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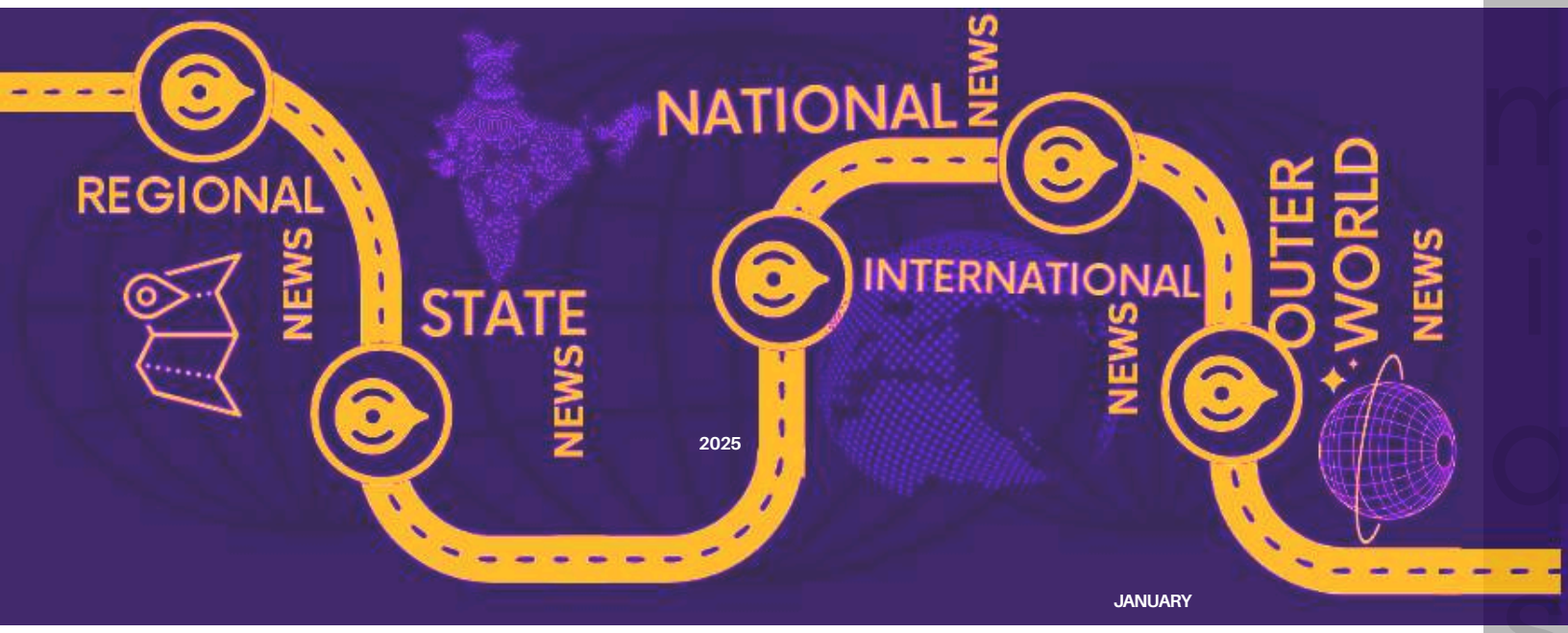

MUST READ!

- SURROGACY AND REPRODUCTIVE RIGHTS
- CONTEMPT OF COURT IN INDIA
- NATIONAL GEOTHERMAL ENERGY POLICY 2025
- RESUMPTION OF U.S. NUCLEAR TESTING
- SPECIAL ECONOMIC ZONES (SEZS) IN INDIA
- NUTRIENT BASED SUBSIDY (NBS) SCHEME
- PROJECT CHEETAH AND CONSERVATION DIPLOMACY
- 30TH UN CLIMATE CONFERENCE (COP30)
- NATIONAL BLOCKCHAIN FRAMEWORK (NBF)
- 2025 NOBEL PRIZE IN PHYSIOLOGY OR MEDICINE
- CONTEMPT OF COURT IN INDIA

SPECIAL COLUMNS

- TELANGANA'S SHATAVAHANA HERITAGE
- MASSIVE INVESTMENT BOOST IN ANDHRAPRADESH

December 2025

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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 December 2025. 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.

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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,

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HISTORY

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SECURITY

SOCIETY

KNOW YOUR STATE

POLITY AND GOVERNANCE

SALIENT FEATURES / PREAMBLE/BASIC CONCEPTS

CONSTITUTIONAL MORALITY IN INDIA

SOURCE: THE HINDU

Why in News?

Constitutional morality has come into renewed discussion due to recent debates over **institutional autonomy**, executive–legislature relations, and the judiciary's role in safeguarding democratic norms.

These developments highlight the need to uphold the **spirit of the Constitution** beyond its written provisions.

Meaning and Origins of Constitutional Morality

Concept

- Constitutional morality signifies **faithful compliance with both the text and spirit** of the Constitution.
- It promotes **respect for procedures, accountability, and civil liberties**, ensuring that authority is exercised legitimately.

Historical Roots

- The concept was first articulated by historian **George Grote**, who argued that **free citizens must uphold constitutional processes** to sustain democracy.
- **Dr. B.R. Ambedkar** adopted this principle in the Indian context, asserting that constitutional morality must be **taught, nurtured, and practiced**, as it does not arise naturally.

Core Pillars of Constitutional Morality

Pillar	Description
Constitutional Values	Upholding equality, liberty, dignity, secularism, and fraternity.
Rule of Law	No individual or authority is above law; power must be exercised with responsibility.
Accountability and Checks	Balanced functioning of executive, legislature, and judiciary.
Ethical Public Governance	Transparency, integrity, and public welfare in policymaking.
Respect for Dissent	Safeguarding free speech and debate as essentials of democracy.

Judiciary's Role in Advancing Constitutional Morality

1. Privacy and Human Dignity

- **Justice K.S. Puttaswamy (2017):** Recognised **Right to Privacy** as fundamental, linking it to **individual dignity, autonomy**, and constitutional morality.

2. Protection of Constitutional Core

- **Kesavananda Bharati (1973):** Introduced the **Basic Structure Doctrine**, preventing Parliament from altering foundational constitutional features like secularism and judicial review.

3. LGBTQ+ Rights and Anti-Discrimination

- **Navtej Singh Johar v. Union of India (2018):** Decriminalised consensual same-sex relations; held that **constitutional morality must prevail over societal or religious morality**.

4. Gender Equality in Religious Practice

- **Sabarimala Case (2018):** Asserted that **women's equality and dignity** cannot be denied by discriminatory customs.

5. Equality within Marriage

- **Joseph Shine (2018):** Struck down adultery law for treating women as property, reinforcing **gender equality and personal autonomy**.

Challenges to Constitutional Morality in India

Political Influence over Institutions

- Appointment and functioning of key bodies like **EC, CBI, Governors**, etc., sometimes reflect **political influence**, eroding neutrality.

Judicial Overreach vs. Judicial Restraint

- While judicial activism advances rights, excessive intervention may **disturb separation of powers**, inviting political backlash.

Social Resistance

- Deep-rooted **caste hierarchies, patriarchy, and religious orthodoxy** resist reforms like inter-caste marriages or women's temple entry.

Weak Public Awareness

- Many citizens are unaware of constitutional rights and responsibilities, limiting participation in democratic governance.

Steps to Strengthen Constitutional Morality

1. Institutional Autonomy

- Ensure independent functioning of **Election Commission, CAG, CVC, Judiciary**, and investigative agencies.

2. Civic and Constitutional Education

- Schools, universities, and public platforms should promote awareness of **constitutional values and duties**.

3. Ethical Political Leadership

- Political actors must model **integrity, transparency, and respect for due process**.

4. Access to Justice

- Reduce judicial backlog, expand **legal aid**, simplify procedures, and make courts more accessible.

Conclusion

Dr. Ambedkar emphasized that **constitutional morality must be cultivated through practice and education**. For a diverse and vibrant democracy like India, **true constitutional governance requires citizens and institutions to uphold the spirit of justice, equality, and fraternity**. Only when constitutional morality guides public conduct does the Constitution function as a **living instrument of democratic transformation** rather than a mere legal text.

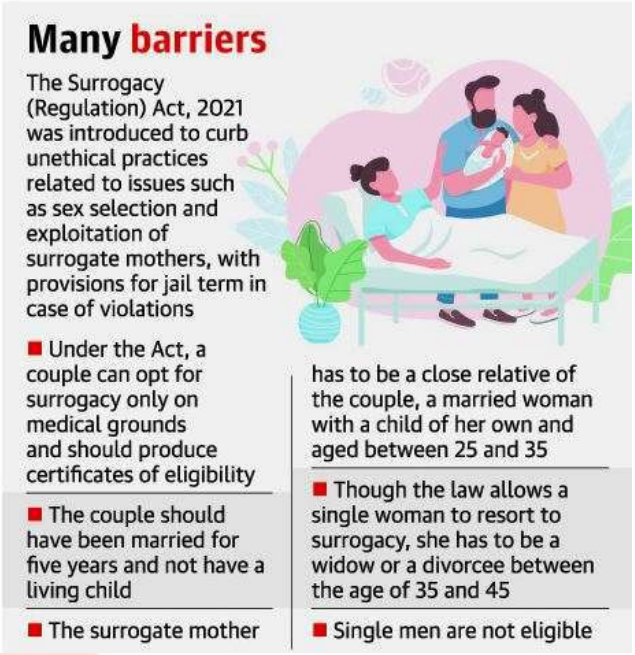
RIGHT ISSUES

SURROGACY AND REPRODUCTIVE RIGHTS

SOURCE: THE HINDU

Why in News?

The Supreme Court has agreed to examine whether the **ban on surrogacy for couples with an existing child**, under the **Surrogacy (Regulation) Act, 2021**, violates the **constitutional right to reproductive autonomy**, particularly in cases of **secondary infertility**. The case tests the balance between **reproductive rights, state regulation, and protection of surrogate mothers**.



Why Surrogacy Law is Being Constitutionally Challenged

1. Restriction on Surrogacy for Couples with Existing Child

- Section 4(iii)(C)(II) disallows surrogacy if intending parents already have a child, **except in cases of disability, incurable diseases, or life-threatening conditions**.
- Petitioners claim this unfairly excludes couples suffering from **secondary infertility** (inability to conceive a second child), violating their **right to parenthood and bodily autonomy**.

2. Arguments by Petitioners

- There is **no national one-child policy**, and adoption laws do not impose such restrictions.
- Surrogacy is often the **only medical option available**, especially for those medically unfit to carry pregnancy.
- Restriction violates **Article 21 (personal liberty and reproductive choice)** and **Article 14 (equality)**.

3. Government's Stand

- Surrogacy is a **statutory privilege, not a fundamental right**.
- Restrictions ensure **surrogate mothers are not exploited** for non-essential or elective surrogacies.
- Provision already allows exceptions for serious medical cases.

Key Legal Framework for Surrogacy in India - Surrogacy (Regulation) Act, 2021

Provision	Description
Type Allowed	Only **altruistic surrogacy**; **commercial surrogacy banned**

Eligibility	Only **legally married Indian couples**, widow or divorcee women with medical need
Surrogate Criteria	Married woman, 25–35 yrs, with one biological child, close relative, can surrogate only once
Rights	Child legally considered biological child of intending parents
Donor Gametes Restriction	Donor eggs banned (Rule 7), partially relaxed for medical cases (2022 amendment)
Legal Status	Surrogacy must follow **MTP Act, ART Act, and guardianship norms**

Major Challenges in India's Surrogacy Framework

1. Balancing Protection and Autonomy

- Ban on commercial surrogacy tries to prevent exploitation but restricts **women's freedom over reproductive labour**.

2. Emotional Pressure in Altruistic Surrogacy

- Family-based surrogacy may lead to **emotional coercion, unfair expectations, and strained relationships**.

3. Narrow Eligibility excluding Modern Families

- Single men, live-in partners, same-sex couples, and foreign nationals are excluded, despite evolving family structures.

4. Lack of Institutional and Medical Support

- No support for **professional counselling, legal contracts, mental health**, or compensation for medical complications.

What Reforms Can Strengthen India's Surrogacy Law?

1. Rethink Rigid Eligibility Rules

- Allow surrogacy in cases of **secondary infertility or repeated miscarriages**, even if a child already exists.
- Include **single parents, same-sex couples, and non-traditional family structures**.

2. Create Clear Regulatory Safeguards

- Instead of bans, ensure **strong oversight**, health insurance, medical safety, and fair compensation for surrogate mothers.

3. Introduce Professional Counselling & Legal Support

- Mandatory **medical, legal, and psychological counselling** for both surrogate and intending parents.

4. Promote Ethical, Transparent Surrogacy Practices

- Empower **District and National Surrogacy Boards** to monitor clinics, ensure traceability, and prevent exploitation.

5. Constitutional Alignment

- Law should respect **Article 21 (Right to Life and Reproductive Choice), Article 14 (Equality), and Article 19 (Personal Liberty)**.

Conclusion

Surrogacy law in India must balance **ethical safeguards with reproductive autonomy**, ensuring dignity, safety, and inclusion. As society evolves, legal frameworks must adapt to protect the **rights of intending parents, surrogates, and children alike**. A **rights-based, inclusive, and regulated surrogacy system** is essential for upholding constitutional values and reproductive justice.

JUDICIARY

SC RULING ON SALE OF MINOR'S PROPERTY

SOURCE: THE HINDU

The Supreme Court in K.S. Shivappa vs. Smt. K. Neelamma (2025) held that a person, after attaining majority, can repudiate (reject) a property sale made by their guardian without court permission, either by filing a suit or by clear conduct such as reselling the property.

Legal Framework

1. **Indian Contract Act, 1872**
   - A minor is **not competent to contract**; any contract involving a minor is **void ab initio** (invalid from the start).
2. **Hindu Minority and Guardianship Act, 1956**
   - Natural guardians may manage the minor's property **only for their welfare**.
   - They **cannot sell immovable property** without permission from the District Court.
   - Any such sale is **voidable** at the minor's instance.
3. **Guardian and Wards Act, 1890**
   - Court approval is **mandatory** to dispose of a minor's property.

4. Limitation Act, 1963

- A person has **3 years after attaining majority** to challenge the transaction.

Supreme Court's Key Rulings

- **Repudiation Methods:** A minor after attaining majority can reject the unauthorized sale by:
  (a) filing a lawsuit, or
  (b) **showing clear conduct**, such as reselling the property.
- **Conduct as Valid Repudiation:** Reselling the property **within 3 years of majority** is sufficient to invalidate the original sale.
- **Power of Attorney:** A **POA holder cannot testify** on matters requiring personal knowledge of the principal.

Conclusion

The ruling strengthens protections over minor property, ensuring guardians adhere to their fiduciary duties. By recognizing repudiation through conduct, the Court makes it easier for individuals to reclaim rights without lengthy litigation. This promotes **justice, fairness, and property security** for minors transitioning into adulthood.

EXECUTIVE

VICE PRESIDENT OF INDIA

SOURCE: THE HINDU

Why in News?

The role of the Vice President surfaced in news amid discussions on constitutional functioning and ongoing Parliamentary developments.

About Vice President

The **Vice President of India** occupies the **second-highest constitutional office**, acting as a vital link between the executive and the legislature. Modeled partially on the American system, the VP serves both as **the ex-officio Chairman of the Rajya Sabha** and the constitutional successor to the President.

Constitutional Basis

- Article **63**: Mandates the office of Vice President.
- Functions under Part V of the Constitution.
- Not a member of either House but **presides over the Rajya Sabha**.

Eligibility (Article 66)

- Indian Citizen
- Minimum 35 years
- Eligible for Rajya Sabha membership
- Must not hold an office of profit under government authorities.

Articles Related to Vice-President at a Glance

Article No.	Subject-matter
63.	The Vice-President of India
64.	The Vice-President to be ex-officio Chairman of the Council of States
65.	The Vice-President to act as President or to discharge his functions during casual vacancies in the office, or during the absence, of President
66.	Election of Vice-President
67.	Term of office of Vice-President
68.	Time of holding election to fill vacancy in the office of Vice-President and the term of office of person elected to fill casual vacancy
69.	Oath or affirmation by the Vice-President
70.	Discharge of President's functions in other contingencies
71.	Matters relating to, or connected with, the election of Vice-President

Election Process

- Elected by an **electoral college** consisting of **both elected and nominated MPs of Lok Sabha and Rajya Sabha**.
- Proportional representation through **single transferable vote**.
- Secret ballot procedure.
- Disputes handled exclusively by the **Supreme Court**.

Tenure and Removal

- Term of **five years**, with eligibility for re-election.
- May continue until successor assumes office.
- Resigns to President.
- Removal requires a **Rajya Sabha resolution with effective majority** and Lok Sabha simple majority.
- Fourteen days' prior notice mandatory.

Powers & Functions

Legislative Role

- Presiding officer of Rajya Sabha.
- Ensures order, allows debates, decides on procedural matters.
- Casting vote in case of tie.

Executive Role

- Acts as **President in case of vacancy**, illness, removal, or resignation.

Other Functions

- Represents the nation at events and delegations.
- Supports constitutional continuity and legislative balance.

POLICIES/SCHEMES/ACTS/REPORTS/ COMMITTEES IN NEWS

NATIONAL GEOTHERMAL ENERGY POLICY 2025

SOURCE: THE HINDU

Why in News?

The **Ministry of New and Renewable Energy (MNRE)** has launched **India's first National Geothermal Energy Policy 2025** to accelerate geothermal resource utilization.

The policy aims to support India's **Net Zero 2070** goal, diversify the renewable energy mix, and enhance long-term **energy security**.

Key Features of the Policy

1. Broad Scope of Application

- Covers **geothermal resource mapping, power plant development, heating applications, and heat pump systems**.
- Encourages use of **abandoned oil and gas wells** for geothermal energy extraction to reduce drilling costs.
- Allows regulated extraction of **associated minerals** like **lithium, boron, silica, and cesium**, under the **MMDR Act, 1957**.

2. Promotion of Emerging Technologies

- Prioritizes **Enhanced Geothermal Systems (EGS)** and **Advanced Geothermal Systems (AGS)** for deep and hard rock regions.
- Encourages **Geothermal Energy Storage** solutions for balancing renewable energy supply.
- Supports the development of **offshore geothermal wells**, especially along volcanic seabeds.

3. Geothermal Resource Data Repository

- A national **geothermal data management system** will be developed.
- Collaboration with:
  - **Ministry of Mines**
  - **Ministry of Earth Sciences**
  - **Geological Survey of India (GSI)**
  - **National Data Repository (NDR)**
- Developers will be allowed **survey permits** for preliminary exploration and R&D.

4. Fiscal and Financial Support

- Under **Renewable Energy Research and Technology Development Programme (RE-RTD)**:
  - Up to **100% financial assistance** for government and non-profit research institutions.
  - Up to **70% assistance** for the private sector and start-ups.
- Additional incentives include:
  - **Carbon credit eligibility**
  - **Waiver of open access charges**
  - Inclusion under **Renewable Purchase Obligations (RPOs)**
  - Support through **Viability Gap Funding (VGF)** and access to **Sovereign Green Bonds**.

5. State-Level Regulatory Mechanism

- States/UTs will issue:
  - **Exploration leases** valid for **3–5 years**
  - **Development leases** for **up to 30 years**
- A **single-window clearance** system will streamline project approvals.

India's Geothermal Potential

- India has **381 hot spring sites** and **10 major geothermal provinces**.
- Key locations:
  - **Puga Valley (Ladakh)**
  - **Manikaran (Himachal Pradesh)**
  - **Cambay Basin (Gujarat)**
  - **Tattapani (Chhattisgarh)**
  - **Khammam (Telangana)**
- India's estimated geothermal generation potential is **around 10,600 MW**.

Significance of the Policy

- Provides **baseload renewable power**, unlike solar and wind which are weather-dependent.

- Helps **decarbonize industries** such as cement, steel, chemicals, and cold storage.
- Reduces **diesel generator dependency** in Himalayan and border regions.
- Supports **district heating** in cold climates like **Ladakh and Himachal Pradesh**.
- Enhances India's position among geothermal innovators such as **Iceland, Philippines, Indonesia, and Germany**.
- Complements India's broader clean energy missions including:
    - **National Green Hydrogen Mission**
    - **RE-RTD Programme**
    - **National Mission on Sustainable Agriculture**

Conclusion

The National Geothermal Energy Policy 2025 marks a **strategic shift** toward harnessing deep-earth thermal resources. It strengthens **energy diversification, regional development, and industrial decarbonization**. With proper implementation and investment, geothermal energy can become a reliable pillar of India's **clean energy transition**.

PRADHAN MANTRI – AYUSHMAN BHARAT HEALTH INFRASTRUCTURE MISSION (PM-ABHIM)

SOURCE: PIB

Why in News?

The Government launched the **Pradhan Mantri Ayushman Bharat Health Infrastructure Mission (PM-ABHIM)** in **October 2021** to address systemic health infrastructure gaps revealed during the **COVID-19 pandemic**.

The mission supports **Universal Health Coverage** and aligns with **Sustainable Development Goal 3 (Good Health and Well-Being)**.

What is PM-ABHIM?

About

- PM-ABHIM is a **nationwide health system strengthening initiative** launched in **2021**.
- It focuses on **expanding public health infrastructure** at **primary, secondary, and tertiary care levels**.

Objectives

- Reduce **urban-rural health disparities**.
- Strengthen **health surveillance and research**.
- Build a **One Health** system connecting **human, animal, and environmental health**.

Implementation Structure

- Operates through a **Centrally Sponsored Scheme (CSS)** and a **Central Sector component**.
- Implemented across **2021-22 to 2025-26**.

Key Components of PM-ABHIM

1. Ayushman Arogya Mandirs (AAMs)

- Upgrading **Sub-Health Centres and Primary Health Centres** into **Urban and Rural AAMs**.
- Provide **preventive, promotive, outpatient, maternal, and child health services**.

2. Block Public Health Units (BPHUs)

- Strengthen **block-level health administration**, disease control programs, and public health emergency response capacity.

3. Integrated Public Health Laboratories (IPHLs)

- Establish district-level laboratories equipped for **advanced diagnostics**, pathogen detection, and **surveillance**.

4. Critical Care Hospital Blocks (CCBs)

- Set up in **high-population districts** to provide **ICU facilities**, oxygenated beds, and advanced treatment infrastructure.

5. National Health Surveillance System

- Establishes a **real-time data network** linking village-level health workers to **district, state, and national platforms**.
- Integrates with the **Ayushman Bharat Digital Mission (ABDM)**.

6. Health Research and One Health Approach

- Supports studies on **zoonotic diseases**, antimicrobial resistance, and frontline preparedness.

Significance of PM-ABHIM

Strengthening Health Infrastructure

- Enhances diagnostic capacity, emergency response, and critical care availability across India.

Promoting Decentralized Healthcare

- AAMs and BPHUs bring essential services **closer to communities**, reducing burden on tertiary hospitals.

Advancing Universal Health Coverage

- Complements **AB-PMJAY**, ensuring not only financial protection but also **physical access** to quality care.

Improved Disease Surveillance

- Real-time reporting strengthens **pandemic preparedness** and early outbreak detection.

Aligns with SDG-3

- Supports goals of **health for all**, reduced mortality, and strengthened national health systems.

National Health Initiatives

1. National Health Mission (NHM)

- Focuses on **community-owned, decentralized healthcare delivery**, especially for vulnerable groups.

2. National Health Policy (2017)

- Emphasizes **primary healthcare**, local governance participation, and trained first responders.

3. Ayushman Bharat (2018)

Includes:

- **AB-PMJAY** (health insurance coverage),
- **Ayushman Arogya Mandirs**,
- **Ayushman Bharat Digital Mission (ABDM)**,
- **PM-ABHIM**.

4. WHO Global Pandemic Agreement (2025)

- Enhances global cooperation for **equitable access to vaccines, tests, and treatments** during pandemics.

Conclusion

PM-ABHIM marks a strategic shift from episodic crisis response to long-term health system preparedness. By expanding critical care, diagnostics, and digital surveillance, it builds a **resilient and inclusive public health network**. The mission stands as a key pillar in India's progress toward **health security, equity, and universal healthcare for all.**

FOUR LABOUR CODES

SOURCE: THE HINDU

Why in News?

Union Government has reaffirmed its plan to operationalise the **Four Labour Codes**, aiming to modernise labour governance.

1. Key Provisions of the Four Labour Codes

A. Code on Wages, 2019

- **Unifies four major wage laws** into a single framework for simplicity.
- Introduces a **universal minimum wage** applicable to all sectors.
- Establishes a statutory **floor wage** based on living standards; states cannot set wages below it.
- Ensures **gender parity** in recruitment, wage payment and working conditions, including protection for transgender persons.
- Mandates **overtime pay** at not less than twice the normal wage.
- Strengthens enforcement via penalties for delayed or non-payment of wages.

B. Industrial Relations Code, 2020

- Merges laws on **trade unions, standing orders, and industrial disputes**.
- Introduces **fixed-term employment**, granting short-term workers the same benefits as permanent workers.
- Requires companies with 300+ workers to seek permission for layoffs/retrenchment (raised from 100 earlier).
- A union with **51% membership** becomes the sole negotiating agent; if not, a negotiating council is formed.
- Provides a **reskilling fund**, requiring companies to contribute 15 days' wages for each retrenched employee.

C. Code on Social Security, 2020

- Combines **nine social security laws** into one.
- Expands coverage of **EPFO and ESIC** to a wider base of workers.
- Introduces legal definitions for **gig workers, platform workers and aggregators**, enabling targeted schemes.

- Establishes a **Social Security Fund** for unorganised workers.
- Recognises **commuting accidents** as workplace accidents for compensation.
- Brings nationwide **portability of benefits**, especially for migrant workers.

D. OSH Code, 2020

- Consolidates **13 safety and working-condition laws**.
- Applicable even to establishments with **one employee** if work involves hazardous activities.
- Expands the definition of **inter-state migrant workers**, granting them annual travel allowance and portability of ration entitlements.
- Permits **night shifts for women** with safety measures and consent.
- Caps **daily working hours at 8** and weekly hours at **48**.
- Mandates creation of a **National Worker Database** for unorganised, gig, and migrant workers.

Need for Labour Reforms

- **Fragmented legal system** made compliance costly and inconsistent.
- Many old laws were **outdated**, unable to regulate gig work, digital employment, or flexible work arrangements.
- Aim to improve **ease of doing business**, attract investments, and encourage formalisation.
- Seeks to ensure **universal wage protection**, safety, and social security across sectors.
- Helps India align with global labour standards to enhance competitiveness.

Concerns & Challenges

- **MSMEs fear higher compliance costs**, especially for ESIC and workplace safety norms.
- **State–Centre coordination issues**, as labour is a Concurrent List subject.
- **51% union rule** may marginalise smaller unions.
- Risk of **overuse of fixed-term contracts**, reducing job security.
- Low awareness among workers may delay real benefits.
- Transition to new wage structures may cause **initial employment disruptions**.

Measures Needed

- Develop **uniform rules across states** to avoid discrepancies.
- Create safeguards against **misuse of fixed-term employment**.
- Strengthen social security for gig and platform workers.
- Provide **capacity-building support for MSMEs** through digital tools, helpdesks, and transitional subsidies.
- Promote awareness campaigns for workers on new entitlements.

Conclusion

The Four Labour Codes represent a major shift toward a **modern, inclusive, and streamlined labour ecosystem**. If implemented effectively, they can enhance worker welfare while improving industrial competitiveness. Balanced execution, clarity in rules, and strong institutional support will determine the long-term success of these reforms.

PRELIMS POINTERS IN NEWS

KOYLA SHAKTI DASHBOARD

SOURCE: PIB

Why in News?

The **Ministry of Coal** is preparing to launch the **Koyla Shakti** dashboard, a unified digital platform designed to enable **real-time monitoring, analysis, and coordination across India's coal production, transportation, and supply ecosystem.**

Key Features of Koyla Shakti Dashboard

- **Centralized Data Integration:** The dashboard aggregates data from **Coal India Ltd., Singareni Collieries, captive and commercial miners**, and logistics agencies, allowing coordinated planning and distribution.
- **Multi-Agency Coordination:** It integrates systems and databases from key Ministries such as **Power, Railways, Finance, Ports & Shipping, Road Transport**, as well as **State Mines Departments** and **power generating units**.
- **Real-Time Monitoring:** Enables instant visibility of coal production levels, stock positions, transportation schedules, and potential bottlenecks in the supply chain.
- **Incident & Alert Response:** Automated notifications ensure **fast resolution of disruptions**, preventing delays in supply to power plants and industrial consumers.
- **Data-Driven Decision Support:** Analytical tools assist policymakers in forecasting demand,

managing seasonal supply fluctuations, improving logistics, and shaping coal sector policies.

- **Scalability:** Designed to integrate additional digital tools like **GIS mapping, drone surveillance, and satellite monitoring** for enhanced operational governance.

Significance

- **Enhances Transparency and Accountability:** Standardized reporting reduces manual errors and minimizes scope for misreporting or resource diversion.
- **Improves Supply Chain Efficiency:** Ensures timely coal movement to **power stations, steel plants, and manufacturing units**, preventing power shortages.
- **Supports Energy Security:** Strengthens India's long-term coal sector planning, helping stabilize electricity generation and industrial operations.
- **Aligned with Digital India and Atmanirbhar Bharat:** Encourages adoption of digital governance tools in resource management.

E-JAGRITI PLATFORM

SOURCE: PIB

Why in News?

The **e-Jagriti platform** has crossed **two lakh registered users** since January 2025. It is emerging as a major digital tool for **consumer grievance redressal** nationwide.

About e-Jagriti Platform

The **e-Jagriti Platform** is a flagship digital initiative of the **Department of Consumer Affairs** aimed at modernizing India's consumer dispute redressal ecosystem. Designed to improve accessibility, transparency, and efficiency, it integrates all major legacy systems into a single unified interface.

Objectives

- Modernize consumer grievance handling.
- Provide **paperless, nationwide access** to dispute resolution.
- Bring multiple consumer courts and systems under one digital platform.
- Reduce delays, costs, and procedural complexity for citizens.

Key Features

1. Global & Remote Access

- Citizens, including **NRIs**, can file complaints from any location.
- Ensures encrypted, secure access with role-based permissions.

2. Inclusivity & Accessibility

- Multilingual interface.
- Tools for visually impaired users.
- User-friendly workflow for all age groups.

3. Integration of Disparate Systems

Combines:

- **OCMS**,
- **e-Daakhil**,
- **NCDRC Case Monitoring System**,
- **CONFONET platforms**, into one seamless digital ecosystem.

4. AI-Enabled Features

- **Smart search** of archived cases using AI-generated metadata.
- **Voice-to-text** transcription for orders and case summaries using ML.
- Predictive retrieval of similar judgments.

5. Case Filing & Tracking

- Online complaint filing, evidence upload, fee payment, and tracking.
- Enables faster disposal by consumer commissions.

6. Commission Digitization

- Supports District, State, and National Commissions, eliminating paperwork.
- Enhances transparency and standardization.

Significance

- Reduces pendency of consumer disputes.
- Empowers citizens with **speedy and low-cost justice**.
- Promotes digital governance aligned with the **Digital India Mission**.
- Builds public trust in consumer protection frameworks.

NATIONAL SOCIAL ASSISTANCE PROGRAMME

SOURCE: THE HINDU

Why in News?

The **National Social Assistance Programme (NSAP)** was recently highlighted for its role in strengthening **India's social security architecture**, especially for vulnerable households.

Key Features of NSAP

1. Nature and Structure

- A **Centrally Sponsored Scheme**, fully supported by Union Government.
- Nodal Ministry: **Ministry of Rural Development**.
- Provides **direct financial assistance** to eligible beneficiaries.

2. Components (Sub-schemes)

(a) Indira Gandhi National Old Age Pension Scheme (IGNOAPS)

- For citizens **60+ years** belonging to BPL households.
- Assistance:
  - **₹200/month** (60–79 years)
  - **₹500/month** (80+ years)

(b) Indira Gandhi National Widow Pension Scheme (IGNWPS)

- For widows aged **40–79 years** from BPL families.
- Central assistance: **₹300/month**; **₹500/month** for 80+ widows.

(c) Indira Gandhi National Disability Pension Scheme (IGNDPS)

- For persons aged **18–79 years** with multiple or severe disabilities.
- Assistance: **₹300/month**, and **₹500/month** for 80+ beneficiaries.

(d) National Family Benefit Scheme (NFBS)

- Provides a **one-time grant of ₹20,000** to BPL families on the death of the primary breadwinner (18–59 years).

(e) Annapurna Scheme

- Provides **10 kg of free food grains per month** to eligible senior citizens not receiving IGNOAPS pension.

3. Importance of NSAP

- Strengthens **income security** for the poor.
- Supports vulnerable groups during emergencies such as **illness, disasters, or loss of income**.
- Complements other welfare initiatives like **PM-JDY, PMGKAY, PMAY-G**.

4. Challenges

- Low pension amounts compared to rising living costs.
- Dependence on outdated BPL lists.
- Leakages and delays in identification of beneficiaries.
- Limited integration with state-level social protection schemes.

CONTEMPT OF COURT IN INDIA

Derogatory comments recently made against the Chief Justice of India and the Supreme Court have reignited debate over the limits of free speech and judicial dignity. The demand to initiate contempt proceedings has brought the legal framework of **contempt of court** into sharp public focus.

Contempt of Court in India

- The judiciary derives its legitimacy from public confidence, and any action that weakens its authority threatens the rule of law.
- The law of **contempt of court** aims to preserve the dignity, independence, and effective functioning of courts.
- While India upholds free speech as a constitutional right, this freedom is not absolute when it interferes with the administration of justice.

What Constitutes Contempt of Court?

1. Legal Framework – Contempt of Courts Act, 1971

The Act, based on the recommendations of the **H.N. Sanyal Committee (1963)**, categorizes contempt into:

(A) Civil Contempt

- **Wilful disobedience** of any judgment, decree, direction, order, or court undertaking.
- Ensures compliance with court orders and accountability.

(B) Criminal Contempt

- **Any act that:**
  - Scandalises or lowers the authority of a court.
  - Prejudices or interferes with judicial proceedings.
  - Obstructs administration of justice in any manner.
- Covers publications in written, spoken, visual, or digital formats.

Constitutional Position

- **Article 129 – Supreme Court** is a *court of record* with inherent power to punish for contempt.
- **Article 215 – High Courts** enjoy similar status.
- These constitutional powers exist **independent** of the Contempt of Courts Act and cannot be diluted by Parliament.

Initiation of Contempt Proceedings

- **Suo Motu:** SC or HC can act on its own if contempt is apparent.
- **On Complaint:** A private individual may file a petition **with prior consent** of the Attorney General (SC) or Advocate General (HC).
- **Punishment:** Up to **6 months simple imprisonment**, or **₹2,000 fine**, or both.
  - Courts often accept a **genuine, unconditional apology**.

Landmark Judgments

1. *Ashwini Kumar Ghosh v. Arabinda Bose* (1952)

- The Court held that **fair and reasonable criticism** of a judgment is permissible.
- But attacks that erode public confidence are punishable.

2. *Anil Ratan Sarkar v. Hirak Ghosh* (2002)

- Reiterated that contempt power must be used **sparingly** and only in serious cases.

3. *M.V. Jayarajan v. High Court of Kerala* (2015)

- Abusive or inflammatory speeches targeting a court amount to **criminal contempt**.

4. *Shanmugam @ Lakshminarayanan v. High Court of Madras* (2025)

- The Court stressed that contempt jurisdiction is essential to protect the **administration of justice**, not the personal prestige of judges.

Balancing Free Speech and Judicial Authority

1. Protecting Robust Public Criticism

- Constructive criticism of judgments is **constitutional** and essential for transparency.
- However, baseless allegations of corruption or bias **undermine judicial independence**.

2. Preserving Judicial Dignity

- Personal attacks on judges are not protected speech.
- Judicial officers cannot publicly defend themselves, thus requiring legal safeguards.

3. "Truth" as a Defense (Section 13 Amendment, 2006)

- Truthful statements made in **public interest** can be a valid defense.
- But the burden of proving truth is heavy and rests entirely on the contemnor.

4. Contempt as a Last Resort

- Courts must invoke contempt only when essential to ensure compliance or prevent obstruction.
- Excessive use may appear authoritarian; insufficient use may reduce judicial authority.

Conclusion

Contempt of court safeguards the judiciary's dignity, independence, and effective functioning. Fair criticism is a constitutional right, but deliberate attacks that obstruct justice warrant corrective action. Striking a balance between free expression and judicial integrity remains vital for a healthy democracy.

Mains Question

Q. Examine the constitutional and statutory framework governing Contempt of Court in India. How can India balance judicial authority with the fundamental right to free speech in a modern democracy? (150 WORDS /10 MARKS)

INTERNATIONAL RELATIONS

INDIA AND ITS NEIGHBOURHOOD

INDIA–BHUTAN RELATIONS

SOURCE: THE HINDU

Why in News?

India's Prime Minister recently visited Bhutan to attend the **70th birthday celebrations of Bhutan's 4th King and to strengthen bilateral** ties through new agreements on hydropower, connectivity, digital cooperation, and development projects. The visit marked a major milestone in expanding India's strategic and economic engagement with Bhutan.

Key Highlights of India's Recent State Visit to Bhutan

1. Economic and Development Support

- India reaffirmed its backing for **Bhutan's 13th Five-Year Plan** and **Economic Stimulus Programme**.
- Support announced for the **Gelephu Mindfulness City**, aimed at making Bhutan a global tourism and wellness hub.
- Establishment of an **Immigration Check Post at Hatisar**, Assam, to improve border security and cross-border movement.

2. New MoUs Signed

- **Three MoUs** were signed in critical sectors:
  - **Renewable Energy Cooperation**
  - **Healthcare Infrastructure Development**
  - **Mental Health Support and Services**

3. Hydropower Diplomacy

- Inauguration of the **1020 MW Punatsangchhu-II Hydropower Project**.
- Resumption of work on the **1200 MW Punatsangchhu-I Project**.
- **Line of Credit worth ₹4,000 crore (₹40 billion)** extended for energy projects.
- Hydropower remains a cornerstone of India's energy security and Bhutan's revenue generation.

4. Connectivity and Infrastructure

- Commitment to strengthen physical connectivity, including:
  - **Darranga Check Post** and **Jogigopha Multimodal Terminal**.
  - Progress in **Cross-Border Rail Links**: Gelephu–Kokrajhar & Samtse–Banarhat.

5. Trade and Agriculture Support

- India institutionalised uninterrupted supply of **fertilisers and essential commodities** to Bhutan.
- First consignment endorsed under long-term trade arrangements to ensure agricultural security.

Major Areas of Cooperation Between India and Bhutan

1. Trade and Economy

- India is Bhutan's **largest trading partner and investor**.
- **Trade volume expanded from ₹3,500 crores in 2014–15 to nearly ₹15,000 crores in 2023–24.**
- Free trade under the **India-Bhutan Trade Agreement (1972, revised 2016).**

2. Development Partnership

- India has been Bhutan's **primary source of development aid** since the 1960s.
- Under the 12th Plan, India contributed **₹4,500 crores**, accounting for **over 70% of external grants**.
- Key sectors: **Agriculture, Health, ICT, energy, urban development, and skill education.**

3. Hydropower Cooperation

- **Four major hydropower projects (2,136 MW)** operational.
- India imports **electricity worth ₹2,500+ crores annually from Bhutan**.
- Hydropower revenue covers about **30% of Bhutan's domestic revenue**, making it a vital economic pillar.

4. Cultural and Educational Ties

- More than **1,000 Bhutanese students pursue studies in India via scholarships annually.**

- India supports **Bhutanese cultural, linguistic and religious heritage**, including temple restoration projects.
- Strong pilgrim tourism linkages at **Bodh Gaya, Nalanda, Sarnath, and Sikkim.**

5. Emerging Technology and Digital Cooperation

- Bhutan uses **RuPay, BHIM, Digital Drukyul** platforms with Indian assistance.
- **India-Bhutan SAT (2022)** launched for disaster management and communication.
- Collaboration in **capacity-building, STEM education, cyber security, and telemedicine**.

Key Challenges in Bilateral Relationship

- **China Factor**: Bhutan's negotiations with China, particularly over **Doklam**, impact India's strategic concerns.
- **Economic Dependence**: Bhutan's reliance on India for aid, trade, and energy needs raises concerns of **strategic imbalance**.
- **Environmental and Water Risks**: Multiple dam projects may impact **river ecology, siltation, and flood risks** in Indian states.
- **Border Management**: Issues of **illegal trade, smuggling, and insurgent movement** pose cross-border security challenges.

Way Forward

- Promote **economic diversification** through **start-ups, MSMEs, eco-tourism, IT, and pharmaceuticals**.
- Expand from hydropower to **solar and wind energy**, ensuring sustainable energy cooperation.
- Strengthen coordination on **China-Bhutan border talks** to protect regional security.
- Enhance **digital, space, and satellite-based cooperation** for governance, education, and healthcare.
- Launch **Himalayan Cultural Corridor** and youth fellowship programs to deepen **soft power exchanges**.
- Adopt **joint river basin management** for flood control, water-sharing, and climate adaptation.

Conclusion

India–Bhutan relations are evolving into a future-oriented partnership rooted in trust, shared values, and mutual strategic interests. The growing cooperation in technology, energy, culture, and connectivity reflects a shift from dependency to collaboration. A strengthened India–Bhutan partnership is vital for peace, stability, and sustainable development in the Himalayan region.

GLOBAL ISSUES

UNITED NATIONS CONVENTION AGAINST CYBERCRIME (UNCC)

SOURCE: THE HINDU

Why in News?

The **United Nations Convention against Cybercrime (UNCC)** has moved closer to becoming a **legally binding international treaty** after **72 out of 193 UN member states signed it** at a high-level conference in Hanoi in October 2025. The Convention will officially **enter into force 90 days after 40 nations ratify** or accede to it.

What is UNCC?

- The Convention's formal title is: **"Convention on Cybercrime: Strengthening International Cooperation to Combat Crimes Committed Through ICT Systems."**
- It was adopted by consensus under **UN General Assembly Resolution 79/243** in **December 2024**.
- The treaty was drafted and facilitated by the **United Nations Office on Drugs and Crime (UNODC)**.
- It is significant as the **first international criminal justice treaty** negotiated in more than **two decades**.

Key Objectives

- Establish a **global legal framework** to define, prevent, and investigate cybercrimes.
- Enable **cross-border access to digital evidence**, which is often stored across jurisdictions.
- Ensure that cooperation mechanisms respect **human rights and sovereignty**.
- Provide **technical and financial assistance** to developing countries.

Key Provisions of the Convention

1. Legal Measures Against ICT-Based Crimes

- Covers offenses such as:
  - Unauthorized access (hacking)
  - Illegal interception of communications
  - Data tampering or theft
  - Money laundering through digital platforms
  - Online sexual abuse and exploitation of children
  - Ransomware and malware attacks

2. Cross-Border Evidence Sharing

- Establishes procedures for:

- Mutual Legal Assistance (MLA)
- Quick request channels for electronic evidence
- Collaborative investigations between national agencies

3. Capacity Building and Technical Assistance

- Provides **training, forensic tools, and investigation support** especially for developing nations.
- Encourages strengthening of **cybercrime units and CERTs (Computer Emergency Response Teams)**.

4. Human Rights and Data Privacy Protections

- Includes clauses ensuring:
  - **Right to privacy**
  - **Freedom of expression**
  - **Due process of law**
- These safeguards are essential to prevent misuse of surveillance powers.

5. Implementation System

- A **Conference of State Parties** will review compliance.
- **UNODC** will serve as the **Secretariat**, guiding implementation and monitoring.

India's Position on UNCC

- **India has not signed the Convention** as of October 2025.
- India participated actively in drafting but maintains caution due to:
  - **Data sovereignty concerns**
  - **Desire for stronger control over cross-border data requests**
- Similar to its earlier stance, India also chose not to sign the **Budapest Convention (2001)** because it was drafted **without India's involvement**.

Cybercrime

- Cybercrime refers to **illegal activities involving computers, networks, or digital systems**.
- It includes **two categories**:
  1. **Cyber-Enabled Crimes**: Fraud, trafficking, hate speech, harassment conducted online.
  2. **Cyber-Dependent Crimes**: Malware attacks, ransomware, phishing, identity theft.

Cybercrime Scenario in India

- According to **NCRB 2023**, cybercrime cases rose **31.2%**, reaching **86,420 cases** in 2023.
- **Karnataka** reported the highest number of incidents.
- India faces organized **cross-border scams** from Southeast Asian crime syndicates.
- Losses from foreign-based cyber fraud between Jan–May 2025: **₹4,800 crore**.

Cybersecurity

- Cybersecurity involves **protecting digital data, networks, and infrastructure** from unauthorized access or attacks.
- It ensures **confidentiality, integrity, and availability** of information systems.

Challenges

- **Privacy Concerns:** Data-sharing provisions may conflict with India's **Right to Privacy (Puttaswamy Judgment 2017)**.
- **Data Sovereignty:** India requires **consent and legal review** before sharing electronic evidence.
- **Strategic Autonomy:** Delaying signing may reduce India's **influence in global digital governance**.

Opportunities

- **Stronger Global Cooperation:** Faster investigation in **cross-border scams and financial fraud**.
- **Capacity Development:** Access to **UN-trained cyber response** frameworks.
- **Domestic Legal Reform:** Encourages updating **National Cybersecurity Strategy**, digital evidence laws, and cyber police training.

Conclusion

The UNCC represents an important step toward **global cooperation on cybersecurity** in an era of borderless digital threats. For India, the key lies in achieving a **balanced approach** — supporting international action while protecting **privacy, sovereignty, and constitutional freedoms**. A measured engagement with the treaty could help India build a **strong, resilient, and trusted cyber ecosystem** for the future.

RESUMPTION OF U.S. NUCLEAR TESTING

SOURCE: INDIAN EXPRESS

Why in News?

The President of the United States has ordered the **resumption of nuclear weapon testing** after a gap of 33 years, since 1992. This marks a major strategic shift with strong implications for **global security, arms control regimes, and nuclear deterrence dynamics**.

Brief History of Global Nuclear Testing

- The era of nuclear weapons began in **1945**, with the U.S. bombings of **Hiroshima and Nagasaki**.

- The Soviet Union tested its first nuclear weapon in **1949**, starting the Cold War arms race.
- Over **2,000 nuclear tests** were conducted globally between **1945 and 1996**.
- **India and Pakistan** conducted nuclear tests in **1998**, declaring themselves nuclear weapon states.
- **North Korea** conducted **six** tests between 2006–2017.
- The last tests by major powers:
    - U.S. — 1992
    - Soviet Union (Russia) — 1990
    - France & China — 1996

This long pause shaped a shared understanding that nuclear testing is *strategically unnecessary* and *morally unacceptable*.

Why U.S. Stopped Testing Earlier

- Severe **environmental pollution** in test sites such as **Bikini Atoll, Nevada desert, Kazakhstan Semipalatinsk**.
- Increasing evidence of **radiation-related health hazards**, genetic abnormalities, and cancers among nearby populations.
- **End of the Cold War** reduced strategic urgency.
- **CTBT (1996)** created a global norm, even though the U.S. signed but never ratified it.

Why Has the U.S. Decided to Resume Nuclear Testing Now?

1. **Modernizing Nuclear Arsenal:** To validate performance of upgraded or new warhead designs.
2. **Maintaining Deterrence Credibility:** Sending a strategic signal to **Russia and China**, especially after Russia revoked CTBT ratification in 2023.
3. **Technological Competition:** Rivals are advancing **hypersonic delivery systems and tactical nuclear weapons**.
4. **Domestic Political Positioning:** Strengthening defense posture under strategic competition.

Global Implications

1. Geopolitical Consequences

- A **new nuclear arms race** is likely.
- Russia and China may **resume open-air or underground tests**, escalating strategic tensions.
- Regional nuclear states (Pakistan, North Korea, Iran) may feel encouraged to expand their arsenals.
- **India may face pressure** to revalidate deterrence credibility against China–Pakistan nexus.

2. Diplomatic Consequences

- Weakens the **CTBT**, the **Non-Proliferation Treaty (NPT)**, and **Global Disarmament Agenda**.
- Reduces trust in multilateral nuclear control systems.

3. Environmental and Human Impact

- Underground or atmospheric tests can contaminate **air, water, soil**, and food chains with radionuclides such as **Cs-137 and Sr-90**.
- Long-term effects include **cancer, birth defects, and ecological collapse**.

India's Nuclear Doctrine and Position

- **Voluntary moratorium** on nuclear testing, but not legally binding.
- **No First Use (NFU)** policy with **Credible Minimum Deterrence**.
- Supports global non-proliferation but remains **outside the NPT and CTBT** to preserve strategic autonomy.
- Expanding nuclear power for **civilian energy**, guided by a **three-stage thorium program**.

Conclusion

The U.S. decision to resume nuclear testing threatens to **undo decades of global restraint** and raises the risks of a renewed nuclear arms race. It challenges existing disarmament frameworks and has profound security, ethical, and environmental implications. A renewed global diplomatic push is essential to stabilize nuclear deterrence and protect human and ecological well-being.

INDO-PACIFIC REGIONAL DIALOGUE 2025

SOURCE: INDIAN EXPRESS

Why in News?

The **Indo-Pacific Regional Dialogue (IPRD) 2025**, the Indian Navy's annual strategic conference, concluded in New Delhi on **30 October 2025**. The 7th edition highlighted the need for **holistic maritime security**, regional capacity-building, and cooperative development.

About Indo-Pacific region

- The **Indo-Pacific region** has become the strategic and economic centre of global activity, linking

major sea routes, energy corridors, and supply chains.

- For India, this vast maritime space is essential not only for **national security**, but also for **economic growth, connectivity, and diplomatic influence**.
- Guided by the vision of **SAGAR (Security and Growth for All in the Region)** and the **Indo-Pacific Oceans Initiative (IPOI)**, India aims to build an open, stable, and rules-based maritime environment.

Significance of the Indo-Pacific for India

1. Maritime Security and Strategic Interests

- Over **95% of India's trade by volume** moves through the Indian Ocean, making uninterrupted sea lanes a national priority.
- India maintains a strong naval presence near vital chokepoints like the **Strait of Malacca** and **Strait of Hormuz** to safeguard energy and trade.
- Policies such as **SAGAR** and the **MAHASAGAR doctrine** reflect India's approach of cooperative and inclusive maritime security.
- Mission-based deployments enhance India's **maritime domain awareness** and ability to respond quickly to emergencies.

2. Economic Integration and Trade Resilience

- The Indo-Pacific is central to global manufacturing, making it crucial for India's **supply chain diversification** under the "**China+1**" model.
- Participation in the **Indo-Pacific Economic Framework (IPEF)** helps India shape rules on trade, technology, clean energy, and supply chains.
- Connectivity projects such as the **India–Middle East–Europe Economic Corridor (IMEC)** offer new pathways for trade.
- FTAs with **Australia** and **UAE** strengthen India's access to regional markets.

3. Connectivity, Logistics, and Port Development

- Projects like **Sagarmala** and **Bharatmala** aim to modernise ports, logistics, and coastal infrastructure.
- The **Chabahar Port** enhances India's outreach to Central Asia and the Persian Gulf.
- Deeper engagement with Japan and Southeast Asia supports **quality maritime infrastructure** across the region.

4. Climate Resilience and Blue Economy

- The Indo-Pacific faces severe climate risks—**cyclones, rising sea levels, coral bleaching**, and ecosystem degradation.
- India promotes climate resilience through initiatives such as the **Coalition for Disaster Resilient Infrastructure (CDRI)**.
- The **Blue Economy** framework encourages sustainable use of marine resources, fisheries management, and ocean-based livelihoods.

5. Diplomatic and Normative Leadership

- The Indo-Pacific allows India to project itself as a **civilizational power and voice of the Global South**.
- As **IORA Chair (2025–27)**, India can shape regional maritime cooperation.
- Cultural diplomacy through **Project Mausam**, naval training, and partnerships with ASEAN and Pacific Island nations enhances India's soft power.

Challenges Faced by India in the Indo-Pacific

1. Great-Power Rivalries and Regional Flashpoints

- Increasing rivalry between the **US and China**, military tensions in the **South China Sea**, and conflicts involving regional states complicate India's strategic space.
- Balancing ties with Quad partners while maintaining relations with **Russia and China** remains delicate.

2. Non-Traditional Security Threats

- Piracy, terrorism, IUU fishing, and **cyberattacks on ports** threaten maritime security.
- Drug trafficking and non-state actors add to regional instability.

3. Climate Vulnerability

- Island nations like **Tuvalu and Kiribati** face existential threats from rising sea levels, requiring greater regional cooperation.

4. Limited Naval Resources and Infrastructure Gaps

- India's naval expansion is steady but slower than China's.
- Weak logistics networks and delays in projects like **Sagarmala** and **Chabahar** constrain India's maritime reach.
- India ranks low in logistics efficiency, affecting competitiveness.

5. Absence of a Unified Indo-Pacific Strategy

- India has multiple frameworks—**Act East, SAGAR, IPOI, IORA**—but lacks one consolidated Indo-Pacific doctrine, reducing strategic coherence.

Steps India Can Take

- Accelerate naval modernisation, surveillance networks, and **logistics agreements** with friendly nations.
- Operationalise the **MAHASAGAR** and **IPOI** frameworks for integrated maritime policy.
- Fast-track port modernisation, deep-sea port development, and IMEC connectivity.
- Boost the **Blue Economy**, fisheries management, coastal resilience, and climate partnerships.
- Strengthen diplomacy with ASEAN, Quad, Pacific Island nations, and IORA members.
- Develop a **Comprehensive National Indo-Pacific Strategy** to unify all maritime initiatives.

Conclusion

The Indo-Pacific is central to India's security, economic stability, and global leadership role. Strengthened maritime capabilities, sustainable development, and regional partnerships will shape India's future in this region. A clear, integrated Indo-Pacific strategy will anchor India as a dependable and influential maritime power.

IBSA (INDIA–BRAZIL–SOUTH AFRICA DIALOGUE FORUM)

SOURCE: THE HINDU

Why in News?

During the **G20 Summit in Johannesburg**, leaders of India, Brazil and South Africa met to strengthen cooperation under the **IBSA platform**.

1. What is the IBSA Forum?

About the Forum

- Established through the **Brasilia Declaration (2003)**.
- No permanent headquarters or secretariat—coordination occurs through rotating chairmanship (South Africa is current chair).
- Built on **shared democratic values**, commitment to multilateral reforms and development cooperation.

Three Pillars of Cooperation

1. **Political Coordination**
   - Common stand on global issues such as UNSC reforms, climate action, terrorism, WTO issues.
2. **Trilateral Development Cooperation**
   - Joint working groups on energy, science, health, agriculture, trade, culture and education.
3. **South–South Assistance through IBSA Fund**
   - Operational since 2006.
   - Has supported **46 development and humanitarian projects** in **34 LDCs** with a total allocation of over **USD 53 million**.
   - Focus areas: agriculture, women's empowerment, renewable energy, housing and education.

Defence Cooperation: IBSAMAR

- Trilateral **naval exercise** between India, Brazil and South Africa.
- **8th edition (2024)** conducted off the coast of South Africa, enhancing maritime coordination and security.

2. Why is IBSA Important for India?

Voice of the Global South

- IBSA allows India to champion the concerns of the **developing world**, including food security, debt sustainability and equitable climate finance.
- Unlike BRICS, IBSA is **not dominated by China**, giving India greater space to shape the agenda.

Support for UN and Global Governance Reforms

- All three members are **aspirants for permanent seats** in a reformed UN Security Council.
- IBSA consistently pushes for **more inclusive multilateral institutions**, aligning with India's long-term diplomatic goals.

Partnership Based on Democratic Values

- Shared belief in **rule of law, pluralism and constitutional governance** creates natural synergy.
- Strengthens India's position as a **democratic leader** of the Global South.

Development Diplomacy through IBSA Fund

- Provides India an avenue to deliver **low-cost, high-impact** development assistance.
- Projects enhance India's goodwill across Africa, Latin America and small island nations.

Platform for Strategic Dialogue

- Useful for coordinating positions on **terrorism**, WTO negotiations, blue economy, public health and digital public infrastructure (UPI, CoWIN).

- India has proposed a **National Security Advisers-level dialogue** for deeper cooperation in counter-terrorism and strategic affairs.

3. Challenges Facing IBSA

Divergent Geopolitical Priorities

- Brazil's foreign policy shifts sharply with changes in government.
- South Africa's domestic challenges limit sustained engagement.
- India's increasing strategic partnerships differ from the approaches of the other two.

Overlap with BRICS

- Since BRICS addresses similar themes—Global South issues, UNSC reforms, economic cooperation—IBSA often gets overshadowed.
- Expansion of BRICS has further reduced the visibility of IBSA.

Low Trade and Connectivity

- Despite complementarities, **IBSA trade remains limited** due to high logistics costs and weak maritime connectivity.

Weak Institutional Structure

- Absence of a **permanent secretariat** delays implementation and creates coordination gaps.

4. Future Roadmap for IBSA

Focus on High-Impact Niche Areas

- **Digital Public Infrastructure (UPI, Aadhaar, DigiLocker)**
- **Climate-smart agriculture**, renewable energy, biofuels
- **Women-led development**, public health systems

Boost Institutional Capacity

- Creation of a **small permanent secretariat** and an **IBSA Business Council**.

Use IBSA as a Caucus within BRICS

- Coordinate positions to **balance China's influence** and preserve the democratic character of the grouping.

Revitalize the IBSA Fund

- Expand its mandate to climate adaptation, food security and digital inclusion.

Conclusion

The **IBSA Forum** remains a valuable platform for deepening democratic solidarity and advancing Global South priorities. By strengthening its institutional framework and focusing on high-impact cooperation, IBSA can complement BRICS while retaining its unique identity. For India, IBSA is a vital instrument to promote **multilateral reform, digital leadership and South–South cooperation**.

PRELIMS POINTERS IN NEWS

LUCKNOW — UNESCO CREATIVE CITY OF GASTRONOMY

SOURCE: THE HINDU

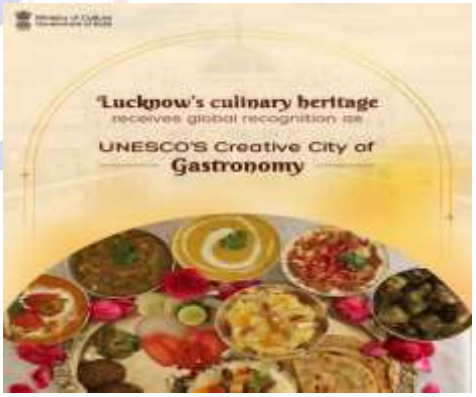
Why in News?

Lucknow was named a **UNESCO Creative City of Gastronomy** at the 43rd UNESCO General Conference, recognising its rich Awadhi culinary tradition.

The accolade spotlights the city's food heritage and potential for culinary tourism and cultural preservation.

Why Lucknow Qualifies

- **Culinary heritage:** Distinguished dishes like **galouti kebab, kakori kebab, biryani, korma, kebab-parathas, sheermal** and artisan breads.
- **Techniques & craftsmanship:** Emphasis on slow-cooking (dum), marination, and blending of spices with delicate textures.
- **Cultural embedding:** Food is central to festivals, ceremonies and the city's social rituals; strong community custodianship.
- **Sustainability & skills:** Local supply chains, traditional ingredients and culinary education promote heritage skills.



UNESCO Creative Cities Network (UCCN)

- Network fosters creativity as a driver of sustainable urban development across fields like **Gastronomy, Crafts, Music, Film**.
- Lucknow joins other Indian cities like **Hyderabad (Gastronomy)** and **Jaipur (Crafts)** in leveraging cultural capital.

Potential Benefits

- **Tourism boost:** Larger culinary tourism flows and international collaborations.
- **Livelihoods:** Opportunities for local cooks, vendors, artisans and small food enterprises.

- **Cultural preservation:** Documentation, training programs and transgenerational transmission of recipes.
- **Urban planning:** Can link food policy to waste management, local sourcing and nutrition.

Challenges & Policy Needs

- Need to preserve authenticity while scaling for tourism.
- Food safety standards, supply chain traceability and sustainable sourcing must be prioritised.
- Skill training and MSME support to ensure benefits reach grassroots.

GULF COOPERATION COUNCIL (GCC)

SOURCE: THE HINDU

Why in News?

The GCC has recently approved a **one-stop travel system** to streamline movement across member states. This marks a major step in regional integration and mobility enhancement.

About Gulf Cooperation Council (GCC)

- The **Gulf Cooperation Council (GCC)** is a political and economic alliance formed in **1981** to promote cooperation among the Gulf's Arab states.
- Born out of regional instability during the Iran-Iraq War and the Iranian Revolution, the GCC remains central to West Asian security and economic coordination.

Members & Headquarters

- **Members:** Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, UAE
- **HQ:** Riyadh, Saudi Arabia

Objectives

- Economic integration and customs union
- Security and defence cooperation
- Social, cultural, and technological collaboration
- Coordinated foreign policy positions

Organisational Structure

1. Supreme Council

- Heads of states
- Highest decision-making body
- Meets annually; presidency rotates alphabetically

2. Ministerial Council

- Foreign ministers
- Implements Supreme Council decisions

3. Secretariat General

- Coordinates research, programs, integration initiatives

One-Stop Travel System

- Enables unified immigration, customs, and security checks
- Simplifies intra-GCC travel for citizens
- Supports labour mobility, tourism, and business expansion

Geopolitical Importance

- Controls key shipping lanes including **Strait of Hormuz**
- Major hub for global oil and energy markets
- Strategic partner for India in trade, diaspora, and security

APEC SUMMIT 2025 – GYEONGJU DECLARATION

The **APEC Summit 2025** was held in **Gyeongju, South Korea**, where member economies adopted the **Gyeongju Declaration 2025**. The summit focused on **AI-led growth, demographic transitions, and inclusive regional cooperation**.

Key Outcomes of APEC Summit 2025

1. Adoption of the Gyeongju Declaration (2025)

- Reaffirmed commitment to **inclusive, sustainable, and innovation-led growth**.
- Recognised the role of **Artificial Intelligence (AI)** and **demographic transitions** in reshaping labour markets, productivity, and economic resilience.
- Identified **three core priorities**:
  - Building the **most dynamic and interconnected** regional economy.
  - Preparing societies and industries for **AI and digital transformation**.
  - Ensuring that the gains of growth are **equitable and broad-based**.

2. Launch of the APEC Artificial Intelligence (AI) Initiative 2026–2030

- A long-term regional plan for **responsible, sustainable, and energy-efficient AI** development.
- Focuses on **innovation partnerships**, **capacity building**, and **cross-border cooperation**.
- Promotes **ethical, transparent, and inclusive AI ecosystems**.
- Encourages member economies to adopt **AI governance frameworks**, data-sharing mechanisms, and workforce-skilling programmes.

3. Framework on Demographic Changes

- Responds to rising challenges such as **ageing populations**, **falling fertility**, and **urban stress** across the region.
- Calls for **people-centric and intergenerational policies** for resilient growth.
- Promotes:
  - Development of a **silver economy** (products and services for senior citizens).
  - Stronger labour markets through **upskilling**, women's participation, and mobility.
  - Fiscal safeguards for **social protection systems**.
  - Shared policy responses and **social innovation** across economies.

4. Strengthened Economic and Technological Cooperation

- **China–South Korea** renewed currency swap arrangement and signed a **cybersecurity MoU**.
- **US–China discussions** indicated a softening of tensions, including talks on restarting trade dialogue and selective tariff relief.
- Reaffirmed commitment to **supply-chain stability**, **technology collaboration**, and **predictable trade flows**.

5. Support for Rules-Based Multilateralism

- Leaders reiterated the goals of **Putrajaya Vision 2040**, which aims to build an **open, dynamic, resilient, and peaceful Asia-Pacific community**.
- Emphasised **free, fair, and transparent trade**, predictable investment climate, and multilateral cooperation.
- Opposed economic fragmentation and unilateral protectionist measures.

About APEC

1. Nature and Purpose

- Established in **1989**, APEC promotes **balanced, inclusive, sustainable, and innovative growth**.
- Uses the term **"economies"** to avoid political sensitivities and ensure economic collaboration.
- Works to streamline **customs, digital trade, regulatory alignment**, and movement of **goods, services, and people**.

2. Membership (21 Economies)

Australia, Brunei, Canada, Chile, China, Hong Kong (China), Indonesia, Japan, South Korea, Malaysia, Mexico, New Zealand, Papua New Guinea, Peru, Philippines, Russia, Singapore, Chinese Taipei, Thailand, USA, Vietnam.

(Corrected list: removed duplicate "China")

- Represents over **62% of global GDP** and **~48% of world trade**.

3. India's Position

- **Not a member**, but maintains strong ties with most APEC economies.
- Seeks membership to boost **investment, market access, regulatory alignment**, and integration under **Act East Policy**.

4. Why India's Membership Stalled

- **Consensus-based admission** and a long-standing **moratorium** on new members.
- Perception of **protectionist policies** and bureaucratic complexity.
- Reported **Chinese resistance** to India's entry.
- India has participated in some meetings as **guest/observer**, but membership remains pending.

Alignment of APEC's Agenda with India's Indo-Pacific Vision

1. Shared Strategic Outlook

- Both call for a **free, open, inclusive, and rules-based Indo-Pacific**.
- Emphasise **transparency, connectivity**, and cooperative economic architecture.

2. Connectivity and Supply Chains

- APEC's focus complements India's **Act East Policy**, **IPOI**, and new maritime initiatives like **MAHASAGAR**.
- Shared priorities in **supply-chain diversification, infrastructure, and logistics efficiency**.

3. Digital Transformation and Innovation

- Strong alignment with **Digital India**, **Startup India**, and the national **IndiaAI mission**.
- Enhances India's emergence as a **digital innovation hub** and a bridge among Indo-Pacific economies.

Conclusion

The **APEC Summit 2025** marked a significant shift toward **technology-driven and people-centred growth**. The Gyeongju Declaration and AI Initiative reflect the region's commitment to **inclusive and future-ready economic cooperation**. For India, APEC's evolving agenda presents opportunities to engage informally and strengthen its role in the broader **Indo-Pacific economic landscape**.

Mains Questions

Q. Discuss the major outcomes of the APEC Summit 2025 and analyse their significance for regional economic integration in the Asia-Pacific. (150 WORDS/ 100 MARKS)

ECONOMY

GROWTH AND DEVELOPMENT

FEMALE LABOUR FORCE PARTICIPATION IN INDIA

SOURCE: THE HINDU

Why in News?

The Ministry of Labour and Employment has announced a strategic plan to raise India's **Female Labour Force Participation Rate (FLFPR)** from **41.7% (2023–24) to 55% by 2030**, aiming to bridge the gender employment gap. This aligns with India's vision for **inclusive economic growth and Viksit Bharat 2047**.

Why is Higher Female Labour Force Participation Critical?

1. Economic Growth & Productivity

- Women's economic participation strengthens **human capital, productivity, and industrial innovation**.
- According to McKinsey, **gender parity can add $700 billion to India's GDP by 2025**.
- Greater inclusion boosts **domestic consumption, savings, and financial resilience**.

2. Social Empowerment & SDGs

- Directly promotes **SDG-5 (Gender Equality)** and enhances **financial independence, social mobility, and decision-making power** for women.
- Reduces poverty cycles as women typically invest in **health, childcare, and education**, improving future generations.

3. Demographic Dividend

- With a young working-age population, increasing FLFPR enhances labour supply, supporting long-term economic growth.

Trends in FLFPR in India

- Declined from **31.2% (2011–12) to 23.3% (2017–18)** due to social norms and lack of quality jobs.
- Rose significantly to **41.7% (2023–24)**, driven mainly by **rural women's participation in informal, unpaid work**.
- Urban participation remains comparatively lower due to lack of childcare, job flexibility, and safety concerns.

Challenges Restricting Women's Workforce Participation

1. Informality & Poor Job Quality

- Over **90% of working women are in informal sector**, with no job security, maternity benefits, or social protection.
- High concentration in **low-paying, low-productivity sectors** like domestic work, agriculture, home-based work.

2. Unpaid Care Work

- Women bear a disproportionate share of unpaid household duties.
- **Unpaid care economy equals 3.1% of India's GDP**, yet remains unrecognized as economic contribution.

3. Mobility, Safety & Workplace Barriers

- Lack of **safe transportation, childcare, night shift support**, and workplace harassment discourage formal job entry.

4. Social and Cultural Norms

- Patriarchal beliefs restrict women's **mobility, decision-making, and financial independence**, especially in rural areas.

Government Initiatives to Enhance FLFPR

Educational & Social Measures

- **Beti Bachao Beti Padhao (BBBP)** – Improves girls' education and retention.
- **NEP 2020** – Ensures equitable access to education, especially for disadvantaged women.

Safety & Legal Protection

- **Sexual Harassment of Women at Workplace (2013)** – Legal redressal for gender-based discrimination.
- **One Stop Centres & Women Helpline** – Immediate support for violence survivors.

Labour Law Reforms

- **Labor Codes** simplify compliance and improve job creation.
- **26 weeks of maternity leave**, **mandatory crèche facilities**, and **permission for night shifts with safety** support women in formal work.

Economic Support

- **PM-JANMAN, TRIFED, MUDRA, SHGs**, and **Van Dhan Vikas Yojana** support entrepreneurship and self-employment.

Way Forward:

1. Build Care Infrastructure

- Establish **community childcare, elderly care centers, shared kitchens**, reducing women's unpaid workload.

2. Promote Formal, Flexible Jobs

- Encourage **part-time, digital, hybrid, gig, and home-based jobs** suited for women.
- Embed women's inclusion into **PLI, Start-up India, and MSME policies**.

3. Recognize Unpaid Work

- Include **Time Use Survey data** to measure indirect economic contributions by women.

4. Digitally Empower Rural Women

- Promote **digital literacy, e-commerce, mobile banking**, and online work among Self Help Groups.

5. Break Social Barriers

- Encourage **joint family responsibility for caregiving**, media-driven behavioral change, male engagement campaigns.

Conclusion

India's rising FLFPR must move from **informal participation to dignified, secure, and remunerative employment**. Recognizing unpaid care work, strengthening social infrastructure, and ensuring safe formal job opportunities are key to unlocking women's true economic potential. Empowered women are the foundation of a **developed, equitable, and economically resilient India**.

HOUSEHOLD FINANCIAL HEALTH IN INDIA

SOURCE: THE HINDU

Why in News?

The RBI has highlighted a growing imbalance in India's household balance sheets, where **financial liabilities have risen far faster than financial assets** since 2019–20. This shift raises concerns over **household vulnerability, debt-driven consumption, and macroeconomic stability**.

About Household Financial Health

- Households are the backbone of India's savings-driven economy, contributing nearly **60% of total national savings**.
- Their financial behaviour influences consumption, investment, credit demand, and macroeconomic stability.

Key Trends in India's Household Financial Position

1. Debt Rising Faster than Assets

- Household financial liabilities grew **102%** between **2019-20 and 2024-25**, whereas financial assets increased only **48%**.
- Borrowing has **outpaced** saving, suggesting higher reliance on loans for consumption and essential spending.

2. Decline in Fresh Savings (as % of GDP)

- New financial assets declined from **12% of GDP (2019–20)** to **10.8% (2024–25)**.
- Liabilities increased from **3.9% to 4.7% of GDP**, peaking at **6.2% in 2023–24**.
- This divergence highlights weakening household resilience to financial shocks.

3. Deposits Still Dominant—but Stagnant Growth

- Bank deposits accounted for **33.3%** of household assets in 2024–25 (up from 32%).
- Despite digital expansion, households continue to prefer **safe but low-return instruments**, which slows wealth creation.

4. Surge in Mutual Fund Investment

- Share of mutual funds jumped from **2.6% (2019–20)** to **13.1% (2024–25)**.
- Reflects:
  - Higher risk appetite
  - Digital onboarding
  - Growing SIP culture
  - Influence of financial literacy campaigns

5. Reduced Preference for Cash

- Currency share fell sharply from **11.7% to 5.9%**, showing a **shift toward digital and financial assets**.

Implications of Rising Household Debt

1. Economic Risks

- IMF: A **5 percentage-point rise** in household debt-to-GDP linked to **1.25 percentage-point lower GDP growth** after 3 years.
- More borrowing for consumption reduces capital formation, hindering long-term growth.

2. Financial Sector Vulnerability

- Household debt in India is **42% of GDP**, lower than EMEs' average (49.1%).
- Two-thirds of loans are **prime or above-prime**, showing good repayment behaviour.
- However, sharp rise in **unsecured consumer loans** poses future NPA risks.

3. Household-Level Challenges

- RBI FSR 2024 notes that more loans are being used for **consumption**, not **asset creation**.
- Low-income families face:
  - High EMIs

- Reduced disposable income
- Greater risk of debt traps

- Rising borrowing costs increase financial fragility.

4. Macroeconomic Stability

- High indebtedness amplifies impact of:
  - Inflation
  - Interest rate hikes
  - Job losses
- Risk of defaults in housing loans and personal loans can affect **bank stability**.

Challenges in Creating Financial Assets

1. Low and Volatile Incomes

- 80–85% of workforce is informal, with **unpredictable earnings**.
- Limited disposable income reduces financial saving capacity.

2. High Cost of Living

- Essential expenses (health, education, fuel, rent) consume a large share of income.
- Leaves limited space for long-term investments.

3. Borrowing for Consumption

- Growing dependence on BNPL, personal loans, and credit cards reduces ability to invest.

4. Weak Financial Literacy

- Many households lack knowledge of:
  - portfolio diversification
  - compounding benefits
  - long-term risk-return trade-offs

5. Rural–Urban Divide

- PLFS shows rural households spend a larger share on essentials, worsening asset inequality.

Way Forward

1. Expand Financial Literacy

- Strengthen NCFE and SEBI initiatives.
- Introduce financial planning modules in schools and skilling programs.
- Low-cost fintech advisory for small savers.

2. Strengthen Social Security Nets

- Expand PM-SYM, PM-JJBY, APY and health insurance coverage.
- Reduce emergency borrowing among the poor.

3. Encourage Long-Term Savings

- Promote **SGBs, ELSS, PPF, NPS and SIPs**.
- Incentivise long-term investment behaviour.

4. Encourage Productive Borrowing

- Improve access to low-cost loans for:
  - Housing
  - Education
  - MSME ventures
- Limit unsecured loan overexposure.

5. Strengthen Macroprudential Monitoring

- RBI should track household leverage and sector-specific credit spikes.
- Build **early-warning systems** for household debt stress.

6. Boost Income Stability

- Support labour-intensive sectors, MSMEs, and skilling programs to enhance savings capacity.

Conclusion

India's household debt has surged much faster than asset creation, signalling rising financial vulnerability. A shift toward consumption-driven borrowing threatens both household stability and long-term economic resilience. Strengthening savings behaviour, promoting social security, and ensuring responsible credit growth are essential for safeguarding India's financial future.

AGRICULTURE AND ALLIED

NUTRIENT BASED SUBSIDY (NBS) SCHEME

SOURCE: THE HINDU

Why in News?

The **Union Cabinet** has approved the **Nutrient Based Subsidy (NBS) rates** for **Phosphatic and Potassic (P&K) fertilizers** for the **Rabi season 2025–26 (October 2025 to March 2026)**.

The decision aims to ensure **affordable fertilizer access** to farmers while reflecting changes in **global fertilizer input prices**.

What is the Nutrient Based Subsidy (NBS) Scheme?

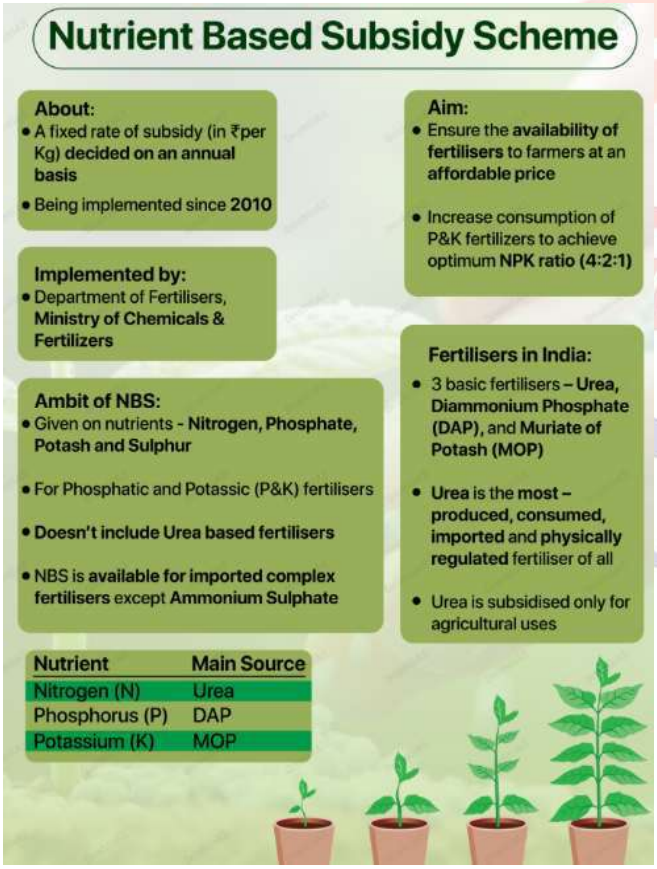
About the Scheme

- Launched in **2010**, under the **Department of Fertilizers, Ministry of Chemicals and Fertilizers**.
- Applies to **Phosphatic and Potassic (P&K) fertilizers**, covering **28 fertilizer grades** including **DAP** and **NPK blends**.

Key Features

- **Subsidy Based on Nutrient Content:**
  - The government provides a **fixed subsidy per kilogram** of **Nitrogen (N), Phosphorus (P), Potash (K), and Sulphur (S)**.
  - Subsidy is **directly given to manufacturers/importers**, who then sell fertilizers to farmers at subsidized prices.

- **Decontrolled Pricing:**
  - P&K fertilizers are **decontrolled**, meaning companies can set the **Maximum Retail Price (MRP)**.
  - However, the Government **monitors MRPs** to prevent excessive pricing.
- **Urea Exclusion:**
  - **Urea is not part of the NBS scheme**.
  - Its price remains **administratively fixed** at **₹242 per 45 kg bag**, leading to **artificially low cost of nitrogen** compared to P&K fertilizers.
- **Special Price Support:**
  - During **global price volatility**, the government may give **extra subsidy**, particularly on **DAP**, to prevent sudden price hikes.



Significance of the Scheme

- Ensures **affordable fertilizer access** for farmers.
- Encourages **balanced nutrient application**, reducing excessive use of nitrogen fertilizers.
- Promotes **soil health** by supporting multi-nutrient fertilizers.
- Enhances **fiscal transparency** in subsidy allocation.
- Supports India's goals of **sustainable agriculture and food security**.

Challenges Associated with the NBS Scheme

1. Nutrient Imbalance

- Since **urea remains highly subsidized**, farmers overuse nitrogen fertilizers and underuse P&K fertilizers.
- Leads to:
  - **Soil nutrient depletion**
  - Declining crop yields
  - Reduced **long-term soil fertility**

2. Global Price Volatility

- India imports:
  - ~25% of urea
  - ~90% of phosphates
  - ~100% of potash
- This exposes India to **international market fluctuations**, impacting the affordability of fertilizers.

3. High Fiscal Burden

- Fertilizer subsidy is India's **second-largest subsidy expense** after food.
- Rising global costs strain government finances, **limiting expenditure** on rural development and irrigation.

4. Environmental Impact

- Overuse of nitrogen fertilizers causes:
  - **Groundwater contamination**
  - **Nitrous oxide emissions**, a potent greenhouse gas
  - Decline in **soil organic carbon**

5. Weak Awareness

- Many farmers lack awareness about **optimal nutrient application**, resulting in misuse or overuse of fertilizers.

Reforms Required to Strengthen NBS

1. Bring Urea Under NBS

- Including **urea** would ensure uniform subsidy treatment and promote **balanced nutrient usage**.

2. Link Subsidies to Soil Health

- Use **Soil Health Card data** to guide fertilizer use based on **local soil needs**.

3. Target Subsidies Efficiently

- Implement **Aadhaar-linked and DBT-based fertilizer purchase limits** to prevent diversion.

4. Support Organic and Bio-Fertilizers

- Promote **biofertilizers, compost, nano-urea** and other **eco-friendly alternatives**.

5. Farmer Training

- Strengthen **KVK and extension services** to educate farmers on:

- Soil testing
- Crop-specific nutrient needs
- Balanced fertilization practices

Conclusion

The **Nutrient Based Subsidy Scheme** is a vital step toward promoting **balanced nutrient use** and **agricultural sustainability**. To achieve its full potential, India must **reform urea pricing**, encourage **soil-based nutrient planning**, and expand the use of **organic and biofertilizers**. A **farmer-centric, environmentally responsible subsidy system** will help secure long-term food security and soil health.

NITI AAYOG'S ROADMAP FOR FRONTIER TECHNOLOGY–LED AGRICULTURAL TRANSFORMATION

SOURCE: PIB

Why in News?

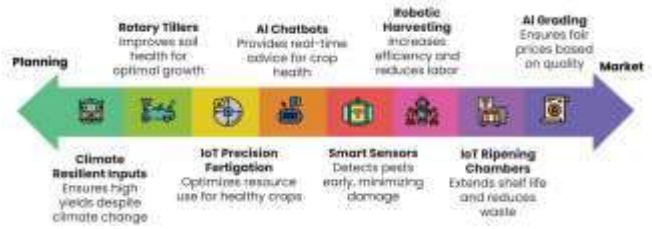
NITI Aayog released its report **"Reimagining Agriculture: Roadmap for Frontier Technology-Led Transformation"**, outlining how emerging tools such as **AI, drones, IoT, geospatial systems, and biotechnology** can reshape Indian agriculture. The roadmap recommends **Digital Agriculture Mission 2.0** built on three pillars — **Enhance, Reimagine, Converge** — to drive tech-enabled, inclusive agricultural growth.

Frontier Technologies in Agriculture

What Are Frontier Technologies?

These include cutting-edge tools such as:

- **Artificial Intelligence (AI)** for predictive advisories
- **IoT sensors** for soil, water, and crop monitoring
- **Drones** for precision farming
- **Biotechnology and genomics** for climate-resilient seeds
- **Digital twins** for modelling crop scenarios
- **Blockchain** for traceability and export competitiveness



Purpose of Frontier Technologies

- Shift agriculture from **input-intensive** to **innovation-driven** growth
- Promote **climate-resilient crop varieties**
- Enhance **resource efficiency** through precision agriculture
- Enable **transparent markets** and stronger value chains
- Diversify farmer income through data-driven decisions

Farmer Categories Identified

To tailor technology adoption, NITI Aayog divides farmers into:

1. **Aspiring Farmers (70–80%)**
   - Small, rain-fed, credit-constrained
   - Need micro-irrigation, crop insurance, basic tech access
2. **Transitioning Farmers (15–20%)**
   - Medium farmers adopting machines, storage, and buyer linkages
3. **Advanced Farmers (1–2%)**
   - Large farmers focusing on exports, robotics, high-value crops, blockchain

Digital Agriculture Mission (DAM)

About the Mission

DAM aims to develop a **digital ecosystem** for agriculture, integrating data, institutions, and technology.

Two Foundational Components

1. **AgriStack**
   - Creates a **unique Farmer ID** linked to land, livestock, schemes, and crop data
   - Target: **11 crore digital farmer IDs** by FY 2027
   - Enables personalised advisories, targeted subsidies, and digital credit
2. **Krishi Decision Support System (DSS)**
   - Geospatial intelligence system using remote sensing, weather, soil, and crop data
   - Supports **crop mapping**, **disaster monitoring**, yield estimation, and crop insurance

Additional Components

- **Soil Profile Mapping** for nutrient-balanced farming
- **Digital General Crop Estimation Survey (DGCES)** for accurate crop data

Significance

- Promotes a shift to **data-driven agriculture**
- Improves **transparency** in subsidies and insurance
- Strengthens **climate resilience**
- Enhances credit inclusion by creating digital records for small farmers

Key Challenges to Technology-Led Transformation

1. Data Governance Issues

- Fragmented databases across states
- Concerns over **data privacy**, consent, and farmer ownership

2. Market and Financial Barriers

- Dependence on **local mandis** despite e-NAM
- Limited credit for adopting AgTech solutions

3. Digital Divide

- Only **45% rural households** have internet access (NFHS-5)
- Low digital literacy among elderly and women farmers

4. Fragmented Agri-Ecosystem

- Weak coordination between academia, startups, and policymakers
- Small holdings restrict mechanisation

5. Shortage of Skilled Talent

- Need for technicians, drone operators, agri-data experts, agri-entrepreneurs

6. Funding Limitations

- AgTech innovations require high-risk capital
- Small farmers lack collateral to invest in technology

Steps Needed for Inclusive Agri-Tech Growth

Enhance — Strengthen Core Systems

- Build a federated **Agri Kosh data ecosystem**
- Develop **AI-powered, multilingual advisories**
- Link **DBT incentives** to the adoption of digital tools
- Subsidise precision inputs like sensors and drones

Reimagine — Reinvent Research & Talent

- Promote **mission-mode R&D** for climate-resilient seeds
- Reform agricultural education for **interdisciplinary skills**
- Train **1 lakh+ Krishi Sakhis and agri-extension workers** as digital leaders
- Mainstream technology modules in agriculture universities

Converge — Build Integrated Innovation Networks

- Establish **Frontier Technology Centres of Excellence**
- Create large pilots between **startups–states–FPOs**
- Use regulatory sandboxes for testing farm-tech innovations
- Institutionalise **policy foresight units** for future-proof governance

Conclusion

NITI Aayog's roadmap charts a clear path towards a **technology-driven, climate-resilient, and inclusive agricultural system**. By combining digital infrastructure, strong institutions, and farmer-centric innovation, India can unlock higher productivity and incomes. A tech-enabled transformation is essential for realising the vision of **Viksit Bharat 2047**.

INDUSTRY AND INDUSTRIAL POLICIES

INDIA'S TEXTILE INDUSTRY

SOURCE: THE HINDU

Why in News?

The Government of India is preparing a **comprehensive cost-competitiveness roadmap** to help the textile sector match global benchmarks amid rising competition from **Bangladesh, Vietnam, and China**.

The initiative aims to enhance productivity, support exports, and strengthen India's position in global textile markets.

Current Status of India's Textile Industry

Economic Importance

- Contributes **2.3% to India's GDP** and about **13% of industrial production**.
- Accounts for **12% of total merchandise exports** (FY 2023–24).

Export Profile

- Total textile exports stood at **USD 34.4 billion (2023–24)**.
- Major segments include:
  - **Apparel (42%)**
  - **Yarn and raw materials (34%)**
  - **Non-apparel finished goods (30%)**

Employment Generation

- The industry provides **direct employment to over 45 million people**, especially women and rural workers.
- Around **80% of production** occurs through **MSME clusters**, making it highly decentralized and socially inclusive.

Global Standing

- India ranks **5th globally** in textile trade.
- Domestic market expected to grow from **USD 174 billion to USD 350 billion by 2030**.

Key Challenges Limiting Global Competitiveness

1. High Input Costs

- Import restrictions under **Quality Control Orders (QCOs)** have made raw materials like **polyester and viscose** significantly costlier than in China.
- This affects **price competitiveness** of Indian finished goods.

2. Lower Labour Productivity

- Labour productivity is **20–40% lower** compared to Bangladesh and Vietnam due to limited skill training and mechanization.

3. Trade Disadvantages

- Absence of major **FTAs** with blocs like the **EU** results in **higher import duties** on Indian textiles compared to Bangladeshi and Vietnamese products.

4. MSME Technological Gap

- Majority of textile MSMEs lack capital to **upgrade machinery**, adopt **Industry 4.0 technologies**, or invest in **design and branding**.

5. Environmental and Compliance Pressures

- Growing global demand for **sustainable and eco-certified textiles** increases costs and requires new production systems.

Government Roadmap and Strategic Reforms

Cost-Competitiveness Strategy

- A **three-phase roadmap** (short-, medium-, and long-term) to reduce:
  - Raw material cost
  - Logistics inefficiencies
  - Compliance burdens
  - Wastage during production

Innovation & Design Promotion

- Dedicated R&D support under:
  - **National Technical Textiles Mission (NTTM)**
  - **PM MITRA Parks**
  - **ATUFS (Technology Upgradation Fund Scheme)**
- Encouraging **start-ups, design studios, and branding hubs**.

Skill & Productivity Enhancement

- **Samarth Scheme** and industry-led Skill Councils to reduce the productivity gap.
- Promote **automation and digital tools** to improve efficiency in MSMEs.

Trade & Policy Reforms

- Fast-track **FTA negotiations**, especially with EU and UK.
- Simplify GST and labour regulations for the textile workforce.
- Utilize **PLI Scheme for Textiles** to scale up domestic manufacturing of **man-made fibres and technical textiles**.

Sustainability and Circular Economy

- Adoption of:
  - **Green energy use** in textile clusters
  - **Water-saving dyeing processes**
  - **Recycling and waste upcycling** under circular economy initiatives.

Conclusion

India's textile sector stands at a strategic turning point: strong capacity but facing global competitive pressures. A **coherent cost roadmap**, combined with reforms in **trade, infrastructure, skills, sustainability, and innovation**, can

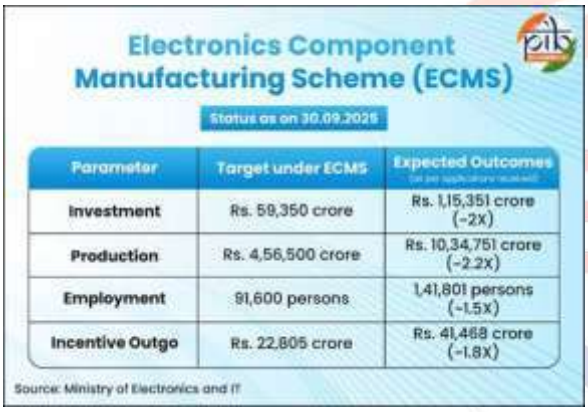
unlock its full export potential. With coordinated implementation, India can realistically achieve the **USD 100 billion export target by 2030**, while generating inclusive employment and global leadership in textiles.

ELECTRONICS MANUFACTURING COMPONENT SCHEME (ECMS)

SOURCE: THE HINDU

Why in News?

The Government of India has approved the **first batch of seven manufacturing projects** under the **Electronics Manufacturing Component Scheme (ECMS)** with an investment commitment of **over ₹5,500 crore**. These projects aim to strengthen India's domestic electronics value chain beyond assembly and move towards component-level self-reliance.



Key Features of ECMS

- **Financial Support:** The scheme provides capital incentives to manufacturers investing in electronic component production.
- **Targeted Components:** Focus areas include **multi-layer Printed Circuit Boards (PCBs)**, **High-Density Interconnect (HDI) PCBs**, **camera modules**, **polypropylene films used in capacitors**, and **Copper Clad Laminates (CCL)**.
- **Geographical Spread:** The approved units are located in **Tamil Nadu (5 projects)**, **Andhra Pradesh (1)**, and **Madhya Pradesh (1)**, promoting **decentralized industrial development**.

Projected Economic Impact

- The approved projects are expected to generate **production worth ₹36,559 crore** over the next few years.
- They are likely to create **more than 5,100 direct jobs** and a wider base of indirect employment in logistics, testing, packaging, and supply services.
- Nearly **60% of the products manufactured** under these projects will be **exported**, helping India integrate into global value chains.

Strategic Significance

- **First-time Manufacturing in India:** The scheme will establish **India's first Copper Clad Laminate (CCL) manufacturing facility**, a crucial material for PCB production currently heavily imported.
- **Supply Chain Security:** Critical for sectors like **defense electronics, electric vehicles, smartphones, telecom equipment, medical devices, and renewable energy systems**.
- **Complements Other Programmes:** Works in synergy with the **Production Linked Incentive (PLI) Scheme**, **Make in India**, **Aatmanirbhar Bharat**, and **National Policy on Electronics (NPE) 2019**.

INFRASTRUCTURE

SPECIAL ECONOMIC ZONES (SEZS) IN INDIA

SOURCE: THE HINDU

Why in News?

A government panel under the **Commerce Ministry and NITI Aayog** is finalising **revised SEZ norms** to help exporters tap the domestic market amid declining competitiveness caused by **high US tariffs**.

The changes aim to improve **operational flexibility, investment flow, and global competitiveness** of Indian SEZs.

Need for Revised SEZ Norms in India

1. Countering US Tariffs and Protecting Export Competitiveness

- Recent **US tariff hikes** have made SEZ exports less competitive.
- Exporters have sustained operations by **absorbing losses**, indicating structural weaknesses.
- Revised norms are needed to ensure **market stability** and reduce dependency on volatile external markets.

2. Enhancing Operational Viability

- Exporters suggest adopting **reverse job work**, where SEZ units can manufacture for domestic tariff area (DTA) companies.
- This will utilise **idle labour and machinery**, especially during seasonal dips in global demand.

- A transparent mechanism is needed to **neutralise duty advantage** when SEZ goods enter the domestic market.

3. Addressing Low Investments and FDI Inflow

- India's SEZs attract **limited FDI**, unlike Vietnam or UAE, due to:
  - Absence of strong **investment treaties**
  - Weak global branding
  - Policy unpredictability
- Low **R&D investment** in sectors like gems and jewellery led to reduction from **500 units to ~360**, lowering export contribution.
- Revised norms aim to position SEZs as **innovation-driven hubs** rather than only export centres.

4. Overcoming Global Uncompetitiveness

- India's SEZs lag behind China's **Shenzhen-style mega clusters** and Dubai's tax-free free zones.
- Productivity issues, exit of labour-intensive units, and inadequate incentives reduce competitiveness.
- With the removal of **Net Foreign Exchange (NFE)** conditions, a new **performance review framework** is required to assess value addition and technology adoption.

What Are SEZs?

A **SEZ** is a designated duty-free zone considered a **foreign territory** for trade and customs purposes.

Governed by **SEZ Act, 2005** and **SEZ Rules, 2006**.

First introduced in **2000**, replacing Export Processing Zones (EPZs).

Status in India

- As of 2023–24, **276 SEZs** are operational, recording **USD 163.69 billion** in exports.
- The **SEZ Amendment Bill, 2024** aims to convert SEZs into **Development Hubs** with flexible rules for exports and domestic sales.

Objectives of SEZs

- Promote **exports**, attract **FDI**, generate **employment**, and improve **competitiveness**.
- Provide a **single-window clearance** and robust infrastructure ecosystem.

Reforms Needed to Revitalize SEZs

1. Allow Reverse Job Work

- Permit SEZ units to manufacture for **domestic firms**.
- Introduce a clear system to **neutralise input duty benefits** for goods sold in the domestic market.

2. Develop SEZ-Linked Industrial Corridors

- Integrate SEZs with corridors like **Delhi–Mumbai Industrial Corridor (DMIC)**.
- Enhance **multimodal connectivity**, reduce logistics costs, and develop **residential townships** near remote SEZs to attract skilled labour.

3. Regulatory Overhaul

- Pass the **SEZ Amendment Bill, 2024**.
- Implement **Baba Kalyani Committee recommendations**—rename SEZs as **3Es (Employment & Economic Enclaves)**.
- Create **separate frameworks** for manufacturing and services zones.
- Simplify entry–exit rules and introduce a **fully digital portal** for approvals.

4. Global Alignment and Competitiveness

- Create **customs hubs**, e-commerce zones, and fast-track approvals.
- Pursue **Mutual Recognition Agreements (MRAs)** with UAE, Singapore, EU for quality standards.
- Study global models like **Shenzhen** (large clusters, innovation systems) and **Dubai Free Zones** (100% foreign ownership).

5. Strengthening Dispute Resolution

- Establish **commercial courts** and **international arbitration centres** inside SEZs.
- Faster dispute resolution will enhance **investor confidence** and reduce compliance burden.

Conclusion

Reforming SEZs is essential for India to enhance export competitiveness and integrate into global value chains. A combination of flexible policies, infrastructure upgrades, and global-standard regulatory systems can transform SEZs into high-productivity hubs. With the right reforms, India's SEZs can evolve into **innovation-driven, investment-friendly, and employment-rich** economic enclaves.

PRELIMS POINTERS IN NEWS

JEEVAN PRAMAAN & INDIA POST PAYMENTS BANK (IPPB)

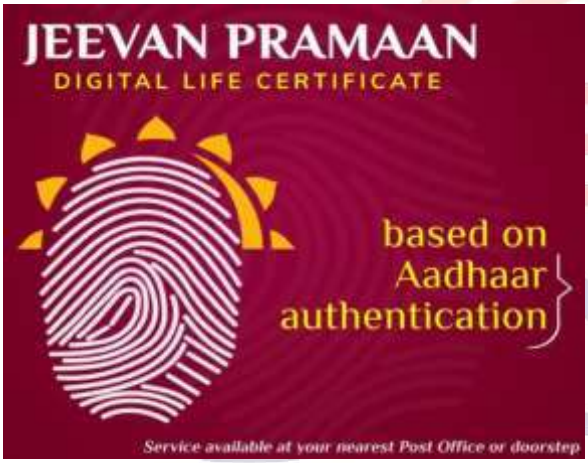
SOURCE: THE HINDU

Why in News?

IPPB signed an MoU with **EPFO** to deliver **Jeevan Pramaan** Digital Life Certificates at pensioners' doorsteps, enhancing access and inclusion. This partnership leverages India Post's reach for Aadhaar-based biometric verification of pensioners.

About Jeevan Pramaan

- **Jeevan Pramaan** is an Aadhaar-linked **Digital Life Certificate (DLC)** that authenticates a pensioner's existence digitally, ensuring uninterrupted pension credits without physical travel to banks or pension disbursing agencies.



How It Works

- Uses **biometric authentication (finger/iris)** linked to Aadhaar.
- Certificate is generated and shared electronically with the pension disbursing agency.
- Valid for one year; pensioners must renew annually.
- IPPB's network enables **doorstep capture** through postmen/Gramin Dak Sevaks or in-branch kiosks.

Significance

- **Financial inclusion:** Helps elderly and immobile pensioners, especially in rural areas.
- **Reduced hardship:** Eliminates travel & queuing at bank branches.
- **Transparency:** Digital records reduce fraud and paperwork.
- **Scalability:** IPPB's vast outreach (post offices, last-mile staff) ensures wide coverage.

IPPB Profile & Innovations

- Launched in **2018**, under Department of Posts to provide affordable banking.
- Innovations include **WhatsApp banking**, **Fincluvation** for fintech partnerships, and international remittances through Ria.
- Uses digital onboarding, POS devices and doorstep services to deepen inclusion.

Risks & Safeguards

- **Data privacy:** Aadhaar and biometric data must be protected under law and tech safeguards.
- **Digital literacy:** Elderly require assistance; doorstep service mitigates this barrier.
- **Contingency:** Provisions needed for failed biometrics or unavailability of Aadhaar.

SARAL SIMS

SOURCE: THE HINDU

Why in News?

The Ministry of Steel has launched **SARAL SIMS**, a simplified registration system for small-scale steel imports under the Steel Import Monitoring System.

What is SARAL SIMS?

- A **single annual registration mechanism** for small consignments under SIMS.
- Applicable from **21 November 2024**.
- Designed for small importers and export-oriented units.

Key Features

1. Simplified Registration

- Only **one annual declaration** required for intended import quantity.
- A single **SARAL SIMS number** can be used for multiple shipments throughout the year.

2. Coverage

- Applies to steel/iron items under **Chapters 72, 73, 86** of ITC-HS 2022.

3. Annual Return Requirement

- Importers must submit an **annual return** by April 30 detailing actual imports.

4. Import Caps (for domestic use)

- Up to **10 tonnes per consignment**.
- Annual limit:
  - **500 tonnes in 2025–26**
  - **1000 tonnes from 2026–27**

5. SARAL SIMS for Export Purposes

- No quantity limit.
- Covers **Advance Authorization, SEZs, and EOUs**.

Benefits

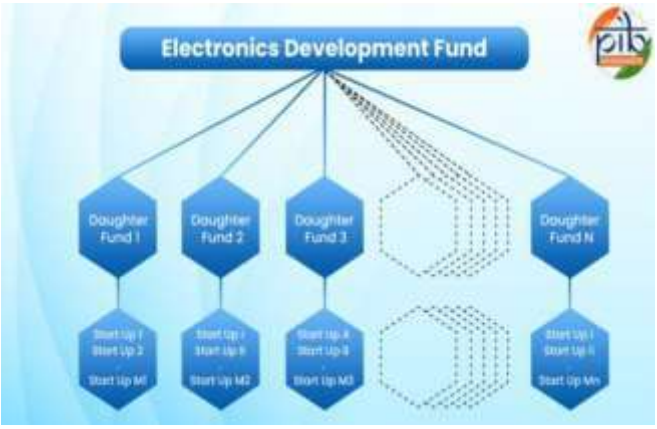
- Reduces paperwork and delays.
- Supports small traders and MSMEs.
- Improves predictability of imports.
- Strengthens monitoring without adding compliance burden.

ELECTRONICS DEVELOPMENT FUND

SOURCE: PIB

Why in News?

The **Electronics Development Fund (EDF)** has recently been highlighted for driving innovation and start-ups in the **electronics and IT hardware ecosystem**. It plays a key role in supporting India's goal of strengthening domestic manufacturing.



About Electronics Development Fund (EDF)

- Launched in **2016**, the **Electronics Development Fund** is a pioneering Government of India initiative designed to build a strong ecosystem for **electronics, nano-electronics, and IT innovation**.
- It functions as a "Fund of Funds," supporting venture funds that invest in early-stage technology start-ups.

Objectives

1. Promote R&D and Innovation

- Support research-driven companies, especially in strategic technology areas.
- Enable India to reduce dependence on imported electronic products.

2. Support Daughter Funds

- Invests in SEBI-regulated **Category I & II AIFs**.
- Ensures professional fund management and accountability.

3. Strengthen Electronics System Design & Manufacturing (ESDM)

- Encourages domestic innovation in semiconductor design, chip development, and embedded systems.
- Aligns with India's **Make in India** and **Digital India** missions.

4. Build IP Assets

- Focus on creating a strong pool of **Indian-owned intellectual property**, particularly in high-tech domains.

5. Support Entrepreneurship

- Helps start-ups creating new technologies, processes, and products.
- Facilitates access to funding for deep-tech ventures.

How EDF Works

- Government provides anchor investment into selected daughter funds.
- Venture funds invest this capital in start-ups across areas like:
  - AI and machine learning
  - Semiconductors
  - IoT and robotics
  - Medical electronics
  - Cybersecurity
- Enables strategic technology acquisitions by Indian companies.

Impact

- Boosts domestic capability in sensitive technologies.
- Encourages private sector participation through co-investment.

- Facilitates long-term growth in electronics manufacturing.
- Supports India's ambition to emerge as a global technology hub.

DRISHTI SYSTEM

SOURCE: PIB

Why in News?

Indian Railways has begun trials for an **AI-enabled 'DRISHTI' wagon locking monitoring system** to enhance freight safety. The system is being developed jointly by **NFR and IIT Guwahati's TIDF**.

About the DRISHTI System

1. What is DRISHTI?

- Full form: **AI-based Freight Wagon Locking Monitoring System**.
- Developed by **Northeast Frontier Railway** in collaboration with **IIT Guwahati TIDF**.
- Uses **computer vision, machine learning**, and precision sensors.

2. Working Mechanism

- Equipped with **AI-powered cameras** placed along freight corridors.
- Captures continuous images of wagon doors during train movement.
- Analyses door position, locking status, and potential tampering.
- Generates **real-time alerts** to railway control centres without halting trains.
- Integrates with existing security systems for faster response.

3. Need for the System

- Manual checking is slow, labour-intensive, and prone to errors.
- Instances of **pilferage, cargo theft, and unsafe door conditions** have increased.
- Prevents safety hazards such as goods falling from moving trains.
- Reduces revenue losses and strengthens supply-chain reliability.

4. Expected Benefits

- **Enhances freight security** and reduces human dependency.
- Ensures **better sealing integrity** of wagons.
- Enables **predictive maintenance** through data-based insights.
- Boosts efficiency in high-volume freight corridors.
- Supports the Railways' vision of **smart, technology-driven logistics**.

EXPORT PROMOTION MISSION (EPM)

SOURCE: THE HINDU

Why in News?

The Union Cabinet recently cleared the **Export Promotion Mission (EPM)** announced in Budget 2025–26. It aims to strengthen India's export competitiveness, especially for **MSMEs and labour-intensive sectors**.

About the Export Promotion Mission

1. Objectives

- Build a **cohesive export ecosystem**.
- Provide both **financial and non-financial support** to exporters.
- Strengthen India's integration with global value chains.
- Promote **first-time exporters** and small-scale producers.

2. Key Features

- Duration: **2025–26 to 2030–31**.
- Total allocation: **₹25,060 crore**.
- Single-window, digitally enabled, outcome-based structure.

- Implemented by **DGFT** under the Department of Commerce.
- Involves coordination with **MSME Ministry, Finance Ministry**, and state governments.
- Prioritises sectors hit by global tariff hikes—**textiles, leather, gems & jewellery, engineering goods, marine products**.

3. Consolidation of Existing Schemes

- Merges schemes such as **Interest Equalisation Scheme (IES)** and **Market Access Initiative (MAI)**.
- Aligns incentives with modern trade requirements and global standards.

4. Sub-schemes under EPM

(a) NIRYAT PROTSAHAN

- Focuses on access to **affordable trade finance**.
- Tools include interest subvention, export factoring, credit guarantees, and working capital support.

(b) NIRYAT DISHA

- Supports non-financial enablers:
  - Export quality standards
  - International branding
  - Packaging and warehousing
  - Logistics and market-entry assistance

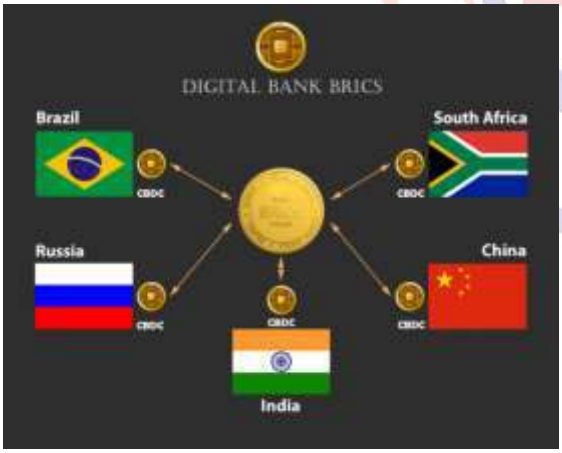
5. Significance

- Reduces cost of exporting for MSMEs.
- Enhances India's ability to manage external shocks.
- Improves SME participation in global supply chains.
- Encourages innovation and diversification of export baskets.

BRICS PAY

BRICS nations are developing **BRICS Pay**, a cross-border digital payments framework aimed at reducing dependence on the **SWIFT** network and the US-dollar–dominated global financial system.

This initiative aligns with BRICS' broader push to create alternative financial structures following sanctions on Russia and rising global geopolitical polarisation.



What is BRICS Pay?

- **BRICS Pay** is a proposed **cross-border digital payment and settlement platform** enabling trade in **local currencies** among BRICS and partner countries.
- It forms part of the **BRICS Cross-Border Payments Initiative**, aimed at:
  - Strengthening financial sovereignty
  - Reducing exposure to Western sanctions
  - Enhancing intra-BRICS banking networks
  - Promoting faster, cheaper, real-time payments

Background

- **2014 Fortaleza Summit:** BRICS created NDB & CRA to reduce Western financial dominance.
- **2015–2021:** After sanctions on Russia, members accelerated efforts to increase local currency use.
- **2024 Kazan Summit:** Formal launch of BRICS Pay as a strategic alternative to SWIFT.

Interoperability Components

BRICS Pay aims to link:

- **Russia:** SPFS (SWIFT alternative)
- **China:** CIPS (global reach; 120+ countries)
- **India:** UPI (fastest-growing global digital payments system)
- **Brazil:** Pix (widely used in Latin America)
- **South Africa:** Rapid Payments Programme

Why is BRICS Challenging SWIFT?

1. Financial Sovereignty

- SWIFT is overseen by **G10 central banks**, limiting the influence of emerging economies.
- Dollar dominance gives Western nations disproportionate power in global finance.

2. Protection from Sanctions

- SWIFT exclusion has been used against **Russia (2022), Iran (2012)**.
- BRICS wants a system resilient to geopolitical coercion.

3. Geopolitical Competition

- Rise of multipolarity encourages BRICS to diversify away from Western systems.

- South–South cooperation requires smoother local currency settlements.

4. Reducing Dollar Dependence

- 84% of global trade is invoiced in USD.
- BRICS aims to promote **local currency trade** and lower forex volatility.

Challenges in Implementing BRICS Pay

1. Divergent National Priorities

- India promotes **UPI**, China pushes **CIPS**—coordination is complex.
- Fear of China's dominance due to economic weight.

2. Political Tensions

- India–China border tensions hinder deeper financial integration.

3. Technical Interoperability Issues

- Harmonising settlement cycles, encryption standards, and regulatory frameworks is highly complex.

4. Lack of Unified Monetary Policy

- BRICS countries follow different exchange rate regimes, inflation targets, and capital controls.

5. External Geopolitical Pressure

- US may retaliate through tariffs or restrictions, discouraging some BRICS+ nations.

6. Trust Deficit Among Global South

- Non-BRICS countries may hesitate to adopt an unfamiliar system without proven security.

What Steps Can Strengthen BRICS Pay?

1. Phased Adoption

- Begin with **bilateral Rupee-Ruble, Rupee-Rand, Yuan-Ruble** settlements.
- Expand to regional blocs (Africa, Latin America, ASEAN).

2. Interoperability Framework

- Standardise messaging systems, cybersecurity norms, and settlement protocols.

3. Incentivise Participation

- Offer **reduced transaction fees**, **real-time settlements**, and **cheaper forex rates** vs SWIFT.

4. Political Coordination

- Build a BRICS **Financial Coordination Council** to oversee policy harmonisation.

5. Global Partnerships

- Engage BRICS+ and developing nations to create a broad user base.

Conclusion

BRICS Pay represents a strategic effort to democratise global finance and reduce reliance on Western-controlled payment systems. If successful, BRICS Pay could reshape global monetary flows and accelerate the shift toward a multipolar financial order.

Mains Question

Q. "BRICS Pay has the potential to challenge the US-centric global financial architecture, but its success depends on political cohesion and technological interoperability among member states." Discuss. (150 WORDS / 10 MARKS)

FAMOUS PERSONALITIES

JANJATIYA GAURAV DIVAS: PRESERVING TRIBAL LEGACY AND NATIONAL PRIDE

SOURCE: INDIAN EXPRESS

Why in News?

India celebrated **Janjatiya Gaurav Divas on 15th November** to honor **Birsa Munda**, marking the beginning of **Janjatiya Gaurav Varsh (2024–25)** to commemorate the **150th birth anniversary** of the iconic tribal freedom fighter. This year's celebrations focus on **preserving tribal heritage, showcasing tribal resistance in freedom struggle**, and promoting cultural pride through museums and digital initiatives.

What is Janjatiya Gaurav Divas?

- Started in **2021** under **Azadi Ka Amrit Mahotsav** to recognize tribal contributions in protecting **land, culture, and environmental wisdom**.
- Honors tribal leaders such as **Birsa Munda, Veer Narayan Singh, Badal Bhoi, Tirot Singh, Alluri Sitarama Raju**, and others.
- Promotes awareness about **tribal revolts** like **Santhal, Bhumkal, Kol, and Munda Ulgulan**, which challenged British exploitation.

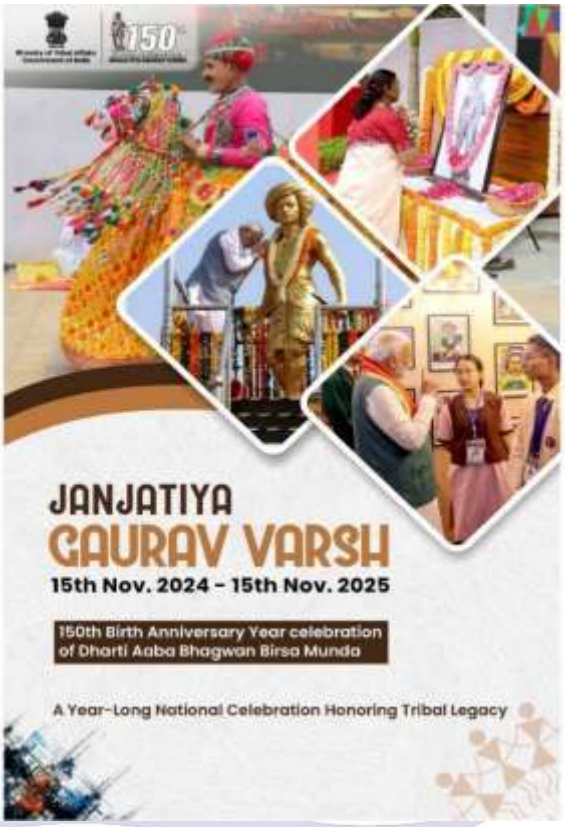
Janjatiya Gaurav Varsh 2024–25: Museums as Memory Guardians

To restore tribal narratives, the government is developing **11 Tribal Freedom Fighter Museums**, of which some have been inaugurated:

Key Museums

Museum	Focus
Bhagwan Birsa Munda Museum (Ranchi, Jharkhand)	Ulgulan, spiritual leadership, Birsa Raj vision
Shaheed Veer Narayan Singh Museum (Raipur, Chhattisgarh)	Revolt against famine exploitation, Halba, Meria & Bhumkal Movements
Badal Bhoi Tribal Freedom Fighters Museum (Chhindwara, MP)	Forest rights resistance, British land restrictions
Raja Shankar Shah & Kunwar Raghunath Shah Museum (Jabalpur)	Literary resistance, martyr-poets of 1857

These museums preserve **oral histories, tribal wisdom, art, culture, and environmental ethos**, strengthening cultural identity.



Who was Birsa Munda?

- **Born:** 15 November 1875, Chota Nagpur Plateau (Jharkhand), belonging to the **Munda tribe**.
- Witnessed **land alienation, begar (forced labor)**, and breakdown of **Khuntkatti land system**.
- Founded the **Birsait faith**, promoting **spiritual awakening, self-rule, and tribal unity**.
- Led the **Ulgulan (1899–1900)** demanding end of British rule, protection of tribal lands, and **Birsa Raj**.
- Organized **guerrilla resistance**, rejected colonial taxes, and fought unfair landlordism.
- **Died in Ranchi Jail (1900)** at age 25 under mysterious circumstances.
- His struggle led to **Chotanagpur Tenancy Act 1908**, safeguarding tribal land rights.
- The State of **Jharkhand was formed on 15 Nov 2000**, his birth anniversary, in his honor.

Government Initiatives to Preserve Tribal Culture and Knowledge

Digital & Cultural Documentation

Initiative	Purpose
Adi Sanskriti Portal	100+ courses on tribal artforms, preserving cultural heritage
Adi Vaani	Real-time speech & text translation between tribal languages and English/Hindi
Tribal Digital Document Repository	Archives history, culture, and documents of tribal communities
Varnamala & Oral Literature Initiative	Documents folk stories, rhymes, oral epics in tribal languages

Community Knowledge and Heritage

- Documentation of **indigenous healing practices, medicinal plants, agriculture, rituals, dances, and artforms**.
- Implementation of **Aadi Mahotsav and Tribal Craft Mela** to promote entrepreneurship and cultural pride.

Welfare & Development Initiatives for Tribals

1. **Forest Rights Act (2006):** Grants tribals legal rights over forest land, resources, and community ownership.
2. **PESA Act (1996):** Empowers Gram Sabhas in tribal areas for decision-making, land management, and self-governance.
3. **PM Adi Adarsh Gram Yojana:** Develops tribal villages with housing, sanitation, digital access, and basic amenities.
4. **PM Janjatiya Unnat Gram Abhiyan:** Focuses on education, healthcare, infrastructure, and livelihood in scheduled tribe villages.
5. **Van Dhan Vikas Yojana:** Promotes income generation through value addition of minor forest produce via tribal SHGs.
6. **TRIFED:** Markets tribal crafts, forest products, and supports entrepreneurship.
7. **Eklavya Model Residential Schools:** Provides quality residential education for tribal students.
8. **Sickle Cell Anemia Mission:** Screens, treats, and aims to eliminate the disease common among tribal communities.
9. **PM-JANMAN:** Comprehensive scheme for PVTGs, ensuring housing, water, health, electricity, and nutrition.

Conclusion

Janjatiya Gaurav Divas not only celebrates tribal heroes like **Birsa Munda** but also restores their **rightful place in India's freedom struggle and civilizational history**. Preserving tribal heritage through **museums, digital archives, and legal protection** strengthens cultural identity and inclusivity. It reinforces the vision of a **diverse, resilient, and culturally enriched India**, where tribal communities are honored as equal partners in nation-building.

GURU TEGH BAHADUR

SOURCE: INDIAN EXPRESS

Why in News?

Security has been intensified near Red Fort after a recent car blast as the site will host the **350th martyrdom anniversary commemoration** of **Guru Tegh Bahadur**.

About Guru Tegh Bahadur

Guru Tegh Bahadur (1621–1675), the **ninth Sikh Guru**, is revered as the *Hind dī Chādar* (Protector of India) for sacrificing his life to defend the right to religious freedom. His martyrdom stands as a unique example where a religious leader died to protect the faith of another community.

Life and Background

- Born as **Tyag Mal** in Amritsar; youngest son of **Guru Hargobind**.
- Earned the title **"Tegh Bahadur"** (Brave of the Sword) after displaying exceptional courage in early battles.
- Travelled extensively across Bengal, Assam, UP, and Punjab spreading Sikh teachings.
- Became Guru in **1664** after Guru Har Krishan's demise due to smallpox.

Major Contributions

1. Spiritual Contributions

- Composed **over 100 hymns** included in the **Guru Granth Sahib**.
- His verses emphasize:
  - Equality of all beings
  - Detachment from ego

- Compassion
- Inner strength and righteous living

2. Social and Religious Role

- Championed **freedom of conscience**, resisting forced conversions of **Kashmiri Pandits** during Aurangzeb's reign.
- Advocated for peaceful coexistence and justice.

3. Administrative Contributions

- Founded the city of **Anandpur Sahib**, which later became a major Sikh religious and political centre.
- Strengthened Sikh institutions that later supported Khalsa under Guru Gobind Singh.

Martyrdom and Legacy

- Arrested under Aurangzeb for refusing to convert to Islam.
- **Beheaded on 24 November 1675** at Chandni Chowk, Delhi.
- Key Sites:
  - **Gurdwara Sis Ganj Sahib** – site of martyrdom
  - **Gurdwara Rakab Ganj Sahib** – cremation site
- His supreme sacrifice laid the foundation for the emergence of the **Khalsa Panth** in 1699.

Significance in Indian History

- Symbol of **religious liberty**, **human rights**, and **courage against tyranny**.
- His martyrdom strengthened socio-religious resistance movements in the later Mughal era.

PRELIMS POINTERS IN NEWS

150 YEARS OF THE ARYA SAMAJ

SOURCE: PIB

Why in News?

The Prime Minister addressed the **International Arya Mahasammelan 2025** in New Delhi, commemorating **150 years of the Arya Samaj** and the **200th birth anniversary of Maharshi Dayanand Saraswati**.

About Arya Samaj

- The **Arya Samaj**, founded in 1875 by **Maharshi Dayanand Saraswati**, emerged as a major religious and social reform movement in colonial India.
- It sought to **restore the purity of Vedic teachings** and remove practices and beliefs that had, over time, become associated with social inequality, superstition, and ritualism.
- The movement played a crucial role in **educating society, improving the status of women, promoting social equality, and awakening national consciousness** during India's struggle against colonial domination.

Founding and Core Philosophy of Arya Samaj

- The Arya Samaj was founded in **Bombay (Mumbai)** on **10 April 1875**.
- It is based on the belief that the **Vedas are the original, universal, and infallible source of knowledge**.
- The Samaj emphasizes **monotheism**, asserting that God is formless, eternal, all-pervading, and the creator of the universe.
- It rejects idol worship, pilgrimage-based piety, animal sacrifice, priestly dominance, astrology-based fatalism, and elaborate rituals.
- It encourages individuals to lead a **disciplined, moral, and rational life** governed by **dharma** and **karma**.

Social Reform Initiatives of Arya Samaj

The Arya Samaj worked extensively to **eliminate social evils**, uplift marginalized sections, and promote **ethical living**.

Women's Rights and Equality

- Supported **widow remarriage** and fought against **child marriage**.
- Established schools for girls and women's hostels.
- Advocated equal rights to education, property, and dignity for women.

Caste and Social Justice

- Opposed caste-based discrimination and untouchability.
- Promoted social equality based on **merit and moral conduct**, not birth.
- Encouraged dining and education across caste lines.

Shuddhi Movement

- Undertook large-scale efforts to **reconvert individuals who had left Hindu society**, particularly in regions affected by missionary and conversion movements.
- Strengthened cultural identity and community confidence among Hindus.

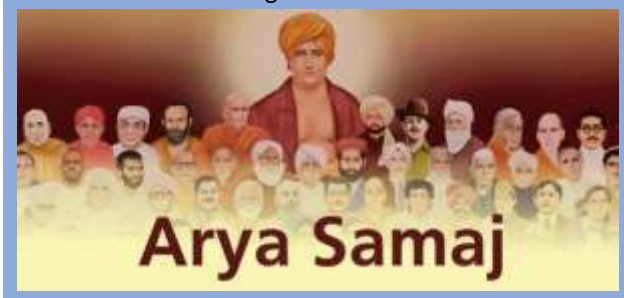
Education and Institution Building

- Established **Dayanand Anglo-Vedic (DAV) Schools and Colleges**, combining Vedic knowledge with modern scientific education.

- Also supported **Gurukul-style residential education**, promoting discipline, simplicity, and moral development.
- Institutions such as **Gurukul Kangri University** are significant contributions of the movement.

Maharshi Dayanand Saraswati: Life and Thought

- Born as **Mool Shankar Tiwari** on **12 February 1824** in Tankara (present-day Gujarat).
- He questioned idol worship and ritualistic practices early in life after witnessing death and suffering.
- He renounced family life at 19 and spent years in spiritual search.
- Became a disciple of **Swami Virajanand** in Mathura, who directed him to revive true Vedic wisdom through reform.



Key Contributions

- Authored **Satyarth Prakash (The Light of Truth)**, which critically examined religious practices and advocated ethical living.
- Strongly opposed **sati, polygamy, child marriage, caste hierarchy, intoxication, and priestly exploitation**.
- Advocated **Hindi in Devanagari script** as the national language to promote unity.

Role in National Movement

- He was the **first to clearly articulate the demand for "Swaraj" in 1876**, decades before the idea was popularized by later nationalist leaders.
- Inspired leaders such as **Lala Lajpat Rai, Bhagat Singh, Swami Shraddhanand, and Mahatma Gandhi**.
- Promoted **Swadeshi (economic self-reliance)** and indigenous education.

Conclusion

Arya Samaj and **Dayanand Saraswati** played a pivotal role in **reviving Vedic rationality**, encouraging **social equality**, and fostering **national awakening**. Their legacy continues through **educational institutions and reform movements**. Their message of **truth, discipline, and social upliftment** remains relevant to India's journey toward **Viksit Bharat 2047**.

DILMUN CIVILIZATION

SOURCE: THE HINDU

Why in News?

A new archaeological discovery on **Failaka Island in Kuwait** has revealed the remains of a **4,000-year-old temple** belonging to the **Dilmun Civilization**, offering deeper understanding of early Gulf-region cultural and trade networks.

About Dilmun Civilization

- The **Dilmun Civilization** was one of the earliest urban and trading cultures of the **Bronze Age**, flourishing roughly between **3000 BCE and 1800 BCE**.
- It occupied the region of **modern Bahrain**, parts of **Kuwait**, **Eastern Saudi Arabia**, and maintained strong trade links with **Mesopotamia** and the **Indus Valley Civilization**.
- The latest discovery reinforces its role as a **significant maritime and cultural hub** in ancient West Asia.

Recent Findings from Failaka Island

The archaeological excavation concentrated on the mound known as **Tell F6**.

Researchers uncovered:

- **Stone foundations** of a **rectangular, multi-chambered temple**, indicating planned sacred architecture.
- **Pottery fragments** displaying typical Dilmun design and craft forms.
- **Cylinder seals and seal impressions**, used for administrative control and trade authentication.

- **Beads and carved ornaments**, suggesting ritual functions and social hierarchy.
- The **temple layout**, including a central ceremonial chamber, resembles religious structures found in **Bahrain**, confirming cultural and ritual continuity across Dilmun territories.

This discovery indicates **organized religious life**, administrative activity, and maritime cultural exchange during the Bronze Age.

Features of the Dilmun Civilization

- **Geographical Position:** Located at a strategic point between **Mesopotamia and the Indus Valley**, Dilmun controlled trade routes across the Persian Gulf.
- **Economic Activities:** It thrived on **sea trade, date cultivation, fishing**, and acted as a major **transshipment center** for **copper from Oman** destined for Mesopotamia.
- **Social and Cultural Life:** The presence of **large burial mounds** indicates **social stratification** and complex mortuary practices.
- **Religious Beliefs:** Dilmun was described in **Sumerian texts** as a pure, sacred land, symbolically associated with **life, prosperity, and immortality**.

MUGHAL PAINTING (BASAWAN)

SOURCE: TIMES OF INDIA

Why in News?

A Mughal miniature, **A Family of Cheetahs** attributed to **Basawan**, fetched **£10.2 million** at Christie's — a record for Mughal art.

The sale renews interest in Mughal atelier techniques and the global market for early modern Indian art.

About Mughal painting

Mughal painting merges Persian refinement with Indian subjects and realism. Patronised by emperors from **Akbar** onwards, it produced detailed miniatures for manuscripts and albums, combining narrative, portraiture and natural history.

Origins & Institutional Growth

- **Humayun's Persian influence**: After exile, Humayun invited Persian artists who infused Persian aesthetics into Indian court art.
- **Akbar's atelier:** Institutionalised painting at the imperial workshop; artists like **Basawan** and **Daswanth** innovated portrait realism and narrative composition.
- **Technique:** Fine brushwork, natural pigments, miniature format, and often gilding — used for manuscripts and imperial albums (muraqqa).

Mature Phase & Themes

- Under **Jahangir**, painting shifted to **natural history, portraiture and scientific observation** (Ustad Mansur's bird studies).
- **Shah Jahan** added lavish ornamentation; courtly life and architectural backdrops became prominent.
- Post-Aurangzeb, many artists migrated to **Rajput and Deccan courts**, leading to hybrid regional schools.

Artistic Innovations

- Use of **perspective and shading**, study of anatomy and animal studies, and blending of **European chiaroscuro** with Persian linearity.
- Miniatures served as visual records of flora, fauna, court persons and diplomatic exchanges.

Cultural & Historical Significance

- The Mughal atelier system created a visual archive of imperial power, aesthetics and cross-cultural synthesis.
- Its influence spread to **Rajput**, **Deccan** and later **Company painting** styles, shaping modern Indian visual traditions.

GEOGRAPHY

PRELIMS POINTERS IN NEWS

LOKTAK LAKE

SOURCE: THE HINDU

Why in News?

A recent **Nagaland University study** has raised concerns about deteriorating water quality in the rivers feeding **Loktak Lake**. The findings warn that changes in land use and unsustainable activities are posing a threat to the lake's ecosystem and local livelihoods.

About Loktak Lake

- **Loktak Lake**, often called the **"lifeline of Manipur"**, is the largest freshwater lake in Northeast India. Known for its unique **phumdis**—floating vegetation masses—it supports biodiversity, fisheries, hydropower, and local communities. However, human pressures have pushed the lake to a fragile ecological state.

Location and Key Features

- Situated in **Manipur's Bishnupur district**.
- Recognised as the **largest freshwater lake** in the Northeastern region.
- Famous for **phumdis**, including the large phumdi on which the **Keibul Lamjao National Park**—home to the endangered **Sangai deer**—stands.
- Receives inflow from several rivers such as **Imphal, Nambul, Khuga, Iril, Sekmai**, and others.
- Declared a **Ramsar site (1990)** and placed on the **Montreux Record (1993)** due to ecological degradation.

Ecological Importance

- Hosts **132 species of plants** and **428 species of animals**.
- Supports fisheries, providing livelihood to thousands.
- Acts as a natural flood controller and carbon sink.
- Facilitates inland transport and eco-tourism.

Issues Highlighted by Recent Study

- **Changing land use patterns** due to agriculture expansion, settlement growth, and shifting cultivation.
- Rivers bringing in **high nutrient loads**, causing eutrophication.
- **Biodiversity loss**, affecting fish populations and migratory species.
- Pressure from **hydropower development**, altering natural water flow.
- Waste disposal, siltation, and over-harvesting of resources stressing the lake's ecological balance.

Broader Environmental Concerns

- Shrinking phumdis threaten the habitat of **Sangai**, Manipur's state animal.
- Climate variability is influencing water levels and aquatic species.
- Traditional communities depending on fishing face economic insecurity.

STRAIT OF MALACCA

SOURCE: THE HINDU

Why in News?

A fresh **cyclonic circulation** recently developed over the central Strait of Malacca at an altitude of about **5.8 km**, triggering unusual wind patterns and heavy rainfall warnings for adjoining Southeast Asian coasts.

Geographical Features

- Connects the **Andaman Sea** and the **South China Sea**.
- Lies between **Sumatra (Indonesia)** to the west and **Peninsular Malaysia & southern Thailand** to the east.
- Length: **~890 km**; Narrowest point: **2.8 km at Phillips Channel**.
- Average depth: **~25 m**, making it vulnerable to congestion and grounding.
- Hot-humid climate dominated by **NE monsoon (winter)** and **SW monsoon (summer)**.

Historical & Political Context

- Named after the **Malacca Sultanate (1400–1511)**.
- Today jointly monitored by **Singapore, Malaysia, and Indonesia**, with coordinated patrols against piracy and trafficking.
- Passage hosts nearly **40% of global maritime trade** and ~**80% of China's oil imports**.

Strategic Significance for India

- Nearly **60% of India's seaborne trade** and **almost all LNG imports** traverse this strait.
- Forms part of India's **Act East Policy** and **Indo-Pacific strategy**.
- Vulnerability: Any blockade could force ships to reroute via **Lombok or Sunda Straits**, significantly raising costs.
- Essential for India's naval outreach to **ASEAN** and for countering China's presence in the eastern Indian Ocean.

Environmental Concerns

- Narrowness leads to **marine congestion**, oil spills, and ecological disturbances.
- Cyclones, though rare, can disrupt shipping and port operations.

ROWMARI–DONDUWA WETLAND COMPLEX (ASSAM)

SOURCE: THE HINDU

Why in News?

There is a push to designate **Rowmari–Donduwa Wetland Complex** (Laokhowa WLS, Kaziranga buffer) as a **Ramsar site**, owing to its exceptional bird diversity and ecological role. Recent bird counts recorded over **47,000** waterbirds, strengthening the conservation case.

About Rowmari–Donduwa complex

- The **Rowmari–Donduwa complex** is a dynamic floodplain–marsh system in Assam that provides critical habitat for migratory and resident waterbirds and acts as a biodiversity corridor in the Brahmaputra floodplain.

Ecological Features

- **Area & habitat:** Small (≈2.5–3 km²) but ecologically rich mosaic of marshes, shallow lakes and riverine islands (chars).
- **Avian diversity:** Hosts large congregations of waterbirds — **Knob-billed Duck, Black-necked Stork, Ferruginous Pochard**, and many migratory species.
- **Faunal links:** Forms part of a larger landscape including **Kaziranga, Laokhowa and Burhachapori**, providing corridors for rhinos, tigers, elephants and Gangetic dolphins.

Ramsar Criteria

- Meets Ramsar criteria for **bird congregations** and **ecological uniqueness** (supports significant waterbird populations and acts as a refuge during adverse conditions).
- Ramsar designation would bring international recognition, resources and a framework for wise use.

Conservation & Management Challenges

- **Hydrological variability** due to Brahmaputra dynamics, erosion and sedimentation.
- **Human pressures:** Fishing, grazing, local agriculture, and seasonal settlements on chars.
- **Invasive species** and climate impacts may alter habitat quality.
- **Coordination:** Need for integrated basin-level planning among Assam Forest Dept, local communities and conservation agencies.

Benefits of Ramsar Status

- Strengthened legal and institutional support for wetland protection.

- Access to technical assistance, funding and international best practices.
- Enhanced eco-tourism and livelihood options for local communities when managed sustainably.

SILIGURI CORRIDOR

SOURCE: PIB

Why in News?

Amid regional changes in Bangladesh and rising Chinese activity near the area, the Indian Army has strengthened the eastern frontier by establishing **three new garrisons near the Siliguri Corridor**.

About Siliguri Corridor

- The **Siliguri Corridor**, often termed India's **"Chicken's Neck,"** is a narrow land bridge that connects mainland India to the **Northeastern region**.
- Due to its strategic vulnerability and proximity to multiple international borders, it is one of India's most sensitive security zones.

Geographical Profile

- **Length:** ~170 km
- **Width:** Narrowest point 20–22 km
- **Area:** ~12,200 sq. km
- **Neighbors:** Nepal (west), Bangladesh (south), Bhutan (north), China's Chumbi Valley (~130 km away)

Strategic Importance

1. Lifeline to the Northeast

- Only land route connecting 8 northeastern states to mainland India.
- Handles all military, civilian, and logistical movement.

2. Vulnerable to Blockade

- Natural disasters, internal unrest, or external aggression could cut off the region.
- China's proximity increases military sensitivity.

3. Cross-border Threats

- Terror networks, insurgent groups, illegal migration, and smuggling add layers of complexity.

Security Concerns

- **PLA presence** in the Chumbi Valley
- Bangladesh political transitions influencing border cooperation
- Infrastructure gaps
- High population density in nearby areas increasing vulnerability

Government Measures

- Strengthening of **infrastructure**, including highways and bridges
- Upgradation of military logistics
- Establishment of new **Army garrisons** for rapid mobilisation
- Enhanced coordination with **Nepal, Bhutan, and Bangladesh**
- Expansion of **rail connectivity** to the Northeast

THAMES RIVER

SOURCE: THE HINDU

Why in News?

A recent viral video showing an Indian tourist washing his feet in the **Thames River** sparked public debate in the UK. The incident highlighted concerns regarding river etiquette and pollution sensitivities.

About River Thames

The **River Thames** is one of the most iconic waterways in the world, historically central to the development of **London** and

southern England. It has served as a vital route for trade, settlement, navigation, and culture throughout British history.

Location & Physical Features

- Length: **346 km**, longest river entirely in England.
- Second longest in the UK after the **River Severn**.
- Origin: **Thames Head** in the Cotswold Hills (Gloucestershire).
- Terminates in the **North Sea** through the Thames Estuary.
- Basin Area: **~16,130 sq km**.
- Tidal Influence: Tides affect the river several miles upstream from central London.

Major Tributaries

Key tributaries include:

- **Lea, Kennet, Churn, Evenlode, Windrush, Ock, Loddon, Coln**.
- The **River Kennet** is the largest tributary.

Course & Associated Cities

- Flows through major towns and cities:
    - Oxford (where it is called the **Isis**)
    - Reading
    - Windsor
    - London
- Historically facilitated **maritime trade and transport**.

Economic & Social Importance

- The Thames supplies **two-thirds of London's drinking water**.
- A major hub for river transport, tourism, and recreation.
- Hosts several famous bridges, including:
    - **Millennium Bridge**
    - **Golden Jubilee Bridges**
    - **London Bridge**

Environmental Significance

- Once heavily polluted, it is now considered **one of the cleanest metropolitan rivers** due to decades of restoration efforts.
- Supports diverse aquatic species including seals, eels, and various fish.

ENVIRONMENT

BIODIVERSITY AND CONSERVATION

INTERNATIONAL DAY FOR BIOSPHERE RESERVES

SOURCE: THE HINDU

Why in News?

India marked the **International Day for Biosphere Reserves**, reaffirming its dedication to conserving biodiversity and promoting sustainable development. The day highlights the critical role of **biosphere reserves** as spaces where ecological protection and human wellbeing coexist through research, community action, and balanced land-use.

International Day for Biosphere Reserves

- Observed every year on **3rd November**.
- Established by **UNESCO** in **2022** to acknowledge the achievements and challenges of the **World Network of Biosphere Reserves (WNBR)**.
- The day promotes awareness on how BRs act as **living laboratories** for innovative conservation and sustainable livelihood practices.
- Encourages global knowledge-sharing and highlights the importance of balancing nature with development.

What are Biosphere Reserves?

Biosphere Reserves are **government-nominated landscapes** aimed at conserving biodiversity while supporting sustainable human activities.

They function as **"learning sites for harmonious coexistence"**, helping understand human–nature interactions.

Core Features

- Include **terrestrial, marine, coastal and island ecosystems**.
- Promote approaches that reconcile **ecological protection, research, and socio-economic development**.
- Remain under national jurisdiction but linked to global knowledge networks through UNESCO.

Three-Zone Structure

1. **Core Zone:** Strictly protected for biodiversity and scientific study.
2. **Buffer Zone:** Surrounds the core; allows limited activities like eco-tourism and research.
3. **Transition Zone:** Largest area; supports sustainable agriculture, settlements, and local livelihoods.

Global Context

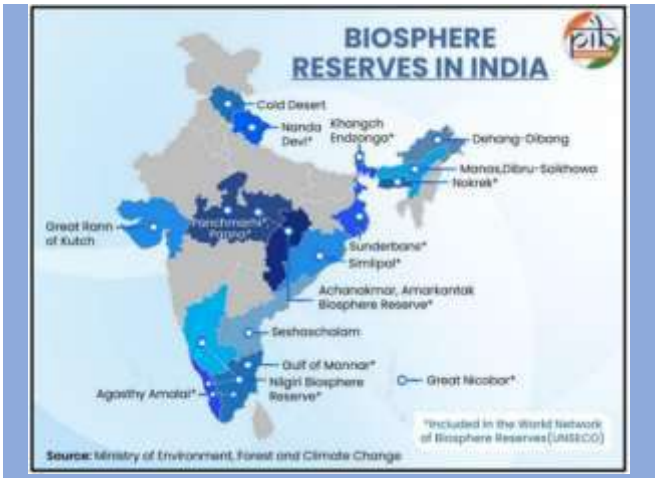
- Over **260 million people** live in BRs worldwide.
- These reserves cover nearly **7 million sq km**, equivalent to the size of **Australia**.

UNESCO's Man and Biosphere (MAB) Programme

- Launched in **1971** as an intergovernmental scientific initiative.
- Aims to strengthen the relationship between humans and ecosystems using **science, local knowledge, and participatory governance**.
- The **WNBR** forms a global platform where BRs exchange innovations and conservation strategies.

Biosphere Reserves in India

- India has **18 Biosphere Reserves**, covering around **91,425 sq km**.
- **13 Indian BRs** are part of the **WNBR**, including Nilgiri, Gulf of Mannar, Sundarbans, Pachmarhi, Nanda Devi, Khangchendzonga, and Great Nicobar.
- These reserves span mountains, islands, deserts, coasts, and forests, reflecting India's ecological and cultural variety.



How India Promotes Biosphere Reserves

Policy Framework

- Managed under the **Conservation of Natural Resources and Ecosystems (CNRE)** scheme.
- States receive funds under a **60:40 model**, and **90:10** for Himalayan and Northeast states.
- Focus areas:
    - Restoration of degraded habitats
    - Community-based conservation
    - Eco-development activities in buffer and transition zones
    - Reducing pressure on core forest areas

Integration with National Missions

- BRs support and complement:
    - **Project Tiger**
    - **Project Elephant**
    - **Green India Mission (GIM)**
    - **Integrated Development of Wildlife Habitats (IDWH)**
    - **National Biodiversity Action Plan (NBAP)**
- These programmes help link conservation with livelihoods, climate action, and sustainable land management.

Challenges in Managing Biosphere Reserves

1. Human Pressure on Ecosystems

- Heavy dependency on forests for fuel, fodder, and grazing degrades habitats.
- Example: **Cold Desert BR** faces overgrazing pressures harming fragile alpine meadows.

2. Habitat Fragmentation & Development

- Expanding agriculture, linear infrastructure, and tourism disturb wildlife corridors.
- For instance, **Nilgiri BR** suffers from fragmentation of elephant movement routes.

3. Poaching & Illegal Resource Extraction

- Poaching of wildlife and unregulated harvesting of timber and minor forest products persists.
- **Simlipal BR** has reported poaching incidents affecting tigers and elephants.

4. Climate Change Impacts

- Sea-level rise, storm surges, and salinity intrusion affect coastal BRs.
- **Sundarbans BR** faces erosion and shrinking mangroves.

5. Weak Research–Policy Integration

- Limited long-term ecological monitoring.
- Data gaps hinder precise management and climate adaptation planning.

6. Tourism Pressure

- Unregulated tourism leads to waste and habitat degradation.
- **Nanda Devi BR** experiences trail erosion and waste accumulation.

7. Boundary Conflicts and Zonation Issues

- Poorly demarcated zones complicate enforcement.
- **Gulf of Mannar BR** experiences overlap between fishing, industry, and conservation areas.

8. Community–Conservation Tensions

- Restrictions in core zones often conflict with livelihood needs.
- In **Sundarbans**, fishing and honey collection sometimes clash with habitat protection rules.

Measures for Effective Management of Biosphere Reserves

Strengthen Community-Led Conservation

- Expand **Joint Forest Management (JFM)**.
- Encourage Gram Sabha leadership under the **Forest Rights Act (2006)**.
- Promote sustainable Non-Timber Forest Produce (NTFP) harvesting via **Van Dhan Vikas Kendras**.

Enhance Sustainable Livelihoods

- Promote eco-tourism, agroforestry, medicinal plant cultivation, green jobs and skill training.
- Develop value chains for forest produce to reduce forest dependence.

Increase Funding & Institutional Capacity

- Expand CNRE funding, ensure multi-year financial support.
- Strengthen BR authorities with ecological and social science experts.

Improve Scientific Monitoring

- Partner with **ICAR, ZSI, BSI, WII**, and universities for long-term studies.
- Use **remote sensing, GIS** and drone mapping through **NRSC** for habitat evaluation.

Better Zonation & Enforcement

- Digital mapping of core–buffer–transition zones.

- Tech-enabled patrolling (M-STRiPES-type systems) to curb poaching and illegal extraction.

Climate-Resilience Measures

- Integrate BR plans into **State Action Plans on Climate Change (SAPCC)**.
- Restore mangroves, grasslands, wetlands and degraded slopes to strengthen resilience.

Conclusion

India's observance of this day underscores its commitment to conserving biodiversity while supporting human wellbeing. With strong policy support and UNESCO collaboration, biosphere reserves can remain models for sustainable development. Strengthening community participation and scientific management will be key to ensuring ecological resilience in the years ahead.

SC'S VIEW ON BIODIVERSITY CONSERVATION

SOURCE: THE HINDU

Why in News?

The Supreme Court's recent observations have deepened the debate on **biodiversity conservation in India**, emphasizing that traditional human-centered (anthropocentric) principles like **intergenerational equity** may not be adequate to protect critically endangered species such as the **Great Indian Bustard** and **Lesser Florican**.

Principle of Intergenerational Equity

- It means every generation has the **right to use natural resources** and the **duty to preserve them** for future generations.
- Views the Earth as a **shared inheritance**, not to be depleted by one generation alone.
- Recognized internationally in **Stockholm Declaration (1972), Rio Declaration (1992), UNFCCC, CBD, and World Heritage Convention**.
- Recent **Kunming-Montreal Global Biodiversity Framework (2022)** also encourages involvement of youth and future-generations-focused policies.

Supreme Court's Observations on the Principle

1. Anthropocentric Limitations

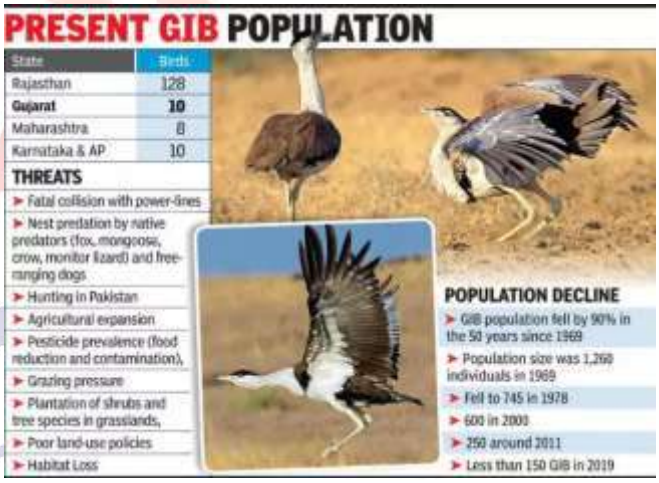
- The Court noted that intergenerational equity focuses on **human welfare**, treating nature mainly as a resource for humans.
- Does not recognize nature's **intrinsic rights** or **ecological importance** independent of human needs.

2. Weak in Protecting Critically Endangered Species

- When a species like the **GIB or Lesser Florican** is near extinction, thinking only of future human generations is insufficient.
- Such species require immediate **eco-centric protection**, not just preservation for human use.

About Great Indian Bustard (GIB)

- **Critically Endangered** large grassland bird; one of the heaviest flying birds.
- Lives in **arid and semi-arid grasslands** of **Rajasthan, Gujarat, Maharashtra, Karnataka, and MP**.
- **Population:** Estimated fewer than **150 in the wild** (as of 2024).
- **Indicator Species**: Its decline signals deterioration of grassland ecosystems.
- **Threats:** Habitat loss, power line collisions due to poor frontal vision, hunting, dog predation.
- **Protection Status:**
  - **IUCN**: Critically Endangered
  - **Wildlife (Protection) Act 1972**: Schedule I
  - **CITES Appendix I; CMS Appendix I**



About Lesser Florican

- **Smallest bustard species**, known for unique mating dance during monsoon.
- Found mainly in **Gujarat, Rajasthan, Madhya Pradesh, Maharashtra**; occasional sightings in Nepal.
- Prefers **lowland grasslands and seasonal agricultural fields**.
- **Population:** Estimated around **250–300 individuals** in India.
- **Protection Status:**
  - **IUCN**: Critically Endangered
  - **Wildlife Protection Act**: Schedule I
  - **CITES Appendix II**
- **Threats:** Grassland degradation, agricultural expansion, use of pesticides, hunting.

Supreme Court's Key Recommendations

1. Adopt Eco-Centric Legal Approach

- Based on **T.N. Godavarman (2012)**, nature and animals have intrinsic rights, not dependent on human benefit.
- Encourages a **constitutional duty** under **Article 48A and Article 51A(g)** to protect wildlife.

2. Constitutional Rights for Animals

- In **Animal Welfare Board vs Nagaraja (2014)**, SC declared that **Article 21 (Right to Life)** includes **fair treatment and dignity for animals**, not just humans.

3. Science-Based, Species-Specific Protection

- Need for targeted rehabilitation, breeding centers, protection from power lines, and habitat restoration.
- Urges **habitat corridors, safe migration zones, and wildlife-friendly infrastructure**.

4. Redefine Environmental Governance

- Environmental laws must be interpreted to ensure **long-term ecological balance**, not just short-term human development.

Conclusion

The Supreme Court emphasized that conserving endangered species requires shifting from human-centered to **nature-centered governance**. Protection must focus on **intrinsic ecological value**, not just human benefits. Safeguarding biodiversity is both a **constitutional duty and ethical responsibility** for sustaining life on Earth.

PROJECT CHEETAH AND CONSERVATION DIPLOMACY

SOURCE: THE HINDU

Why in News?

During the first-ever Indian Presidential visit to **Botswana**, India announced the translocation of **eight cheetahs** as part of **Project Cheetah**, marking a major step in global wildlife cooperation. This symbolic transfer strengthens India-Botswana conservation ties and advances India's cheetah reintroduction efforts.

About Project Cheetah

- **Launch**: Started in 2022 under the umbrella of **Project Tiger**, making India the first country to reintroduce cheetahs from Africa.
- **Aim**: To restore cheetah populations, **revive grassland ecosystems**, promote **eco-tourism**, and support **local livelihoods**.
- **Governance**: Implemented by **National Tiger Conservation Authority (NTCA)**, **Wildlife Institute of India (WII)**, and **Madhya Pradesh Forest Department**, monitored by a dedicated **Steering Committee** (2023).
- **Current Status**: India has **27 cheetahs**, including **16 born in Indian habitats**.
- **Habitat Sites**:
  - **Kuno National Park (MP)** – primary site
  - **Gandhi Sagar Wildlife Sanctuary and Nauradehi WLS** – proposed expansion sites
- **Community Role**: Over **350 'Cheetah Mitras'** engaged for awareness, community coexistence, and conflict mitigation.

Challenges in Project Cheetah and Wildlife Translocation

1. Habitat Limitations

- India's **grassland ecosystems are fragmented**, and most are classified as wastelands, leading to **inadequate space** for viable cheetah populations.
- Only **Kuno National Park** was initially prepared, which may not support long-term breeding and expansion.

2. Human-Wildlife Conflict

- Local communities living around protected areas often face issues related to **livestock predation**, fear, and lack of compensation.

- Ensuring continuous cooperation of villagers through **Cheetah Mitras** requires sustained incentives and awareness.

3. High Mortality and Adaptation Issues

- African cheetahs face difficulty **adapting to Indian climatic conditions**, diseases, and different prey base.
- Several deaths due to stress, infection, territorial fights, and monsoon-related challenges have been reported.

4. Prey Availability and Ecological Imbalance

- Successful reintroduction requires adequate populations of **chital, blackbuck, and antelope**.
- Current prey density in some habitats is **below the threshold** needed for sustaining large carnivores.

5. Political and Administrative Coordination

- Project involves multiple agencies—NTCA, WII, state government—leading to **coordination challenges** in decision-making and monitoring.

6. Long-Term Funding and Management

- High cost of monitoring, GPS tracking, healthcare, and landscape restoration needs **consistent funding** and local participation.

7. Disease Concerns and Genetic Diversity

- Risk of **cross-border disease transmission**, and limited genetic variability among introduced cheetahs may affect population resilience.

8. Climate Challenges

- African cheetahs face difficulties adapting to **extreme Indian summers, heavy monsoons, and humidity**, which impact survival and breeding success.

Significance of Botswana's Role

- Botswana handed over eight cheetahs, symbolizing **global environmental cooperation**.
- Five cheetahs quarantined at **Mokolodi Nature Reserve**, demonstrating **scientific and responsible translocation**.

Key Facts About Botswana

Geography and Ecosystem

- **Location**: Landlocked country in **Southern Africa**, bordered by **South Africa, Namibia, and Zimbabwe**.
- **Kalahari Desert**: Covers around **70% of the country**, supporting grasslands and wildlife.
- **Landscape**: Dominated by **savanna grasslands**, dotted with ancient **baobab trees** (some over 2,000 years old).

Major Natural Attractions

- **Okavango Delta**: One of the **largest inland deltas**, a **UNESCO World Heritage Site**, rich in wildlife.
- **Chobe National Park**: Known for housing **over 50,000 elephants**, among the largest elephant populations globally.
- **Conservation Efforts**: Around **17% of land** protected as national parks and wildlife reserves.

Economy

- Major global **diamond producer**, contributing **around 20% of the world's diamond supply**.
- Stable economy, high wildlife tourism, and strong environmental policies.

Conclusion

Project Cheetah marks a historic ecological restoration effort and strengthens India's global wildlife diplomacy. The collaboration with Botswana highlights the importance of **cross-border conservation partnerships**. Protecting cheetahs is not just an environmental goal but a step toward restoring **ecological balance and sustainable coexistence**.

CLIMATE CHANGE AND POLLUTION

CLOUD SEEDING AND AIR POLLUTION CONTROL

SOURCE: INDIAN EXPRESS

Why in News?

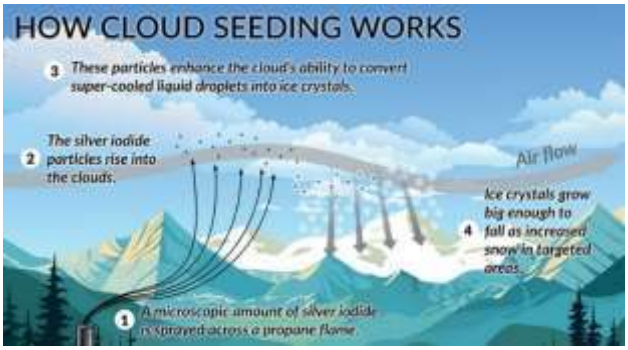
The **Delhi government**, in partnership with **IIT-Kanpur**, planned cloud seeding experiments to reduce severe post-monsoon smog.

However, scientists from the **Ministry of Earth Sciences** cautioned that **lack of suitable rain-bearing clouds** during this season may make the operation ineffective.

What is Cloud Seeding?

- It is a **weather modification technique** that enhances precipitation from **existing clouds**.
- **Chemical agents** used:
  - **Silver Iodide**
  - **Potassium Iodide**
  - **Sodium Chloride**
  - **Dry Ice (Solid CO_2)**
- These substances act as **Cloud Condensation Nuclei (CCN)** or **Ice Nuclei (IN)**.

- Once dispersed using **aircraft, rockets, or ground generators**, they stimulate the **formation and growth of ice crystals**, leading to precipitation.
- Cloud seeding **cannot create new clouds** — it only works when **moisture-laden clouds** are already present.



Cloud Seeding in India and Globally

India

- Research under **Cloud Aerosol Interaction and Precipitation Enhancement Experiment (CAIPEEX)** by the **Ministry of Earth Sciences** (2009–2019) demonstrated **up to 30–46% rainfall enhancement** in suitable conditions.
- States that have experimented:
  - **Maharashtra, Karnataka, Andhra Pradesh, Tamil Nadu** (primarily drought relief).

Global Examples

- **China** widely uses cloud seeding for **weather control** and major events (e.g., **2008 Beijing Olympics**).
- **UAE and Saudi Arabia** use cloud seeding routinely to **address freshwater scarcity**.
- **USA** often uses seeding for **snowpack enhancement** in agricultural regions.

Applications of Cloud Seeding

- **Increasing rainfall in drought-prone areas:** Cloud seeding enhances precipitation from existing clouds to improve water availability in dry regions.
- **Reducing pollution through rainfall washout:** Induced rain helps wash pollutants and dust particles out of the atmosphere for temporary air quality improvement.
- **Clearing fog near airports or highways:** Cloud seeding can convert fog droplets into raindrops, improving visibility for safer transportation.
- **Limiting hailstorms in agricultural zones:** It prevents the formation of large hailstones by promoting early ice crystal formation, reducing crop damage.

Limitations for Air Pollution Control in Delhi

1. Lack of Suitable Clouds

- Post-monsoon months (October–December) have **dry and stable atmospheric conditions**.
- Clouds present are often **thin, moisture-poor**, and **not suitable for seeding**.

2. Dependence on Western Disturbances

- Rainfall in winter mostly comes from **Western Disturbances**, which are **irregular and unpredictable**, making planning difficult.

3. Short-Lived Impact

- Rainfall may **temporarily** reduce pollutants, but levels rise again if **emissions continue**.
- Hence, cloud seeding is **not a long-term solution**.

4. Environmental and Accountability Concerns

- Possible **silver iodide accumulation** in soil and water.
- No **clear liability structure** if seeding coincides with extreme rainfall events.

5. Misallocation of Public Resources

- High costs with **uncertain effectiveness** divert funds from **proven solutions** like clean fuels, EV adoption, waste control, and sustainable agriculture.

Persistent Causes of Air Pollution in Delhi

- **Vehicular Emissions** from 1.2+ crore registered vehicles.
- **Crop Residue Burning** in Punjab and Haryana.
- **Construction and Industrial Dust** emissions.
- **Winter Temperature Inversion** trapping pollutants near ground level.
- Delhi's position in the **Indo-Gangetic Basin**, limiting pollutant dispersion.

Sustainable Long-Term Solutions

- Promote **EV adoption** and expand charging networks.
- Enforce **National Clean Air Programme (NCAP)** and **Graded Response Action Plan (GRAP)** strictly.
- Provide farmers **subsidized stubble management machines**.
- Scale **solid waste segregation**, composting, and bio-CNG plants.
- Increase **urban green cover**, green roofs, and dust barriers.
- Encourage **citizen participation** in carpooling, energy conservation, and waste reduction.

Conclusion

Cloud seeding may offer **temporary relief** under favorable weather conditions, but it is **not a replacement** for

addressing the **structural drivers** of Delhi's pollution. Sustainable progress requires **reducing emissions at their source**, strengthening governance, supporting farmers, and promoting cleaner technologies. Long-term solutions must prioritize **air-quality improvement, public health, and ecological balance**.

INDIA'S CLIMATE VULNERABILITY: CRI 2026

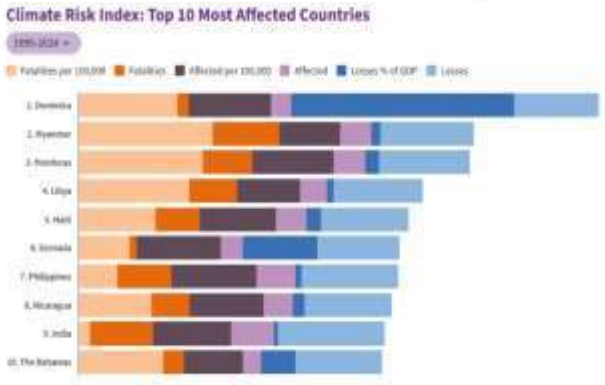
SOURCE: INDIAN EXPRESS

Why in News?

The **Germanwatch Climate Risk Index (CRI) 2026**, presented at **COP30 in Brazil**, ranked **India as the 9th most affected country globally** by extreme weather events (1995–2024). This highlights India's growing exposure to climate-induced disasters like floods, heatwaves, storms, and glacial lake outbursts.

About Germanwatch Climate Risk Index

- Annual index by **Germanwatch**, tracking human and economic impacts of **climate-related disasters** across the world.
- Based on **fatalities, economic losses, population affected**, and other impact indicators.
- Sources include **EM-DAT disaster database**, World Bank, and IMF.
- Focuses on **rapid-onset events** like floods, storms, heatwaves, and wildfires.



Key Global Findings

- From **1995–2024**, over **9,700 extreme weather events** caused **832,000 deaths** and **USD 4.5 trillion in damages** worldwide.
- **Global South** nations such as Dominica, Myanmar, Honduras, and Libya were worst affected, showing climate injustice.
- Cyclone Nargis (2008) in Myanmar caused **1,40,000 deaths**, highlighting the intensity of EWEs.

India's Position and Vulnerability

- India ranked **9th globally** in CRI 2026 (long-term) and **15th in 2024**, showing persistent climate stress.
- Over three decades, India experienced **430 extreme weather events**, affecting **1 billion people**, causing **80,000+ deaths** and **USD 170 billion in losses**.
- India ranked **3rd globally in 2024** in terms of population affected, after Bangladesh and the Philippines.
- In 2024, **floods affected 50 million people globally**, heatwaves affected **33 million**, and **8 million in India** were impacted during monsoon.

Impacts of Climate Change on India

1. Water Crisis

- **Melting Glaciers** are reducing flows in Himalayan rivers (Ganga, Brahmaputra), threatening long-term water security.
- **Groundwater depletion** rising from 10–20 km³ to over **250 km³ annually**, making many rivers seasonal.
- **Water quality ranking**: India is **120th out of 122 countries**, due to arsenic and fluoride contamination.

2. Mountain Ecosystem Disruption

- Frequent **Glacial Lake Outburst Floods (GLOFs)**, landslides, cloudbursts, and forest fires.
- **Black carbon deposits** speeding Himalayan ice melt.
- Biodiversity in the **Himalayas – one of India's four biodiversity hotspots** – under stress.

3. Threat to Coastal Regions

- **Sea level rising at 3.6 mm/year globally; Mumbai saw 4.4 cm rise (1987–2021)**.
- Projected **0.4–0.8 m rise in sea level by 2100**, affecting cities like **Mumbai, Chennai, Kolkata**.
- **Salinisation** damaging farmlands, groundwater, and affecting **over 250 million coastal residents**.
- Loss of **mangroves and coral reefs**, which act as natural storm barriers.

4. Socio-Economic Impacts

- World Bank predicts **6–10% GDP loss by 2100** due to climate change.
- Climate change may push **50 million Indians into poverty**.
- Agriculture affected by **erratic monsoon, floods, droughts, and heatwaves**, endangering **food security**.
- **Heat stress, vector diseases**, and urban health crises rising sharply.

Steps India Must Take

1. Climate Mitigation and Adaptation

- Accelerate **Nationally Determined Contributions (NDCs)** and **National Action Plan on Climate Change**.
- Mobilize **USD 300 billion for adaptation and resilience by 2035**.

2. Water Security Measures

- Reform **National Water Policy (2012)** for aquifer management.
- Promote **rainwater harvesting, zero-tillage, drip irrigation, and groundwater recharge**.
- Revive **traditional tanks, ponds, stepwells, and wetland systems**.

3. Build Coastal Resilience

- Restore **mangroves, sand dunes, and coral reefs** as natural protective barriers.
- Develop **multi-hazard early warning systems** and **climate-adaptive relocation plans**.

4. Decarbonize the Economy

- Achieve **500 GW non-fossil fuel energy by 2030**, promote **green hydrogen, EVs, battery storage**.
- Implement **carbon pricing, green bonds, and climate-smart agriculture**.

5. Governance & Community Participation

- Integrate climate planning into **Smart Cities Mission, Jal Shakti Abhiyan, PMFBY, and coastal zone management**.
- Promote **community-based adaptation**, involving **Gram Sabhas and local institutions**.
- Invest in **climate research, carbon capture, resilient crops, and AI-based weather modeling**.

Conclusion

India's ranking in CRI 2026 highlights its growing sensitivity to climate shocks and long-term environmental stress. Strengthening climate adaptation, water security, resilience planning, and decarbonization is essential to protect lives, ecosystems, and the economy. A **climate-resilient, sustainable development pathway** is the key to securing India's future.

INDIA'S EMISSION TRENDS AND GLOBAL IMPACT

SOURCE: INDIAN EXPRESS

Why in News?

The **Global Carbon Project (GCP) 2025 study** reveals that India's carbon emissions from fossil fuels are projected to grow by only **1.4% in 2025**, a sharp slowdown from **4% in 2024**. This indicates India's improving energy efficiency, rising renewable energy adoption, and declining reliance on coal.

Key Findings of the Global Carbon Project (GCP) 2025 Study

India's Emission Profile

- India's emissions expected to increase from **3.19 billion tonnes (2024) to 3.22 billion tonnes (2025)**.
- **Per capita emissions: 2.2 tonnes**, one of the *lowest* among major economies.
- India ranks **3rd globally in total CO_2 emissions**, behind China (12 Bt) and the US (4.9 Bt).
- Emission growth fell from **6.4% (2005–14)** to **3.6% (2015–24)** due to energy transition and structural reforms.
- **Coal** remains the dominant source of emissions.

Global Emission Scenario

- Global CO_2 emissions from fossil fuels expected to reach a record **38.1 billion tonnes in 2025 (up 1.1%)**.
- Coal use up **0.8%**, oil up **1%**, natural gas up **1.3%** globally.
- Total global emissions (fossil fuel + land use) remain around **42 billion tonnes**.
- The **carbon budget for limiting warming to 1.5°C is nearly exhausted**, with only **170 billion tonnes remaining** — equivalent to **four years at current global emissions**.

Factors Behind India's Slow Emission Growth

1. Renewable Energy Expansion

- India ranks **4th in renewable capacity**, **4th in wind**, and **3rd in solar power**.
- Renewables now account for **50.07% of installed capacity (484.82 GW)** — achieving COP26 target *five years early*.
- Non-fossil capacity stands at **242.8 GW**, advancing toward the **500 GW goal (2030)**.

2. Declining Coal Dependence

- Coal consumption rose modestly, and **power sector emissions fell by 1% in early 2025**.
- Strong solar and wind generation prevented coal-fired surges during summer peaks.

3. Weather Advantages

- **Early and strong monsoon** reduced electricity demand for cooling and irrigation, lowering fossil-fuel use.

4. Structural Economic Shifts

- Growth in **services, digital economy, energy efficiency**, and cleaner technologies reduced carbon intensity.

India's Long-Term Low Emission Development Strategy (LT-LEDS)

India's LT-LEDS follows the **C-L-I-M-A-T-E** transition model:

Letter	Strategy
C	Clean Electricity – Renewable and flexible energy grids
L	Low-Carbon Transport – EVs, hydrogen mobility, public transit
I	Inclusive Urban Adaptation – Smart cities, energy-efficient buildings
M	Manufacturing Decarbonisation – Green hydrogen, circular economy
A	Atmospheric CO_2 Removal – Carbon capture, bio-energy, nature-based solutions
T	Tree & Ecosystem Enhancement – Forest expansion, mangrove restoration
E	Economic Path to Net-Zero – Green finance, carbon markets, ESG regulations

India's GHG Emissions Status (BUR-4, 2024)

- Total emissions (excluding land use): **2,959 Mt CO_2e**
- Net emissions (including land-related CO_2 absorption): **2,437 Mt CO_2e**
- **Energy sector** contributes **75.66%** of total emissions.
- Land and forests sequester **522 Mt CO_2**, offsetting **22% of total emissions**.

Conclusion

India's slower emission growth reflects progress in renewable energy, efficiency, and structural economic changes, setting a positive climate example. However, with the **global carbon budget quickly depleting**, stronger global cooperation and faster transitions are essential. India must continue its **clean energy momentum, deepen LT-LEDS implementation, and push for climate equity at COP30**.

30TH UN CLIMATE CONFERENCE (COP30)

SOURCE: THE HINDU

Why in News?

The **30th UN Climate Conference (COP30)** concluded in Belém, Brazil, where nations adopted the **Belém Package** as the main negotiated outcome.

Key Outcomes of COP30 – The Belém Package

1. Belém Package (29 Decisions)

- A comprehensive bundle aimed at **accelerating implementation** rather than announcing new targets.
- Focus areas: **finance, adaptation, capacity-building, gender inclusion, just transition**, and enhanced cooperation.

2. Global Mutirão Agreement

- Prioritises **delivery over ambition**, avoiding new binding commitments.
- Brazil introduced the **Global Mutirão Platform**, a digital tool to track progress in **energy, finance, and trade**.

3. Just Transition Mechanism (JTM)

- Also called the **Belém Action Mechanism (BAM)**.
- Supports developing countries in shifting away from fossil fuels, but **no dedicated new funding** attached.

4. Global Implementation Tracker & Belém Mission to 1.5°C

- New monitoring systems to check whether national policies and **updated NDCs** align with a 1.5°C pathway.
- Signifies the world's shift from "new pledges" to **accountability**.

5. Adaptation Initiatives

- Launch of the **NAP Implementation Alliance** to accelerate national adaptation plans.
- Countries agreed to **triple global adaptation finance by 2030**, though **burden-sharing remains unclear**.
- **Global Goal on Adaptation (GGA)** now backed by a **Baku Roadmap** and **59 voluntary indicators**.

6. Belem Health Action Plan

- Strengthens health systems to withstand climate shocks.
- Built on **equity, climate justice and community participation**.

7. Tropical Forests Forever Facility (TFFF)

- Performance-based incentives to reward nations that **protect tropical forests** using satellite verification.
- Aim: mobilise **USD 125 billion**; Brazil contributed **USD 1 billion**.

8. Belém 4x Pledge

- Aims to **quadruple the global use of sustainable fuels by 2035**.
- The **IEA** will track progress annually.

9. Declaration on Hunger, Poverty & People-Centred Climate Action

- Signed by **43 countries + EU**.

- Puts vulnerable populations at the core of adaptation policies.

10. Belém Gender Action Plan

- Enhances **gender-responsive climate decision-making** and women's participation.

India's Position and Negotiation Strategy at COP30

1. Climate Finance as a Legal Obligation

- India insisted that **developed countries** must fulfil **Article 9.1** of the Paris Agreement.
- Sought clarity on the **USD 1.3 trillion annual climate finance goal by 2035** (Baku-Belém Roadmap).
- Pointed out that developing nations need **USD 310–365 billion annually** for adaptation alone.

2. Equity and Climate Justice

- Strongly reaffirmed **CBDR–RC**.
- Emphasised historical responsibility of industrialised nations.
- Opposed unilateral carbon measures like the **EU's CBAM**, calling them **disguised trade barriers**.

3. Push for Adaptation and Support to Vulnerable Nations

- Argued for **equal priority** to adaptation and mitigation.
- Requested predictable finance for **LDCs, SIDS and climate-vulnerable regions**.

Major Shortcomings of COP30

1. No Global Agreement on Fossil Fuel Phase-out

- Final text avoided firm commitments on phasing out coal, oil or gas.

2. Weak Progress on Climate Finance

- No consensus on who pays, how much, or accounting rules.

3. Delay in Updated NDCs

- Many major economies missed deadlines, deepening the **ambition gap**.

4. Implementation Gap Unaddressed

- Strong announcements but **no enforcement architecture**.

5. Just Transition Mechanism Lacks Funding

- Limits practical support for workers and transitioning economies.

Conclusion

COP30 delivered important tracking tools and cooperation platforms, but avoided tough decisions on **fossil fuels and finance**. For India, it reinforced demands for **equity, climate justice and predictable finance**. With key decisions pushed to **COP31**, the coming year will determine whether global climate commitments finally turn into meaningful action.

GLOBAL METHANE STATUS REPORT 2025

SOURCE: THE HINDU

Why in News?

The **Global Methane Status Report 2025** warns that crop-residue burning is rapidly turning India into a major global methane hotspot. It highlights methane's surge as a key driver of global warming.

About Methane

Methane is a potent greenhouse gas responsible for nearly **one-third of present-day warming**. Tracking its sources and mitigation potential is crucial for achieving near-term climate goals. The Global Methane Status Report provides updated assessments of global trends.

About the Report

- Published by **UN Environment Programme (UNEP)** and **Climate and Clean Air Coalition (CCAC)**.
- Reviews progress on the **Global Methane Pledge** (30% reduction by 2030).
- Tracks emissions from energy, agriculture, and waste sectors.

Key Findings of the 2025 Report

1. Global Trends

- Methane levels have **more than doubled** since pre-industrial times.
- Rising emissions may lead to **24,000 additional premature deaths** and **2.5 million tonnes crop loss** per year by 2030.

2. India-Specific Findings

- India is **third-largest methane emitter** globally.
- Agricultural sector contributes **12% of global agricultural methane**—one of the highest.
- Crop-residue burning and livestock are primary sources.

3. Mitigation Potential

- If all nations fully implement their **NDCs and methane action plans**, emissions can reduce by **8%** by 2030.
- **G20+ countries** hold **72% mitigation potential**.

Sources of Methane

- **Agriculture**: rice cultivation, livestock (enteric fermentation).
- **Energy**: natural gas leaks, coal mines.
- **Waste**: landfills, sewage.

Why Methane Matters

- 80 times more potent than CO_2 over 20-year period.
- Short atmospheric lifetime → fast mitigation benefit.
- Direct impact on public health and crop productivity.

INDIAN INITIATIVES, EFFORTS AND COMMITMENTS

INTERNATIONAL SOLAR ALLIANCE (ISA) AND THE 8TH ISA ASSEMBLY

SOURCE: THE HINDU

Why in News?

President Droupadi Murmu addressed the **8th Session of the International Solar Alliance (ISA) Assembly** in New Delhi, calling for the **Global South to lead a people-centric solar transition**.

The session marked major progress on **global solar cooperation, sustainable solar supply chains, and capacity building initiatives**.

Key Highlights of the 8th ISA Assembly

1. Launch of the SUNRISE Network

- **SUNRISE (Solar Upcycling Network for Recycling, Innovation & Stakeholder Engagement)** was launched to promote a **circular economy** in the solar sector.
- Focus areas:
  - Recycling and reuse of old **solar PV modules and batteries**
  - Development of **green jobs**
  - Designing frameworks for **solar waste management**
- It aims to prevent future **solar waste crises** as global solar deployment accelerates.

2. One Sun One World One Grid (OSOWOG) Programme

- A dedicated **OSOWOG implementation roadmap** was announced.
- Objective: **Interconnect solar energy grids across Asia, Africa, Middle East and Europe**.
- Feasibility studies for major cross-border grid links will be completed in **2–3 years**.
- OSOWOG promotes **global solar trade** and optimizes sunlight availability across time zones.

3. SIDS Solar Procurement Platform

- **Sixteen Small Island Developing States (SIDS)** signed a collaboration agreement with ISA and the **World Bank**.
- Goals:
  - Joint procurement of affordable solar systems
  - Resilient power supply for climate-vulnerable islands
  - Training and local capacity building

4. Global Capability Centre and ISA Academy

- The **Global Capability Centre** in India will act as a **"Solar Innovation Hub"**, connecting global research institutions.
- The **ISA Academy**, an AI-enabled e-learning platform, will offer:
  - Solar engineering training modules
  - Online certification programs
  - Virtual technology demonstrations

5. Release of Five Major ISA Reports

- **Ease of Doing Solar 2025**
  - Global clean energy investments reached **USD 2,083 billion in 2024**
  - **Solar attracted USD 521 billion**, confirming its leadership in renewable markets.
- **Global Solar Trends & Outlook 2025**

- Solar power is now the **largest driver** of clean energy growth worldwide.

- **Solar Compass: Integrated PV Applications**
  - Highlights expansion potential in **Building-Integrated Photovoltaics (BIPV)**, especially in developing countries where **70% of future urban buildings** are yet to be constructed.
- **Solar PV Skills and Jobs in Africa**
- **Global Floating Solar Framework**

About the International Solar Alliance (ISA)

- Launched at **COP21 Paris, 2015** by **India and France**.
- **Headquartered in Gurugram, India** — the **first** treaty-based intergovernmental organization with headquarters in India.
- **125 Member and Signatory Countries**.

Core Mission

- To make **solar energy affordable, accessible, and reliable** across all nations, especially those in the **Global South**.

Strategic Pillars

- **Catalytic Finance Hub**: Mobilize **USD 1 trillion** in solar investments by **2030**.
- **Global Capability Centre**: Drive technical training and innovation.
- **Policy Support & Regional Action**: Tailored solutions for member states.
- **Technology Roadmaps**: Promote new solar applications like BIPV and floating solar.

India's Leadership in the Solar Transition

Major Achievements

- India ranks:
  - **3rd globally in solar power capacity**
  - **4th in total renewable energy capacity**
- Solar capacity rose from **2.82 GW (2014)** to **110.9 GW (2025)** — a **39-fold increase**.

Key National Initiatives

- **National Solar Mission:** A flagship program to make India a global leader in solar energy through large-scale deployment, technology development, and policy support.
- **PM-Surya Ghar Muft Bijli Yojana:** Provides financial assistance and subsidies for households to install **rooftop solar** systems and receive **free electricity** up to a specified limit.
- **PM-KUSUM Scheme:** Helps farmers adopt **solar-powered irrigation pumps** and enables them to sell surplus power to the grid, improving income and reducing diesel dependence.
- **Solar Parks Scheme:** Establishes large, pre-developed solar park zones with land, transmission, and infrastructure to promote utility-scale solar projects.
- **PLI Scheme for Solar Manufacturing:** Offers production-linked incentives to boost **domestic manufacturing** of high-efficiency solar modules and reduce import dependence.

Many of these models are now being **replicated across Africa and Island Nations through ISA cooperation**.

Conclusion

The **8th ISA Assembly** highlighted India's role as a **global catalyst for solar cooperation**, innovation, and sustainable energy access. With initiatives like **SUNRISE**, **OSOWOG**, and **ISA Academy**, India is guiding a **just and inclusive clean energy future**. This aligns with the shared vision of **"One Sun, One World, One Grid"** — ensuring solar power benefits **all humanity.**

ADAPTATION GAP REPORT 2025

SOURCE: INDIAN EXPRESS

Why in News?

The **UN Environment Programme (UNEP)** released the **Adaptation Gap Report 2025**, titled *"Running on Empty,"* which highlights the widening gap between the **climate adaptation finance required by developing countries** and the **funds currently being provided by developed nations**.

Key Findings of the Report

- **Huge Increase in Adaptation Finance Needs:** Developing countries will require **USD 310–365 billion annually by 2035** to effectively adapt to climate change. This is nearly **12 times greater** than current financial support.
- **Inadequate Commitments:** At **COP-29 in Baku**, developed countries committed to providing **USD 300 billion annually** as part of the **New Collective Quantified Goal (NCQG)**. However, the report considers this insufficient even to meet adaptation needs alone, especially without inflation adjustment.
- **Decline in Adaptation Finance:** International public finance for adaptation **fell from USD 28 billion in 2022 to USD 26 billion in 2023**, reversing earlier progress and pushing vulnerable countries into greater climate risk.
- **Failure to Meet Past Promises:** The **Glasgow Commitment (COP-26)** to **double adaptation finance to USD 40 billion by 2025** is on track to be missed.
- **Debt-Heavy Financing:** Nearly **58% of climate finance comes as loans**, increasing the debt burden of developing countries and limiting their future resilience investments.
- **Highest Impact on Most Vulnerable: Least Developed Countries (LDCs)** and **Small Island Developing States (SIDS)** are most affected, despite contributing least to global emissions.

Significance

- The report warns that **insufficient adaptation will lead to large-scale climate losses**, food insecurity, migration pressures, and irreversible ecological damage.
- Strengthening adaptation is not only an environmental concern but also a **development, health, security, and economic stability imperative**.

NATIONAL GREEN HYDROGEN MISSION (NGHM) 2023

SOURCE: PIB

Why in News?

India launched the National Green Hydrogen Mission (NGHM) in 2023 to steer the country toward cleaner energy and reduce fossil fuel dependence. The government's recent announcements — including the designation of major ports as green-hydrogen hubs — underscore progress in building a comprehensive green hydrogen ecosystem.

What is Green Hydrogen (GH_2)?

- **Definition:** Green Hydrogen refers to hydrogen produced through **electrolysis powered by renewable energy** (such as solar or wind), which splits water into hydrogen and oxygen.
- It can also be derived from **biomass or agricultural waste**, provided overall emissions stay within safe limits.
- Under Indian standards, hydrogen qualifies as "green" only if its total production-related emissions do not exceed a specified low threshold, ensuring truly clean production.

About the National Green Hydrogen Mission (NGHM)

Objectives and Vision

- NGHM aims to make India a **global hub for production, utilisation, and export** of green hydrogen and its derivatives (like green ammonia, methanol).
- It envisions substantial **decarbonisation of the Indian economy**, reducing fossil fuel import

dependence, meeting net-zero targets, and boosting energy security.

Targets by 2030

- Achieve **5 million metric tonnes (MMT)** of green hydrogen production annually.
- Add approximately **125 GW of renewable energy capacity** dedicated solely for hydrogen production.
- Mobilise investments over **₹8 lakh crore**, generate about **6 lakh jobs**, reduce fossil fuel imports by ₹1 lakh crore, and **cut roughly 50 MMT of CO_2** annually.

Key Components & Recent Developments

Strategic Interventions (SIGHT)

- The mission's financial backbone — the **SIGHT scheme** — offers incentives for manufacturing of electrolysers and green hydrogen production, to jump-start early growth and domestic industry.

Green Hydrogen Hubs & Infrastructure

- In October 2025, three major ports — **Deendayal Port (Gujarat), V.O. Chidambaranar Port (Tamil Nadu), and Paradip Port (Odisha)** — were officially designated as **Green Hydrogen Hubs**, paving the way for large-scale production, processing, export, and integrated hydrogen logistics.
- The hub-model aims to cluster demand, production, storage, and export capabilities — improving economies of scale and reducing costs.

Regulation, Standards & R&D

- The mission framework includes development of **regulations, certification standards**, and policies to ensure hydrogen produced is genuinely "green."
- A dedicated **R&D fund and industry–academia partnerships** (via Strategic Hydrogen Innovation Partnership – SHIP) are proposed to encourage innovation, domestic technology development, and reduce reliance on imports.

Demand Creation & Sectoral Applications

- GH_2 is seen as a key clean-fuel for **hard-to-decarbonize sectors** — including steel manufacturing, fertiliser production, refining, shipping, and long-haul transport — where electrification alone is impractical.
- Use in **green ammonia/methanol**, maritime shipping (via hydrogen bunkering), heavy industry, and possibly export markets signal long-term strategic scope.

Significance for India's Energy and Climate Goals

- GH_2 offers a **clean, flexible, and zero-carbon fuel or feedstock**, critical for decarbonising sectors unsuited for direct electrification.
- It supports India's pledge for **Net Zero emissions by 2070**, reduces import dependence on fossil fuels, and strengthens energy **self-reliance (Aatmanirbhar Bharat)**.
- The development of a **domestic hydrogen industry and export potential** can position India as a global player in the emerging hydrogen economy.

Conclusion

Green hydrogen is emerging as a cornerstone of India's clean-energy and climate strategy, offering a low-carbon alternative for industry, transport, and export. The National Green Hydrogen Mission aims to build a robust hydrogen ecosystem, drive large-scale investments, create jobs, and cut emissions. Its success can steer India toward a more **sustainable, resilient, and self-reliant** energy future.

DISASTER MANAGEMENT

EARLY WARNING SYSTEMS IN THE HIMALAYAS

SOURCE: PIB

Why in News?

The Himalayan region has witnessed an alarming rise in natural disasters, prompting renewed focus on strengthening **Early Warning Systems (EWS).**

Early Warning System (EWS): Meaning & Components

About EWS

- An **Early Warning System (EWS)** is an integrated setup that detects and predicts hazards in advance, communicates alerts, and enables timely protective action.
- It serves as a critical tool for reducing loss of life, property damage, and livelihood disruption.

Multi-Hazard EWS

- Designed to anticipate **multiple hazards simultaneously**—floods, landslides, earthquakes, cloudbursts, GLOFs, etc.
- Expansion of multi-hazard EWS is a **key target under the Sendai Framework (2015–2030)**.

Key Components

1. **Risk Knowledge:** Hazard mapping, vulnerability assessment.
2. **Monitoring & Forecasting:** Sensors, satellites, radars, AI-enabled analytics.
3. **Dissemination:** Rapid communication via phones, sirens, apps, and community networks.
4. **Response Capability:** Local-level preparedness, evacuation drills, and coordination.

Why EWS is Critical for the Himalayas

1. High Disaster Incidence

- Of **687 disasters in India (1900–2022)**, nearly **240 occurred in the Himalayan belt**.
- 12 Himalayan states/UTs face recurring **landslides, flash floods, extreme rainfall, earthquakes, and GLOFs**.

2. Climate Change Intensification

- Rapid glacial retreat and permafrost thaw increase risks of sudden floods and slope failures.
- **2024 Climate Change Journal** warns that **~90% of the Himalayas may suffer persistent droughts** if warming reaches 3°C.

3. Active Tectonics

- The Himalayas lie along highly active faults (e.g., **Indus–Ganga, Dhaulagiri**).
- Regions fall mostly under **Seismic Zones IV and V**.

4. Anthropogenic Pressure

- **Hydropower tunneling**, deforestation, unscientific construction, and road widening (e.g., Char Dham project) intensify slope instability.
- Incidents like **Joshimath land subsidence** demonstrate the vulnerability.

Current Initiatives for Strengthening Himalayan EWS

1. MoEFCC AI-based Pilot

- AI-driven hailstorm alerts in **Uttarakhand and Himachal Pradesh** with sub-kilometre precision.

2. IMD & NCMRWF

- Integrated models for cloudburst and extreme rainfall prediction.

3. ISRO & NRSC

- Real-time satellite-based monitoring of glaciers, glacial lakes, snowpack, and unstable slopes.

4. NDMA Regional Framework

- State-specific Himalayan disaster preparedness plans.

5. Community-Based EWS

- **DMS–Himalaya** trains communities in hazard mapping and response.

6. Android Earthquake Alert System (Google + NDMA)

- Smartphones act as seismic sensors; alerts based on **Modified Mercalli Intensity Scale**.

7. Early Warnings for All (WMO–UNDRR)

- Global initiative supporting India's commitment to universal early-warning coverage.

Challenges in Implementing EWS in the Himalayas

- **Complex Terrain:** Difficult to install/maintain radars, AWS stations, or sensors.
- **Sparse Data Infrastructure:** Limited real-time ground observations.
- **Institutional Fragmentation:** Poor coordination between IMD, ISRO, NDMA, and states.
- **Community Awareness Gaps:** Low preparedness reduces response effectiveness.
- **High Costs & Low Funding Priority:** Preparedness receives less funding than post-disaster relief.
- **Cross-Border Data Issues:** Limited data sharing with Nepal, Bhutan, and China delays alerts.

Way Forward

1. National Mission on Himalayan EWS

- A dedicated, NDMA-led mission with long-term funding.

2. Technology Integration

- AI/ML-based models, dense AWS networks, satellite-linked sensors.

3. Community-Centric EWS

- Use of local volunteers, panchayats, and school-based preparedness programs.

4. Transboundary Cooperation

- Real-time data exchange with neighbouring Himalayan nations.

5. Scientific Land-Use Planning

- Hazard zonation maps, construction restrictions in unstable zones, and implementation of **Mishra Committee (1976)** recommendations.

6. Legal Strengthening

- Inclusion of disaster management in the **Seventh Schedule** as recommended by the **J.C. Pant Committee**.

Conclusion

A robust Early Warning System is indispensable for safeguarding the fragile Himalayan ecosystem and its millions of inhabitants. **Science-driven monitoring, community engagement, and regional cooperation** must form the core of a resilient disaster-management strategy.

Strengthening Himalayan EWS is crucial not only for reducing losses but also for advancing India's commitments under the **Sendai Framework** and **SDG-13 (Climate Action)**.

PRELIMS POINTERS IN NEWS

COELACANTH – A LIVING FOSSIL

SOURCE: THE HINDU

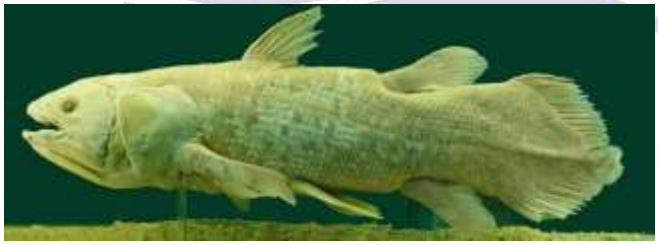
Why in News?

Paleontologists in China have identified a **new species** of the coelacanth genus *Whiteia* from fossil remains.

The finding adds to the understanding of ancient lobe-finned fishes once thought extinct.

About Coelacanth

- The **Coelacanth** is one of the world's most extraordinary fish species, known for its evolutionary significance and prehistoric lineage. Long believed to be extinct, its rediscovery changed scientific understanding of vertebrate evolution.



Evolutionary Background

- Belongs to the order **Coelacanthiformes**.
- Existed since the **Devonian period (≈420 million years ago)**.
- Referred to as **"living fossils"** because they closely resemble their ancient ancestors.
- Once a widespread group with nearly **90 species**.

Living Species

- Two surviving species today:
  - **West Indian Ocean Coelacanth**
  - **Indonesian Coelacanth**
- Found in deep, dark marine waters.
- Can grow up to **2 meters** in length.

Unique Features

- Possess **lobe-finned limbs** supported by bone—early indicators of limb evolution towards tetrapods.
- Their **paired fins** move like the limbs of four-legged animals.
- Have a special **rostral organ** filled with gel, enabling them to detect low-frequency electrical signals and navigate in darkness.
- A distinctive **hinge in the skull** allows them to widen their gape significantly when feeding.

Scientific Importance

- Provide insight into the evolutionary transition from fish to land animals.
- Help understand vertebrate anatomy, limb development, and deep-sea adaptations.
- Fossil discoveries like the new *Whiteia* species expand knowledge of prehistoric marine ecosystems.

PROTECTION OF PLANT VARIETIES AND FARMERS' RIGHTS (PPV&FR) ACT, 2001

SOURCE: THE HINDU

Why in News?

India celebrated the **Silver Jubilee of the PPV&FRA Act, 2001** and the **21st Foundation Day of PPV&FRA**, honoring farmers and individuals with the **Plant Genome Saviour Awards**.

Objectives

- Protect **new plant varieties**, encourage innovation, and preserve biodiversity.
- Recognize farmers as **conservers and developers** of plant genetic resources.
- Align with **TRIPS (WTO)** while safeguarding India's agricultural interests.

Rights Provided under the Act

1. Breeders' Rights

- Exclusive rights to **produce, sell, market, distribute, import, or export** their registered plant varieties.

- Can appoint **agents or licensees** and seek legal action against infringement.

2. Farmers' Rights

- Farmers can **save, use, sow, re-sow, exchange, or sell unbranded seeds** even if the variety is registered.
- Farmers who develop or conserve unique varieties can also **register and receive protection**.
- Provides compensation if registered seed fails to perform.

3. Researchers' Rights

- Researchers can use any registered variety for **experimentation and breeding new varieties** but repeated use requires permission.

PPV&FRA Authority

- Established in **2005**, headquartered in **New Delhi**.
- Maintains the **National Register of Plant Varieties**.
- Led by a Chairperson with 15 members.

Significance

- Encourages **innovation in plant breeding** and protects **traditional farming knowledge**.
- Supports **food security, genetic conservation**, and sustainable agriculture.
- Balances **commercial interests with farmers' livelihoods**.

PROTIDRICERUS ALBOCAPITATUS – NEW OWLFLY SPECIES

SOURCE: DOWN TO EARTH

Why in News?

A new species of **owlfly**, named *Protidricerus albocapitatus*, has been discovered in Kerala's **Nedumkayam forest**, marking the first such find in India after 134 years. The discovery increases India's known owlfly species count to **37**.

About Protidricerus albocapitatus

- Newly discovered insect from **Kerala's Malappuram district**.
- Belongs to family **Myrmeleontidae** (same family as antlions).
- Distinguishing features:
  - **White tufted head**
  - **Clubbed antennae**
  - Transparent wings with subtle coloration

Characteristics of Owlflies (General)

Habitat

- Prefer **lateritic soils**, grasslands, and mixed vegetation.
- Also found near village households adjacent to forested areas.

Appearance

- Prominent **bulging compound eyes** like owls.
- Long, clubbed antennae resembling those of butterflies.
- Wings gain coloration after emergence.

Behaviour

- Nocturnal or active during **dusk**.
- **Aerial predators** feeding on small insects.
- Release a **musk-like chemical** to deter predators.
- Females lay eggs on twigs with a protective secretion.

Ecological Importance

- Regulate populations of small insects and pests.
- Serve as bio-indicators of healthy ecosystems.
- Their presence signifies **intact forest and grassland habitats**.

Significance of the Discovery

- Indicates **high insect diversity** in the Western Ghats.
- Helps in updating conservation strategies for lesser-known insect groups.
- Strengthens India's taxonomic knowledge base.

GINKGO-TOOTHED BEAKED WHALE

SOURCE: THE HINDU

Why in News?

Scientists recently documented **ginkgo-toothed beaked whales** alive in the wild near Baja California, Mexico—**the first confirmed sighting** of this elusive species.

About Ginkgo-Toothed Beaked Whale

The **ginkgo-toothed beaked whale (*Mesoplodon ginkgodens*)** is among the least observed cetaceans on Earth. Known only from strandings since the 1950s, the species is part of the beaked whale group—deep-diving, shy marine mammals adapted to life in remote oceanic waters.

Key Features

Taxonomy & Distribution

- Family: **Ziphiidae**
- Found in **tropical and temperate waters** of the Pacific and Indian Oceans.
- Rarely seen because they inhabit deep offshore waters and surface only briefly.

Appearance

- Robust body, smooth skin with fewer scars compared to other beaked whales.
- Small pointed flippers.
- Unique **ginkgo-leaf–shaped pair of teeth** located mid-jaw in males—basis of their name.

Ecological & Behavioural Traits

- Among **the deepest-diving mammals**, capable of dives exceeding **1,000 meters**.
- Highly elusive and avoid boats; spend most of their life underwater.
- Feed primarily on **deep-sea squid and fish** using suction feeding.
- Social groups usually small—commonly pairs or small pods.

Conservation Concerns

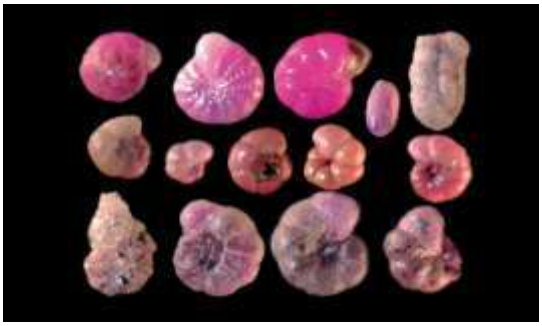
- **IUCN Red List: Data Deficient** due to insufficient population data.
- **CITES Appendix II** protection.
- Threatened by:
  - Noise pollution (naval sonar)
  - Plastic ingestion
  - Bycatch
  - Ship strikes
  - Deep-sea habitat degradation

FORAMINIFERA

SOURCE: THE HINDU

Why in News?

A global scientific review recently identified **57 new living species of Foraminifera**, expanding knowledge of these important marine microorganisms.



About Foraminifera

- **Foraminifera**, commonly called **forams**, are microscopic, single-celled marine organisms found across oceans, coasts, and estuaries.
- Despite their small size, they play a major role in **marine ecosystems**, **carbon cycling**, and **paleoclimate studies** due to their distinctive shells and fossil record.

Key Characteristics

1. Habitat

- Found in both **planktonic** (floating) and **benthic** (sea-floor) forms.
- Only ~40 of ~8,000 species are planktonic; majority are benthic.
- Thrive from shallow coasts to deep-sea floors.

2. Shell Structure

- Known for **multi-chambered shells**, made of:
  - **Calcium carbonate** (calcareous)
  - **Sand grains** stuck together (agglutinated)
- Shells have tiny openings (**foramen**) that give them their name.

3. Biology

- Extremely **flexible** cellular structure; can change shape.
- Move using **pseudopodia** for feeding and locomotion.

4. Diet

- Detritus
- Diatoms
- Algae
- Bacteria
- Tiny crustaceans

Ecological Significance

- **Bioindicators:** Sensitive to temperature, salinity, pollution.
- **Carbon Cycle:** Their shells trap carbon and sink to form sediments.
- **Food chain:** Support small marine organisms.

Importance in Climate Science

- Their fossilised shells record past **temperatures**, **ocean chemistry**, and **climate shifts**.

- Used in **oil exploration**, **paleoclimate reconstruction**, and **marine monitoring**.

CARACAL

SOURCE: THE HINDU

Why in News?

A rare sighting of the **Asiatic Caracal** was recently reported from **Ramgarh, Jaisalmer (Rajasthan)**, marking a significant conservation milestone.

About Caracal

- The **Caracal (Caracal caracal)** is an elusive medium-sized wild cat known for its characteristic **long, black-tufted ears** and remarkable jumping ability.
- Despite being widespread across Africa and West Asia, its presence in India has drastically reduced, making it a species of conservation concern for the country.

Distribution

- Found across **Africa, Middle East, Central Asia**, and **northwestern India**.
- In India, Caracals survive in **small, fragmented populations**, mainly in
    - **Rajasthan (western arid landscapes)**
    - **Kutch region of Gujarat**
- Current estimates place India's population at **roughly 50 individuals**, indicating a sharp decline.

Habitat

- Caracals prefer **dry, open, and semi-arid landscapes**.
- Typical habitats:
    - Semi-deserts
    - Savannahs
    - Arid shrublands
    - Dry forests and woodlands
- They thrive in regions with low rainfall and sparse vegetation, which offer ideal hunting grounds.

Physical Characteristics

- **Medium-sized**, strong build, long legs, and short facial structure.
- Coat: **Reddish-tan or sandy**, occasionally black.
- Distinctive features include:
    - **Black ear tufts**, up to 5 cm long
    - White markings near nose and eyes
    - Longer hind legs for high leaps
- **Jumping ability**: Can leap ~3 m vertically to catch birds mid-air.
- **Speed**: Up to **80 km/h**.
- Primarily **nocturnal**, solitary or found in small family units.

Behaviour & Ecology

- Skilled predators feeding on rodents, hares, birds, small ungulates.
- Known for patience, stealth, and acrobatic hunting.
- Play an ecological role in regulating small prey populations.

Conservation Status

- **IUCN Red List**: Least Concern (globally)
- **India population** remains critically low due to habitat loss, hunting, and declining prey base.
- Listed under the **Wildlife Protection Act, 1972 (Schedule I)** in India.

HUMBOLDT PENGUIN

SOURCE: THE HINDU

Why in News?

Chilean researchers recently raised alarms over the **rapid decline of the Humboldt penguin population** along the Pacific coast. They warned that **ongoing climate stress and human pressures** pose severe risks to the species' survival.

About Humboldt Penguin

1. Taxonomy and Characteristics

- Scientific name: **Spheniscus humboldti**, belonging to the *banded penguin* group.
- Average height: around **60–70 cm (just over 2 feet)**.
- Distinctive features:
    - Black breast band and **pink patches around the eyes** which help regulate body temperature.

- Streamlined bodies adapted for swimming and diving in cold waters.

2. Habitat and Distribution

- Found along the **Pacific coasts of Chile and Peru**.
- Nearly **80% of the global population** is present in Chile.
- They rely on the **Humboldt Current**, one of the world's most productive ecosystems due to nutrient-rich upwelling.

3. Behaviour and Breeding

- Breeding seasons vary: **March–April or September–October** depending on the colony.
- **Monogamous species**—pairs stay loyal and identify each other through unique vocal sounds.
- Nest in **rock crevices or guano burrows**, relying on undisturbed coastal zones.

4. Threats

- **Commercial fishing** reduces prey availability (anchovies, sardines).
- **Climate change** alters sea temperature and food patterns.
- **Habitat disruption** due to coastal development.
- **Pollution**, entanglement in fishing nets and **oil spills**.
- **Avian influenza** outbreaks in recent years have caused additional mortality.

Conservation Status

- **IUCN:** Vulnerable
- **CITES:** Appendix I (highest protection level)

SOIL ORGANIC CARBON DEPLETION IN INDIA

A recent **ICAR study** based on more than **2.5 lakh soil samples** from **620 districts** reveals that **unscientific fertiliser use** and **climate change** are rapidly reducing **Soil Organic Carbon (SOC)** levels across India's farmlands.

About Soil Organic Carbon

- **Soil Organic Carbon (SOC)** is the key indicator of soil health. It represents the carbon stored in **soil organic matter**—plant residues, microorganisms, root exudates, and humus.
- SOC influences **nutrient cycling, soil structure, water retention, microbial diversity** and also plays a major role in **carbon sequestration**, directly linking soil health with **climate change mitigation**.

Key Findings of the ICAR Study

1. Impact of Fertilisers and Climate Change

- Overuse of **urea and phosphorus** in regions like **Punjab, Haryana, and Western Uttar Pradesh** has depleted organic carbon.
- States with **balanced fertiliser use**, such as **Bihar**, showed healthier SOC levels.
- **Higher temperatures accelerate decomposition** of organic matter, leading to a faster loss of carbon.
- Climate-induced processes—heat stress, reduced biomass, erratic rainfall—further degrade soil carbon.

2. Influence of Temperature, Elevation & Rainfall

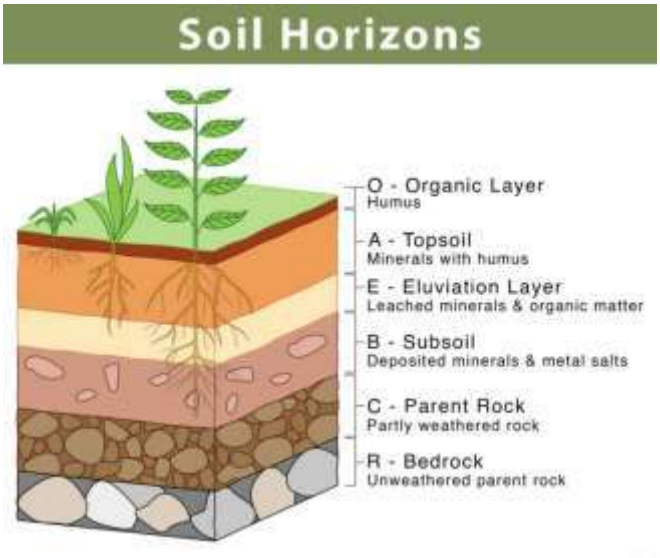
- SOC is **higher in elevated regions** (e.g., Himalayan foothills) due to cooler temperatures and slower mineralisation.
- Hot and arid states like **Rajasthan and Telangana** show naturally low SOC.
- Rainfall affects SOC, but temperature and elevation show a stronger correlation.

3. Role of Cropping Systems

- **Rice-based and pulse-based cropping systems** retain more SOC due to constant moisture, root mass and biological activity.
- **Wheat, maize, and coarse-grain systems** show lower SOC because of intensive tillage and less organic residue.
- **Monocropping** and removal/burning of residues aggravate carbon loss.

4. Micronutrient Linkages

- Low SOC is associated with **deficiencies of zinc, iron, boron**, and other micronutrients.
- High SOC helps bind and store micronutrients, boosting soil fertility and crop health.



Implications of Declining Soil Organic Carbon

1. Reduced Soil Fertility & Lower Crop Productivity

- SOC improves **soil structure, aeration, and moisture retention**.
- Its decline leads to:
  - Compacted soils
  - Poor water-holding capacity
  - Slow nutrient release
  - Declining yields
- Direct threat to **India's food security**.

2. Climate Change Feedback Loop

- Carbon-poor soils release more **CO_2**, worsening global warming.
- Lighter, degraded soils heat up more easily, modifying local microclimates.

3. Higher Cost of Cultivation

- Farmers compensate for low SOC by using more fertilisers.
- Production costs rise while soil quality continues to decline.

4. Threat to Agricultural Sustainability

- The input-driven Green Revolution model is now degrading the soil.
- This undermines programmes like:
  - **National Mission for Sustainable Agriculture (NMSA)**
  - **Soil Health Card Scheme**
  - **Natural Farming initiatives**

5. Loss of Soil Biodiversity

- SOC is primary food for soil biota: **earthworms, fungi, bacteria**.
- Declining SOC collapses this ecosystem, reducing nutrient cycling.

Steps Needed for Sustainable Soil Management

1. Sustainable Crop & Land Management

- **Zero tillage**, **crop rotation**, **cover crops** and **mulching** protect soil structure.
- Promote **residue retention** instead of burning.

2. Balanced Fertiliser Use

- Strengthen **Soil Health Card Scheme** with real-time digital databases.
- Promote **soil-test based nutrient management**.
- Shift subsidies toward **organic fertilisers, biofertilisers, compost, and nano-urea**.

3. Carbon-Sequestering Cropping Systems

- Promote **agroforestry, SRI, intercropping, and green manuring**.
- Encourage cultivation of **carbon-rich crops** and perennials.

4. National Carbon Credit Framework for Agriculture

- Develop soil carbon maps using ICAR data.
- Provide incentives to farmers adopting:
  - No-till agriculture
  - Organic manuring
  - Biomass management
- Introduce **Carbon Payment for Ecosystem Services (PES)**.

5. Leveraging Technology

- Digital platforms integrating:
  - Soil Health Card data
  - Satellite imagery
  - Weather advisories
- Promote **drip and sprinkler irrigation** under "Per Drop More Crop".

Conclusion

The ICAR study shows that **unchecked fertiliser use and climate change** are rapidly degrading soil organic carbon across India. Restoring SOC is essential for **soil fertility, sustainable agriculture, and climate resilience**.

A coordinated approach—balancing fertilisers, adopting carbon-positive farming practices, and incentivising farmers—can reverse soil degradation and secure India's agricultural future.

Mains questions

Q. "Soil organic carbon levels strongly correlate with cropping patterns and Agro-Ecological Conditions." Explain how cropping systems influence SOC levels, citing examples from the ICAR study. (150 WORDS / 10 MARKS)

SCIENCE AND TECHNOLOGY

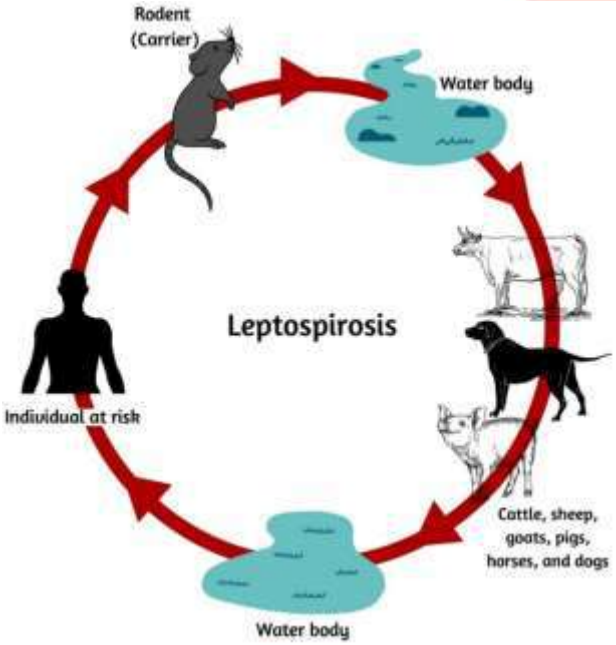
MEDICAL HEALTH/VACCINES/DISEASES

LEPTOSPIROSIS

SOURCE: THE HINDU

Why in News?

Jamaica has declared a **public health emergency** after widespread flooding from Hurricane Melissa triggered a major **leptospirosis outbreak**, raising global concerns over climate-linked disease surges.



About Leptospirosis

Leptospirosis is a potentially fatal **zoonotic bacterial disease** transmitted from animals to humans, especially thriving in warm, humid environments. Climate extremes, urban flooding, and poor sanitation amplify its spread.

Causes & Transmission

- Caused by **Leptospira interrogans**, a spiral-shaped bacterium.
- Transmission occurs when bacteria enter through **skin cuts, wounds, or mucous membranes**, typically via contaminated water or soil.
- **Rodents, cattle, pigs, and dogs** act as primary reservoirs.
- Infected animals shed the bacteria in **urine**, contaminating surroundings for months.

Symptoms & Clinical Course

Leptospirosis has **two phases**:

1. **Acute Phase (Anicteric)**
   - Fever, chills, muscle pain, headache, vomiting, diarrhoea.
   - Often mistaken for influenza, dengue, or malaria.
2. **Severe Phase (Weil's Disease)**
   - **Kidney failure**, **liver damage**, **meningitis**, internal bleeding.
   - Mortality can rise significantly without timely treatment.

Risk Factors

- Floods, stagnant water, and poor drainage.
- Occupational exposure: **farmers, sewage workers, fishermen, veterinarians**.
- Urban slums with high rodent density.
- Recreational exposure: swimming in contaminated water.

Diagnosis & Treatment

- Confirmed through **ELISA**, **PCR**, or **MAT** tests.
- Treated using **doxycycline, penicillin, or ceftriaxone**.
- Early intervention is critical to prevent organ damage.

Prevention & Control

- Rodent control and safe waste management.
- Protective gear for high-risk workers.
- Avoiding stagnant water during floods.
- WHO recommends **doxycycline prophylaxis** for high-risk groups.
- Public awareness during monsoon seasons.

ACANTHOSIS NIGRICANS

SOURCE: THE HINDU

Why in News?

A recent health advisory emphasised that early detection of **Acanthosis Nigricans** can act as a warning sign for **prediabetes and diabetes** in both children and adults. Doctors highlight its rising incidence due to obesity and metabolic disorders in India.

About Acanthosis Nigricans

Acanthosis Nigricans (AN) is a visible dermatological marker of underlying metabolic disturbances. It manifests as dark,

velvety skin patches and is strongly linked to **insulin resistance**, making it a crucial early clinical indicator of metabolic disease.

What is Acanthosis Nigricans?

- A skin condition that causes **hyperpigmented, thickened, velvety patches** in body folds.
- Commonly seen on the **neck, underarms, groin, elbows, knuckles, and under the breasts**.
- The changes occur **gradually over months**.

Causes

- **Insulin resistance** (most common cause).
- **Obesity**, especially central obesity.
- **Metabolic syndrome & Type-2 diabetes**.
- **Endocrine disorders**: PCOS, hypothyroidism, Cushing's.
- **Drug-induced cases**: steroids, hormonal therapy, niacin.
- **Rare malignancy-related form** (gastric or liver cancers).

Symptoms & Clinical Features

- Dark, velvety, rough skin patches.
- Mild **itching** or **odor** may occur.
- Rapid darkening indicates **worsening insulin resistance**.
- In children, AN is an early sign of future metabolic disease risk.

Diagnosis

- Primarily clinical examination.
- Blood tests for **HbA1c, fasting sugar, thyroid function, lipid profile**, and hormonal panels.
- Evaluation of drug use and family history.

Treatment & Management

1. Treat underlying cause

- Weight reduction is the **most effective measure**.
- Managing diabetes, hormonal disorders, liver issues etc.

2. Dermatological treatment

- **Prescription creams** (retinoids, exfoliating agents).
- **Chemical peels or laser therapy** for cosmetic relief.

3. Lifestyle interventions

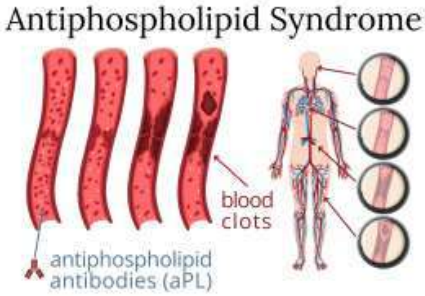
- Low-glycaemic diet
- Regular exercise
- Reducing processed and sugary foods

ANTIPHOSPHOLIPID SYNDROME (APS)

SOURCE: TIMES OF INDIA

Why in News?

A 29-year-old patient in Chennai survived multiple simultaneous blood clots, drawing national attention to **Antiphospholipid Syndrome (APS)** and its life-threatening complications.



What is APS?

- A chronic autoimmune disorder marked by antibodies such as **anticardiolipin**, **lupus anticoagulant**, and **anti-β2 glycoprotein I**.
- These antibodies make blood unusually prone to clotting in both **arteries and veins**.
- Can affect young individuals and is **more common in women**.

Clinical Features

A. Thrombotic Manifestations

- Deep vein thrombosis (DVT)
- Pulmonary embolism
- Stroke, transient ischemic attacks (TIAs)
- Myocardial infarction
- Kidney and spleen infarction

B. Obstetric Complications

- Early miscarriages
- Stillbirth
- Placental insufficiency
- Preeclampsia and fetal growth restriction

C. Other Symptoms

- Livedo reticularis (mottled skin)
- Leg ulcers
- Headaches or seizures

- Rarely progresses to **catastrophic APS**, a medical emergency with multi-organ failure.

Risk Factors

- Presence of another autoimmune disease (especially SLE)
- Infections, certain medications
- Genetic predisposition
- Hormonal therapy or oral contraceptives may worsen clotting tendency.

Diagnosis

- Requires **clinical evidence of clotting** or pregnancy morbidity
- **persistent presence of APS antibodies** (tested 12 weeks apart).

Treatment and Management

- No permanent cure; treatment focuses on **preventing further clots**.
- **Anticoagulants** (warfarin, heparin) are standard therapy.
- **Aspirin** in selected cases.
- Pregnant women: **heparin + low-dose aspirin** regime.
- Lifestyle modifications: weight control, exercise, stopping smoking, controlling diabetes or hypertension.

AFRICAN SWINE FEVER (ASF)

SOURCE: DOWN TO EARTH

Why in News?

Assam recently banned inter-district movement of pigs after fresh cases of **African Swine Fever**, a highly fatal viral disease, were reported.

About the Disease

- Caused by a **DNA virus** of the *Asfarviridae* family.
- Not zoonotic—does **not infect humans**.
- Endemic to Africa but now present across Europe and Asia.
- First confirmed in India in **2020** (Assam & Arunachal Pradesh).

Transmission

- Direct contact between infected and healthy pigs.
- Contaminated feed, vehicles, boots, equipment.
- Long virus survival in pork products (ham, sausages, bacon).
- Spread by soft ticks in tropical regions.
- Human movement and trade are major vectors.

Symptoms

- High fever
- Weakness and loss of appetite
- Red or blotchy skin
- Vomiting and bloody diarrhea
- Breathing difficulty
- Sudden death in severe cases

ASF is clinically indistinguishable from **classical swine fever**, requiring lab confirmation.

Impact

- Heavy economic losses due to mass culling.
- Threat to small farmers and tribal households dependent on pig husbandry.
- Disruption of pork supply chains in NE India.

Prevention & Control

- No vaccine or treatment globally.
- Strict **biosecurity measures** are the only defense.
- Steps include:
  - Culling infected herds
  - Banning animal movement
  - Disinfection protocols
  - Safe disposal of carcasses
  - Farm-level hygiene control
  - Monitoring wild boar populations

SPACE TECHNOLOGY

GSAT-7R / CMS-03

SOURCE: INDIAN EXPRESS

Why in News?

ISRO launched **GSAT-7R (CMS-03)** on **LVM3-M5**, India's heaviest indigenous communications satellite to GTO, strengthening secure naval communications. The mission underscores India's growing space capabilities and the strategic push for autonomy in defence communications.

About GSAT-7R / CMS-03

- **GSAT-7R / CMS-03** is a multi-band, high-capacity communication satellite designed mainly for the **Indian Navy** to ensure secure voice, data and video links across the **Indian Ocean Region (IOR)**.
- It replaces the aging GSAT-7 platform and supports networked maritime operations.

Technical & Operational Highlights

- **Mass & Orbit:** **~4,400 kg** placed into **Geosynchronous Transfer Orbit (GTO)**; will use onboard propulsion to reach **Geostationary Orbit (GEO)**.
- **Payload:** Advanced **multi-band transponders** enabling encrypted communications, high throughput links and resilient connectivity.
- **Mission Life:** Designed for about **15 years** of service.
- **Launch Vehicle:** Carried by **Launch Vehicle Mark-3 (LVM-3)** — India's heavy-lift launcher with a record of Chandrayaan and OneWeb missions.
- **Indigenous Content:** Over **80% local systems**, reinforcing **Aatmanirbhar Bharat** in strategic space assets.

Strategic Importance

- **Naval C4ISR:** Enhances Command, Control, Communications, Computers, Intelligence, Surveillance & Reconnaissance in the IOR.
- **Operational Reach:** Improves coordination for surface ships, submarines (via relay), maritime patrol aircraft and unmanned systems.
- **Defence Autonomy:** Reduces reliance on foreign satellites and launch services; supports secure wartime communication.
- **Dual Use:** Can aid **HADR** (Humanitarian Assistance & Disaster Relief) with high-bandwidth telemetry and serve as an emergency communication node.

Broader Implications

- Validates LVM-3's heavy-lift reliability — important for **Gaganyaan** and future deep-space missions.
- Strengthens India's space diplomacy by showcasing indigenous heavy-lift and satellite build capabilities.

EMERGING TECHNOLOGIES

TECHNOLOGY-LED LANGUAGE PRESERVATION AND DIGITAL INCLUSION IN INDIA

SOURCE: PIB

Why in News?

India is advancing **digital multilingual inclusion** using **AI, NLP, and machine learning** to support communication, governance, and education in diverse Indian languages.

Platforms like **Bhashini, BharatGen, and Adi-Vaani** are enabling digital access across **22 Scheduled Languages** and numerous **tribal and regional dialects**.

Key Platforms Driving Multilingual Digital Inclusion

1. Bhashini

- Implemented under the **National Language Translation Mission (NLTM)** by **MeitY**.
- Provides **AI-based real-time translation**, speech-to-text, and voice processing.
- Supports **22 Scheduled Languages** and emerging support for tribal dialects.
- Enables multilingual access to **government portals, digital payments, health, and education services**.

2. Sanchika (CIIL)

- Managed by the **Central Institute of Indian Languages**.
- Functions as a **digital repository** of dictionaries, folktales, primers, and recorded oral knowledge.
- Supports scholars, translators, and linguists in documenting **endangered languages and regional variations**.

3. BharatGen

- A multilingual **AI model** developed under MeitY.
- Supports **Text-to-Text and Text-to-Speech** translation.

- Uses linguistic datasets from **SPPEL and Sanchika** for accurate Indian language understanding.
- Helps create **locally relevant AI applications** in administration, media, and education.

4. Adi-Vaani

- Developed by the **Ministry of Tribal Affairs (MoTA)** in 2024.
- India's first **AI platform dedicated to tribal language preservation**.
- Supports **Santali, Bhili, Gondi, Mundari**, and others using **NLP + Speech Recognition**.
- Helps **tribal communities** engage digitally while preserving oral traditions.

5. GeMAI (Government e-Marketplace AI Assistant)

- Provides **voice-based support** in regional languages for small traders and artisans.
- Helps local entrepreneurs navigate **procurement and marketplace services**.

6. Anuvadini (AICTE)

- Translates **technical, law, engineering, and medical textbooks** into Indian languages.
- Aligns with **NEP 2020** goal of **education in the mother tongue**.

7. e-KUMBH

- A **digital library** offering free technical and higher-education materials in regional languages.

8. SWAYAM

- India's leading **MOOC platform** offering **multilingual courses** to over five crore learners.
- Strengthens higher education **access and inclusivity**.

Supportive National and Institutional Initiatives

1. SPPEL (Scheme for Protection and Preservation of Endangered Languages)

- Launched in **2013** to document languages spoken by **fewer than 10,000 speakers**.
- Creates **audio, text, and video corpora** for future learning and AI research.

2. TRI-ECE (MoTA)

- Promotes **AI-supported translation tools** to translate between **tribal languages and mainstream Indian languages**.
- Ensures **community involvement** in preservation efforts.

3. National Translation Mission (NTM)

- Aims to **translate academic and knowledge texts** into Indian languages.
- Democratizes higher education.

4. National Mission on Manuscripts (NMM)

- Digitizes and preserves **ancient manuscripts** in Sanskrit, Pali, Prakrit, and regional languages.

Broader Impact of Multilingual Technology Platforms

1. Governance

- Citizens can access **government services** in their local language.
- Enhances **participation, transparency, and trust**.

2. Education

- Multilingual digital learning improves **comprehension and inclusivity**.
- Reduces educational inequality among rural and tribal learners.

3. Cultural Preservation

- Digitizing languages helps **protect oral histories and traditions**.
- Prevents language loss in the era of globalization.

4. Economic Inclusion

- Supports small businesses and artisans by enabling **language-friendly access** to e-commerce and financial systems.

5. Research and Innovation

- Builds **large multilingual datasets**, strengthening India's **AI and language technology ecosystem**.

Conclusion

India's language inclusion strategy blends **technology with cultural preservation**, ensuring that linguistic diversity thrives in a digital world. Platforms like **Bhashini, BharatGen, and Adi-Vaani** are empowering citizens while safeguarding cultural identity. These initiatives position India as a **global leader in multilingual digital innovation and inclusive development**.

NATIONAL BLOCKCHAIN FRAMEWORK (NBF)

SOURCE: PIB

Why in News?

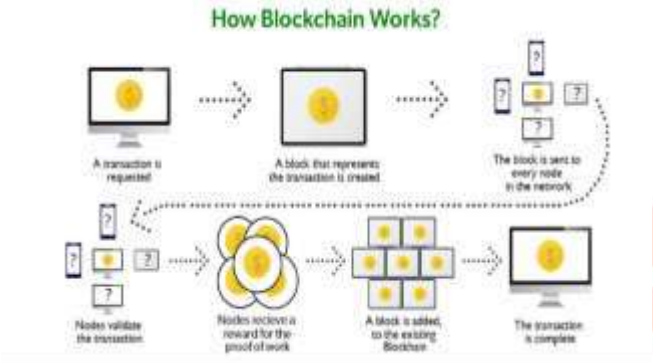
The Government of India launched the **National Blockchain Framework (NBF)** in **September 2024** to strengthen transparency and trust in public digital services.

As of **October 2025**, more than **34 crore official documents** have already been authenticated using blockchain under NBF, demonstrating its large-scale adoption.

About Blockchain technology

- **Blockchain technology** has emerged as a foundational tool for improving data trust, transparency, and verification in governance.

- Unlike traditional data systems that depend on centralized intermediaries, a blockchain operates as a **distributed, secure, and tamper-proof ledger**.
- India's **National Blockchain Framework (NBF)** aims to establish a unified architecture for building **scalable, verifiable, and citizen-centric digital public services**.
- It aligns with the goals of **Digital India** and **Aatmanirbhar Bharat** to promote **indigenous innovation** and reduce dependence on foreign digital ecosystems.



What is the National Blockchain Framework (NBF)?

NBF is India's **national-level blueprint** for integrating blockchain across government sectors.

It provides:

- A **uniform reference architecture**
- Shared blockchain infrastructure
- Tools for secure data verification
- Support for research, startups, and application deployment

Core Components of NBF

1. Vishvasya Blockchain Stack

- A **modular and indigenous blockchain platform** to build government-grade applications.
- **Blockchain-as-a-Service (BaaS):** Allows government departments to deploy applications without installing separate blockchain networks.
- **Distributed Infrastructure:** Operates across **NIC Data Centres** (Bhubaneswar, Pune, Hyderabad) ensuring **high availability**.
- **Permissioned Network:** Only verified government entities participate, preventing misuse.
- **Open APIs:** Enables secure interoperability between government databases.

2. NBFLite

- A **sandbox environment** for startups, students, research labs and innovators.
- Enables **prototype development and testing** before large-scale deployment.

3. Praamaanik

- A blockchain-based service to **verify authenticity of mobile applications**.
- Helps protect users from **fake apps, malware, and data fraud**.

4. National Blockchain Portal

- A central platform offering:
  - Policy guidance
  - Standard operating procedures
  - Access to blockchain demo applications and developer tools

How NBF is Transforming Governance

1. Certificates & Public Records

- Academic, caste, income, and birth certificates stored as **tamper-proof digital entries**.
- Over **34 crore certificates** verified—reducing document fraud.

2. Logistics & Supply Chain

- Used in **Karnataka's Aushada system** to trace pharmaceutical supply chains and prevent **fake drugs**.

3. Judiciary & Criminal Justice Chain

- Records judicial orders and summons securely.
- The **Inter-operable Criminal Justice System (ICJS)** connects police, courts, jails, and forensic institutions.

4. Property Chain

- Land ownership and property transfers recorded on blockchain.
- Ensures **clear title history** and reduces litigation.

Supporting National Blockchain Adoption

- **National Strategy on Blockchain (MeitY):** Provides a national roadmap to promote blockchain use across sectors with standards, policy guidance, and research support.
- **NIC Centre of Excellence:** Offers technical expertise and conducts pilot blockchain projects for government implementation.
- **TRAI:** Uses blockchain-based Distributed Ledger Technology (DLT) to stop spam and fraudulent SMS communications.
- **RBI:** Pilots the **Digital Rupee (e₹)** using blockchain to enable secure, traceable, and real-time digital payments.
- **NSDL:** Uses blockchain to maintain **Debenture Covenant Monitoring System**, ensuring tamper-proof tracking of corporate financial obligations for investor protection.

Conclusion

The **National Blockchain Framework** is a major step toward **trust-based digital governance**. By integrating **indigenous technology, regulatory support, and skill development**, India is positioning itself as a **global leader in secure digital public infrastructure**. The effective expansion of NBF can significantly strengthen **transparency, accountability, and citizen empowerment**.

INDIA'S 6G VISION - 2ND INTERNATIONAL BHARAT 6G SYMPOSIUM

SOURCE: PIB

Why in News?

At the **India Mobile Congress (IMC) 2025**, India hosted the **2nd International Bharat 6G Symposium**, emphasizing its growing leadership in next-generation telecom technologies. The event showcased India's progress towards a **self-reliant 6G ecosystem**, aligning with the long-term goal of **Viksit Bharat 2047**.

Key Outcomes of the 2nd Bharat 6G Symposium

1. New Delhi Declaration on 6G

- Global telecom alliances, including **Bharat 6G, Europe's 6G-IA, and North America's Next G Alliance**, jointly released a declaration.
- The declaration positions 6G as a **global public good** guided by five principles:
    - Secure and Trusted Networks
    - Resilient and Reliable Infrastructure
    - Open and Interoperable Systems
    - Inclusive and Affordable Connectivity
    - Sustainable and Efficient Deployment
- It also promotes **collaborative research, open standards, and workforce development**.

2. Economic Vision and Global Positioning

- India aims for:
    - **USD 1.2 trillion economic contribution** from 6G by **2035**
    - **10% of global 6G patents**
    - **Threefold increase** in satellite communication infrastructure by **2033**
- The symposium displayed India's **indigenous 4G core**, highlighting readiness to export telecom solutions to developing countries.

3. Collaboration and Technology Co-creation

- Strong emphasis on **industry–academia partnerships**, innovation centers, and startup participation.
- India demonstrated a move from being a **consumer of telecom equipment** to **producer and exporter**, supported by:
    - 1 lakh+ **indigenously deployed 4G towers**
    - Expansion of local telecom manufacturing under **PLI schemes**.

Bharat 6G Vision

Launched in **2023**, **Bharat 6G Vision** aims to make India a **leader and co-developer of 6G technologies** by **2030**, focusing on **affordability, sustainability, security, and universal connectivity**.

1. Bharat 6G Alliance (B6GA)

- A platform linking **government, industry, academia, and startups**.
- Works on:
    - **Spectrum strategy**
    - **Hardware and software innovation**
    - **Sustainable telecom deployments**
- MoUs signed with global bodies (USA, Europe, South Korea, Finland, Brazil) to align research and international standards.
- As of July 2025, B6GA has **80+ member organizations**.

2. Bharat 6G Mission

- Focuses on:
    - **Indigenous R&D and patents**
    - **Talent development**
    - **Trusted supply chains**
    - **Environmental sustainability**
- Ensures that future telecom innovation is **rooted in Indian research ecosystems**.

3. Infrastructure and R&D Support

- Government funded:
    - **6G THz Testbed**
    - **Advanced Optical Communication Testbed**
- **100 5G labs** established to train a 6G-ready workforce.
- **104 research proposals** approved for developing **6G network systems and components**.

Challenges Ahead

Challenge	
Infrastructure Readiness	Dense fiber networks, advanced semiconductors, and domestic hardware manufacturing are still limited.
Limited R&D Output	Patent generation and breakthrough innovations lag behind global leaders.
Spectrum Uncertainty	THz band standards are evolving, requiring international coordination.
Skill Shortages	Need trained professionals in AI, photonics, quantum communication, network science.
Affordability Concerns	Risk of widening digital divide without inclusive rollout policies.
Cybersecurity Risks	More devices and faster networks increase vulnerability to data breaches.

Conclusion

India's 6G push reflects its transition from a **technology-dependent nation** to a **technology-shaping power**. By strengthening **R&D ecosystems, global partnerships, and skilled workforce development**, India is laying the foundation for a **secure and inclusive digital future**. This effort supports the broader national aspiration of building a **technologically advanced and globally connected Viksit Bharat by 2047**.

PRELIMS POINTERS IN NEWS

BENZENE

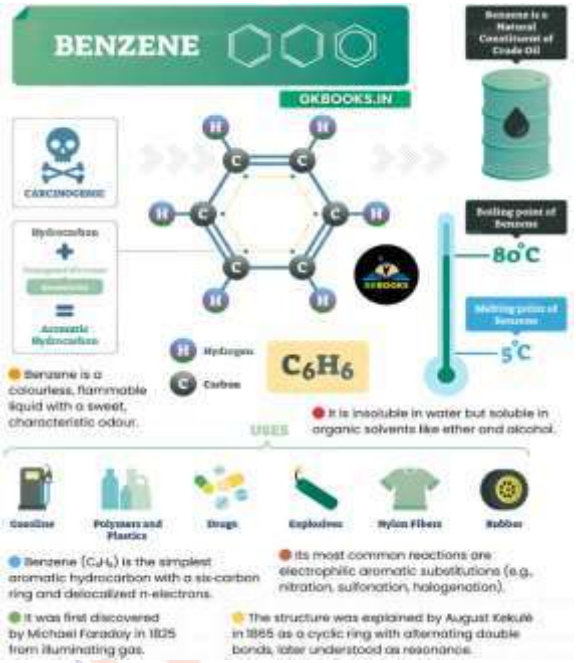
SOURCE: THE HINDU

Why in News?

Two centuries after its discovery, benzene remains central to global chemical industries, prompting renewed interest in its legacy and applications. The discussion also revives concerns related to its toxicity and long-term health effects.

About Benzene

Benzene is a simple yet influential aromatic compound widely used in industrial processes. While essential for manufacturing several materials, it is also a recognized carcinogen, requiring strict regulatory control.



Discovery and Nature

- First isolated in **1825** by **Michael Faraday** from illuminating gas.
- **August Kekulé** later proposed its revolutionary **cyclic structure**, a milestone in organic chemistry.
- Colourless liquid with a **sweet smell**; evaporates quickly.

Properties

- Slight solubility in water and high flammability.
- Naturally formed from **volcanic activity** and **forest fires**.
- Part of the **BTEX group** (Benzene, Toluene, Ethylbenzene, Xylene).
- Base chemical for many polymers and intermediates.

Industrial Applications

- Fundamental in producing **styrene**, **phenol**, **cyclohexane**, **nylon**, and **polystyrene**.
- Used in manufacturing **rubber, dyes, detergents, lubricants, drugs, and pesticides**.
- Important building block for **synthetic fibres** and resins.

Health and Environmental Impact

- **Long-term exposure** can cause serious blood disorders, including
  - **Acute Myeloid Leukemia (AML)**
  - **Aplastic anaemia**

- **Myelodysplastic syndrome**
- Affects bone marrow and immune system.
- Benzene vapours contribute to **air pollution** and household exposure.

Regulation and Safety

- Strict workplace regulations in industries.
- Monitoring of ambient benzene levels in urban areas due to traffic emissions.
- Promotion of clean fuels to reduce benzene-related pollution.

AMMONIUM NITRATE

SOURCE: THE HINDU

Why in News?

A blast near Delhi's **Red Fort** has raised concerns over the use of **Ammonium Nitrate**, suspected to be used by a white-collar terror module linked to **Jaish-e-Mohammed**. The incident has renewed debate on the **misuse of dual-use chemicals** for IEDs and terror attacks.

About Ammonium Nitrate

- **Chemical formula:** NH_4NO_3; a white, crystalline, nitrogen-rich inorganic compound.
- **Nature:** Classified as an **oxidizing agent**, meaning it accelerates combustion but is not explosive by itself.
- **Melting point:** Around 170°C; highly **water-soluble**.

Legitimate Industrial Uses

- **Agriculture:** Used as a **nitrogen-based fertilizer**, especially in rain-fed and mountainous areas.
- **Mining & Infrastructure:** Used in **controlled blasting** for quarrying, tunneling, and road construction.
- Key component in commercial **emulsion explosives and gels**.

Weaponization Potential

- **Pure ammonium nitrate is not explosive**, but when mixed with **fuel oil, potassium chlorate, sulfur**, or diesel, it forms **ANFO (Ammonium Nitrate Fuel Oil)**—a powerful explosive.
- ANFO requires **detonators like RDX or TNT** for triggering.
- Widely used in **Improvised Explosive Devices (IEDs)** by terror groups.

Use in Major Attacks

- Previously used in **Pulwama (2019)**, Hyderabad (2013), Mumbai & Delhi blasts (2000-2011), and other attacks by **Indian Mujahideen** and **Jaish-e-Mohammed**.

Regulation in India

- Governed by **Ammonium Nitrate Rules, 2012** under **Explosives Act, 1884**.
- Requires **PESO license** for import, export, storage, or transport.
- Any mixture containing **over 45% ammonium nitrate** is legally treated as an explosive.
- Storage in **densely populated or unauthorized areas** is strictly prohibited.

LARGEST EVER BLACK HOLE FLARE DISCOVERED

SOURCE: THE HINDU

Why in News?

Astronomers detected the **largest and most distant flare ever recorded**, originating from the **supermassive black hole in AGN J2245+3743**, located **10 billion light-years away**. The event was linked to a **tidal disruption event (TDE)**—when a black hole consumes a massive star.

What is a Tidal Disruption Event (TDE)?

- Occurs when a star strays too close to a **supermassive black hole**.
- The black hole's gravity **tears the star apart**, releasing massive energy.
- Produces an **extremely bright flare**, detected across wavelengths—X-ray, optical, radio, and gamma-ray.

Key Features of This Flare

- The flare's brightness increased **40 times in a few months**, reaching **30 times more luminosity** than any previously recorded black hole flare.
- Released energy equivalent to **10 trillion suns**.
- Confirmed by **Keck Observatory (2023)**.

- The star consumed was around **30 times the mass of the Sun**, significantly larger than typical stars involved in TDEs.

Time Dilation Effect

- Due to extreme gravity, time slows near a black hole — known as **General Relativistic Time Dilation**.
- This allowed scientists to **observe the event in slower motion**, providing valuable clues into black hole physics.

Difference: Black Hole Flare vs Solar Flare

Feature	Black Hole Flare	Solar Flare
Cause	Star disrupted by black hole's gravity	Magnetic field reconnection on Sun
Energy	10 trillion suns	10,000-100,000× less energetic
Duration	Months to years	Minutes to hours
Trigger	Tidal Disruption	Magnetic Explosion

Conclusion

This flare provides **unprecedented insight into black hole behavior, gravity, and space-time distortions**. It is a landmark discovery in understanding **galaxy evolution and cosmic energy dynamics**. Such events help improve knowledge of the **universe's most mysterious and powerful objects**.

MICROPLASTICS

SOURCE: INDIAN EXPRESS

Why in News?

A recent study shows that **continuous rainfall** intensifies the flow of **microplastics** into urban lakes, raising concerns over water quality and ecosystem health.

About Microplastics

Microplastics—minute plastic fragments less than **5 mm**—have emerged as a pervasive global pollutant. Their persistence, mobility, and toxicity make them a major environmental and public-health challenge.

Types of Microplastics

1. Primary Microplastics

- Intentionally manufactured tiny particles used in:
  - **Cosmetics**, exfoliants
  - **Microfibers** from synthetic clothing
  - Industrial abrasives
- Enter the environment directly through wastewater, spills, or abrasion.

2. Secondary Microplastics

- Formed by the **breakdown of larger plastics** (bottles, bags, fishing nets).
- Degraded by **UV radiation, waves, heat, and mechanical friction**.

Chemical Composition

- Composed of polymers of **carbon and hydrogen**.
- Often contain harmful additives like:
  - **Phthalates**
  - **PBDEs** (flame retardants)
  - **TBBPA**
- These leach into ecosystems, amplifying toxicity.

Environmental & Health Impacts

- **Non-biodegradable**; persist for decades.
- Ingested by fish, birds, plankton → **bioaccumulation** and **biomagnification**.
- Can block digestive tracts, reduce fertility, and impair growth in aquatic organisms.
- Enter human food chains via **seafood, water, salt, and even air**.
- Linked to inflammation, endocrine disruption, and potential carcinogenic effects.

Mitigation Strategies

- Bans on microbeads in cosmetics.
- Efficient wastewater filtration technologies.
- Promoting biodegradable materials.
- Extended Producer Responsibility (EPR).
- Strengthening global conventions like **UN Plastics Treaty (under negotiation)**.

2025 NOBEL PRIZE IN PHYSIOLOGY OR MEDICINE

The **2025 Nobel Prize in Physiology or Medicine** has been awarded for breakthroughs in **peripheral immune tolerance**, bringing global focus back on immunology.

What is Immunology?

Immunology is the branch of medical science that studies the **immune system**, the body's defence mechanism against harmful agents such as viruses, bacteria, fungi, parasites, and foreign substances.

- It examines how the body identifies pathogens and protects itself.
- It also studies breakdowns in immune regulation leading to **autoimmune disorders**, allergies, cancers, organ-transplant rejection, and chronic inflammation.
- Modern tools like monoclonal antibodies, immunotherapies, and vaccines are direct products of immunological research.

Why Immunology Matters for India

1. India's Dual Disease Burden

- India faces parallel threats: **communicable diseases** (TB, dengue, HIV, COVID-like outbreaks) and **non-communicable diseases** (autoimmune disorders, cancers).
- Immunology provides solutions to both—ranging from vaccines to cutting-edge cancer immunotherapies.

2. Large Population = Global Research Opportunity

- India's vast population and genetic diversity provide a unique setting to study immune responses and disease patterns.

3. Pandemic Preparedness

- COVID-19 demonstrated that countries with strong immunology ecosystems-controlled mortality and developed vaccines faster.

4. Economic and Strategic Value

- Nations leading in immunology shape global pharma markets, supply chains, and biotech innovation. India must shift from being a *consumer* to a **producer of immunological technologies**.

Government Initiatives Supporting Immunology

1. Department of Biotechnology (DBT)

- Funds research on vaccines, monoclonal antibodies, and infectious disease immunology.

2. Indian Council of Medical Research (ICMR)

- Supports translational research in TB, malaria, autoimmune disorders, and epidemiology.

3. National Institutes & Missions

- **National Institute of Immunology (NII)** – flagship institute advancing fundamental immunology.
- **BIRAC** – promotes academia–industry partnerships in biosimilars, cell therapies, and affordable vaccines.
- **National Biopharma Mission** – supports development of next-generation biologics.

4. Mission COVID Suraksha (2020)

- Boosted India's domestic vaccine development pipeline.

Challenges Hindering India's Immunology Ecosystem

1. Limited Immunology Education

- Medical curricula give **minimal exposure** to molecular biology, immunotherapy, and advanced immune mechanisms.
- Only a few institutes offer competitive immunology training.

2. Funding and Infrastructure Gaps

- Research funding is often short-term and risk-averse.
- Limited high-containment (BSL-3/4) laboratories restrict breakthrough work in viral immunology.

3. Weak Translational Pathways

- Discoveries often remain in academic labs due to poor clinician–scientist collaboration.
- Industry uptake of basic discoveries is slow.

4. High Cost of Immunotherapies

- Advanced treatments like **CAR-T cell therapy** cost ₹30–40 lakh, making them inaccessible for most citizens.

5. Regulatory Fragmentation

- Overlapping approval processes across DBT, ICMR, CDSCO delay trials and innovation.
- India lacks a unified biomedical regulatory authority.

6. Under-utilised Public Health Data

- Immunogenomic mapping and immune surveillance systems are still evolving, limiting predictive responses to outbreaks.

Way Forward

1. Strengthen Education and Human Capital

- Revise medical and life-science curricula to include immunology as a core subject.
- Set up **Regional Immunology Training Centres** with hands-on training in Flow Cytometry, ELISA, Immunoassays, and Genomics.

2. Boost Research & Infrastructure Funding

- Allocate **15–20% of national life-science funding** to immunology.
- Establish Regional Immunology Research Centres and Biobanks for immunogenetic data collection.

3. Promote Translational Innovation

- Encourage academia–industry collaborations through BIRAC.
- Incentivise development of **low-cost immunotherapies** and **indigenous biosimilars**.

4. Policy Integration & Global Cooperation

- Embed immunology into India's **National Health Policy** and **Pandemic Preparedness Plan**.
- Collaborate with WHO, CEPI, and global immunology networks.

Conclusion

India is at a critical juncture where **advancing immunology can transform public health, strengthen biotech capabilities, and boost global leadership**. By investing in research, training, and innovation, India can bridge gaps and emerge as a hub of immunological breakthroughs. A stronger immunology ecosystem will ensure better preparedness, inclusive healthcare, and long-term national resilience.

Mains Question

Q. "Discuss the significance of strengthening immunological research in India in the context of rising infectious and non-communicable diseases. How can India bridge existing gaps to become a global leader in immunology?" (150 WORDS / 10 MARKS)

SECURITY

PRELIMS POINTERS IN NEWS

INS IKSHAK – INDIGENOUS SURVEY VESSEL

SOURCE: PIB

Why in News?

The Indian Navy is set to commission **INS Ikshak**, an indigenously built **Survey Vessel (Large)** at Kochi. The ship marks a major step in India's push for self-reliance in maritime infrastructure and oceanographic capabilities.

Key Characteristics

- Name **Ikshak** means *"The Guide"*, reflecting its role in mapping unexplored waters.
- Built by **Garden Reach Shipbuilders & Engineers (GRSE)**, Kolkata.
- More than **80% indigenous content**, showcasing the success of **Atmanirbhar Bharat** in defence.

Technical Features

- Dimensions: **110 m long**, **16 m wide**, displacement of **3,400 tons**.
- Equipped with **two main engines**, twin-shaft propulsion.
- **Cruising speed:** 14 knots; **maximum speed:** 18 knots.
- Equipped with modern survey equipment like multi-beam echo sounders, shallow water sensors, and oceanographic systems.

Roles and Operational Capability

- Primary role: **hydrographic surveys** for producing navigational charts for the Navy, merchant ships, and coastal development.
- Dual-role capability allows the vessel to be used as a **Humanitarian Assistance and Disaster Relief (HADR)** platform.
- Can function as a **hospital ship** during crises, natural disasters, or wartime emergencies.
- First ship in its class with **dedicated accommodation for women officers and sailors**.

Strategic Significance

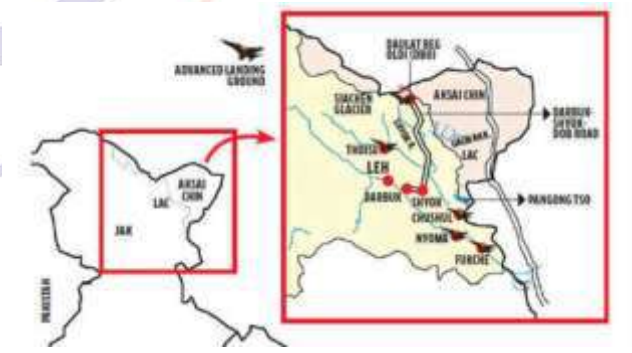
- Enhances India's ability to map the **Indian Ocean Region (IOR)** accurately.
- Supports naval operations, fishing safety, port development, and sea-lane security.
- Strengthens India's maritime diplomacy by providing survey assistance to friendly nations.

NYOMA AIRBASE

SOURCE: TIMES OF INDIA

Why in News?

India recently inaugurated the **Nyoma Advanced Landing Ground (ALG)** in eastern Ladakh, which is now the **country's highest fighter-capable airbase**, built by the **Border Roads Organisation (BRO)**. This strategic facility enhances India's rapid air deployment and surveillance capabilities near the **Line of Actual Control (LAC) with China**.



Strategic Importance of Nyoma Airbase

- Located just **35 km from the LAC**, offering **quick-response capability** against any Chinese aggression.
- Helps counter the **PLA's military infrastructure buildup** and deployment in eastern Ladakh since 2020.
- Strengthens India's **forward posture**, enabling rapid mobilization of troops, weapons, and surveillance assets.

Key Capabilities

- Supports **fighter jet operations**, including aircraft like **Rafale, Su-30 MKI, and transport aircraft (C-130J, Chinook)**.

- Enhances **logistical supply**, medical evacuation, troop rotation, and advanced surveillance.
- Acts as a hub for **drone operations**, precision-guided weapons, and high-altitude warfare technology.

Broader Strategic Impact

- Boosts India's **AatmaNirbhar Bharat in defence infrastructure**.
- Complements nearby bases like **Daulat Beg Oldie (DBO), Fukche, and Thoise**, creating a strong air defence grid along the northern borders.
- Symbolizes India's readiness for **multi-domain warfare** in high-altitude terrain.

JAVELIN MISSILE & EXCALIBUR PROJECTILE

SOURCE: THE HINDU

Why in News?

The **U.S. State Department** approved the sale of **Javelin anti-tank missiles** and **Excalibur guided artillery shells** to India worth **USD 92.8 million**.

About the Javelin Missile

1. Key Features

- **Man-portable**, fire-and-forget anti-tank missile.
- Developed by **Raytheon** and **Lockheed Martin**.
- Effective range: **2.5 km** (new variants up to 4 km).
- Weight: **~5.1 kg** (missile), making it highly portable.
- Uses **infrared imaging seeker** enabling the operator to fire and immediately take cover.

2. Operational Advantages

- **Top-attack mode**: strikes the weakest armour on tanks.
- **Direct-attack mode**: for bunkers, buildings, and helicopters.
- Soft-launch mechanism allows firing from **confined spaces**.
- **Tandem HEAT warhead** defeats explosive reactive armour.

About the Excalibur Projectile

1. What is Excalibur?

- A **GPS-guided 155 mm artillery shell** designed for long-range precision strikes.
- Jointly developed by **U.S. Army Research Laboratory** and **ARDEC**.
- Used with India's **M-777 Ultra-Light Howitzers**.

2. Features

- **Accuracy within 2 metres**, minimizing collateral damage.
- Extends artillery range to:
  - 40 km (39-calibre guns)
  - 50 km (52-calibre guns)
  - 70 km (58-calibre guns)
- Useful in **mountain warfare**, counter-insurgency, and high-value target engagement.

Strategic Significance for India

- Enhances India's deterrence against heavily armoured forces.
- Crucial for **LAC deployment** given terrain constraints.
- Supports modernization under **Aatmanirbhar Bharat**, as India is simultaneously developing indigenous ATGMs.
- Ensures interoperability with U.S. systems under **COMCASA**.

PATRIOT AIR DEFENCE SYSTEM

SOURCE: THE HINDU

Why in News?

Western allies, notably **Germany**, have supplied Ukraine with additional **Patriot air defence systems** to counter intensified Russian strikes. The deployment highlights Patriot's strategic value in defending critical infrastructure and civilian areas.

About Patriot Air Defence System

- The **Patriot** is a long-range, mobile **Surface-to-Air Missile (SAM)** system designed for intercepting aircraft, cruise missiles and short- to medium-range ballistic missiles. It is a vital component of layered air defence.

System Capabilities

- **Radar & Detection:** Phased-array radar detects and tracks targets at distances exceeding **150 km**.
- **Engagement envelope:** Capable of intercepting aerial threats at altitudes up to **~20 km** with high accuracy.
- **Mobility:** Road-mobile launcher units allow rapid redeployment and survivability.
- **Interoperability:** Integrates with other air-defence layers for a multi-tiered defence posture.

Variants & Evolution

- Modern upgrades (PAC-2, PAC-3) improved **hit-to-kill capability**, reduced reaction time, and enhanced tracking.
- Interoperable command systems allow networked defence across several batteries and allied forces.

Strategic Significance

- **Area Defence:** Protects cities, military bases, critical infrastructure and population centres from missile barrages.
- **Deterrence:** Presence of Patriot batteries can deter adversary missile use or force targeting changes.
- **Allied Support:** Transfers to Ukraine reflect coalition logistics and shared air-defence commitments.

Global Context & Alternatives

- Many nations combine Patriot with systems like **S-400 (Russia)**, **Iron Dome (Israel)**, **THAAD (US)** or indigenous systems (India's **Akash, PAD, QRSAM**).
- No single system is foolproof; layered defences and early warning are essential.

Limitations

- High cost and maintenance overheads.
- Vulnerable to saturation attacks (large salvoes) and complex countermeasures like low-signature drones.
- Requires robust logistics, trained crews and integrated sensors.

ARMY TACTICAL MISSILE SYSTEM (ATACMS)

SOURCE: THE HINDU

Why in News?

Ukraine recently announced that it used **US-supplied ATACMS missiles** to strike targets inside Russia, marking a major escalation in its long-range strike capability. The development has renewed global attention on ATACMS' technological, strategic, and geopolitical relevance.

Key Features of ATACMS

1. Technical Specifications

- **Manufacturer:** Lockheed Martin
- **Type:** Tactical ballistic missile
- **Range:** Up to **300 km** (varies by variant)
- **Guidance:** Inertial + GPS-based navigation
- **Launch Platforms:**
  - **M270 MLRS** (tracked)
  - **M142 HIMARS** (wheeled, highly mobile)
- **Propulsion:** Single-stage solid propellant
- **Cost:** Approx. $1.5 million per missile

2. Warhead Options

- **Unitary HE warhead:** Capable of destroying fortified structures and bunkers.
- **Cluster warhead:** Releases hundreds of bomblets for area-wide damage against armour and troop concentrations.
- **High terminal velocity** enables penetration and makes interception difficult.

3. Battlefield Advantages

- **Fire-and-forget precision** ensures minimal operator exposure.
- **High-mobility launchers** enable rapid relocation to avoid counter-battery fire.
- **All-weather, day-night capability** allows continuous operations.

- **Top-attack mode** enhances lethality against tank formations.

4. Global Operators

- Besides the US, ATACMS is also used by **Bahrain, Greece, South Korea, Taiwan, and UAE**.
- Its role in Ukraine has demonstrated its effectiveness in **deep-strike missions**, targeting command posts, airfields, logistics hubs, and long-range artillery systems.

Geopolitical Significance

- Strengthens NATO and partner deterrence capability.
- Influences the **Russia-Ukraine conflict dynamics** by expanding Kyiv's strike depth.
- Signals U.S. willingness to provide advanced weaponry to allies.

SOCIETY

PRELIMS POINTERS IN NEWS

SANGAI FESTIVAL, MANIPUR

SOURCE: THE HINDU

Why in News?

The **Sangai Festival 2025** opened amid protests by **internally displaced persons (IDPs)** and civil society groups, affecting public participation and drawing nationwide attention.

About the Festival

- Named after the **Sangai deer**, Manipur's state animal.
- Exhibits Manipuri **dance, music, martial arts, crafts, and cuisine**.
- The classical dance **Ras Leela** is a key attraction.
- **Theme 2025:** *"Where Blossoms Breathe Harmony."*
- Aims to promote cultural diplomacy, boost tourism, and support local artisans.

About Sangai (Eld's Deer Subspecies)

- **Scientific Name:** *Rucervus eldii eldii*.
- **Status:**
  - **IUCN:** *Critically Endangered*
  - **Wildlife Protection Act, 1972:** *Schedule I*
- Locally celebrated as the **"dancing deer"** due to its delicate movement on floating vegetation.
- **Distribution:**
  - Exclusively found in **Keibul Lamjao National Park (KLNP)**, the world's **only floating national park**, located on **Loktak Lake**.
- **Habitat:**
  - Lives on **phumdis**—floating mats of organic matter.
- **Appearance:**
  - Medium-sized deer with **long brow tines** forming distinctive, curved antlers.

Threats

- Shrinking phumdi habitat due to hydrological changes.
- Illegal hunting and habitat fragmentation.
- Human disturbance from tourism and settlement pressures.
- Climate impacts on Loktak Lake's water levels.

Conservation Efforts

- **KLNP protection measures** and anti-poaching units.
- Loktak Lake eco-restoration programmes.
- Community-based conservation and livelihood support for locals.
- Captive breeding and genetic monitoring initiatives.

RAULANE FESTIVAL

SOURCE: THE HINDU

Why in News?

Pictures of the **Raulane Festival** of Kinnaur, Himachal Pradesh went viral recently, drawing public interest in this rare cultural tradition.

The festival showcases ancient Himalayan beliefs and rituals linked to "Sauni" celestial spirits.

About Raulane Festival

The Raulane Festival is a **5,000-year-old winter tradition** of Kalpa village in Himachal Pradesh. It reflects the deep spiritual connection between Himalayan communities, nature, and local deities. The festival's rituals aim to ensure protection, warmth, and well-being during harsh winters.

Cultural Background

- Celebrated mainly in **Kalpa, Kinnaur district**.
- Held during **early winter or early spring**, based on local lunar calendars.
- Commemorates **Saunis** — celestial fairies believed to safeguard villagers and livestock.

Main Rituals and Events

1. Symbolic "Divine Marriage"

- Two men ceremonially represent the divine couple:
  - **Raula (groom)**
  - **Raulane (bride)**
- They act as mediums for the Sauni spirits.
- Considered vessels through which divine blessings pass to the community.

2. Sacred Costume and Ornaments

- The pair wear:
  - Heavy wool garments
  - Pure silver ornaments
  - Intricate wooden masks
- These symbolize purity, protection, and ancient lineage.

3. Ritual Dance at Nagin Narayan Temple

- A slow, meditative dance performed by the couple.
- Drums, horns, and chants accompany the ritual.
- Represents the balancing of energies, harmony, and warding off misfortune.

4. Community Participation

- Entire village joins in rhythmic movements.
- Offerings are made to local deities for health and prosperity.
- Strengthens social unity and cultural identity.

Cultural Significance

- Preserves **pre-Buddhist Himalayan traditions**.
- Highlights **nature worship**, the importance of spirit guardians, and seasonal cycles.
- Reinforces community bonds in high-altitude environments.

MARAM NAGA TRIBE

SOURCE: THE HINDU

Why in News?

The Centre recently approved **₹9 crore under the Jan Man Scheme** for the welfare and cultural preservation of the **Maram Naga tribe** of Manipur. The funds will support socio-economic development and protection of tribal heritage.

About the Maram Naga Tribe

1. Origin and Location

- Primarily inhabit **Senapati district** of Manipur.
- Also present in parts of **Myanmar**.
- Part of the larger **Naga ethnic group** with Tibeto-Burman roots.

2. Language and Script

- Speak the **Maram language**, belonging to the **Sino-Tibetan language family**.
- Variations in dialect arise due to geographical separation.
- Use **Roman script** for writing.

3. Occupation and Lifestyle

- **Agriculture is the main livelihood**.
- Practise **shifting (jhum) cultivation** along with wet rice farming.
- Secondary occupations include hunting and animal rearing.
- Community life is rooted in village councils and traditional norms.

4. Belief System and Festivals

- Worship **supernatural forces**, both benevolent and malevolent.
- Major festivals:
  - **Punghi** (July) — agricultural celebration.
  - **Kanghi** (December) — marks end of harvest.
  - **Mangkang** (April) — unique festival honouring women.
- Rich heritage of folk songs, dances, and customary rituals.

5. Cultural and Historical Importance

- Known for traditional attires, bamboo craft, and warrior heritage.
- Strong sense of community, clan identity, and ecological knowledge.
- Preservation efforts are vital due to increasing exposure to modern influences.

TELANGANA'S SHATAVAHANA HERITAGE

The **Shatavahanas**, also known as the **Andhras**, were among the earliest imperial powers to emerge in the Deccan after the decline of the Mauryan Empire.

- Between the **1st century BCE and 3rd century CE**, they ruled vast regions covering present-day **Telangana, Andhra Pradesh, Maharashtra, Karnataka**, and parts of Madhya Pradesh.
- Telangana formed the **geographical and cultural core** of their empire, nurturing a rich legacy in art, architecture, trade, religion, and governance.
- The Shatavahana period marks the **earliest historical phase of Telangana**, laying the foundation for Telugu cultural evolution and Deccan polity.

Origins and Political Expansion

The Shatavahanas rose to prominence after the Mauryans withdrew from the Deccan. Their earliest capital is believed to have been **Kotilingala** (Karimnagar district), making Telangana central to their emergence. Later capitals shifted to **Pratishthana (Paithan)** in Maharashtra and **Amaravati** in Andhra.

Key rulers associated with Telangana include:

Ruler	Period (Approx.)	Key Contributions/Events Linked to Telangana	Important Sites/Finds
Simuka	c. 1st century BCE	Considered the **founder** of Shatavahana dynasty; early consolidation happened around present-day Telangana.	Coins found at **Kotilingala**, indicating it was an early capital.
Satakarni I	c. 1st century BCE	Expanded control in Deccan; issued inscriptions and coins found in Telangana; supported early Buddhist settlements.	Finds at **Peddabankur, Kotilingala**.
Gautamiputra Satakarni	c. 106–130 CE	Greatest Shatavahana ruler; restored imperial power; his rule strengthened Telangana's administrative and trade centres.	**Kondapur, Dhulikatta**.
Vashishtiputra Pulumavi	c. 130–159 CE	Encouraged trade and Buddhist patronage; several settlements in Telangana flourished under his reign.	Roman coins and artefacts at **Kondapur**, Buddhist remains at **Phanigiri**.
Yajna Sri Satakarni	c. 165–195 CE	Revived the empire during its later phase; strengthened maritime trade affecting inland Telangana routes.	Artwork and structures in **Dhulikatta, Phanigiri** point to continued patronage.

Key Shatavahana Sites in Telangana

1. Kotilingala (Karimnagar)

- Considered the **earliest Shatavahana capital**.
- Archaeological finds include punch-marked coins, seals, brick structures, and early fortifications.
- Coins of **Simuka, Satakarni, and Pulumavi** were discovered here, proving its central administrative role.

2. Dhulikatta (Peddapalli district)

- A thriving **Buddhist centre and fortified township**.
- Excavations revealed a stupa with limestone railings, structured brick buildings, coins, and Roman trade goods.
- Indicates active foreign trade and Buddhist patronage.

3. Phanigiri (Suryapet)

- One of the **largest Buddhist complexes** in Telangana.
- Contains viharas, chaityas, stupas, and relic caskets.

- Developed between the 1st century BCE and 3rd century CE, showcasing strong cultural continuity under Shatavahanas.

4. Nelakondapalli (Khammam)

- A Buddhist centre with stupas, monasteries, and terracotta art.
- Yields evidence of long-distance trade and urban activity.

5. Kondapur (Sangareddy)

- A major urban settlement with a multi-layered cultural sequence.
- Discovery of Roman coins, glassware, beads, ivory objects, and metal artefacts highlights its cosmopolitan nature.

6. Peddabankur (Karimnagar)

- A prosperous agro-urban settlement with advanced iron tools and craft centres.

These sites collectively demonstrate the **urbanism, craft specialization, Buddhist patronage, and international trade** that flourished in Telangana during Shatavahana rule.

Religion and Culture in Shatavahana Telangana

1. Patronage to Buddhism

Although the rulers were Brahmanical, the Shatavahanas generously patronized **Buddhist monasteries and stupas**, enabling the spread of Buddhism in the Deccan.

- Structures at **Dhulikatta, Phanigiri, Nelakondapalli** reflect Hinayana Buddhist traditions.
- Donations from merchants, guilds, and royal officers highlight **state-sponsored and community-supported Buddhism**.

2. Brahmanical Influence

- The Shatavahanas performed Vedic rituals such as **Ashvamedha, Rajasuya**, and **Agnishtoma**, symbolizing their political legitimacy.

3. Religious Harmony

- The coexistence of Buddhist, Brahmanical, and local folk traditions points to a **pluralistic religious environment**.

Art and Architecture

The Shatavahanas were patrons of **stupa architecture, rock-cut caves, railings, sculptural panels, and terracotta art**.

Karle Chaitya

Amaravati Stupa

Architectural Features in Telangana

- Large stupas with **drum, dome (anda), harmika, chattravali**, and pradakshina paths.
- Limestone railings decorated with lotus medallions, narrative reliefs, and symbolic motifs.
- Viharas with pillared halls, cells, and meditation chambers.

Sculpture and Iconography

- Art at Dhulikatta and Phanigiri reflects the **Amaravati School** style.
- Dominance of **narrative panels**, nature motifs, Bodhi tree representations, and symbolic depictions of Buddha.

Terracotta Tradition

- Kondapur yielded exquisite terracotta figurines, plaques, and pottery.
- The artefacts reflect **urban fashion, social life, costumes, and ornaments**.

The Shatavahana art of Telangana played a key role in connecting northern and southern styles, creating a distinct **Deccan artistic identity**.

Economic Life and Trade Networks

1. Agriculture and Craft Activity

- Strong agrarian base supported by fertile plains of the Godavari and Krishna basins.
- Crafts flourished: bead-making, metallurgy, pottery, textile production, ivory work.

2. Trade and Commerce

Telangana was part of an extensive commercial network linking:

- **Roman Empire** (through western ports)
- Inland Indian routes
- South Indian maritime centres

Findings such as:

- Roman gold coins
- Glassware
- Amphora pieces
- Beads and metal objects

prove active long-distance trade.

3. Guild-based Economy

Shatavahanas encouraged **shrenis (guilds)** of artisans and merchants.

Guilds donated to Buddhist stupas, financed trade, and ensured product quality—showing a **proto-industrial economic system** in Telangana.

Administration and Governance

1. Decentralized Administration

- Telangana had **important provincial centres** like Kotilingala and Dhulikatta.

- Administration included **maharathis, mahabhojas, amatyas**, and local guilds.

2. Land Grants

- The rulers granted land to Brahmins and Buddhist monasteries.
- This strengthened local networks and promoted settlement expansion.

3. Coinage

- Widespread use of **lead, copper, and bronze coins**.
- Coins feature the **Ujjain symbol, ships, animals**, and dynasty names—demonstrating a sophisticated monetary system.

Coin discoveries across Telangana reinforce its role as a **core zone of state activity**.

Legacy of the Shatavahanas in Telangana

1. Foundation of Telugu Culture

- Early Prakrit inscriptions evolved into proto-Telugu linguistic forms.
- Administrative terms, social patterns, and cultural motifs influenced Telugu society.

2. Spread of Buddhism

- The Buddhist heritage sites of Telangana owe their expansion to Shatavahana patronage.
- These sites remain valuable for **tourism, research, and cultural identity**.

3. Urban and Trade Networks

- The era created a network of urban centres that shaped Telangana's commercial history for centuries.

4. Artistic Contribution

- Telangana's Buddhist art contributed significantly to the **Amaravati–Deccan school**, influencing South Indian art traditions.

Contemporary Relevance

The Telangana government's efforts to develop sites such as **Phanigiri, Dhulikatta, and Kondapur** highlight the importance of Shatavahana heritage in:

- Cultural revival
- Tourism
- Local employment
- Academic research
- Preservation of identity

These initiatives enhance regional pride and showcase Telangana's deep historical roots.

Conclusion

The Shatavahana era stands as a defining chapter in Telangana's cultural and historical evolution. From early capitals like Kotilingala to flourishing Buddhist centres like Phanigiri and Dhulikatta, the region was a vibrant political and economic heartland of the empire. Their patronage of art, trade, and religion shaped a distinctive Deccan identity. Today, as Telangana revives its ancient heritage, the Shatavahana legacy continues to inspire cultural pride and enrich India's historical narrative.

MASSIVE INVESTMENT BOOST IN ANDHRA PRADESH

The **State Investment Promotion Board (SIPB)** of Andhra Pradesh recently approved investment proposals worth **₹1.01 lakh crore** across multiple sectors. These projects are expected to generate large-scale employment and boost the state's industrial and economic growth.

What is SIPB?

- The **State Investment Promotion Board (SIPB)** is a high-level body chaired by the Chief Minister of Andhra Pradesh.
- It evaluates and approves major industrial investment proposals.
- Acts as a **single-window mechanism** for large-scale projects.
- Coordinates with departments related to industry, energy, infrastructure, ports, and finance.

Key Highlights of the Approved Investments

1. Large Investment Volume

- Total investment: **₹1.01 lakh crore**.
- Represents one of the state's biggest investment clearances in recent years.

2. Major Focus Areas

The proposals span across **multiple strategic sectors**, including:

a. Adani Group Investments

- The Adani Group has proposed one of the largest long-term investments in the state.
- Over the next ten years, approximately **₹1 lakh crore** will be invested in **ports, cement capacity expansion, data centers, and renewable energy projects**.
- This will strengthen Andhra Pradesh's coastal infrastructure, logistics competitiveness, and energy ecosystem.

b. Reliance Industries' AI and Data Center Plans

- Reliance Industries, through its AI-focused joint venture, has proposed an investment of **₹4,000 crore** for establishing an **advanced AI data center** in the state.
- Additionally, reports in *The Hindu* indicated a much larger investment commitment—around **$11 billion**—for developing AI-enabled data infrastructure.
- These projects position Andhra Pradesh as a future hub for **AI computing, digital infrastructure, and cloud technologies**.

c. Green Hydrogen & Pumped Hydro Projects (₹60,000 Crore)

- A major component of SIPB approvals is the development of a large **green hydrogen hub**, supported by renewable energy generation and pumped hydro storage.
- With **₹60,000 crore** earmarked, AP aims to become a major contributor to India's **green hydrogen mission**, enabling export-oriented and energy-intensive industries.

d. AI Infrastructure (First Phase $200 Million)

- The state is also attracting targeted investments in **AI and high-performance computing (HPC)** infrastructure.
- The first-phase investment of **$200 million** includes data centers, energy-efficient cooling, and specialized AI hardware clusters.

e. Solar Manufacturing in Rayalaseema

- Rayalaseema is emerging as a **solar manufacturing cluster**, with multiple proposals for **PV module and cell plants**.
- These units boost local employment and support India's renewable energy supply chain.

3. Expected Job Creation

- Estimated employment generation: **tens of thousands of direct and indirect jobs**.
- High potential for youth employment in MSMEs, manufacturing clusters, and logistics.

4. Boost to Regional Development

- Projects distributed across:
    - **Rayalaseema** (renewable energy, manufacturing)
    - **Coastal Andhra** (ports, logistics, agro-processing)
    - **North Coastal region** (industrial clusters and mineral-based industries)
- Helps reduce regional economic disparities.

5. Ease of Doing Business Measures

- AP continues to rank high in the **Ease of Doing Business (EoDB)** framework.
- Single-desk approvals, land allotment mechanisms, power supply reliability, and logistics connectivity attract investors.

6. Environmental and Sustainability Focus

- Many proposals align with:
    - **Net-zero transition goals**
    - Large-scale renewable energy
    - Environment-friendly industrial practices
- Encourages green manufacturing and reduces carbon emissions.

Significance of SIPB's Approvals

- Strengthens Andhra Pradesh as an **investment-friendly state**.
- Ensures diversification of industries and long-term economic stability.
- Promotes **export-oriented growth**, given the state's coastal advantages.
- Enhances the revenue base and infrastructure development.
- Supports India's broader goals of **Make in India, energy transition**, and industrial competitiveness.

Conclusion

The SIPB's approval of ₹1.01 lakh crore in investments marks a crucial phase in Andhra Pradesh's industrial growth trajectory. These projects will stimulate employment, infrastructure expansion, and sustainable development. The state's proactive policies continue to make it a preferred destination for large-scale investments.

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