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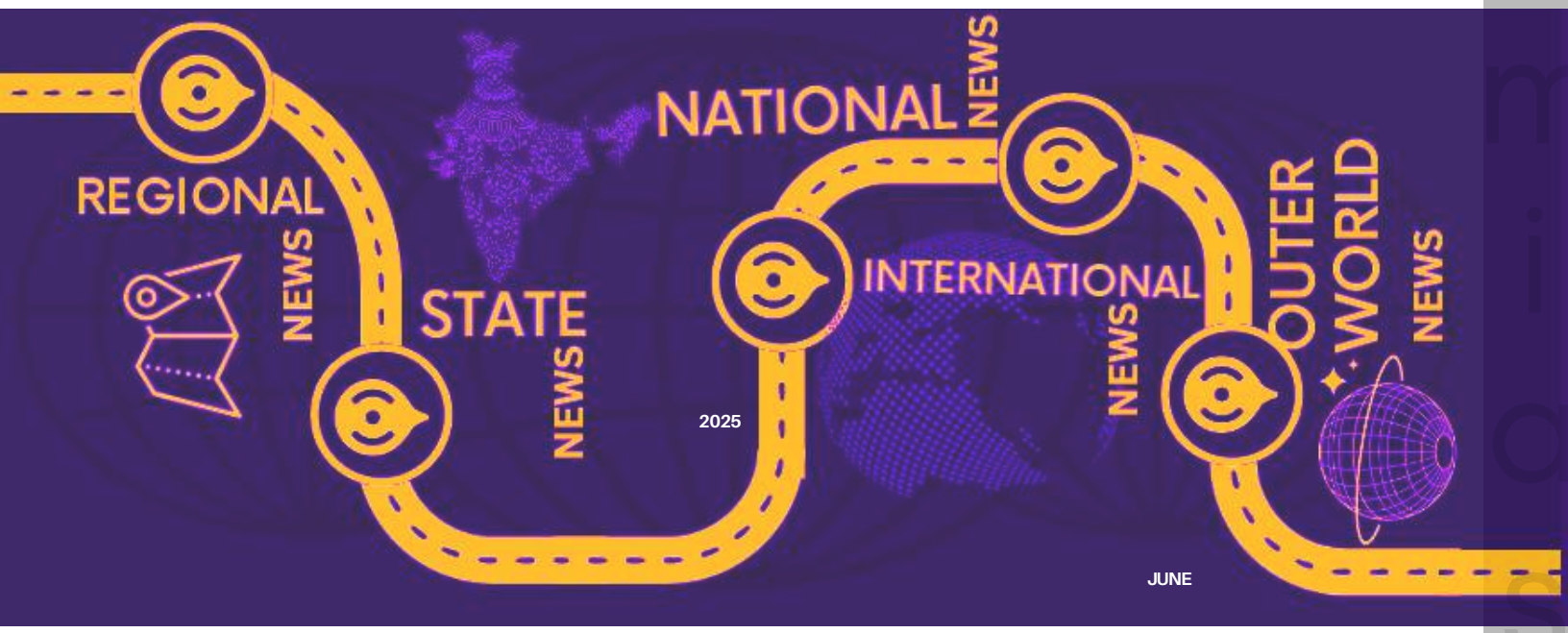

MUST READ!

- National Judicial Policy
- Assam Prohibition of Polygamy Bill, 2025
- Manual Scavenging in India
- India–Russia Bilateral Relations
- Genome-Edited (GE) Crops in India
- G20 Summit 2025 – Johannesburg
- Micrometeoroids And Orbital Debris (MMOD)
- HIV/AIDS and India's National Response
- Biological Weapons Convention (BWC) & Biosecurity
- Disaster Financing in India

SPECIAL COLUMNS

- TELANAGANA – NAGOBA JATARA
- AP - ANDHRA PRADESH'S NEW ECONOMIC ZONES

January 2026

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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 January 2026. Our magazine is designed to help you prepare for competitive examinations like UPSC and other State PSC Exams, and we hope that you will find it informative, engaging, and useful.

In this magazine, you will find a wide range of topics covering current affairs, including politics, economics, sports, science and technology, and many more. Our team of writers and editors work hard to bring you the most accurate and up-to-date information, so you can stay informed and prepared for any competitive exam.

We understand that preparing for competitive exams can be a daunting task, but we are here to make it easier for you. Our magazine is designed to be easy to read and understand, with clear and concise articles that will help you stay on top of the latest news and events.

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

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

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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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POLITY AND GOVERNANCE

INTERNATIONAL RELATIONS

ECONOMY

SECURITY

SOCIETY

KNOW YOUR STATE

POLITY AND GOVERNANCE

JUDICIARY

TRANSPARENCY IN POLITICAL FUNDING – SUPREME COURT REVIEW

SOURCE: THE HINDU

Why in News?

The **Supreme Court has agreed to examine** a petition questioning the rule that permits political parties to accept **anonymous cash donations below ₹2,000**. Petitioners argue that this provision enables **untraceable political funding**, thereby undermining transparency in India's electoral system.

What Key Concerns Have Been Raised in the Petition?

1. Demand for Complete Ban on Cash Donations

- Section **13A(d) of the Income Tax Act** permits parties to receive anonymous cash contributions up to ₹2,000.
- Petitioners contend that this threshold facilitates **splitting of large donations** into multiple small amounts, effectively masking donor identity.
- Calls for **mandatory disclosure** of all contributions, regardless of amount.

2. Violation of Fundamental Rights

- Argues that secrecy in political finance infringes **Article 19(1)(a)**, which includes the voter's **Right to Information** about who influences political parties.
- Cites earlier judgments such as **ADR (2002)** and the **2024 Electoral Bonds verdict**, both affirming that voters must have access to financial disclosures.

3. Oversight of Contribution Reports

- Requests the Supreme Court to direct the **Election Commission of India (ECI)** to closely verify **Form 24A**, which lists contributions received by parties.
- Seeks mandatory deposit of contributions lacking **PAN, address, or identity details**.

4. Strengthening Enforcement Mechanisms

- Urges the ECI to use its powers under **Paragraph 16A of the Election Symbols Order, 1968** to penalise non-compliant parties, including suspending or withdrawing party symbols.
- Demands that political party accounts be audited by **independent auditors appointed by the ECI**.

Existing Rules Governing Political Donations

1. Representation of People Act (RPA), 1951

- Section **29B** allows political parties to receive voluntary contributions from individuals and companies (except government companies and foreign sources).

2. Companies Act, 2013

- Companies (except those less than 3 years old) may donate up to **7.5% of their average net profits** from the preceding 3 years.

3. Income Tax Act, 1961

- Sections **80GGB** and **80GGC** provide tax deductions for donations to political parties or electoral trusts.

4. Foreign Contribution (Regulation) Act, 2010

- Prohibits foreign donations but exempts Indian companies even if **foreign shareholding exceeds 50%**, enabling multinational subsidiaries to contribute subject to FEMA.

5. Electoral Trusts Scheme, 2013

- Allows companies to set up non-profit trusts that redistribute donations to political parties.
- Must allocate **95% of funds** to eligible parties and cannot accept cash.

Why Transparency Matters in Political Funding

1. Informed Voter Choice

- The citizen's right to know funding sources is central to **free political expression**.

2. Preventing Policy Capture

- Transparent donations reduce the likelihood of **quid pro quo**, rent-seeking, and biased policymaking.

3. Safeguarding National Security

- Anonymous channels increase the risk of **foreign influence** in domestic politics.

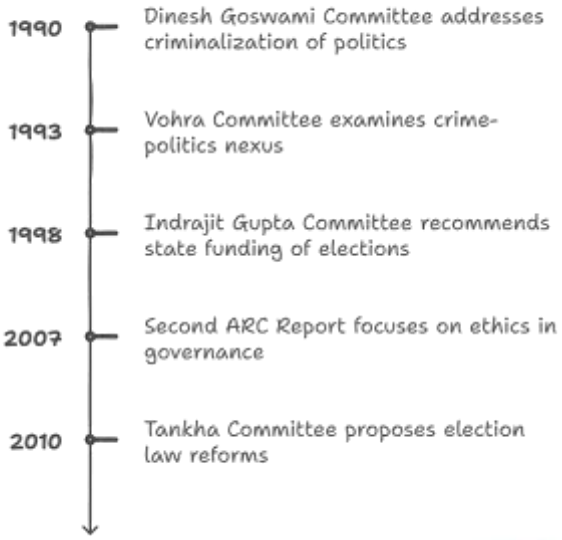
4. Protecting Market Efficiency

- Hidden corporate donations foster **crony capitalism**, undermining fair competition.

5. Upholding Democratic Equality

- Without transparency, wealthier groups wield disproportionate influence, threatening the idea of an **egalitarian democracy**.

Key Committees on Electoral Reforms:



Reforms Needed for Transparent Political Finance

1. Eliminating Anonymous Cash Donations

- Amend Section 13A(d) to **remove or drastically reduce** the ₹2,000 cash limit.
- Shift all contributions to **banking and digital modes** to create an audit trail.

2. Institutional Strengthening

- Empower ECI to **de-register parties**, appoint auditors, and monitor compliance.
- Coordination with **RBI and SEBI** to regulate corporate donations and curb illicit money flows.

3. Real-Time Public Disclosure

- Develop an **ECI digital portal** where parties upload donation details (name, PAN, address) in real time.
- Integrate with the Income Tax Department to flag suspicious contributions.

4. Long-Term Structural Measures

- Consider **partial state funding** (as recommended by Indrajit Gupta Committee and Law Commission) to reduce dependence on private capital.
- Establish a **national ceiling on campaign spending** with strict monitoring.
- Provide whistleblower protection for reporting irregularities.

Conclusion

The Supreme Court's intervention revives the debate on the urgent need for **clean and transparent political finance** in India. Eliminating cash-based anonymity and empowering institutions are essential to curb corruption and restore public trust. Strengthening transparency will reinforce **fair elections and democratic accountability**, aligning India with global best practices.

NATIONAL JUDICIAL POLICY

SOURCE: INDIAN EXPRESS

Why in News?

Chief Justice of India **Surya Kant** has suggested creating a **National Judicial Policy** to bring uniformity across courts. He also indicated that the Supreme Court may examine a plea seeking revival of the **National Judicial Appointments Commission (NJAC)**, reopening debates on the Collegium system.

Why is a National Judicial Policy Needed?

1. Reducing Divergent Judgments

- Different courts often deliver **conflicting decisions** on issues like bail, reservations, and service matters.
- Such variations fuel **forum shopping** and create uncertainty for litigants.
- A common policy would ensure **uniform standards**, clearer precedents, and **coherent constitutional interpretation**.

2. Improving Access to Justice

- Over **5 crore pending cases**, long delays, high litigation costs, and language barriers hinder justice.
- A national framework can promote **affordable, timely, and inclusive** justice delivery, especially for vulnerable groups.

3. Addressing Structural Weaknesses

- Nearly **one-third of High Court judge posts** remain vacant, resulting in one HC judge for almost **19 lakh people**.
- District courts struggle with **poor infrastructure**, limited IT systems, and inadequate staff.
- A unified policy can push for **capacity building** across all judicial tiers.

4. Standardising Technology & Case Management

- Adoption of **e-filing, virtual courts, and digital records** differs sharply across states.
- A national policy would ensure **uniform digital platforms**, improving citizen experience and court efficiency.

5. Strengthening Systemic Harmony

- A broad framework helps courts align with **shared constitutional principles** while preserving judicial independence.

Concerns Regarding a National Judicial Policy

1. "One-Size-Fits-All" Issues

- States differ widely in caseload, resources, and digital readiness; uniform rules may ignore local needs.

2. Fear of Executive Overreach

- If the executive shapes the policy, it may affect the **separation of powers** and judicial autonomy.

3. Implementation Limitations

- Many courts lack the manpower and infrastructure to adopt **standardised nationwide practices**.

4. Institutional Resistance

- High Courts have administrative control under **Articles 214–226** and may resist centralised norms.

5. Unreliable Judicial Data

- Lack of credible real-time data hampers **evidence-based planning and monitoring**.

About NJAC

Formed through the **99th Constitutional Amendment (2014)** to replace the Collegium.

A six-member body including the **CJI, two senior SC judges, Law Minister**, and **two eminent persons**.

Why NJAC Was Struck Down (2015)

- The SC held it violated the **basic structure**, as **judicial independence** could be compromised.
- Executive and non-judicial veto powers were seen as threats to fairness since the government is the **largest litigant**.

Collegium vs NJAC – Key Contrasts

- **Collegium** ensures **judicial primacy** but lacks transparency.
- **NJAC** aimed for **broader representation** but risked political influence.
- Debate continues on how to balance **independence** with **accountability and openness**.

Way Forward

1. Flexible National Judicial Policy

- National standards with space for **state-level customisation**.

2. Transparent & Time-Bound Appointments

- Clear criteria, structured timelines, and improved coordination between judiciary and government.

3. Stronger Case Management

- Common rules for filing, listing, adjournments, and disposal targets.

4. Enhancing Access to Justice

- Invest in **regional courts, legal aid, translation services, ADR platforms**, and digital courts.

Conclusion

A National Judicial Policy can bring greater **coherence, efficiency, and accessibility** to India's justice system. Revisiting debates on NJAC and the Collegium is an opportunity to strengthen **appointments and transparency**. Reforms must progress without weakening the **independence of the judiciary**, the bedrock of India's constitutional framework.

DIGITAL ARREST SCAMS & SUPREME COURT DIRECTIONS

SOURCE: HINDUSTHAN TIMES

Why in News?

The Supreme Court of India has empowered the **Central Bureau of Investigation (CBI)** to lead nationwide probes into *digital arrest scams*, after the Union Government revealed losses of nearly **₹3,000 crore**, largely affecting senior citizens.

Supreme Court's Key Directions on Digital-Arrest Scams

1. Strengthening Investigations

- The CBI has been given **primary responsibility** to probe digital arrest scams, followed by related frauds such as fake investment schemes and deceptive part-time job offers.
- States have been asked to provide mandatory consent under the **DSPE Act, 1946**, enabling seamless CBI jurisdiction.

2. International Cooperation

- SC instructed the CBI to coordinate with **INTERPOL** to uncover offshore networks operating from cybercrime hubs outside India.

3. Financial Surveillance

- The Court sought inputs from the **Reserve Bank of India (RBI)** on the use of **AI and ML tools** to trace money "layering" across multiple accounts—common in large-scale fraud.

4. Digital Platform Accountability

- Intermediaries must comply with the **IT Rules, 2021**, and furnish timely information requested by investigators.

5. Institutional Capacity Building

- States/UTs must operationalise **regional cybercrime coordination centres** and link them with the **Indian Cybercrime Coordination Centre (I4C)**.

6. Telecom Measures

- The Department of Telecommunications (DoT) has been asked to improve **SIM issuance norms** and strengthen **KYC verification** to curb identity misuse.

What is Digital Arrest?

Digital arrest is a **social-engineering scam** where criminals pose as officials from agencies like police, CBI, ED, or customs.

They call victims using **spoofed numbers**, fabricate criminal allegations, and threaten immediate arrest or account freezing.

Modus Operandi

- Fraudsters share fake documents, video-call victims in rooms resembling police offices, and create panic to extract money.
- Victims are coerced into paying "penalties", "verification fees", or "security deposits".

Scale of the Problem

- By 2024, I4C had blocked over **59,000 WhatsApp accounts** linked to digital arrest operations.

Challenges in Controlling Digital-Arrest Scams

1. Sophisticated Cyber Techniques

- Use of **spoofed caller IDs**, deepfakes, forged official letters, encrypted chats, and remote malware tools.

2. Human Vulnerability

- Scams exploit **fear, urgency, and authority**, particularly affecting senior citizens and digitally-inexperienced users.

3. Poor Cyber Hygiene

- Weak passwords, outdated software, unsecured Wi-Fi, and oversharing personal details increase victim exposure.

4. Growth of Digital Payments

- UPI, QR codes, and online transfers create faster channels for fraud if users lack awareness.

5. Dark-Web Ecosystems

- Organised cyber gangs purchase **leaked databases**, SIM cards, and spoofing tools from dark-web markets.

6. Enforcement Limitations

- Shortage of trained cyber police, jurisdictional hurdles, and cross-border networks delay investigations.

7. Rapidly Evolving Tools

- Criminals constantly update scam tactics using **AI-generated voices**, deepfake videos, and fake court notices.

8. Low Reporting

- Many victims avoid reporting due to fear or embarrassment.

India's Initiatives Against Digital-Arrest Scams

1. Indian Cybercrime Coordination Centre (I4C)

- Central agency for cyber intelligence sharing, training, and threat monitoring.

2. National Cybercrime Reporting Portal

- Single platform for citizens to register cyber complaints.

3. Helpline 1930

- Helps victims quickly freeze fraudulent transactions.

4. Anti-Spoofing Measures

- DoT now blocks **international spoofed calls** mimicking Indian numbers.

5. Public Awareness

- Government uses **SMS alerts, CyberDost handles, airports, and railway displays** to spread awareness.

Conclusion

Digital-arrest scams reflect how cybercriminals exploit fear and technology to target citizens. The Supreme Court's intervention strengthens enforcement, coordination, and regulatory oversight. A combination of robust policing, vigilant digital behaviour, and widespread public awareness is essential to secure India's digital ecosystem.

EXECUTIVE

GOVERNOR–STATE GOVERNMENT TENSIONS IN INDIA

SOURCE: THE HINDU

Why in News?

The Supreme Court recently criticised the **Kerala Governor** for not acting on recommendations made by a court-

appointed committee regarding **Vice-Chancellor appointments**, intensifying debates on the Governor–State conflict. The Court had constituted a **Justice Dhulia-led panel (Aug 2025)** to shortlist candidates, underscoring recurring tensions around the Governor's role as Chancellor.

Major Controversies Associated with the Role of Governors

1. Governor as Chancellor of State Universities

- In most States, the Governor automatically becomes the **Chancellor** of public universities.
- Conflicts arise when the Governor's decisions on **Vice-Chancellor appointments, university rules or administrative actions** diverge from the State government's advice.
- This leads to debates on **institutional autonomy**, the Governor's **discretionary authority**, and the broader Centre–State political imbalance.

2. Withholding Assent and Legislative Delays

- The largest flashpoint involves the Governor's powers under **Article 200**, such as:
    - Withholding assent,
    - Reserving Bills for the President,
    - Leaving Bills pending indefinitely.
- Long delays disrupt governance and reduce legislative efficiency, allowing the Governor to indirectly influence State policy.

3. Concerns Over Appointment and Tenure

- Governors are often perceived as **political nominees**, especially when they are retired bureaucrats or political leaders aligned with the Union ruling party.
- Their tenure depends on the **pleasure of the President**, enabling quick removal after a change of national government.
- This creates a perception that the Governor may not always act **independently or impartially**.

4. Interference During Legislative Processes

- Tensions escalate when Governors:
    - Delay **summoning or proroguing** the Assembly,
    - Advise floor tests based on opposition claims, bypassing the Speaker,
    - Influence the mode of voting (voice vote vs. division).
- Such actions, especially during political instability, give rise to allegations of **partisanship**.

5. Discretion During Chief Ministerial Appointment

- After a **hung Assembly**, the Governor exercises discretion to decide whom to invite first.
- Controversies arise when:
    - The single largest party is overlooked,
    - Coalitions are recognised without proof of majority,
    - The successor after a CM's death or resignation is chosen without internal party consensus.
- These instances raise concerns over **overreach and lack of objectivity**.

Key Commissions on Reforming the Governor's Office

1. Sarkaria Commission (1988)

- Called for **intergovernmental consultation** on Centre–State disputes.
- Recommended **restrictive use of Article 356** and dissolution of the assembly only after Parliament's approval.

2. Venkatachaliah Commission (2002)

- Suggested that Governors should complete their **five-year tenure**.
- Any early removal should require **consultation with the Chief Minister**.

3. Punchhi Commission (2010)

- Emphasised limiting the Governor to **constitutional roles only**, not administrative functions.
- Proposed **strict timelines** for actions on Bills (e.g., six months for reserved Bills).
- Recommended safeguards to prevent misuse of **Article 356**.

Key Judicial Pronouncements

1. Nabam Rebia Case (2016)

- SC ruled that the Governor cannot independently summon or prorogue the Assembly; must follow **aid and advice** of the Council of Ministers.

2. Shivraj Singh Chouhan Case (2020)

- Held that a **floor test** may be ordered by the Speaker or Governor if there is credible doubt about the government's majority.

3. Tamil Nadu Governor Case (2023)

- Mandated strict timelines for the Governor to act on Bills:
  - **One month** to withhold assent,
  - **Three months** for decisions contrary to Cabinet advice,
  - **One month** for reconsidered Bills.

4. Presidential Reference on Governor's Powers (2025)

- SC held that **courts cannot impose fixed timelines** for assent under Articles 200/201.
- Rejected the concept of **"deemed assent."**
- However, prolonged and unexplained delays could face **limited judicial scrutiny**.

Measures to Reduce Governor–State Tensions

1. Codify the Governor's Discretion

- Clearly outline the **specific circumstances** where discretion is permitted.
- This will reduce ambiguity and prevent arbitrary interpretation of Article 163.

2. Reform Floor-Test Procedures

- The **floor of the House** should be the sole method to verify majority.
- Governor should invite the leader with **most verifiable support**, who must prove majority within **48 hours**.

3. Depoliticise Governor Appointments

- Create an **independent selection body**, possibly involving the PM, CJI, Lok Sabha Speaker, and State CM.
- This would enhance credibility and neutrality.

4. Strengthen Constitutional Conventions

- Governors must consistently act on the **aid and advice** of the elected government.
- Regular dialogue between the Governor and CM can prevent confrontational situations.

5. Implement Commission Recommendations

- Follow key reforms of **Sarkaria** and **Punchhi Commissions**—including consulting the CM during appointment and choosing **eminent non-partisan individuals**.

Conclusion

Tensions between Governors and State governments persist due to unclear discretionary powers and politicised appointments. Strengthening conventions, codifying discretion, and adopting long-pending commission reforms can restore trust in the federal framework. **A Governor who functions within constitutional limits is essential for healthy democracy and cooperative federalism.**

POLICIES/SCHEMES/ACTS/REPORTS/ COMMITTEES IN NEWS

SHAKTI SCHOLARS YOUNG RESEARCH FELLOWSHIP

SOURCE: PIB

Why in News?

The **National Commission for Women** recently launched the **SHAKTI Scholars Young Research Fellowship** to promote research on women-centric policy issues. The initiative aims to strengthen **evidence-based policymaking** related to women's safety, rights, and empowerment in India.

About SHAKTI Scholars Young Research Fellowship

- **SHAKTI Scholars Young Research Fellowship** is a **six-month structured research programme** designed to support **young and emerging scholars** working on issues related to women.
- The fellowship recognises that **sound public policy must be grounded in credible research and field-based evidence**.
- By engaging young researchers, the programme seeks to create a **direct link between academic research and policy formulation** on women's issues.

Need for the Fellowship

- Women in India continue to face **structural challenges** such as gender-based violence, unequal access to justice, and digital insecurity.
- Many policies fail due to **lack of grassroots data and interdisciplinary research inputs**.
- The fellowship addresses this gap by encouraging **research-driven solutions** that are practically relevant and policy-oriented.
- It also nurtures a new generation of scholars committed to **gender-sensitive governance**.

Objectives of SHAKTI Scholars Fellowship

- The fellowship aims to **encourage multidisciplinary research**, drawing from law, sociology, economics, public policy, technology, and gender studies.
- It seeks to promote **academic work that directly contributes to gender equality, safety, dignity, and empowerment** of women.
- Another key objective is to enable young scholars to produce **policy-relevant research outputs** that can support the mandate of the National Commission for Women.
- The programme also aims to build **research capacity among youth**, particularly in women-centric policy domains.

Key Research Areas

- The fellowship supports research on **women's safety and dignity**, including crime prevention and victim support systems.
- It focuses on **gender-based violence**, such as domestic violence, sexual harassment, and trafficking.
- Research on **legal rights and access to justice** for women, including legal awareness and institutional responsiveness, is encouraged.
- **Cyber safety of women**, including online harassment and digital abuse, forms an important research area.
- Studies on the **implementation of the Prevention of Sexual Harassment (POSH) framework** at workplaces are specifically prioritised.
- These research themes are aligned with **current policy gaps and governance challenges**.

Eligibility Criteria

- The fellowship is open only to **Indian citizens**, ensuring relevance to the national policy context.
- Applicants must be **between 21 and 30 years of age**, targeting early-career scholars.
- A **minimum educational qualification of graduation** from a recognised institution is mandatory.
- Preference is given to candidates who have completed or are pursuing **Master's, M.Phil., or Ph.D. programmes** in relevant disciplines.
- This ensures **academic rigour and research competence** among selected scholars.

Duration and Financial Support

- The fellowship has a **fixed duration of six months**, making it intensive and outcome-oriented.
- Each selected scholar receives a **research grant of ₹1 lakh** for the entire fellowship period.
- The grant supports **fieldwork, data collection, interviews, analysis, and report writing**.
- Financial support ensures that scholars can focus on research **without economic constraints**.

Institutional and Policy Significance

- Research findings from the fellowship can inform **policy recommendations, advisory reports, and legislative inputs**.
- The programme strengthens the role of NCW as a **knowledge-driven statutory body**.
- It promotes a culture of **research-backed governance** in addressing women's issues.

NATIONAL SCHEDULED CASTE AND SCHEDULED TRIBE HUB (NSSH) SCHEME

SOURCE: THE HINDU

Why in News?

The **Ministry of MSME** has intensified efforts under the **NSSH Scheme** to promote **SC/ST entrepreneurship**. The initiative aims to enhance **participation of SC/ST enterprises in public procurement**.

NATIONAL SC-ST HUB
Safalta ki pehchaan

About National Scheduled Caste and Scheduled Tribe Hub (NSSH)

- The **National Scheduled Caste and Scheduled Tribe Hub (NSSH)** is a **flagship scheme** of the **Ministry of Micro, Small and Medium Enterprises**.
- It seeks to create an **inclusive entrepreneurial ecosystem** for **SC/ST communities**.

Institutional Framework

- The scheme is implemented by **National Small Industries Corporation (NSIC)**.
- It supports the objectives of **social justice, economic inclusion, and enterprise development**.

Objectives of the Scheme

- To enhance **capacity and competitiveness** of SC/ST entrepreneurs.
- To promote an **entrepreneurial culture** among historically marginalised communities.
- To facilitate participation of SC/ST enterprises in **government procurement**.

Public Procurement Focus

- scheme supports the **mandatory 4% procurement target** from SC/ST enterprises under the **Public Procurement Policy**.
- It assists SC/ST entrepreneurs in **vendor registration, tender participation, and compliance requirements**.

Financial and Credit Support

- NSSH facilitates access to **institutional credit** through banks and **NBFCs**.
- It provides **financial assistance**, market linkage support, and hand-holding.
- Credit facilitation helps overcome **entry barriers faced by first-generation entrepreneurs**.

Skill Development and Capacity Building

- The scheme focuses on **entrepreneurship training, skill development, and mentoring**.
- It promotes awareness about **business management, digital tools, and compliance norms**.

GOVERNANCE

MANUAL SCAVENGING IN INDIA

SOURCE: THE HINDU

Why in News?

The **Calcutta High Court** has awarded **₹30 lakh compensation** to each of the four workers who died while cleaning a sewer in Kolkata's Kudghat area in 2021. The court criticised the administration for **grave negligence** and urged governments to revise outdated compensation rules fixed at ₹10 lakh since 1993.

What is Manual Scavenging?

1. Definition

- Under the **PEMSR Act, 2013**, manual scavenging refers to **handling or removing human excreta** from pits, open drains, septic tanks, insanitary latrines, or railway tracks using manual tools or bare hands.

2. Legal Prohibition

- The practice was first banned under the **1993 Act**.
- The **PEMSR Act, 2013** strengthens the ban, criminalises employment of manual scavengers, and mandates rehabilitation with dignity.
- The **SC/ST (Prevention of Atrocities) Act, 1989** treats compelling a Scheduled Caste individual to perform manual scavenging as an offence.
- Violates **Article 17 (abolition of untouchability)** and **Article 21 (right to life with dignity)**.

3. Supreme Court Directions

In **Dr. Balram Singh vs Union of India (2023)**, the Court:

- Called for **complete mechanisation** of sewer and septic tank cleaning.
- Allowed human entry only in rare emergencies with safety gear.
- Declared timely compensation and rehabilitation a **constitutional obligation**.
- Directed creation of a **centralised portal** to track deaths and benefits.

4. Current Situation (2024)

- Out of 766 districts, **732 claim to be manual scavenging-free**, yet nearly **58,000 individuals** remain identified as manual scavengers.

Major Challenges Faced by Manual Scavengers

1. Intergenerational Entrapment

- Manual scavenging functions as a **hereditary occupation**, restricting mobility and reproducing caste hierarchies.

2. Severe Health Hazards

- Exposure to toxic gases like **hydrogen sulphide** leads to chronic respiratory diseases, infections, and frequent **asphyxiation deaths**.

3. Social Stigma and Caste Marginalisation

- Workers face lifelong discrimination, often treated as "untouchable," resulting in **social isolation and psychological trauma**.

- Women suffer a **triple burden**—caste, gender, and occupation—leading to anxiety, depression, and extremely poor working conditions.

4. Economic Hardship

- Low wages, absence of job security, and lack of alternative opportunities keep workers in chronic poverty.

5. Substance Dependence

- Some workers resort to alcohol or drugs to cope with humiliation and hazardous working conditions.

6. Inadequate Compensation and Enforcement

- Compensation for sewer deaths is often **delayed, contested, or denied**.
- Outdated norms (₹10 lakh since 1993) fail to reflect present realities, as highlighted by the Calcutta High Court.

7. Operational Gaps

- Poor training in modern sewer-cleaning equipment leads to underutilisation of technology, pushing workers back into hazardous manual cleaning.

Measures Needed to Eliminate Manual Scavenging

1. Full Mechanisation

- Ensure **100% machine-based cleaning** of sewers, septic tanks, drains, and sludge.
- Establish and equip **Sanitation Response Units (SRUs)** with trained personnel.

2. Strong Institutional Architecture

- Create a **Responsible Sanitation Authority** in every district.
- Set up 24×7 helplines to report blockages and emergencies.

3. Tightening Legal Enforcement

- Treat sewer deaths as **culpable homicide**, penalise violators, and guarantee immediate compensation.
- Move from one-time payments to **long-term livelihood rehabilitation**.

4. Monitoring and Regulation

- Distinguish sanitation workers from manual scavengers to prevent misuse of labour.
- Regulate private desludging contractors and follow **NHRC** guidelines for oversight.

5. Financial and Livelihood Support

- Expand loans under **Swachhta Udyami Yojana** for mechanised equipment.
- Strengthen **SRMS** for enterprise support.
- Train workers under **PM-DAKSH** and provide preferential hiring in ULBs and MGNREGA.

Conclusion

Ending manual scavenging is essential to uphold **dignity, equality, and constitutional morality**. Mechanisation, strict legal enforcement, and meaningful rehabilitation must replace hazardous caste-based labour practices. A coordinated approach can help India move closer to **safer sanitation systems and inclusive social justice**.

POLICE REFORMS IN INDIA

SOURCE: THE HINDU

Why in News?

At the **60th All India Conference of DGPs/IGPs** in Raipur, held on the theme *"Viksit Bharat: Security Dimensions"*, the Prime Minister emphasised the urgent need to improve public trust in policing.

He highlighted the need for **greater professionalism, sensitivity, and citizen-focused policing** across India.

Major Challenges Facing Police Forces in India

1. Colonial Legacy

- India continues to rely on the **Police Act of 1861**, which prioritised control over service.

- This leads to excessive reliance on **force-based policing**, with many personnel supporting custodial violence.
- Studies show nearly **30%** of personnel approve third-degree methods even for minor offences.

2. Trust Deficit with People

- Marginalised communities—**Dalits, Adivasis, minorities**—often view police as biased or intimidating.
- Low public trust hampers **community intelligence**, crucial for crime prevention.
- Successful models like **Janamaithri (Kerala)** and **Mohalla Committees (Maharashtra)** remain limited.

3. Workforce Shortages & High Workload

- Against the UN benchmark of **222 officers per lakh population**, India has only **154.84**.
- Long working hours are common:
  - 24% work over **16 hours a day**,
  - Average duty hours touch **14 hours**.
- Personnel juggle law enforcement, festivals, VIP duties, and elections without adequate rest or resources.

4. Weak Infrastructure & Tech Capabilities

- Limited training in **digital forensics, cybercrime, and scientific investigation** affects quality of probes.
- India has only **0.33 forensic experts per lakh population**, far below global levels (20–50).
- Result: Poor evidence handling, wrongful arrests, and low conviction rates.

5. Political Interference

- Transfers, suspensions, and postings often depend on political considerations.
- A 2019 survey found **72% officers** faced political pressure in cases involving influential individuals.
- Such interference undermines **professional autonomy** and impartial enforcement.

Major Committees/Commissions on Police Reform

Gore Committee (1971)

- Called for **people-centric policing**, better training, and human rights sensitisation.

National Police Commission (1977–81)

- Proposed **fixed tenures**, separation of **law & order** from investigation, and a **new Model Police Act**.

Ribeiro (1998) & Padmanabhaiah Committee (2000)

- Recommended autonomous oversight bodies, modern training, and operational freedom.

Malimath Committee (2003)

- Strengthen **forensic capacity**, create a federal crime agency, and introduce **witness protection**.

Supreme Court – Prakash Singh Judgment (2006)

- Issued **seven landmark directives**:
  - **State Security Commissions**
  - Two-year tenure for DGPs
  - Fixed tenures for field officers
  - Separation of investigation and law & order
  - Police Establishment Boards
  - Police Complaints Authorities
  - National Security Commission

Model Police Act (2006) & NHRC (2021)

- Stress **autonomy, accountability**, and responsible use of surveillance.

Smart Policing (2015) & MPF Scheme

- Promote **tech-driven policing**, predictive analytics, upgraded weaponry, communication networks, and forensic labs.

What Reforms Are Needed?

1. Enforce Supreme Court Directives

- Establish **independent State Security Commissions**.
- Create empowered **Police Complaints Authorities** with statutory powers.

2. Strengthen Accountability & Professionalism

- Make **Police Establishment Boards** effective.
- Introduce performance audits based on **service quality, investigation standards**, and public satisfaction.

3. Functional Specialisation

- Separate **investigation wings** in all police stations.
- Expand robust **cybercrime units**, forensic labs, and national database integration through **NATGRID**.

4. Institutionalise Community Policing

- Build structured police-community partnerships.
- Promote **police-as-service**, Citizens' Charters, and grievance redressal through digital platforms.

5. Tackle Emerging Crime

- Establish specialised units for **financial fraud, cyberterrorism, narcotics, and organised crime**.
- Improve **inter-agency coordination** and joint operations across States and central agencies.

Conclusion

Modern and trusted policing is essential for a secure and progressive India. Implementing long-pending reforms, improving autonomy, and adopting technology-driven, community-oriented policing can transform the force into a

professional and citizen-friendly institution. A reformed police system is vital for achieving the vision of **Viksit Bharat**.

PRELIMS POINTERS IN NEWS

SANCHAR SAATHI

SOURCE: THE HINDU

Why in News?

The Government of India has mandated that all newly manufactured or imported mobile phones must come with the **Sanchar Saathi app pre-installed**. This aims to strengthen digital security for mobile users.

What is Sanchar Saathi?

- A **telecom safety and awareness platform** available as both an app and website.
- Helps users **protect their digital identity**, track mobile connections, and report suspicious behaviour.

Key Features

1. CHAKSHU

- Allows reporting of fake KYC messages, impersonation scams, fraudulent calls, and suspicious WhatsApp links.
- Helps authorities identify scam patterns.

2. Spam Reporting

- Users can register complaints against unsolicited commercial calls and messages violating TRAI rules.

3. Reporting Malicious Links & Apps

- Enables users to flag **phishing URLs, unsafe APK files**, and fraudulent websites.

4. Check Mobile Connections Linked to Your ID

- Shows how many phone numbers are registered using your credentials.
- Helps detect SIM misuse.

5. Block Lost or Stolen Phones

- Allows blocking IMEI numbers so the device becomes unusable.
- Unblocking possible upon recovery.

6. Device Authenticity Check

- Helps verify if a mobile phone is genuine by validating its IMEI.

7. Detect International Calls Masked as Indian Calls

- Allows reporting of spoofed calls using illegal telecom routes.

8. Locate Local Internet Service Providers

- Users can find available broadband service providers by PIN code.

PM-SETU SCHEME

SOURCE: THE HINDU

Why in News?

The **Ministry of Skill Development and Entrepreneurship** invited industry leaders to participate in the **PM-SETU Scheme**. The scheme aims to modernise India's **Industrial Training Institutes (ITIs)**.

About PM-Setu Scheme

- **PM-SETU (Pradhan Mantri Skilling and Employability Transformation through Upgraded ITIs)** is a **Centrally Sponsored Scheme**.
- It seeks to align vocational training with **industry requirements and emerging technologies**.

Objectives

- The primary objective is to **upgrade 1,000 government ITIs** into modern skill centres.
- The scheme aims to improve **employability, productivity, and workforce readiness**.
- It supports India's demographic dividend through **skill-based growth**.

Implementation Model

- PM-SETU follows a **hub-and-spoke model**.
- **200 hub ITIs** act as centres of excellence linked to **800 spoke ITIs**.
- Hubs provide advanced training, while spokes ensure **last-mile access**.

Key Components

- Introduction of **demand-driven and industry-designed courses**.
- Creation of **Special Purpose Vehicles (SPVs)** with anchor industry partners for outcome-based training.
- Development of **long-term diplomas, short-term skill courses, and executive programs**.

Institutional Strengthening

- Five **National Skill Training Institutes** at Bhubaneswar, Chennai, Hyderabad, Kanpur, and Ludhiana are being upgraded.
- These institutes will function as **global Centres of Excellence**.
- International collaboration is supported by **World Bank and Asian Development Bank funding**.

Financial Outlay

- The scheme has a financial allocation of **₹60,000 crore over five years**.
- Funds are used for infrastructure, faculty training, innovation, and placements.

PRADHAN MANTRI RASHTRIYA BAL PURASKAR (PMRBP)

SOURCE: THE HINDU

Why in News?

The **President of India** will confer the **Pradhan Mantri Rashtriya Bal Puraskar** to outstanding children on **Veer Bal Diwas**. The award recognises **exceptional achievements by children** in diverse fields at the national level.

About Pradhan Mantri Rashtriya Bal Puraskar (PMRBP)

- **Pradhan Mantri Rashtriya Bal Puraskar (PMRBP)** is a **prestigious national honour** instituted by the **Government of India**.
- It aims to acknowledge and encourage **extraordinary talent, courage, and service** demonstrated by children.

Purpose and Significance

- The award promotes a culture of **excellence, courage, and social responsibility** among young citizens.
- It highlights the role of children as **active contributors to nation-building**.
- It also serves as a source of **inspiration for other children** across the country.

Award Categories

- PMRBP is awarded for achievements in **Bravery**, **Art and Culture**, **Environment**, **Social Service**, **Science and Technology**, and **Sports**.
- These categories reflect both **individual talent** and **social impact**.

Institutional Framework

- The award is administered by the **Ministry of Women and Child Development**.
- A **National Selection Committee** evaluates nominations through a transparent and merit-based process.

Eligibility Criteria

- The award is open only to **Indian citizens**.
- The eligible age group is **above 5 years and not exceeding 18 years** as of 31st July of the award year.
- The achievement or act must have occurred within **two years** of the nomination deadline.

Award Details

- A maximum of **25 awards** are conferred each year, with flexibility allowed in special cases.
- Each awardee receives a **medal, certificate, and citation booklet**.

AILA – ARTIFICIALLY INTELLIGENT LAB ASSISTANT

SOURCE: INDIAN EXPRESS

Why in News?

Researchers at **Indian Institute of Technology Delhi** developed **AILA**, an AI-based scientific agent. AILA

dramatically reduced experiment optimisation time in advanced laboratory research.

About AILA (Artificially Intelligent Lab Assistant)

- **AILA (Artificially Intelligent Lab Assistant)** is an advanced **AI agent** capable of independently performing scientific experiments.
- It represents a major leap from assistive AI tools to **autonomous scientific decision-making systems**.

Development and Collaboration

- AILA was developed by **IIT Delhi researchers** in collaboration with scientists from **Denmark and Germany**.
- The project reflects growing **international cooperation in advanced AI research**.

Core Capabilities

- AILA can **design experiments, write code, operate instruments, collect data, and analyse results** independently.
- It functions in **real time**, adjusting experimental parameters like a trained human scientist.

Unique Technological Advancement

- Unlike earlier AI tools focused on writing or analysis, AILA interacts directly with **physical laboratory instruments**.
- It can operate the **Atomic Force Microscope (AFM)**, one of the most sensitive nanoscale instruments.

Efficiency Gains

- AILA reduced **AFM imaging optimisation time** from nearly **24 hours to just 7–10 minutes**.
- This significantly enhances **research productivity and precision**.

Scientific and Strategic Importance

- AILA enables **automation of the entire scientific workflow**.
- It reduces human error and improves **reproducibility of experiments**.
- It positions India as a leader in **AI-driven scientific innovation**.

JIYO PARSI SCHEME

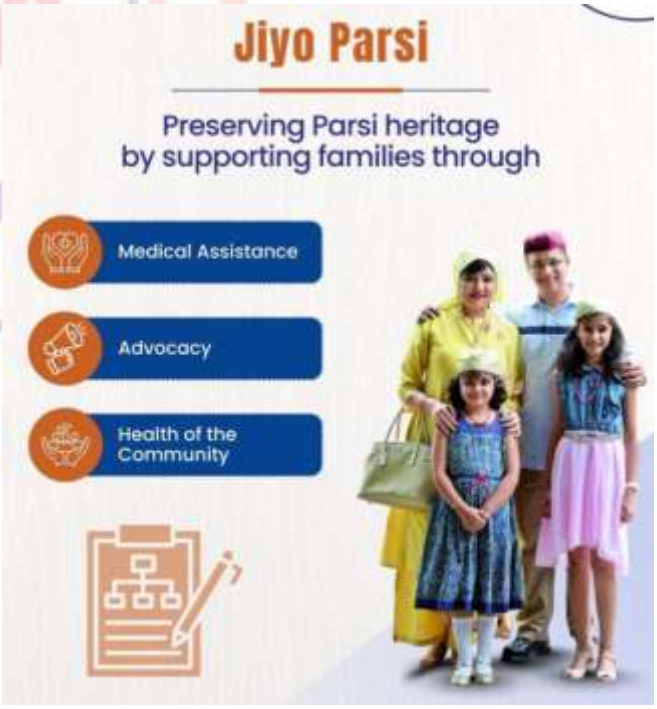
SOURCE: PIB

Why in News?

A recent report submitted by the **International Institute for Population Sciences (IIPS)** observed that the **Jiyo Parsi Scheme** has been **largely successful in reaching its intended beneficiaries**.

About Jiyo Parsi Scheme

- **Jiyo Parsi** is a **Central Sector Scheme** implemented by the **Ministry of Minority Affairs**.
- The scheme was launched during **2013–14** in response to concerns over the **rapidly shrinking Parsi population**, one of India's smallest and oldest minority communities.
- It is a **unique demographic intervention scheme**, as it focuses not on migration or welfare alone, but on **population stabilisation through medical and social support**.
- The scheme adopts a **scientific, evidence-based, and culturally sensitive approach** to address demographic decline.



Need for the Scheme

The Parsi population in India has been **consistently declining for decades** due to:

- Low fertility rates
- Late marriages
- Infertility issues
- Changing social lifestyles

A shrinking population posed risks to the **cultural continuity, social institutions, and community identity** of Parsis.

The scheme was conceptualised to **support willing couples**, rather than impose coercive or incentive-based population policies.

Objectives of Jiyo Parsi Scheme

- To **reverse the declining trend** in the Parsi population in India.
- To **stabilise and gradually increase** the population through **medical and structured social interventions**.
- To provide **emotional, financial, and institutional support** to Parsi couples facing fertility and family-related challenges.
- To ensure that demographic revival occurs in a **voluntary, informed, and ethical manner**.

Components of the Scheme

1. Medical Component

This component provides **financial assistance for infertility treatment** under standard and approved medical protocols.

Support covers:

- Assisted reproductive technologies
- Fertility treatments
- Associated medical procedures

2. Health of the Community Component

• This component seeks to **encourage Parsi couples to have children** by reducing caregiving burdens.

• Financial assistance is provided to couples for:

- Care of **dependent elderly family members**
- Support for **childcare and upbringing**

3. Advocacy Component

The advocacy component focuses on **awareness generation and counselling**.

Activities include:

- Counselling sessions for couples with fertility or family concerns
- Outreach programmes and seminars
- Medical camps and expert interactions
- Publicity through brochures, films, and digital platforms

Implementation Mechanism

- The scheme is implemented through **State Governments**, in coordination with **respective Parsi institutions and community bodies**.
- Eligible beneficiaries are identified with the support of **local Parsi organisations**, ensuring community participation.
- Financial assistance under all components is provided through **Direct Benefit Transfer (DBT)**, ensuring transparency and efficiency.
- **Biometric authentication and verification** of beneficiaries is mandatory to prevent duplication and misuse of funds.
- Periodic monitoring and evaluation are undertaken to assess **outcomes and impact**.

Significance of the Scheme

- Jiyo Parsi represents a **rare example of demographic policy tailored to a specific minority community**.
- It balances **medical science, social support, and cultural sensitivity**.
- The scheme demonstrates how **targeted welfare interventions** can address unique demographic challenges without coercion.
- It strengthens India's commitment to **minority protection and inclusive governance**.

ASSAM PROHIBITION OF POLYGAMY BILL, 2025

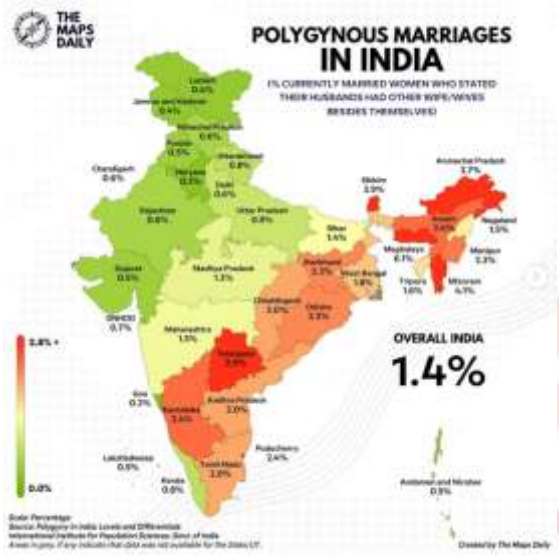
Why in News?

The Assam government has tabled the **Assam Prohibition of Polygamy Bill, 2025** in the state assembly. The proposed law seeks to **criminalize polygamy** and introduce strict penalties for offenders, marking a significant shift in Assam's personal law landscape.

Key Provisions of the Assam Anti-Polygamy Bill, 2025

- **Criminalisation of polygamy:** Entering into, or concealing, a second marriage while the first remains valid becomes a punishable offence with **up to 7 years' imprisonment and fines**.
- **Scope and exemptions:**
  - Areas under the **Sixth Schedule** and **Scheduled Tribes listed under Article 342** are exempt due to protection of customary practices.
  - The law applies to residents of Assam, even if the polygamous marriage occurs **outside the state** and they avail benefits from Assam's welfare schemes.
- **Liability of facilitators:** Village heads, community leaders, **qazis**, and guardians who assist or enable such marriages may also face penalties.

- **Compensation for affected women:** A structured mechanism will ensure **financial and legal support** for women harmed by polygamous unions.
- **Impact on convicts:** Those convicted will be **barred from government jobs, schemes, welfare benefits**, and even eligibility for elections.
- **Grandfather clause:** Existing polygamous marriages conducted under recognized personal or customary laws **before enactment** will remain valid.



About Polygamy

- Polygamy refers to a marital setup where **one individual has multiple spouses simultaneously**.
- **Polygyny** (man with multiple wives) has historically been more common in several cultures.
- **Polyandry** (woman with more than one husband) exists in limited tribal contexts.
- **Bigamy** is the act of marrying again while a previous marriage remains legally valid, and is a **criminal offence** across most Indian personal laws.

Status of Polygamy in India

- As per **NFHS-5 (2019-21)**, Assam's polygamy prevalence stands at **2.4%**, while Meghalaya records the highest at **6.1%**.
- Monogamy is legally enforced for **Hindus, Christians, Parsis, and under the Special Marriage Act**.
- Under **Muslim personal law**, polygyny is not prohibited, though subject to constitutional scrutiny if it violates fundamental rights.

Judicial Stand on Polygamy

- In **Parayankandiyal v. K. Devi (1996)**, the Supreme Court stated that **monogamy is central to Hindu social values**.
- **Narasu Appa Mali (1951)** upheld the legislative power to reform personal laws in public interest.
- **Javed v. State of Haryana (2003)** clarified that Article 25 rights are **subject to social order and welfare**, and polygamy is not an essential religious practice.

Implications and Challenges

- **Equality concerns:** Different personal laws create inconsistencies with **Articles 14 and 15**.
- **Gender justice:** Polygamy may affect **women's dignity, autonomy, and emotional well-being**, conflicting with Article 21.
- **Social complexity:** While prohibited for some communities, it remains permissible for others, complicating legal uniformity.
- **Changing societal norms:** With higher awareness, polygamy is increasingly viewed as **incompatible with modern values of fairness and dignity**.

Measures Needed

- **Incremental reform** of personal laws to align them with constitutional rights.
- **Consultative UCC framework** to standardize marriage laws while respecting cultural sensitivities.
- **Stronger enforcement** with victim-support mechanisms and compensation systems.
- **Awareness campaigns** involving civil society and community leaders to shift mindsets.
- **Judicial oversight** through constitutional review of discriminatory practices.

Conclusion

The debate around polygamy reflects India's wider struggle to balance **religious freedom and gender equality**. Assam's initiative marks a decisive step toward strengthening women's rights. Ensuring **legal clarity, social acceptance, and constitutional harmony** will be essential for meaningful long-term reform.

INTERNATIONAL RELATIONS

INDIA RELATIONS WITH OTHER NATIONS

INDIA–NEW ZEALAND FREE TRADE AGREEMENT (FTA)

SOURCE: THE HINDU

Why in News?

India and New Zealand have **concluded negotiations on a comprehensive Free Trade Agreement (FTA) in just nine months**, reflecting growing economic convergence.

Free Trade Agreement (FTA)

- A Free Trade Agreement (FTA) is a formal economic arrangement between two countries aimed at **reducing or eliminating tariffs and non-tariff barriers** to enhance trade, investment, and economic cooperation.

Objectives and Targets of the India–New Zealand FTA

1. Expansion of Bilateral Trade

- The FTA aims to **double bilateral trade to around USD 5 billion within five years**, from the current low base.
- This reflects an intention to move beyond limited commodity trade and build **deeper economic engagement**.

2. Promotion of Investment Flows

- The agreement seeks to facilitate nearly **USD 20 billion in New Zealand investments over the next 15 years**.
- These investments are expected to complement India's **manufacturing, infrastructure, renewable energy, and agri-processing sectors**, supporting domestic capacity building.

3. Export Diversification for India

- With rising protectionism and tariff barriers in traditional markets like the US and parts of Europe, the FTA provides **alternative export destinations**.
- It reduces India's dependence on a few markets and enhances **trade resilience**.

4. Growth in Services and Skilled Mobility

- Services trade and movement of professionals are key pillars, reflecting India's strength in **IT, healthcare, education, and professional services**.
- Temporary employment and education linkages strengthen **people-to-people ties**.

Existing Trade Relations

1. Trade Volume and Growth

- Bilateral trade reached **around USD 1.3 billion in FY 2024–25**, recording strong year-on-year growth.
- Despite this growth, trade remains **modest relative to the economic size and potential** of both countries.

2. Composition of Indian Exports

- India exports **pharmaceuticals, textiles, engineering goods, chemicals, and IT/IT-enabled services**.
- These exports highlight India's comparative advantage in **manufacturing and knowledge-based sectors**.

3. Composition of Imports from New Zealand

- India imports **wool, fruits, forestry products, and dairy-related items**, reflecting New Zealand's strength in agriculture.
- This has resulted in **limited value-chain integration**, with trade largely commodity-driven.

4. Structural Imbalance

- Trade is asymmetrical, with **manufactured and service exports from India** and **primary agricultural exports from New Zealand**.

- Regulatory barriers and limited awareness have constrained deeper engagement.

Key Features of the India–New Zealand FTA

1. Tariff Liberalisation

- India will extend **duty concessions on about 95% of New Zealand's tariff lines**.
- New Zealand will offer **duty-free access on 100% of India's tariff lines**, significantly improving market access for Indian goods.

2. Protection of Sensitive Sectors

- India has excluded **dairy, rice, wheat, sugar, edible oils, onions, and rubber** from tariff liberalisation.
- This ensures **farmer livelihood protection and food security**, while maintaining political and social balance.

3. Support to Labour-Intensive Sectors

- Preferential access will benefit **textiles, apparel, leather, footwear, engineering goods, and pharmaceuticals**.
- These sectors are major **employment generators**, aligning trade policy with inclusive growth.

4. Services and Skilled Mobility Provisions

- The FTA introduces **5,000 temporary employment visas annually**.
- Indian professionals can work in New Zealand for **up to three years**, boosting services exports and remittances.

5. Trade Facilitation Measures

- Provisions on **rules of origin, customs cooperation, SPS measures, and technical standards** aim to reduce procedural delays.
- This improves **predictability, transparency, and ease of doing business**.

Challenges Associated with the FTA

1. Agricultural Sensitivities

- Strong domestic concerns in India regarding dairy and horticulture restrict deeper liberalisation.
- Any miscalibration could trigger **farmer protests and rural distress**.

2. Political Opposition in New Zealand

- Sections of New Zealand's political leadership express concerns about **immigration pressure and dairy sector competitiveness**.
- This could affect long-term commitment and implementation.

3. Low Trade Base

- Since existing trade volumes are small, **economic gains may be gradual**, not immediate.
- Expectations must be managed realistically.

4. Non-Tariff Barriers

- Differences in **regulatory standards, certification procedures, and SPS norms** may continue to restrict exports.
- Tariff cuts alone may not ensure market access.

5. Limited Utilisation Capacity

- Many Indian **MSMEs lack awareness, scale, and compliance capacity** to fully benefit from FTAs.
- Without support, utilisation rates may remain low.

Way Forward

1. Strengthening Supply Chains

- Both countries should move beyond tariff cuts to build **integrated manufacturing and agri-processing value chains**.
- This will enhance value addition and trade depth.

2. Deepening Services Cooperation

- Greater collaboration in **IT, education, healthcare, tourism, fintech, and professional services** can generate high-value growth.
- Mutual recognition of qualifications should be expanded.

3. Leveraging Diaspora and Skills

- Mobility provisions should promote **skill transfer, innovation, and entrepreneurship**, not just short-term employment.
- Diaspora networks can act as trade and investment bridges.

4. Supporting MSMEs

- Targeted support through **export credit, standards assistance, digital trade platforms, and awareness programmes** is essential.
- This ensures inclusive benefits from the FTA.

5. Continuous Review Mechanism

- Joint trade committees should **regularly review implementation**, resolve disputes, and adjust commitments.
- This makes the agreement flexible and sustainable.

Conclusion

The **India–New Zealand FTA** is a forward-looking agreement that balances **market access with domestic sensitivities**. By promoting trade, investment, and skilled mobility, it strengthens India's **Indo-Pacific economic engagement**. With effective implementation, the pact can evolve into a **durable and diversified partnership** supporting long-term economic resilience.

INDIA–OMAN COMPREHENSIVE ECONOMIC PARTNERSHIP AGREEMENT (CEPA)

SOURCE: THE HINDU

Why in News?

India and Oman have signed a **Comprehensive Economic Partnership Agreement (CEPA)**, making it India's **second major trade pact in West Asia after the UAE**.

Key Features of the India–Oman CEPA

1. Zero-Duty Market Access for Indian Goods

- Oman has eliminated customs duties on **over 98% of its tariff lines**, covering almost **99% of India's current exports**.
- This makes Indian products significantly **more price-competitive** in the Omani market and in re-export destinations.

2. Support to Labour-Intensive Sectors

- Sectors such as **textiles, leather, gems and jewellery, engineering goods, pharmaceuticals, automobiles, and auto components** receive full tariff elimination.
- These sectors are **employment-intensive and MSME-driven**, directly supporting India's goals of **job creation and export-led growth**.

3. Deep Liberalisation in Services Trade

- Oman has opened **127 services sub-sectors**, including **IT, professional services, R&D, education, healthcare, logistics, and consultancy**.
- This creates **high-value opportunities** for Indian firms, especially in sectors where India enjoys a global comparative advantage.

4. Enhanced Mobility for Skilled Professionals (Mode 4)

- The quota for **intra-corporate transferees** has been raised from **20% to 50%**, allowing greater movement of Indian professionals.
- **Contractual service suppliers** can now stay for **up to two years**, with the possibility of extension, improving workforce stability and earnings.

5. 100% Foreign Direct Investment (FDI) in Services

- Indian companies are permitted **full foreign ownership** in several services sectors in Oman.
- This enables **long-term commercial presence**, regional headquarters, and integration into Gulf and African markets.

6. Breakthrough for AYUSH and Traditional Medicine

- For the first time globally, a trade agreement includes **full market access for traditional medicine across all trade modes**.
- This opens the **Gulf wellness and healthcare market** for India's **AYUSH, yoga, and holistic health sectors**.

7. Faster Pharmaceutical Approvals

- Oman will accept approvals from **USFDA, EMA, and UKMHRA**, significantly reducing regulatory delays.
- This lowers compliance costs and accelerates **Indian pharmaceutical exports**, a critical strength area.

Strategic Importance in India's West Asia Trade Strategy

1. Diversification Beyond the West

- The CEPA helps India reduce over-reliance on the **US and EU**, where exporters face rising **carbon-linked barriers like CBAM**.
- West Asia offers a **tariff-friendly and faster-growing alternative market**.

2. Oman as a Gateway Economy

- Oman's proximity to the **Strait of Hormuz** and its modern ports like **Duqm and Sohar** make it a natural **re-export and logistics hub**.
- Indian goods can access **West Asia, East Africa, and global trans-shipment routes** efficiently.

3. Strategic Position within the GCC

- With FTAs already in place with **UAE (2022)** and **Oman (2025)**, India strengthens its position despite stalled **India–GCC FTA talks**.
- These bilateral pacts help India **avoid tariff disadvantages** in Gulf markets.

4. Services-Led Growth Potential

- Oman's services imports are substantial, but India's share remains **low**, indicating **significant untapped potential**.
- IT, healthcare, education, and professional services are less affected by tariff barriers and offer **stable long-term growth**.

5. Energy Security Complementarity

- Oman remains a **reliable supplier of crude oil, LNG, fertilisers, and petrochemical inputs**.
- This supports India's **energy security and agricultural stability**, especially amid global volatility.

Challenges Associated with the Oman CEPA

1. Limited Domestic Market Size

- Oman's domestic market is relatively small, which may limit **large-scale export expansion** beyond niche and re-export segments.

2. Competitiveness and Quality Concerns

- Indian exporters must upgrade **quality standards, packaging, branding, and certification** to meet evolving Gulf consumer preferences.

3. Implementation and Non-Tariff Barriers

- Actual gains depend on smooth implementation of **visa rules, professional recognition, and regulatory cooperation**.
- Delays in mobility provisions can dilute benefits.

4. Regional Geopolitical Risks

- West Asia remains vulnerable to **conflicts, shipping disruptions, and energy shocks**, which can raise logistics and insurance costs.

5. Fragmentation of GCC Trade Policy

- Multiple bilateral FTAs may complicate efforts toward a **single India–GCC agreement**, increasing compliance costs for exporters.

Way Forward

- **Develop Oman as a re-export hub** for Indian goods targeting Africa and West Asia.
- **Move up the value chain** by promoting branded, value-added exports rather than raw materials.
- **Deepen services and skills integration** through faster mutual recognition agreements.
- **Align CEPA benefits with domestic schemes** such as PLI, MSME clusters, and skilling initiatives.
- **Use bilateral success to revive India–GCC FTA negotiations** by demonstrating tangible gains.

Conclusion

The **India–Oman CEPA** strengthens India's **West Asia economic pivot** amid rising global protectionism. By combining **tariff-free goods access, deep services liberalisation, and skilled mobility**, it enhances India's export resilience. Effective implementation can transform Oman into a **strategic economic bridge connecting India with the Gulf and Africa**.

DEEPENING INDIA–AFRICA ENGAGEMENT

SOURCE: THE HINDU

Why in News?

India–Africa relations are in focus following renewed policy debates on **doubling bilateral trade by 2030** and strengthening South–South cooperation.

Evolution of India–Africa Relations

- **Ancient period:** India had peaceful commercial and cultural links with East Africa through Indian Ocean trade, contributing to Swahili civilisation without conquest.
- **Colonial era:** Shared experiences of imperial exploitation created political solidarity; Mahatma Gandhi's struggle in South Africa influenced both Indian and African nationalism.
- **Post-independence phase:** India supported African decolonisation and cooperated through platforms like **Bandung Conference (1955)** and the **Non-Aligned Movement**, focusing on capacity building rather than extractive trade.

Key Areas of Convergence

1. Trade and Economic Cooperation

- India is among the **top trading partners and investors** in Africa.
- Exports include **pharmaceuticals, automobiles, machinery, and textiles**, while Africa supplies **energy, minerals, and agri-commodities**.

- India aims to **double trade by 2030** by promoting value addition and services.

2. Development Partnership and Capacity Building

- India provides **concessional Lines of Credit** for infrastructure, water, power, and industrial projects.
- Programmes emphasise **local capacity creation**, not debt-driven dependency.

3. Education, Technology and Digital Cooperation

- Schemes like **ITEC** and scholarships have trained thousands of African professionals.
- Digital initiatives such as tele-education, tele-medicine, and adoption of **India's digital public infrastructure models** deepen cooperation.

4. Health, Energy and Global Cooperation

- India supplies **affordable medicines and vaccines**, reinforcing health diplomacy.
- Cooperation under the **International Solar Alliance** and support for Africa's voice in global forums reflect shared Global South priorities.

Challenges

- **Trade imbalance and limited market penetration**, with Indian exports concentrated in few sectors.
- **Slow implementation of development projects**, reducing on-ground impact.
- **Logistics and connectivity constraints**, worsened by Red Sea disruptions increasing shipping time and cost.
- **Political instability and security risks** in parts of Africa affecting investments and diaspora safety.
- **Underrepresentation in global governance**, with differing positions on UNSC reform.

Way Forward

- Shift from **commodity trade to value-added manufacturing and joint production** in Africa.
- Engage proactively with the **African Continental Free Trade Area (AfCFTA)** to access a unified market.
- Improve **trade finance, insurance, and risk-mitigation** for Indian MSMEs.
- Reduce logistics costs through **dedicated India–Africa maritime and air corridors**.
- Expand **services trade**, especially IT, healthcare, education, and skill development.

Conclusion

India–Africa relations are at a **decisive turning point**, backed by trust and shared development goals. Achieving trade and partnership targets requires moving beyond commodities to **manufacturing, services, and MSME-led engagement**. A **multi-pillar, people-centric strategy** can transform India–Africa ties into a durable engine of inclusive growth.

GLOBAL ISSUES

UN ESCAP ASIA-PACIFIC DISASTER REPORT 2025

SOURCE: INDIAN EXPRESS

Why in News?

The **UN ESCAP Asia-Pacific Disaster Report 2025** has warned that Asian megacities like **Delhi, Dhaka, Karachi, Manila, Shanghai, and Seoul** could face **2–7°C additional heating** due to the **Urban Heat Island (UHI) effect**.

Key Findings of the Report

1. Urban Heat Amplification (Urban Heat Island Effect)

- The report highlights that cities can heat up by **2–7°C more than surrounding rural areas**, even if global temperature rise is capped at **1.5–2°C**.
- Dense concrete surfaces, asphalt roads, glass buildings, limited green cover, and waste heat from **vehicles, air conditioners, and industries** trap and re-radiate heat.
- Megacities such as **Delhi, Dhaka, and Karachi** are projected to experience **dangerous localised heat stress**, far exceeding global averages.

2. Chronic Heat Exposure in South Asia

- South Asia is expected to face **300 or more days annually with a heat index above 35°C**, and **over 200 days above 41°C** in several regions.
- The **heat index**, which combines temperature and humidity, reflects **actual human discomfort and health risk**, making it more dangerous than dry heat alone.
- High humidity prevents sweat evaporation, increasing risks of **heat exhaustion and heat stroke**.

3. Rapid Increase in Extreme Heat Events

- The year **2024 was the hottest on record globally**, with South Asia experiencing prolonged and intense heatwaves.
- In **Bangladesh**, the April–May 2024 heatwave affected **over 30 million people**, disrupting schools, health systems, and livelihoods.
- In **India**, the long heatwave reportedly caused **around 700 heat-related deaths**, making it among the deadliest climate events in the region.

4. Rising Population Exposure

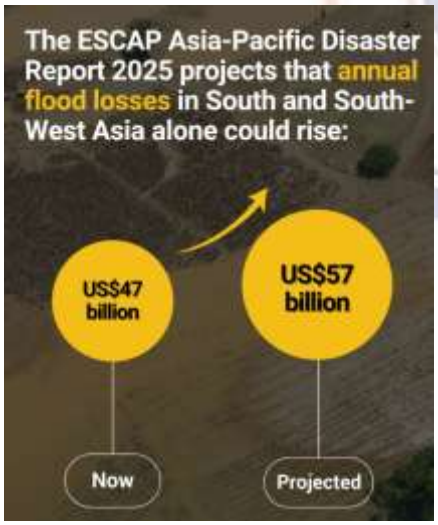
- The report projects that **over 40% of South Asia's population** will be exposed to **dangerous heat index levels (>35°C and >41°C)** in both medium- and long-term scenarios.
- Importantly, **exposure will increase regardless of mitigation efforts**, due to continued **urban expansion and population growth**.

5. Compounding Threat of Heat and Pollution

- Extreme heat worsens **air pollution** by increasing **ground-level ozone, PM2.5 and PM10 concentrations**, and releasing volatile organic compounds (VOCs).
- Heat also intensifies **wildfires and droughts**, creating a feedback loop that raises **cardiovascular and respiratory disease risks**, especially among children and the elderly.

6. Economic and Sectoral Impacts

- Heat-related productivity losses in Asia are projected to rise sharply, equivalent to **millions of full-time jobs lost annually by 2030**.
- Sectors such as **agriculture, construction, transport, and informal work** are most affected due to outdoor exposure.
- Annual climate-related economic losses could rise into **hundreds of billions of dollars** under high-emissions pathways.



Why South Asia Is the Global Heat Hotspot

- **High temperature combined with high humidity** pushes the heat index into lethal ranges for most of the year.
- **Rapid and unplanned urbanisation** creates concrete-dominated cities with minimal ventilation and green cover.
- A **large outdoor workforce** in agriculture, construction, and informal sectors faces unavoidable exposure.
- **Low adaptive capacity**, including limited access to cooling, electricity, clean water, and healthcare, increases vulnerability.
- **High population density and poverty** mean even moderate heatwaves affect **tens of millions**, disproportionately harming the poor.

Challenges in Reducing Heat Risk

- Many **Heat Action Plans** lack scientific grounding, funding, and legal enforceability.
- Urban planning prioritises construction over **blue-green infrastructure** like trees, lakes, and ventilation corridors.
- **Early warning systems** remain weak, with limited district-level and neighbourhood-specific forecasts.
- Healthcare systems lack **heat emergency units, cooling shelters, and trained response teams**.
- Labour laws do not adequately mandate **shade, rest breaks, water access, or work-hour adjustments** during heatwaves.
- Power and water shortages worsen risk when cooling becomes essential for survival.

Way Forward

- Establish a **National Heat-Health Warning Network** with last-mile communication in local languages.
- Promote **heat-sensitive urban design**, including cool roofs, reflective materials, urban forests, and permeable pavements.
- Legally protect workers through **mandatory heat-safety standards** and employer accountability.
- Strengthen **climate-resilient agriculture** using heat-tolerant crops, micro-irrigation, and insurance.
- Upgrade local health systems with **cooling shelters, mobile clinics, hydration centres**, and rapid response teams.
- Expand **social safety nets** for vulnerable households through subsidised cooling, water access, and income support.

Conclusion

The UN ESCAP report identifies **extreme heat as the fastest-growing climate threat in Asia**, with South Asia at its epicentre. Without urgent adaptation—especially in cities, labour protection, and health systems—heatwaves will become **chronic humanitarian crises**. A **science-driven, equity-focused, and urban-centred response** is essential to protect lives, livelihoods, and long-term resilience.

INDIA'S STRATEGIC INTERESTS IN THE INDIAN OCEAN REGION (IOR)

SOURCE: THE HINDU

Why in News?

The **7th NSA-level Colombo Security Conclave (CSC) in 2025** highlighted India's renewed push to shape the **security architecture of the Indian Ocean Region**.

How the Indian Ocean Shapes India's Strategic Interests

1. Geopolitical Leadership and Regional Stability

- India anchors its **Neighbourhood First Policy** and **SAGAR (Security and Growth for All in the Region)** vision in the IOR.
- Platforms like the **Colombo Security Conclave (CSC)** help India move from a passive player to an **active norm-builder**, promoting cooperation in maritime security, counter-terrorism, and cyber security.
- Expansion of CSC membership (e.g., Seychelles) reflects growing regional acceptance of India's leadership role.

2. Role as a Net Security Provider and First Responder

- India's rapid humanitarian and disaster relief operations enhance **strategic trust and soft power**.
- Operations such as **disaster relief to Sri Lanka and Maldives** demonstrate India's ability to respond faster than distant powers.
- This humanitarian diplomacy strengthens long-term security partnerships.

3. Energy Security and Protection of Sea Lines of Communication (SLOCs)

- Over **two-thirds of India's crude oil** and around **half of LNG imports** pass through the **Strait of Hormuz**.
- Any disruption to these SLOCs can severely affect India's economy.
- Naval missions like **Operation Sankalp** aim to protect Indian merchant vessels in high-risk zones.

4. Strategic Connectivity and Trade Corridors

- The ocean provides India a **maritime alternative to hostile land borders**, enabling access to Central Asia, West Asia, and Africa.
- Projects like **Chabahar Port** strengthen India's connectivity while countering over-dependence on China-led routes.
- Maritime connectivity supports India's role in **rules-based regional trade**.

5. Blue Economy and Deep-Sea Resources

- The IOR offers access to **polymetallic nodules and critical minerals**, crucial for clean energy and electric mobility.
- India's progress under the **Deep Ocean Mission** reduces dependence on external mineral monopolies.
- Sustainable blue-economy practices also support livelihoods of coastal communities.

Key Challenges in the Indian Ocean Region

1. Grey-Zone Warfare and Scientific Espionage

- China increasingly uses **research vessels and dual-use infrastructure** to collect sensitive seabed and acoustic data.
- Existing legal frameworks like UNCLOS struggle to regulate such activities.

2. Strategic Volatility of Littoral States

- Smaller IOR nations often oscillate between major powers to extract economic benefits, creating **policy uncertainty**.
- India must continuously invest diplomatically and economically to retain trust.

3. Sub-Surface Nuclear and Naval Competition

- Deployment of advanced submarines by China increases pressure on India's **second-strike credibility**.
- Ensuring credible deterrence while avoiding escalation remains challenging.

4. Climate and Infrastructure Vulnerability

- Rising sea levels threaten island nations like Maldives and India's own **Andaman & Nicobar Islands**.
- Climate change has become a **security issue**, not just an environmental one.

Way Forward

- Strengthen **SAGAR through capacity building**, patrol vessels, and coastal radar networks for IOR states.
- Institutionalise **minilateral groupings** like CSC for faster decision-making.

- Enhance **Underwater Domain Awareness** and protect undersea data cables.
- Integrate **blue economy cooperation** with sustainable development.
- Invest in **climate-resilient maritime infrastructure**.

Conclusion

The Indian Ocean Region is the **core of India's strategic, economic, and security interests**. As competition intensifies, India must combine **maritime power with developmental partnerships** to retain trust. A balanced approach—security, connectivity, and climate resilience—will secure India's long-term influence in the IOR.

INDIA–RUSSIA BILATERAL RELATIONS

The President of **Russia**, Vladimir Putin, is on a state visit to **India** for the **23rd India–Russia Annual Summit** in New Delhi.

Institutional Framework of Relations

- Bilateral ties are anchored in **annual leadership summits**, providing top-level political guidance.
- The **India–Russia Inter-Governmental Commission (IRIGC)** operates through:
  - Trade, Economic, Scientific & Technological Cooperation (TEC)
  - Military & Military-Technical Cooperation (M&MTC)
- Additional mechanisms include the **2+2 dialogue**, **NSA-level talks**, parliamentary exchanges, and sector-specific working groups, ensuring continuity despite global disruptions.

Areas of Strategic Convergence

- Both countries advocate a **multipolar world order** and oppose unilateral dominance.
- They support **reform of global governance institutions**, including **UN Security Council expansion** with India as a permanent member.
- India and Russia coordinate positions in **BRICS, SCO, G20, and the United Nations**, especially on sovereignty, non-intervention, and development concerns.

Key Areas of Cooperation

1. Defence and Strategic Security

- Russia remains one of India's **largest defence partners**, with platforms such as **Su-30MKI, T-90 tanks, INS Vikramaditya, nuclear submarines, and the S-400 air defence system**.
- Joint development and production projects include:
  - **BrahMos cruise missile**
  - Licensed production of **AK-203 rifles**
  - Long-term **Military-Technical Cooperation Programme (2021–2031)**
- Regular joint exercises like **INDRA** strengthen interoperability and strategic signalling.

2. Nuclear and Space Cooperation

- Russia is India's **only foreign partner operating a nuclear power plant on Indian soil**, exemplified by the **Kudankulam Nuclear Power Project**.
- In space, Russia supports **Gaganyaan** through astronaut training and technology sharing, building on decades-old ISRO–Soviet cooperation.

3. Energy and Natural Resources

- Russia has emerged as a **major supplier of discounted crude oil, LNG, and coal**, especially after the Ukraine conflict disrupted global energy markets.
- Indian companies hold upstream stakes in Russian energy projects such as **Sakhalin**, enhancing long-term energy security.
- Cooperation is expanding into **LNG, Arctic energy, critical minerals, hydrogen, and nuclear fuel cycles**.

4. Trade and Connectivity

- Bilateral trade reached **around USD 68–70 billion in FY 2024–25**, largely driven by energy imports.
- Leaders have set ambitious targets of **USD 100 billion trade and USD 50 billion mutual investment by 2030**.
- Connectivity initiatives include:
  - **International North–South Transport Corridor (INSTC)**

- **Chennai–Vladivostok Eastern Maritime Corridor**
- Interest in the **Northern Sea Route** to shorten shipping time.

5. Science, Technology, Education and Culture

- Joint cooperation spans **AI, IT, nanotechnology, materials science, and innovation**, guided by a shared STI roadmap.
- Over **20,000 Indian students**, mainly in medicine, study in Russia.
- Cultural exchanges through films, yoga, festivals, and literature sustain **people-to-people ties**.

Key Challenges

- **Ukraine war and Western sanctions** complicate India's diplomatic balancing and financial transactions.
- **Trade imbalance** heavily favours Russia, with unresolved payment and settlement issues.
- Continued **dependence on Russian defence spares** poses risks amid sanctions and Russia's wartime priorities.
- **Connectivity corridors** face infrastructure, regulatory, and geopolitical bottlenecks.
- Russia's relative lag in some **cutting-edge technologies** limits future defence procurement prospects.

Way Forward

- **Rebalance trade** by expanding Indian exports in pharmaceuticals, agriculture, machinery, and IT services.
- Shift defence ties from buyer–seller to **co-design, IP sharing, and export-oriented co-production**.
- Fast-track **INSTC and maritime corridors** through digital customs, PPPs, and regular shipping.
- Deepen cooperation in **new-age technologies**, clean energy, AI, cyber security, and critical minerals.
- Strengthen **people-to-people and academic linkages** with easier mobility and degree recognition.
- Institutionalise dialogue to manage differences while preserving **strategic autonomy**.

Conclusion

India–Russia relations remain one of India's **most enduring strategic partnerships**, built on defence, energy, and political trust. The current summit offers an opportunity to **rebalance ties beyond hydrocarbons and legacy defence platforms**. Adapting the partnership to new technologies, trade realities, and global pressures will determine its future relevance.

ECONOMY

GROWTH AND DEVELOPMENT

RUPEE DEPRECIATION

SOURCE: THE HINDU

Why in News?

In **2025**, the Indian Rupee fell to a **record low of around ₹90.43 per US dollar**, making it the **worst-performing Asian currency** this year. The depreciation has been driven by **foreign fund outflows, trade imbalance, high imports, and uncertainty in India–US trade negotiations**.

Rupee Depreciation

- A depreciating rupee means **more rupees are required to buy one unit of foreign currency**.
- It reflects changes in **capital flows, trade balance, inflation differentials, global risk sentiment, and macroeconomic stability**.
- Unlike devaluation, which is a **policy decision**, depreciation is **market-driven** and continuous.

Depreciation vs Devaluation

- **Devaluation** is a deliberate reduction in currency value by the government or central bank under a **fixed or pegged exchange rate**.
- **Depreciation** occurs under a **floating or managed float system**, like India's, due to **market forces** such as capital outflows, rising imports, or global shocks.
- India has not devalued the rupee; recent movements are **depreciation driven by economic factors**.

Key Factors Causing Rupee Depreciation (2025)

1. Sustained FPI Outflows

- Foreign Portfolio Investors have withdrawn **over ₹1.4 lakh crore since early 2025**, shifting funds to economies offering higher or safer returns.
- Global geopolitical tensions have strengthened the **US dollar's safe-haven demand**, weakening emerging-market currencies like the rupee.

2. Trade Deficit and Weak Exports

- India's **merchandise exports declined**, while imports rose sharply in late 2025.
- With imports outpacing exports, the **trade deficit widened**, increasing demand for dollars and pressuring the rupee.

3. High Crude Oil Prices

- India imports over **85% of its crude oil**, making the rupee highly sensitive to global oil prices.
- Rising Brent crude prices inflate the import bill, worsen the **current account deficit (CAD)**, and weaken the currency.

4. Surge in Gold Imports

- Gold imports surged sharply in 2025, driven by price volatility and investment demand.
- Higher gold imports increased dollar demand and widened the **external imbalance**, adding to depreciation pressures.

5. India–US Trade Deal Uncertainty

- Delays and uncertainty around the **India–US trade agreement** raised concerns about tariffs, market access, and export prospects.
- This weakened investor confidence in India's external sector.

Impact of Rupee Depreciation

Positive Effects

- **Boost to Exports:** Indian goods become cheaper in global markets, benefiting sectors like **IT services, pharmaceuticals, textiles, and engineering goods**.
- **Higher Remittances:** NRIs receive more rupees per dollar, supporting household incomes and foreign exchange inflows.
- **Import Substitution:** Costlier imports may encourage **domestic manufacturing** under initiatives like *Make in India*.

Negative Effects

- **Imported Inflation:** Essential imports such as crude oil, fertilisers, electronics, and medicines become costlier, raising inflation.

- **Higher External Debt Burden:** Firms and governments with **foreign-currency loans** face higher repayment costs.
- **Wider Trade and CAD:** Even without higher volumes, a costlier import bill expands deficits.
- **Capital Flight Risk:** Persistent depreciation may trigger further FPI outflows, creating a negative feedback loop.
- **Lower Purchasing Power:** Rising import prices reduce consumer welfare and domestic demand.

How Can the Indian Rupee Be Strengthened?

1. Reduce Dollar Dependence

- Expand **rupee-based trade settlement** through Special Vostro Rupee Accounts.
- Promote **local currency settlement agreements** with Asia, Africa, and the Gulf.

2. Deepen Global Use of INR

- Encourage **Masala Bonds** and offshore rupee lending.
- Support inclusion of **Indian government securities in global bond indices** to attract stable long-term flows.

3. Strengthen External Sector Fundamentals

- Boost **export competitiveness** through productivity, quality upgrades, and market diversification.
- Curb non-essential imports, especially **gold**, via monetisation and digital alternatives.

4. Maintain Macroeconomic Stability

- Keep **inflation under control**, follow prudent fiscal policy, and ensure predictable regulation to attract steady capital inflows.
- Maintain strong **foreign exchange reserves** and calibrated central bank intervention to manage volatility.

5. Promote INR Acceptance Digitally

- Expand **UPI-based international payments** and digital rupee usage to enhance the rupee's global visibility.

Conclusion

The rupee's depreciation in 2025 reflects **capital outflows, high imports, weak exports, and global uncertainty**. While depreciation offers limited export benefits, prolonged weakness can undermine **price stability and investor confidence**. A stronger rupee requires **structural export growth, reduced import dependence, macroeconomic stability, and wider global use of the INR**.

AGRICULTURE AND ALLIED

GENOME-EDITED (GE) CROPS IN INDIA

SOURCE: THE HINDU

Why in News?

India's progress on **genetically modified (GM) crops has stalled since 2006**, with Bt cotton being the only commercial GM crop. Recently, however, **genome-edited (GE) crops have gained momentum**, with GE rice varieties cleared for release and GE mustard in advanced trials—signalling a major shift in India's agri-biotech policy.

Recent Advancements Supporting GE Crop Research in India

1. Streamlined Regulatory Framework

- GE crops **without foreign DNA** are exempt from the **MoEFCC's biosafety regulations** that apply to GM crops.
- Unlike GM crops, GE varieties do **not** require Genetic Engineering Appraisal Committee (GEAC) approval.
- Clearance is needed only from the **Institutional Biosafety Committee**, which must verify that the edited plant carries **no exogenous genetic material**.
- This lighter regulatory pathway accelerates crop development, field trials, and eventual commercial release.

2. Increased Government Funding

- The Union Budget **2023–24 allocated ₹500 crore** specifically for boosting GE crop research and breeding.
- GE crops are now treated at par with conventional cultivars for field testing and varietal release, reducing bureaucratic delays.

3. Indigenous Gene-Editing Tool Developed

- ICAR scientists have introduced an **Indian genome-editing platform** using the protein **TnpB**.
- TnpB is **much smaller** than the widely used CRISPR-Cas9 protein, making it easier to deliver into plant cells using viral vectors.
- The indigenous system is **patent-free within India**, substantially lowering research costs and reducing dependency on foreign technologies.

4. Capacity Building for Scientists

- The DBT and Indo-US Science & Technology Forum run the **GETin (Genome Engineering/Editing Technologies Initiative)**.

- GETin offers **Overseas Fellowships**, enabling Indian researchers to access cutting-edge training in premier U.S. laboratories.

What is Genome Editing?

Genome editing refers to **precise, targeted modification** of an organism's DNA using tools like **CRISPR-Cas9, TALENs**, and **Zinc Finger Nucleases**.

How CRISPR Works

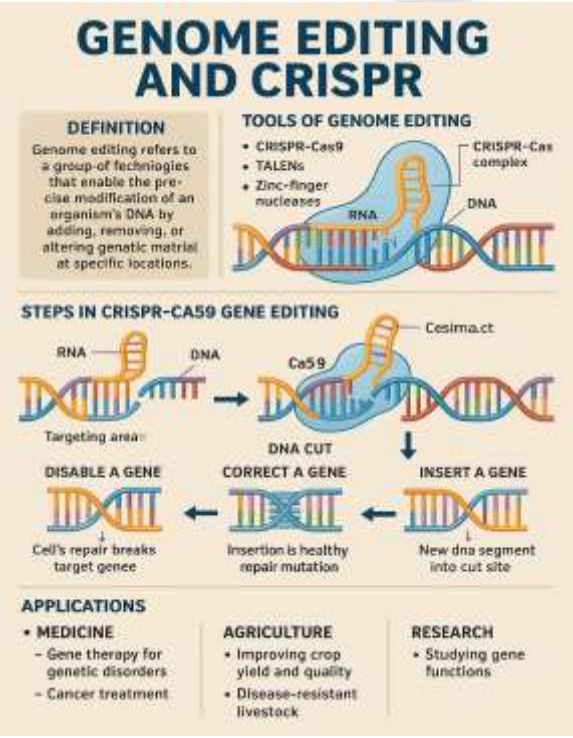
- **CRISPR RNA:** Acts like a *search engine*, locating the exact DNA sequence to be edited.
- **Cas9 Enzyme:** Works as molecular *scissors*, cutting the DNA at the targeted site.
- **Cell Repair:** The cell repairs the cut, allowing scientists to:
  - **Disable** a gene.
  - **Correct** a faulty gene using a template.
  - **Insert** a desired gene sequence.

Applications

- **Medicine:** Gene therapy, cancer immunotherapy, antiviral treatments.
- **Agriculture:** Higher yields, disease-resistant crops, climate-resilient varieties.
- **Research:** Gene knockout studies to understand functions.

GE Crop Examples in India

- **Samba Mahsuri GE Rice:** ~19% higher yield.
- **MTU-1010 GE Rice:** Enhanced tolerance to saline and alkaline soils.
- **GE Mustard:** Improved oil quality, lower pungency, resistance to fungal diseases and pests.



Gene Editing vs Genetic Modification

Feature	Gene Editing (GE)	Genetic Modification (GM)
Core Process	Alters native genes precisely	Inserts foreign genes
Foreign DNA	None (transgene-free)	Present (transgenic)
Regulation	Exempt from GEAC; quicker approvals	Requires GEAC, multi-year trials
Commercialisation	Fast	Slow
Examples (India)	GE rice, GE mustard	Bt cotton

Why Gene Editing Is Favoured Over GM Technology

1. Wider Applicability

- GE can refine complex traits—nutrition, shelf life, pest resistance—without altering the plant's fundamental character.

2. Improvement of Local Varieties

- GE enhances **elite, farmer-preferred cultivars** (e.g., Samba Mahsuri) without changing taste or regional adaptability.

3. Greater Public Acceptance

- GE mimics natural mutation and avoids foreign DNA, reducing social resistance associated with GM foods.

4. Faster and Cost-Effective Development

- Gene editing accelerates breeding cycles and reduces testing timelines, enabling rapid deployment of climate-resilient crops.

5. Streamlined Regulatory Pathway

- Fewer biosafety layers allow quicker release of GE crops compared to the decade-long approval route for GM crops.

Key Issues and Pathways for Responsible GE Advancement

1. Ethical & Moral Concerns

- Risks of **germline editing** and "designer traits" require strong ethical boundaries.
- Calls for global consensus and public dialogue.

2. Safety & Precision Challenges

- Off-target mutations and mosaicism remain concerns.
- Demands improved accuracy and long-term testing protocols.

3. Equity & Accessibility

- High initial costs may create **genetic inequality**.
- Policies must ensure **affordable access** and prevent discrimination.

4. Regulatory Gaps

- Patchy global rules may enable misuse.
- Harmonised international standards and adaptive national laws are essential.

5. Ecological Risks

- Gene drives may irreversibly alter ecosystems.
- Requires controlled experimentation and reversal mechanisms.

Conclusion

India is strategically shifting from stalled GM crop adoption to **rapid advances in genome editing**, backed by regulatory reforms and indigenous innovation. GE crops offer precision, speed, and wider social acceptance, making them crucial for future food and climate resilience. A balanced approach—combining scientific progress with strong ethical and ecological safeguards—will help India realise the full potential of its **agri-biotechnology revolution**.

KUTTANAD WETLAND AGRICULTURAL SYSTEM

SOURCE: THE HINDU

Why in News?

Recent **soil tests in Kuttanad paddy fields** revealed **elevated aluminium concentrations**, raising concerns about soil health and crop productivity. The findings threaten the sustainability of the **Kuttanad Wetland Agricultural System**, a globally recognised traditional farming landscape.

About Kuttanad Wetland Agricultural System

- The **Kuttanad Wetland Agricultural System** is a unique agricultural region located in **Kerala**.
- It is the **only agricultural system in India** that supports **rice cultivation below mean sea level**.
- The system reflects centuries-old **human adaptation to wetland ecology**, combining farming, fishing, and water management.
- Kuttanad is often referred to as the **"Rice Bowl of Kerala"** due to its extensive paddy cultivation.

Unique Characteristics of the System

- Paddy fields in Kuttanad lie **1–2 metres below sea level**, making them highly vulnerable to flooding and salinity intrusion.
- Cultivation is made possible through **earthen bunds (levees)** constructed to keep out saline backwaters.
- Continuous **water pumping and drainage systems** are used to regulate water levels during cropping seasons.
- Farming practices are closely aligned with **seasonal hydrological cycles**.

Landscape Structure of Kuttanad

- The Kuttanad system is a **complex mosaic of three interlinked landscape components**.
- **Wetlands** are primarily used for **paddy cultivation and seasonal fish catching**, forming the core agricultural zone.
- **Garden lands**, located on slightly elevated areas, are used for **coconut, tubers, banana, and other food crops**.
- **Water bodies**, including canals and backwaters, are utilised for **inland fishing, shell collection, and transport**.
- These components together ensure **livelihood diversification and ecological balance**.

Recognition under GIAHS

- The **Kuttanad Below Sea-Level Farming System** is recognised under the **Globally Important Agricultural Heritage Systems (GIAHS)** programme of the **Food and Agriculture Organization**.
- GIAHS recognition highlights systems that balance **agricultural productivity, biodiversity conservation, traditional knowledge, and livelihoods**.
- Kuttanad is recognised for its **sustainable wetland management and cultural heritage value**.

Aluminium Toxicity in Soil

- **Aluminium becomes more soluble and toxic** when soil pH falls **below 5**, which is common in waterlogged and acidic soils.
- In Kuttanad, soil acidity is aggravated by **prolonged flooding, excessive fertiliser use, and reduced organic matter**.
- Elevated aluminium levels pose a serious threat to **soil fertility and crop health**.

Impact of Aluminium on Plants

- Excess aluminium **damages the root system** of paddy plants, restricting root growth.

- It severely interferes with the uptake of **essential nutrients such as phosphorus, calcium, potassium, and magnesium**.
- This leads to **stunted plant growth, poor tillering, and reduced yields**.
- Long-term aluminium toxicity can result in **irreversible soil degradation**.

Environmental and Socioeconomic Implications

- Declining soil health threatens **food security and farmer livelihoods** in the region.
- Reduced productivity increases farmers' dependence on **chemical inputs**, worsening soil acidity.
- Degradation of wetlands affects **fish diversity and aquatic ecosystems**.
- The issue highlights the need for **sustainable soil and water management practices**.

Way Forward

- Adoption of **soil liming and organic amendments** to reduce acidity.
- Promotion of **integrated nutrient management** and reduced chemical fertiliser use.
- Strengthening **traditional water management practices**.
- Policy support for **climate-resilient and heritage-based farming systems**.

INDUSTRY AND INDUSTRIAL POLICIES

MSME SECTOR CHALLENGES

SOURCE: PIB

Why in News?

The **Delayed Payments Report 3.0** on *"MSMEs' Access to Finance and Timely Payments"* reveals that a vast number of MSMEs continue to struggle with **credit shortages, late payments, and operational bottlenecks**. The report underscores the urgency to improve **innovation, competitiveness, and financial resilience** in the sector.

What are MSMEs?

1. Definition and Classification

- Defined based on **investment in plant and machinery/equipment** and **annual turnover**.
- MSMEs operate across diverse sectors—textiles, handicrafts, manufacturing, services—and are crucial for **entrepreneurship and regional development**.

2. Regulatory Framework

- The **Micro, Small and Medium Enterprises Development Act, 2006** provides the legal foundation for defining MSMEs, creating a National Board, and enabling policy measures for competitiveness.
- The **Ministry of MSME** (established in 2007) formulates schemes, monitors implementation, and supports enterprise development.

Role of MSMEs in India's Economic Growth

1. Employment and GDP Contribution

- Contribute nearly **29% of GDP** and **36% of manufacturing output**.
- Provide jobs to over **12 crore people**, especially in labour-intensive sectors such as textiles and garments.

2. Exports and Global Trade

- Account for roughly **45% of India's exports**.
- Small enterprises dominate global markets in sectors such as **handicrafts and carpets**.

3. Rural Development and Inclusivity

- Drive **rural industrialisation**, aligned with the vision of PURA (Providing Urban Amenities in Rural Areas).
- Institutions like **KVIC** support village industries and balanced regional growth.

4. Innovation and Start-Up Ecosystem

- Many start-ups are MSME-led, driving innovation in **fintech, e-commerce, logistics, and digital services**.

5. Women Entrepreneurship

- Over **20% of MSMEs** registered on Udyam are women-led, signalling increased participation in economic activity.

Key Challenges Facing MSMEs

A. Financial Stress (As Highlighted in the Report)

- **Delayed Payments:** Pending dues exceed **₹8.14 lakh crore**, locking up working capital and halting expansion plans.

- **Credit Gap:** Estimated unmet credit demand is around **₹25 lakh crore**, forcing MSMEs into costly informal lending.
- **Rigid Banking Norms:**
  - Banks struggle with **information asymmetry** in assessing MSME creditworthiness.
  - Strict NPA rules make lenders cautious, limiting formal credit access despite Priority Sector Lending.

B. Structural Challenges

- **Low Formalisation:** Over **90%** of MSMEs remain informal, restricting their ability to benefit from institutional support.
- **Limited Technical Expertise:** Lack of access to advisory support for **IPR, exports, certifications**, and scaling strategies.
- **Supply Chain Vulnerability:** Dependence on imported inputs makes MSMEs sensitive to global disruptions—e.g., Red Sea crisis affecting exports in 2024.
- **Market Barriers:** High tariffs abroad, weak branding, and limited digital presence restrict global competitiveness.
- **Technological Obsolescence:** Working capital shortages leave little room for investment in **automation, R&D, and digital tools**.

Important Committees on MSME Reform

1. Standing Committee on Finance (2022)

- Advocated **cash-flow based lending**, linking GSTIN to account aggregators.
- Promoted formalisation through **GST-linked credit**.
- Recommended targeted **credit guarantees** for vulnerable sectors.
- Suggested strengthening **SIDBI's role** with increased capital.

2. UK Sinha Committee (2019)

- Proposed a **₹5,000 crore stressed asset fund** and increasing **collateral-free loan limits**.

3. Abid Hussain Committee (1997)

- Called for a shift from protection to **promotion**, cluster development, and marketing support.

4. Nayak Committee (1992)

- Recommended banks finance **20% of projected turnover** for working capital.

Key Strategies for Transforming the MSME Sector

1. Financing Innovations

- Promote **invoice discounting, P2P lending, venture debt**, and a **public credit registry** based on GST and utility data.

2. Enhancing Market Access

- Build MSME-only storefronts on e-commerce platforms. Strengthen export clusters with logistics support and common branding.

3. Technology Upgradation

- Provide grants for **automation, cloud tools, and digital machinery**.
- Establish **tech clinics** offering affordable consultancy.

4. Addressing Payment Delays

- Reform the **MSME Samadhaan Portal**, ensure automatic penalties, and introduce one-time settlements for dues.

5. Building Resilience

- Promote **cluster-based development**, shared infrastructure, and green practices through incentives and ESG-linked benefits.

Conclusion

India's MSME ecosystem holds immense potential but remains hindered by delayed payments, a widening credit gap, and limited technological readiness. Strengthening formalisation, financing channels, market linkages, and infrastructure can unlock their true economic impact. A resilient MSME sector is essential for inclusive growth, employment generation, and a competitive Indian economy.

INFRASTRUCTURE

INDIA'S TRANSPORT SECTOR

SOURCE: THE HINDU

Why in News?

In **2025**, India witnessed major disruptions in transport services, including **overcrowded trains, flight cancellations, and safety incidents**, exposing systemic capacity gaps.

Key Challenges Hindering India's Transport System

1. Infrastructure Deficiencies

- Major cities such as **Delhi, Mumbai, and Kolkata** face chronic road congestion due to inadequate public transport and excessive reliance on private vehicles.
- Urban rail networks and long-distance trains suffer from **severe overcrowding**, especially during peak and festive seasons, reflecting capacity shortfalls.

- Much of India's **road and railway infrastructure remains outdated**, resulting in slow travel speeds, frequent breakdowns, and higher accident risks.

2. Neo-Liberal Policy Constraints

- India's economic model has increasingly limited **direct public investment**, while encouraging private participation without strong regulation.
- Public transport remains affordable but **chronically under-funded**, leading to poor service quality and overcrowding.
- In sectors like aviation, market concentration has created **quasi-monopolies**, reducing competition and weakening consumer protection instead of improving efficiency.

3. Safety and Security Concerns

- India records **one of the highest numbers of road accident deaths globally**, with pedestrians and cyclists most vulnerable due to unsafe road design.
- Despite safety improvements, **rail accidents and derailments** continue to occur, triggering public concern.
- The **2025 aviation accident in Ahmedabad**, which resulted in heavy casualties, further highlighted safety and regulatory gaps across transport modes.

4. Environmental Sustainability Challenges

- The transport sector contributes about **14% of India's energy-related CO_2 emissions**, making it a major pollution source.
- Adoption of **electric vehicles and clean fuels** is progressing but remains uneven.
- Extreme climate events such as **floods, heatwaves, and storms** increasingly damage transport infrastructure, underlining the need for climate-resilient systems.

5. Data and Governance Gaps

- While digitisation has improved, India lacks **integrated, real-time data systems** for traffic management and logistics optimisation.
- Technologies such as **smart traffic signals, GPS-enabled buses, and predictive analytics** are still limited to select cities.
- Weak transparency in project execution has led to **delays, cost overruns, and corruption** in infrastructure development.

6. Social Equity and Accessibility Issues

- Low fares ensure affordability but do not guarantee **reliable or dignified access** to transport services.
- Elderly persons, women, and persons with disabilities face **significant accessibility and safety barriers** in public transport systems.
- Overcrowding and poor last-mile connectivity reduce inclusiveness.

Importance of India's Transport Sector

- Enables **national mobility and economic integration** across regions.
- Reduces logistics costs, supporting India's ambition to become a **global manufacturing and export hub**.
- Connects **remote, border, tribal, and rural areas** to markets and services.
- Supports agriculture, MSMEs, tourism, trade, and industry.
- Enhances access to **healthcare, education, and employment**, promoting social inclusion.
- Strengthens **disaster response and supply-chain resilience** during emergencies.

Government Initiatives for Transport Development

- **PM Gati Shakti – National Master Plan:** Integrated planning across transport modes to cut logistics costs.
- **National Infrastructure Pipeline (NIP):** Long-term funding framework for connectivity projects.
- **Bharatmala and Sagarmala:** Highway expansion and port-led development.
- **Metro Rail Policy & UDAN:** Urban mobility and regional air connectivity.
- **PM e-Bus Sewa, FAME-II, ITS Policy (2022):** Electric mobility, smart transport, and digital governance.
- **Vande Bharat and Amrit Bharat:** Railway modernisation and station redevelopment.

Way Forward

- Increase **public investment** using flexible fiscal frameworks for core transport infrastructure.
- Prioritise **safe-system approaches**, including road design, enforcement, and technologies like **Kavach**.
- Accelerate **low-carbon mobility**, EV-based public transport, and non-motorised transport.
- Strengthen **data-driven governance** through real-time mobility platforms.
- Ensure **universal accessibility and social equity**, especially for women, elderly, and persons with disabilities.

Conclusion

India's transport challenges reflect a system under strain from **rising demand and insufficient investment**. Addressing

safety, sustainability, and capacity gaps is now a **developmental and governance imperative**. A resilient, inclusive, and climate-ready transport system is essential for **long-term economic growth and social equity**.

INDIA'S MARITIME SECTOR

SOURCE: PIB

Why in News?

India is accelerating reforms in its maritime sector under the **Maritime Amrit Kaal Vision 2047** to support its ambition of becoming a **$30-trillion economy by 2047**.

Recent Developments in India's Maritime Sector

1. Expansion of Port Capacity and Efficiency

- India's total port handling capacity has nearly **doubled from about 1,400 MMTPA (2013–14) to around 2,760 MMTPA (2024–25)**.
- Major ports handled **over 850 million tonnes of cargo in FY 2024–25**.
- Operational reforms have reduced **average vessel turnaround time from about 93 hours to under 50 hours**, improving global competitiveness.

2. Structural and Legal Reforms

- New laws such as the **Merchant Shipping Act 2025**, **Carriage of Goods by Sea Act 2025**, and **Indian Ports Act 2025** modernise colonial-era frameworks.
- These reforms align India's maritime governance with **international standards**, improve safety, environmental compliance, and ease of doing business.

3. Maritime Amrit Kaal Vision 2047 and Investment Push

- The vision outlines nearly **₹80 lakh crore (~$1 trillion)** investment over 25 years in ports, shipping, shipbuilding, inland waterways, and green maritime technologies.
- The **Shipping Corporation of India** plans to expand its fleet significantly by 2047, strengthening India's global shipping presence.
- **India Maritime Week 2025** showcased strong international confidence, with large investment commitments in ports and logistics.

4. Coastal Shipping and Inland Waterways Growth

- The **Coastal Shipping Act 2025** formally recognises coastal shipping as a major transport mode to reduce logistics costs.
- Cargo movement on inland waterways rose from **18 million tonnes (2013–14) to over 145 million tonnes (2024–25)**.
- National Waterways increased from **5 to 111**, supporting low-cost, low-emission transport.

5. Shipbuilding, Skills and Green Transition

- A **₹70,000-crore shipbuilding and repair package** aims to push India into the **top 10 global shipbuilders by 2030**.
- India now has **over 3 lakh trained seafarers**, making it a leading global supplier of maritime manpower.
- Initiatives like the **Green Tug Transition Programme** and **Green Shipping Corridors** promote low-carbon maritime growth aligned with India's **net-zero 2070 goal**.

Challenges

1. Infrastructure and Scale Gaps

- Despite capacity growth, India handles only **about 10% of global seaborne trade**.
- Draft limitations and limited automation force transshipment through foreign ports like Colombo and Singapore.

2. High Logistics Cost and Hinterland Bottlenecks

- Last-mile connectivity gaps, congestion, and uneven multimodal integration keep logistics costs higher than global benchmarks.
- Southeast Asian ports still outperform India in vessel processing speed.

3. Weak Shipping Fleet and Freight Dependence

- India's share of the global merchant fleet is only **around 1–1.5%**, leading to heavy dependence on foreign-flag vessels.

- This results in **large annual freight payments abroad**, draining foreign exchange.

4. Environmental and Climate Risks

- About **one-third of India's coastline is vulnerable to erosion**, cyclones, and sea-level rise.
- Green shipping adoption is progressing, but large-scale transition remains slow.

5. Rising Strategic Competition in the IOR

- Growing presence of extra-regional powers, especially China's **"String of Pearls"**, raises concerns over maritime security and SLOC protection.

Way Forward

- Develop **deep-draft, automated ports** and reduce dependence on foreign transshipment hubs.
- Strengthen **multimodal logistics integration** through rail, road, and inland waterways.
- Expand India's **merchant fleet and shipbuilding capacity** with financial and policy incentives.
- Accelerate **green shipping, port electrification, and alternative fuels**.
- Enhance **maritime security**, surveillance, and regional cooperation in the Indian Ocean.
- Invest in **skills, innovation, and maritime cyber security** for future readiness.

Conclusion

India's aspiration to become a **$30-trillion economy by 2047** is closely tied to the strength of its maritime sector. Efficient ports, competitive shipping, secure sea lanes, and green technologies are essential for export-led growth. With sustained reforms and investment, India can emerge as a **secure, sustainable, and globally competitive maritime power**.

TRADE AND EXPORTS

EXPORT PROMOTION MISSION (EPM)

SOURCE: PIB

Why in News?

In **Union Budget 2025–26**, the Government of India approved the **Export Promotion Mission (EPM)** to boost exports, particularly from **MSMEs, labour-intensive sectors, and low-export regions**.

What is the Export Promotion Mission (EPM)?

- The **EPM**, announced in the **Union Budget 2025–26**, consolidates multiple export-support interventions into a **single, coordinated programme**.
- It has a financial outlay of **₹25,060 crore for the period FY 2025–26 to FY 2030–31**.
- The mission aims to:
  - Improve **access to export finance**
  - Strengthen **quality, compliance and branding**
  - Expand exports from **MSMEs, first-time exporters, and low-export districts**
- The **Directorate General of Foreign Trade (DGFT)** acts as the implementing agency.

Structure and Governance of EPM

- EPM is anchored in a **whole-of-government approach**, involving:
  - Department of Commerce
  - Ministry of MSME
  - Ministry of Finance
  - Export Promotion Councils and Commodity Boards
  - Financial institutions and state governments
- This coordination ensures that **policy, finance, infrastructure and capacity-building efforts** work in alignment rather than in silos.

Integrated Sub-Schemes under EPM

1. Niryat Protsahan (Financial Support Pillar)

- Focuses on easing **credit and liquidity constraints** faced by exporters, especially MSMEs.
- Key features include:
  - Affordable trade finance and **interest subvention**
  - **Factoring and exporter credit cards**
  - Credit enhancement and collateral support
- These measures reduce the **cost of capital**, enabling MSMEs to compete globally.

2. Niryat Disha (Non-Financial Support Pillar)

- Addresses structural and capability gaps beyond finance.
- Provides support in:
  - **Quality certification and standards compliance**
  - Branding, packaging and participation in **global trade fairs**
  - Logistics, transport facilitation and market intelligence
- Special emphasis is placed on **district-level capacity building**, supporting India's push for **inclusive export growth**.

Digital Implementation and Monitoring

- EPM is implemented through a **DGFT-run digital platform**, ensuring:
  - Paperless processing
  - Faster approvals
  - Greater transparency and accountability
- Its **outcome-based digital design** allows real-time monitoring and rapid response to changes in global trade conditions.

Sectoral and Regional Focus

- EPM prioritises **tariff-affected and labour-intensive sectors** such as:
  - Textiles and apparel
  - Leather and footwear
  - Gems and jewellery
  - Engineering goods and marine products
- It also targets **interior and low-export districts**, complementing initiatives like **Districts as Export Hubs**, thereby broadening India's export base.

India's Export Landscape: Current Status

- India's exports reached a **record USD 778.21 billion in 2023–24**, a **67% increase compared to 2013–14**.
- The **services sector now contributes about 44% of total exports**, highlighting India's strength in IT, professional services and digital trade.
- Export composition is shifting from **low-value goods to high-value manufacturing**, including electronics, engineering goods and renewable-energy components.
- However, **export concentration in limited regions and firms** continues to be a challenge, which EPM seeks to address.

How EPM Complements Existing Export Initiatives

- Works alongside:
  - **PM Gati Shakti** and **National Logistics Policy** to reduce logistics costs
  - **PLI schemes** to boost export-oriented manufacturing
  - **RoDTEP and RoSCTL** to neutralise embedded taxes
  - **RBI Trade Relief Measures 2025** to ease liquidity stress
- Together, these create a **comprehensive export ecosystem**.

Significance of the Export Promotion Mission

- Enhances **export competitiveness of MSMEs**
- Promotes **regional balance and inclusive growth**
- Strengthens India's resilience amid **global protectionism and supply-chain disruptions**
- Supports national goals of **Atmanirbhar Bharat** and **Viksit Bharat @ 2047**

Conclusion

The **Export Promotion Mission** represents a shift from fragmented schemes to a **unified, technology-driven export strategy**. By combining finance, compliance, logistics and market access, it empowers MSMEs and new exporters to integrate into global trade. Effective implementation of EPM can significantly strengthen **India's position as a competitive and resilient export economy**.

PRELIMS POINTERS IN NEWS

TEX-RAMPS SCHEME

SOURCE: PIB

Why in News?

The Government of India recently approved the **Tex-RAMPS Scheme** to strengthen research, data systems, and innovation in the textile sector. The scheme will operate from **2025–26 to 2030–31**.

About Tex-RAMPS scheme

The **Tex-RAMPS (Research, Assessment, Monitoring, Planning & Start-up)** scheme aims to modernize India's textile ecosystem. By improving research capacity, data analytics, and start-up support, it seeks to position India as a global textile innovation hub.

Key Features

1. Central Sector Scheme

- Fully funded by the **Ministry of Textiles**.
- Budget allocation: **₹305 crore**.

2. Research and Innovation Support

- Encourages R&D in **smart textiles, sustainability, and advanced manufacturing**.
- Focuses on improving productivity and global competitiveness.

3. Data, Analytics & Diagnostics

- Establishes comprehensive systems for:
  - Employment tracking
  - Supply-chain mapping
  - India-Size anthropometric study
- Enables **evidence-based policymaking**.

4. Integrated Textiles Statistical System (ITSS)

- A real-time platform for **data integration and performance monitoring**.

5. Capacity Development

- Strengthens state-level planning, conducts workshops, and circulates best practices.

6. Start-up & Innovation Support

- Supports textile incubators, hackathons, and academia-industry partnerships.
- Nurtures high-value textile start-ups.

RAMBAN SULAI HONEY

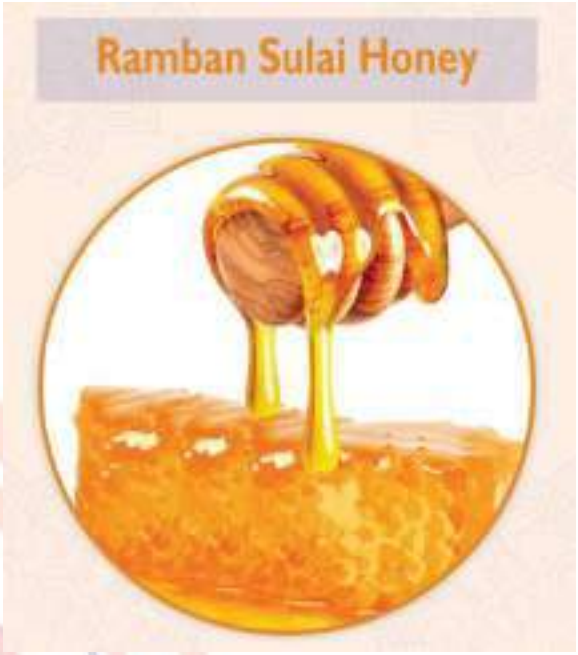
SOURCE: THE HINDU

Why in News?

The Prime Minister recently highlighted **Ramban Sulai Honey** during *Mann Ki Baat*, noting its growing popularity after receiving a **GI tag**. It has now emerged as one of Jammu & Kashmir's signature natural products.

About Ramban Sulai Honey

- Derived from **Sulai (wild basil) plants** found in the Himalayan ranges of Ramban district in J&K.
- Produced by bees that feed on the **snow-white Sulai flowers** blooming from August to October.
- Known for its **crystal-clear appearance**, ranging from white to amber.
- High in **minerals, enzymes, antioxidants** and natural vitamins.
- Carries a unique **aromatic, floral flavour** and smooth consistency.
- Traditionally valued for its **healing and digestive benefits**.



Special Characteristics

- **Purity:** Minimal contamination due to natural forest habitats.
- **High Yield:** Ramban bees and favourable climate conditions result in larger honey output than many regions.
- **Medicinal Profile:** Beneficial for respiratory issues, immunity, and digestive health.
- **Natural Extraction:** Most harvesting is traditionally done, ensuring minimal processing.

Recognition & Government Support

- Earned the **Geographical Indication (GI) tag in 2021**, protecting its identity.
- Selected as Ramban district's **"One District, One Product (ODOP)"** to promote local marketing and value addition.
- Featured in national programmes, boosting visibility and rural income.

What is a GI Tag?

- A **Geographical Indication** is a sign that identifies goods originating from a specific region with unique qualities linked to that place.
- Recognized under **TRIPS Agreement** and protected in India under the **GI Act, 1999**.
- GI registration prevents unauthorized use and is valid for **10 years**, renewable indefinitely.

- Examples: **Darjeeling Tea, Mysore Silk, Kashmiri Saffron**.

TRADE ENABLEMENT AND MARKETING SCHEME (TEMS)

SOURCE: PIB

Why in News?

The Ministry of MSME informed Parliament about the implementation progress of the **Trade Enablement and Marketing Scheme**, a key initiative under the RAMP programme.

It aims to help MSMEs participate effectively in digital and e-commerce markets.

Overview of the Scheme

- A **sub-scheme** under **Raising and Accelerating MSME Performance (RAMP)**.
- A **Central Sector Scheme** fully funded by the Union Government.
- Budget outlay of **₹277.35 crore** for **2024–2027**.

Objectives

- Enable MSMEs to **leverage e-commerce platforms** for wider market reach.
- Help small firms adopt **digital storefronts, payment systems**, and logistics networks.
- Reduce operational hurdles in online selling.
- Build **digital transaction histories** to improve credibility and ease of credit access.

Eligibility

- Available to **Udyam-registered Micro and Small Enterprises** in manufacturing and services.
- Designed to benefit **5 lakh enterprises**, with at least **50% women-owned** units.

Key Components

1. **Integration with ONDC Network**
    - Helps MSMEs list products, manage orders, and access nationwide customer bases.
2. **Digital Tools and Market Access**
    - Training for cataloguing, pricing, packaging, customer handling, etc.
3. **Payment & Logistics Support**
    - Simplifies operations through secure payments and last-mile delivery systems.
4. **Business Formalisation**
    - Encourages digital documentation and transparency.

Implementing Agency

- **National Small Industries Corporation (NSIC)** as the nodal organisation.

Conclusion

The scheme is an important step toward digital inclusion of small enterprises. By strengthening e-commerce readiness, TEMS can help MSMEs expand markets, enhance competitiveness, and contribute more effectively to India's economic growth.

FINANCIAL FRAUD RISK INDICATOR (FRI)

SOURCE: THE HINDU

Why in News?

The **Department of Telecommunications (DoT)** reported that the **Financial Fraud Risk Indicator (FRI)** prevented potential losses of **₹660 crore** within six months of its rollout. The initiative strengthens **real-time fraud prevention** across banks, NBFCs, and UPI platforms.

About Financial Fraud Risk Indicator (FRI)

- **Financial Fraud Risk Indicator (FRI)** is a **risk-based digital security tool** designed to detect mobile numbers linked to financial fraud.
- It classifies mobile numbers based on their **likelihood of involvement in cyber and financial crimes**.
- The tool enables **early warning and preventive action**, rather than post-fraud investigation.

Institutional Framework

- FRI was launched in **May 2025** by the **Digital Intelligence Unit (DIU)** of the **Department of Telecommunications**.
- It operates through the **Digital Intelligence Platform (DIP)**, which enables real-time information sharing among stakeholders.

Risk Classification Mechanism

Mobile numbers are categorised into **Medium Risk, High Risk, and Very High Risk**.

The classification is based on **multi-dimensional data analysis**.

Inputs are sourced from:

- **Indian Cybercrime Coordination Centre (I4C)** via NCRP
- **DoT's Chakshu platform**
- **Banks, NBFCs, and UPI service providers**

Role of Mobile Number Revocation List (MNRL)

DIU periodically circulates the **Mobile Number Revocation List (MNRL)**.

The list contains numbers disconnected due to:

- Cybercrime involvement
- Failed KYC verification
- Exceeding usage limits
- These numbers frequently reappear in **financial fraud attempts**.

How FRI Prevents Fraud

Once a suspicious number is flagged, it undergoes **instant risk analysis**.

Risk assessment is immediately shared with all stakeholders through DIP.

Banks can:

- Decline transactions
- Delay high-risk transfers
- Issue alerts to customers

Significance

- Prevents fraud in **UPI, mobile banking, and digital payments**.
- Improves **trust in India's digital economy**.
- Enhances **inter-agency coordination** between telecom and financial sectors.

RAPID FINANCING INSTRUMENT (RFI)

SOURCE: INDIAN EXPRESS

Why in News?

The **International Monetary Fund** approved **USD 206 million** in emergency assistance for **Sri Lanka** under the **Rapid Financing Instrument (RFI)**. The funding aims to meet **urgent balance of payments needs** following the catastrophic **Cyclone Ditwah**.

About Rapid Financing Instrument (RFI)

- The **Rapid Financing Instrument (RFI)** is an **emergency financial assistance mechanism** of the IMF.
- It is designed to provide **quick-disbursing funds** to member countries facing **urgent balance of payments (BoP) pressures**.
- RFI is particularly relevant during **natural disasters, economic shocks, conflicts, or fragile situations**.

Institutional Framework

- RFI operates under the **General Resources Account (GRA)** of the IMF.
- It complements other IMF lending instruments but is **faster and less conditional**.
- It is available to **all IMF member countries**, irrespective of income level.

Purpose and Rationale

- Many crises create **immediate foreign exchange shortages**, limiting a country's ability to import essentials.
- RFI addresses **short-term liquidity gaps** rather than long-term structural problems.
- It allows governments to respond swiftly to **humanitarian, reconstruction, and macroeconomic pressures**.

Types of Rapid Financing Instrument

1. Regular Window

• This window is designed for **urgent BoP needs** arising from:

- Domestic instability
- Exogenous shocks
- Fragility or conflict situations
  - Countries can access **up to 50% of their IMF quota per year**.
  - The cumulative access limit is **100% of the quota**.

2. Large Natural Disaster Window

- This window is meant for countries hit by **severe natural disasters**.
- Eligibility requires damage equivalent to or exceeding **20% of the country's GDP**.
- It allows access to **up to 80% of quota per year**.
- The cumulative access limit is **133.33% of quota**, recognising the scale of devastation.

Conditionality and Policy Requirements

- RFI support is provided **without ex-post programme-based conditionality**.

- There are **no regular reviews or structural reform benchmarks**.
- However, **prior actions may apply** to ensure transparency and proper use of funds.
- Recipient countries are expected to pursue **sound macroeconomic policies** to address underlying BoP problems.

Significance for Crisis-Hit Countries

- RFI ensures **rapid access to foreign exchange**, avoiding prolonged negotiations.
- It helps maintain **essential imports** such as food, fuel, and medicines.
- It supports **macroeconomic stability** during emergencies.
- It acts as a **bridge financing tool** until longer-term arrangements are put in place.

TIDE 2.0 SCHEME

SOURCE: THE HINDU

Why in News?

The Union Government informed Parliament about the progress and outcomes of the **TIDE 2.0 Scheme**. The scheme plays a crucial role in supporting **technology-based startups and innovation ecosystems**.

About TIDE 2.0 Scheme

- **Technology Incubation and Development of Entrepreneurs (TIDE) 2.0** is a **flagship startup support scheme** launched in **2019**.
- It aims to promote **technology-driven entrepreneurship**, particularly in the **Electronics and Information Technology (E&IT) domain**.
- The scheme focuses on nurturing startups working with **emerging and disruptive technologies**.

Objectives of TIDE 2.0

- To support startups working in **Artificial Intelligence (AI), Internet of Things (IoT), Blockchain, Robotics, Cloud Computing, and related fields**.
- To strengthen **technology incubation ecosystems** within academic and research institutions.
- To help startups move from **idea stage to market-ready products and services**.
- To promote **innovation-led economic growth and job creation**.

Implementation Framework

TIDE 2.0 is implemented through **51 incubators** located in:

- Institutes of Higher Learning
- Premier Research and Development organisations

• These incubators provide **end-to-end support** to startups, including mentoring, infrastructure, and networking.

• The scheme aims to **handhold around 2,000 technology startups over a five-year period**.

Support Provided to Startups

- Startups receive **financial assistance**, technical guidance, and access to incubation facilities.
- Incubators offer **industry linkages, ecosystem partnerships, and market access support**.
- Startups are guided on **product development, business models, and scaling strategies**.

Centres of Excellence in Intellectual Property Rights (CoE-IP)

Under TIDE 2.0, **Centres of Excellence in IPR** are established to strengthen **intellectual property awareness and protection**.

These centres support **startups, SMEs, academia, and individual innovators**.Services include:

- Patent and trademark filing support
- IPR awareness programmes
- Training and capacity building in IP management

Complementarity with Other Initiatives

TIDE 2.0 complements national initiatives such as:

- **Startup India**
- **SAMRIDH**
- **GENESIS**
- Sector-specific innovation programmes

Significance of TIDE 2.0

Strengthens India's **technology and innovation base**.

Encourages **deep-tech and knowledge-intensive startups**.

Promotes **self-reliance in emerging technologies**.

Contributes to **digital transformation and economic competitiveness**.

NATIONAL MISSION ON EDIBLE OILS (NMEO)

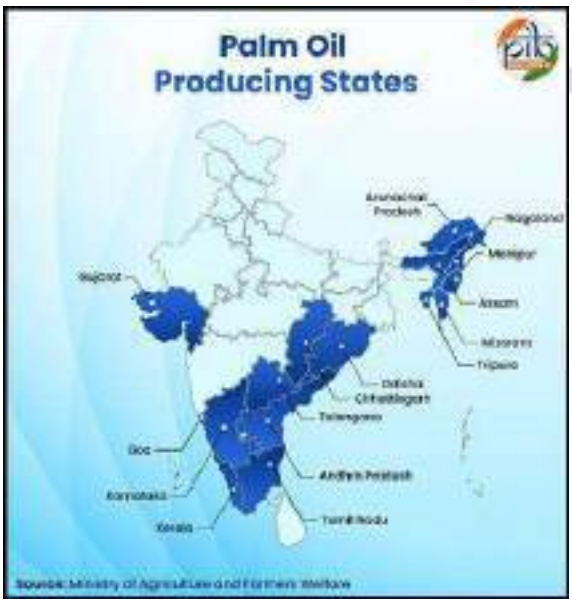
The Government of India is implementing the **National Mission on Edible Oils (NMEO)** through **NMEO–Oil Palm (2021)** and **NMEO–Oilseeds (2024)** to reduce India's heavy reliance on edible oil imports.

India's Edible Oil and Oilseed Scenario

- India produces around **12–13 million tonnes of edible oil**, meeting only **44% of domestic demand**, while consumption continues to rise due to population growth and changing diets.
- The country cultivates **9 major oilseeds**—groundnut, soybean, rapeseed-mustard, sunflower, sesame, safflower, niger, castor, and linseed—covering about **14% of gross cropped area**.
- Oilseeds are largely **rainfed (around 76%)**, making production highly vulnerable to climate variability.
- Consumption has increased sharply, with **rural intake rising by over 80%** and **urban intake by nearly 50%** between 2004–05 and 2022–23.

What is NMEO–Oil Palm (NMEO-OP)?

- **NMEO-OP**, launched in **2021** as a Centrally Sponsored Scheme, focuses on expanding **oil palm cultivation** to boost domestic **Crude Palm Oil (CPO)** production.
- It has a financial outlay of about **₹11,040 crore**, reflecting the strategic importance of palm oil in India's import basket.



Key Features of NMEO-OP

- **Price Assurance Mechanism:** Introduction of **Viability Price (VP)** to protect farmers from global palm oil price fluctuations.
- **Enhanced Subsidies:** Assistance for planting material increased significantly, along with maintenance support during the non-bearing phase.
- **Rejuvenation Support:** Financial aid for rejuvenating old oil palm gardens to improve productivity.
- **Regional Focus:** Special emphasis on the **North-Eastern states**, along with traditional oil palm states like **Andhra Pradesh and Telangana**.

Targets and Progress

- **Area Expansion:** Target to bring **6.5 lakh hectares** under oil palm by **2025–26**.
- **Production Goals:**
  - **11.2 lakh tonnes CPO** by 2025–26
  - **28 lakh tonnes CPO** by 2029–30
- **Progress:** By late **2025**, oil palm area reached about **6.2 lakh hectares**, while CPO production increased from **1.9 lakh tonnes (2014–15)** to about **3.8 lakh tonnes (2024–25)**.

What is NMEO–Oilseeds (NMEO-OS)?

- **NMEO-OS**, approved in **2024** for **2024–25 to 2030–31**, aims to achieve **self-sufficiency in edible oils** by improving productivity and expanding oilseed cultivation.
- It targets both **primary oilseeds** and **secondary sources** such as cottonseed, rice bran, coconut, and Tree-Borne Oilseeds.

Key Objectives

- **Bridging Yield Gaps:** Rapid dissemination of improved seed varieties and technologies through **FPOs, cooperatives, and private players**.
- **Area Expansion:** Bringing **fallow lands and intercropped areas** under oilseeds cultivation.
- **Market Strengthening:** Improving price realisation and market access for farmers.
- **Secondary Oil Sources:** Enhancing extraction from underutilised sources to raise overall oil availability.

Targets under NMEO-OS

- Increase oilseed area from **29 million ha (2022–23)** to **33 million ha by 2030–31**.
- Raise oilseed production from **39 million tonnes** to nearly **70 million tonnes**.
- Add **40 lakh hectares** using rice fallows, crop diversification, and intercropping.

Combined Impact of NMEO-OP and NMEO-OS

- Together, the two components aim to produce about **25.45 million tonnes of edible oil by 2030–31**, meeting nearly **72% of India's domestic demand**.
- Implementation relies on **Self-Help Groups and Krishi Sakhis** as Community Agriculture Service Providers, supported by digital monitoring through the **Krishi Mapper platform**.

Importance of the National Mission on Edible Oils

- **Food and Nutritional Security:** Ensures stable availability of edible oils and essential fats.
- **Farmer Welfare:** Diversifies income sources and improves price stability for oilseed and oil palm farmers.
- **Foreign Exchange Savings:** Reduces the large import bill for edible oils.
- **Rural Employment:** Generates jobs in cultivation, processing, and value chains.
- **Atmanirbhar Bharat:** Strengthens domestic capacity in a strategically sensitive commodity.

Challenges

- **Environmental Concerns:** Oil palm expansion must avoid deforestation and ecological damage, especially in the North-East.
- **Climate Risks:** Continued dependence on rainfed agriculture affects yield stability.
- **Market Volatility:** Global price swings can still influence farmer decisions despite price assurance.
- **Implementation Capacity:** Requires strong coordination between Centre, states, and grassroots institutions.

Way Forward

- Promote **sustainable oil palm practices** with strict environmental safeguards.
- Expand **irrigation, climate-resilient seeds, and precision farming** for oilseeds.
- Strengthen **processing infrastructure and value addition** at the local level.
- Enhance **farmer awareness and extension services** to ensure adoption of best practices.
- Align NMEO with nutrition, climate, and rural development policies for long-term impact.

Conclusion

The **National Mission on Edible Oils** addresses India's critical edible oil import dependence through targeted expansion of oil palm and oilseed productivity. By aiming for **72% self-sufficiency by 2030–31**, it strengthens food security, farmer incomes, and foreign exchange stability. With sustainable implementation, NMEO can become a cornerstone of **Atmanirbhar Bharat and nutritional security**.

HISTORY

PRELIMS POINTERS IN NEWS

SIRPUR ARCHAEOLOGICAL SITE

SOURCE: PIB

Why in News?

The Government of India is preparing **Sirpur**, a major archaeological site in Chhattisgarh, for nomination to the **UNESCO World Heritage List**.

About Sirpur

Sirpur, located on the banks of the **Mahanadi**, flourished between the 5th and 12th centuries as the capital of **Dakshina Kosala**. It served as a vibrant centre of religion, art, and trade, with strong Hindu, Buddhist, and Jain influence.

Historical Significance

1. Early Discoveries

- First documented in 1871 by **Alexander Cunningham**, founder of ASI.
- Excavations revealed a **multi-religious urban centre**.

2. Cultural Landscape

- Once home to **Panduvanshi and Somavamshi** rulers.
- Known for extensive temple architecture and Buddhist learning centres.

Major Excavated Structures

1. Hindu Architecture

- **22 Shiva temples** and **5 Vishnu temples** discovered.
- **Lakshmana Temple:** A 7th-century brick temple known for intricate carvings.

2. Buddhist Heritage

- **10 Buddhist viharas**, stupas, meditation halls.
- Includes **Tivaradeva Mahavihara** with a significant Buddha statue.

3. Other Structures

- The **Surang Tila complex**, built in a **panchayatana** layout.
- A 6th-century **market complex**, showing Sirpur's importance as a trade hub.

ARUNACHALESVARA TEMPLE

SOURCE: THE HINDU

Why in News?

Authorities recently **removed encroachments** around the Arunachalesvara Temple in Tiruvannamalai to ease pilgrimage movement during the **Karthigai Deepam festival**.

About Arunachalesvara Temple

The **Arunachalesvara Temple**, dedicated to Lord Shiva in his form as **Arunachala**, is one of South India's most significant spiritual landmarks. Located at the base of the sacred Arunachala Hill, the temple has evolved over centuries under various dynasties.

Historical Background

- Origin traces back to **ancient Tamil traditions** with references in early Saiva scriptures.
- The existing structure dates from the **early Chola period (9th century)**, with later contributions by **Cholas, Hoysalas**, and **Vijayanagara rulers**.

Architectural Features

1. Dravidian Temple Architecture

- Spread over **25 acres**, making it one of India's largest temple complexes.
- Features **nine gopurams**, each carved with mythological figures.

- The **Rajagopuram (217 feet)** on the eastern side is one of the tallest temple towers in India.

2. Sacred Spaces

- Houses many shrines, halls, and mandapas including the **thousand-pillar hall** built during the Vijayanagara era.
- Intricate sculptures and inscriptions depict religious themes and historical events.

3. Cultural Importance

- Centre of Tamil Shaivism.
- Attracts lakhs of devotees during **Karthigai Deepam**, where a huge flame is lit atop the Arunachala Hill symbolising Shiva.

THANJAVUR PAINTING

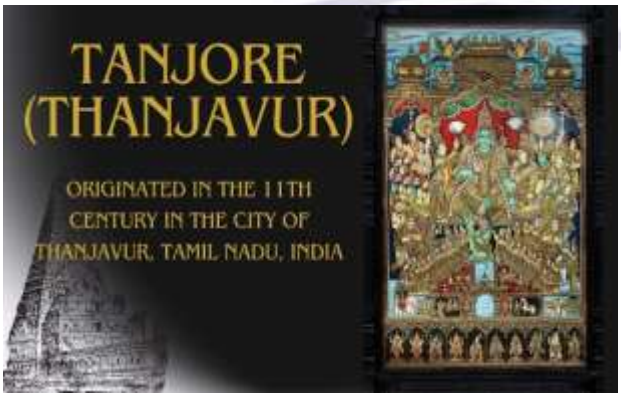
SOURCE: PIB

Why in News?

The **Department of Posts** recently transported a priceless **Thanjavur painting of Shri Ram** from Bengaluru to Ayodhya using its **Logistics Post service**. The event highlighted the **cultural value and heritage importance** of traditional Indian art forms.

About Thanjavur Painting

- **Thanjavur Painting**, also known as **Tanjore Painting**, is a **classical South Indian art form** that originated in **Thanjavur** around the **17th century**.
- It represents a unique blend of **art, devotion, and craftsmanship**, deeply rooted in temple traditions.



Historical Background

- The art form flourished under the **Nayaka rulers of Thanjavur**, who were great patrons of temple art and culture.
- These paintings were traditionally created for **temples, palaces, and household shrines**.
- Over time, Thanjavur paintings became symbols of **religious devotion and royal patronage**.

Material and Technique

- Thanjavur paintings are made on **wooden panels known as palagai padam**.
- The base is prepared using **cloth pasted on wood**, often made from **jackfruit or teak**, bound with **Arabic gum**.
- A special **gesso paste** made of chalk powder, gypsum, and glue is applied to create **raised and embossed designs**.
- **Gold foil** is carefully embedded over the gesso work, giving the painting its distinctive shine.

Artistic Features

- These paintings are known for their **rich and vibrant colours**, particularly red, blue, green, and gold.
- Figures are usually placed at the **centre**, with minimal background detailing to maintain focus.
- The use of **relief work and gold leaf** gives a three-dimensional appearance.
- Facial expressions are calm and divine, symbolising **spiritual serenity**.

Themes and Symbolism

- Thanjavur paintings primarily depict **Hindu gods and goddesses**, such as **Lord Krishna, Lord Ganesha, Goddess Lakshmi, and Lord Rama**.
- Scenes from **Puranas and epics** are common.
- The paintings serve both **decorative and devotional purposes**.

Cultural and Legal Significance

- Thanjavur paintings have received the **Geographical Indication (GI) tag**, ensuring legal protection and authenticity.
- They support **local artisans** and preserve traditional knowledge systems.
- The art form contributes to **India's soft power and cultural diplomacy**.

GEOGRAPHY

PRELIMS POINTERS IN NEWS

FUJIWHARA EFFECT

SOURCE: INDIAN EXPRESS

Why in News?

Two cyclonic systems are expected to develop over the **Bay of Bengal**, raising the possibility of a **Fujiwhara interaction** between them. Meteorologists warn that this rare interaction may alter storm intensity and movement.

What Is the Fujiwhara Effect?

1. Basic Concept

- The Fujiwhara Effect describes the interaction between **two nearby cyclonic systems, causing them to rotate around a common centre.**
- **First identified in 1921** by Japanese meteorologist **Dr. Sakuhei Fujiwhara, this** phenomenon plays a crucial role in predicting complex storm behaviour.
- They begin to **orbit anticlockwise** around a point located between their centres.
- The degree of interaction depends on their **size, intensity, and distance**.

2. Distance Threshold for Interaction

- **Tropical cyclones:** Interaction occurs when they are **within 1,400 km** of each other.
- **Extratropical cyclones:** Can interact even up to **2,000 km apart**.

3. Dynamics of the Rotation

- The **smaller or weaker cyclone** tends to move faster around the shared pivot.
- If the intensity difference is large, the weaker system may get **absorbed** by the stronger one.

4. Possible Outcomes

- **Merger:** Two storms may spiral inward and merge into a larger cyclone.
- **Path Deviation:** The storms may change their original track, complicating forecasting.
- **Intensity Changes:** One or both systems may intensify or weaken depending on structural interactions.

Significance for India

- Interaction of Bay of Bengal storms can lead to **unpredictable landfall patterns**, complicating evacuation and preparedness.
- Coastal and inland regions must stay alert due to the potential for **rapid track changes** or **unexpected rainfall distribution**.

NINGALOO REEF

SOURCE: INDIAN EXPRESS

Why in News?

A new ecological survey revealed that **nearly 70% of corals** in Western Australia's **Ningaloo Reef** have died. The findings raise concerns about rising ocean temperatures and marine biodiversity loss.

Key Features of Ningaloo Reef

1. Location and Geography

- Lies along the **East Indian Ocean** on Western Australia's coast.
- Extends nearly **300 km** but is relatively narrow, covering about **50 sq km**.

2. Biodiversity

- Hosts **250 coral species**, including over **200 hard corals**.
- Home to **500+ fish species**, as well as whales, manta rays, potato cod, dugongs, and sea turtles.

3. Ecological Value

- Supports a mix of **tropical and temperate marine life**.
- A major attraction for **snorkelling, diving, and marine tourism**.

Threats to the Reef

1. Coral Bleaching

- Warming seas have caused mass bleaching events, killing large coral populations.

2. Climate Change

- Rising temperatures, ocean acidification, and extreme weather events place the reef under severe stress.

3. Human Pressure

- Tourism, coastal development, and pollution threaten fragile ecosystems.

Conservation Status

- Listed as a **UNESCO World Heritage Site**.
- Australia is monitoring coral health and developing climate-resilience measures, but the scale of die-off is alarming.

BEZYMIANNY VOLCANO

SOURCE: THE HINDU

Why in News?

Scientists observed that the **Bezymianny Volcano** is rebuilding its structure faster than expected after previous explosive eruptions.

This challenges traditional assumptions about **volcanic dormancy after major eruptions**.

About Bezymianny Volcano

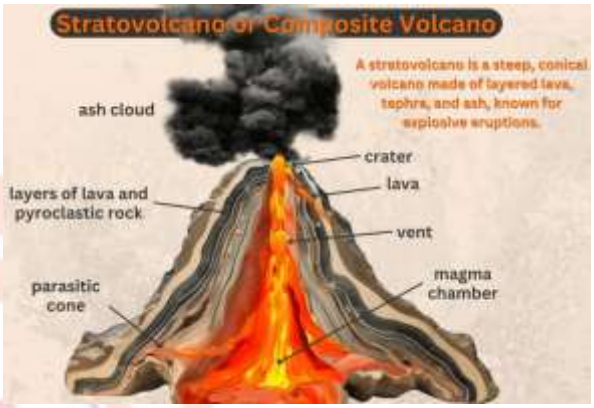
- Bezymianny Volcano is a **highly active stratovolcano** located on the **Kamchatka Peninsula** in Russia.
- It is globally significant for understanding **explosive volcanism and magma dynamics**.

Geographical Setting

- The volcano is situated near the extinct **Kamen volcano** and forms part of the **Pacific Ring of Fire**.
- Its slopes contain **lava flows, domes, and pyroclastic deposits**, indicating repeated eruptions.

Eruptive History

- Bezymianny remained dormant for nearly **1,000 years** before erupting violently in **1956**.
- The 1956 eruption was among the **largest volcanic explosions of the 20th century**.
- Unlike many volcanoes, Bezymianny resumed activity almost immediately after the eruption.



Stratovolcano Characteristics

- Stratovolcanoes are **tall, steep, and cone-shaped** volcanic structures.
- They are formed by alternating layers of **lava and pyroclastic material**, giving them a composite structure.
- These volcanoes erupt **andesitic and dacitic lava**, which is viscous and gas-rich.
- Gas build-up results in **frequent explosive eruptions**.

Scientific Importance

- Bezymianny provides insight into **rapid volcanic regeneration**.
- It helps scientists study **magma chamber refilling and dome growth cycles**.
- Such studies improve **eruption prediction and disaster preparedness**.

CHILLAI-KALAN

SOURCE: THE HINDU

Why in News?

The Kashmir region is set to enter **Chillai-Kalan**, accompanied by forecasts of **rain and snowfall**. The period marks the **harshest phase of winter in Kashmir**.

About Chillai-Kalan

- **Chillai-Kalan** is a **40-day period of intense winter cold** in the **Kashmir Valley**.
- The term is derived from Persian, meaning **"Major Cold"**.

Duration and Phases

Chillai-Kalan usually begins on **21 December** and ends on **30 January**.

It is followed by:

- **Chillai-Khurd** (Small Cold): 20 days
- **Chillai-Bacha** (Baby Cold): 10 days
- Together, they define the **traditional Kashmiri winter calendar**.

Climatic Characteristics

- The region experiences **sub-zero temperatures**, heavy snowfall, and cold waves.
- Water bodies often **freeze**, and transportation becomes difficult.
- Snowfall during this period is considered **crucial for hydrological balance**.

Cultural Significance

- Chillai-Kalan is linked to Persian traditions such as **Shab-e Yalda** (Night of Forty).
- The night symbolises **rebirth of light after the longest night**.
- Traditional architecture, clothing, and food habits evolved to **withstand extreme cold**.

Environmental Importance

- Heavy snowfall during Chillai-Kalan **recharges glaciers and snow reserves**.
- It ensures sustained water flow in **rivers, streams, and lakes** during summer.
- Snow acts as **natural insulation** for crops and soil.

Socioeconomic Impact

- Agriculture slows, but snowfall benefits **horticulture and agriculture in the long term**.
- Tourism sees both challenges and opportunities through **winter tourism**.
- Infrastructure and livelihoods face **temporary disruptions**.

SOUTHERN OCEAN

SOURCE: THE HINDU

Why in News?

Scientists found that the **Southern Ocean absorbs a large share of human-generated carbon dioxide**. It helps **mitigate global surface warming**.

About Southern Ocean

- The **Southern Ocean**, also called the **Antarctic Ocean**, is the **fourth-largest ocean**.
- It surrounds **Antarctica** and connects the **Pacific, Atlantic, and Indian Oceans**.

Geographical and Physical Features

- Defined by the **International Hydrographic Organization** as the southernmost part of the World Ocean.
- Characterised by **strong winds, powerful storms, cold temperatures, and seasonal sea ice**.
- It was formed about **34 million years ago** after the opening of the **Drake Passage**.

Antarctic Circumpolar Current (ACC)

- Dominated by the **Antarctic Circumpolar Current**, the **strongest and longest ocean current on Earth**.
- The ACC connects all major oceans, enabling **global heat and nutrient exchange**.

Biodiversity and Productivity

- Cold, nutrient-rich waters support **phytoplankton growth**, forming the base of marine food webs.
- It sustains **krill, fish, penguins, seals, and whales**.
- It is one of the **most productive marine ecosystems** globally.

Role in Global Climate Regulation

- The Southern Ocean absorbs **heat and carbon dioxide** from the atmosphere.
- It acts as a **buffer against global warming**.

- Seasonal sea ice influences **planetary albedo and heat balance**.

TUNDRA ECOSYSTEM

SOURCE: THE HINDU

Why in News?

A recent study from **Arctic Alaska** found that **wildfires in the tundra have become more frequent and intense** than at any time in the past **3,000 years**.

About Tundra Ecosystem

- The **Tundra Ecosystem** is a **treeless biome** found in **high-latitude Arctic regions** and on **high mountain tops**.
- It is characterised by **extreme cold, strong winds, low rainfall, and fragile ecological balance**.
- Despite harsh conditions, the tundra plays a **critical role in global climate regulation**.

Key Characteristics of the Tundra Ecosystem

- **Low temperatures** dominate the region, with average temperatures ranging from **–34°C to –6°C**, limiting biological activity.
- The tundra experiences a **very short growing season** of about **50–60 days**, during which sunlight may last **up to 24 hours a day**.
- A defining feature is **permafrost**, a permanently frozen layer of soil that restricts root growth and water drainage.
- **Precipitation is minimal**, mostly falling as snow, making the tundra comparable to deserts in moisture availability.
- Due to harsh climatic conditions, the tundra has **limited biodiversity**, with only highly adapted species surviving.
- The tundra acts as a **major carbon sink**, as cold temperatures slow decomposition and trap organic carbon in frozen soils.

Types of Tundra in the World

- **Arctic Tundra** occurs north of the **taiga (boreal forest)** belt in the Northern Hemisphere, covering parts of **Canada, Russia, Greenland, Scandinavia, and Alaska**.
- **Alpine Tundra** exists above the **tree line in high mountain ranges** such as the **Himalayas, Andes, Rockies, and Alps**.
- **Antarctic Tundra** is limited to **sub-Antarctic islands and ice-free coastal regions of Antarctica**.

Flora and Fauna

- Vegetation mainly includes **mosses, lichens, sedges, cotton grass, and dwarf shrubs** like birches.
- Fauna includes **Arctic foxes, polar bears, snow geese, caribou, and migratory birds**, all adapted to cold and seasonal food scarcity.

Impact of Climate Change

- Rising temperatures are causing **permafrost thaw**, releasing stored **carbon dioxide and methane**.
- Increased vegetation and drier conditions have made tundra regions **more fire-prone**.
- Wildfires accelerate **carbon release**, creating a **positive feedback loop** that worsens global warming.

ENVIRONMENT

BIODIVERSITY AND CONSERVATION

HUMAN–WILDLIFE CONFLICT (HWC) IN INDIA

SOURCE: THE HINDU

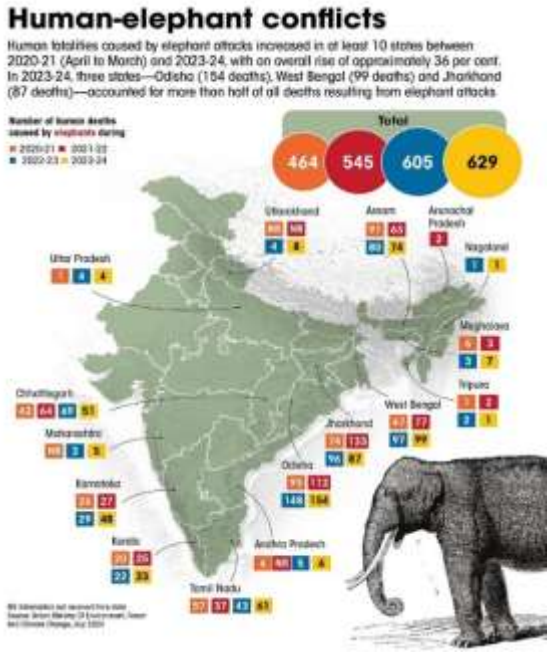
Why in News?

A recent **train–elephant collision in Assam**, occurring outside a mapped elephant corridor, has highlighted serious gaps in **wildlife movement mapping and preventive infrastructure**.

- The incident has renewed focus on **human–wildlife conflict (HWC)** as a growing ecological, economic, and governance challenge in India.

Status of Human–Wildlife Conflict in India

- Between **2019 and 2024**, elephant-related incidents caused **over 2,700 human deaths**, while **tigers killed around 350 people** across India.
- At the same time, **hundreds of elephants** have died due to **electrocution, train collisions, poisoning, and habitat stress**.
- Projections suggest that **India could emerge as a global hotspot for HWC by 2070** due to population growth, climate stress, and infrastructure expansion.



Key Drivers of Rising Human–Wildlife Conflict

1. Habitat Loss and Fragmentation

- Expansion of **farms, roads, railways, canals, mining, and settlements** has reduced and fragmented wildlife habitats.
- **Linear infrastructure** cuts across forests and ancient migration routes, increasing mortality from **vehicle collisions and electrocution**.
- The Assam elephant deaths and crop damage in **Kodagu (Karnataka)** illustrate how disrupted corridors intensify conflict.

2. Adaptation of Wildlife to Human Landscapes

- Intelligent and adaptable species such as **elephants, monkeys, and leopards** learn to associate human areas with food and shelter.
- In parts of **Maharashtra**, leopards living permanently in sugarcane fields ("*sugarcane leopards*") have become highly habituated to villages.
- Relocation often fails because animals return to human-dominated landscapes offering easy resources.

3. Climate Change and Water Stress

- **Erratic monsoons, prolonged droughts, and drying forest waterholes** push animals toward villages, ponds, and irrigation tanks.
- Changes in fruiting patterns force **bears and primates** to forage outside forests.
- In **Jammu & Kashmir**, Himalayan brown bears increasingly descend to lower altitudes due to altered food availability.

4. Wildlife Population Recovery

- Conservation success under **Project Tiger and Project Elephant** has increased populations of key species.
- However, **habitat expansion has not kept pace**, resulting in higher animal densities near forest edges and human settlements.

Government Initiatives to Address HWC

1. Constitutional, Judicial and Legal Framework

- **Article 51A(g)** places a **Fundamental Duty** on citizens to protect wildlife and the environment.
- The Supreme Court has recognised animal welfare and ecological balance in judgments such as **A. Nagaraja (2014)** and **Mirzapur Moti Kureshi (2005)**.

- The **Wildlife Protection Act, 1972**, and its **2006 amendment**, recognise wildlife corridors as vital for animal movement.
- The **National Wildlife Action Plan (2017–31)** prioritises coexistence, research, and habitat connectivity.

2. Policy and Disaster Management Approach

- The **NDMA guidelines** treat HWC as a **disaster risk**, advising integration of mitigation measures into development planning.
- Compensation mechanisms exist, though they often remain **slow and inadequate**.

3. Technological Interventions

- **Gajraj System**: An AI-based surveillance tool by Indian Railways to detect elephants near tracks and prevent collisions.
- **TrailGuard AI**: Real-time camera system using artificial intelligence to detect animals, humans, and vehicles in protected areas.
- **GPS collars, mobile alerts, and drone monitoring** are increasingly used for early warning.

4. Species-Specific Programmes

- **Project Tiger (1973)** and **Project Elephant (1992)** focus on habitat protection and corridor security.
- **Tigers Outside Tiger Reserves (TOTR)** uses advanced technology to manage conflict as nearly **30% of tigers live outside reserves**.

Elephant Corridors in India

- As per the **Elephant Corridors of India Report 2023**, India has **150 identified elephant corridors** across **15 states**.
- **West Bengal** has the highest number (26 corridors).
- About **84% are intra-state corridors**, while some are **inter-state and transnational** (e.g., with Nepal).
- Poor legal protection of corridors remains a major cause of accidents and conflict.

What More Needs to Be Done?

- **Landscape-level planning** that integrates forests, farms, and infrastructure.
- Mandatory **Human–Wildlife Conflict Impact Assessments** for roads, railways, and power projects.
- Legally secure and scientifically map **wildlife corridors**.
- Improve **compensation systems** using direct benefit transfers and market-linked valuation.
- Promote **conflict-resistant livelihoods** such as beekeeping, agro-forestry, and eco-tourism.
- Strengthen **community participation**, awareness, and inter-state coordination.

Conclusion

Human–wildlife conflict in India is no longer an isolated conservation issue but a **systemic governance challenge**. Securing corridors, deploying science-based technology, and enabling community-led coexistence are essential for sustainable solutions.

MUKUNDRA HILLS TIGER RESERVE (MHTR)

SOURCE: DOWN TO EARTH

Why in News?

The administration of **Mukundra Hills Tiger Reserve** launched a documentary titled **"Enchanting Mukundra"**. The initiative aims to promote **wildlife conservation and eco-tourism**.

About Mukundra Hills Tiger Reserve (MHTR)

- **Mukundra Hills Tiger Reserve (MHTR)** is a protected area in **Rajasthan**.
- It plays an important role in **tiger conservation and ecological connectivity** in central India.

Geographical Location

- The reserve spans **Bundi, Kota, Jhalawar, and Chittorgarh districts**.
- It is located in a valley formed between the **Mukundra and Gargola hill ranges**.

Constituent Protected Areas

- MHTR includes **Mukundra National Park**, **Darrah Wildlife Sanctuary**, **Jawahar Sagar Sanctuary**, and parts of **Chambal Sanctuary**.
- These areas together form the **core and buffer zones** of the tiger reserve.

Strategic Importance

- The reserve lies between **Ranthambore Tiger Reserve** and **Kuno National Park**.

- It functions as a **critical wildlife corridor**, facilitating genetic exchange among tiger populations.

Rivers and Vegetation

- The reserve is located along the **eastern bank of the Chambal River**.
- Vegetation is predominantly **dry deciduous forest**, dominated by **Kala Dhok (Anogeissus pendula)**.

Flora and Fauna

- Flora includes **Khair, Ber, Raunj, and Kakan** species.
- Fauna includes **Leopard, Sloth Bear, Chinkara, Nilgai, Hyena, Jungle Cat**, and **Common Langur**.
- Reptiles include **Python, Crocodile, Gharial, and turtles**.

Historical Background

- The area was once a **royal hunting reserve of the Maharaja of Kota**.
- It was later designated as a tiger reserve for **conservation purposes**.

CORINGA WILDLIFE SANCTUARY

SOURCE: THE HINDU

Why in News?

The **Asian Waterbird Census** is being conducted in **Coringa Wildlife Sanctuary** and its adjoining wetlands. The exercise supports **scientific monitoring of wetlands and waterbird populations**, which is vital for biodiversity conservation.

About Coringa Wildlife Sanctuary

- **Coringa Wildlife Sanctuary** is a protected area located in **Andhra Pradesh**, along the eastern coast of India.
- It is recognised as one of the **most ecologically significant mangrove ecosystems** in the country.
- The sanctuary plays a crucial role in **coastal protection, biodiversity conservation, and climate resilience**.

Geographical Location and Features

- The sanctuary is situated in the **Godavari estuarine region**, where the **Coringa River joins the Bay of Bengal**.
- It forms part of a **complex network of tidal creeks, mudflats, and mangrove swamps**.
- The area is influenced by **tidal action, freshwater inflow from the Godavari, and saline seawater**, creating rich ecological conditions.
- Being a **coastal wetland**, the sanctuary is highly sensitive to **climate change and sea-level rise**.

Vegetation and Mangrove Ecosystem

- Coringa contains the **second-largest stretch of mangrove forests in India**, after the Sundarbans.
- Mangroves here are adapted to **saline, waterlogged, and oxygen-poor soils**.
- Dominant mangrove species include **Rhizophora**, **Avicennia**, and **Sonneratia**, which stabilise coastlines with their complex root systems.
- These mangroves act as **natural buffers**, reducing the impact of cyclones and storm surges on inland areas.

Faunal Diversity

- Coringa supports a wide range of **terrestrial, aquatic, and avian species**.
- Mammals found in the sanctuary include **Smooth-coated Otter**, **Fishing Cat**, and **Jackal**, which depend on wetland ecosystems for survival.
- The sanctuary is an important habitat for **migratory and resident birds**, making it a key ornithological site.
- Bird species recorded include **Black-capped Kingfisher**, **Brahminy Kite**, **Reef Heron**, **Sandpipers**, and various gull species.
- The coastal belt of the sanctuary serves as a **nesting and breeding ground for Olive Ridley turtles**, an internationally protected species.

Ecological and Environmental Importance

- Mangroves in Coringa provide **coastal defence** by reducing erosion and protecting against extreme weather events.
- They act as **major carbon sinks**, storing large amounts of carbon and helping mitigate climate change.
- The sanctuary supports **fish breeding and nursery grounds**, which sustain local fisheries and livelihoods.
- It plays a vital role in maintaining **nutrient cycling and food-web stability** in coastal ecosystems.

Asian Waterbird Census (AWC)

- The **Asian Waterbird Census** is a **citizen-science programme** conducted annually across Asia.

- It forms part of the global **International Waterbird Census (IWC)** initiative.
- In India, the census is coordinated by **Bombay Natural History Society** and **Wildlife Institute of India**.
- Volunteers, researchers, and forest officials participate in **systematic counting and identification of waterbird species**.
- The data collected helps in **wetland management, conservation planning, and policy formulation**.
- It also aids in identifying **threatened species and habitat degradation trends**.

Threats and Conservation Challenges

- Coringa faces threats from **industrial expansion, pollution, aquaculture, and encroachment**.
- Climate change poses risks through **sea-level rise, increased cyclonic activity, and salinity changes**.
- Effective conservation requires **scientific monitoring, community participation, and strict regulation**.

CLIMATE CHANGE AND POLLUTION

CLIMATE CHANGE AND INDIA'S TEA INDUSTRY

SOURCE: INDIAN EXPRESS

Why in News?

Assam's major tea belts are witnessing **prolonged heat, delayed monsoons, and unusually high humidity even beyond October**. These shifts now threaten the livelihoods of over **12 lakh tea workers** and pose a serious risk to the long-term stability of **India's tea economy**.

How Climate Change is Impacting India's Tea Industry

1. Rising Temperatures and Heat Stress

- Increasing heat waves scorch tender leaves, causing **blackening, wilting, and disrupted flush cycles**.
- High temperatures reduce nutrient uptake, weakening tea bushes and shortening their productive lifespan.

2. Erratic and Unpredictable Rainfall

- Extended dry spells and a decline in winter rainfall reduce **soil moisture**, affecting plant growth.
- Conversely, sudden heavy showers lead to **erosion, runoff, and waterlogging**, preventing effective absorption and damaging root systems.

3. Shifting Suitability of Tea Landscapes

- Traditional tea heartlands like **South Bank and Upper Assam** may gradually lose climatic suitability.
- Cultivation is expected to move to **higher-altitude districts** such as Karbi Anglong and Dima Hasao, altering the geographical map of India's tea belt.

4. The Economic Paradox

- Tea prices have grown by only **4.8% annually** over three decades—far below inflation and other staples.
- Rising production costs and stagnant prices prevent growers from investing in **replantation, climate adaptation, and soil restoration**.

5. Lack of Climate-Specific Policy Support

- Unlike staple crops, tea growers receive **little assistance for climate shocks** like droughts or heatwaves.
- Absence of targeted schemes leaves the industry highly vulnerable to worsening climatic disruptions.

Key Facts About India's Tea Industry

1. Growth Requirements

- **Temperature:** Ideal range of **13°C–28°C**, with optimal growth at **23–25°C**.
- **Rainfall:** Needs **1,500–2,500 mm** of evenly distributed rain annually.
- **Soil:** Prefers deep, friable soil rich in organic matter.
- Distinct seasons are essential for maintaining **flush cycles and flavour quality**.

2. Institutional Framework

- The **Tea Board of India** (1953), under the Ministry of Commerce, supports cultivation, marketing, and research.
- Headquarters: **Kolkata**; Overseas offices: **London, Moscow, Dubai**.

3. Production & Markets

- India is the **2nd largest producer**, **2nd largest consumer**, and **3rd largest exporter**.

- Major tea zones: **Assam, West Bengal, Tamil Nadu, Kerala**, contributing nearly 96% of output.
- India consumes **80%** of its tea domestically; exports primarily **black tea** to 25+ countries.

Building Climate Resilience in India's Tea Sector

1. Agricultural and On-Farm Measures

- Develop **climate-tolerant tea varieties** with deeper roots.
- Improve **soil health and water retention** through mulching, micro-irrigation, and rainwater harvesting.
- Integrate **shade trees and agroforestry** to reduce heat stress and stabilise microclimates.

2. Economic and Market Strategies

- Promote sustainability standards like the **'trustea' code** to expand premium markets.
- Encourage **direct-to-consumer models** via digital platforms to improve growers' earnings.

3. Policy and Structural Interventions

- Extend disaster relief, subsidies, and insurance support comparable to food crops.
- Strengthen **research institutions** and skilling programs for smallholders.
- Learn from global examples like Kenya's **Farmer Field Schools (FFSs)** for hands-on, quality-focused training.

Conclusion

Climate instability, stagnating prices, and rising production risks are placing Assam's tea sector at a crossroads. Building resilience through **agronomic reforms, sustainable practices, and stronger policy backing** is now essential. Ensuring long-term stability is crucial not only for growers but for safeguarding India's **$10-billion tea industry** and its global reputation.

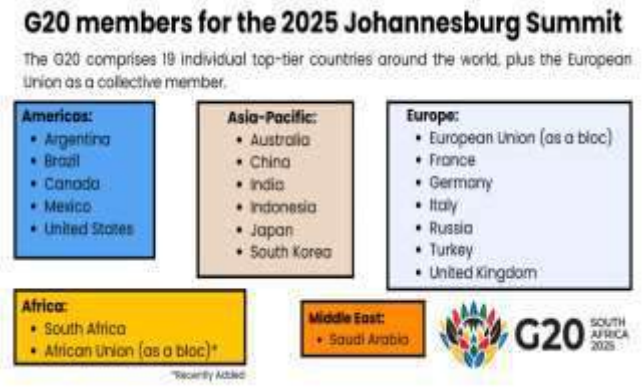
GLOBAL AGREEMENTS AND EFFORTS

G20 SUMMIT 2025 – JOHANNESBURG

SOURCE: THE HINDU

Why in News?

The **20th G20 Summit 2025** convened in **Johannesburg, South Africa**, marking the first time the G20 met on African soil. Leaders adopted the **Johannesburg Declaration**, placing Global South concerns at the heart of the agenda.



Key Highlights of the Summit

1. Johannesburg Leaders' Declaration

- A **122-para unanimous document** outlining commitments across climate action, financial reform, multilateral institutions, and sustainable development.
- Reaffirmed the G20's role as a platform for shaping **cooperative global governance**.

2. Ubuntu as Guiding Ethos

- Adopted the African idea of **Ubuntu – "I am because we are"** to stress mutual responsibility.
- Encouraged nations to prioritise **equity, compassion, and collective advancement**.

3. Call for UNSC Reform

- Supported restructuring of the **UN Security Council** to reflect present geopolitical balances.
- Called for **greater representation** of Africa, Latin America, and Asia-Pacific.

4. Strong Stand Against Terrorism

- Condemned **all forms of terrorism**, reinforcing India's long-standing position.
- Sought deeper collaboration on tackling financing networks and extremist safe havens.

5. Climate Finance & Transition

- Committed to scaling climate finance from **"billions to trillions."**
- Pushed for **just, affordable and equitable** transitions under the Paris Agreement.

6. Women's Leadership & Inclusion

- Encouraged removal of systemic barriers restricting women's **economic and political participation**.
- Recognised women as **key contributors to peacebuilding and sustainable growth**.

7. Debt Stress & Global Financial Reform

- Flagged Africa's **USD 1.8 trillion debt** and the burden of interest payments.
- Launched a **Cost of Capital Commission** to reform unfair global credit rating norms.

8. Mission 300

- Supported a major initiative to provide **electricity to 300 million** people in Sub-Saharan Africa by 2030.

9. Critical Minerals Framework

- Welcomed guidelines for **sustainable and diversified** mineral supply chains.
- Promoted **local beneficiation, exploration and transparent markets**.

10. Youth & Gender Labour Targets

- Adopted the **Nelson Mandela Bay Target** to reduce youth **NEET** rates by 5% by 2030.
- Committed to **25% gender parity** in labour force participation by 2030.

11. Troika

- The 2025 Troika includes **Brazil**, **South Africa**, and the **United States**.

Significance of the G20 Summit 2025

1. Landmark for Africa & Global South

- First G20 on African soil, giving visibility to **African development priorities**.
- Strengthened the collective voice of the **Global South** in shaping global norms.

2. Momentum for Multilateral Reform

- Renewed push for **UNSC reform**, global financial restructuring, and fair representation.
- Reinforced the idea that global institutions must reflect **21st-century realities**.

3. Boost to Sustainable Development Agenda

- Enhanced climate finance pathways and commitment to **green transitions**.
- Critical Minerals Framework strengthens **resource security** for developing nations.

4. Economic Governance & Financial Stability

- Focus on debt relief and rating reforms aimed at reducing the **cost of capital** for vulnerable economies.
- Helps advance a more **balanced economic architecture**.

Conclusion

The **Johannesburg G20 Summit** marked a turning point by elevating African and Global South perspectives to the centre of global decision-making. Its outcomes reflect a push toward **equity, sustainability, and inclusive multilateralism**. The summit strengthened the momentum for building a more **representative and cooperative world order**.

DISASTER MANAGEMENT

DISASTER FINANCING IN INDIA

SOURCE: THE HINDU

Why in News?

The Centre recently approved **₹260 crore** in disaster relief for Kerala after the **Wayanad landslides (July 2024)**, despite the State reporting losses of nearly ₹2,200 crore. This sharp mismatch has revived concerns about **cooperative federalism** and the growing **centralisation of disaster finance** in India.

India's Current Disaster-Financing Architecture

1. 15th Finance Commission Framework

- Expanded disaster finance beyond traditional relief funds by recommending **National Disaster Risk Management Fund (NDRMF)** and **State Disaster Risk Management Funds (SDRMF)**.
- Combined **relief and mitigation** components into a unified risk-management ecosystem.
- Allocation criteria rely mainly on **population, area**, and **historical spending**, not hazard exposure.

2. State Disaster Response Fund (SDRF)

- Main source of **immediate relief** for States covering food, shelter, health assistance, and compensation.
- Funded in a **75:25 ratio** (Centre:States) and **90:10** for NE & Himalayan States.
- Allows up to **10% flexibility** for locally notified disasters.
- Funds are released biannually as per Finance Commission norms.

3. National Disaster Response Fund (NDRF)

- Supplements SDRF when a disaster is classified as **"severe"** and state resources fall short.
- Entirely financed by the **Union Government**.

4. Mitigation Funds (SDMF & NDMF)

- Created to promote long-term resilience—flood control, slope stabilisation, earthquake safety, etc.
- All States except Telangana have initiated **SDMF**.
- The Centre contributes **75%/90%** depending on State category.

Major Concerns in India's Disaster-Financing System

1. Fiscal Imbalance Between Centre and States

- Actual losses reported by States often far exceed **NDRF/SDRF allocations**.
- Perceived under-financing undermines **cooperative federalism**.

2. Outdated Relief Norms

- Current compensation (e.g., **₹4 lakh for loss of life**, **₹1.2 lakh for fully damaged houses**) does not reflect inflation or rebuilding costs.

3. Ambiguity in 'Severe Disaster' Classification

- The Disaster Management Act lacks a clear definition, allowing **discretion in approvals**.
- In Kerala's case, delayed classification restricted access to enhanced relief.

4. Procedural Delays and Multiple Clearances

- Fund release depends on **state memoranda, central assessment teams, MHA scrutiny**, and high-level approvals—slowing relief.

5. Distorted Allocation Criteria

- Reliance on population and area rather than **hazard maps** and **climate risk indices** leads to misaligned funding.
- Often, **committed SDRF funds** are treated as "unspent," giving a misleading impression of underutilisation.

6. Weak Local-Level Capacity

- DDMAs, municipalities, and panchayats frequently lack **trained personnel, GIS tools, and emergency infrastructure**, limiting effective use of funds.

7. Increasing Centralisation

- Growing dependence on discretionary approvals signals a shift **away from federal balance** toward tighter central control.

Global Best Practices

- **United States:** Automatic fund release using per-capita damage indicators; reduces discretion.
- **Mexico:** Parametric triggers based on rainfall/wind thresholds; ensures rapid payouts.
- **Philippines:** Uses rainfall–fatality indices for activating Quick Response Funds.
- **African & Caribbean Pools:** Satellite-based parametric insurance.
- **Australia:** Links federal assistance to a state's relief spending share, enhancing accountability.

Key Reforms Needed

1. Adopt Rule-Based, Automatic Triggers

- Use **rainfall intensity, crop loss, fatalities, loss-to-GSDP**, and a **scientific risk index** for swift fund release.
- Expand hazard coverage and promote **parametric insurance and regional risk pools**.

2. Modernise Relief Norms

- Update compensation levels to reflect **current costs, inflation**, and rebuilding requirements.

3. Strengthen Federal Balance

- Ensure **predictable, timely, and transparent** NDRF/SDRF allocations.
- Avoid conditional or negotiation-based fund release.

4. Improve Finance Commission Methodology

- Shift from population–area formula to a **multi-hazard vulnerability index** using GIS-based risk maps.

5. Build Local Institutional Capacity

- Equip DDMAs and local bodies with **skilled staff, emergency centres, digital mapping tools**, and stronger community volunteer networks like **Aapda Mitra**.

Conclusion

India's existing disaster-financing model is struggling to keep pace with rising climate risks and state-level vulnerabilities. A more **rules-based, transparent, and science-driven** approach is essential for fair and timely support. Strengthening cooperative federalism will be vital to ensure that disaster-hit communities receive relief and recovery assistance when they need it most.

PRELIMS POINTERS IN NEWS

GREY SEAL

SOURCE: THE HINDU

Why in News?

A recent study revealed that **grey seal milk contains over 300 types of oligosaccharides**, offering new insights into marine mammal nutrition.

About Grey seal

The **grey seal (Halichoerus grypus)** is a large marine mammal found across the North Atlantic. Known for its distinctive

features and diverse habitats, it plays a vital ecological role in coastal ecosystems.

Key Characteristics

1. Appearance and Physiology

- Males may grow up to **10 feet**, while females are smaller.
- Pups are born with soft **white lanugo fur**, helping them retain heat.
- Grey seals are **diurnal** and exhibit **bottling behaviour**, where they float vertically with only their heads above water.

2. Habitat and Distribution

- Found in coastal waters from **mid-Atlantic to the Baltic Sea**.
- Haul out on **rocks, sandbars, islands**, and occasionally on ice shelves.

3. Diet

- Carnivorous, feeding mainly on **benthic or demersal fish**, along with crustaceans.

4. Life Span

- Typically live **25–35 years**.

Conservation Status

- Listed as **Least Concern** by IUCN but threatened locally by pollution, entanglement, and habitat disturbance.

MANCHURIAN WALNUT TREE

SOURCE: TIMES OF INDIA

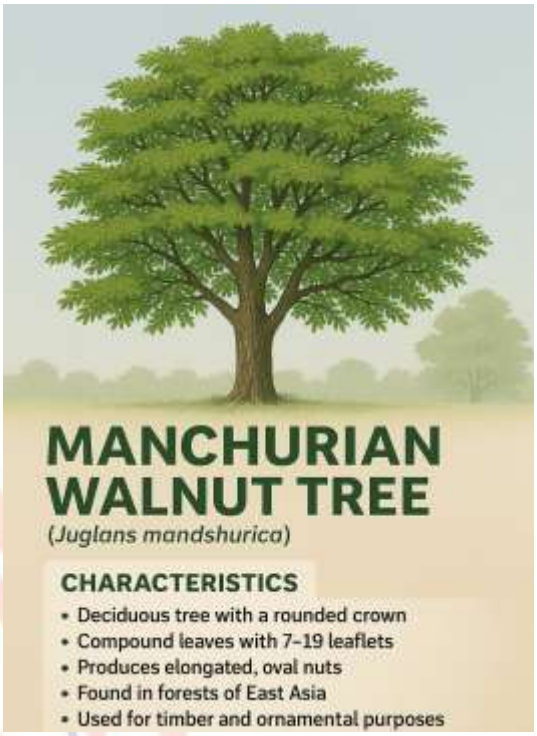
Why in News?

Researchers recently discovered that leaves of the **Manchurian walnut tree** exhibit exceptional **natural herbicidal properties**, offering a potential eco-friendly weed-control solution.

About Manchurian walnut tree

The **Manchurian walnut tree (Juglans mandshurica)** is a hardy deciduous species native to northeastern Asia.

Known for its resilience, longevity, and versatile uses, the tree is now gaining attention for its **weed-killing bioactive compounds**, which could offer sustainable alternatives to chemical herbicides.



Key Features of the Manchurian Walnut Tree

1. Habitat and Distribution

- Found mainly in **Manchuria (China), Korean Peninsula**, and parts of **eastern Russia**.
- Thrives in **well-drained, fertile soils** with neutral pH.

2. Cold and Climate Tolerance

- Exceptionally cold-resistant; withstands temperatures up to **–45°C**.
- Suitable for temperate regions and harsh winters.

3. Growth Characteristics

- Fast growth rate during the first 20 years (nearly **2 m per year**).
- Can reach **30 metres** in height and live up to **300 years**.
- Begins fruiting between **7–10 years** of age.

Applications and Uses

1. Medicinal Value

- Leaves, bark, and green husks possess **analgesic, antifungal, antibacterial, and antiparasitic properties**.
- Widely used in **traditional medicine** for skin infections, digestive disorders, and inflammation.

2. Food and Household Uses

- Immature fruits used in **jams and preserves**.
- Seeds known for their nutritional richness.

3. Timber and Economic Uses

- Wood is used in **furniture, flooring, and decorative objects** due to its durability.
- Increasing industrial demand for fine-quality walnut timber.

4. Ecological Importance

- Large canopy improves **soil quality and moisture retention**.
- Provides habitat for several bird species.

ALOE VERA

SOURCE: THE HINDU

Why in News?

Recent computer simulations suggest that **bioactive compounds in Aloe vera** may inhibit enzymes linked to **Alzheimer's disease**. This has renewed interest in its medicinal potential beyond skincare.

About Aloe vera

Aloe vera (Aloe barbadensis Mill.) is a succulent plant widely used in traditional and modern medicine. Known for its therapeutic gel-filled leaves, it is valued for its healing, antimicrobial, and anti-inflammatory properties.

Botanical Features

- Native to the **Arabian Peninsula** but now cultivated across warm regions worldwide.
- Thrives in **arid, sandy, and well-drained soils**.
- Leaves are thick, fleshy, and store water—forming the medicinal **gel** used in numerous applications.

Medicinal Properties

1. Rich Bioactive Composition

- Contains vitamins, minerals, antioxidants, amino acids, and enzymes.
- Exhibits strong **antibacterial, antiviral, and antiseptic** effects.

2. Health Applications

- Widely used to treat **burns, wounds, and skin inflammation**.
- Supports digestion and may help reduce oxidative stress.
- Current research suggests potential in **neurological disease management**.

Other Uses

1. Pharmaceutical and Cosmetic Industry

- Found in gels, creams, lotions, shampoos, and herbal formulations.

2. Environmental Uses

- Its shallow root system helps prevent **soil erosion** in dry regions.

CUBAN GAR

SOURCE: DOWN TO EARTH

Why in News?

Cuban researchers have intensified conservation measures in the **Zapata Swamp** to protect the **Cuban gar**, a critically endangered prehistoric fish.

About Cuban gar

The **Cuban gar (Atractosteus tristoechus)** is a rare freshwater fish, belonging to one of the oldest surviving fish families on Earth. Known locally as **manjuarí**, it plays a crucial ecological role in Cuba's wetlands but is now on the brink of extinction.

Characteristics of the Cuban Gar

1. Evolutionary Significance

- Belongs to a lineage that dates back **100 million years**.
- A living fossil offering insight into ancient aquatic life.

2. Habitat and Distribution

- Found in **rivers, lakes, backwaters, pools**, and slow-moving streams.
- Occupies both **freshwater and brackish water** environments.
- Endemic to **western Cuba** and **Isla de la Juventud**.

3. Unique Physiological Traits

- Can tolerate **high ammonia and nitrate** levels.
- Has the ability to **breathe atmospheric air**, enabling survival in low-oxygen waters.

4. Feeding Behaviour

- An **ambush predator**, feeding on small fish and crustaceans.

Threats

1. Habitat Loss

- Wetland conversion and pollution have drastically reduced its breeding grounds.

2. Invasive Species

- Competition from **African walking catfish** disrupts the gar's ecological niche.

3. Slow Reproductive Rate

- Limited reproductive output makes population recovery slow.

Conservation Status and Efforts

- Classified as **Critically Endangered** by **IUCN**.
- Cuba's restoration efforts include **breeding programs, habitat conservation**, and invasive species control.

MANCHUDARJEELING MANDARIN

SOURCE: INDIAN EXPRESS

Why in News?

The **Darjeeling Mandarin Orange** recently received a **Geographical Indication (GI)** status, making it the third product from the region after Darjeeling Tea and Dalley Khursani.

About Darjeeling Mandarin Orange

- Cultivated in the **hill districts of Darjeeling, West Bengal**.
- A variety of *Citrus reticulata Blanco*.
- Locally known as **"Suntala"**.
- Noted for its **strong aroma, sweetness, thin peel**, and bright colour.
- One of the major **cash crops** for hill farmers.

Climatic & Soil Requirements

- Grows at **600–1500 metres** above sea level.
- Prefers **frost-free tropical and subtropical climates**.
- Annual rainfall: **100–120 cm**.
- Temperature range: **10–35°C**.
- Requires **light to medium loamy soils** with good drainage.

Special Attributes

- Rich in **vitamin C**, natural sugars and antioxidants.
- Unique flavour attributed to **hill microclimate**, cool nights and warm days.
- Long-standing cultivation tradition enhances farmers' livelihood.

GI Tag Significance

- Protected under the **GI Act, 1999**.
- Prevents misuse of the name "Darjeeling Mandarin".
- Enhances market recognition, export prospects and farmer income.
- Valid for **10 years**, renewable.

BAMBOO SHRIMP

SOURCE: THE HINDU

Why in News?

Researchers recently **rediscovered the Bamboo Shrimp** in Karnataka and Odisha after a gap of 72 years, bringing attention to its ecological significance.

About Bamboo Shrimp

- Also called **Wood Shrimp, Flower Shrimp, Marble Shrimp, Asian Fan Shrimp**.
- Medium-sized freshwater shrimp native to **Southeast Asia**.
- Exhibits colour changes depending on mood or environment.

Biological & Ecological Features

- An **amphidromous species**:
  - Larvae develop in **brackish water**.
  - Adults live in **freshwater rivers**.
- Mostly **nocturnal**, hiding under rocks or driftwood during the day.
- Adapted to **fast-moving streams**, using strong legs to cling to surfaces.

Distribution

- Found across Southeast Asia: **Malaysia, Singapore, Thailand**.
- Recently confirmed in **India** after many decades.

Feeding Adaptations

- A unique **filter-feeder**.
- Uses fan-like structures on limbs to trap **algae, microorganisms and organic particles** from flowing water.
- Plays an important role in maintaining aquatic ecosystem balance.

Conservation Importance

- Rediscovery suggests that certain freshwater habitats continue to support sensitive species.
- Highlights need for **river conservation, pollution control**, and biodiversity mapping.

LONG-BILLED VULTURE

SOURCE: DOWN TO EARTH

Why in News?

BNHS and the Maharashtra Forest Department successfully **tagged long-billed vultures** in **Melghat Tiger Reserve**. The initiative supports **vulture conservation and scientific monitoring**.

About Long-Billed Vulture

- The **Long-Billed Vulture** is an **Old-World vulture species** native to South Asia.
- It plays a crucial role as a **scavenger**, maintaining ecological balance.

Physical Characteristics

- The species is **medium-sized and bulky**, with a **long, curved beak** adapted for scavenging.
- Females are generally **smaller than males**.
- Its appearance supports efficient feeding on animal carcasses.

Habitat and Distribution

- Long-billed vultures inhabit **open landscapes, savannas, and areas near human settlements**.
- They are found mainly in **India, Pakistan, and Nepal**.
- Nesting often occurs on **cliffs and tall trees**.

Ecological Importance

- The species helps in **rapid disposal of carcasses**, preventing disease spread.
- Vultures reduce populations of **pathogens and scavenging pests**.
- Their decline can disrupt **public health and ecosystem stability**.

Conservation Status and Threats

- The species is listed as **Critically Endangered** on the **IUCN Red List**.
- Major threats include **diclofenac poisoning**, habitat loss, and food scarcity.
- Low breeding rates worsen population recovery.

Conservation Efforts

- Tagging and monitoring help track **movement, survival, and nesting patterns**.
- Ban on veterinary diclofenac has improved survival prospects.
- Protected areas like Melghat provide **safe habitats**.

NEELUS SIKKIMENSIS

SOURCE: THE HINDU

Why in News?

Scientists from the **Zoological Survey of India** discovered a new species named **Neelus sikkimensis** in Sikkim. This is the **first record of the genus Neelus in India**.

About Neelus sikkimensis

- **Neelus sikkimensis** is a newly identified species of **Collembola**, commonly called **springtails**.

- The discovery highlights India's **rich but underexplored soil biodiversity**, especially in high-altitude ecosystems.

Taxonomic Importance

- With this discovery, the total number of known **Neelus species worldwide has increased to eight**.
- It expands scientific understanding of **micro-arthropod diversity in the Himalayan region**.

Habitat and Discovery Location

- The species was found in the **high-altitude landscapes of Sikkim**.
- These regions are characterised by **cold climates, moss-rich soil, and low light conditions**, ideal for subterranean species.

Distinct Biological Features

- Neelus sikkimensis has an **extremely small, microscopic body**, adapted for life within soil layers.
- It exhibits a **complete absence of eyes**, indicating adaptation to permanent darkness.
- The species shows a unique **labral chaetotaxy**, which refers to a distinct arrangement of bristles on its mouthparts.

About Collembola

- Collembola are among the **oldest hexapods on Earth**, existing for over 400 million years.
- They are found in almost all **terrestrial ecosystems**, including forests, grasslands, and agricultural soils.
- They feed on **fungi, algae, decaying plant matter, and microbes**.

Ecological Role

- Springtails play a crucial role in **nutrient cycling and soil formation**.
- They help maintain **soil fertility and microbial balance**.
- Their presence acts as an indicator of **healthy soil ecosystems**.

Scientific and Conservation Significance

- The discovery underlines the importance of **micro-fauna conservation**, which is often neglected.
- It strengthens India's biodiversity documentation efforts.

PERSISTENT ENVIRONMENTAL CRISES IN INDIA

Why in News?

India's recurring environmental emergencies, especially **severe air pollution in Delhi-NCR**, have renewed debate on the **constitutional right to a clean environment**. Recently, the **Commission for Air Quality Management (CAQM)** strengthened the **Graded Response Action Plan (GRAP)** by mandating school closures and phased office timings during severe pollution phases.

Major Persistent Environmental Crises in India

1. Severe Air Pollution

- India remains one of the **most air-polluted countries globally**.
- According to the **World Air Quality Report 2024**, **13 of the world's 20 most polluted cities are in India**.
- Air pollution contributed to **about 2.1 million deaths in India in 2021**, making it a major public health emergency.
- Health impacts include **asthma, chronic lung disease, heart ailments, and reduced life expectancy**, particularly affecting children and the elderly.

2. Water Scarcity and Water Pollution

- India's **per capita water availability** has declined from **1,816 cubic metres (2001)** to **1,545 cubic metres (2011)** and is projected to fall to **around 1,200 cubic metres by 2050**, nearing water-scarcity thresholds.
- Groundwater contamination with **arsenic, fluoride, and nitrates** is widespread in states like **West Bengal, Bihar, and Uttar Pradesh**.
- Climate change, glacial retreat, erratic monsoons, and river pollution have increased **flood–drought cycles**, worsening water insecurity.

3. Biodiversity Loss and Habitat Degradation

- Rapid deforestation due to **infrastructure expansion, mining, and urban growth** has fragmented habitats.
- Biodiversity hotspots such as the **Western Ghats** face severe pressure.

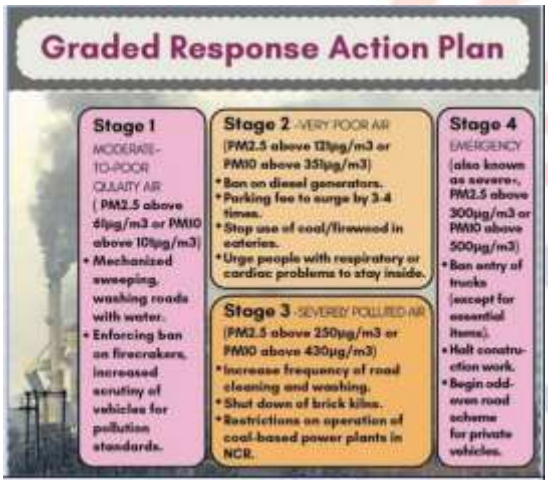
- Climate projections indicate that **up to one-third of India's biodiversity could be at risk by mid-century**, undermining ecosystem services and livelihoods.

4. Land Degradation and Soil Health Decline

- About **83.7 million hectares** of land were affected by desertification and degradation in **2018–19**, showing a rising trend over previous decades.
- Excessive chemical fertiliser use and intensive farming have reduced **Soil Organic Carbon** in many regions from historical levels of ~1% to **around 0.3%**, lowering productivity and resilience.

5. Waste Management Crisis

- India generates around **62 million tonnes of waste annually**, including plastic, hazardous, biomedical, and e-waste.
- Although collection rates have improved, **scientific processing and disposal remain inadequate**, leading to landfill overflow, open burning, and groundwater contamination.
- Poor segregation and weak urban governance remain core problems.



Graded Response Action Plan (GRAP)

- **GRAP** is a **pre-emptive emergency framework** to control air pollution in **Delhi-NCR**.
- It was introduced following the **Supreme Court's 2016 order in the M.C. Mehta case** and notified in **2017**.
- GRAP operates in **four stages**, based on Air Quality Index (AQI):
  - **Stage I (Poor):** Dust control, vehicle emission checks
  - **Stage II (Very Poor):** Restrictions on diesel generators
  - **Stage III (Severe):** Limits on construction and vehicle use
  - **Stage IV (Severe+):** School closures, industrial shutdowns, heavy vehicle bans
- Recent amendments made **school closures mandatory** in severe phases, strengthening public health protection.

Commission for Air Quality Management (CAQM)

- **CAQM** is a statutory body created under the **CAQM Act, 2021** to coordinate air-pollution control across **Delhi-NCR and adjoining states**.
- It acts as the **apex authority**, superseding fragmented institutional responses.
- The Commission is **accountable to Parliament** and empowered to issue binding directions, enhancing regulatory coherence.

Evolution of Environmental Jurisprudence in India

- Indian courts have progressively expanded environmental rights under **Article 21**.
- Key judgments include:
  - **Maneka Gandhi (1978):** Expanded the meaning of "life" to include dignity and environmental quality
  - **RLEK v. State of UP (1985):** Recognised the right to a healthy environment
  - **M.C. Mehta cases:** Established pollution-free environment as a fundamental right
  - **Vellore Citizens (1996):** Introduced **Precautionary Principle** and **Polluter Pays Principle**
  - **M.K. Ranjitsinh (2024):** Recognised protection from climate change impacts under **Articles 21 and 14**

Key Challenges in Addressing Environmental Crises

- **Weak enforcement** despite strong laws like the Environment Protection Act, 1986
- **Developmental pressures**, including fast-tracked infrastructure clearances
- **Trans-boundary and technical complexity**, such as Indo-Gangetic air pollution
- **Behavioural resistance**, including low compliance with waste segregation and conservation norms
- **Institutional fragmentation** and lack of real-time monitoring

Way Forward

- Provide **explicit constitutional recognition** of the **Right to a Clean and Healthy Environment**.
- Strengthen institutions through a **National Environmental Authority** for cross-sector coordination.

- Use **AI, satellite data, and real-time disclosure** for enforcement and transparency.
- Shift to **outcome-based environmental budgeting** and climate-centric urban planning.
- Realign economic incentives through **carbon pricing, green bonds, and CSR-based environmental funding**.
- Deepen **international cooperation** for climate finance and clean technology transfer.

Conclusion

India's recurring environmental crises expose a serious gap between **law, policy, and implementation**. Judicial innovation and emergency measures like GRAP are necessary but **insufficient on their own**. A **constitutional, institutional, and technology-driven transformation** is essential to secure ecological sustainability and public health in the long run.

SCIENCE AND TECHNOLOGY

MEDICAL HEALTH/VACCINES/DISEASES

HIV/AIDS AND INDIA'S NATIONAL RESPONSE

SOURCE: THE HINDU

Why in News?

The Ministry of Health and Family Welfare marked **World AIDS Day 2025** on 1 December under the theme ***"Overcoming disruption, transforming the AIDS response"*.** The event showcased India's steady progress under the **National AIDS Control Programme (NACP)** in reducing HIV prevalence and expanding treatment access.

What is HIV/AIDS?

1. About the Virus

- **HIV (Human Immunodeficiency Virus)** attacks the body's **CD4 immune cells**, gradually weakening the defence system.
- Untreated HIV progresses to **AIDS (Acquired Immunodeficiency Syndrome)**, the most advanced stage of infection.

2. Modes of Transmission

- Spread through **infected bodily fluids** such as blood, semen, vaginal fluids, and breast milk.
- Common routes include **unprotected sex**, **shared needles**, unsafe transfusions, and unsterilised tattoo equipment.
- Not transmitted through casual contact like touching, sharing food, or mosquito bites.

3. Symptoms

- **Early phase:** Fever, rash, fatigue.
- **Chronic stage:** Weight loss, prolonged diarrhea, swollen lymph nodes.
- Progression increases vulnerability to **opportunistic infections** such as TB, meningitis, and certain cancers.

4. Treatment

- No complete cure exists.
- **Antiretroviral Therapy (ART)**—taken lifelong—suppresses viral load, enabling patients to live healthy, productive lives.

5. Global Commitment

- **SDG 3.3** targets ending AIDS as a public health threat by **2030**.

India's National AIDS Control Programme (NACP)

About NACP

- India's flagship programme for **HIV prevention, care, and treatment**.
- Implemented by **NACO** under the Ministry of Health and Family Welfare.
- Uses a decentralised model through State AIDS Control Societies and **DAPCUs** at district level.

Evolution of NACP

NACP I (1992–1999)

- First structured national response.
- Emphasis on slowing the spread and improving HIV surveillance.

NACP II (1999–2006)

- Focused on **reducing transmission**, expanding awareness campaigns, and strengthening infrastructure.

NACP III (2007–2012)

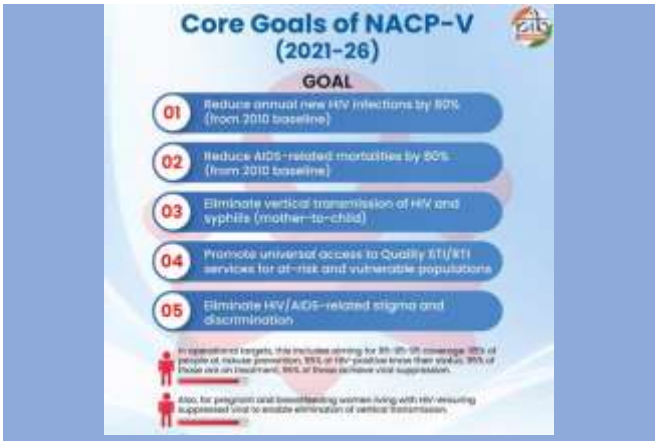
- Targeted **halting and reversing** the epidemic.
- Introduced large-scale prevention programmes and integration with health systems.
- Establishment of **DAPCUs** for decentralised implementation.

NACP IV (2012–2017; extended to 2021)

- Aimed at **accelerating reversal** and integrating HIV services nationwide.
- Key initiatives included:
  - **HIV/AIDS Prevention and Control Act, 2017** banning discrimination.
  - **Mission Sampark** to track and re-engage patients lost to follow-up.
  - **Test and Treat policy**, offering ART to all diagnosed individuals.
  - Nationwide **viral load monitoring**.

NACP V (2021–2026)

- A Central Sector Scheme; investment of **₹15,000+ crore**.
- Aligns with global 2030 goals and focuses on prevention, last-mile service delivery, and stigma reduction.



Achievements of NACP

- **HIV prevalence fell** from 0.33% (2010) to **0.20% (2024)**—well below global average (0.70%).
- **New infections declined by 49%** (2010–2024), outpacing the global reduction of 40%.
- India now accounts for **only 5% of global new HIV infections**.
- Under NACP-V:
    - HIV testing increased from **4.13 crore to 6.62 crore**,
    - Individuals on ART increased from **14.94 lakh to 18.60 lakh**.

Conclusion

India's sustained political commitment, expanded treatment access, and community-based interventions have significantly curbed the HIV epidemic. To meet the 2030 global target**, India must continue strengthening prevention, tackling stigma, and ensuring uninterrupted ART access**. A transformed and resilient AIDS response will be essential for safeguarding public health and social wellbeing.

PRIMARY SCLEROSING CHOLANGITIS (PSC)

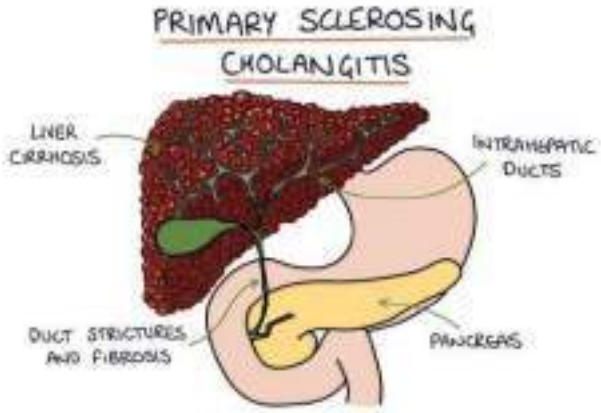
SOURCE: THE HINDU

Why in News?

Primary Sclerosing Cholangitis (PSC) has gained attention due to the development of a **new monoclonal antibody–based therapy** showing potential in slowing disease progression.

About Primary Sclerosing Cholangitis

- **Primary Sclerosing Cholangitis** is a **rare, chronic, and progressive liver disease** that affects the **bile ducts**, which are responsible for carrying bile from the liver to the intestine.
- Persistent inflammation and scarring of these ducts gradually impair liver function and can result in **end-stage liver disease**.



Nature of the Disease

- PSC involves **chronic inflammation of intrahepatic and extrahepatic bile ducts**, leading to their **narrowing and blockage**.
- Obstruction of bile flow causes **bile accumulation in the liver**, which damages liver cells over time.
- Continued injury results in **fibrosis, cirrhosis, and liver failure**.

Causes and Risk Factors

- The exact cause of PSC is **not clearly understood**, making it an idiopathic disease.
- Scientific evidence suggests a role of **genetic predisposition**, particularly in individuals with autoimmune tendencies.
- **Immune system dysfunction** may cause the body to mistakenly attack bile ducts.
- **Gut microbiome imbalance** and **environmental triggers** are also believed to contribute.
- PSC has a strong association with **Inflammatory Bowel Disease**, especially **ulcerative colitis**.

Symptoms

- PSC often remains **asymptomatic in early stages**, delaying diagnosis.
- As the disease progresses, patients may develop **severe itching**, **chronic fatigue**, and **upper abdominal pain**.
- **Jaundice** occurs due to bile accumulation in the bloodstream.
- Recurrent **bile duct infections** may cause fever and chills.

Complications

- Long-term PSC leads to **cirrhosis and portal hypertension**.

- Patients face a significantly higher risk of **cholangiocarcinoma (bile duct cancer)**.
- There is also an increased incidence of **gallbladder and colorectal cancers**.
- Without transplantation, **median survival is around 10 years** from diagnosis.

Treatment and Recent Advances

- There is **no approved drug** that can completely stop PSC progression.
- Treatment focuses on **symptom management**, infection control, and regular cancer screening.
- **Endoscopic procedures** may temporarily relieve bile duct obstruction.
- **Liver transplantation** remains the only definitive cure in advanced cases.
- The development of **monoclonal antibody therapy** offers hope by targeting immune-driven inflammation.

SPACE TECHNOLOGY

MICROMETEOROIDS AND ORBITAL DEBRIS (MMOD)

SOURCE: THE HINDU

Why in News?

A **micrometeoroid debris impact** recently caused a **crack in the window of China's Shenzhou-20 spacecraft**, highlighting vulnerabilities in crewed missions. The incident renewed global concern over **astronaut safety and spacecraft protection** from **MMOD threats** in Earth's orbit.

About Micrometeoroids

- **Micrometeoroids** are **naturally occurring particles** in space, usually ranging from **a few micrometres to about two millimetres** in size.
- Most micrometeoroids originate from **collisions between asteroids** in the asteroid belt located between **Mars and Jupiter**.
- A smaller proportion comes from **comet debris**, released as comets approach the Sun.
- These particles travel at **extremely high velocities**, typically between **11 km/s and 72 km/s**.
- Due to such speeds, even a tiny micrometeoroid carries **enormous kinetic energy**, capable of puncturing spacecraft surfaces.
- Earth's gravity slightly increases their concentration in **near-Earth space**, raising risks for satellites and space stations.
- Micrometeoroids are **effectively uncountable**, making prediction and avoidance extremely difficult.

Orbital Debris

- **Orbital debris**, also called **space junk**, refers to **human-made objects** orbiting Earth that no longer serve any functional purpose.
- All orbital debris originates from **human activities in space**.
- Major sources include **defunct satellites**, **discarded rocket stages**, **fragmentation from collisions**, and **intentional anti-satellite (ASAT) weapon tests**.
- Orbital debris typically travels at speeds of around **10 km/s**, which is sufficient to **penetrate spacecraft shielding**.
- Unlike micrometeoroids, orbital debris is **artificial and increasing rapidly** due to growing space activity.
- Even a small bolt or paint flake can cause **catastrophic damage** at orbital velocities.

Distribution and Risk Zones

- Orbital debris is most densely concentrated in **Low Earth Orbit (LEO)**, between **200 km and 2,000 km altitude**.
- This region hosts critical assets such as **communication satellites, Earth-observation satellites, and space stations**.
- Billions of **micro-impacts occur annually** on spacecraft operating in Earth's orbit.
- Certain orbital regions face higher collision probabilities due to **crowded satellite constellations**.
- Long-lived debris can remain in orbit for **decades**, increasing cumulative risk.

Threats to Space Missions

- MMOD poses a direct threat to **astronaut safety**, especially during long-duration missions.

- Spacecraft windows, solar panels, and thermal insulation are **highly vulnerable** to high-velocity impacts.
- Satellite systems essential for **communication, navigation, weather forecasting, and disaster management** are at risk.
- Collisions can trigger **cascade effects**, where one impact generates more debris, known as the **Kessler Syndrome**.
- Increased shielding and avoidance manoeuvres significantly **raise mission costs**.

Mitigation and Protection Measures

- Spacecraft use **multi-layer shielding**, such as **Whipple shields**, to absorb impact energy.
- **Tracking and cataloguing systems** monitor larger debris to enable collision avoidance.
- International guidelines promote **debris-free satellite design** and controlled re-entry after mission completion.
- Active debris removal technologies are being explored but remain **technologically and economically challenging**.

MARS ATMOSPHERE AND VOLATILE EVOLUTION (MAVEN) MISSION

SOURCE: THE HINDU

Why in News?

NASA recently lost contact with the MAVEN spacecraft after it successfully operated for more than a decade around Mars.

About MAVEN Mission

- **MAVEN (Mars Atmosphere and Volatile EvolutioN)** is **NASA's first mission exclusively dedicated to studying the upper atmosphere of Mars**.
- It is a key part of NASA's **Mars Exploration Program**, which aims to understand Mars' **geology, climate history, and potential for life**.
- Unlike surface rovers, MAVEN operates as an **orbiter**, focusing on atmospheric and space-environment interactions.

Scientific Background and Need

- Geological evidence shows that **ancient Mars once had flowing liquid water**, rivers, and lakes.
- However, present-day Mars is **cold, dry, and has a very thin atmosphere**.
- Scientists hypothesised that Mars lost its atmosphere to space, but the **exact mechanisms were unclear**.
- MAVEN was designed to fill this knowledge gap by studying **atmospheric escape processes**.

Objectives of MAVEN Mission

- To understand **how and at what rate Mars lost its atmosphere over billions of years**.
- To study the role of the **solar wind**, which is a stream of charged particles emitted by the Sun.
- To analyse how the absence of a **global magnetic field** on Mars made its atmosphere vulnerable.
- To explain Mars' climatic transformation from **warm and wet conditions to cold and arid conditions**.
- To assess the implications of atmospheric loss for **planetary habitability**.

Launch and Orbital Characteristics

- MAVEN was **launched in November 2013** aboard an Atlas V rocket.
- It **entered Mars orbit in September 2014**, marking the start of its scientific mission.
- The spacecraft completes one orbit around Mars every **3.5 hours**.
- Its highly elliptical orbit allows it to approach as close as **150 km above the Martian surface**, enabling detailed measurements of the upper atmosphere.
- This orbit helps MAVEN sample different atmospheric regions and solar wind interactions.

Scientific Instruments on MAVEN

- MAVEN carries **three major instrument packages**, each designed for a specific function.
- The **Solar Wind and Magnetic Field Package** studies how **solar wind interacts with the Martian ionosphere**, which is crucial because Mars lacks a protective magnetic shield.
- The **Ultraviolet Spectrometer** measures ultraviolet emissions from the upper atmosphere, helping scientists understand **atmospheric composition, density, and escape rates**.

- The **Neutral Gas and Ion Mass Spectrometer** analyses the **chemical composition of gases and ions** in the upper atmosphere, providing data on how gases are lost to space.

Key Scientific Discoveries

- MAVEN confirmed that **Mars lost nearly two-thirds of its early atmosphere** to space over time.
- The **solar wind played a dominant role** in stripping away atmospheric gases, especially during the early active phase of the Sun.
- Atmospheric loss accelerated during **solar storms**, which increased erosion of the Martian atmosphere.
- The loss of atmosphere led to a decline in **surface pressure and temperature**, making liquid water unstable.
- These findings explain why **Mars transitioned from a potentially habitable planet to a barren desert world**.

Broader Scientific Significance

- MAVEN provided the **first direct evidence** linking solar activity to long-term climate change on a planet.
- The mission helps scientists understand **planetary evolution beyond Earth**, including exoplanets.
- Insights from MAVEN are crucial for assessing **habitability of planets without magnetic fields**.
- The data supports future **human exploration of Mars**, particularly radiation and atmospheric risk assessment.

ANTARIKSH PRAYOGSHALA (SPACE LABS)

SOURCE: THE HINDU

Why in News?

The **Indian National Space Promotion and Authorisation Centre (IN-SPACe)** issued a **Request for Proposal (RfP)** to establish **Antariksh Prayogshala (Space Labs)** in select academic institutions.

About Space Labs

- **Antariksh Prayogshala** is a **first-of-its-kind national initiative** to create **state-of-the-art space laboratories** within Indian universities and academic institutions.
- The programme is designed to bridge the gap between **theoretical learning and practical exposure** in space science and technology.
- It aligns with India's long-term vision of emerging as a **leading global space economy and innovation hub**.

Implementing Agency

- The initiative is spearheaded by **IN-SPACe**, an **autonomous nodal body** under the **Department of Space (DoS)**.
- IN-SPACe functions as a **single-window facilitator and regulator** for non-governmental entities (NGEs) in the space sector.
- It promotes, authorises, and supervises **private and academic participation** in space activities while coordinating with **ISRO**.

Objectives of Antariksh Prayogshala

- To provide **hands-on training and experimentation facilities** in space technologies to students and researchers.
- To create a pipeline of **skilled human resources** for India's expanding space sector.
- To promote **research, innovation, and technology development** in areas such as satellite systems, launch technologies, and space applications.
- To enable **meaningful collaboration between academia, industry, startups, and government agencies**.

Key Features

- **Up to seven academic institutions** will be selected in a **phased manner**, ensuring **one Space Lab in each geographical zone** of India.
- This zonal distribution ensures **balanced regional representation and equitable access** to advanced space infrastructure.
- The labs will be equipped with **modern tools, testing facilities, and simulation environments** related to space technologies.
- Facilities will also be made available to **Non-Governmental Entities (NGEs)**, including startups and private companies, within that zone.
- The labs are intended to act as **regional hubs for space research and innovation**.

Funding and Selection Process

IN-SPACe will provide **financial support up to 75% of the total project cost**, subject to a **maximum cap of ₹5 crore per institution**.

Funding will be released on a **milestone-linked basis**, ensuring transparency, accountability, and timely execution. The selection process follows a **two-stage mechanism**:

- **Stage 1:** Screening of institutions based on eligibility criteria such as academic capability, infrastructure, and past research experience.
- **Stage 2:** Evaluation and ranking by an **Empowered Committee (EC)**, followed by final zone-wise selection.

Significance of the Initiative

- Strengthens **industry–academia linkages**, which are critical for technology-driven sectors like space.
- Helps develop a **highly skilled workforce** required for satellite manufacturing, launch services, and downstream space applications.
- Encourages **private sector participation** and startup involvement in space R&D.
- Supports the objectives of **Atmanirbhar Bharat** by reducing dependence on foreign space technologies.
- Enhances India's capacity to compete in the **global commercial space market**.

EMERGING TECHNOLOGIES

PRIVATE SECTOR PARTICIPATION IN INDIA'S NUCLEAR POWER SECTOR

SOURCE: THE HINDU

Why in News?

The Prime Minister announced that **India will soon open its civil nuclear power sector to private investment**, ahead of the introduction of the **Atomic Energy Bill, 2025** in Parliament. This marks a major policy shift aimed at expanding nuclear capacity and attracting fresh capital and technology.

How the Private Sector Can Strengthen India's Nuclear Programme

1. Supporting Large-Scale Capacity Expansion

- India intends to expand nuclear capacity from **8.8 GW to 22 GW by 2032**, and **100 GW by 2047**.
- NPCIL, the current monopoly operator, lacks the **capital base, engineering capacity, and human resources** required to build such large-scale infrastructure.
- Private players can contribute **capital infusion, skilled manpower, and advanced EPC (Engineering, Procurement, Construction) capabilities**, crucial for timely expansion.

2. Filling the Massive Financing Gap

- Achieving **100 GW of nuclear capacity** demands an investment close to **₹15 lakh crore**.
- The **2025–26 Budget allocates only ₹20,000 crore**, far below what is required.
- Private capital can diversify funding sources, reduce fiscal pressures on the government, and mobilize **long-term, low-cost finance** for nuclear infrastructure.

3. Speeding Up Project Execution

- Several NPCIL projects, including **Kudankulam Units 3–6**, have suffered chronic delays due to procurement hurdles and construction bottlenecks.
- Private sector involvement can improve **supply-chain efficiency, project management practices**, and accountability—cutting down time and cost overruns.

4. Advancing Technology and Innovation

- Private participation can help India adopt **advanced reactor designs, Small Modular Reactors (SMRs), molten-salt reactors, and high-temperature gas-cooled reactors**.
- This is vital for increasing safety, flexibility, and scalability in nuclear deployment.
- Partnerships with global nuclear industries can accelerate technology transfer and innovation.

5. Strengthening Uranium Supply Chains

- India's uranium reserves are limited and meet only **around 25% of future requirements**.
- Allowing private firms to engage in **mining, import, and processing** of uranium would enhance energy security and reduce dependence on G2G uranium supply contracts.

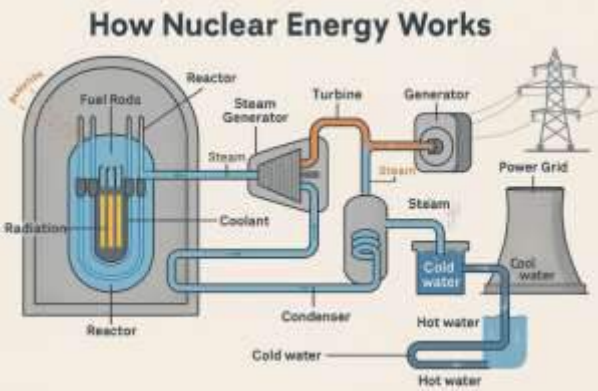
6. Enhancing India's Net-Zero and Energy Security Agenda

- Private sector entry can fast-track low-carbon capacity addition, supporting **India's 2070 net-zero goal**.
- Local manufacturing of reactor components can deepen **indigenisation and integrate India into global nuclear value chains**.

India's Nuclear Energy Landscape

- India currently operates **20+ reactors** with a combined capacity of **8.18 GW**.
- Targets include **100 GW by 2047**.
- The **Nuclear Energy Mission (2025-26)** prioritises R&D in **SMRs**, aiming for **five indigenous SMRs by 2033**.

- New technologies under development include **Bharat Small Reactors, SMRs, Molten Salt Reactors**, and **High-Temperature Gas-Cooled Reactors**.



Major Barriers to Private Sector Participation

1. Nuclear Liability Issues

- The **Civil Liability for Nuclear Damage Act (2010)** allows operator recourse against suppliers, unlike international norms under the **CSC (1997)**.
- This makes supplier liability unpredictable and insurance costs prohibitively high.

2. High Capital Costs and Financing Risks

- The capital cost of nuclear plants may touch **₹14 crore per MW** by 2026–27.
- Nuclear energy is not considered "renewable," restricting access to **green finance, tax incentives, and concessional credit**.

3. Unclear Ownership and Revenue Models

- The **Atomic Energy Act, 1962** limits private participation in reactor ownership, power generation, and sale of electricity.
- This creates uncertainty about the private sector's long-term role.

4. Fuel Constraints and Import Restrictions

- Domestic uranium reserves (~76,000 tonnes) are insufficient, and private entities **cannot mine, import, or process uranium**.
- They lack control over fuel supply—an essential input for reactor operation.

5. Regulatory and Security Challenges

- The nuclear sector has stringent oversight under **AERB** and **DAE**, which could impose heavy compliance burdens on private firms entering the space.

Way Forward to Strengthen India's Nuclear Sector

1. Legislative Reforms

- Amend the **Atomic Energy Act (1962)** to allow private ownership and operation of nuclear reactors.
- Revise the **CLND Act (2010)** to restrict supplier liability and align with **international CSC norms**, boosting investor confidence.
- The upcoming **Atomic Energy Bill, 2025** is a major step in this direction.

2. Designing a Clear PPP Framework

- Define models for co-ownership, tariff rules, risk sharing, and long-term PPAs.
- Provide clarity on **revenue flows, safety obligations**, and decommissioning responsibilities.

3. Securing Nuclear Fuel

- Strengthen uranium supply partnerships with **Canada, Australia, Kazakhstan**, and others.
- Expand R&D on **thorium-based reactors**, particularly **BHAVINI's Prototype Fast Breeder Reactor (PFBR)**.

4. Improving Project Execution

- Use EPC-based contracts, digital procurement systems, and private construction expertise to avoid costly delays.

Conclusion

Opening India's nuclear sector to private players marks a historic transition toward **scalable, secure, and low-carbon energy growth**. Its success will depend on resolving liability constraints, clarifying ownership models, and modernising regulatory frameworks. If executed well, this reform can reshape India's long-term **energy security and climate strategy**.

PRELIMS POINTERS IN NEWS

THALASSEMIA

SOURCE: THE HINDU

Why in News?

Five thalassemia-affected children in Jharkhand were recently found HIV-positive after receiving **contaminated blood transfusions**, raising concerns over blood safety and screening standards in public health facilities.

What is Thalassemia?

- A **genetic disorder** in which the body makes inadequate amounts of **hemoglobin**, resulting in chronic anemia.
- Due to defective production of either the **alpha** or **beta** chains of hemoglobin.
- Leads to poorly formed red blood cells that cannot effectively transport oxygen.

Types of Thalassemia

1. Based on Hemoglobin Chain Affected

- **Alpha Thalassemia:** Reduced or absent alpha chain production.
- **Beta Thalassemia:** Reduced or absent beta chain production.

2. Based on Severity

- **Thalassemia Minor/Trait:** Usually asymptomatic; individuals act as carriers.
- **Intermedia:** Moderate form; may require transfusions occasionally.
- **Thalassemia Major (Cooley's Anemia):** Severe form needing **regular transfusions** from early childhood.

3. Special Variants

- **Constant Spring**, **Cooley's Anemia**, and **Hemoglobin Bart Hydrops Fetalis** (the most severe alpha variant).

Symptoms and Complications

- Persistent **fatigue, pale skin, breathlessness**, and general weakness.
- Severe cases may show **bone deformities** due to marrow expansion, enlarged spleen, and a weakened immune system.
- Long-term transfusions can cause **iron overload**, affecting the heart and liver.

Risk Factors

- Strongly tied to **family history** as it is inherited.
- More common among populations from the **Mediterranean, Middle East, South Asia, Africa**, and tribal communities in India.

Thalassemia Burden in India

- India has nearly **1.5 lakh patients** with about **12,000 new cases** annually.
- **3–4%** of the population carries the beta-thalassemia gene (higher in tribal areas).
- Recognized as a disability under the **RPwD Act, 2016**.

Government Initiatives

Comprehensive Guidelines on Hemoglobinopathies (2016)

- Framework for diagnosis, treatment protocols, psychological support and management of severe forms like NTDT.

National Health Mission (NHM)

- Supports states in improving **blood banks, day-care units, labs**, medicines and training for thalassemia care.

Thalassemia Bal Sewa Yojana (TBSY)

- CSR initiative of **Coal India Ltd.**, offering up to **₹10 lakh** support for **Bone Marrow Transplants**; Phase II includes **Aplastic Anemia**.

e-RaktKosh

- Digital platform to track **blood availability**, crucial for patients needing frequent transfusions.

Conclusion

Thalassemia remains a major public health challenge requiring vigilance, safe transfusion practices and widespread screening. Strengthening infrastructure and supporting affected families are essential for long-term care. Preventive strategies hold the key to reducing India's thalassemia burden.

FLUORIDE CONTAMINATION & FLUOROSIS

SOURCE: THE HINDU

Why in News?

An NGO survey in Odisha's Mayurbhanj district found **excess fluoride in drinking water**, leading to rising cases of dental and skeletal fluorosis among villagers.

What is Fluoride?

- An **inorganic anion (F^-)** derived from fluorine.
- Highly reactive and usually found combined with minerals.

- Naturally present in water, soil, plants, and some foods.
- About **99% of total body fluoride** is stored in bones and teeth.

Natural Sources

- Occurs in minerals like **fluorspar, cryolite, fluorapatite**.
- Found in groundwater in many regions due to geological formations.
- Present in tea, seafood, and some dietary supplements.

Industrial Uses

- Aluminium manufacturing
- Steel and glass fibre industries
- Brick, tile, and ceramic production
- Phosphate fertilizer plants

  All these can release fluoride into air, soil, and water.

Health Impacts

1. **Dental Fluorosis**
   - Discolouration and mottling of teeth, especially in children under 8 years.
   - Caused by long-term consumption of high-fluoride water.
2. **Skeletal Fluorosis**
   - Stiffness, joint pain, reduced mobility.
   - In severe cases, bone deformities and disability.
3. **Other Effects**
   - Gastrointestinal discomfort
   - Neurological symptoms in extreme exposure

Prevention

- Safe drinking water through defluoridation units.
- Rainwater harvesting in fluoride-endemic regions.
- Awareness on fluoride-safe nutrition (calcium and vitamin C rich foods).

NOROVIRUS

SOURCE: THE HINDU

Why in News?

The United States has reported a surge in **norovirus cases**, often called the *winter vomiting disease*, signalling a seasonal rise in infections.

About Norovirus

- A virus that causes **inflammation of the stomach and intestines (gastroenteritis)**.
- Known as the **"stomach flu"** or **"winter vomiting bug"**.
- Responsible for **~90% of viral gastroenteritis outbreaks globally**.
- People of all ages can be infected repeatedly due to multiple strains.

Spread & Transmission

- Spread through:
  - **Contaminated food and water**
  - **Touching infected surfaces**
  - **Direct contact** with infected individuals
- Outbreaks common in **schools, cruise ships, hostels, healthcare centres**.
- Patients remain contagious from onset of illness to **3 days after recovery**.

Symptoms

- Vomiting
- Diarrhoea
- Abdominal cramps
- Nausea
- Mild fever
- Fatigue and dehydration (in severe cases)

Treatment

- No specific **antiviral medicine** or **vaccine** yet.
- Focus on:
  - Rehydration
  - Rest
  - Oral or intravenous fluids in severe dehydration
- Most patients recover within **1–3 days**.

Prevention

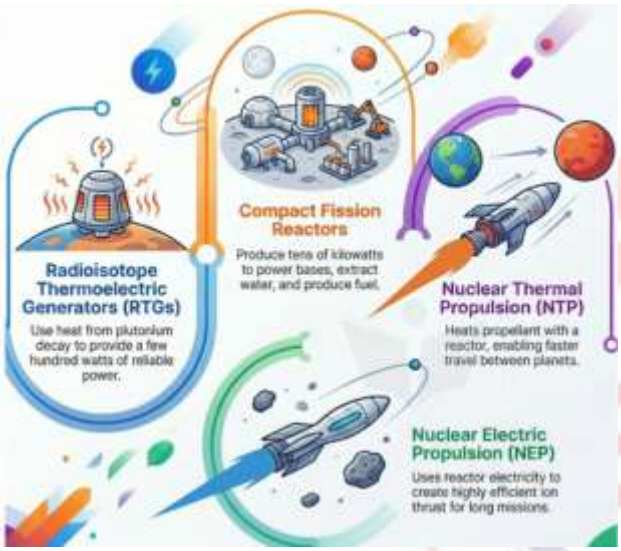
- Handwashing with soap and water.
- Proper food handling and sanitation.
- Avoiding contact with infected individuals.

Conclusion

Norovirus remains a globally significant cause of gastroenteritis due to its high infectivity. Early detection, hygiene measures and rapid outbreak management are essential to reduce its spread and protect vulnerable groups.

NUCLEAR TECHNOLOGIES & THE FUTURE OF SPACE EXPLORATION

The United States has unveiled an ambitious plan under its **Lunar Fission Surface Power Project** to place a compact nuclear reactor on the Moon by the early 2030s. This forms a core element of NASA's **Artemis Base Camp**, signalling the beginning of large-scale nuclear energy use for permanent off-Earth habitats.



How Nuclear Technologies Enable Future Space Missions

1. Radioisotope Thermoelectric Generators (RTGs)

- RTGs convert heat released by **plutonium-238 decay** into electricity.
- They produce only a few hundred watts—sufficient for probes like **Voyager**, Curiosity, and Cassini—but inadequate for human bases.
- Still useful for long-duration, low-power scientific missions.

2. Compact Fission Reactors

- About the size of a shipping container, these reactors can generate **10–100 kW** of continuous power.
- Capable of powering **habitats, drilling systems, oxygen production**, and initial lunar or Martian industries.
- The US KRUSTY and Fission Surface Power prototypes reflect this trend.

3. Nuclear Thermal Propulsion (NTP)

- Heats hydrogen or other propellants using nuclear reactions, achieving **far higher thrust** than chemical rockets.
- Could reduce **Mars travel time by several months**, enabling safer crewed missions.
- The US **DRACO programme** is expected to test NTP systems soon.

4. Nuclear Electric Propulsion (NEP)

- Uses reactor-generated electricity to power ion engines, producing **steady, highly efficient thrust**.
- Ideal for cargo missions and deep-space probes exploring outer planets, asteroids, or interstellar boundaries.

Why Nuclear Power is Essential for Space Operations?

1. Solar Power Limitations

- The **14-day lunar night** drops temperatures below –170°C, making solar panels nearly unusable.
- Mars experiences months-long **dust storms**, further decreasing solar output.
- Nuclear reactors offer **continuous, weather-independent power**.

2. Ensuring Reliability

- Human outposts need uninterrupted power for **life support, heating, communication, mining, and scientific instruments**.
- Nuclear power ensures a stable **base-load supply**, crucial for safety.

3. Flexibility in Location

- Solar energy restricts bases to sunlight-rich regions.
- Nuclear energy allows missions to operate in **permanently shadowed craters** (rich in water ice) and high-latitude regions, enabling broader exploration.

4. Meeting High Power Demands

- Large crews, agriculture units, and **in-situ resource utilization (ISRU)** require power in the **megawatt range**.
- Only nuclear fission can scale to support such energy-intensive activities.

5. Fuel Production for Missions

- Producing return fuel on Mars—splitting ice, generating hydrogen and methane—demands significant power.
- A nuclear plant can support this "**Mars fuel factory**," lowering mission costs and reducing Earth-launched fuel loads.

Legal Framework Governing Space Nuclear Use

1. Outer Space Treaty (1967)

- Prohibits **nuclear weapons** in space.
- Permits peaceful use of nuclear power systems for exploration.

2. UN Principles of 1992

- Lays down safety norms for nuclear sources, requiring **risk assessments** and safe disposal of radioisotopes after mission completion.

Key Legal & Environmental Challenges

1. Environmental Damage

- A malfunctioning reactor may contaminate pristine lunar or Martian environments, damaging **scientific records and habitability**.

2. Safety Zones vs. Sovereignty

- Exclusion zones around reactors are logical but risk enabling **informal territorial claims**, violating the OST's non-appropriation principle.

3. Risk of Conflict

- Accidents or suspected weaponisation could fuel mistrust, leading to **geopolitical tensions**.

4. Unregulated Testing

- Absence of universal standards may lead to unsafe experiments and **high-risk competition** among nations and private companies.

Towards a Responsible Space Nuclear Framework

1. Strengthen International Law

- Update 1992 Principles to cover **NTP, NEP**, and reactor safety standards.

2. Create Oversight Mechanisms

- Form an independent **International Space Nuclear Safety Group**, similar to the IAEA.

3. Clarify Incident Responsibility

- Establish **non-exclusive safety zones**, update the **Liability Convention (1972)**, and define emergency protocols.

4. Promote Norm-Setting & Transparency

- Major space powers must lead rule-making and involve private companies to ensure predictable, safe operations.

Conclusion

Nuclear energy is set to transform space exploration by enabling reliable habitats, advanced propulsion, and large-scale industry on the Moon and Mars. But without strong global rules, oversight, and environmental safeguards, these benefits carry serious geopolitical and ecological risks. **A cooperative and responsible framework is essential to ensure nuclear power strengthens—not destabilises—the future of space exploration.**

SECURITY

ORGANIZED CRIME AND ITS LINKAGES WITH TERRORISM

BIOLOGICAL WEAPONS CONVENTION (BWC) & BIOSECURITY

SOURCE: INDIAN EXPRESS

Why in News?

At the 50-year commemoration of the **Biological Weapons Convention (BWC)** in New Delhi, India emphasized the world's continued vulnerability to **bioterrorism** and called for stronger global biosecurity cooperation.

What is the Biological Weapons Convention (BWC)?

- The BWC is an international treaty that **bans the development, production, stockpiling, transfer and use of biological and toxin-based weapons**.
- Formally titled *Convention on the Prohibition of the Development, Production and Stockpiling of Bacteriological (Biological) and Toxin Weapons and on their Destruction*.
- Opened for signature in **1972** and came into effect in **1975**; **India ratified it in 1974**.
- The convention is reviewed every five years to address **scientific, technological and security developments**.
- It supplements the **1925 Geneva Protocol**, which had only prohibited the *use* of biological weapons.
- A key feature is the **General Purpose Criterion**, which bans any agent or toxin that has no legitimate peaceful, protective or medical purpose.
- It is the **first multilateral treaty** to outlaw an entire class of **Weapons of Mass Destruction (WMD)**.

India's Approach to BWC Implementation

- India has set up a robust domestic regulatory system, including:
  - **Rules on hazardous microorganisms and genetically engineered organisms (1989)**.
  - **WMD Act, 2005**, prohibiting unlawful activities involving WMDs and their delivery systems.
  - Export controls through the **SCOMET list**.
- India actively supports CBMs, capacity building, technology sharing and equitable access to medical countermeasures.
- India highlights the need for **bio-forensics**, oversight of dual-use research, and stronger global assistance mechanisms under **Article VII**.

Gaps and Limitations in the BWC

- **No verification or compliance-monitoring system**, unlike the Chemical Weapons Convention's OPCW.
- The **Implementation Support Unit (ISU)** only performs administrative functions and lacks investigative authority.
- Absence of a structured framework to track **emerging technologies** such as synthetic biology, gene editing and biofabrication.
- Weak enforcement mechanisms reduce **deterrence** and undermine trust among member states.
- Limited financial and institutional capacity has slowed progress on strengthening the treaty.

About Bioterrorism

Bioterrorism refers to the **intentional release** of harmful biological agents or toxins to intimidate or coerce governments or populations.

Its dangers include:

- **High casualty potential** due to rapid spread and difficulty of early detection.
- **Challenges in attribution**, as biological attacks may mimic natural outbreaks.
- **Low cost of weaponisation**, making it attractive to non-state actors.
- **Dual-use risks**, where beneficial research can be misappropriated.
- Severe **psychological, economic and social disruption**.

Measures to Strengthen Biosecurity

- Develop a **comprehensive national biosecurity architecture** covering high-risk agents, research oversight and incident-response mechanisms.
- Enhance **bio-forensics** to trace sources of outbreaks and strengthen accountability.
- Increase **Global South participation**, ensuring fair access to vaccines, diagnostics and emergency assistance.
- Strengthen oversight on **dual-use research**, with ethical review and transparent reporting systems.
- Improve **Confidence-Building Measures (CBMs)** through regular data sharing and facility declarations.
- Promote **international cooperation** in surveillance, capacity building, safe biotechnology practices and public health preparedness.
- Establish a **global assistance database** under Article VII to support countries facing biological incidents.

Conclusion

Bioterrorism remains a growing global concern as science advances faster than governance frameworks. Strengthening the BWC with verification tools, improved transparency and inclusive cooperation is essential. India's call for a more resilient and equitable biosecurity system is timely and critical for global safety.

PRELIMS POINTERS IN NEWS

GHOSTPAIRING CYBER ATTACK

SOURCE: THE HINDU

Why in News?

CERT-In issued an advisory warning WhatsApp users about a new cyber threat known as **GhostPairing**. The attack enables **silent takeover of WhatsApp accounts** without SIM swaps or passwords.

About GhostPairing

- **GhostPairing** is a **social-engineering-based cyber attack** targeting WhatsApp users.
- It exploits WhatsApp's **multi-device pairing feature**.
- Attackers gain **near-complete access** to the victim's account without detection.

Modus Operandi

Victims receive a message like **"Hi, check this photo"** from a trusted contact.

The link opens a **fake Facebook-style preview page**.

Victims are prompted to "verify" by entering:

- Their phone number
- A pairing or verification code
- This unknowingly links the attacker's device to the victim's WhatsApp account.

Why GhostPairing is Dangerous

No **SIM swap, OTP theft, or password hacking** is required.

Victims receive **no alert** of account compromise.

Attackers can:

- Read private chats
- Access contacts
- Conduct financial fraud
- Spread misinformation

Cybersecurity Implications

- Highlights risks from **human behaviour and digital trust**, not technical flaws.
- Shows rising sophistication of **cyber fraud techniques**.
- Poses threats to **privacy, financial security, and social stability**.

Preventive Measures

- Avoid clicking unknown links, even from trusted contacts.
- Enable **two-step verification** on WhatsApp.
- Promote **digital literacy and cyber awareness**.

ANJADIP – ANTI-SUBMARINE WARFARE SHALLOW WATER CRAFT

SOURCE: PIB

Why in News?

The **Indian Navy** received **'Anjadip'**, the third **Anti-Submarine Warfare Shallow Water Craft (ASW SWC)**. The induction strengthens **coastal defence and anti-submarine capabilities**.

About Anjadip

- **Anjadip** is the third of **eight ASW Shallow Water Crafts** being inducted into the Navy.
- It is **indigenously designed and built** by **Garden Reach Shipbuilders and Engineers (GRSE), Kolkata**.
- The ship is named after **Anjadip Island**, off the coast of **Karwar, Karnataka**.

Design and Construction

- Built under a **Public-Private Partnership (PPP)** between GRSE and **L&T Shipyard, Kattupalli**.
- Designed as per **Indian Register of Shipping (IRS)** classification rules.
- It reincarnates the legacy of the **erstwhile INS Anjadip**, decommissioned in 2003.

Technical Specifications

- Displacement: **900 tonnes**
- Maximum speed: **25 knots**
- Endurance: **1,800 nautical miles**
- It is the **largest Indian naval warship powered by waterjet propulsion**.

Combat and Surveillance Capabilities

Equipped with:

- **Lightweight torpedoes**
- **Indigenous anti-submarine rockets**
- **Shallow-water SONAR systems**
  - Designed for operations in **littoral and coastal waters**.
  - Capable of **mine laying, coastal patrol, and underwater surveillance**.

Strategic Significance

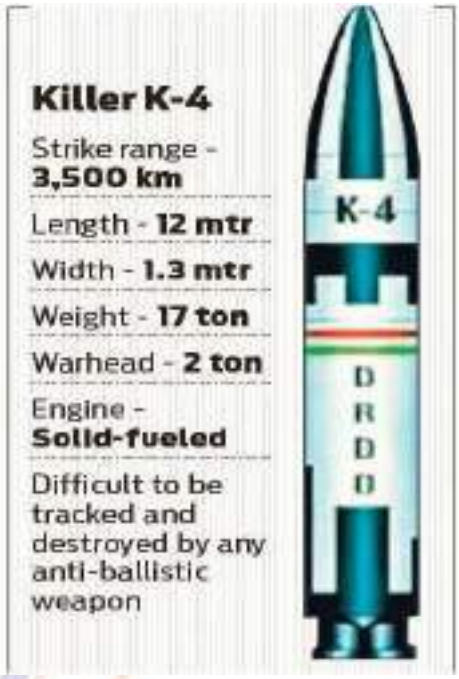
- Strengthens India's **anti-submarine warfare** capability against underwater threats.
- Enhances **coastal security and maritime domain awareness**.
- Supports **Atmanirbhar Bharat in defence manufacturing**.

K-4 MISSILE

SOURCE: PIB

Why in News?

India successfully tested the **K-4 submarine-launched ballistic missile** from INS Arighaat. The test strengthens India's **sea-based nuclear deterrence capability**.



About K-4 Missile

- The **K-4 missile** is a **nuclear-capable SLBM** developed to enhance India's **second-strike capability**.
- It forms a key component of India's **nuclear triad**.

Development

- The missile was developed by the **Defence Research and Development Organisation**.
- It is designed for deployment on **Arihant-class nuclear submarines**.

Technical Features

- The K-4 missile is approximately **12 metres long** and weighs **17 tonnes**.
- It has a **range of about 3,500 kilometres**, making it a major improvement over K-15.
- It uses a **two-stage solid-fuel propulsion system**.

Advanced Capabilities

- The missile uses **cold-launch technology**, enhancing submarine survivability.
- It is guided by **inertial navigation supported by GPS and NavIC**, ensuring high accuracy.
- Manoeuvrability allows it to **evade missile defence systems**.

Strategic Significance

- K-4 strengthens India's **credible minimum deterrence** posture.
- It ensures survivability of nuclear forces even after a first strike.
- It enhances India's strategic stability in the **Indo-Pacific region**.

SAMUDRA PRATAP – POLLUTION CONTROL VESSEL

SOURCE: PIB

Why in News?

The **Indian Coast Guard** inducted **Samudra Pratap**, India's first **indigenously built Pollution Control Vessel (PCV)**. The vessel significantly enhances India's **marine pollution response capability**.

About Samudra Pratap

- **Samudra Pratap** is a specialised vessel designed to combat **marine pollution incidents**, including oil spills and chemical contamination.
- It marks a major step towards **self-reliance in maritime environmental protection**.

Design and Construction

- Samudra Pratap is **indigenously designed and built** under the **02 PCV project** by **Goa Shipyard Limited**.
- It is the **largest ship in the Indian Coast Guard fleet**, reflecting enhanced operational capacity.

Technical Specifications

- The vessel has a **displacement of about 4,170 tonnes**, enabling long-duration missions.
- It is armed with a **30 mm CRN-91 gun** and **two 12.7 mm remote-controlled guns** for maritime security.
- Advanced navigation and control are ensured through an **Integrated Bridge System**.

Advanced Operational Capabilities

- Samudra Pratap is equipped with **Dynamic Positioning (DP-1)** capability, allowing precise station-keeping during pollution control operations.
- It has a **high-capacity external firefighting system**, certified with **FiFi-2 / FFV-2 notation**.
- The ship can **detect, analyse, recover, and separate oil pollutants** from contaminated seawater.

Environmental Importance

- The vessel enables **quick response to oil spills**, preventing large-scale marine damage.
- It supports India's obligations under **international maritime pollution conventions**.
- It strengthens **coastal and offshore environmental security**.

Strategic Significance

- Samudra Pratap enhances the Coast Guard's ability to protect **India's Exclusive Economic Zone (EEZ)**.
- It contributes to **Blue Economy sustainability**.
- The vessel reflects India's push for **Atmanirbhar Bharat in defence shipbuilding**.

DIRECTED ENERGY WEAPONS (DEWS)

SOURCE: INDIAN EXPRESS

Why in News?

Apollo Micro Systems has received approval to access **Directed Energy Weapon technologies** from **Defence Research and Development Organisation** entities. This development marks significant progress in **India's indigenous high-technology defence capabilities**.

About Directed Energy Weapons (DEWs

- **Directed Energy Weapons (DEWs)** are advanced weapon systems that use **focused electromagnetic or particle energy** instead of traditional kinetic projectiles.
- Unlike bullets or missiles, DEWs transfer energy directly to a target in the form of **lasers, microwaves, or particle beams**.
- DEWs are considered a **next-generation warfare technology** due to their precision, speed, and cost efficiency.

- Major global powers are investing in DEWs to counter **emerging threats such as drones, hypersonic weapons, and missile swarms**.

Working Principle of Directed Energy Weapons

- DEWs operate by generating **high-energy electromagnetic waves** and focusing them precisely on a target.
- **High-energy lasers** damage targets by heating their surface, leading to structural failure, burning, or melting of critical components.
- **High-power microwave weapons** disrupt or destroy electronic circuits, sensors, and communication systems.
- Energy is delivered at the **speed of light**, allowing instant engagement without travel time.
- The weapon continues to affect the target **as long as the beam remains focused**, unlike conventional ammunition.

Types of Directed Energy Weapons

- **Laser Weapons** are used to physically damage targets such as drones, missiles, or sensors.
- **High-Power Microwave (HPM) Weapons** are used to disable electronics without visible destruction.
- **Particle Beam Weapons**, though largely experimental, involve accelerating subatomic particles to damage targets.

Key Capabilities of DEWs

- DEWs offer **extremely high precision**, allowing selective targeting of vulnerable components like sensors, engines, or control systems.
- The focused nature of energy results in **minimal collateral damage**, making them suitable for urban and sensitive environments.
- DEWs are highly effective against **unmanned aerial vehicles (UAVs), loitering munitions, missiles, and electronic warfare systems**.
- Once deployed, operational costs are low, as DEWs primarily require **electric power instead of expensive ammunition**.
- DEWs provide **deep magazines**, meaning they can fire repeatedly without reloading as long as power is available.

Strategic and Military Advantages

- DEWs are particularly effective for **counter-drone and swarm defence**, where conventional weapons may be overwhelmed.
- They enable **silent and stealth operations**, as they do not produce explosions, smoke, or loud noise.
- DEWs reduce dependency on complex logistics chains required for ammunition supply.
- They enhance **multi-domain warfare capabilities** across land, sea, air, cyber, and space.
- Their rapid response capability makes them suitable for **short-range air defence systems**.

Limitations and Challenges

- DEWs require **high and continuous power supply**, limiting deployment in remote or mobile platforms.
- Atmospheric conditions such as **fog, rain, dust, and turbulence** can reduce laser effectiveness.
- Thermal management and cooling systems are technologically demanding.
- High initial development and infrastructure costs pose challenges for large-scale deployment.

Indian Context and Strategic Importance

- Indigenous development of DEWs strengthens **Atmanirbhar Bharat in defence manufacturing**.
- DEWs enhance India's preparedness against **asymmetric threats**, including drone swarms and missile attacks.
- Collaboration between DRDO and private firms promotes **defence innovation and self-reliance**.
- DEWs support India's transition towards **technology-driven modern warfare**.

AKASH-NG MISSILE SYSTEM

SOURCE: THE HINDU

Why in News?

The **Defence Research and Development Organisation** has successfully completed **User Evaluation Trials** of the **Akash-NG missile system**. Completion of trials indicates readiness for **induction into the Indian Armed Forces**.

About Akash-NG

- **Akash-NG (Next Generation Akash)** is an **advanced surface-to-air missile (SAM) system** designed to counter modern aerial threats.

- It is intended to protect **critical military assets, population centres, airbases, and strategic infrastructure** from hostile air attacks.

Background and Evolution

- Akash-NG is the successor to the **original Akash missile system**, which has been in service with the **Indian Air Force since 2014** and the **Indian Army since 2015**.
- The need for Akash-NG arose due to the emergence of **high-speed aircraft, drones, cruise missiles, and electronic warfare capabilities**.
- The system reflects India's shift from **import dependence to indigenous air defence solutions**.
- Akash-NG has been developed by **DRDO** and produced by **Bharat Dynamics Limited**.
- It incorporates **fully indigenous components**, including seekers, radars, and command systems.

Technological Advancements

- The missile weighs around **350 kilograms**, which is significantly lighter than the earlier 720-kg version, enhancing **mobility and deployment speed**.
- It uses an **indigenous Radio Frequency (RF) seeker**, allowing accurate target tracking in the terminal phase.
- The **dual-pulse solid rocket motor** provides improved range, speed control, and manoeuvrability.
- The system is supported by **home-grown radars and Command, Control, and Communication (C2) systems**, ensuring secure operations.

Operational Capabilities

- Akash-NG can engage **high-speed, low-altitude, and high-altitude aerial targets**.
- It has a **maximum range of 30 km** and an operational ceiling of **18 km**.
- The system can **simultaneously engage up to 10 targets**, with a firing interval of **one missile every 10 seconds**.
- It is effective against **fighter jets, UAVs, helicopters, and cruise missiles**.

Deployment Flexibility

- The missile system can be deployed in **mobile, semi-mobile, and fixed configurations**.
- This flexibility allows use in **diverse terrains and battlefield conditions**, including border areas.

Strategic and National Importance

- Akash-NG strengthens India's **layered air defence architecture**.
- Indigenous development supports **Atmanirbhar Bharat in defence manufacturing**.
- It enhances India's ability to counter **aerial threats in a contested security environment**.

SOCIETY

PRELIMS POINTERS IN NEWS

ABUJHMADIYA TRIBE

SOURCE: THE HINDU

Why in News?

The **Bastar Olympics** witnessed rising participation from the **Abujhmadiya tribe**, drawing national attention to their cultural identity. The tribe is among India's **Particularly Vulnerable Tribal Groups (PVTGs)**.

About Abujhmadiya tribe

The **Abujhmadiya tribe**, a sub-group of the Gond community, resides in the remote **Abujmarh region of Chhattisgarh**. Known for their distinct cultural traditions and forest-based lifestyle, they are among India's most isolated tribal communities.

Key Features of the Abujhmadiya Tribe

1. Demography and Settlement

- Live in dense, hilly forests of **Abujmarh**, one of India's least surveyed regions.
- Practice **subsistence agriculture**, growing rice, maize, and millet.

2. Social Structure

- Organised into **clans**, each preserving its own customs.
- Society is patriarchal but strongly community-oriented.

3. Cultural Practices

- Speak **Abuj Maria**, Hindi, and Chhattisgarhi.
- Follow **animism**, worshipping forests, ancestral spirits, and natural forces.
- **Tattooing (Godana)** is considered a permanent ornament for women.
- Celebrate festivals such as:
  - **Saja Festival** – linked to agricultural cycles.
  - **Bastar Dussehra** – marked by dances and ritual performances.

4. Economy

- Engage in farming, forest produce collection, fishing, and occasional hunting.
- Depend heavily on the forest for food, herbs, and livelihood.

Challenges Faced

- Restricted mobility due to remote forests.
- Limited access to **education, healthcare, and government schemes**.
- Vulnerability to displacement and conflict.

HORNBILL FESTIVAL

SOURCE: PIB

Why in News?

Nagaland inaugurated the **26th edition of the Hornbill Festival** with vibrant cultural showcases. This year, **Switzerland and Ireland** were announced as partner countries for the 2025 celebration.

About Hornbill Festival

- Started in **2000** as a state initiative to promote culture and tourism.
- Held every year at **Naga Heritage Village, Kisama**, near Kohima.
- Jointly organized by the **Departments of Tourism and Art & Culture**, Government of Nagaland.
- Acts as a platform for showcasing the **traditional music, dance, crafts, warfare rituals, attire**, and cuisine of Nagaland's tribes.

Purpose and Significance

- Encourages **inter-tribal interaction** and cultural cohesion.
- Revives traditional art forms that may otherwise fade.
- Strengthens Nagaland's image as a **cultural tourism hub**.
- Provides income opportunities to artisans, performers, and local entrepreneurs.
- Promotes global cultural exchanges through international participation.

Why Named After the Hornbill Bird?

- The **Great Indian Hornbill** holds deep cultural importance in Naga folklore and ceremonial traditions.
- Its feathers and imagery appear in traditional attire and social customs.

Theme of 2025

- **"Cultural Connect"**, emphasising deeper cultural bonds within and beyond Nagaland.

Activities and Events

- Folk dances & music festivals
- Indigenous games and warrior re-enactments
- Handicraft exhibitions
- Food festivals featuring tribal cuisines
- Rock concerts, sports events, and night carnivals
- Workshops on tribal crafts and heritage preservation

HAKA DANCE

SOURCE: THE HINDU

Why in News?

The **Haka dance** was performed during a protest related to a Sikh religious procession in New Zealand. The event sparked debate on **cultural expression and political symbolism**.

Cultural Origins

- Historically, the Haka was performed before battles to demonstrate **strength and unity**.
- It was also used during **celebrations, mourning, and welcoming ceremonies**.
- Each Haka narrates **tribal history, values, and identity**.

Key Features

- The dance includes **forceful foot stamping, hand movements, and chanting**.
- **Pukana**, or fierce facial expressions, convey emotion and power.
- Synchronised movements symbolise **collective strength and discipline**.

Modern Significance

- Today, the Haka is performed at **sports events, weddings, funerals, and protests**.
- It gained global recognition through the **New Zealand All Blacks**.
- It is increasingly used as a **peaceful form of cultural and political assertion**.

KHIAMNIUNGAN TRIBE

SOURCE: THE HINDU

Why in News?

The **Khiamniungan tribe** from Nagaland was mentioned by the Prime Minister in *Mann Ki Baat*, drawing national focus to their culture and traditional practices.

The Khiamniungan tribe is one of the culturally vibrant Naga tribes with deep connections to the landscape of eastern Nagaland and northwestern Myanmar. Their traditions, festivals, and ecological knowledge reflect a harmonious relationship with nature shaped over centuries.

About the Khiamniungan Tribe

- Inhabits **eastern Nagaland** and extends into **northwestern Myanmar**.
- The name "Khiamniungan" means **"source of great water/river"**.

- Traditionally organized along **clan-based social structures**.
- Their language, **Khiamniungan**, belongs to the **Sino-Tibetan family**.

Society & Culture

- Strong clan ties influence social interactions, marriage rules, and village governance.
- Known for unique handicrafts, woodwork, and traditional attire decorated with natural dyes and ornaments.

Festivals

1. **Tsokum Sumai**
    - Celebrated in September or early October.
    - A harvest-invoking festival seeking blessings for prosperity.
2. **Khaotzao Sey Hok-ah Sumai**
    - Marks the completion of agricultural activities for the year.
    - Emphasizes community bonding and thanksgiving.

Economy

- Agriculture is the mainstay; **jhum (shifting) cultivation** is widely practised.
- Crops include millet, maize, pulses and traditional vegetables.
- The tribe is also known for **cliff-honey hunting**, a skill passed down through generations.

Traditional Knowledge

- Deep understanding of forest ecology, wildlife behaviour and seasonal patterns.
- Honey hunting involves sophisticated techniques to safely harvest wild honey from cliffs.

PALIYAR TRIBE

SOURCE: THE HINDU

Why in News?

17 families of the Paliyar Tribe in **Dindigul district, Tamil Nadu** petitioned the district administration for recognition of their settlement as a **formal village**. The demand highlights issues of **tribal rights, development, and recognition**.

About Paliyar Tribe

- The **Paliyar Tribe** is an **indigenous tribal community** primarily found in the **hilly regions of Tamil Nadu and Kerala**.
- They are among the **oldest forest-dwelling communities** of South India.

Ethnographic Identity

- Paliyars are known by multiple names such as **Paliyans, Pazhaiyarares, and Panaiyars**.
- The name **Panaiyar** originated from their habitation in the **Palani Hills**.
- Historically, they were spread across **Dindigul district, Sirumalai, and Palani hills**, adjoining the **Western Ghats**.

Language and Culture

- The Paliyars speak a **Tamil-related dialect**, reflecting their **Dravidian linguistic heritage**.
- Their culture is deeply connected to **nature, forests, and ecological cycles**.
- Festivals involve **nature-based rituals, traditional music, and dance**.
- They perform special ceremonies to **invoke rainfall and protect forest spirits**.

Traditional Occupation

- Traditionally, Paliyars were **hunters and gatherers**, relying entirely on forest resources.
- They practised **nomadic and semi-nomadic lifestyles**, living in caves or temporary shelters.
- They never practised cremation; instead, they **buried the dead near their settlements**, reflecting unique spiritual beliefs.

Present-Day Livelihoods

• Over time, Paliyars have transitioned into:

- **Forest produce traders**
- **Food crop cultivators**
- **Beekeepers**
- **Seasonal wage labourers**, especially on plantations. They are widely respected for their **traditional knowledge of medicinal plants**.

Social Organisation

- Paliyars live in small settlements known as **kudis**.
- These communities are **loosely structured**, emphasising equality and cooperation.
- Decision-making is often **collective and consensus-based**.

Issues and Challenges

- Many Paliyar settlements lack **official village recognition**, limiting access to welfare schemes.
- Issues include **land rights insecurity, poor healthcare, education gaps, and livelihood vulnerability**.
- Modern development pressures threaten their **cultural identity and forest access**.

TELANGANA: NAGOBA JATARA

Nagoba Jatara is one of the **most prominent and culturally rich tribal festivals of India**, celebrated mainly by the **Mesram clan of the Gond tribe**. The festival is observed at **Keslapur village** in **Adilabad district**, which lies in a forest-dominated tribal belt of northern Telangana. The Jatara is dedicated to **Nagoba**, the **serpent deity**, who is believed to be the **protector of the tribe, guardian of forests, and giver of fertility and prosperity**.

Geographical Location and Timing

- The festival takes place in **Keslapur village**, located in the **Indervelly mandal of Adilabad district**, an area traditionally inhabited by tribal communities.
- The region is characterised by **dense forests, hilly terrain, and a strong dependence of local communities on forest resources**.
- Nagoba Jatara is celebrated every year during **Pushya Masam**, which usually falls in **January or February** according to the Hindu lunar calendar.
- The festival typically lasts for **three to five days**, but the rituals and preparations extend over several weeks. The timing of the festival is closely linked with **agricultural cycles**, especially after the harvest season, which allows the community to participate collectively.

Historical Background and Origin

- The origins of Nagoba Jatara are **ancient and pre-Vedic**, rooted in **animism and totemic worship**, which form the foundation of Gond tribal religion.
- The Mesram Gonds believe that their ancestors migrated centuries ago from **central India**, particularly the forest regions of present-day **Maharashtra and Chhattisgarh**.
- During this migration, the serpent deity **Nagoba** is believed to have **protected the tribe from natural calamities, wild animals, and enemies**.
- Since tribal societies traditionally relied on **oral transmission of knowledge**, the history of Nagoba Jatara is preserved through **folklore, myths, songs, and ritual narratives** rather than written texts.
- This continuity of belief highlights the **resilience of tribal culture**, which has survived despite political changes, colonial rule, and modernisation.

The Deity Nagoba: Beliefs and Symbolism

Nagoba is worshipped as a **serpent god**, but the worship does not involve elaborate idols or temples in the conventional sense. Instead, the deity is represented through **sacred stones, snake symbols, and natural elements**, reinforcing the idea that **divinity resides in nature itself**.

Symbolic Importance of the Serpent

The serpent occupies a central position in tribal cosmology because:

- It symbolises **fertility and regeneration**, due to its ability to shed skin.
- It represents **rain and water**, which are essential for agriculture.
- It acts as a **protector of forests and land**, reinforcing ecological balance.
- It signifies the **cyclical nature of life and death**, a key concept in tribal philosophy.

Thus, Nagoba worship is not merely religious but deeply connected to **environmental consciousness and survival ethics**.

Who Celebrates Nagoba Jatara?

The festival is primarily celebrated by the **Mesram clan of the Gond tribe**, but over time, participation has expanded to include:

- Other Gond sub-tribes
- Kolam and Pardhan tribes
- Non-tribal devotees from nearby regions

Despite this wider participation, **ritual authority remains with the Mesram clan**, ensuring that the core tribal identity and customs are preserved. This demonstrates a **balanced**

cultural assimilation, where inclusivity does not lead to cultural dilution.

Rituals and Ceremonial Practices

1. Invocation of the Deity (Prana Pratishtha)

The central ritual of Nagoba Jatara involves the **symbolic invocation of the spirit of Nagoba**. Tribal priests, known as **Pujaris**, perform rituals using traditional chants, drums, and offerings. Unlike Sanskrit-based rituals, the prayers are recited in **tribal dialects**, reinforcing cultural autonomy.

This ritual signifies the **renewal of the bond between the deity and the community**, ensuring protection and prosperity for the coming year.

2. Offerings (Bhet System)

Devotees bring offerings known as **Bhet**, which typically include:

- Newly harvested grains
- Coconuts and fruits
- Goats or fowls (animal sacrifice, now regulated)

These offerings symbolise **gratitude towards nature and ancestral spirits**. Importantly, the sacrificial practice is not commercial or excessive; it follows strict traditional norms, reflecting **controlled and symbolic ritualism** rather than exploitation.

3. Processions and Pilgrimage

One of the most striking aspects of Nagoba Jatara is the **long-distance pilgrimage** undertaken by devotees. Many walk **barefoot for several days**, carrying flags, drums, and ritual objects. This physical hardship is seen as an act of **collective devotion and spiritual discipline**, reinforcing community solidarity.

4. Role of Women in the Festival

Women play a **central and respected role** in Nagoba Jatara. They are involved in:

- Preparing offerings
- Singing traditional songs
- Participating in rituals and dances

This reflects the **gender complementarity** present in tribal societies, where women are integral to religious and social life rather than being marginalised.

Social and Cultural Significance

Strengthening Tribal Identity

- Nagoba Jatara acts as a **cultural anchor**, reinforcing a shared sense of history, ancestry, and belonging. In an era of rapid modernisation, the festival helps tribal communities **retain their distinct identity**.

Transmission of Oral Traditions

- During the Jatara, elders narrate stories related to tribal origin, migration, and moral values. This ensures **intergenerational transfer of knowledge**, which is crucial for the survival of non-literate cultures.

Platform for Social Regulation

The festival also functions as a **social institution**, where:

- Disputes are informally resolved
- Marriage alliances are discussed
- Inter-village relationships are strengthened

Economic Importance

- Nagoba Jatara stimulates the **local tribal economy**.
- Temporary markets emerge where forest produce, handicrafts, and traditional food items are sold.
- This provides **seasonal income** to tribal households and supports a **self-reliant, community-based economic model**, rather than large-scale commercialisation.

Environmental and Ecological Significance

The worship of Nagoba reinforces **environmental ethics** by:

- Discouraging harm to snakes and wildlife
- Promoting sustainable use of forest resources
- Encouraging coexistence with nature rather than domination

This makes Nagoba Jatara a strong example of **traditional ecological knowledge**, relevant for discussions on **sustainable development and climate ethics**.

Administrative Support and Governance

The Telangana government facilitates the festival by providing:

- Temporary shelters and drinking water
- Health camps and sanitation facilities
- Crowd and traffic management

However, the state largely follows a **non-intrusive approach**, allowing rituals to be conducted according to tribal customs. This reflects respect for **cultural autonomy under constitutional safeguards** such as **Article 29** and **PESA Act, 1996**.

Challenges

- Risk of **over-commercialisation**
- Cultural dilution due to excessive tourism
- Environmental stress on forest areas during peak gatherings

Conclusion

Nagoba Jatara is a **living symbol of India's tribal civilisation**, where religion, ecology, and community life are inseparably linked. It showcases how **indigenous traditions promote sustainability, social cohesion, and cultural continuity**. Preserving such festivals is essential for **inclusive development and cultural pluralism in India**.

ANDHRA PRADESH'S NEW ECONOMIC ZONES

Andhra Pradesh, under the leadership of **Chief Minister N. Chandrababu Naidu**, is implementing a major **regional economic zoning strategy** aimed at transforming the state's economic geography and accelerating balanced, large-scale growth.

This policy shift is in the news because the state has **restructured itself into three mega economic zones** — a departure from the older "Special Economic Zone (SEZ)" model — and is pushing multi-sectoral investments, integrated planning, and location-specific industrial specialization.

Historical Background

Special Economic Zones (SEZs) — The Old Paradigm

India's SEZ policy, formalised under the **SEZ Act of 2005**, aimed to boost exports, attract foreign investment, and drive manufacturing clusters. Many states including Andhra Pradesh developed multiple SEZs around ports and industrial cores.

Limitations observed with SEZs:

- They tended to become **enclave-like spaces**, with weak integration into local economies.
- Once fiscal incentives diminished, many SEZs struggled to sustain investor interest.
- Land use was often isolated from housing, services, and logistics, limiting **agglomeration economies**.

Need for a New Spatial Development Strategy

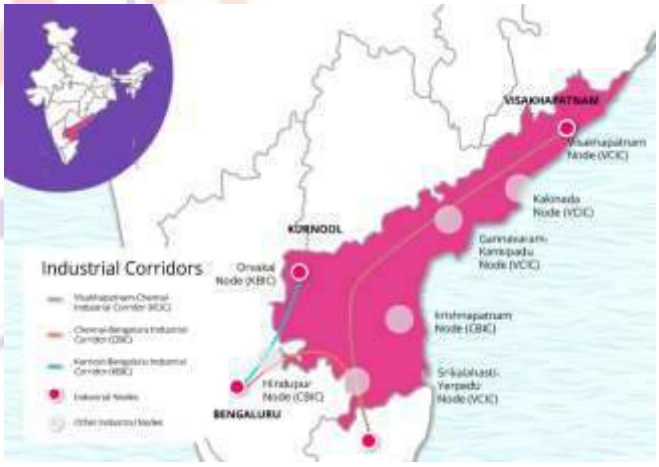
- Global experience (e.g., **Shenzhen model**) shows that successful economic zones are not just tax incentive areas but **large integrated urban-industrial regions** with strong governance, infrastructure, and local linkages.
- Andhra Pradesh's **new economic zone strategy** builds on this insight by expanding the scale and purpose of spatial planning.

Andhra Pradesh's Three New Economic Zones

The state has been **restructured into three broad economic zones** that align with regional assets, geography, and comparative economic advantages.

1. North Coastal Zone (Visakhapatnam Economic Region)

- **Headquarters:** Visakhapatnam
- **Focus:** Port-led industrialisation, logistics, manufacturing hubs, global trade.
- This zone leverages large ports like **Visakhapatnam, Gangavaram and Kakinada** and aims to build strong **global trade linkages**, boosting exports and industrial output.
- It is envisioned as a **major growth engine** for the state, serving as a logistics, manufacturing, and IT integration belt.
- The **Visakhapatnam Economic Region (VER)** aims to become an industrial hub with emphasis on manufacturing, pharmaceuticals, defence manufacturing, and emerging tech sectors.



2. Central Coastal Zone (Amaravati Region)

- **Headquarters:** Amaravati
- **Focus:** Agro-processing, logistics, value-added agriculture, and emerging technology corridors.
- This region builds on the state capital area's institutional infrastructure, **connectivity networks**, and location advantage to attract investment and economic diversification.
- The region is additionally bolstered by initiatives like **Amaravati Quantum Valley (a high-tech hub for quantum computing and innovation)**.

3. Rayalaseema Zone (Tirupati and allied areas)

- **Headquarters:** Tirupati

- **Focus:** Renewable energy, mineral-based industries, horticulture, and tourism-linked economic activities.
- Rayalaseema's natural endowments support **solar energy production, mining value chains, and agro-based industrialisation**.

Key Features of the New Model

1. Scale and Integration (Beyond SEZs)

- Zones cover **large sub-state regions**, not just specific industrial parks or enclaves.
- This allows housing, services, industry, and logistics to integrate and create **agglomeration economies**.

2. Governance Structure

- Each zone is proposed to have a **dedicated CEO**, and strategic oversight by senior officials.
- A **steering committee chaired by the Chief Minister** ensures vertical coordination across departments and policy coherence.

3. Focus on Local Linkages

- Unlike isolated SEZ enclaves, these zones aim to create **deep linkages with local suppliers, SMEs, workforce and infrastructure networks**.

4. Leveraging Regional Strengths

- Port connectivity in the North
- Institutional and knowledge infrastructure in the Central
- Natural and renewable assets in Rayalaseema This specialization supports **comparative advantage based growth**.

Expected Economic Impact

1. Investment Attraction

The state is rapidly becoming an investment magnet. Andhra Pradesh attracted a **substantial share (25.3%) of all new project intentions in India in the first nine months of FY26**, across diverse sectors.

2. Employment Generation

Large industrial and service sector investments under this zonal strategy are expected to generate **millions of jobs**, both directly and through supply chains.

3. Balanced Regional Development

The tripartite zonal approach is designed to prevent **uneven development** and ensure that growth is not concentrated only in a single city or district but is **distributed across the state**.

4. Export Growth

Port-based industrial clusters and manufacturing ecosystems are expected to significantly enhance **exports**, integrating Andhra Pradesh more deeply into global value chains.

Comparison With Previous Models

Feature	SEZ Model	New Economic Zone Approach
Scale	Small/Enclave	Large sub-state regions
Focus	Tax incentives	Productivity & integration
Local Linkages	Weak	Strong
Governance	Fragmented	Dedicated CEOs & Steering Committee
Outcome	Isolated growth	Integrated regional transformation

The shift aims to correct past limitations of SEZs and adopt a **broader spatial development paradigm** that aligns with global success stories.

Governance and Policy Alignment

- **State Government Leadership:** Direct oversight by the CM and senior administrative officers ensures political priority and administrative coordination.
- **Policy Reforms:** Inclusion of **sector-specific incentives, single-window clearances, and institutional facilitation mechanisms** to ease business entry and expansion.
- **Connectivity Planning:** Integration with transportation corridors such as the **Visakhapatnam-Chennai Industrial Corridor** and major port networks.

Challenges

- **Land acquisition and resettlement issues**, especially in densely populated or agricultural belts.
- **Environmental sustainability** concerns due to rapid industrial expansion.
- Balancing **local community interests** with large-scale investment projects.
- Ensuring **effective implementation** across departments and timely infrastructure delivery.

Conclusion

Andhra Pradesh's **new economic zone strategy** marks a departure from conventional SEZ-based industrial policy and seeks to reshape regional growth through **large-scale, integrated planning, specialized zones, and governance innovation**. With the potential to attract major investment, generate employment, and boost exports, this strategy positions the state as a **dynamic engine of economic transformation in India**.

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