

- **IUCN – Least Concern.**
- Protected under **Wildlife Protection Act, 1972 (Schedule II)**.

VISHWAMITRI RIVER AND MUGGER CROCODILE CENSUS

SOURCE: THE HINDU

Why in News?

A Muggers crocodile census was conducted in Gujarat’s Vishwamitri River following flood mitigation work. The river supports a significant crocodile population.



About Vishwamitri River

The **Vishwamitri River** originates from the Pavagadh hills in Gujarat and flows into the Gulf of Khambhat. It is known for sustaining **Mugger crocodiles (Crocodylus palustris)**.

Ecological Features

- Non-perennial and highly meandering river.
- Supports crocodiles, turtles, monitor lizards, and bird species.

- Crocodiles inhabit an 18 km stretch within Vadodara.

About Mugger Crocodile

- Also called marsh crocodile.
- Found in freshwater habitats across India and South Asia.
- Diet includes fish, amphibians, reptiles, and mammals.
- **IUCN Status – Vulnerable.**
- Protected under **Wildlife Protection Act, 1972 (Schedule I)**.

Threats

- Habitat encroachment and urbanisation.
- Fishing net entanglement.
- Human-wildlife conflict.

INDIAN HIMALAYAN REGION: CLIMATE CRISIS AND DEVELOPMENT DILEMMA

Why in News?

The Himalayan region is warming nearly **50% faster than the global average**, leading to frequent landslides, floods and glacial disasters.

Recent extreme events and rising human losses have raised concerns about **unsustainable infrastructure and fragile mountain ecology**.



Significance of the Himalayan Ecosystem for India

1. Hydrological Security – India’s Water Tower

- The Himalayas store vast quantities of snow and ice, feeding major rivers like **Indus, Ganga and Brahmaputra**.
- Glacial melt ensures water availability during dry months, supporting agriculture in the northern plains.
- Nearly **240 million mountain residents** and over **1.6 billion downstream populations** depend on Himalayan rivers.

2. Climate Regulator and Monsoon Driver

- Acts as a barrier blocking cold Central Asian winds.
- Forces moisture-laden monsoon winds upward, causing rainfall over the Gangetic plains.
- Ensures stable wet-dry cycles essential for **Kharif agriculture**.

3. Strategic and Security Importance

- Serves as a natural defence along the **Line of Actual Control (LAC)**.
- Infrastructure projects like tunnels and border village development strengthen security while preventing depopulation.
- Border villages function as a **“living defence buffer.”**

4. Renewable Energy Hub

- Holds an estimated **1,15,000 MW hydropower potential**, making it India’s largest hydro reservoir.
- Hydropower supports grid stability during renewable intermittency.

5. Biodiversity and Ecological Wealth

- One of the world’s richest biodiversity regions with thousands of endemic species.
- Provides ecosystem services such as soil stability, pollination and medicinal plant resources.

6. Climate Change Indicator

- Rapid glacier retreat acts as a **visible signal of global warming**.

- Impacts long-term water security and even coastal vulnerability through sea-level rise.

7. Socio-Economic and Cultural Corridor

- Supports tourism, horticulture, pastoralism and spiritual economy.
- Sustains fragile high-altitude livelihoods.

Steps Taken by India for Sustainable Himalayan Development

1. Eco-Mobility Initiatives

- Promotion of ropeways and alternative mobility systems to reduce slope cutting.
- Reduced terrain disturbance compared to conventional highways.

2. Community-Based Conservation

- Snow leopard conservation and eco-tourism initiatives integrate livelihood with biodiversity protection.
- Training local youth in nature-based enterprises.

3. Judicial Interventions

- Courts have emphasised **carrying capacity assessments** in fragile zones.
- Recognition of environmental protection as linked to fundamental rights.

4. Decentralised Renewable Energy

- Rooftop solar subsidies for hill states.
- Micro-grids reduce dependence on diesel generators and long transmission lines.

5. Springshed and Aquifer Revival

- Focus on reviving mountain springs rather than relying only on dams.
- Nearly **50% of Himalayan springs are reported to be drying**, prompting aquifer recharge efforts.

6. Early Warning Systems for Glacial Risks

- Installation of sensors and satellite monitoring for Glacial Lake Outburst Floods (GLOFs).
- Integration of scientific monitoring with community alerts.

7. Plastic and Waste Management Initiatives

- Deposit-refund systems and Extended Producer Responsibility (EPR) in some states.
- Aim to reduce plastic accumulation in headwaters.

8. Scientific Research and Policy Integration

- National Mission on Sustaining Himalayan Ecosystem (NMSHE) promotes climate vulnerability mapping.
- District-level climate risk planning encouraged.

Major Challenges in the Indian Himalayan Region

1. Accelerated Glacier Retreat

- Hindu Kush Himalayas have recorded significant ice mass loss.
- GLOF incidents have increased due to unstable glacial lakes.

2. Infrastructure-Induced Instability

- Excessive tunnelling, slope cutting and blasting destabilise fragile geology.
- Land subsidence cases highlight risks of over-engineering.

3. Overtourism and Carrying Capacity Breach

- Religious and adventure tourism often exceed ecological limits.
- Waste generation estimated in millions of tonnes annually across the IHR.

4. Black Carbon Deposition

- Soot from vehicles and biomass burning accelerates glacier melting by reducing surface reflectivity.

5. Biodiversity Fragmentation

- Linear infrastructure disrupts wildlife corridors.
- Invasive species are spreading to higher altitudes due to warming.

6. Weak Institutional Coordination

- Multiple ministries handle roads, tourism, hydropower separately.
- Lack of unified Himalayan-specific ecological code.

7. Seismic Vulnerability

- Region lies in a high seismic zone with potential for major earthquakes.
- Large dams increase risk of cascading failures.

8. Changing Fire Regimes

- Winter forest fires increasing due to dry biomass accumulation and reduced snowfall.

Way Forward

1. Himalayan-Specific Building and Land-Use Code

- Enforce geology-sensitive construction norms.
- Limit slope cutting, road width and vertical expansion.

2. Resilience-Led Development Model

- Prioritise disaster-risk reduction over rapid infrastructure expansion.
- Embed geologists and climate scientists at planning stage.

3. Basin-Level and Cumulative Impact Assessments

- Shift from project-wise approvals to landscape-scale planning.
- Cap infrastructure density in sensitive valleys.

4. Nature-Based Solutions

- Treat forests and wetlands as core infrastructure.
- Promote afforestation and slope stabilisation.

5. Regulated Tourism

- Strict visitor caps based on scientific carrying capacity.
- Decentralised tourism clusters to reduce pressure.

6. Context-Sensitive Hydropower Design

- Prefer smaller, distributed energy systems over mega dams.
- Incorporate seismic safety buffers.

7. Community Empowerment

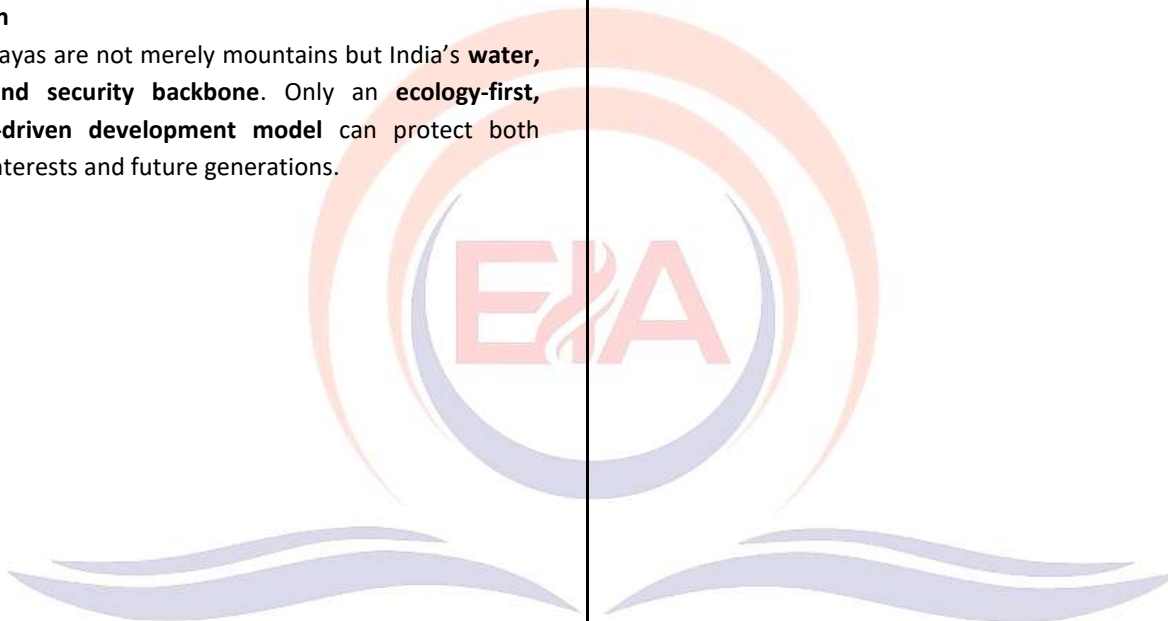
- Strengthen panchayats in ecological monitoring.
- Integrate indigenous knowledge into planning.

8. Unified Himalayan Governance Framework

- Integrate climate adaptation, disaster management and development planning.
- Establish a dedicated Himalayan policy coordination body.

Conclusion

The Himalayas are not merely mountains but India's **water, climate and security backbone**. Only an **ecology-first, resilience-driven development model** can protect both national interests and future generations.



SCIENCE AND TECHNOLOGY

MEDICAL HEALTH/VACCINES/DISEASES

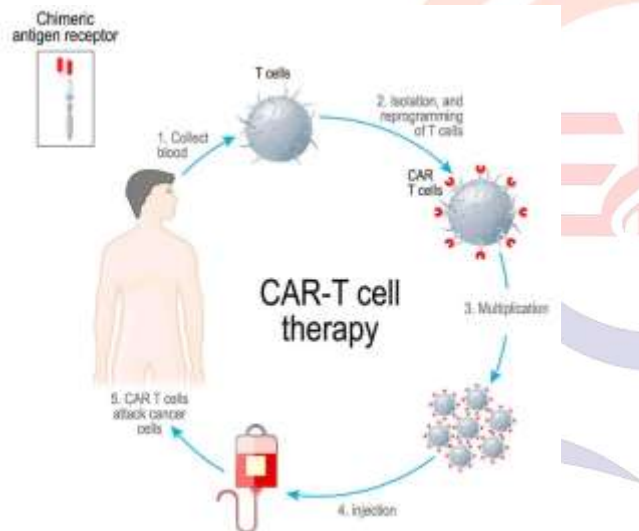
CAR-T CELL THERAPY

SOURCE: THE HINDU

SOURCE: THE HINDU

Why in News?

Researchers at **IIT Bombay** have developed a safer technique for detaching and recovering lab-grown T-cells, addressing a key bottleneck in **CAR-T Cell Therapy** manufacturing. This innovation may reduce costs and improve scalability of advanced cancer treatment in India.



What is CAR-T Cell Therapy?

CAR-T stands for **Chimeric Antigen Receptor T-cell therapy**. It is a type of **cellular immunotherapy** in which a patient's T-cells are genetically engineered to attack specific cancer cells.

Step-by-Step Process

1. **Collection of T-cells**
 - Blood is drawn from the patient.
 - T-cells (a type of white blood cell) are isolated.
2. **Genetic Modification**
 - A gene coding for a **Chimeric Antigen Receptor (CAR)** is inserted into T-cells.
 - This enables them to recognise specific tumour antigens.
3. **Multiplication**
 - Modified T-cells (now called **CAR-T cells**) are grown in large numbers in the laboratory.

4. Infusion into Patient

- CAR-T cells are infused back into the patient.
- They identify and destroy cancer cells.

About T-Cells

- T-cells are produced in the **bone marrow** and mature in the **thymus**.
- They are central to adaptive immunity.
- Types include:
 - Helper T-cells
 - Cytotoxic T-cells
 - Regulatory T-cells

CAR technology enhances their ability to detect cancer cells that may otherwise evade immune surveillance.

How CARs Work

- **Chimeric Antigen Receptors (CARs)** are synthetic proteins.
- They combine:
 - An antigen-recognition domain.
 - Intracellular signalling domains to activate T-cells.
- This allows direct recognition of tumour antigens without needing traditional immune pathways.

Significance of CAR-T Cell Therapy

1. High Precision

- Targets specific cancer antigens.
- Minimises damage to healthy tissues compared to chemotherapy.

2. Long-Term Remission

- CAR-T cells can persist in the body.
- Provide sustained immune surveillance.
- Effective in relapsed or refractory blood cancers.

3. Personalised Treatment

- Tailored to each patient's immune system.
- Represents a shift toward **precision medicine**.

4. Hope for Incurable Cases

- Has shown success in:
 - Acute lymphoblastic leukemia (ALL)
 - Certain lymphomas
 - Multiple myeloma

5. Reduced Systemic Toxicity

- Compared to conventional chemotherapy, off-target damage is relatively lower.

Concerns and Risks

Despite its promise, CAR-T therapy carries significant risks:

1. Cytokine Release Syndrome (CRS)

- A severe inflammatory response.
- Symptoms:
 - High fever
 - Low blood pressure
 - Organ dysfunction
- In extreme cases, can be life-threatening.

2. Neurotoxicity

- Side effects affecting the nervous system.
- Symptoms:
 - Headache
 - Confusion
 - Seizures
 - Coma (rare)

3. Low Blood Cell Counts

- Reduction in:
 - Red blood cells
 - White blood cells
 - Platelets
- Increases risk of bleeding and infections.

4. Infection Risk

- Immune suppression during treatment.
- Patients become vulnerable to opportunistic infections.

5. Off-Target Effects

- CAR-T cells may attack healthy tissues expressing similar antigens.

6. High Cost

- Manufacturing complexity makes therapy expensive.
- Accessibility remains limited in low- and middle-income countries.

Challenges in Scaling CAR-T in India

- Limited advanced cell therapy centres.
- High infrastructure requirements.
- Need for trained immunologists and molecular biologists.
- Strict regulatory approvals.
- Ethical concerns regarding gene editing.

Way Forward

1. Indigenous Innovation

- Support research institutions for cost-effective CAR designs.
- Encourage public-private partnerships.

2. Strengthen Biomanufacturing Infrastructure

- Expand GMP-compliant cell therapy labs.
- Develop scalable and automated manufacturing.

3. Regulatory Streamlining

- Faster but safe approval pathways.
- Strengthen oversight through CDSCO.

4. Financial Accessibility

- Insurance coverage expansion.
- Government support for rare and high-cost treatments.

5. Research into Safer CAR Designs

- Development of next-generation CAR-T with:
 - Reduced CRS risk
 - Enhanced specificity
 - Built-in safety switches

Conclusion

CAR-T Cell Therapy marks a revolutionary advance in **personalised cancer treatment**, offering hope to patients with otherwise limited options. With indigenous innovation and regulatory support, India can make this life-saving therapy more **accessible, affordable, and safer** in the coming years.

BREAST CANCER AND THE ROLE OF IMMUNE CELLS IN TUMOUR PROGRESSION

SOURCE: THE HINDU

Why in News?

A recent review by researchers from Nagaland University highlights how immune cells can be reprogrammed to support breast cancer growth.

What is Breast Cancer?

- A condition in which breast cells grow abnormally, forming tumours.
- Tumours may be **in situ (non-invasive)** or **invasive**, spreading to nearby tissues and distant organs.

Common Types

- **Ductal carcinoma** – Begins in milk ducts (most common).
- **Lobular carcinoma** – Begins in milk-producing glands.

Global Burden

- Most common cancer among women worldwide.
- Leading cause of cancer-related deaths in women.
- Metastasis and drug resistance account for a significant share of mortality.

Symptoms

- Lump in breast or underarm.
- Skin dimpling or nipple changes.
- Abnormal discharge or persistent pain.

Risk Factors

- Increasing age.
- Genetic mutations (e.g., BRCA1, BRCA2).

- Family history.
- Obesity and alcohol consumption.

Treatment Options

- **Surgery** (lumpectomy or mastectomy).
- **Radiation therapy.**
- **Systemic therapies** – Chemotherapy, hormone therapy, targeted drugs.

Shift Toward the Tumour Microenvironment

- Recent research published in the *Breast Global Journal* emphasizes the importance of the **tumour microenvironment**—the network of immune cells, blood vessels, and structural components surrounding the tumour.
- Traditionally, cancer was viewed as a disease of rogue tumour cells alone.
- However, evidence now suggests that cancer can manipulate the body’s own immune system to aid its survival and spread.

What are Macrophages?

Macrophages are **white blood cells** that defend the body by engulfing pathogens and abnormal cells (phagocytosis).



They exist in two functional states:

M1 Macrophages

- Anti-tumour and pro-inflammatory.
- Destroy abnormal or cancerous cells.

M2 Macrophages

- Promote tissue repair.
- Suppress inflammation.

In breast cancer, tumour cells push macrophages toward the **M2 state**, converting them into **Tumour-Associated Macrophages (TAMs)**.

How Tumour-Associated Macrophages Promote Cancer

1. Angiogenesis

- TAMs release cytokines that stimulate the formation of new blood vessels.
- These vessels supply oxygen and nutrients to tumours.

2. Immune Suppression

- TAMs inhibit T-cell activity.
- Cancer cells display “don’t eat me” signals, preventing immune attack.

3. Tissue Remodeling

- TAMs break down the extracellular matrix.
- Makes it easier for cancer cells to invade surrounding tissues.

4. Metastasis

- Facilitate tumour cell escape into bloodstream.
- Spread commonly occurs to lungs, bones, and liver.

Implications for Future Therapy

1. Reprogramming Macrophages

- Convert M2 macrophages back to tumour-fighting M1 state.
- Restore natural anti-cancer immunity.

2. Blocking Conversion Signals

- Target molecular pathways that push macrophages toward M2 type.

3. Targeted Immunotherapy

- More precise and potentially less toxic than conventional chemotherapy.
- Aligns with global trends in **personalised medicine**.

4. Complementing Existing Treatments

- Can enhance effectiveness of surgery, radiation, and chemotherapy.

Significance for India

- Breast cancer incidence rising in urban India.
- Late-stage diagnosis remains common.
- Indigenous research strengthens India’s role in global cancer science.
- Immunotherapy innovation could improve survival rates and reduce treatment toxicity.

Conclusion

Breast cancer progression depends not only on tumour cells but also on the **immune microenvironment**, particularly macrophages.

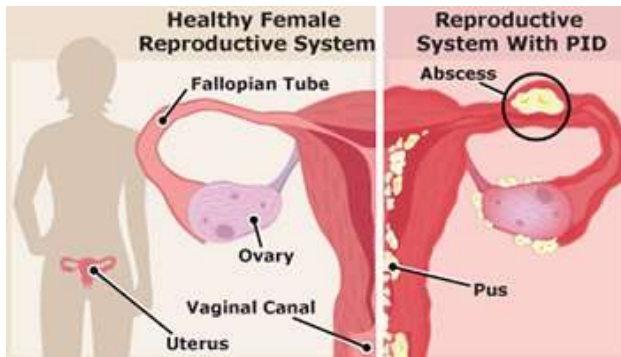
Reprogramming immune cells offers a promising path toward **more effective and personalised cancer therapies** in the future.

PELVIC INFLAMMATORY DISEASE (PID)

SOURCE: THE HINDU

Why in News?

Pelvic Inflammatory Disease has gained attention amid rising sexually transmitted infections. It remains a preventable but significant cause of female infertility.



About Pelvic Inflammatory Disease

Pelvic Inflammatory Disease (PID) is an infection of the upper female reproductive organs, including the uterus, fallopian tubes and ovaries. It often develops when bacteria ascend from the lower genital tract.

Causes

- Untreated **sexually transmitted infections** such as chlamydia and gonorrhoea.
- Bacterial vaginosis due to disturbance of natural vaginal flora.
- Practices like vaginal douching that disrupt protective **Lactobacillus bacteria**.

Symptoms

- Lower abdominal pain.
- Abnormal or foul-smelling discharge.
- Pain during intercourse.
- Fever in severe cases.

Complications

- Scarring of fallopian tubes.
- Infertility and ectopic pregnancy.
- Chronic pelvic pain.

Prevention and Management

- Early diagnosis and antibiotic treatment.
- Safe sexual practices and STI screening.
- Avoid unnecessary vaginal cleansing products.

SPACE TECHNOLOGY

INDIA'S SPACE ECONOMY: FROM STATE MONOPOLY TO PRIVATE-LED GROWTH

SOURCE: THE HINDU

Why in News?

India's space sector is witnessing a rapid transformation with rising private participation, startup growth, and policy reforms. The government aims to expand India's space

economy to **\$44 billion by 2033**, strengthening its global position.



Current Landscape of India's Space Economy

- Valued at approximately **\$8–9 billion**, contributing nearly **2% of the global space market**.
- Target: **\$44 billion economy and 8% global market share by 2033**.
- Around **399 space-tech startups** operating in launch systems, satellites, propulsion, and electronics.
- Generated nearly **₹20,000 crore in GDP contribution** over the last decade.
- Supports approximately **95,000–1,00,000 jobs**.
- Every **\$1 invested generates about \$2.5 in economic output**, indicating strong multiplier effects.
- India has launched over **430 foreign satellites**, establishing itself as a reliable low-cost launch destination.

Key Growth Drivers

1. Cost Competitiveness

- India's missions are globally known for cost efficiency (e.g., Chandrayaan-3).
- Provides affordable launch services for small and medium satellites.

2. Satellite-Based Services

- Demand for **High-Throughput Satellites (HTS)** for broadband connectivity.
- Applications in:
 - Telemedicine
 - Tele-education
 - Agriculture monitoring
 - GAGAN navigation system

3. Public-Private Partnership (PPP) Model

- Transfer of technologies like **Small Satellite Launch Vehicle (SSLV)** to private players.

- IN-SPACe acts as a regulatory and facilitation body.

4. Rising Demand for Earth Observation

- Real-time data for climate monitoring, urban planning, and disaster management.
- Growth of SmallSat constellations.

5. Downstream Monetisation

- Focus shifting from launch-centric activities to **data services and analytics**.
- Nearly **70% of future revenues** expected from downstream applications.

Government Initiatives and Policy Support

1. Indian Space Policy 2023

- Allows non-governmental entities to undertake end-to-end space activities.
- Clarifies roles of ISRO (R&D), IN-SPACe (regulation), and NSIL (commercialisation).

2. Liberalised FDI Norms

- Up to **100% FDI** allowed in satellite component manufacturing.
- Up to 74% in satellite operations under automatic route.

3. Manufacturing Ecosystem

- Development of hubs such as **Kerala Space Park**.
- Plug-and-play infrastructure for space-grade manufacturing.

4. Capital Support

- ₹1,000 crore venture fund for deep-tech startups.

Encourages innovation and risk-taking

Challenges Ahead

1. Legal Vacuum

- Absence of a comprehensive **Space Activities Act** creates regulatory uncertainty.
- Need clear provisions on liability, licensing, and insurance.

2. High Capital Requirements

- Long gestation period (7–10 years).
- Limited venture capital appetite.

3. Restricted Technology Access

- Export controls and strategic restrictions limit access to advanced propulsion and launch technologies.

4. Global Competition

- Companies like **SpaceX** conduct over 90 launches annually.
- Intense competition in reusable launch systems.

5. Weak Domestic Integration

- Space data not fully integrated into governance sectors like agriculture, climate, and disaster response.

Way Forward

- Enact a **Space Activities Act** to ensure regulatory clarity.
- Establish a dedicated **Space Venture Fund** with sovereign guarantees.
- Promote calibrated technology transfer through IN-SPACe.
- Focus on niche areas:
 - Small satellite launches
 - Affordable services
 - Data analytics
- Integrate space applications into national development priorities.

Conclusion

India's transition from state-led control to a **dynamic private-driven space ecosystem** marks a new era in technological advancement. With supportive policies and strategic focus, India can strengthen its position in the emerging **trillion-dollar global space economy**.

EMERGING TECHNOLOGIES

NEW DELHI DECLARATION ON AI IMPACT 2026: INDIA'S GLOBAL AI LEADERSHIP

SOURCE: THE HINDU

Why in News?

The **India-AI Impact Summit 2026** concluded with 89 countries adopting the **New Delhi Declaration**, calling for equitable and responsible development of Artificial Intelligence. The declaration reflects India's vision of "**Sarvajan Hitaya, Sarvajan Sukhaya**"—AI for the welfare of all.

Key Highlights of the New Delhi Declaration

1. Democratizing AI Resources

- Emphasises affordable **digital infrastructure and connectivity**.
- Guided by *Vasudhaiva Kutumbakam* (world as one family).
- Introduces the **Charter for Democratic Diffusion of AI** to expand access to foundational AI tools while respecting national sovereignty.

2. AI for Economic and Social Good

- Encourages open AI models for scalability.
- Launch of **Global AI Impact Commons**, a voluntary platform to replicate successful AI use cases in health, agriculture, and education.

3. Trusted and Secure AI

- Establishment of **Trusted AI Commons** for shared benchmarks and ethical standards.
- Promotes adaptability and responsible AI deployment.

4. Science and Research Collaboration

- Removal of barriers to global AI research cooperation.
- Formation of the **International Network of AI for Science Institutions** to pool expertise.

5. Access for Social Empowerment

- Focus on AI applications for governance, public services, and marginalized communities.
- Encourages knowledge exchange among nations.

6. Human Capital Development

- Stresses **skilling, reskilling, and AI literacy**.
- Supports playbooks for workforce readiness in an AI-driven economy.

7. Resilience and Sustainability

- Voluntary guiding principles for **energy-efficient AI systems**.
- Recognises the need for resilient AI infrastructure amid rising computational demands.



India’s Strategic Outcomes from the Summit

1. Semiconductor Security

- India joined the US-led **Pax Silica Alliance** to secure semiconductor supply chains.
- Bilateral cooperation under the India–US AI Opportunity Partnership.

2. Investment Commitments

- Over **USD 250 billion pledged** for AI-related infrastructure globally.
- Around USD 20 billion earmarked for deep-tech venture capital in India.

3. Compute Expansion

- Government plans to increase GPU capacity from 38,000 to over **100,000 GPUs by 2026**, strengthening sovereign compute capacity.

4. IndiaAI Mission 2.0

- Focus on compute infrastructure, datasets, and AI adoption across sectors.
- Reinforces India’s ambition to develop **indigenous foundation models**.

5. Sovereign AI Push

- Companies like Sarvam AI unveiled large language models (30B and 105B parameters).
- BharatGen introduced multilingual AI models supporting 22 Indian languages.

6. MSME AI Adoption

- Proposal for a **UPI-style AI Stack** to make AI tools accessible to small businesses.

7. Global Governance Initiatives

- UN proposed a USD 3-billion global fund for equitable AI access.
- Announcement of a 40-member UN scientific panel on AI governance.

Concerns Regarding the Declaration

1. Non-Binding Nature

- Commitments are voluntary.
- No enforcement or monitoring mechanism.

2. Lack of Clear Redlines

- Unlike the EU AI Act, no explicit prohibition of high-risk AI uses such as predictive policing.

3. Labour Market Disruption

- India’s **5.8 million IT workforce** faces automation risks.
- Limited structured engagement with labour unions.

4. Infrastructure Gaps

- India still lags in advanced semiconductor fabrication.
- Risk of becoming a **“data colony”**, supplying data while foreign firms control platforms.

5. Environmental Concerns

- Data centres consume large quantities of electricity and water.
- Urban centres like Bengaluru face water stress.

Measures for Inclusive and Sustainable AI Growth

Operationalising the Three Sutras

1. People (Human-Centric AI)

- Embed ethics under the **MANAV Vision**.
- Ensure transparency and accountability (“Glass Box” approach).

2. Planet (Sustainable AI)

- Incentivise renewable-powered data centres.
- Promote energy-efficient algorithms.

3. Progress (Economic Inclusion)

- Launch MSME AI Stack.
- Scale reskilling programs such as AI-focused vocational training.

Institutional and Regulatory Reforms

- Align AI chip production with India Semiconductor Mission (ISM).
- Develop interoperable safety standards within Trusted AI Commons.
- Create cross-border regulatory sandboxes for testing AI in health and agriculture.
- Strengthen domestic AI legislation for data protection and accountability.

Conclusion

The New Delhi Declaration marks a significant step toward **democratic and inclusive AI governance**, positioning India as a global AI leader. However, its success will depend on translating voluntary commitments into enforceable frameworks that balance **innovation, equity, and sustainability**.

INDIA'S THREE-STAGE NUCLEAR PROGRAMME AND THORIUM STRATEGY

SOURCE: THE HINDU

Why in News?

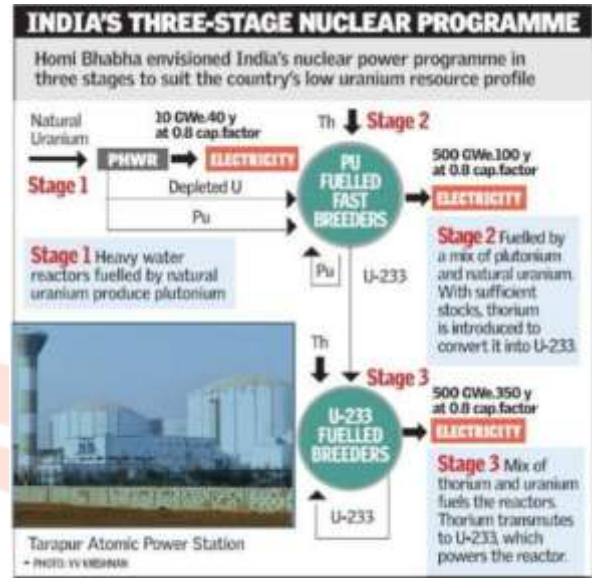
India is accelerating its nuclear expansion under the **100 GWe by 2047 target**, with renewed focus on thorium utilisation.

Expansion of **Pressurised Heavy Water Reactors (PHWRs)** is expected to fast-track India’s long-term thorium roadmap.

India’s Nuclear Energy Snapshot

- **Share in Electricity Mix:** Nuclear contributes about **3% of total electricity generation**.
- **Installed Capacity:** Around **7–8 GWe operational capacity**.
- **PHWR Backbone:** India operates **19 PHWRs**, forming the core of domestic reactor technology.

- **Uranium Dependency:** Over **70% of uranium requirements are imported**.
- **Thorium Endowment:** India holds nearly **25% of global thorium reserves**, mainly in coastal monazite sands.
- **Long-Term Target:** Achieve **100 GWe nuclear capacity by 2047**.



India’s Three-Stage Nuclear Programme

Stage I – PHWR-Based Uranium Cycle

- Uses **natural uranium** in PHWRs.
- Produces electricity and generates **plutonium-239** as a by-product.
- Provides the base for scaling fissile material.

Stage II – Fast Breeder Reactors (FBRs)

- Utilise plutonium fuel to breed more fissile material.
- Prototype Fast Breeder Reactor (PFBR) at Kalpakkam is a key milestone.
- Scale-up has faced commissioning and operational delays.

Stage III – Thorium-Based Cycle

- Thorium-232 absorbs neutrons to produce **uranium-233 (U-233)**.
- U-233 becomes the primary fissile fuel for sustained power generation.
- Intended to make India largely self-reliant in nuclear fuel.

Why Thorium is Strategically Important

1. Resource Security

- India has only **1–2% of global uranium reserves**, but abundant thorium.
- Thorium ensures **long-term fuel independence**.

2. Energy Sovereignty

- Reduces reliance on global uranium markets.
- Strengthens strategic autonomy.

3. Proliferation Resistance

- Thorium fuel cycle offers relatively **higher proliferation resistance** compared to conventional uranium-plutonium pathways.

4. Climate Commitments

- Supports India's pledge of achieving **Net Zero by 2070**.
- Provides stable, low-carbon baseload power.

How PHWR Expansion Accelerates Thorium Transition

1. Increased Irradiation Capacity

- More PHWRs allow large-scale irradiation of thorium to generate **U-233 stockpiles**.

2. Hedge Against FBR Delays

- Slower deployment of fast breeders can be offset by leveraging PHWR infrastructure.

3. Fuel Flexibility

- Thorium can be blended with enriched fuels (e.g., HALEU) in PHWRs.
- Enables gradual integration without drastic system overhaul.

4. Capacity Scaling

- Plan to reach **50–75 GWe PHWR capacity by 2047**, adding nearly 3 GWe annually.
- Speeds up readiness for Stage III reactors.

Challenges in Thorium Deployment

1. Fissile Inventory Requirement

- Large quantities of U-233 must be generated before independent thorium reactors operate.

2. Technological Complexity

- Advanced reprocessing and fuel fabrication infrastructure needed.
- Handling U-233 involves radiation safety challenges.

3. Economic Constraints

- High capital cost compared to established uranium-based reactors.
- Competes with falling renewable energy prices.

4. Fast Reactor Bottleneck

- Delays in breeder reactor scale-up limit fissile production.

5. Emerging Reactor Designs

- Advanced systems like molten salt thorium reactors remain at R&D stage.

Way Forward

1. Scale PHWR Fleet

- Expand indigenous PHWR construction under Nuclear Energy Mission.

2. Demonstrate Thorium Reactors

- Operationalise the Advanced Heavy Water Reactor (AHWR) as a proof-of-concept.

3. Invest in Next-Gen Systems

- Accelerate R&D in molten salt thorium reactors.

4. Parallel Capacity Expansion

- Use imported Light Water Reactors under enabling policies like the SHANTI framework to meet near-term demand.

5. Strengthen Fuel Cycle Infrastructure

- Develop safe reprocessing, storage and regulatory mechanisms.

Conclusion

India's thorium roadmap represents a long-term strategy for **energy independence and climate-resilient growth**. By scaling PHWRs and advancing next-generation reactors, India can unlock the strategic value of thorium and move closer to its **100 GWe nuclear ambition by 2047**.

BIO-BASED CHEMICALS: A SUSTAINABLE INDUSTRIAL TRANSITION FOR INDIA

SOURCE: TIMES OF INDIA

Why in News?

The concept of **bio-based chemicals** is gaining prominence as countries move toward low-carbon and sustainable industrial systems. India is exploring this sector as part of its broader **green growth and bioeconomy strategy**.

What are Bio-Based Chemicals?

- Industrial chemicals produced from **renewable biological feedstocks** such as sugarcane, corn, agricultural residues, and biomass.
- Manufactured through processes like **fermentation, enzymatic conversion, and biocatalysis**.

Examples

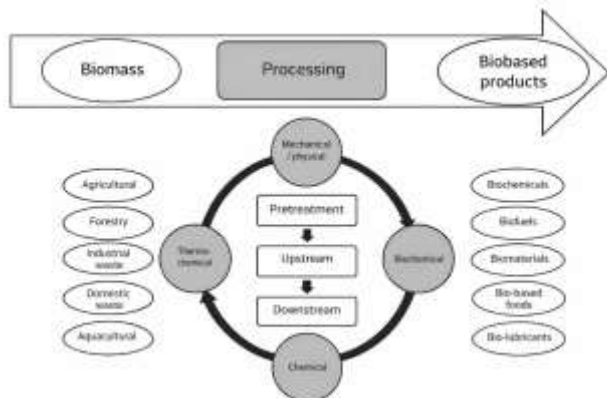
- Organic acids (e.g., lactic acid).
- Bio-alcohols and solvents.
- Surfactants.
- Chemical intermediates used in plastics, cosmetics, and pharmaceuticals.

Role of Enzymes

- **Enzymes** are biological catalysts that accelerate chemical reactions.
- Used in:
 - **Detergents**
 - **Food processing**
 - **Pharmaceuticals**
 - **Textiles**
 - **Pulp and paper**
 - **Biomanufacturing**

Advantages

- Operate at lower temperatures and pressures.
- Reduce energy consumption.
- Lower greenhouse gas emissions.



Why Does India Need Bio-Based Chemicals?

1. Strong Agricultural Base

- Large availability of biomass and crop residues.
- Scope for value addition to farm produce.

2. Existing Fermentation Expertise

- Pharmaceutical and vaccine industries provide technical strength.

3. Import Substitution

- India imported nearly **\$480 million worth of acetic acid in 2023**.
- Domestic bio-based production can reduce dependence on petrochemicals.

4. Economic Opportunity

- Creates new markets for farmers.
- Generates rural employment.
- Enhances global competitiveness.

India's Current Position

Policy Push

- Department of Biotechnology's **BioE3 Policy** prioritises bio-based chemicals.
- Focus on biomanufacturing and sustainable industrial growth.

Key Indian Companies

- Praj Industries – Bio-refining and ethanol-based technologies.
- Godrej Industries – Bio-derived chemical products.
- Godavari Biorefineries – Ethanol-based chemicals.
- Jubilant Ingrevia – Acetyl intermediates.
- String Bio – Novel microbial solutions.

Risks and Challenges

1. Cost Competitiveness

- Bio-based products may initially be costlier than petrochemicals.

- Scale-up challenges deter private investment.

2. Feedstock Supply

- Need reliable biomass availability.
- Infrastructure for storage and transport remains weak.

3. Market Acceptance

- Manufacturers may hesitate to shift from established petrochemical inputs.
- Standardisation and certification gaps.

4. Technological Barriers

- Need advanced fermentation technologies.
- High R&D expenditure.

Way Forward

1. Shared Infrastructure

- Establish biofoundries and pilot plants under BioE3.
- Reduce capital risks for startups.

2. Standards and Certification

- Clear sustainability benchmarks.
- Procurement preferences for bio-based products.

3. Financial Incentives

- Tax benefits and viability gap funding.
- Green procurement mandates.

4. Farmer Integration

- Promote biomass supply chains.
- Encourage crop residue utilisation.

5. R&D Support

- Strengthen academia-industry collaboration.
- Focus on high-value specialty chemicals.

Conclusion

Bio-based chemicals represent a critical pathway toward **sustainable industrialisation and green growth** in India. With policy support and innovation, India can emerge as a global leader in the **circular bioeconomy** while reducing fossil fuel dependence.

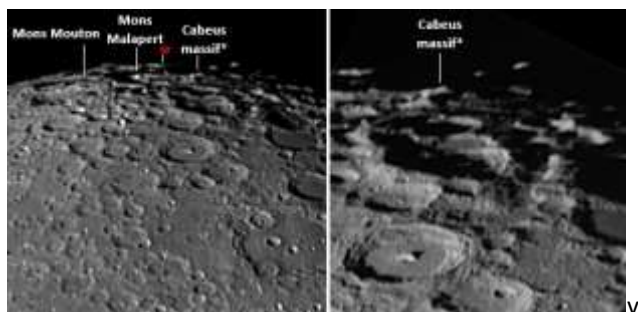
PRELIMS POINTERS IN NEWS

MONS MOUTON – LUNAR LANDING SITE

SOURCE: THE HINDU

Why in News?

ISRO's Space Applications Centre has identified **Mons Mouton** near the Moon's south pole as the landing region for **Chandrayaan-4**, India's first lunar sample return mission. The site selection marks a crucial step in India's advanced lunar exploration programme.



About Mons Mouton

- **Mons Mouton** is a mountain located near the **South Pole of the Moon**, rising nearly **6,000 metres** above surrounding terrain.
- It lies in the **South Circumpolar Region (SCR)** and is positioned near the rim of the **South Pole–Aitken Basin**, one of the oldest and largest known impact basins in the solar system.
- The feature is named after **Melba Roy Mouton**, a NASA mathematician and early space programme pioneer.

Geographical and Scientific Features

- Located in a region with **extended sunlight exposure**, critical for solar-powered missions.
- Proximity to **permanently shadowed craters**, which may contain **water-ice deposits**.
- Relatively flat summit region improves **landing safety and stability**.
- Maintains **clear line-of-sight communication with Earth**, reducing signal disruption risks.

Scientific Importance

- The South Pole–Aitken Basin contains **ancient lunar crust material**, offering clues about early planetary formation.
- Ice deposits, if confirmed, may support future **human lunar habitation** and fuel generation.
- Sample return missions can provide direct evidence of **lunar geological evolution**.
- Enhances India's capabilities in **deep-space exploration and planetary science**.

ETHYLENE GLYCOL

SOURCE: TIMES OF INDIA

Why in News?

Tamil Nadu authorities issued a public warning after laboratory tests detected **ethylene glycol contamination** in a syrup batch. The incident has renewed concerns over chemical adulteration in consumables.

Ethylene glycol

- **Ethylene glycol (C₂H₆O₂)** is the simplest member of the glycol family of organic compounds. It is widely used in industrial applications but is **toxic to humans if ingested**.

Physical and Chemical Properties

- Colourless, odourless, slightly viscous liquid.
- Sweet taste, which makes accidental ingestion dangerous.
- Highly soluble in water and alcohol.
- Stable across a wide temperature range.



Industrial Applications

- Used in **antifreeze and de-icing fluids** for vehicles and aircraft.
- Raw material for manufacturing **polyesters (PET), resins and synthetic fibres**.
- Used in inks, hydraulic fluids and industrial solvents.

Health Impacts

- Metabolised into **toxic compounds such as glycolic acid and oxalic acid**.
- Can cause **kidney failure, metabolic acidosis and neurological damage**.
- Even small quantities can be fatal if untreated.

Regulatory Concerns

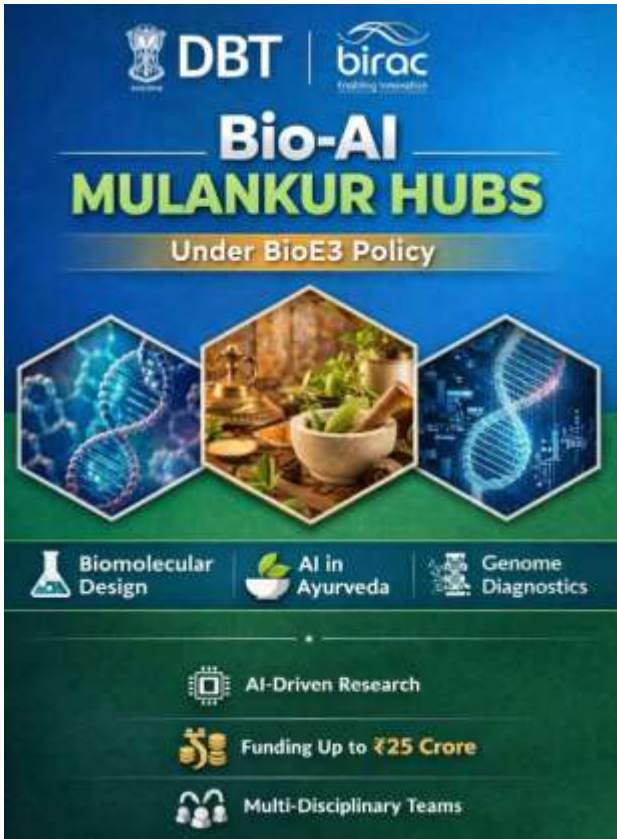
- Adulteration in food or pharmaceuticals is illegal and dangerous.
- Strict quality testing and monitoring mechanisms are essential.

BIO-AI MULANKUR HUBS

SOURCE: THE HINDU

Why in News?

The Department of Biotechnology and BIRAC will establish **Bio-AI Mulankur hubs** in 2026. These hubs aim to integrate Artificial Intelligence into biotechnology research and innovation.



About Bio-AI Mulankur hubs

- **Bio-AI Mulankur hubs** are proposed integrated platforms combining **AI-driven predictions, laboratory validation and advanced data analytics.** They align with India’s **Biotechnology for Economy, Environment and Employment (BioE3) Policy.**

Objectives

- Institutionalise **AI as a scientific engine in biotechnology.**
- Accelerate high-performance **biomanufacturing and innovation.**
- Promote research in health, agriculture and environmental sustainability.

Focus Areas

- **Genomics and diagnostics**
- Biomolecular and therapeutic design
- **Synthetic biology**
- Evidence-based Ayurveda research

Significance

- Enhances India’s leadership in **AI-biotech convergence.**
- Promotes employment generation and sustainable industrial growth.
- Strengthens collaboration between academia and industry.

SUPREME COURT JUDGEMENT ON STEM CELL THERAPY FOR AUTISM

SOURCE: TIMES OF INDIA

Why in News?

The Supreme Court ruled that **stem cell therapy cannot be offered as a clinical treatment for Autism Spectrum Disorder (ASD)** outside approved clinical trials. The judgment seeks to curb unproven and misleading medical practices.

About Stem cell therapy

Stem cell therapy, also called **regenerative medicine**, uses stem cells to repair or replace damaged tissues. Stem cells are unique because they can **differentiate into specialised cell types** such as nerve, muscle, or blood cells.

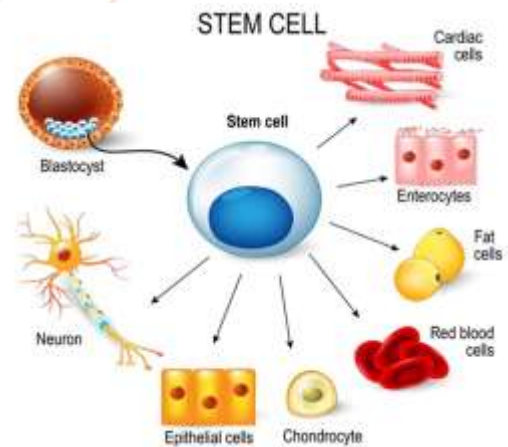
However, its application in **Autism Spectrum Disorder (ASD)** remains experimental and lacks conclusive scientific validation.

How Stem Cell Therapy Works

1. **Extraction** – Stem cells are collected from bone marrow or other tissues.
2. **Processing** – Cells are cultured and specialised in laboratories.
3. **Implantation** – Modified cells are infused into the patient.

Types

- **Autologous therapy** – Uses patient’s own cells.
- **Allogeneic therapy** – Uses donor cells.



Claims in Autism Treatment

Some experimental approaches suggest stem cells may:

- Reduce **brain inflammation.**
- Modulate immune system abnormalities.
- Enhance neural connectivity.
- Improve blood flow and oxygen supply to the brain.

However, these claims lack large-scale, peer-reviewed clinical validation.

Supreme Court Observations

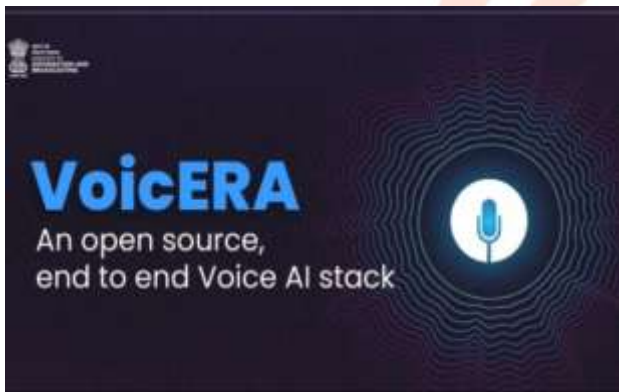
- Stem cell therapies for autism cannot be marketed as **established clinical treatments**.
- Consent is invalid if not supported by **credible scientific evidence**.
- Practices violate the **National Guidelines for Stem Cell Research (2017)** and **New Drugs and Clinical Trial Rules (2019)**.
- Directed the government to establish a **dedicated regulatory authority** for oversight.

VOICERA

SOURCE: PIB

Why in News?

The Ministry of Electronics and Information Technology launched **VoicERA** at the India AI Impact Summit 2026. The platform strengthens India’s multilingual voice AI infrastructure.



About VoicERA

VoicERA is an open-source end-to-end **Voice AI technology stack** deployed on the **BHASHINI National Language Infrastructure**.

Key Features

- Modular and interoperable architecture.
- Supports real-time **multilingual speech systems**.
- Enables conversational AI and telephony integration.
- Prevents vendor lock-in and reduces duplication of effort.

Applications

- Agricultural advisory services
- Education support systems
- Grievance redressal mechanisms
- Public scheme information dissemination

Significance

- Strengthens **Digital Public Infrastructure (DPI)**.

- Promotes inclusive digital access for India’s linguistic diversity.
- Supports scalable, secure citizen services.

NEW TELESCOPES IN LADAKH – NLST & NLOT

SOURCE: THE HINDU

Why in News?

The Union Budget 2026–27 approved two major astronomical facilities in Ladakh — the **National Large Solar Telescope (NLST)** and the **National Large Optical–Near Infrared Telescope (NLOT)**. These projects aim to strengthen India’s global standing in space and astrophysical research.



National Large Solar Telescope (NLST)

Location

- Merak region near **Pangong Tso Lake**, Ladakh.

Technical Features

- **2-metre aperture** solar telescope.
- Operates in **visible and near-infrared wavelengths**.
- Designed to study fine-scale solar structures.

Scientific Objectives

- Study **solar magnetism and solar flares**.
- Monitor **coronal mass ejections (CMEs)** and sunspots.
- Improve understanding of **space weather**, which affects satellites, GPS, aviation, and power grids.
- Complement India’s **Aditya-L1 solar mission** data.

Significance

- Will become India’s **third major solar observatory**.
- Enhances indigenous capability in **solar physics and heliophysics research**.

National Large Optical–Near Infrared Telescope (NLOT)

Location

- Hanle, Ladakh (already hosts the Indian Astronomical Observatory).

Technical Features

- **13.7-metre segmented mirror telescope.**
- Made of **90 hexagonal mirror segments** working as a single large mirror.
- Observes in optical and near-infrared spectrum.

Scientific Objectives

- Detection and analysis of **exoplanets.**
- Study of **stellar evolution, supernovae, and galaxies.**
- Understanding the **early universe and cosmic origins.**

Global Relevance

- Places India among countries operating **large-class optical telescopes.**
- Strengthens participation in international collaborations.

Strategic Importance

- Ladakh's altitude (~4,000 m) offers **thin atmosphere and stable conditions** ideal for astronomy.
- Promotes India's scientific presence in a **strategically sensitive border region.**
- Supports skill development in advanced optics and instrumentation.

SNOWBALL EARTH

SOURCE: THE HINDU

Why in News?

A recent study in *Earth and Planetary Science Letters* found evidence of short climate cycles during a Snowball Earth phase. The findings challenge assumptions of complete climatic stability during global glaciation.



About Snowball Earth

Snowball Earth refers to a period during the **Cryogenian Period (720–635 million years ago)** when Earth was almost entirely covered in ice.

Key Features

- Glaciers possibly extended to tropical latitudes.

- Oceans largely frozen, limiting atmosphere-ocean interaction.
- Caused by drastic changes in **carbon dioxide levels and solar radiation.**

New Findings

- Analysis of sedimentary **varves in Scotland's Port Askaig Formation.**
- Identified solar-linked cycles of **9–11 years and 60–150 years.**
- Suggests climate variability persisted despite global glaciation.

Significance

- Improves understanding of early Earth climate systems.
- Helps refine climate models for extreme environmental conditions.

COPERNICUS SENTINEL-2 MISSION

SOURCE: THE HINDU

Why in News?

The Copernicus Sentinel-2 satellites recently captured high-resolution imagery of Northern Italy during the 2026 Winter Olympics.



About Sentinel-2

Sentinel-2 is part of the **Copernicus Programme**, the European Union's flagship Earth observation initiative. It provides **high-resolution optical imagery** for monitoring land, vegetation, water bodies, disasters, and environmental change.

The mission is developed by the **European Space Agency (ESA)** on behalf of the **European Union.**

Satellite Constellation

- Consists of two identical satellites: **Sentinel-2A and Sentinel-2B** (with Sentinel-2C joining the constellation for continuity).

- Placed in the same **sun-synchronous polar orbit** at about 786 km altitude.
- Provides a **290 km swath width**, enabling coverage of large land areas.
- Offers a **revisit time of 5 days globally**, and more frequent coverage over Europe.

Technical Features

- Equipped with a **Multispectral Instrument (MSI)**.
- Captures imagery across **13 spectral bands** (visible, near-infrared, and short-wave infrared).
- Spatial resolution ranges from **10 m to 60 m**, depending on the band.
- Enables detection of subtle variations in vegetation health and land cover.

Applications

1. Agriculture

- Crop monitoring and yield estimation.
- Detection of crop stress and irrigation needs.
- Supports precision farming.

2. Disaster Management

- Flood mapping, wildfire monitoring, landslide detection.
- Real-time damage assessment after natural disasters.

3. Climate & Environment

- Forest cover analysis.
- Wetland and coastal ecosystem monitoring.
- Glacier retreat and snow cover studies.

4. Urban & Infrastructure Planning

- Urban sprawl mapping.
- Land use and land cover classification.

SODIUM-ION BATTERIES: A STRATEGIC ALTERNATIVE TO LITHIUM-ION TECHNOLOGY

Why in News?

Sodium-ion batteries are emerging as a promising alternative to lithium-ion batteries amid rising concerns over critical mineral dependence and supply-chain risks. As global battery demand grows, India is exploring sodium-ion technology to strengthen **energy security and domestic manufacturing**.

What are Batteries?

A **battery** is an electrochemical device that converts chemical energy into electrical energy.

Components

- **Anode** (negative electrode)
- **Cathode** (positive electrode)
- **Electrolyte** (medium for ion movement)

A **cell** is the basic electrochemical unit, while a battery usually consists of multiple cells connected together.

Types

- **Primary batteries** – Non-rechargeable (e.g., alkaline).
- **Secondary batteries** – Rechargeable (e.g., lithium-ion, nickel-metal hydride).

Dominance and Limitations of Lithium-Ion Batteries

Why Lithium-Ion Became Dominant

- High energy density.
- Long cycle life.
- Low self-discharge rate.
- Continuous global R&D investment.

By 2025:

- Global lithium-ion capacity is nearly **2.5 times annual demand**.
- Battery costs fell from around **\$1,100/kWh (early 2010s)** to nearly **\$108/kWh**.



Structural Challenges

1. Critical Mineral Dependence

- Requires lithium, cobalt, nickel, and graphite.
- Mining and refining are geographically concentrated.
- High exposure to geopolitical tensions.

2. Supply Vulnerability

- Rising global EV demand intensifies mineral competition.
- Price volatility affects battery affordability.

3. Safety Concerns

- Risk of **thermal runaway**.
- Classified as dangerous goods for transport.

India's Battery Manufacturing Scenario

- PLI Scheme for Advanced Chemistry Cells (2021) allocated **40 GWh capacity**.
- Operational capacity remains limited (~1 GWh commissioned).
- Limited domestic lithium reserves.
- Heavy reliance on imports for raw materials and finished batteries.

India's long-term energy transition depends on reducing such external dependencies.

Sodium-Ion Batteries: The Alternative

Energy Security Advantage

- Sodium is abundant and widely available.
- Derived from soda ash and common salts.
- Reduces dependence on critical minerals.

Energy Density Considerations

- Sodium has higher atomic mass → lower specific energy than lithium.
- However:
 - Layered transition-metal oxide cathodes show competitive performance.
 - Energy density is approaching lithium iron phosphate (LFP) batteries.
- Volumetric energy density gap is narrowing with research advancements.

Safety Advantages

- Lower peak temperatures during thermal runaway.
- Can be stored and transported at **zero volts safely**.
- Use **aluminium current collectors** instead of copper.
- Reduced fire risk compared to lithium-ion.

This improves logistics and reduces insurance costs.

Manufacturing Compatibility

- Existing lithium-ion production lines can be adapted.
- Requires minor modifications.
- Main difference: stricter moisture control.
- Lowers capital investment barriers.

This allows manufacturers to hedge against lithium supply risks.

Supply Chain Resilience

- Eliminates need for cobalt and nickel in some chemistries.
- Aluminium is cheaper and widely available.
- Reduces exposure to commodity price fluctuations.

Global Outlook

- Around **70 GWh sodium-ion capacity operational globally (2025)**.
- Expected to reach nearly **400 GWh by 2030**.

- Cost projections indicate sodium-ion batteries could become cheaper than lithium-ion by **2035**.

Countries are investing in sodium-ion for grid storage and low-range EVs.

Strategic Importance for India

1. Energy Independence

- Reduces reliance on imported lithium.
- Strengthens domestic battery ecosystem.

2. Grid Storage Potential

- Ideal for stationary storage.
- Supports renewable energy integration.

3. Affordable EV Segment

- Suitable for two-wheelers, three-wheelers, and small vehicles.

4. Climate Commitments

- Enables faster adoption of clean energy technologies.

Way Forward

1. Policy Inclusion

- Extend public support and incentives to sodium-ion chemistries.

2. Flexible Manufacturing

- Encourage dual-capability battery plants (Li-ion + Na-ion).

3. Standards and Certification

- Develop safety codes and testing protocols.

4. R&D Investment

- Targeted funding for pilot projects.
- Focus on cathode chemistry improvement.

5. Early Deployment

- Promote adoption in:
 - Grid storage systems.
 - Public transport fleets.
 - Small EV platforms.

Conclusion

Sodium-ion batteries offer a safer, more abundant, and supply-secure alternative to lithium-ion technology. By aligning industrial policy and innovation, India can build a **resilient and future-ready battery ecosystem** that strengthens energy security and economic growth.

SECURITY

PRELIMS POINTERS IN NEWS

SAYYAD-3G NAVAL AIR DEFENCE SYSTEM (IRAN)

SOURCE: THE HINDU

Why in News?

Iran's Islamic Revolutionary Guard Corps (IRGC) Navy successfully tested the **Sayyad-3G** naval air defence missile. This marks a major step in Iran's maritime air defence capabilities.



Key Features

- **Range:** Approximately 150 km.
- **Launch System:** Vertical Launch System (VLS) with 360-degree coverage.
- **Speed:** Mach 4.5–5.1.
- **Guidance:** Radar terminal homing + inertial mid-course guidance.
- **Platform:** Launched from Shahid Soleimani-class corvettes.

Strategic Significance

- Creates a **regional air defence umbrella** at sea.
- Shifts strategy from point defence to area defence.
- Enhances deterrence against high-performance aircraft and drones.

Regional Impact

- Strengthens Iran's control in sensitive maritime chokepoints.
- Raises operational risks for adversary surveillance aircraft.
- Alters power balance in the Persian Gulf.

KHORRAMSHAHR-4 (KHEIBAR) MISSILE

SOURCE: THE HINDU

Why in News?

Iran recently released footage of the **Khorramshahr-4 ballistic missile** amid rising tensions with the United States. The display signals continued advancement in Iran's missile capabilities.



About Khorramshahr-4 ballistic missile

The **Khorramshahr-4**, also called the **Kheibar missile**, is one of Iran's most powerful **medium-range ballistic missiles (MRBM)**. It has been developed by Iran's state-run **Aerospace Industries Organization (AIO)**.

Development Background

- First tested in **2017** and publicly showcased in Tehran the same year.
- Represents the fourth generation in the Khorramshahr missile series.
- Designed to strengthen Iran's strategic deterrence posture.

Technical Features

- **Height:** Approximately 13 metres.
- **Diameter:** Around 1.5 metres.
- **Weight:** Nearly 20 tonnes.
- **Fuel Type:** Liquid-fuelled propulsion system.
- **Range:** About **2,000 km**, placing much of West Asia within reach.
- **Payload Capacity:** Up to **1,800 kg**, capable of carrying multiple warheads.
- Claimed ability to strike numerous targets in a designated impact zone.
- Launch preparation time reportedly under **15 minutes**.

- Travels at very high speeds, reportedly several times the speed of sound.

Strategic Significance

- Enhances Iran’s **regional deterrence capability**.
- Strengthens missile-based defence strategy in absence of advanced air force assets.
- Raises concerns about **regional stability and missile proliferation**.

AIR-SHIPS BASED HIGH-ALTITUDE PSEUDO-SATELLITE (AS-HAPS)

SOURCE: INDIAN EXPRESS

Why in News?

The Defence Acquisition Council approved procurement of **AS-HAPS** for the Indian Air Force. The system offers persistent surveillance capability.



About High-Altitude Pseudo-Satellites

- **High-Altitude Pseudo-Satellites (HAPS)** are solar-powered unmanned platforms operating in the stratosphere at **18–20 km altitude**.

Key Features

- Remain airborne for months using solar energy.
- Provide satellite-like services at lower cost.
- Equipped with optical, infrared sensors, and communication systems.
- Ideal for border surveillance and maritime monitoring.

Advantages

- Persistent hovering over a fixed region.
- Faster deployment than satellites.
- Cost-effective compared to orbital systems.

India’s Progress

- Developed by **National Aerospace Laboratories (NAL)**.
- Prototype successfully tested in Karnataka in 2024.

INS TARANGINI

SOURCE: INDIAN EXPRESS

Why in News?

INS Tarangini participated in the international fleet review and MILAN naval exercise at Visakhapatnam. The event highlights India’s maritime diplomacy.



About INS Tarangini

INS Tarangini is the Indian Navy’s first dedicated **Sail Training Ship (STS)**. It was built by **Goa Shipyard Limited** and commissioned in 1997.

Historical Significance

- First Indian naval vessel to **circumnavigate the globe (2003–04)**.
- Serves as a floating ambassador of India during overseas visits.

Design and Structure

- A **three-masted barque**.
- Square-rigged on the fore and main masts, fore-and-aft rigged on the mizzen mast.
- Can remain at sea for over **20 days continuously**.

Role and Functions

- Provides practical sail training to **naval cadets**.
- Promotes values of **discipline, endurance, leadership, and teamwork**.
- Enhances maritime cooperation during international deployments.

Crew and Capacity

- Permanent crew includes officers and sailors.
- Can train around **30 cadets at a time**.

H-125 LIGHT UTILITY HELICOPTER

SOURCE: THE HINDU

Why in News?

India and France inaugurated the Final Assembly Line of the **Airbus H-125 helicopter** in Karnataka. The move strengthens India’s defence manufacturing ecosystem.



Airbus H-125 helicopter

The **H-125** is a single-engine light utility helicopter from Airbus’ **Écureuil family**. It is widely known for reliability and performance in extreme terrains.

Key Features

- **High-altitude capability**, suitable for mountainous and desert conditions.
- Maximum speed around **250 km/h**.
- Range approximately **650 km**.
- Reconfigurable for rescue, medical evacuation, and logistics missions.
- Known as the only helicopter to land on **Mount Everest’s summit**.

Applications

- Used in emergency services, tourism, policing, and defence logistics.
- Important for **high-altitude supply missions** in India’s border areas.

Significance to India

- Boosts **Make in India** and defence indigenisation.
- Enhances rapid response and disaster management capacity.

EXERCISE VAJRA PRAHAR 2026

SOURCE: TIMES OF INDIA

Why in News?

India and the United States will conduct the 16th edition of **Exercise Vajra Prahar** in Himachal Pradesh. The drill deepens special forces cooperation.



About Vajra Prahar

Vajra Prahar is a bilateral **Special Forces exercise** between the Indian Army and the US Army.

Objectives

- To enhance **interoperability** between Indian and US Special Forces.
- To improve **joint operational readiness** in complex security scenarios.
- To exchange advanced **special operations tactics, techniques and procedures (TTPs)**.
- To strengthen cooperation in **counter-terrorism and unconventional warfare**.

Key Focus Areas

- **Counter-terror operations**, including urban warfare and hostage rescue missions.
- **Precision strike operations** using modern weapon systems and intelligence inputs.
- **Intelligence-based joint planning** and rapid decision-making.
- Conduct of **simulated high-risk missions** in mountainous and semi-urban terrain.
- Use of advanced communication, surveillance, and mobility systems.

Strategic Importance

- Reinforces the growing **India–US strategic defence partnership**.
- Enhances coordination in addressing **cross-border terrorism and regional security threats**.
- Contributes to stability in the **Indo-Pacific region** through stronger military cooperation.
- Builds mutual trust, tactical compatibility, and rapid-response capabilities between the two armed forces.

CJ-1000 HYPERSONIC MISSILE

SOURCE: THE HINDU

Why in News?

China showcased the **CJ-1000 hypersonic missile** during a military parade. The development highlights advancements in scramjet propulsion technology.



About CJ-1000

The **CJ-1000** is a land-based **scramjet-powered hypersonic cruise missile** developed by China.

Technical Characteristics

- Estimated range of at least **2,500 km**.
- Mounted on a mobile transporter-erector-launcher.
- Powered by a **scramjet engine**, enabling sustained hypersonic speeds.
- Operates at lower altitudes than glide vehicles.

Why Scramjet Missiles Matter

- Fly at **20–30 km altitude**, making radar detection difficult.
- Continuous engine thrust ensures manoeuvrability.
- Greater terminal accuracy compared to glide vehicles.

Strategic Implications

- Challenges existing missile defence systems.
- Signals intensifying **hypersonic arms competition**.

SOCIETY

VULNERABLE SECTIONS OF SOCIETY

WOMEN IN STEM IN INDIA: FROM ACCESS TO RETENTION

SOURCE: THE HINDU

Why in News?

Despite rising enrollment of women in **STEM education**, their long-term retention in research and scientific careers remains low. This gap has renewed focus on addressing **systemic and institutional barriers** beyond symbolic policy measures.

What is STEM?

- STEM includes disciplines that promote:
 - **Scientific inquiry**
 - **Technological innovation**
 - **Engineering solutions**
 - **Mathematical reasoning**
- It nurtures critical thinking and problem-solving skills.
- Plays a crucial role in addressing global challenges like climate change, public health, and digital transformation.

Current Status in India

- Women constitute around **43% of STEM enrollments** in higher education.
- However, significantly fewer women continue into:
 - Doctoral research.
 - Faculty positions.
 - Leadership roles in scientific institutions.

The Enrollment–Retention Gap

- Cultural expectations that scientists must be continuously available and geographically mobile.
- Disproportionate burden of **unpaid care work** on women.
- Career breaks often penalised in performance evaluations.

Limitations of Existing Policies

Schemes such as:

- Career break fellowships.

- Women-focused research grants (e.g., WISE-KIRAN).

While well-intentioned, these policies:

- Address symptoms rather than structural biases.
- Do not sufficiently transform workplace culture.
- Often assume that women alone must “adjust” to institutional norms.

Key Issues Identified

1. Intersectional Inequality

- Experiences differ across caste, class, geography, and institutional access.
- Urban, upper-caste women often have better access to:
 - Mentorship.
 - Networks.
 - Research infrastructure.
- Women from marginalized communities face compounded exclusion.

2. Barriers for Gender Minorities

- Trans and non-binary scientists encounter:
 - Administrative mismatches in documentation.
 - Harassment and safety concerns.
 - Institutional invisibility.
- Even a single discriminatory incident can disrupt careers.

3. Structural Violence and Workplace Culture

- Harassment and gender bias remain concerns.
- Lack of childcare facilities.
- Field-based research can expose marginalized women to additional vulnerabilities.
- Merit is often equated with endurance of hostile environments.

4. Economic and Job Insecurity

- India’s female labour force participation rate remains around **32%**.
- STEM jobs are often contractual or temporary.
- Limited secure research positions reduce long-term retention.
- Economic precarity affects marginalized women more severely.

Why Gender Inclusion Matters?

1. Leadership Representation

Women remain underrepresented in:

- Senior faculty roles.

- Principal investigator positions.
- Scientific decision-making bodies.

2. Impact on Knowledge Production

Diverse teams generate:

- Broader research questions.
- Context-sensitive innovations.
- Inclusive technological solutions.

Gender inclusion enhances scientific relevance and societal impact.

Strengthening Democratic Science

- Inclusive STEM participation enriches public debate on:
 - Climate adaptation.
 - Emerging technologies.
 - Public health policies.
- Diverse scientific communities strengthen **deliberative democracy**.
- Marginalized voices reshape ethical and research priorities.

Way Forward

1. Institutional Reforms

- Redefine merit beyond uninterrupted productivity.
- Recognise care responsibilities in evaluation systems.

2. Safe and Inclusive Workplaces

- Strengthen anti-harassment mechanisms.
- Ensure gender-sensitive infrastructure (childcare, safe housing during fieldwork).

3. Leadership Pipeline

- Mentorship programmes for women.
- Transparent promotion criteria.

4. Intersectional Approach

- Support women from rural and marginalized backgrounds.
- Inclusive policies for gender minorities.

5. Job Security and Economic Reform

- Increase secure research positions.
- Expand funding for long-term projects.

6. Cultural Change

- Challenge stereotypes of the “ideal scientist.”
- Promote work-life balance as institutional value.

Conclusion

Ensuring women’s retention in STEM requires **deep institutional transformation**, not just increased enrollment. A diverse and inclusive scientific ecosystem will strengthen India’s innovation capacity and contribute to a more equitable and democratic society.

HEALTH SECTOR

PUBLIC HEALTH SPENDING IN INDIA

SOURCE: INDIAN EXPRESS

Why in News?

India continues to fall short of the public health expenditure targets set under the **National Health Policy (NHP) 2017**.

Current Status of Public Health Spending

1. Missed National Targets

- NHP 2017 aimed to increase public health spending to **2.5% of GDP by 2025**.
- As per recent budget estimates (2025–26), total public health expenditure remains around **1.3–1.4% of GDP**, well below target.
- The **Union government’s share** is only about **0.29% of GDP**, compared to 0.37% during the Covid-19 period (2020–21).

2. Centre–State Imbalance

- States have gradually increased spending from about **0.67% of GDP (2017–18)** to nearly **1.1% (2025–26)**.
- Meanwhile, the Union share in transfers for centrally sponsored health schemes has declined significantly (from nearly 75% in 2014–15 to around 43% in 2024–25).
- This trend places greater fiscal burden on states, especially poorer ones.

3. Health and Education Cess (HEC) Issue

- The **Health and Education Cess**, intended to supplement health funding, is largely used to replace existing allocations rather than add new resources.
- Only a fraction of cess collections are directed toward core health expenditure.

4. Global Comparison

- India’s **per capita public health spending** remains among the lowest globally.
- Countries like **Thailand, Malaysia, and BRICS nations** spend multiple times more per capita on public healthcare.
- Even neighbouring nations such as **Sri Lanka and Bhutan** allocate significantly higher public resources relative to population size.

National Health Policy (NHP) 2017 – Key Features

Objective

- Achieve **Universal Health Coverage (UHC)**.

- Ensure affordable primary, secondary, and tertiary healthcare.
- Reduce catastrophic health expenditure.

Core Principles

- **Equity and universality**
- **Affordability and quality care**
- **Accountability and patient-centred approach**

Key Quantitative Targets

- Raise public health spending to **2.5% of GDP by 2025**.
- Increase state health budgets to over **8% of total state expenditure**.
- Reduce **Maternal Mortality Ratio (MMR)** and **Under-Five Mortality Rate (U5MR)**.
- Reduce premature deaths from **Non-Communicable Diseases (NCDs)** by 25%.
- Eliminate diseases like **TB and Kala-azar** within set timelines.

Reasons for Low Public Health Spending

- **Political Economy Factors:** Infrastructure projects offer visible electoral gains compared to systemic health investments.
- **Fragmented Financing:** No dedicated, ring-fenced health financing mechanism.
- **Weak “Health in All Policies” Implementation:** Determinants like nutrition, sanitation, pollution are handled separately.
- **Private Sector Dominance:** Rapid expansion of private healthcare creates perception that health is a **private consumer service**, reducing pressure on public provisioning.
- **Absence of Binding Roadmap:** NHP targets lack statutory backing or year-wise milestones, making them aspirational.

Steps Needed to Increase Public Health Spending

- **Strengthen Fiscal Capacity:** Improve **tax-to-GDP ratio** through compliance and GST reforms. Introduce earmarked sin taxes on tobacco, alcohol, and unhealthy products for health funding.
- **Accelerate Infrastructure Grants:** Effective utilization of **Finance Commission health grants** for PHCs and CHCs.
- **Promote Blended Finance:** Combine public funds with private and philanthropic investments. Expand insurance coverage for the **“missing middle.”**
- **Improve Efficiency:** Adopt **outcome-based budgeting**. Strengthen procurement systems and audit transparency.

- **Legal and Policy Reforms:** Consider enacting a **Right to Health framework**. Debate inclusion of public health in the **Concurrent List** for uniform standards.
- **Prioritize Primary Care:** Allocate at least **two-thirds of health spending to primary healthcare**, as recommended by NHP 2017.

Conclusion

India’s persistent underinvestment in public health highlights a gap between policy vision and fiscal commitment. Without higher Union support, stronger federal coordination, and legally backed financing reforms, achieving Universal Health Coverage will remain a distant goal.

PRELIMS POINTERS IN NEWS

DENOTIFIED TRIBES (DNTS) AND CENSUS 2027

SOURCE: THE HINDU

Why in News?

The Union Government has assured enumeration of **Denotified Tribes (DNTs)** in Census 2027. Community leaders are demanding a separate census category and constitutional safeguards.

DE notified Tribes (DNTs), also known as *Vimukta Jati*, are the tribes that were originally listed as “Criminal Tribes” and “addicted to the systematic commission of non-bailable offences.”

Once a tribe became “notified” as criminal, all its members were required to register with the local magistrate, failing which they would be charged with a “crime” under the Indian Penal Code.



About Denotified Tribes (DNTs)

Denotified Tribes were once labelled as “criminal tribes” under the **Criminal Tribes Act, 1871**. The Act was repealed in 1952, but many communities continue to face stigma and socio-economic marginalisation.

Historical Context

- Colonial administration enforced compulsory registration and surveillance.
- After independence, many were brought under **SC, ST or OBC lists**, while others remain unclassified.
- Last detailed enumeration was in the **1931 Census**.

Commissions

- **Renke Commission (2008)** highlighted their deprivation.

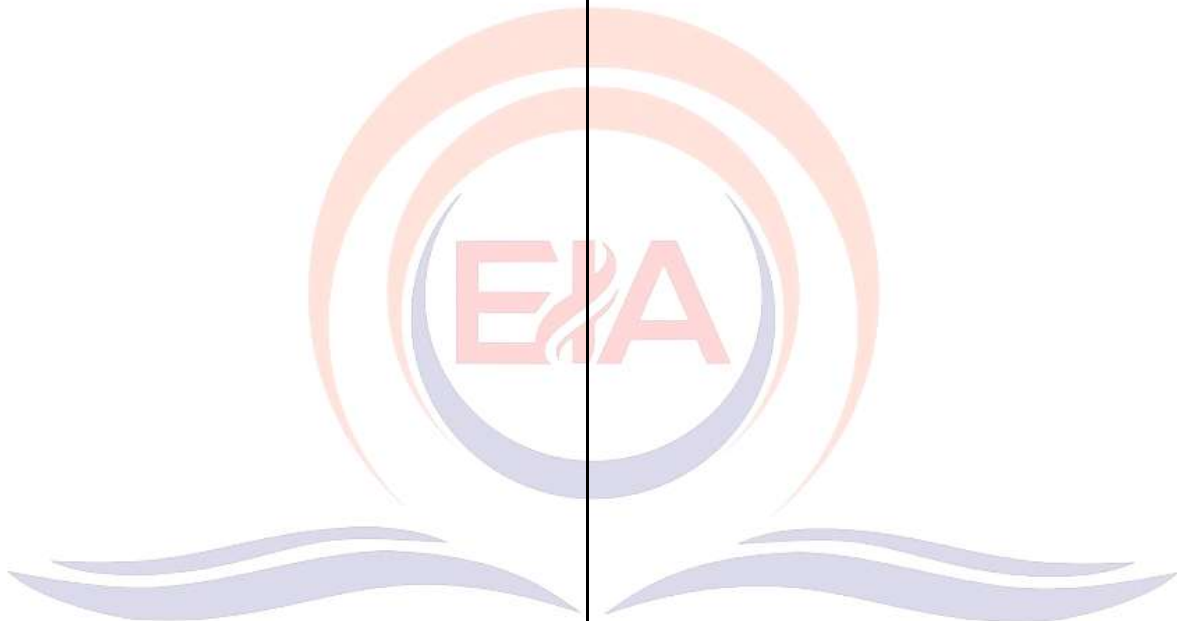
- **Idate Commission (2017)** identified around 1,200 communities, including 268 unclassified groups.

Current Issues

- Lack of proper certification hinders welfare access.
- Continued discrimination and poverty.
- Absence of constitutional status limits political representation.

Government Measures

- **SEED Scheme** supports education, livelihood and housing.
- DNT Welfare Board established, but not a constitutional body.



25 HERITAGE SITES EYE GLOBAL FUNDING — TELANGANA'S PUSH FOR CULTURAL CONSERVATION

Telangana is preparing to showcase around **25 heritage monuments** at the **60th World Monuments Fund (WMF) Conference** to attract **international funding and partnerships** for conservation and restoration.

This initiative reflects a broader effort to preserve cultural heritage and integrate it with sustainable urban development and tourism strategies.

Context and Background

- Heritage structures are physical embodiments of a region's **history, culture, artistry and identity**.
- They serve not only as cultural assets but also as **drivers of tourism, education, livelihood and urban character**.
- Telangana, a relatively new state formed in **2014**, inherited a rich historical legacy from the **Kakatiya, Qutb Shahi, Asaf Jahi (Nizam) and other dynasties**.
- Yet many monuments have suffered from neglect, encroachment, environmental degradation, and the pressures of modern urbanisation.
- State authorities have thus begun proactive measures to secure **global funding, technical expertise and stakeholder participation** to restore and maintain these sites.

Role of World Monuments Fund (WMF)

- The **World Monuments Fund (WMF)** is a leading international non-profit dedicated to **heritage preservation worldwide**.
- It conducts the **World Monuments Watch**, a biennial programme that identifies endangered sites and mobilises global resources for conservation.
- Being featured or connected with WMF events enhances visibility and improves the chances of **funding, expertise and public-private partnerships**.

Heritage Sites Identified for Funding

Among the **25 monuments** selected across Telangana are iconic and historically significant structures that encapsulate the region's diverse cultural past:

7. Taramati Baradari – Hyderabad

- A pavilion built during the Qutb Shahi period linked with courtly culture and music.
- Symbolises the **artistic efflorescence** of medieval Deccan sultanates.

2. Akanna Sarai – Maheshwaram

- A water structure with architectural and historical value.
- Represents traditional urban public-works heritage.

3. Ghanpur Group of Temples – Warangal

- A cluster of Kakatiya dynasty temples showcasing **late medieval temple architecture**.
- Important for the study of regional stone craftsmanship.



4. Medak Fort – Medak

- Built in the **Rashtrakuta era**, later expanded by Qutb Shahis.
- Offers insights into fortification strategies and regional defence history.

5. Mudumal Megalithic Menhirs – Narayanpet

- Prehistoric stone structures dating back over **3500 years**.
- Added to India's **tentative list of UNESCO World Heritage Sites**, indicating its archaeological importance.

6. Pachala Someshwara Temple – Nalgonda

- A historic temple site representing medieval **religious architecture**.

7. Panagal Museum – Nalgonda

- Houses artefacts from various dynasties, facilitating archaeological research and public education.

Heritage Sites in Hyderabad

In the state capital, several heritage buildings and structures have been earmarked for restoration:

8. Old MCH Office

- Represents British-era civic architecture.

9. Katora Houz

- A historical water reservoir associated with Qutb Shahi city planning.

10. City College Building

- A colonial educational structure reflecting early 20th-century institutional design.



11. Puranapul Bridge

- An ancient bridge central to early Hyderabad’s transport and trade network.

12. JNTU Women’s College Physics & Chemistry Blocks

- Early educational facilities with architectural character.

13. ENT Hospital

- A legacy building with architectural and social history value.

Policy Approach: “Own Your Monument”

The **Heritage Partners Initiative**, launched by Telangana’s Tourism and Culture department, promotes the slogan **“Own Your Monument, Adopt Your Monument”**.

This approach seeks to involve multiple stakeholders:

- **Public sector agencies** (GHMC, HMDA, cultural bodies) for policy support.
- **Private partners and philanthropists** for funding and project implementation.
- **Local communities** to ensure **heritage becomes a living part of urban and rural identity**, not an isolated relic.
- **Academia and conservation experts** for appropriate restoration practices.

This strategy aligns with global best practices where **heritage conservation is integrated with urban planning, local livelihood and tourism** rather than treated as an isolated task.

Significance of Heritage Conservation

Cultural and Educational Importance

- Heritage sites convey **historical continuity and identity**. They help communities understand their **cultural roots, artistic traditions, religious practices and societal evolution** over centuries.

Tourism and Economic Development

- Restored and well-presented heritage destinations attract tourists, generating **economic benefits, employment, and local entrepreneurship**. Integration of heritage with tourism infrastructure can support **sustainable growth**.

Urban Renewal and Placemaking

- Well-conserved heritage buildings contribute to **vibrant urban spaces**, enhancing city aesthetics and creating **community gathering places** that enrich civic life.

Academic Research and Knowledge

- Many monuments house **archaeological evidence, inscriptions and art forms** valuable for research across history, art history, sociology and anthropology.

Challenges in Heritage Preservation

1. Funding Deficits

- Many heritage sites are in states of disrepair due to **lack of dedicated funding** for restoration and ongoing maintenance. Securing global funding helps fill this critical gap.

2. Urban Pressures and Encroachment

- Rapid urbanisation, infrastructure growth and real estate pressures often endanger heritage structures through **encroachment, pollution and structural damage**.

3. Technical Expertise

- Restoration requires **specialised conservation skills**, including materials science, architectural history, structural engineering and site-specific contextual understanding. Partnerships with global experts can augment local capacities.

4. Public Awareness

- Heritage conservation depends on **public awareness and ownership**. Without community engagement, restoration projects may remain isolated and unsustainable.

Way Forward

To ensure long-term sustainability and impact, Telangana’s heritage strategy should prioritise:

- **Integrated Heritage Management Plans** that align with urban planning and tourism development.
- **Public-private partnerships (PPP)** to attract finance, innovation and shared ownership.
- **Continuous Maintenance Funds** beyond one-time restoration expenditures.
- **Digital Documentation and Interpretation** to engage global audiences and younger generations.

- **Policy Support and Legal Protection** to prevent encroachment and misuse.

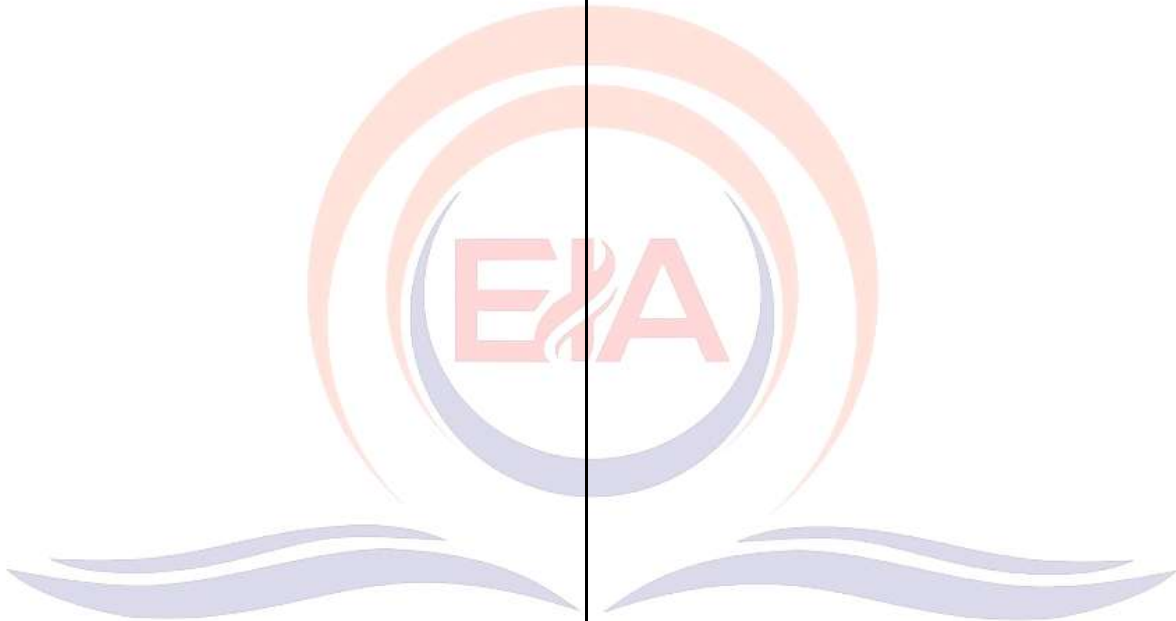
Encouraging private sector philanthropy, CSR funding and international NGO grants can complement state and central resources.

Conclusion

Telangana's effort to secure **global funding for heritage conservation** reflects a progressive blend of **cultural pride and economic strategy**.

By participating in international forums, the state enhances visibility and access to global expertise, while reinforcing heritage as a living asset.

Sustained partnerships and community engagement will be key to preserving these monuments for future generations.



NITI AAYOG'S RENEWABLE ENERGY BLUEPRINT FOR ANDHRA PRADESH

NITI Aayog has prepared a draft **Renewable Energy (RE) Blueprint** to transform Andhra Pradesh into one of India's **top renewable energy hubs by 2035**.

The plan sets ambitious targets for **solar, wind, energy storage and export-oriented clean energy capacities** backed by large investments and jobs creation.

Current Renewable Energy Profile

Installed Renewable Capacity

- Andhra Pradesh's total installed renewable energy capacity stood at **~13,488 MW** by mid-2025.
- This comprised about **5,523 MW solar, 4,397 MW wind, 2,810 MW large hydro, 163 MW small hydro and ~594 MW biopower**.
- Renewables constitute **nearly 47-50 %** of AP's total installed electricity capacity.

Growth Trends

- Renewable capacity in the state grew from **~8,481 MW (2020) to ~13,488 MW (2025)**, highlighting strong growth momentum.
- Andhra Pradesh also contributes **~9 % of India's wind capacity** and has substantial installed solar parks like Kurnool (1000 MW).

National Context: India crossed **250 GW of non-fossil fuel capacity** (51.5 % of total installed power) by late 2025, a major clean energy milestone ahead of 2030 commitments.



Key Goals of the Blueprint

The blueprint sets **long-term targets up to 2035:**

Domestic Renewable Energy Targets

- **35 GW solar power capacity**
- **12 GW wind energy capacity**
- **55–60 GWh energy storage systems** (batteries and pumped storage)

These targets are designed to meet Andhra Pradesh's internal electricity demand with clean sources.

Export-Oriented Renewable Projects

To position AP as a **renewable power export hub:**

- **30 GW solar capacity**
- **25–30 GW wind power**
- **10–12 GW pumped storage capacity**

These export capacities can support energy supply beyond the state and help meet national and regional clean energy needs.

Investment and Economic Impact

Investment Requirements

The blueprint estimates a total investment of around **₹7.5 lakh crore by 2035:**

- **₹3.3 – ₹3.4 lakh crore** for domestic energy transition.
 - **₹4 – ₹4.2 lakh crore** for renewable export hub infrastructure.
- Around **90 % of this capital is expected from the private sector.**

Employment and Industrial Growth

- The blueprint projects the creation of **5 – 6 lakh jobs** in construction, operations and clean energy industries.
- Investments are expected to spur **manufacturing, green hydrogen production, battery storage plants, and associated clean tech sectors.**

Strategic Components of the Plan

1. Clean Power Generation and Storage

- Large-scale deployment of solar parks, wind farms and hybrid energy projects.
- Integration of Battery Energy Storage Systems (BESS) and pumped hydro to manage intermittency.

2. Energy Export Promotion

- Using coastal ports (like Visakhapatnam and Kakinada) to export surplus renewable energy and green hydrogen derivatives, positioning AP on global clean energy trade routes.

3. Policy and Regulatory Support

- Streamlining clearances, grid access, and land allocation for renewable infrastructure.
- Competitive tariff frameworks to attract investment.

4. Market and Financial Mechanisms

- Use of **green bonds, carbon finance, public-private partnerships**, and incentives to mobilise capital.

5. Consumer and Cost Benefits

- With large renewable deployment, cost estimates suggest power procurement and supply could average **below ₹6 per unit**, reducing energy costs for industries and households.

Significance of the Blueprint

Energy Security

- A diversified clean energy portfolio reduces dependence on fossil fuels and enhances resilience against fuel price volatility.

Climate Commitments

- The strategy aligns with India's **Net Zero by 2070** goal and supports NDC targets under the Paris Agreement.

Economic Development

- Renewable infrastructure acts as a catalyst for **industrial growth, employment and clean tech innovation**.

Regional Leadership

- By becoming a clean energy hub, Andhra Pradesh can attract global capital, technology and export prospects in low-carbon industries.

Challenges and Implementation Issues

1. Grid Integration

- Renewable sources are intermittent and require robust grid balancing, demand response mechanisms, and storage solutions.

2. Financing and Capital Flow

- Mobilising ₹7.5 lakh crore predominantly from private sources demands stable policies, predictable returns and risk mitigation frameworks.

3. Land and Environmental Constraints

- Large renewable projects require land, which raises concerns over agricultural land use, environmental impact and stakeholder consent.

4. Infrastructure and Skill Gaps

- Rapid deployment needs skilled labour, local capacity building and modern transmission infrastructure.

Conclusion

NITI Aayog's Renewable Energy Blueprint provides Andhra Pradesh with a **visionary roadmap** to become a leader in India's clean energy transition by 2035. With strong targets, major investments and strategic market positioning, the state can realise **energy security, sustainable growth and climate action goals**.

UNION BUDGET 2026-27

Meaning of Budget

A **Budget** is the Government's **annual financial statement** that presents:

- Estimated **receipts (income)**
- Estimated **expenditure (spending)**
- For the upcoming **financial year (1 April – 31 March)**

It reflects the **fiscal policy**, developmental priorities, redistribution strategy, and macroeconomic management approach of the government.

Constitutional Basis

The Budget is governed by the following Constitutional provisions:

- **Article 112** – Annual Financial Statement (AFS)
- **Article 113** – Procedure in Parliament with respect to estimates
- **Article 114** – Appropriation Bill
- **Article 110** – Money Bill (Finance Bill classification)
- **Article 266** – Consolidated Fund, Contingency Fund & Public Account
- **Article 267** – Contingency Fund of India

Objectives of the Budget

1. **Resource Mobilisation** – The Budget mobilises financial resources through **taxation, non-tax revenue, and borrowings** to fund government expenditure.
2. **Economic Growth** – It promotes **investment, capital formation, and industrial expansion** to accelerate overall economic development.
3. **Redistribution of Income** – Through **progressive taxation and welfare schemes**, the Budget aims to reduce income inequality.
4. **Fiscal Discipline** – It seeks to maintain **controlled deficits and sustainable public debt levels** for macroeconomic stability.
5. **Inflation Control** – The Budget regulates **aggregate demand through taxation and expenditure management** to curb price rise.
6. **Employment Generation** – By increasing **infrastructure spending and MSME support**, the Budget facilitates job creation.
7. **Social Welfare** – It ensures allocation for **education, health, and rural development** to promote inclusive growth.



Significance of Budget 2026–27

The **Budget 2026–27** holds special significance as it is the **first Budget prepared in Kartavya Bhawan**, symbolising a renewed governance approach rooted in duty and accountability. The Finance Minister presented the Budget on the auspicious occasion of **Magha Purnima and the birth anniversary of Guru Ravidas**, highlighting its inclusive and value-driven orientation.

The Budget is described as a **“Yuva Shakti–driven Budget”**, reflecting the Government’s **Sankalp** to prioritise the **poor, underprivileged and disadvantaged** sections of society. Its overall vision is to move India steadily towards **Viksit Bharat**, balancing **economic ambition with social inclusion**.



It is inspired by three Kartavyas (duties):

1. **First Kartavya** – To accelerate and sustain **economic growth** by improving productivity, competitiveness, and resilience against global uncertainties.
2. **Second Kartavya** – To fulfil people’s aspirations by **building capacity and empowering citizens** as partners in development.
3. **Third Kartavya** – In line with **Sabka Sath, Sabka Vikas**, to ensure equitable access to resources and opportunities for all regions and communities

FIRST KARTAVYA – ACCELERATING ECONOMIC GROWTH

The **First Kartavya** of Budget 2026–27 focuses on accelerating and sustaining economic growth by enhancing **productivity, competitiveness, and resilience** against global volatility.

Scaling up Manufacturing in 7 Strategic & Frontier Sectors

The Budget 90odernizat strengthening India’s domestic manufacturing ecosystem in high-value, technology-intensive sectors to reduce import dependence and integrate into global value chains.



A. Biopharma SHAKTI

- **Outlay:** ₹10,000 crore over 5 years.
- **Objective:** Position India as a global hub for **biologics and biosimilars**, moving beyond generics to innovation-driven pharmaceuticals.
- **Institutional Expansion:** Establishment of **3 new NIPERs** and upgradation of 7 existing ones to boost research and advanced training.
- **Clinical Ecosystem:** Creation of **1,000+ accredited clinical trial sites** to strengthen drug development capacity.
- **Regulatory Strengthening:** Scientific review cadres within CDSCO to improve regulatory efficiency and credibility.

B. India Semiconductor Mission (ISM) 2.0

- Expansion beyond fabrication to include **equipment manufacturing, materials, and full-stack Indian IP design**.
- Industry-led **research and training centres** to develop a skilled semiconductor workforce.

C. Electronics & Critical Minerals

- **Electronics Components Manufacturing Scheme** outlay enhanced to ₹40,000 crore.
- Creation of **Rare Earth Corridors** in Odisha, Kerala, Andhra Pradesh, and Tamil Nadu for mining, processing, and manufacturing.

D. Chemicals & Capital Goods

- Establishment of **3 Chemical Parks** through cluster-based plug-and-play model.
- Creation of **Hi-Tech Tool Rooms** by CPSEs at two locations.
- **Construction & Infrastructure Equipment (CIE) Scheme** to promote advanced domestic manufacturing.
- **Container Manufacturing Scheme** with ₹10,000 crore over 5 years.

E. Textiles – Integrated Programme

- **National Fibre Scheme** covering natural, man-made, and new-age fibres.
- Textile Expansion & Employment Scheme for cluster 90odernization.
- Mega Textile Parks focused on **technical textiles**.
- Mahatma Gandhi Gram Swaraj Initiative for khadi, handloom, and handicrafts with branding and global outreach.
- Dedicated initiative for **sports goods manufacturing**.

Rejuvenating Legacy Industrial Sectors

- Scheme to revive **200 legacy industrial clusters**.
- Focus on infrastructure 90odernization, technology upgradation, and productivity improvement.

Creating ‘Champion SMEs’ and Supporting Micro Enterprises

The Budget introduces a **three-pronged MSME strategy**:

A. Equity Support

- ₹10,000 crore SME Growth Fund.
- ₹2,000 crore additional allocation to Self-Reliant India Fund.

Objective: Improve access to growth capital and reduce dependence on debt.



B. Liquidity Support

- Mandatory TreDS platform for CPSE procurement.
- CGTMSE-backed credit guarantee for invoice discounting.
- Integration of GeM with TreDS for faster payments.
- Development of secondary market using TreDS receivables as asset-backed securities.

Objective: Address working capital constraints and reduce payment delays.

C. Professional Support

- Creation of **Corporate Mitras** through ICAI, ICSI, and ICMAI.
- Focus on Tier-II and Tier-III towns.

Objective: Assist MSMEs in compliance, governance, and market expansion.

Significance: MSMEs contribute significantly to employment and exports; strengthening them boosts inclusive growth.

Infrastructure Push

Infrastructure remains the core growth multiplier.

A. Public Capital Expenditure

- Increased to **₹12.2 lakh crore in FY 2026–27**.
- Focus on crowding in private investment.

B. Infrastructure Risk Guarantee Fund

- Provides partial credit guarantees to reduce financing risk.

C. Asset Monetisation

- Monetisation of CPSE assets through dedicated REITs.

D. Logistics & Transport Expansion

- New Dedicated Freight Corridor: **Dankuni–Surat**.
- Development of **20 National Waterways** in five years, starting with NW-5 (Odisha).
- Ship-repair hubs at **Varanasi and Patna**.
- Coastal Cargo Promotion Scheme to raise waterways share from 6% to 12% by 2047.
- Seaplane VGF Scheme for regional connectivity and tourism.

Significance: Reduces logistics cost, improves supply chain efficiency, and enhances export competitiveness.

Long-Term Energy Security

Energy transition and security are central to sustainable growth.

- ₹20,000 crore allocation over 5 years for **Carbon Capture, Utilisation and Storage (CCUS)**.
- Customs duty exemptions for lithium-ion cells, solar glass inputs, nuclear equipment, and critical minerals.
- Excise exemption on biogas component in biogas-blended CNG.

Developing City Economic Regions (CERs)

Urban transformation is positioned as a growth accelerator.

- ₹5,000 crore per CER over 5 years through reform-linked challenge mode.
- Seven High-Speed Rail Corridors connecting major industrial cities:
 - Mumbai–Pune
 - Pune–Hyderabad
 - Hyderabad–Bengaluru
 - Hyderabad–Chennai
 - Chennai–Bengaluru
 - Delhi–Varanasi
 - Varanasi–Siliguri

Significance: Promotes agglomeration economies, reduces congestion, and enhances regional productivity.

Financial Sector & Capital Markets Reforms

A robust financial ecosystem supports growth.

- High-Level Committee on Banking for Viksit Bharat.
- Restructuring of PFC and REC to improve financial efficiency.
- Review of FEMA (Non-Debt Instruments) Rules to ease capital flows.
- Introduction of market-making framework and total return swaps for corporate bonds.
- ₹100 crore incentive for municipal bond issuances above ₹1,000 crore.



SECOND KARTAVYA – PEOPLE & SERVICES-LED GROWTH

The **Second Kartavya** of Budget 2026–27 focuses on fulfilling the aspirations of citizens by building human capital and positioning the **services sector as a core driver of Viksit Bharat**.

Education to Employment

A **High-Powered Standing Committee** has been proposed to strengthen the services sector as a growth engine. The

objective is to align **education, skilling, and employment opportunities** with emerging service-sector demands, ensuring that youth become productive contributors to economic growth.

Health, Care & Allied Services

The Budget recognises healthcare and care services as major employment generators.

- Training of **100,000 Allied Health Professionals** over five years.
- Development of **1.5 lakh caregivers** under NSQF-aligned programs to strengthen the care economy.
- Establishment of **Five Regional Medical Tourism Hubs** to attract global patients and generate foreign exchange.
- Setting up **3 new All India Institutes of Ayurveda** and strengthening the **AYUSH ecosystem**, promoting traditional medicine globally.

Animal Husbandry & Veterinary Services

- Creation of **20,000+ veterinary professionals** to improve livestock productivity.
- Introduction of **loan-linked capital subsidy schemes** to encourage private investment in veterinary colleges, hospitals, and diagnostic facilities.

Orange Economy & Design Sector

The Budget promotes the **creative and digital economy**:

- Establishment of **AVGC (Animation, Visual Effects, Gaming & Comics) labs** in 15,000 schools and 500 colleges to build digital creative skills.
- Setting up a new **National Institute of Design in eastern India** to promote innovation and design excellence.

Education & Tourism

- Creation of **5 University Townships** near industrial corridors to integrate academia with industry.
- Construction of **girls' hostels in every district** to improve female access to higher education.
- Establishment of a **National Institute of Hospitality** to professionalise tourism services.
- Upskilling of **10,000 tourist guides** and creation of a **National Destination Digital Knowledge Grid**.
- Development of eco-tourism trails and hosting of the **Global Big Cat Summit** to promote sustainable tourism.

Sports Development

The **Khelo India Mission** aims to create an integrated sports ecosystem over the next decade, combining talent identification, infrastructure, coaching, and sports science.

THIRD KARTAVYA – INCLUSIVE DEVELOPMENT

The **Third Kartavya** of Budget 2026–27 aligns with the vision of **Sabka Sath, Sabka Vikas**, ensuring that every region, community, and vulnerable section benefits from economic growth. It focuses on rural prosperity, social justice, regional balance, and improved healthcare access.

Increasing Farmer Incomes

The Budget prioritises enhancing agricultural productivity and income diversification.

- Integrated development of **500 reservoirs and Amrit Sarovars** to strengthen irrigation and water security.
- Promotion of **high-value agriculture** including coconut, cocoa, cashew, sandalwood, and nut cultivation to increase farmer profitability.
- Launch of a **Coconut Promotion Scheme** to improve productivity and exports.
- Dedicated programmes for **cashew and cocoa** cultivation and processing.
- Introduction of **Bharat-VISTAAR**, an AI-based agri-advisory platform integrating AgriStack and ICAR data to provide real-time guidance to farmers.

Empowering Divyangjan

The Budget strengthens inclusion of persons with disabilities through targeted interventions.

- **Divyangjan Kaushal Yojana** to provide customised skill training aligned with industry needs.
- **Divyang Sahara Yojana** to ensure timely access to high-quality assistive devices.
- Support to **ALIMCO** for scaling up manufacturing of assistive technologies.
- Establishment of **Assistive Technology Marts** to improve accessibility and affordability.

Mental Health & Trauma Care

Recognising mental health as a public health priority:

- Establishment of **NIMHANS-2 in North India** to expand advanced mental healthcare services.
- Upgradation of existing institutes in **Ranchi and Tezpur**.
- Setting up of **Emergency & Trauma Care Centres** in district hospitals to improve accident and emergency response systems.

Purvodaya & North-East Development

The Budget emphasises balanced regional growth under the **Purvodaya initiative**.

- Development of the **East Coast Industrial Corridor**, including the Durgapur node.

- Promotion of **5 tourism destinations** and deployment of **4,000 e-buses** to enhance sustainable transport.
- Implementation of the **Buddhist Circuit Scheme** across North-Eastern states to promote cultural tourism and regional integration.

Pillars Of Growth

Key Terms

Term	Definition	Formula / Key Point
Fiscal Deficit	It is the excess of total government expenditure over total receipts excluding borrowings during a financial year.	Fiscal Deficit = Total Expenditure – Total Receipts (excluding borrowings)
Primary Deficit	It represents the current year's fiscal deficit excluding interest payments on past debt, showing fresh borrowing requirements.	Primary Deficit = Fiscal Deficit – Interest Payments
Revenue Deficit	It is the excess of revenue expenditure over revenue receipts , indicating government dissaving.	Revenue Deficit = Revenue Expenditure – Revenue Receipts
Current Account Deficit (CAD)	It is the shortfall between foreign exchange earned through exports and foreign exchange spent on imports of goods and services .	Occurs when Imports + Outflows > Exports + Inflows
Fiscal Consolidation	It refers to measures taken by the government to ensure sustainable fiscal health by reducing deficits, controlling debt, and improving revenue mobilisation.	Focuses on deficit reduction and debt sustainability

The Budget rests on six pillars:

1. **Sustaining Economic Growth**
2. **Strengthening Foundations**
3. **People-Centric Development**
4. **Trust-Based Governance**
5. **Ease of Doing Business & Living**
6. **Fiscal Consolidation**

Key Highlights of Tax Reforms

The Union Budget 2026–27 introduces significant **tax reforms aimed at simplification, rationalisation, compliance reduction, and investment promotion**, while maintaining stability in direct taxation.

New Income Tax Act, 2025

- The government has replaced the **Income Tax Act, 1961** with a simplified **Income Tax Act, 2025**, effective from **1st April 2026**.
- The objective is to reduce complexity, remove redundant provisions, and make tax compliance more transparent and predictable.

Stability in Tax Rates

- There are **no changes in income tax slabs for FY 2026–27**, ensuring policy continuity and stability for taxpayers and investors.

TCS Rationalization

- Tax Collected at Source (TCS) on **overseas tour packages** and remittances for **education and medical purposes under the Liberalised Remittance Scheme (LRS)** has been reduced to a uniform **2% without any threshold**, simplifying compliance and reducing ambiguity.

Rationalization of TDS

- To eliminate interpretational disputes, **TDS on supply of manpower services** is fixed at **1% for**

Individuals/HUF and 2% for others, creating clarity and uniformity.

- Additionally, **non-production of books of accounts and failure to pay TDS (where payment is made in kind)** have been **decriminalized**, shifting towards trust-based tax administration.

Customs Duty Rationalization

- Personal use import tariff reduced from **20% to 10%**.
- Full customs duty exemption on **17 cancer drugs and medicines/foods for 7 rare diseases**, promoting affordable healthcare.

Securities Transaction Tax (STT)

- STT has been **marginally increased (0.1% to 0.15% in certain segments)** to curb excessive speculation and stabilise equity markets.

Minimum Alternate Tax (MAT) Reform

- All **non-residents paying tax on a presumptive basis** are exempted from MAT, enhancing India's attractiveness as an investment destination.

Tax Administration Reforms

- Formation of a **Joint Committee (MCA & CBDT)** to integrate ICDS into IndAS, eliminating separate accounting standards from 2027–28.
- Rationalisation of the definition of accountant under Safe Harbour Rules.

- Immunity from prosecution for **non-disclosure of foreign assets below ₹20 lakh** (retrospective from 1 October 2024).

Buyback Tax Shift

- Tax on share buybacks will now be levied as **Capital Gains in the hands of shareholders**, shifting the tax burden from companies to investors.

Strategic Incentives for Investment & Industry

Data Centres

- Foreign companies providing cloud services through Indian data centres will receive a **tax holiday till 2047**, boosting digital infrastructure.

IFSC (GIFT City)

- Tax holiday for Offshore Banking Units extended from **10 to 20 years**, strengthening India’s global financial hub ambitions.

Critical Minerals & EV Ecosystem

- Customs duty exemptions on capital goods for processing **Lithium, Cobalt and critical minerals**, and manufacturing of Lithium-ion cells.

IT Sector Safe Harbour

- Safe Harbour threshold increased to **₹2,000 crore**, with unified classification for software and KPO services.

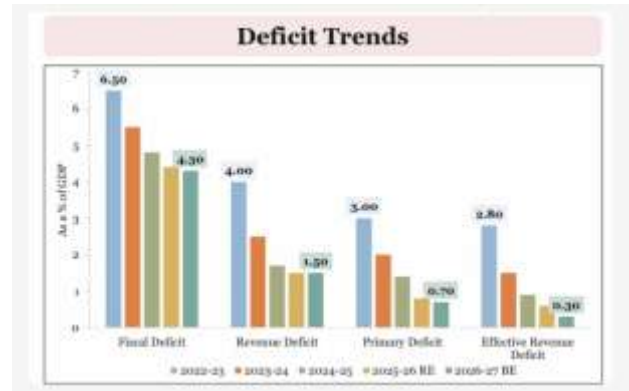
Customs Modernization & Export Promotion

- Higher duty-free import limits for Marine, Leather, and Textile sectors.
- Duty exemptions for aviation and defence MRO components.
- Introduction of **single digital window for cargo clearance** and rollout of **Customs Integrated System (CIS)**.
- AI-based container scanning for faster clearance.
- EEZ and high-seas fish catch made duty-free.
- Simplified dispute settlement with reduced penalties for honest taxpayers.

Macroeconomic Fundamentals Highlighted in Union Budget 2026–27

Fiscal Deficit

- The fiscal deficit for **Budget Estimates (BE) 2026–27** is targeted at **4.3% of GDP**, improving from **4.4% in the Revised Estimates (RE) of 2025–26**.
- This aligns with the government’s medium-term glide path of reducing the fiscal deficit below 4.5% and signals continued commitment to fiscal prudence.
- The gradual reduction reflects efforts to balance growth-supporting expenditure with deficit containment.



Debt-to-GDP Ratio

- The **debt-to-GDP ratio** is projected to decline to **55.6% in BE 2026–27**, down from **56.1% in RE 2025–26**.
- The government has articulated a medium-term target of reducing this ratio to **50% by 2030–31**.
- Lower debt levels would reduce interest burdens and create greater fiscal space for developmental expenditure.

Capital Expenditure (Capex)

Public investment remains the primary engine of growth.

- **Capex allocation** has been increased to **₹12.2 lakh crore for FY 2026–27**, approximately **3.1% of GDP**, up from ₹11.2 lakh crore.
- When grants-in-aid to states for capital asset creation are included, the **Effective Capital Expenditure** rises to **₹17.1 lakh crore**, about **4.4% of GDP**.

This sustained capex push aims to crowd in private investment, enhance infrastructure, and generate long-term multiplier effects.

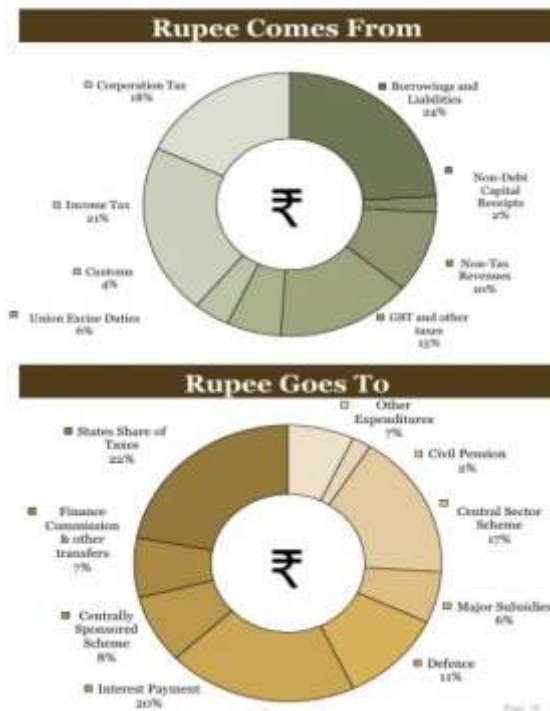
GDP Growth Assumptions

The Budget assumes a **Nominal GDP growth rate of 10.5%** for FY 2026–27.

- **Real GDP growth** is projected at around **7%**, indicating stable expansion supported by domestic demand and investment.
- The nominal growth assumption underpins revenue projections and fiscal calculations.

Revised Estimates 2025–26

- **Non-debt receipts** are estimated at approximately **₹34 lakh crore**.
- **Total expenditure** is pegged at **₹49.6 lakh crore**, with capital expenditure around **₹11 lakh crore**. These estimates reflect adjustments due to revenue performance and spending priorities during the year.



Budget Estimates 2026–27

- **Non-debt receipts** are estimated at **₹36.5 lakh crore**, showing moderate revenue growth.
- **Net tax receipts** are projected at **₹28.7 lakh crore**, reflecting expected tax buoyancy.
- **Total expenditure** is projected at **₹53.5 lakh crore**, consistent with expansionary yet calibrated fiscal policy.

Borrowing Strategy

To finance the fiscal deficit:

- **Net market borrowings** are estimated at **₹11.7 lakh crore**.
- **Gross borrowings** are projected at **₹17.2 lakh crore**.
- The remaining gap will be financed through **small savings and other sources**.

This borrowing strategy aims to manage liquidity without crowding out private investment.

Concerns Regarding Union Budget 2026–27

Global Headwinds

- The Budget assumes **10% nominal GDP growth**, which may face risks from global slowdown, geopolitical tensions, supply chain disruptions, and trade fragmentation.
- External shocks could reduce export demand, weaken capital inflows, and strain fiscal projections.

Revenue Buoyancy Risks

- Shortfalls in **income tax and GST collections** have constrained fiscal space in recent years.
- Lower-than-expected tax growth could force expenditure compression, including cuts in capital

expenditure and social sector schemes, affecting growth momentum.

Overreliance on Supply-Side Strategy

- The Budget heavily emphasises **infrastructure, manufacturing, and capex-led growth**.
- However, **private consumption contributes nearly 60% of GDP**, and rural demand remains subdued.
- Without strong demand revival, supply-side investments may not fully translate into sustained growth.

Implementation Constraints

- High-technology initiatives such as **Bharat-VISTAAR and Biopharma SHAKTI** require advanced institutional capacity and coordination.
- Execution delays, bureaucratic bottlenecks, and persistent land acquisition challenges in infrastructure projects may limit timely outcomes.

Job Creation Gap

- A capex-heavy growth model focused on **semiconductors, biopharma, and advanced manufacturing** may generate limited employment relative to India’s labour force size.
- There is a growing **education–employment skill mismatch**, raising concerns of jobless or K-shaped growth.

Green Transition & Resource Pressures

- Transitioning to renewable energy and electric mobility increases demand for **critical minerals, water, and energy inputs**.
- Rising import dependence on lithium, cobalt, and rare earths may expose India to external vulnerabilities and increase costs for MSMEs.

Uncertain Capital Flows

- Persistent **FPI outflows** and uncertain FDI trends may weaken external financing stability.
- Volatile global capital movements could impact exchange rates and investment sentiment.

External Aid Prioritisation

- While grants-in-aid to foreign countries continue (with Bhutan as a major beneficiary), absence of allocation for strategic projects like **Chabahar Port** raises concerns over India’s regional connectivity strategy and geopolitical outreach.

Measures to Strengthen India’s Economy Beyond Budget 2026–27

Reviving the Twin Engines of Demand

- Growth requires both **investment and consumption**.

- Faster rollout of initiatives like **SHE Marts and Bharat-VISTAAR** can raise rural incomes and stimulate demand due to higher marginal propensity to consume.

Strategic Autonomy in Critical Resources

- India must combine domestic initiatives such as **Rare Earth Corridors** with overseas mineral partnerships to secure supply chains.
- Increasing **R&D expenditure** beyond current low levels is essential for strengthening semiconductor and biopharma ecosystems.

Skilling for Emerging Sectors

- The push in **AVGC, semiconductors, and advanced manufacturing** must be complemented by aggressive skill development under an upgraded **Skill India framework**, preventing talent shortages.

Improving Quality of Expenditure

- There is a need to shift focus from **outlays to outcomes**. Government spending must be evaluated based on tangible asset creation, productivity gains, and income generation rather than fund utilisation alone.

Correcting Inverted Duty Structures

- In sectors like textiles and electronics, higher taxes on raw materials than finished imports hurt domestic industry.
- A sector-wise duty rationalisation is necessary to ensure that **“Made in India” products remain cost-competitive**.

Conclusion

While Budget 2026–27 lays a strong foundation for structural transformation, sustained growth requires balanced demand revival, execution efficiency, resource security, skill alignment, and improved expenditure quality to ensure inclusive and resilient economic development.

ECONOMIC SURVEY 2025-26

The Union Finance Minister presented the **Economic Survey 2025-26** in Parliament ahead of the Union Budget. The Survey highlights India's macroeconomic stability, reform momentum and its transition from **Strategic Resilience** to **Strategic Indispensability** amid global uncertainty.

About Economic Survey

The **Economic Survey** is the Government of India's annual analytical report on the state of the economy. Prepared by the Economic Division under the **Chief Economic Adviser (CEA)** in the Ministry of Finance, it reviews growth trends, sectoral performance, fiscal and monetary conditions, social indicators and policy priorities.

First introduced in **1950-51** as part of the Budget documents and separated in **1964**, the Survey provides evidence-based policy direction before the presentation of the Union Budget.

The 2025-26 Survey portrays India as a **fast-growing, macro-stable and structurally strengthening economy**, while cautioning against global risks and domestic institutional constraints.

I. STATE OF THE ECONOMY

1. Growth Performance

- Real **GDP growth** estimated at **7.4% in FY26**, with **GVA growth at 7.3%**.
- India is projected to grow between **6.8-7.2% in FY27**, remaining the **fastest-growing major economy** for the fourth consecutive year.
- Growth supported by:
 - Strong **domestic demand**
 - Public capital expenditure
 - Services sector expansion



2. Demand-Side Drivers

Private Consumption

- **Private Final Consumption Expenditure (PFCE)** grew by **~7%**.
- Consumption share reached **61.5% of GDP** – highest in over a decade.

- Boosted by:
 - Low inflation
 - Stable employment
 - Rising real incomes
 - Tax rationalisation
 - Strong rural demand

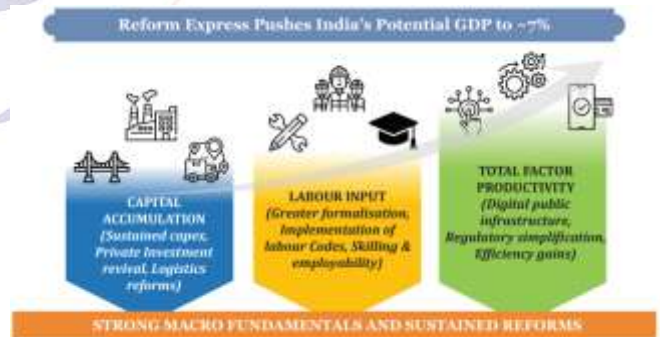


Investment

- **Gross Fixed Capital Formation (GFCF)** grew **~7.8%**.
- Investment sustained at around **30% of GDP**.
- Public capex crowding in private investment.

3. Supply-Side Dynamics

- **Services sector** remains growth engine with **~9% GVA growth**.
- Industry showing revival via **PLI and infrastructure push**.
- Agriculture resilient due to good monsoon and productivity support.



II. FISCAL DEVELOPMENTS

1. Revenue Trends

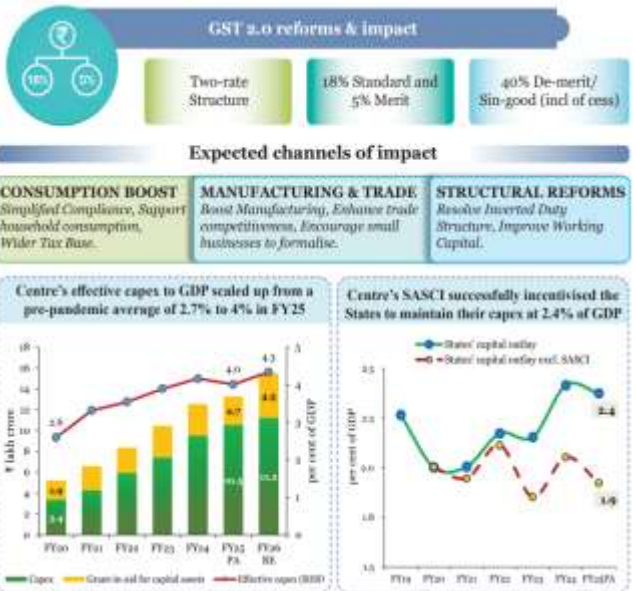
- Revenue receipts increased from **~8.5% of GDP** (pre-pandemic average) to **~9.2% in FY25**.
- Rise driven by:
 - Higher **direct tax collections**
 - Expanding tax base (ITR filers rose from 6.9 crore to 9+ crore).
- **GST collections (Apr-Dec FY26): ₹17+ lakh crore**, reflecting compliance improvements.

Fiscal policy as a key anchor of macroeconomic stability and confidence



2. Expenditure and Capex

- Central **effective capital expenditure** increased to ~4% of GDP.
- Pre-pandemic capex average was around 2.7% of GDP.
- Special Assistance to States for Capital Investment (SASCI)** incentivised states to maintain capital outlay.



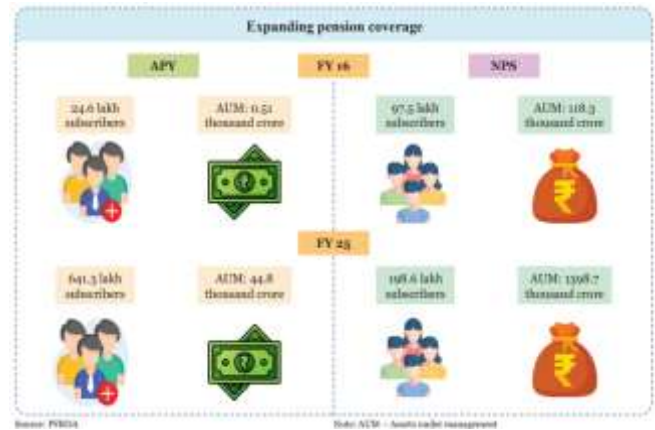
3. Fiscal Discipline

- General government debt-to-GDP reduced by ~7 percentage points since 2020.
- State fiscal deficit around 3.2% of GDP.
- Survey cautions against excessive **unconditional cash transfers** crowding out productive capital spending.

III. MONETARY MANAGEMENT AND FINANCIAL SECTOR

1. Banking Stability

- Gross NPAs at 2.2%; Net NPAs at 0.5%** (Sept 2025).
- Credit growth ~14–15% YoY.
- Banking sector well-capitalised and stress-resilient.



2. Financial Inclusion

Key schemes:

- Pradhan Mantri Jan Dhan Yojana** – 55+ crore accounts.
- Pradhan Mantri Mudra Yojana** – ₹36+ lakh crore loans disbursed.
- Stand-Up India, PM SVANidhi – expanded formal credit access.

3. Capital Markets Expansion

- 21+ crore demat accounts.
- 12 crore unique investors (significant women participation).
- Mutual fund penetration rising in Tier-2/3 cities.

4. Global Validation

- IMF–World Bank **Financial Sector Assessment Program (FSAP) 2025** praised India's resilient financial architecture.
- Total financial sector assets ~187% of GDP.

IV. EXTERNAL SECTOR

1. Trade Expansion

- India's share in global merchandise exports increased from 1% (2005) to ~1.8%.
- Services exports share doubled to ~4.3%.
- Total exports crossed **USD 825+ billion in FY25**.

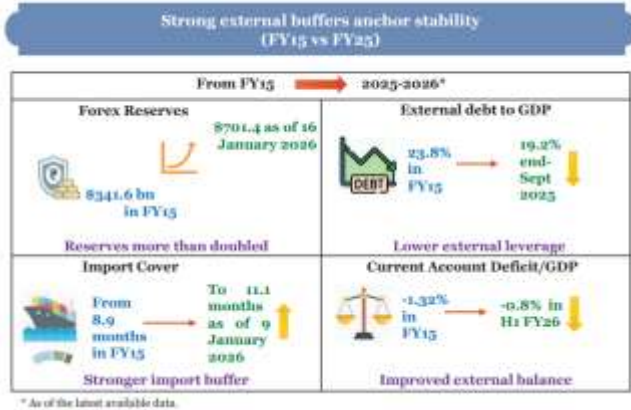


2. Services Export Strength

- Services exports at record USD 387+ billion.
- IT, business services, financial services key drivers.

3. Current Account and Forex

- CAD moderate (~1–1.5% of GDP).
- Remittances reached record USD 135+ billion.
- Forex reserves above USD 700 billion (~11 months import cover).



4. Energy Diversification

- Reduced over-dependence on specific suppliers.
- Increased crude imports from diversified geographies.

5. FDI Trends

- USD 60+ billion FDI inflows (Apr–Nov 2025).
- India among top global destinations for Greenfield investments.

V. INFLATION MANAGEMENT

- CPI inflation averaged ~1.7% (Apr–Dec 2025) — historically low.
- Food and fuel disinflation key contributors.
- Among major EMDEs, India saw sharpest moderation.

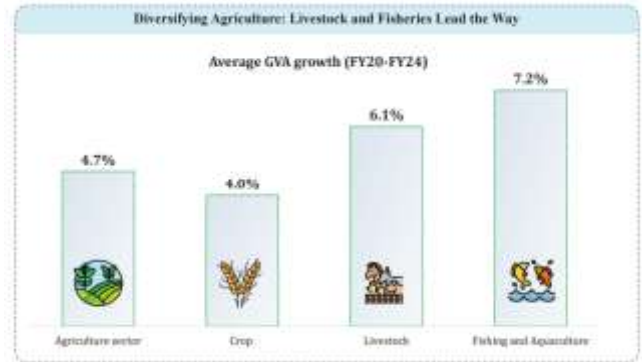


VI. AGRICULTURE AND RURAL ECONOMY

1. Production Trends

- Foodgrain output at record ~3,577 LMT.

- Horticulture surpassed foodgrain in value terms (~33% of agri GVA).
- Livestock and fisheries recorded strong growth.



2. Institutional Support

- MSP system strengthened.
- Agriculture Infrastructure Fund improved post-harvest logistics.
- e-NAM expanded digital agricultural marketing.

3. Income Support

- PM-KISAN and PM Kisan Maandhan pension coverage improved income stability.

VII. SERVICES SECTOR LEADERSHIP

- India is 7th-largest services exporter.
- Services contribute:
 - ~30% total employment
 - ~62% urban employment
- 80% of FDI inflows in recent years directed to services.



Technology and Innovation

- India hosts world's 3rd-largest startup ecosystem.
- Rise of Global Capability Centres (GCCs).
- Rapid expansion in **GenAI startups**.



VIII. INDUSTRY AND INNOVATION

1. Innovation Rankings

- Global Innovation Index rank improved from 81 (2015) to 38 (2025).
- India among top nations in:
 - Patents
 - Trademarks
 - Industrial designs

2. PLI Impact

- ₹2 lakh crore investment attracted.
- ₹18+ lakh crore output generated.
- 12+ lakh jobs created.

3. Critical Technologies

- India among top five globally in 45 of 64 identified critical technologies.
- Indicates technological leap.

IX. INFRASTRUCTURE PUSH

Highways

- National highways expanded from ~91,000 km (FY14) to ~1,46,000+ km (FY26).
- Central capex rose 4.2 times since FY18.

Railways

- Near 100% electrification achieved.
- 69,000+ route km network.

Power and Telecom

- Power capacity ~510 GW.
- DISCOM profitability improved.
- Tele-density ~87%.
- 5G coverage in nearly all districts.



Water & Rural Infrastructure

- 81%+ rural tap water coverage under Jal Jeevan Mission.
- 99%+ rural road connectivity.

X. ENVIRONMENT AND ENERGY TRANSITION

1. Renewables Expansion

- 38+ GW added in FY26 (solar dominant).
- Rapid scaling of solar capacity.

2. Nuclear Energy Push

- **National Nuclear Energy Mission** aims at Small Modular Reactors (SMRs).
- Long-term goal: 100 GW nuclear capacity by 2047.

3. Circular Economy

- PARIVESH 3.0 streamlined clearances.
- Extended Producer Responsibility (EPR) frameworks expanded.



XI. EDUCATION AND HEALTH

Education

- Target: 100% GER in school by 2030; 50% GER in higher education by 2035.
- NEP 2020 reforms:
 - National Credit Framework
 - Academic Bank of Credits
 - Flexible entry-exit



Health

- MMR reduced by ~86% since 1990.
- IMR reduced significantly (25 per 1000 in 2023).
- Tele-MANAS expanded mental health services.

XII. EMPLOYMENT AND SKILLING

- **Total Employment:** Around **56.2 crore (15+ age group)** in Q2 FY26, with net addition of nearly **8.7 lakh jobs** over Q1 FY26.
- **Labour Force Participation Rate (LFPR):** Increased from ~55% to **56.1%**, indicating higher workforce engagement.



- **Unemployment Rate:** Remained stable at around **5%**, reflecting labour market resilience.
- **Female Labour Force Participation:** Rose significantly from **23.3% (2017–18)** to **41.7% (2023–24)**; female unemployment declined from **5.6%** to **3.2%**.
- **Manufacturing Jobs:** Organised sector employment grew by **6% YoY** in FY24 (over 10 lakh jobs added).
- **Social Security Expansion:** Labour Codes extended coverage to **gig and platform workers**.
- **Digital Inclusion:** **e-Shram** registered 31 crore workers (54% women).
- **Job Matching:** **National Career Service** linked 5.9 crore job seekers with 53 lakh employers.

XIII. URBANISATION AND GOVERNANCE

Namo Bharat RRTS

- High-speed regional connectivity reduces commute time.
- Encourages **polycentric urban growth**.

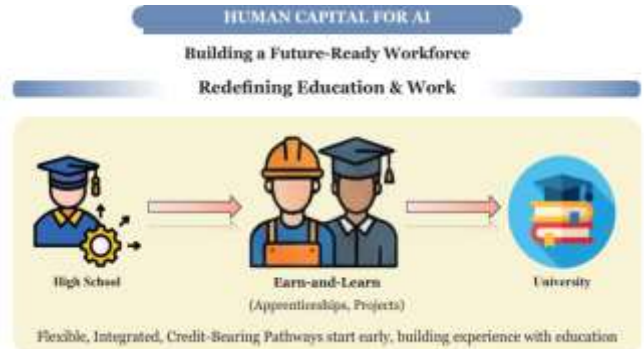
Waste Management

- MSW processing improved from 16% (2014–15) to ~80% (2024–25).
- Door-to-door collection in 98% urban wards.

XIV. EVOLUTION OF INDIA'S AI ECOSYSTEM

- Second-most AI-skilled workforce globally.
- Large domestic digital user base (~1 billion connected users).

- Focus on **Frugal AI** — application-driven, cost-efficient innovation.
- Emphasis on domestic value retention in cross-border data flows.



XV. KEY CHALLENGES

1. Global Fragmentation

- Trade weaponisation
- Supply-chain concentration
- Resource nationalism

2. Weak State Capacity

- Bureaucratic risk aversion
- Policy hysteresis
- Fear of audits inhibiting bold decisions

3. Competitiveness Concerns

- High logistics and energy costs
- Rupee supported by capital flows rather than export surpluses

4. Low Private R&D

- Underinvestment in frontier sectors.
- Short-term profit orientation.

5. Societal Behavioural Constraints

- Weak civic discipline
- Limited delayed gratification
- Governance burden diverted to enforcement.

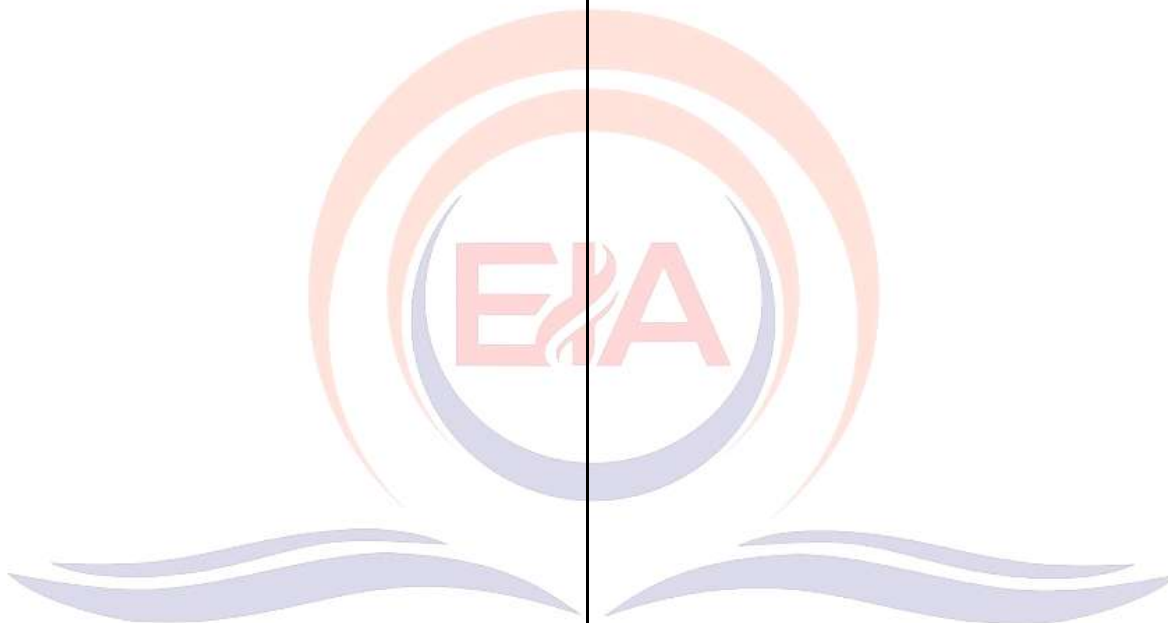
XVI. WAY FORWARD

1. **Manufacturing Deepening** – Medium and high-tech production, electronics, EVs.
2. **Agricultural Productivity Push** – Crop diversification, climate resilience.
3. **Sustained Public Capex** – Crowd-in private investment.
4. **Human Capital Reform** – Skill alignment with industry needs.
5. **Urban Reforms** – Higher FSI, stronger ULB finances.
6. **Energy Security** – Nuclear + renewables mix.
7. **AI-Led Growth** – Sector-specific AI for governance, agriculture, health.
8. **Strategic Indispensability** – Become essential node in global supply chains.

CONCLUSION

The Economic Survey 2025–26 presents India as a **macro-stable, reform-driven and globally integrated economy** poised for sustained expansion.

Achieving **Viksit Bharat** will depend on strengthening **state capacity, innovation, competitiveness and inclusive growth** while navigating an uncertain global order.





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