



INSIGHTSIAS

SIMPLIFYING IAS EXAM PREPARATION

GOLDEN TEMPLE

The Indian Army has denied media reports about deploying air defence guns at the Golden Temple during Operation Sindoor.



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GENERAL STUDIES-I

Syllabus: Indian Culture-Salient aspects of Art Forms

SANTARA (SALLEKHANA)

Context:

Recently a three-year-old girl in Indore reportedly died after being administered Santhara by a Jain monk, bringing the ancient Jain ritual of voluntary fasting unto death back into public and legal discourse.

About Santhara (Sallekhana):

- **Definition:** Santhara or Sallekhana is a Jain religious vow of voluntary fasting unto death, undertaken to purify the soul and attain moksha.
- **Religious Association:** Practiced in **Jainism** by both monks and laypersons under extreme conditions like terminal illness, old age, or famine.
- **Features:**
 - Involves gradual withdrawal from food and water.
 - Taken only with spiritual maturity and under religious supervision.
 - Involves forgiveness, detachment, and spiritual reflection.



About Key Jain Practices:

Core Doctrines of Jainism:

1. **Ahimsa (Non-violence):** Jains believe in absolute non-violence towards all living beings, including insects and microbes, making it a foundational ethical principle.
2. **Satya (Truthfulness):** Speaking truth is mandatory, but it must not harm others—truth should be spoken with compassion and care.
3. **Asteya (non-stealing):** One must not take anything that is not willingly offered, emphasizing ethical acquisition and honesty.
4. **Brahmacharya (Chastity):** Celibacy for monks and sexual restraint for householders, promoting control over desires and spiritual discipline.
5. **Aparigraha (non-possessiveness):** Detachment from material and emotional possessions is stressed to reduce greed and promote liberation.

Triratna (Three Jewels of Jainism):

1. **Samyak Darshan (Right Faith):** Having correct perception of truth, free from doubts, is the first step toward spiritual liberation.
2. **Samyak Jnana (Right Knowledge):** True knowledge must be free from doubt and error, grounded in understanding reality and karma.
3. **Samyak Charitra (Right Conduct):** Moral and disciplined behavior aligned with Jain principles, essential for attaining moksha (liberation).

Legal Status of Santhara in India:

- **2015 Rajasthan High Court Ruling:** Declared Santhara illegal, equating it with suicide under IPC Section 306.
- **Supreme Court Stay:** In August 2015, the SC stayed the order, recognising the practice under the constitutional right to religious freedom (Article 25).
- **Current Status:** Legally protected as a religious practice, subject to consent and religious guidance.

Significance in Jainism:

- **Spiritual Goal:** Seen as a peaceful, dignified exit from life aimed at shedding karma and achieving liberation (moksha).
- **Historical Practice:** Followed by Jain sages like **Bhadrabahu** and **Chandragupta** Maurya in Shravanabelagola.
- **Literary References:** Found in Jain texts like **Ratnakaranda Shrivakachara** and Tamil works like **Silappadikaram** and

Neelakesi.

Conclusion:

Santhara represents a deeply spiritual and ethical tradition in Jainism, reflecting values of detachment, discipline, and non-violence. While its legality has sparked debates, it continues to be a constitutionally protected religious practice in India. Balancing religious freedom and modern ethics remains crucial in its discourse.

PYQ:

The Pala period is the most significant phase in the history of Buddhism in India. Enumerate. (UPSC - 2020)

MADHUBANI AND GOND ART

Context:

Artists of Madhubani and Gond art met President Droupadi Murmu under the Artists-in-Residence Programme – Kala Utsav at Rashtrapati Bhavan.

About Madhubani and Gond Art:

About Madhubani Art (Mithila Art):

- **Region:** Originates from the **Mithila region** of **Bihar**; also referred to as **Mithila painting**.
- **What It Is?**
 - A **folk-art form** traditionally created by women on **walls and floors** of huts during auspicious occasions.
 - Now practiced on **cloth, canvas, and handmade paper**.
- **Key Features**
 - **Natural Materials:** Uses **plant-based pigments, cow dung-treated paper, and bamboo pens**.
 - **Bold Outlines:** Black lines made with cow dung and charcoal; filled with vibrant natural colors.
- **Themes:**
 - **Religious:** Depictions of Hindu deities like **Radha-Krishna, Shiva, Saraswati**, etc.
 - **Social:** Scenes from **village life, weddings, and festivals**.
 - **Nature:** Birds, animals, trees (Tulsi, Banyan), sun, and moon.
 - **Cultural Identity:** Symbol of **female creativity** and **rural tradition** passed down through generations.



About Gond Art:

- **Region:** Practiced by **Pardhan Gond tribes** of **Madhya Pradesh** and adjoining Central Indian states.
- **What It Is?**
 - Tribal art form with roots in **oral storytelling** and **ritualistic practices**.
 - Initially drawn on **walls of homes** to depict **folk tales** and **nature**.
- **Key Features:**
 - **Mythical Narratives:** Depicts **divine stories, village folklore, and animist beliefs**.
 - **Pattern Work:** Fills motifs with **fine dots and lines** to create visual rhythm.
 - **Nature Connection:** Harmonious coexistence of **humans, flora, and fauna**.
 - **Colour Use:** Bright, bold colour schemes with creative compositions.
 - **Global Reach:** Popularized internationally through works like *"The Night Life of Trees"* by **Tara Books**.

[Syllabus: Salient features of Indian Society](#)

SOCIAL MEDIA DEFINING SELF-WORTH

Context: The tragic suicide of young entrepreneur **Misha Agarwal**—reportedly triggered by a drop in **social media followers**—has reignited urgent conversations around the influence of social media on mental health, particularly among adolescents.

- With identity now performed and validated online, social media is emerging as a powerful, yet dangerous mirror of self-worth.

About Social Media:

What Are Social Media?

- Social media refers to **web-based platforms and mobile applications** that enable users to **create, share, and interact** with content and with other users. These platforms include **Instagram, Facebook, X (formerly Twitter), YouTube, Snapchat, TikTok**, and others.
- While designed for connection and expression, social media also **reshapes identity**, influences perceptions of reality, and impacts **mental health**, especially among children and adolescents.



Legal Framework Governing Social Media in India:

- **IT Act, 2000:** Primary legislation for regulating online platforms.
- **Intermediary Guidelines, 2021:** Mandate content takedown, user grievance redress, traceability of harmful messages.
- **POCSO Act, 2012:** Prohibits child sexual content and protects children from digital abuse.
- **Consumer Protection Act, 2019:** Addresses misleading advertisements and influencer accountability.
- **Mental Healthcare Act, 2017:** Provides right to access mental health services, including for digital stress-related conditions.

Social Media and Identity Formation in Adolescents:

- Encourages curated, idealized versions of identity for public approval.
- Self-worth becomes dependent on likes, shares, follower count.
- Promotes comparison, performance pressure, and validation-seeking behavior.
- Reinforces trends that reward appearance and online presence over authenticity.

Impact on Adolescents:

- **Adolescents are vulnerable** due to ongoing identity formation.
- **Online and offline** lives are blended—leading to continuous peer scrutiny.
- **Exposure** to filtered realities can cause distorted body image, low self-esteem, and anxiety.
- **Unrealistic routines and trends** (e.g., fitness or beauty challenges) create stress and shame when not met.

Mental Health Implications

- **Increased cases of** body dysmorphia, eating disorders, and social withdrawal.
- **Content encouraging perfection, rebellion, or risk-taking** can trigger emotional distress.
- **Repeated exposure to negative comparisons may lead to depression or suicidal ideation.**
- **Mental health services are underutilized due to lack of awareness and stigma.**

Challenges in Parental Monitoring

- Adolescents often use multiple or fake accounts (e.g., “Finsta”) to hide from adults.
- Excessive surveillance can lead to secrecy and distrust.
- Many parents lack digital literacy and cannot decode trends or online slang.
- Communication gaps widen when monitoring replaces dialogue.

Way Forward:

- **Digital Literacy in Schools:** Include modules on emotional well-being and algorithm awareness.
- **Parental Guidance:** Shift from monitoring to trust-based, curiosity-led conversations.
- **Platform Accountability:** Deprioritize harmful content; show mental health prompts; restrict visibility metrics for minors.
- **Mental Health Services:** Increase budget for school counselors; promote helplines and peer support programs.
- **Regulation of Influencers:** Frame norms for children in sponsored content; enforce transparency in digital advertising.

Conclusion:

Social media is redefining how young people perceive self-worth by linking identity to public validation.

Without proper regulation, digital literacy, and mental health support, this trend can lead to widespread emotional and psychological harm. The solution lies in a balanced approach combining legal safeguards, empathetic parenting, ethical tech design, and community engagement.

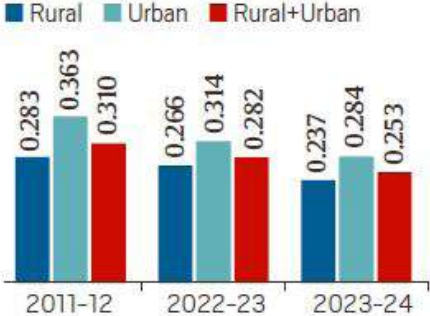
NSO HOUSEHOLD CONSUMPTION EXPENDITURE SURVEYS AND POVERTY

TABLE 1: POVERTY RATIOS USING DIFFERENT CUT-OFFS: ALL INDIA									
Poverty Line (PL) Cut-offs	Rural			Urban			Rural+urban		
	2011 -12	2022 -23	2023 -24	2011 -12	2022 -23	2023 -24	2011 -12	2022 -23	2023 -24
150	66.6	34.8	27.8	52.8	27.8	21.7	62.6	32.8	26
125	51.3	20.8	14.8	40.1	16.9	11.9	48.1	19.7	13.9
115	43.5	15.8	9.9	34.7	12.9	8.8	41	15	9.6
100	30.9	9.6	4.9	26.8	9.3	4.8	29.5	9.5	4.9
85	18.3	4.8	4.2	18.1	4.6	4.1	18.3	4.7	4.2
75	11.1	4.2	3.7	12.4	4.1	3.6	11.5	4.2	3.7
50	3.9	2.8	2.5	4.3	2.7	2.4	4	2.8	2.4

Note: 1. 100 per cent PL refers to Rangarajan Committee's Poverty Line, adjusted for CPI-based inflation.
2. Rural + Urban data are the weighted average; weights being their respective shares in the estimated persons.

Source: Estimates using Household Consumer Expenditure Surveys of NSSO

Table 2: Gini Coefficient of Total Consumption Expenditure, All India



Period	Rural	Urban	Rural+Urban
2011-12	0.283	0.363	0.310
2022-23	0.266	0.314	0.282
2023-24	0.237	0.284	0.253

Source: Report No. 592 (HCES 2023-24), National Statistics Office

Context:

Recent NSO Household Consumption Surveys (2022–23 and 2023–24) and a World Bank report confirm a sharp fall in poverty rates in India, largely driven by high GDP growth and reduced inequality.

Key Highlights of NSO Household Consumption Expenditure Surveys and Poverty:

Key Indicator	Details
Updated Poverty Lines (Rangarajan Committee)	Rural: ₹972 (2011–12) to ₹1,837 (2022–23) to ₹1,940 (2023–24)
	Urban: ₹1,407 (2011–12) to ₹2,603 (2022–23) to ₹2,736 (2023–24)
Poverty Ratio (All India)	Declined from 29.5% (2011–12) to 9.5% (2022–23) and 4.9% (2023–24)
Extreme Poverty (World Bank definition)	Share of people living below \$2.15/day (PPP) reduced from 16.2% to 2.3% (2011–12 to 2022–23)
Distribution of the Poor	Over 50% of poor are concentrated between 75–100% of the poverty line threshold, enabling better targeting
Consumption Inequality	Gini Coefficient declined from 0.310 (2011–12) to 0.253 (2023–24) , showing improved spending equity
Rural-Urban Contribution	Both contributed equally to poverty reduction; urban areas showed faster inequality reduction
Survey Improvements	Introduced updated thresholds , refined sampling , and expanded sectoral insights in the 2022–23 and 2023–24 rounds

Poverty Trends in India (2011–2024)

- Sharp Decline in Headcount Ratio:** Poverty fell from **29.5% (2011–12)** to **4.9% (2023–24)** — a reduction of 24.6 percentage points.

- **Global Benchmark Progress:**
 - **Extreme poverty (<\$2.15/day)** dropped from **16.2% to 2.3%** (World Bank).
 - **\$3.65/day poverty line** fell from **61.8% to 28.1%**.
- **Impact of Growth and Inflation:** GDP growth increased to **9.2% in 2023–24**. CPI inflation fell to **5.4%**, aiding purchasing power.
- **Poverty Clustered Near Threshold:** Over **50% of the poor lie just below the poverty line**, making targeted support more effective.

Challenges to Poverty Eradication in India:

- **Vulnerability to Shocks:** Large sections hover around the poverty line and may fall back due to health or climate crises.
- **Uneven Safety Nets:** Welfare coverage, especially for urban poor and migrants, remains patchy (e.g., limited urban PDS access).
- **Food Inflation Concerns:** Food inflation rose to **7.5% in 2023–24**, which disproportionately affects the poor.
- **Data Gaps in Urban Poverty:** Recent surveys underrepresent informal workers and unregulated job sectors.
- **Regional Disparities:** States like **Bihar, Jharkhand, and Odisha** continue to report higher poverty despite national averages improving.

Way Ahead:

- **Targeted Cash Transfers:** Expand schemes like **PM-GKAY** and **DBT for LPG** to reach transient poor above poverty line.
- **Resilient Rural Employment:** Strengthen **NREGA** allocations with climate-resilient job creation.
- **Urban Social Protection Framework:** Develop a unified urban social safety net for gig workers and migrant families.
- **Invest in Education & Nutrition:** Bridge learning and nutritional gaps via **PM-POSHAN** and **Saksham Anganwadi**.
- **Continuous Poverty Tracking:** Institutionalize annual multidimensional poverty audits using real-time data sources.

Conclusion:

India has made commendable strides in poverty reduction, bringing it down to **below 5%** for the first time. This has been driven by **robust GDP growth** and improved consumption equity. Sustained focus on inclusive safety nets and economic resilience will be key to eradicating poverty permanently.

PYQ:

1. Explain various types of revolutions that took place in agriculture after Independence in India. How have these revolutions helped in poverty alleviation and food security in India? (UPSC-2017)

Syllabus: Globalisation and its effects on Indian society

MODERNISATION VS WESTERNISATION

Context:

Union Minister asserted that while modernisation is essential for national progress, blind westernisation must be resisted to preserve India's cultural identity.

- He stressed the importance of **balancing science and tradition** to realise India's vision of becoming a 'Vishwaguru'.

About Modernisation vs Westernisation:

- **Modernisation:**
 - **Definition:** A comprehensive process involving **technological, institutional, and value-based** transformation aimed at societal development.



- **Features:**
 - **Structural transformation** in economy, polity, and society.
 - **Rationality and scientific temper** over traditional beliefs.
 - **Democratic institutions, mass education, and urbanisation.**
 - Emphasis on **self-sustaining growth** with rising productivity and human development indicators.
- **Westernisation:**
 - **Definition:** Adoption of **Western lifestyles, values, and systems**, often at the cost of traditional cultural practices.
 - **Features:**
 - Popularised by **M.N. Srinivas** in the Indian context.
 - Covers **secular, legal, political, and technological domains.**
 - Includes **dress codes, food habits, language**, and social institutions like live-in relationships.
 - Often conflicts with Indian societal ethos, particularly in rural and traditional contexts.

Impacts of Westernisation on Indian Society:

1. **Cultural Erosion:** Weakening of joint family structures, caste panchayats, and traditional festivals.
E.g. Declining interest among youth in **arranged marriages** and **religious practices**.
2. **Value Conflict:** Clash between individualism (West) and collectivism (Indian tradition).
3. **Widening Social Divide:** Gap between Westernised urban elite and rural traditional masses leading to social tension.
4. **Positive Outcomes:** Progressive laws (e.g., abolition of Sati, child marriage) and human rights awareness stemmed from Western influence.

Modernisation Can Drive India's Progress:

1. **Technological Growth:** Innovations in **biotech, digital governance, and space** can uplift public services.
E.g. India ranks among the top 5 countries in **digital payment adoption** (RBI, 2024).
2. **Institutional Reforms:** Modernisation supports efficient bureaucracy, judicial efficiency, and transparent governance.
3. **Educational Expansion:** Promotes universal access to quality education, enabling human capital formation.
4. **Cultural Resilience through Reform:** India's traditional values can be modernised without being westernised.
E.g. Promotion of Ayurveda and Yoga globally while maintaining scientific validation.
5. **Balanced Development:** Modernisation rooted in Indian values helps bridge the rural–urban divide without alienating cultural identity.

Conclusion:

Modernisation is a **dynamic pathway to national progress** when fused with **cultural rootedness**. India's strength lies in embracing innovation while safeguarding its value systems. The challenge is to advance without losing identity — progress must be inclusive, indigenous, and intentional.

PYQ:

1. 'Globalisation is generally said to promote cultural homogenisation but due to these cultural specificities appear to be strengthened in the Indian society.' Elucidate (UPSC -2018)

[Syllabus: Important Geophysical phenomena](#)

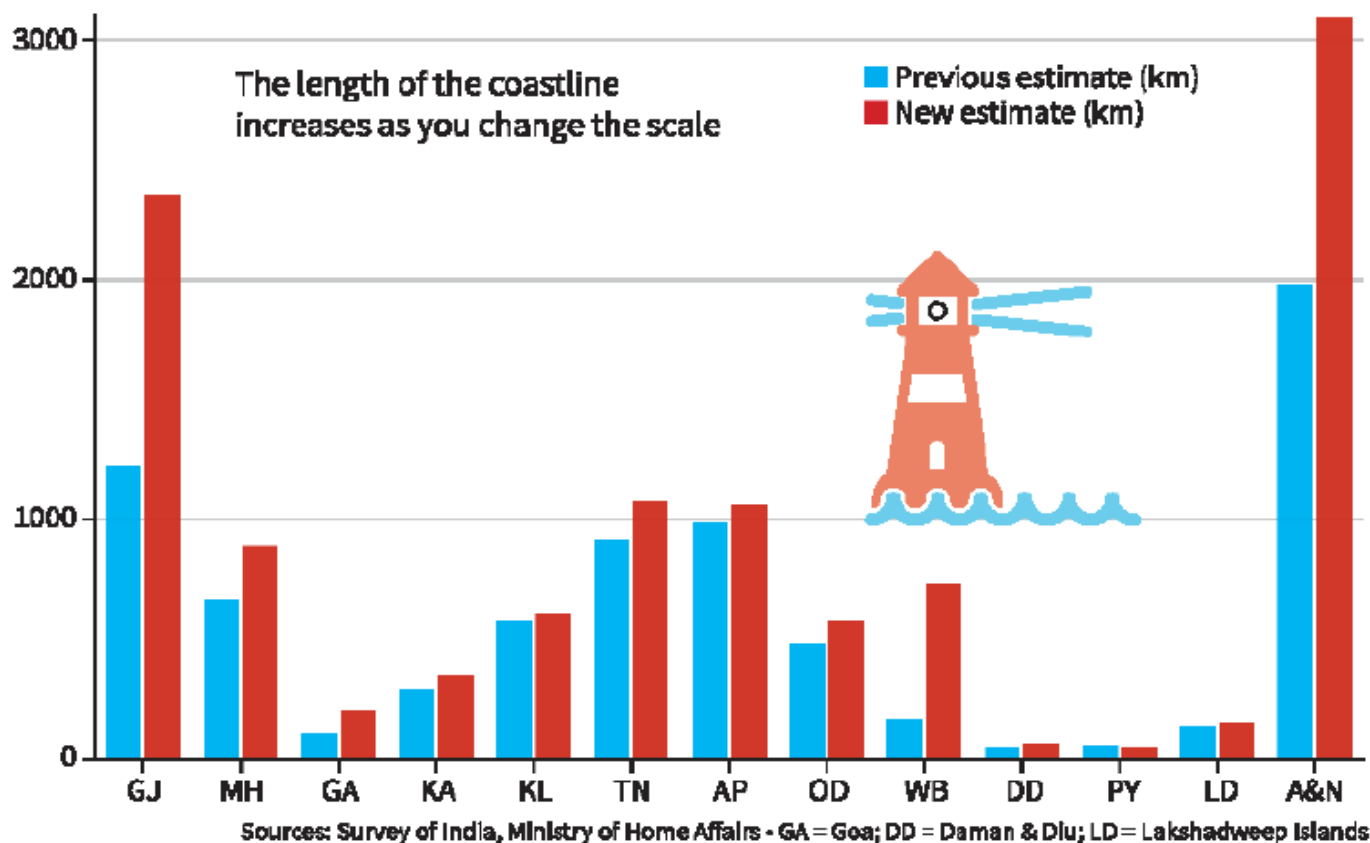
UPDATED INDIA'S COASTLINE LENGTH

Context:

The Ministry of Home Affairs, in its 2023–24 report, updated **India's coastline length to 11,099 km**, up from 7,516.6 km.

- The change stems not from land gain but due to **better mapping precision**, highlighting the **coastline paradox**.

The coast grows



About Updated India's Coastline Length:

India's Coastline Length – Key Overview:

- **Previous Length:** 7,516.6 km (based on 1970s maps at 1:4,500,000 scale).
- **Revised Length:** 11,098.8 km (as of Dec 2024).
- **States Involved:** 11 coastal States + 2 UTs (Andaman & Nicobar, Lakshadweep).
- **Key Feature:** Longest coastline among Indian states — **Gujarat (~1,600 km)**.
- **No New Land Added:** No change in national borders or geological expansion.

Measurement Methodology:

- **Agencies Involved:** National Hydrographic Office (NHO) and Survey of India.
- **Technology Used:**
 - **Scale:** 1:250,000 electronic navigation charts.
 - **Tools:** GIS, LIDAR-GPS mapping, drone imaging, satellite altimetry.
- **Reference Line:** Highwater line from 2011 data, closing river mouths at standard inland points.
- **Mapped Features:** Tidal creeks, estuaries, sandbars, low-tide islands.

Implications for India:

1. **Maritime Security:**
 - Longer coastline means **more area to surveillance and protects** (e.g. post-26/11 coastal radar grid).
 - Coastal policing and Navy deployment need revaluation.
2. **Disaster Management:**
 - Critical for **cyclone, tsunami, and sea-level rise preparedness** (e.g., Odisha's early warning systems).
 - Enhances accuracy in **coastal zone regulation (CRZ) mapping**.
3. **Economic Zoning:**
 - Impacts **EEZ (Exclusive Economic Zone)** calculation and fishing rights allocation.
 - Coastal States like **Tamil Nadu and Kerala** can gain **blue economy leverage**.
4. **Infrastructure Planning:**
 - Better data for **ports, shipping lanes, and coastal tourism** (e.g., Sagarmala project).

Significance of Increasing Coastline:

- **Reflects scientific progress:** Not territorial gain, but enhanced precision through modern cartography.
- **Strengthens policy decisions:** Data-backed planning for coastal development, biodiversity protection, and climate resilience.
- **Reinforces India's maritime identity:** Supports India's goal of becoming a Blue Economy leader.

Conclusion:

The revised coastline is the outcome of advanced geospatial technologies, not any physical expansion of land. It strengthens India's capacity to safeguard, develop, and sustainably manage its coastal regions. This shift highlights how scientific progress—rather than natural changes—can redefine our understanding of geography.

PYQ:

Comment on the resource potentials of the long coastline of India and highlight the status of natural hazard preparedness in these areas. (UPSC-2023)

EARLY ARRIVAL OF MONSOON

Context:

The India Meteorological Department (IMD) declared the onset of the southwest monsoon over Kerala on May 24, 2025, eight days ahead of the usual June 1 date.

- This marks one of the earliest monsoon arrivals in over a decade, last seen in 2009.

About Early Arrival of Monsoon:

What is the Southwest Monsoon?

- The **Southwest Monsoon** is a seasonal wind system that brings **over 70% of India's annual rainfall** during June–September.
- It plays a critical role in **agriculture, water availability**, and overall economic activity.

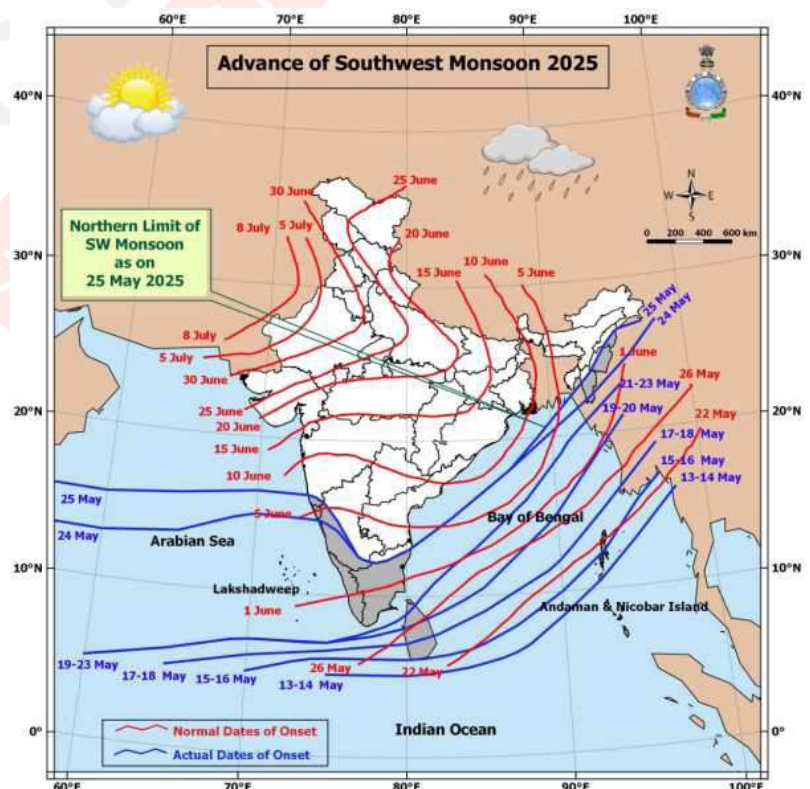
When is Monsoon Onset Declared?

The IMD uses **three main criteria** to confirm the monsoon's onset over Kerala:

1. **Rainfall Trigger:** 60% of 14 designated stations must record ≥ 2.5 mm rainfall for two consecutive days.
2. **Wind Field Criteria:** Westerlies should extend up to **600 hPa** (hectoPascals) level with wind speeds of 15–20 knots at 925 hPa.
3. **Outgoing Longwave Radiation (OLR):** OLR must be **below 200 W/m^2** , indicating active convection and cloud cover.

Factors Behind Early Monsoon Onset 2025:

- **Madden-Julian Oscillation (MJO):** Enhanced eastward-moving tropical disturbance boosted convection and rainfall over the Indian Ocean. E.g. MJO impact observed from May 13 over the south Andaman Sea (IMD).
- **Mascarene High Intensification:** Strong high-pressure system over the southern Indian Ocean aided in directing moist winds to Indian coastlines.
- **Convection Surge:** Rising heat and moisture movements increased vertical cloud build-up, bringing early rains.
- **Somali Jet Strengthening:** Cross-equatorial winds became stronger, accelerating the arrival of monsoon currents over Kerala and Karnataka.



- **Heat Low Formation:** Persistent low pressure over **Pakistan and NW India** created suction for moist monsoonal air.
- **Monsoon Trough Activation:** Elongated low-pressure zone stretching from Arabian Sea to Bay of Bengal activated rainfall over central India and NE India.

Consequences of Early Monsoon Onset

- **Agriculture Boost:** Early sowing of **Kharif crops** such as paddy and pulses can begin, improving crop calendar adherence.
- **Reservoir Recharge:** Helps early water level replenishment in **drought-prone states** like Tamil Nadu and Karnataka.
- **Urban Flooding Risk:** Cities unprepared for early rain, e.g., **Bengaluru**, may see increased urban flooding.
- **Altered Weather Patterns:** Early monsoon may disrupt normal temperature patterns, seen in cooler summer 2025 trends across south India.
- **Forecast Challenges:** Early onset may or may not ensure a **longer or stronger** monsoon season, posing risks for water management planning.

Conclusion:

The **early onset of the 2025 monsoon** is the result of favourable atmospheric and oceanic conditions including MJO and Somali Jet dynamics. While it brings hope for agriculture and water security, it also demands **preparedness** against urban flooding and misaligned rainfall patterns.

PYQ:

Why is the South-West Monsoon called 'Purvaiya' (easterly) in the Bhojpur region? How has this directional seasonal wind system influenced the cultural ethos of the region? (10 M)

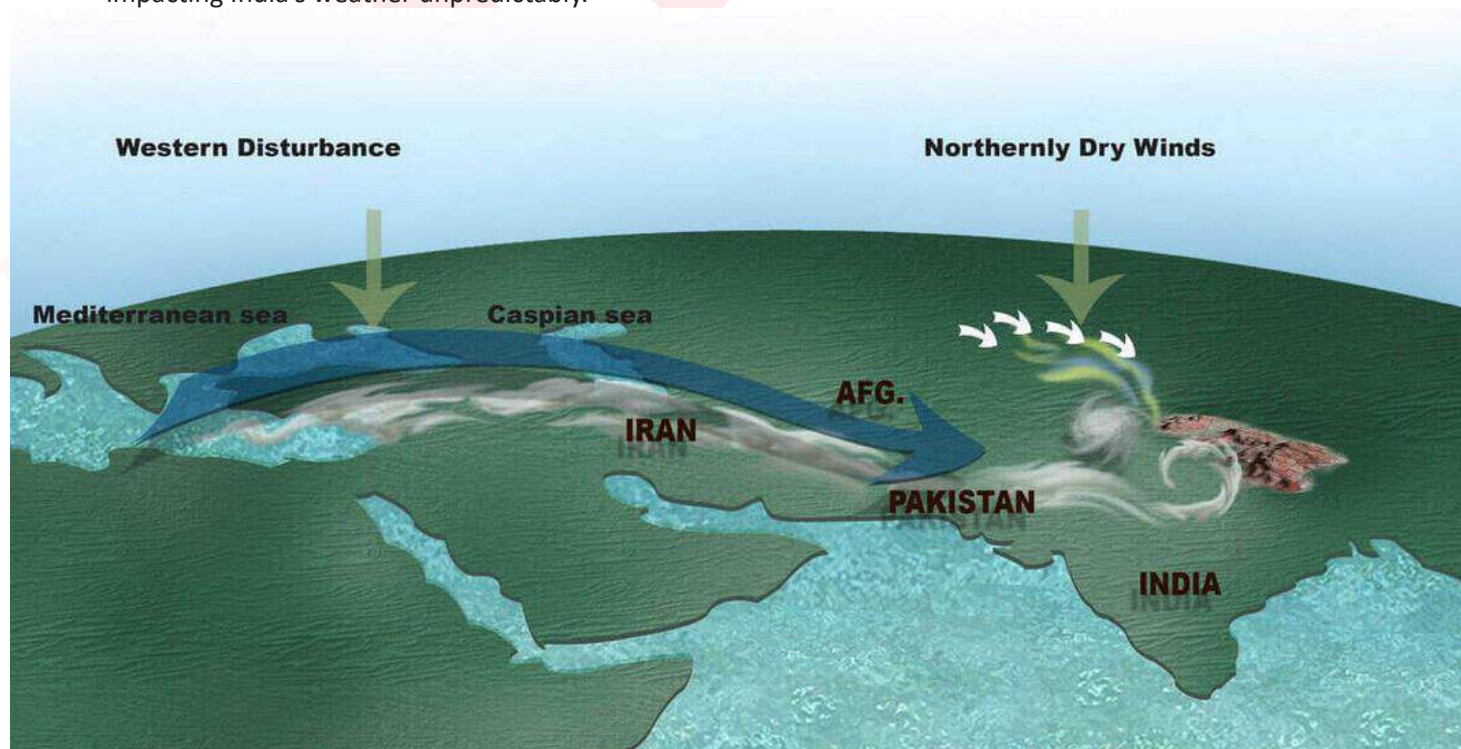
[Syllabus: World Physical Geography & Resources](#)

WESTERN DISTURBANCE

Context:

A strong Western Disturbance triggered heavy rainfall and storms across Delhi, North and South India, causing floods, hail, and airport disruption.

- Recent studies show **climate change is altering the frequency, intensity, and seasonality** of Western Disturbances, impacting India's weather unpredictably.



GENERAL STUDIES-II

Syllabus: Indian Constitution

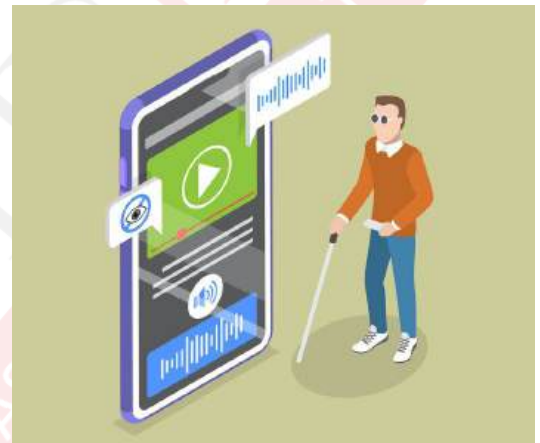
RIGHT TO DIGITAL ACCESS

Context:

The Supreme Court has held that the right to digital access is part of the right to life and liberty under Article 21, mandating inclusive revisions in digital KYC norms.

About Right to Digital Access:

- **What It Is?**
 - The *right to digital access* refers to the **guaranteed ability** of every citizen, including the disabled and marginalized, to access and benefit from digital public and financial infrastructure.
- **Constitutional Interpretation:** The **SC** reinterpreted **Article 21** (right to life and liberty) to include digital accessibility, especially in the context of increasing dependence on **online identity verification, governance, and welfare delivery**.



Issues Surrounding Right to Digital Access:

- **Exclusion in KYC Systems:** Visual and motor-based tasks like blinking, selfie capture, and OTP validation **exclude persons with visual impairments or facial disfigurement**.
- **Non-compliance with ICT Accessibility Standards:** Most KYC apps lack **screen readers, audio prompts, or alternate identity verification modes**.
- **Denial of Basic Services:** Lack of accessible KYC leads to exclusion from **banking, telecom, pension, and welfare schemes** for persons with disabilities (PwDs).
- **Discriminatory Design:** The absence of universal design principles breaches Section 42 of the **Rights of Persons with Disabilities Act, 2016**.
- **Widening Digital Divide:** Barriers affect not only PwDs but also **rural citizens, senior citizens, and linguistic minorities**.

About Supreme Court Judgment on Digital Access (*Pragya Prasun & Amar Jain v. Union of India* (2025))

- The SC ruled that **digital inclusion is a constitutional imperative**, not a discretionary policy matter.
- It invoked **Articles 14, 15, 21, and 38**, affirming that digital infrastructure must be inclusive, accessible, and nondiscriminatory.
- **Directed reform of KYC norms:** Introduce **alternative modes of live verification**, appoint **digital accessibility nodal officers**, and **conduct periodic accessibility audits**.
- Emphasized the need for **PwD user testing** during app/portal development phases to prevent exclusion.

E.g. In *Pragya Prasun & Amar Jain v. Union of India* (2025), SC held that blinking and visual input-based verification violates the right to life and dignity of blind users and acid attack survivors.

Significance of the Judgment:

- **Constitutional Recognition of Digital Inclusion:** Establishes that **digital access is a fundamental right**, laying a foundation for future tech legislation.
- **Strengthens Disability Rights:** Reinforces India's obligations under the **UNCRPD** and the **RPwD Act, 2016**.
- **Inclusive Digital Transformation:** Directs state to design **tech solutions with equity**, ensuring **no one is left behind**.
- **Boost to Accessible Governance:** Enables better access to **e-governance, health, education, and financial inclusion** for the disabled and marginalized.
- **Promotes Substantive Equality:** Upholds **justice beyond formal equality**, enabling structural reform in how digital

systems are conceptualized and delivered.

Conclusion:

The Supreme Court's recognition of digital access as intrinsic to Article 21 marks a **paradigm shift** in constitutional law. It compels both the government and private institutions to **rethink accessibility as a legal right**, not a technical afterthought. Bridging the digital divide is no longer optional—it is a matter of **ensuring dignity and equity** for every citizen.

PYQ:

“Development and welfare schemes for the vulnerable, by its nature, are discriminatory in approach.” Do you agree? Give reasons for your answer. (UPSC-2023)

OVERSEAS CITIZEN OF INDIA (OCI)

Context:

Union Home Minister launched a revamped Overseas Citizen of India (OCI) portal, aimed at enhancing digital accessibility, security, and service delivery.

About Overseas Citizen of India (OCI):

- **What is the OCI Card?**
 - The **Overseas Citizen of India (OCI)** card is a form of permanent residency available to Persons of Indian Origin (PIOs), allowing them to live and work in India indefinitely, with certain exceptions.
- **Introduced in:** August 2005 under Section 7A of the Citizenship Act, 1955.
- **Objective:** Strengthen India's ties with the global Indian diaspora by granting multiple rights akin to long-term residency.
- **Eligibility Criteria for OCI:**
 - A person is eligible for OCI if they:
 - Were citizens of India on or after 26th January 1950, or eligible to become citizens then.
 - Are children, grandchildren, or great-grandchildren of such individuals.
 - Are a **minor child of Indian citizens** or of OCI cardholders.
 - Are a **foreign spouse** of an Indian citizen/OCI holder, with marriage subsisting for 2+ years (subject to security clearance).
- **Not eligible:**
 - If applicant or their ancestors were ever citizens of **Pakistan or Bangladesh**.
 - If applicant is serving or retired foreign military personnel.
- **Key Benefits of an OCI Cardholder:**
 - **Lifelong, multiple-entry visa** for visiting India.
 - **Exemption from FRRO registration**, irrespective of duration of stay.
 - **Parity with Indian citizens** in domestic airfares and ticket fees for national monuments and parks.
 - **Parity with NRIs in:**
 - Adoption of Indian children.
 - Admission in Indian educational institutions against NRI or supernumerary seats.
 - Purchase of non-agricultural properties.
 - Pursuing professions like doctors, lawyers, architects, and CAs.
 - **Faculty appointments** allowed in premier institutes like IITs, NITs, IIMs, and AIIMS.
- **Latest Rules & Restrictions (as of 2021 notification):**
 - OCI cardholders must take **special permission** for:
 - **Research, missionary, journalistic activities**, or mountaineering.
 - Visiting **restricted/protected/prohibited areas**.
 - Interning with or working in **foreign diplomatic missions** in India.
 - Also, OCIs are treated **at par with foreign nationals** under **FEMA 2003**, reversing earlier parity with NRIs in economic/financial matters.



- **Key Restrictions on OCI cardholders:**
 - Cannot vote or contest elections.
 - Cannot hold Indian constitutional positions (e.g., President, Vice President, Supreme Court Judge).
 - Cannot hold regular **government jobs**.
 - Cannot buy **agricultural or plantation property**.
- **Renunciation of OCI:**
 - Any OCI cardholder may voluntarily renounce OCI status.
 - Upon registration of renunciation, they **cease to be OCI holders**.
 - The same applies to their **minor children** registered under the OCI scheme.

[Syllabus: Governance](#)

CASTE CENSUS IN INDIA

Context:

The Cabinet Committee on Political Affairs (CCPA) has approved caste enumeration census as part of the upcoming Population Census, reversing its 2021 stance.

About the Caste Census in India:

- **What is a Caste Census?**
 - It is the **systematic collection of data on caste identities** of individuals during a national census.
 - It provides **socio-demographic insights** essential for affirmative action and social justice planning.
- **Legal/Constitutional Backing:**
 - No specific constitutional provision mandates caste census, but it is permitted under **Article 340** for identifying backward classes.
 - As per **Article 246** of the Constitution of India, Census is a **union subject listed at 69** in the Union List in the Seventh Schedule.
- **Historical Context & Origin:**
 - First conducted in **British India from 1881 to 1931**.
 - Independent India (1951 onwards) excluded caste enumeration except for **Scheduled Castes (SCs) and Scheduled Tribes (STs)**.
- **Last Caste Census Held:**
 - **1931 Census** was the last full caste enumeration.
 - **SECC 2011** attempted caste data collection but **data remains unpublished**.



Need for Caste Census in India:

- **Data-Driven Affirmative Action:** Accurate OBC population data is lacking; Mandal Commission estimated 52% OBCs, but no empirical backing.
E.g.: Bihar's 2023 caste survey revealed OBC+EBC population at 63%.
- **Reservation Rationalisation:** Helps in **quota restructuring** and possible **sub-categorisation** within OBCs for equitable benefit distribution.
- **Social Justice Planning:** Enables targeted **health, education, and livelihood schemes** for marginalized caste groups.
- **Women's Political Reservation:** Census data is needed for **delimitation**, which will operationalize **women's reservation** in legislatures.
- **Constitutional Mandate under Article 15(4):** Allows state to make special provisions for backward classes – which needs **clear identification**.

Challenges to Conducting Caste Census:

- **Enumeration Complexity:** Multiple castes/sub-castes, overlapping categories (e.g., SC-OBC status) make

classification difficult.

- **Lack of Standardised Caste Lists:** Centre and states have **different OBC lists**, making aggregation inconsistent.
- **Political Manipulation:** Caste data can fuel **vote bank politics**, leading to social polarization.
- **Data Sensitivity & Accuracy:** Self-declaration may result in **false reporting or exaggeration**, leading to flawed conclusions.
- **Risk of Deepening Caste Identities:** Critics argue it may **perpetuate caste consciousness** instead of reducing inequalities.

Way Ahead:

- **Scientific Categorisation:** Build consensus on standardised classification of castes and sub-castes.
- **Transparent Methodology:** Use **digital tools** and trained enumerators to improve accuracy and security of caste data.
- **Safeguard Against Misuse:** Ensure **data privacy** and restrict caste data usage to **policy and welfare only**.
- **Post-Census Action Plan:** Publish findings, consult stakeholders, and integrate caste data into policy design.
- **Constitutional Validation:** Any quota revision/sub-categorisation based on caste census must undergo **judicial and parliamentary scrutiny**.

Conclusion:

The caste census marks a major policy shift aimed at correcting **historical data gaps**. While it promises **greater social justice**, the success will depend on **methodological integrity** and **non-political usage**. If executed transparently, it can redefine India's **affirmative action roadmap** for the next generation.

PYQ:

Discuss the role of the National Commission for Backward Classes in the wake of its transformation from a statutory body to a constitutional body. (UPSC - 2022)

INDIA'S LEGAL AND ETHICAL BATTLE AGAINST DIGITAL MISINFORMATION

Context:

India, identified as one of the most misinformation-vulnerable nations by the *WEF Global Risks Report 2024*, faces increasing challenges with the unchecked rise of influencer-driven content.

- This has triggered calls for **tightened regulation and ethical accountability** of social media influencers.

About Digital Misinformation and De-Influencing:

- **What is Digital misinformation and De-influencing?**
 - **Digital misinformation** refers to **false or misleading information** shared online, often without intent to deceive, but with harmful consequences.
 - **De-influencing** is a growing social media trend where influencers discourage the purchase of certain products. While it may promote **mindful consumption**, it frequently relies on **clickbait, half-truths, and exaggerated narratives** to gain traction.
 - In a rapidly digitising society, these phenomena blur the line between **opinion, advertising, and deception**, making regulatory clarity vital.
- **Background:**
 - The proliferation of **Instagram, YouTube, and TikTok** has created a new class of digital opinion-makers — influencers.
 - Their content — often promotional — impacts health behaviour, consumption patterns, and public discourse.
 - India's **Ministry of Consumer Affairs, SEBI, and ASCI** have issued guidelines like "**Endorsement Know-hows**" to regulate paid promotions.
 - Despite this, **viral health content**, such as "liver detox hacks" or "anti-cancer diets", regularly escapes scrutiny, undermining evidence-based practices.



- **India – A Legally Regulated, Ethically Conscious Model:**
 - India has adopted a layered regulatory framework combining **constitutional safeguards, statutory mandates, and industry self-regulation** to manage the influence economy:
 - **Legal Framework:**
 - **Article 19(1)(a)** of the Constitution ensures **freedom of speech**, but with **reasonable restrictions** under Article 19(2) to curb defamation and protect public order.
 - **Consumer Protection Act, 2019** explicitly bans misleading advertisements, holding influencers legally accountable for deceptive content.
 - **IT Act Sections 66 & 67 and the Intermediary Guidelines, 2021**, penalize the spread of harmful or obscene content.
 - **Ethical Oversight:**
 - Guidelines by the **Advertising Standards Council of India (ASCI)** and **SEBI** set benchmarks for fair disclosures and truthful influencer endorsements.
 - Non-compliance may lead to public reprimands and blacklisting from platforms or campaigns.
 - **Evolving Jurisprudence and Regulatory Trends**
 - **Indian Medical Association v. Union of India:** Held influencers accountable for **false health endorsements**.
 - **Delhi HC (2024):** Restricted an influencer from disparaging a brand, stating that **freedom of speech is not absolute**, especially in health-related content.
 - **Public Trust Principle:** Courts are emphasizing **authenticity, credentials, and fact-verification** in digital discourse.
- **Concerns**
 - **Blurring of Fact and Opinion :** Influencer content often uses **selective data, emotional appeals, and ambiguous language**, making it difficult for viewers to discern **truth from manipulation**.
 - **Health Sector Risks :** Health advice without professional qualification can be life-threatening.
 - Current platform self-regulation lacks the rigour needed for such sensitive content.
 - **Trust Erosion and Commercial Exploitation:** Monetising public trust through **sensational negativity or sponsored misinformation** undermines the **credibility of digital platforms**.
 - **Lack of Registration and Tracking:** No mandatory **registration database** exists for influencers, especially those giving health or financial advice.

Way Ahead: Strengthening Digital Accountability

- **Create a Public Registry for High-Risk Influencers:** Set up a mandatory registration system for influencers offering health or financial advice, including:
 - Professional credentials
 - Nature of content (paid/unpaid)
 - Regulatory compliance record
- **Strengthen Platform Responsibility:** Mandate **fact-checking overlays**, flag **sponsored health content**, and use **AI tools** to detect misinformation.
- **Build Digital Literacy Among Consumers:** Launch government-led campaigns to, promote **source verification**, encourage **critical thinking** and teach how to **report misleading content**.
- **Co-regulation with Civil Society:** Involve **medical associations, consumer forums, and legal bodies** in creating sector-specific content standards.
- **Enforce Ethical Review Mechanisms:** Require platforms to implement **periodic audits** of top influencers in high-risk categories like **health, finance, and wellness**.

Conclusion:

India's growing digital influence landscape demands **urgent regulatory recalibration**. With **AI-driven misinformation** and unchecked influence over public choices, the **stakes for public health, financial safety, and social cohesion** have never been higher. A blend of **constitutional restraint, legal enforcement, and ethical vigilance** can ensure that **digital empowerment** does not come at the cost of **truth and trust**.

SOUTH ASIA PRESS FREEDOM REPORT 2024–25

Context:

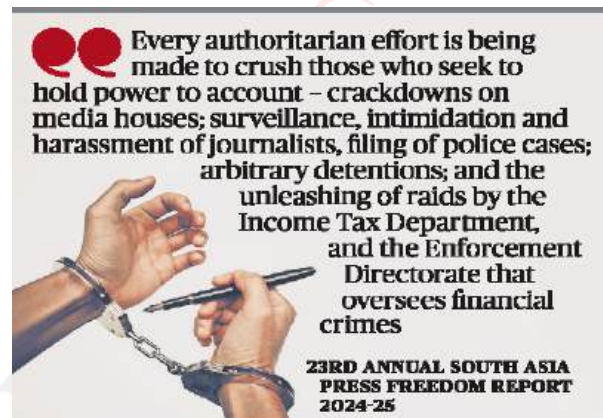
The 23rd Annual South Asia Press Freedom Report 2024–25, titled “Frontline Democracy: Media and Political Churn”, has flagged India as part of a wider trend of shrinking press freedom.

About South Asia Press Freedom Report 2024–25:

- **Publisher:** Asia Press Freedom group
- **Coverage:** 8 South Asian countries – India, Pakistan, Afghanistan, Sri Lanka, Bangladesh, Nepal, Bhutan, Maldives

Key Findings:

- **250+ media rights violations** recorded; **69 journalists jailed/detained**, **20 killed** in the line of duty.
- **India** ranked **151st** globally in press freedom; **Bhutan** fell to **152nd**, its lowest ever.
- **Pakistan** saw its **most violent year** for journalists in two decades.
- Major risks stem from **disinformation**, **legal suppression**, **surveillance**, and **AI-related threats**.



Issues Surrounding Press Freedom:

- **Legal and Institutional Pressure:** Frequent use of **UAPA, PMLA, sedition**, and **defamation laws** against critical journalists. **Example:** Income Tax and ED raids on dissenting media outlets.
- **Disinformation Ecosystem:**
 - Political party “IT Cells” amplifies **hate speech and fake news**, undermining public trust.
 - Global Risks Report 2024 names **manipulated information** the biggest short-term global threat.
- **Choking of Independent Media:** Denial of **government advertisements**, restrictions on digital media platforms, and selective internet shutdowns.
- **AI and Gig Economy Risks:** **AI-generated content** threatens journalistic authenticity; gig workers face **low wages** and **job insecurity**.
- **Gender Inequality:** Limited representation of women in newsroom leadership roles; widespread **gender-based harassment** in the media.

Consequences of Declining Press Freedom:

- **Self-Censorship:** Fear of legal action and violence compels media houses to avoid critical reporting.
- **Democratic Deficit:** Weakens the **fourth pillar** of democracy, hampering accountability and transparency.
- **Public Mistrust:** Rising perception of media bias erodes trust in institutions.
- **Information Access Shrinks:** Laws like India’s **DPDP Act 2023** and amended RTI provisions block legitimate public queries.

Way Ahead:

- **Media Law Reforms:** Pass the **Media Transparency Bill 2024** to curb monopolies and politicised ad distribution.
- **Independent Regulatory Framework:** Establish a **media ombudsman** to review censorship complaints and promote fair editorial standards.
- **Protect Journalists’ Rights:** Enact **labour protections** for freelance and gig journalists; ensure legal aid and safety mechanisms.
- **Fact-Checking Infrastructure:** Invest in **independent fact-checking bodies** to counter disinformation, especially during elections.
- **Promote Digital Pluralism:** Support **independent and community-driven media** to balance dominant corporate and political narratives.

Conclusion:

Press freedom in South Asia is under acute strain due to state control, legal harassment, and disinformation. India

must act now to **safeguard journalistic integrity**, ensure **citizens' right to know**, and protect **democratic institutions**. A **free and fair press is the bedrock of participatory governance**.

PYQ:

"In the Indian governance system, the role of non-state actors has been only marginal." Critically examine this statement. (UPSC - 2016)

CLIENTELISM, PATRONAGE, AND FREEBIES IN POLITICS

Context:

Recent debates have reignited scrutiny over freebies, often conflated with patronage and clientelism, raising concerns over democratic integrity.

About Clientelism, Patronage, and Freebies in Politics:

Differences in Clientelism, Patronage, and Freebies

1. Clientelism

- A **reciprocal, election-driven exchange** where politicians offer **individual benefits** (cash, gifts, liquor) in return for **assured votes**.
- Involves **monitoring and potential retribution**; relies on **party brokers** or local networks to ensure loyalty (e.g., vote buying in urban slums or rural belts).

1. Patronage

- A **long-term relationship** where politicians distribute **sustained benefits** like jobs, loans, or subsidies to build **loyal voter bases**.
- Operates through **institutional capture or access to state resources** (e.g., state recruitment biases, cooperative bank appointments).

2. Freebies

- **Universally targeted schemes** aimed at broad social classes or groups with **no electoral strings attached** (e.g., free bus rides for women, DBT to female accounts).
- These are **state-funded, transparent, and auditable**, reducing intermediary influence and fostering inclusion.



Issues Surrounding These Practices:

- **Conflation Muddies Debate:** Equating clientelism with universal welfare leads to **misguided criticism** of inclusive policies (e.g., DBT schemes labelled as freebies).
- **Undocumented Clientelism:** Election-time inducements, such as cash or liquor, remain **underreported** but directly distort democratic choice.
- **Democratic Undermining:** Clientelism **undermines voter autonomy** and **entrenches inequality**, while formal freebies may **enhance social outcomes**.
- **Urban Bias & Access Gaps:** Patronage and clientelism often **exclude rural poor or marginalised groups**, while freebies aim for **equitable access**.
- **Lack of Monitoring Mechanisms:** Informal practices like clientelism are hard to **audit or regulate**, making them **politically invisible yet powerful**.

Way Ahead:

- **Differentiate Welfare from Vote-Buying:** Establish **legal and policy boundaries** to distinguish **universal welfare schemes** from reciprocal political inducements.
- **Institutionalise Accountability:** Strengthen **election expenditure audits**, enforce **Model Code of Conduct**, and empower **ECI surveillance units**.
- **Promote Transparent DBT Systems:** Expand **tech-enabled, cashless delivery models** that reduce political mediation and leakage.
- **Educate Voters on Electoral Ethics:** Run **voter literacy campaigns** to reduce acceptance of inducements and promote **informed democratic participation**.
- **Regulate Long-term Patronage Networks:** Institute **transparent hiring and allocation** processes in state jobs and

local development schemes.

Conclusion:

While clientelism and patronage threaten democratic fairness through selective incentives, well-structured freebies aim at inclusive development. India must refine its policy and electoral frameworks to **discourage informal political exchanges** while **strengthening transparent welfare delivery**. Differentiating these concepts is crucial to safeguarding both **democracy and development**.

PYQ:

Discuss the role of the Election Commission of India in the light of the evolution of the Model Code of Conduct. (UPSC-2022)

DEPARTMENT OF POSTS NEW DIGITAL PLATFORMS

Context:

The Department of Posts launched two new digital platforms — ‘Know Your DIGIPIN’ and ‘Know Your PIN Code’ — to modernize India’s addressing and geospatial infrastructure, in line with the National Geospatial Policy 2022.

About Department Of Posts New Digital Platforms:

About Know Your DIGIPIN Portal:

- **Ministry Involved:** Department of Posts, Ministry of Communications.
- **Objective:** To enable **digital address precision** using geo-coded grids and enhance last-mile service delivery across India.
- **Developed By:** In collaboration with IIT Hyderabad and NRSC, ISRO.
- **Features:**
 - **Geo-coded Addressing:** Each DIGIPIN corresponds to a precise latitude-longitude grid, offering **high-resolution location identification**.
 - **Address-as-a-Service (AaaS):** Supports government, private firms, and users with standardized and secure address solutions.
 - **Open-Source Platform:** Technical data and source code are hosted on **GitHub**, promoting innovation and public adoption.
 - **GIS Integration:** Enables **accurate logistics, disaster response, and e-governance** by integrating GIS into address systems.
 - **Inclusivity:** Facilitates digital inclusion of **rural and remote areas** by offering uniform address identifiers.



About Know Your PIN Code Portal:

- **Ministry Involved:** Department of Posts, Ministry of Communications.
- **Objective:** To modernize the traditional **six-digit PIN Code system** using geospatial technology and GNSS-based mapping.
- **Features:**
 - **Geo-fencing of PIN Codes:** Digitally maps boundaries of over 1.5 lakh PIN Codes to improve accuracy.
 - **Location-based PIN Retrieval:** Users can identify the correct PIN using real-time GNSS location inputs.
 - **Public Feedback System:** Enables citizens to submit suggestions to refine the PIN dataset for continuous improvement.
 - **Open Data Access:** The geo-referenced PIN Code data is available on the Open Government Data (OGD) Platform.
 - **Support for Delivery Services:** Enhances e-commerce, emergency response, and postal logistics with accurate regional mapping.

PARLIAMENTARY OVERSIGHT IN INDIA

Context:

Despite India adopting a parliamentary system to ensure **daily executive accountability**, recent trends show that **Parliament's oversight role is weakening**.

- Disruptions, underutilised committees, and absence of post-legislative review have diluted Parliament's role as the guardian of public interest.

About Parliamentary Oversight

What is Parliamentary Oversight?

- **Definition:** It refers to the **continuous monitoring and evaluation of executive actions by the legislature**, ensuring accountability, transparency, and responsiveness in governance.
- **Why it Matters:** In India's **parliamentary democracy**, the executive is collectively responsible to the legislature. Oversight tools like **Question Hour, Zero Hour, and Parliamentary Committees** ensure daily and periodic checks on the government.

Constitutional and Institutional Basis

- **Article 75:** Council of Ministers is collectively responsible to the Lok Sabha.
- **Parliamentary Devices:** Includes **motions (adjournment, no-confidence), debates, questions, and committee reports**.
- **Ambedkar's Vision:** Called parliamentary democracy the system of "**more responsibility, less stability**", emphasizing **daily accountability** through Parliament.

Challenges Undermining Oversight

- **Disruption of Question Hour:** The **17th Lok Sabha (2019–24)** witnessed **only 60% Question Hour functionality**; in the **Rajya Sabha**, it was **52%**.
 - Frequent adjournments and protests prevent ministers from being held accountable.
 - *E.g.* During the Pegasus spyware controversy (2021), repeated disruptions curtailed meaningful questions to the government.
- **Committees Not Utilised Effectively:** **Standing Committees** generate detailed reports, but these are **rarely debated** in the full House. Membership rotation every year reduces domain expertise.
 - *E.g.* The **Standing Committee on Environment** report on pollution in Delhi (2021).
- **Lack of Post-Legislative Scrutiny:** No structured process exists to **review the effectiveness or compliance of laws** post-enactment.
 - *E.g.* The **Companies (Amendment) Act, 2013**, aimed to simplify compliance but led to a surge in criminal prosecutions.

Reforms Needed for Strengthened Oversight

- **Institutionalise Post-Legislative Scrutiny (PLS)**
 - **UK Model:** Government departments submit law implementation reviews after 3–5 years.
 - *India Application:* A **sub-committee under each DRSC** could periodically review key laws like the **Insolvency and Bankruptcy Code** or **National Education Policy** to ensure timely correction.
- **Strengthen Committee Work:**
 - Translate reports into **regional languages**, produce **infographics and short videos** to enhance accessibility.
 - Mandate **floor discussions** on selected committee reports.
 - *E.g.* In 2022, the **report on Data Protection Bill** by the IT Committee was overlooked before the bill was withdrawn.
 - Provide committees with **dedicated technical staff and data analysts**.
 - *E.g.* The US Congress has **Congressional Research Services (CRS)** for non-partisan policy support — India lacks such institutional backing for MPs.
- **Leverage Technology and AI:**
 - Use AI to track anomalies in **budget allocations, scheme implementation, and audit trends**.
 - *E.g.* A digital tool could have flagged misutilisation in **PM-Kisan**, where ineligible farmers received benefits due to data mismatch, helping MPs raise early alarms.

Way Forward

- Launch a **Parliamentary Modernisation Scheme** with investment in **digital tools**, **research wings**, and **multilingual dissemination**.
- Promote **cross-party consensus** to ensure smooth functioning during Question Hour and legislative business.
- Foster **citizen participation** through public feedback portals for bills and committee reports.
- Encourage state legislatures to **adopt DRSCs**, creating a **federal oversight ecosystem**.

Conclusion

As K.R. Narayanan said in 1993, oversight is not to criticise, but to support better governance. Strengthening Parliament's scrutiny function is essential to revive public trust, uphold constitutional checks, and deliver on the promise of **"government accountable to the people."**

PYQ: Explain the structure of the Parliamentary Committee system. How far have the financial committees helped in the institutionalization of Indian Parliament? (UPSC 2023)

[Syllabus: Parliament and State Legislatures](#)

BIENNIAL ELECTION FOR RAJYA SABHA

Context:

The Election Commission has announced the schedule for the biennial elections for the eight Rajya Sabha seats including six seats from Tamil Nadu and two seats from Assam.

About Biennial Election for Rajya Sabha:

- **What It Is?**
 - **Rajya Sabha** is the **Upper House of Parliament**, representing the **States and Union Territories**.
 - It is a **permanent body**, and elections are held periodically to fill the **seats of retiring members**.
- **Term and Membership:**
 - **Total strength:** 250 (maximum), currently **245 members**.
 - **233 elected members** (States and UTs)
 - **12 nominated members** by the President (experts in literature, art, science, or social service)
 - **Tenure:** Each member serves a **6-year term**.
 - **Retirement:** One-third of members **retire every 2 years**.
- **Election Process:**
 - **Indirect Elections:**
 - Conducted via **proportional representation** by means of the **single transferable vote**.
 - **State MLAs** elect representatives from States.
 - **UT Electoral Colleges** elect members from Union Territories (Delhi, Puducherry, J&K).
 - **Bye-Elections:**
 - Held when a seat becomes vacant before the term ends.
 - Member elected serves **only the remainder** of the predecessor's term.
- **Qualifications (Article 84):**
 - To be eligible for Rajya Sabha membership, a person must:
 - Be a **citizen of India**.
 - Be at least **30 years of age**.
 - Make and subscribe an **oath of office** (as per the Third Schedule).
 - Meet any **other qualifications prescribed by law**.
- **Disqualifications:**
 - A person can be disqualified if:



- They hold an **office of profit** under the government.
- They are declared **unsound of mind** or **insolvent**.
- They are **not a citizen of India** or have acquired foreign citizenship.
- They incur disqualification under the **Tenth Schedule** (anti-defection law).

PRIVATE MEMBER'S BILLS

Context:

Private Member's Bills (PMBs) have witnessed sharp decline in deliberation despite their democratic significance. NHRC, experts, and MPs urge procedural reforms to revive PMBs as tools of legislative innovation and independent expression.

About Private Member's Bills (PMBs):

- **What it is?**
 - A **Private Member's Bill** is a legislative proposal introduced by an **MP who is not a Minister**.
 - It reflects **individual viewpoints**, not necessarily the government's official agenda.
- **Procedure in Parliament:**
 - **Introduced on Fridays** in both Houses as per Rules of Procedure.
 - Follows the same stages as a government bill—**first reading, discussion, voting**.
 - Can become law if passed in **both Houses** and gets **Presidential assent**.



Recent Data and Decline: (Source: PRS Legislative Research)

- **Only 14 PMBs** passed since Independence; **none since 1970** passed both Houses.
- **17th Lok Sabha:** 729 PMBs introduced (only 2 discussed).
- **18th Lok Sabha (2024):** 64 PMBs introduced, **zero discussed** so far.
- In **2024 Winter Session**, Lok Sabha spent just **0.15 hours** on PMBs and Rajya Sabha **0.62 hours**.

Significance of Private Member's Bills:

- **Encourages Democratic Expression:** Enables MPs to propose legislation on **personal conviction or constituency needs**.

E.g. Supriya Sule's "Right to Disconnect" Bill (2019).

- **Policy Incubator:** Often **precedes government legislation** on sensitive issues.

E.g. Tiruchi Siva's 2014 Transgender Rights Bill inspired the 2019 Act.

- **Platform for Ruling Party MPs:** Allows ruling MPs to voice independent views.

E.g. Gopal Shetty's Bill on healthcare for senior citizens.

- **Strengthens Parliamentary Oversight:** Fosters **deliberative democracy** beyond party whip controls.

Reasons for Decline in PMBs:

- **Government Priority:** Government business overshadows Friday PMB slots.

E.g. Budget discussions replaced PMB sessions in 2024.

- **Frequent Disruptions:** Adjournments and walkouts **truncate scheduled time** for PMBs.

E.g. 2 Fridays lost in 2024 Winter Session.

- **Anti-Defection Law Impact:** MPs often hesitate to challenge party line even in PMBs. Post-52nd Amendment limits dissent.

- **MP Disinterest & Timing Issues:** Many MPs **skip Friday sessions** to return to constituencies.

- **Chair's Discretion:** Arbitrary scheduling and limited discussion under **Speaker's or Chairman's control**.

E.g. Limited PMB discussion despite full 62-hour session.

Way Forward – Reforms Needed:

- **Protect Friday Time for PMBs:** Amend rules to make this time **non-negotiable**, barring national emergencies.
- **Midweek Scheduling:** Shift PMB discussions to **Wednesdays** to avoid low attendance.
- **Priority Committee for PMBs:** Set up an expert review panel to shortlist **high-impact Bills** for fast-track discussion.

E.g. Inspired by U.K.'s Ten-Minute Rule.

- **Extend Working Hours:** Parliament may sit longer to accommodate both **government and private business**.
- **Digital Access & Tracking:** Introduce **online dashboards** to track PMBs' progress and promote transparency.

Conclusion:

Private Member's Bills are a **vital democratic instrument** for MPs to reflect public aspirations and challenge dominant narratives. Their erosion reflects a **centralised legislative process**, undermining deliberative democracy. Reviving and reforming the PMB mechanism is essential to **restore participatory law-making in Parliament**.

PYQ:

1. The role of individual MPs (Members of Parliament) has diminished over the years and as a result healthy constructive debates on policy issues are not usually witnessed. How far can this be attributed to the anti-defection law, which was legislated but with a different intention? (UPSC-2013)

EMBLEMS AND NAMES (PREVENTION OF IMPROPER USE) ACT, 1950

Context:

The Supreme Court dismissed a petition seeking protection of V.D. Savarkar's name under the Emblems and Names (Prevention of Improper Use) Act, 1950.



About Emblems and Names (Prevention of Improper Use) Act, 1950:

- **What is It?**
 - A regulatory legislation to prevent the commercial or improper use of national emblems, names, and symbols that hold public significance or represent national institutions.
- **Enforced On:** 1st September, 1950, through Gazette notification.
- **Nodal Authority:** Central Government – empowered to amend the Schedule and issue rules under the Act.
- **Objectives of the Act:**
 - Prohibit **misuse of names/emblems** associated with national institutions or public trust.
 - Protect the **dignity of names and symbols** associated with the Indian government, historic personalities, and international bodies.
 - Maintain **decorum in commercial branding**, preventing deceptive or misleading affiliations.
- **Key Features:**
 - **Prohibition Clause (Section 3):** Disallows the use of specified names/emblems for business, trade, patents, or advertising **without Central Government permission**.
 - **Scope (Section 1 & 2):**
 - Applies across **India and Indian citizens abroad**.
 - "Name" includes **abbreviations**, and "emblem" includes flags, seals, and coats of arms.
 - **Ban on Registrations (Section 4):** Authorities cannot register companies, trademarks, or patents bearing protected names/emblems.
 - **Penalty (Section 5):** Misuse punishable by **fine up to ₹500**.
 - **Mandatory Sanction (Section 6):** Prior sanction from the Centre is needed before prosecution.
 - **Dynamic Schedule:** The Schedule includes protected items such as the Indian National Flag, **Mahatma Gandhi's name**, Rashtrapati Bhavan, and others.

Syllabus: Judiciary

THREE-YEAR JUDICIAL PRACTICE MANDATE

Context:

The Supreme Court reinstated the rule mandating a minimum of three years of legal practice as a prerequisite for applying to the Civil Judge (Junior Division) posts.

What Is the Three-Year Judicial Practice Mandate?

- As per the latest ruling in *All India Judges Association v. Union of India*, a candidate must now have **at least three**

- **years of courtroom experience** before appearing for judicial service exams.
- The mandate applies to **entry-level judges**, reinstating the condition removed in 2002 to broaden access to judicial posts.



Need for the Practice Requirement

1. **Improves Judicial Preparedness:** Early exposure to real courtroom scenarios builds decision-making skills and legal maturity.
E.g. The Bar Council of India (2021) stated that judges without practice were often *"inept and incapable"* in handling matters.
2. **Reflects High Court Consensus:** 23 out of 25 High Courts reported unsatisfactory outcomes from recruiting fresh graduates into the judiciary.
3. **Addresses Training Gaps:** Judicial academies often lack individual mentoring capacity and cannot simulate litigation complexities.
4. **Fosters Professional Maturity:** Advocates gain better emotional intelligence and legal intuition through active litigation.

Challenges Associated with the Mandate

1. **Exclusion of Marginalized Aspirants:** Women and first-generation lawyers may struggle to sustain three years in litigation due to socio-economic or familial constraints.
E.g. NFHS data shows average female marriage age is 19.2, creating early-career conflicts for female law graduates.
2. **Litigation Is Not a Level Field:** Early-stage advocates, especially women, often face hostile work conditions, harassment, and lack of mentorship in court corridors.
3. **Tokenistic Practice Risk:** Without verification norms, the mandate may become a formality rather than a meaningful experience.
4. **Reduced Diversity in Judiciary:** The added hurdle may deter young, capable women and others from marginalized communities from even attempting judicial entry.
5. **Judicial Overreach Concerns:** The mandate, as per Article 234, should be determined by State executives in consultation with High Courts, not by the Supreme Court.

Significance of the Move:

1. **Enhances Quality of Judgments:** Judges with courtroom experience are more adept at managing procedural complexities and ensuring fair trials.
2. **Bridges Theory-Practice Divide:** The move attempts to build a professionally competent Bench, not just a theoretically sound one.
3. **Aligns with Global Best Practices:** Most developed judicial systems expect prior legal experience before assuming judicial office.

Conclusion:

The three-year practice mandate reflects a desire to build a judiciary with practical legal insight and emotional maturity. However, without addressing socio-economic barriers and structural inequalities, it risks narrowing entry for many deserving candidates. Judicial reform must strike a balance between **quality and inclusivity, rigour and representation**.

PYQ:

'Constitutional Morality' is rooted in the constitution itself and is founded on its essential facets. Explain the doctrine of Constitutional Morality' with the help of relevant judicial decisions. (UPSC -2021)

JUDICIAL TRANSFERS: HELP OR HINDRANCE?

Context:

Two Bar Associations recently protested the Supreme Court collegium's transfer recommendations involving judges from the Karnataka and Delhi High Courts.

- The protests reignited debates on judicial independence, executive interference, and the lack of a structured transfer policy.

About Judicial transfers: Help or hindrance?

- **What are Judicial Transfers?**
 - **Judicial transfer** refers to moving a judge from one **High Court to another** based on administrative needs or public interest.
- **Constitutional Provision:**
 - **Article 222(1)** of the Constitution empowers the **President** to transfer a judge in consultation with the **Chief Justice of India (CJI)**.
- **Procedure of Judicial Transfers:**
 - **Initiation:** Proposed by the **CJI**, considering judicial performance and administrative grounds.
 - **Consultation:** Mandatory with CJs of both High Courts and senior SC judges familiar with the judge's work.
 - **Collegium Recommendation:** For judges, it includes the CJI and two senior-most SC judges; for CJs, the full 5-member collegium is involved.
 - **Executive Approval:** Law Ministry processes the file to PM to **President** grants final approval.
 - **Notification:** Department of Justice issues transfer orders via Gazette.



Need for Judicial Transfers:

- **Prevent Local Influence:** Reduces chances of bias from local networks or pressures.
- **Promote Judicial Neutrality:** Helps in maintaining independence by avoiding prolonged stay in one High Court.
- **Strengthen Judicial Administration:** Enables redistribution of judicial expertise across High Courts.
- **Fill Urgent Vacancies:** Used (though controversially) to address temporary judge shortages.
- **Encourage Diversity:** Intended to promote **inclusivity and regional representation**.

Issues Surrounding Judicial Transfers:

- **Executive Interference Risk:** E.g., *Justice Muralidhar's* midnight transfer raised concerns of retaliation for "inconvenient" judgments.
- **Opacity in Collegium Decisions:** *Supreme Court Observer (2021)* found that **59% of transfer orders had no reasons given**.
- **Disruption to Judicial Continuity:** Part-heard cases suffer delays; judges face local law and language barriers.
- **Impact on Seniority:** Transfers can **disrupt promotion prospects** as seniority is calculated inter se within a court.
- **No Solution to Vacancies:** Shifting judges only relocates the problem and all HCs except Sikkim and Meghalaya are under strength.
- **Tokenism in Diversity Push:** As of 2023, only **4% SC/ST judges** and **14% women judges** in HCs — transfers don't solve root issues.

Way Ahead:

- **Codify a Transparent Transfer Policy:** With clear, objective criteria and stated reasons for public trust.
- **Ensure Routine Transfers:** Transfers should be **non-arbitrary and planned** to avoid speculation or bias.
- **Use Retired Judges & Fast-Track Appointments:** Better approach to deal with **judicial vacancies** than transfers.
- **Enhance Collegium Accountability:** Publishing detailed justifications can **restore faith** in the process.
- **Diversity at Entry Level:** Focus on **recruitment reforms**, reservations, and mentorship for underrepresented groups.

Conclusion:

Judicial transfers, when routine and transparent, can enhance administrative efficiency. However, **arbitrary and opaque transfers risk judicial independence** and public confidence. To preserve the judiciary's credibility, **systemic reforms are more effective** than reactive relocations.

PYQ:

"Constitutionally guaranteed judicial independence is a prerequisite of democracy." Comment. (UPSC-2023)

CHIEF JUSTICE OF INDIA

Context:

Justice BR Gavai was sworn in as the 52nd Chief Justice of India on May 14, 2025, by President Droupadi Murmu at Rashtrapati Bhavan.

- He is the first Buddhist and the second Dalit to hold the post, after Justice KG Balakrishnan.

About Chief Justice of India:

- **What It Is:**
 - The **Chief Justice of India** is the head of the **Supreme Court** and the **judicial system** of India.
 - They are known as the “**Master of the Roster**”, responsible for case allocation and judicial leadership.
- **Constitutional Provision:**
 - **Article 124(2)** of the Constitution governs the **appointment of the Chief Justice and Judges of the Supreme Court**.
- **Appointing Authority:** The **President of India** appoints the CJI, based on the recommendation of the outgoing CJI, following seniority convention.
- **Procedure of Appointment:**
 - The **Law Minister** seeks the outgoing CJI's recommendation.
 - Consultation is made with senior Supreme Court judges if fitness is in doubt.
 - The Law Minister forwards the proposal to the **Prime Minister**.
 - The Prime Minister advises the **President**, who appoints the new CJI.
 - The **oath of office** is administered by the **President of India**.
- **Powers and Functions of CJI:**
 - **Master of the Roster:** Allocates cases to benches and forms Constitution benches.
 - **Judicial Leadership:** Guides judicial policy and jurisprudence.
 - **Advisory Role:** Advises the government on legal and constitutional matters.
 - **Administrative Authority:** Appoints court officers and oversees court functioning.
 - **Emergency Role:** In rare cases, may discharge presidential duties if both President and Vice President's offices are vacant.
 - **Appointments:** Must be consulted in all appointments of SC and HC judges (except CJI himself).



SUPREME COURT'S ADVISORY JURISDICTION

Context:

President of India has invoked the Supreme Court's advisory jurisdiction under Article 143(1) to clarify whether time limits can be imposed on the President and Governors to act on state legislature Bills.

About Supreme Court's Advisory Jurisdiction:

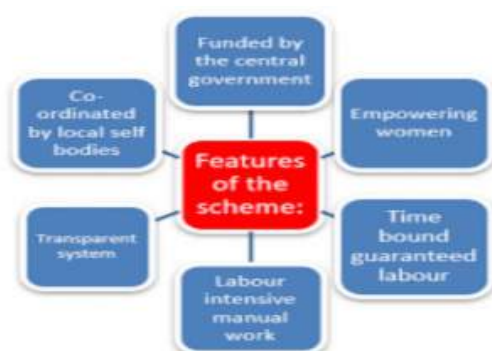
- **What Is Advisory Jurisdiction?**
 - Advisory jurisdiction allows the **President of India to seek the SC's opinion** on questions of law or fact of public importance.
 - It enables **constitutional interpretation without a direct legal dispute**.
 - The opinion given is **not binding**, unlike judicial rulings.
- **Constitutional Basis:**
 - **Article 143(1):** The President may refer any **question of law or fact** of public importance to the SC.



- **Article 143(2):** Refers to matters related to pre-constitutional treaties, agreements, or covenants, especially concerning former princely states.
- **Features:**
 - **Discretionary in Nature:** SC **may** choose to answer or decline the reference.
 - **Non-binding:** The opinion returned is **advisory**, not enforceable.
 - **Bench Strength:** As per **Article 145(3)**, such matters must be heard by a **Constitution Bench** (minimum five judges).
 - **Independent Aid:** Offers the President **independent legal insight** apart from Cabinet advice.
- **Historical Usage of Article 143:**
 - Invoked **14 times** since 1950.
 - Landmark instances include:
 - **Delhi Laws Act Case (1951):** On delegation of legislative powers.
 - **Berubari Union Case (1960):** On transfer of territory to Pakistan.
 - **Kesavananda Bharati Follow-up (1973):** Reinforced Basic Structure doctrine.
 - **Judges Appointment Reference (1998):** Collegium system clarified.
 - **Cauvery Dispute (1992):** Federal tribunal jurisdiction.
 - **Ayodhya Site (1993):** Reference declined for being politically sensitive.

Syllabus: Government Policies & Interventions

LIBTECH INDIA REPORT ON MNREGA



About MGNREGA:

- It provides a legal guarantee for **100 days of unskilled manual employment** in every financial year to adult members of any rural household.
- It is a **demand-driven scheme**.
- A **60:40 wage and material ratio** have to be maintained.

MGNREGS



- Employment will be given within **15 days of application for work**, if it is not then a **daily unemployment allowance** has to be paid.
- **Social Audit** has to be done by the **Gram Sabha**
- At least **one-third of beneficiaries** shall be **women**
- Wages are to be paid according to the **Minimum Wages Act 1948** for agricultural labourers in the State

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Context:

A LibTech India report on MGNREGA for FY 2024–25 highlights a stark mismatch between rising registrations (increase by 8.6%) and declining employment delivery (decline by 7.1%), mainly due to delayed payments and budget shortfalls.

About MGNREGA:

- **What it is:** A social security and livelihood assurance program guaranteeing 100 days of wage employment to rural households.
- **Launched in:** 2005 under the Mahatma Gandhi National Rural Employment Guarantee Act.
- **Ministry:** Ministry of Rural Development.
- **Objective:** Enhance livelihood security by providing employment in unskilled manual labour and building rural assets.
- **Key Features:** Demand-driven, legal entitlement to work, time-bound wage payment (within 15 days), compensation for delays, emphasis on transparency via MIS and social audits.

Key Data on MGNREGS:

- **Registrations:** Increased from 13.80 crore (FY24) to 14.98 crore (FY25), a rise of 8.6%.
- **Employment Delivery:** Dropped by 7.1%; only 7% of households got 100 days of work.
- **Person-days:** Fell from 52.42 to 50.18 days per household (↓4.3%).
- **Fund Utilisation:** ₹82,963 crore spent (106% of ₹86,000 crore budgeted).
- **State Trends:** Decline in Odisha (−34.8%), TN (−25.1%), Rajasthan (−15.9%). Increase in Maharashtra (+39.7%), Bihar (+13.3%).

About MGNREGA Wage Payment System:

- **Stage 1 (State):** Must complete muster roll, measurement, wage list, and FTO generation in 8 days.
- **Stage 2 (Centre):** Central government processes FTO and credits wages within 7 days post Stage 1.
- **Formula for Delay Compensation:** 0.05% of wage/day beyond 15 days from muster roll completion.
- **Payment Types:**
 - **Aadhaar-based (APBS):** Routed via NPCI mapper, prone to rejections if Aadhaar-bank mapping fails.
 - **Account-based:** Direct to bank account, easier resolution of errors.
- **LibTech 2021 Data:**
 - 71% Stage 2 payments were delayed.
 - **SC:** 80% payments in 15 days, **ST:** 63%, **Others:** only 51%.
 - Chhattisgarh had highest rejection (11.4%), affecting 21,537 job cards.

Issues Surrounding MGNREGA:

- **Delayed Wage Payments:** Workers are not getting paid on time, which goes against the law. A report shows 71% of central government payments were delayed.
- **Lack of Funds:** The government gave ₹86,000 crore, but this is not enough as more people are asking for work.
- **Caste-based Payment Delays:** Payments are being split by caste. SC/ST workers are paid first, while others have to wait longer.
- **Payment Failures:** Over ₹4 crore worth of payments failed, mainly due to Aadhaar-related technical problems.
- **Low Compensation for Delays:** Even when payments are late, workers rarely get compensation. Only 3.76% of dues were paid.

Way Ahead:

- **Give More Funds:** Increase the budget to ₹1.5–2 lakh crore to meet rising demand for work.
- **Simplify the Payment System:** Use simple bank transfers instead of Aadhaar-based payments to avoid delays and confusion.
- **Ensure Timely Compensation:** Automatically pay compensation to workers if their wages are delayed.
- **Improve Monitoring:** Use real-time tracking systems to check payment status and fix problems faster.
- **Treat All Workers Equally:** Stop separating payments based on caste. All workers should be treated the same under the law.

Conclusion:

Despite its shortcomings, MGNREGA remains a cornerstone of rural resilience, particularly post-COVID. Addressing payment delays, ensuring adequate funding, and simplifying systems are essential to uphold its constitutional promise of livelihood with dignity.

CIVIL LIABILITY FOR NUCLEAR DAMAGE ACT (CLNDA), 2010

Context:

The Government is considering amendments to the Atomic Energy Act and the Civil Liability for Nuclear Damage Act (CLNDA), 2010 to allow private sector participation in nuclear power and streamline supplier liability norms.

- India is aiming to produce **100 GW nuclear** energy by 2047.

About Civil Liability for Nuclear Damage Act (CLNDA), 2010:

What is it?

A legislation enacted to ensure prompt compensation to victims of nuclear incidents through a *no-fault liability regime*, aligned with international standards.



Key Features:

- Legislated in:** 2010
- No-fault liability:** Operator held liable irrespective of fault.
- Channelling of liability:** Only the operator is liable to pay compensation to victims.
- Right of recourse:** Operator can claim compensation from supplier in case of faulty equipment or services.
- Supplier liability clause:** Introduced ambiguity and deterred foreign/private suppliers.
- Compensation cap:**
 - ₹1,500 crore from operator (mandatory insurance/security).
 - Additional ₹2,100–₹2,300 crore from government if damage exceeds ₹1,500 crore.
- Restriction on private entry:** Private firms avoided entry due to expansive and unclear supplier liability clauses.

About Atomic Energy Act, 1962:

- What is the Atomic Energy Act, 1962?**
 - The **Atomic Energy Act, 1962** is India's principal legislation governing the development, control, and use of nuclear energy. It replaced the earlier Atomic Energy Act of 1948 and provided the **legal foundation** for centralized control over atomic energy resources, technology, and research in India.
- Objective of the Act:**
 - National Development:** Promote the peaceful use of atomic energy for the welfare of the people and industrial progress.
 - Regulatory Oversight:** Establish a robust legal framework to regulate radioactive substances, plants, and nuclear safety.
 - Strategic Control:** Ensure state monopoly over nuclear resources to safeguard national security and sovereignty.
- Key Features of the Act:**
 - The Central Government is the sole authority to control **production, use, disposal, and research** in atomic energy.
 - Any discovery of uranium/thorium must be reported.
 - Mining, disposal, or possession of these minerals needs prior **government authorization**.
 - The government can carry out **mineral exploration** on private land with notice and compensation.
 - Only licensed individuals/entities can conduct atomic energy-related activities.
 - Breach of license, obstruction of authority, or false declarations are punishable.
- Restrictions on Private Sector Entry:**
 - The Act **bars private players** from engaging in atomic energy activities unless specifically permitted by the Central Government.
 - Only public sector entities like **NPCIL** are authorized to own and operate nuclear facilities.

PRIVATE SCHOOL FEE REGULATION IN INDIA

Context:

Delhi government issued fresh guidelines mandating prior approval for fee hikes by private schools on government land.

- This move follows protests against sudden hikes and highlights the lack of uniform regulatory practices across Indian cities.



About Private School Fee Regulation in India:

Data Stats:

- NSS 2017–18: Average annual private school fee in Delhi** at secondary level is ₹32,003—**3x higher** than the all-India average of ₹11,026.
- PRS 2024 Analysis:** In the entire 17th Lok Sabha, **only 9.08 hours** were spent discussing private education issues, reflecting low legislative focus.

Need for Regulation of Private School Fees:

- Prevent Arbitrary Hikes:** Unregulated fee increases impose sudden financial burdens on parents.

E.g., 20% hike in South Delhi school sparked mass protests in April 2025.

- Ensure Transparency & Accountability:** Mandating disclosure of audited financials reduces exploitation and builds trust.
- Protect Right to Education (Article 21A):** Excessive fees undermine equitable access to quality education, especially for middle-income families.
- Bridge Socio-economic Gaps:** Regulating fees ensures that private education doesn't become exclusive to the elite.

E.g., Delhi's average annual private school expense is ₹32,000 vs ₹11,000 national average.

- Enable Fair Competition:** Controls promote healthy rivalry between government and private schools based on quality, not affordability.

Challenges in Fee Regulation:

- Lack of Transparency:** Schools rarely disclose audited financials or breakdowns of charges.

E.g., retrospective hikes found illegal under Delhi's 2025 fee regulation draft.

- Regulatory Gaps:** No central law; each state adopts varying standards, creating inconsistency.
- Balancing Autonomy vs Accountability:** Excessive control may compromise infrastructure, salaries, and innovation.

E.g., NEP 2020 promotes private participation while calling for transparency.

- Overburdened Government Schools:** Without adequate reform, fee control pushes more demand toward already strained government institutions.

City-wise Models of Fee Regulation in India:

- Delhi – Approval-Based Model:** Schools on govt land must seek prior approval under the Delhi School Education Act, 1973.
- Bengaluru – Formula-Based Cap Model:** Fee hikes capped at 10% annually under Karnataka's 2022 rules with audit-backed justifications.
- Mumbai – Objection-Based Grievance Model:** Schools can raise fees without approval, but 25% parent objection triggers FRC review.

Way Ahead:

- Establish Central Guiding Framework:** Draft a **National Fee Regulation Code** to bring uniformity while allowing state flexibility.
- Ensure Transparency in Financial Disclosures:** Make annual school audits, salary expenses, and fee breakup publicly accessible.
- Use Technology for Monitoring:** Create state-level digital dashboards for parents to review and object to fees.

- **Balance Regulation with Operational Freedom:** Instead of rigid caps, link fee hikes to indices like inflation or infrastructure expansion.
- **Empower Parents Legally:** Strengthen PTA roles and provide legal aid for parents contesting unfair fee hikes.

Conclusion:

Fee regulation in private schools must walk the fine line between **accessibility and institutional autonomy**. City-specific models reflect diverse approaches but underscore the need for **uniform, transparent, and equitable regulation**. A national policy direction, rooted in **data, dialogue, and fairness**, is the next logical step.

PYQ:

“Earn while you learn’ scheme needs to be strengthened to make vocational education and skill training meaningful.”
 Comment. (UPSC-2021)

EXPERIENTIAL LEARNING

Context:

Article in newspaper highlights India’s exam-centric education and advocates experiential learning for cultivating higher-order thinking skills.

- Aligns with **NEP 2020** reforms promoting critical thinking and real-world application of knowledge.

About Experimental Learning:

What is Experiential Learning?

- A learner-centric approach where knowledge is gained through experience, reflection, and application (David Kolb, 1984).
- **Key Features:**
 - “Learning by Doing” through **hands-on activities**.
 - Builds skills like **problem-solving, teamwork, and creativity**.
 - Follows a **four-stage cycle**:
 - Starting with a concrete experience
 - Moving to reflective observation
 - Followed by abstract conceptualisation
 - Finally leading to active experimentation.



Why India Needs Experiential Learning:

- **Exam-Centric Limitations:** 80% of students in India struggle with application-based questions (ASER Report 2023).
- **Unequal Learning Outcomes:** Urban-rural and public-private divides hinder holistic education access.
- **Low Higher-Order Thinking:** Present rote learning model restricts skills like analysis, evaluation, and innovation.
- **Cognitive Diversity:** As per Gardner’s Theory of Multiple Intelligences, different students learn differently—visual, kinaesthetic, or auditory.

Implementing Experiential Learning in India:

- **Pedagogical Strategies:**
 - **Flipped Classrooms:** Students learn theory at home; apply and discuss in class.
 - **Field Projects:** Linking science with real-world problems via outdoor experiments.
 - **Collaborative Learning:** Group tasks, role-playing, and peer feedback.
 - **Simulation & Tech:** Use of AR/VR in history, geography, and STEM simulations.
- **Best Practices:**
 - **Inquiry-based learning** in Navodaya Vidyalaya’s.
 - **Activity-based learning** adopted in Tamil Nadu schools has improved retention and engagement.

Challenges:

- **Logistics & Training:** Shortage of trained educators; lack of labs and digital tools in rural schools.

- **Contextual Readiness:** Not all students may be prepared; e.g., Grade 8 students reading at Grade 2 level (ASER 2022).
- **Uniform Policy Pitfalls:** One-size-fits-all frameworks ignore socio-economic and cultural diversity.

Way Ahead:

- **Policy Integration:** Embed experiential modules within existing curriculum without disrupting current structure.
- **Capacity Building:** Train teachers under DIKSHA and NCERT's new training modules.
- **Tech + Community:** Use digital platforms and local knowledge holders (farmers, artisans) for learning activities.
- **Assessment Reform:** Shift from memory-based tests to portfolio-based, outcome-focused evaluation.
- **Public-Private Partnerships:** Leverage NGOs and Ed-Techs for scalable implementation.

Conclusion:

Experiential learning transforms the classroom into a laboratory of life. It nurtures curious, self-driven learners ready to face real-world challenges. Integrating it within India's education system is not just desirable but essential for equitable, quality learning.

PYQ:

'Earn while you learn' scheme needs to be strengthened to make vocational education and skill training meaningful." Comment. (UPSC - 2021)

MIZORAM INDIA'S FIRST FULLY LITERATE STATE

Context:

The Chief Minister of Mizoram officially declared the state as fully literate. With this, Mizoram has become the first state in India to achieve complete literacy.

- Earlier, on 24.06.2024, Ladakh became the first administrative unit to declare full literacy.

About Mizoram India's First Fully Literate State:

- **What is 'Full Literacy'?**
 - A state is considered **fully literate** when its **literacy rate exceeds 95%**, as per the benchmark defined under the ULLAS scheme.
 - Mizoram achieved a **literacy rate of 98.2%** as per the **PLFS 2023-24**, surpassing the threshold.
 - Mizoram (literacy rate in 2011 Census: 91.33%)
 - **Initiative Used:** Nav Bharat Saaksharta Karyakram under ULLAS



About ULLAS Scheme (Understanding Lifelong Learning for All in Society):

- **Launched:** FY 2022-2027
- **Type:** Centrally Sponsored Scheme
- **Ministry:** Ministry of Education
- **Budget Outlay:** ₹1037.90 crore (₹700 Cr Centre + ₹337.90 Cr State share)
- **Objectives:**
 - Promote **inclusive adult education** aligning with **NEP 2020**
 - Target **non-literates aged 15+** across India
 - Enhance **functional literacy, digital skills, and vocational learning**
- **Key Components:**
 - **Foundational Literacy & Numeracy (FLN):** Teaches basic reading, writing, and arithmetic skills to non-literate adults.
 - **Critical Life Skills:** Covers essential knowledge like health awareness, financial literacy, and family welfare.
 - **Basic Education:** Offers education equivalent to primary, middle, and secondary schooling.
 - **Vocational Skills:** Imparts job-oriented skills to boost employability at the local level.
 - **Continuing Education:** Provides lifelong learning through cultural, scientific, and recreational courses.
- **Implementation Features:**
 - **Volunteer-Based Teaching:** Uses trained community volunteers as educators for adult learners.
 - **Digital-First Delivery:** Learning materials are delivered via mobile apps, TV, radio, and online platforms.
 - **Enrolment Stats:** Over 2.37 crore learners and 40.84 lakh volunteer teachers have registered as of 2025.

- **Assessment Method:** Learners are evaluated through the Foundational Literacy and Numeracy Assessment Test (FLNAT).

STATE OF THE WORLD'S NURSING 2025 REPORT

Context:

The WHO's "State of the World's Nursing 2025" report warns of a worsening global nursing shortage, with Africa and the Eastern Mediterranean expected to face 70% of the shortfall by 2030.



About State of the World's Nursing 2025 Report:

Status of Nursing in India

- **India's nurse-to-population ratio:** Approximately **30 nurses per 10,000 people** — below WHO's recommended threshold.
- **Nursing education:** India has scaled up nursing graduate numbers but faces **quality inconsistencies** and **faculty shortages**.
- **Migration trend:** India remains a **top source of foreign-trained nurses**, especially to the UK, Gulf, and Australia.
- **Workforce retention:** Many nurses migrate due to **low wages**, **limited leadership roles**, and **poor workplace conditions**.

Key Issues in India's Nursing Sector:

- **Inadequate Workforce:** WHO norms require 44.5 health workers/10,000 people; India falls short, especially in rural areas.
- **Urban-Rural Disparity:** Concentration of nurses in urban private hospitals limits access in rural PHCs and CHCs.
- **Poor Working Conditions:** Long hours, wage delays, inadequate mental health support, and unsafe workspaces

deter retention.

- **Lack of Leadership Roles:** Low presence of **Chief Nursing Officers** at state/national levels limits policy influence.
- **Low Public Investment:** Limited fiscal space and infrastructure bottlenecks hamper training and employment expansion.
- **International Migration:** Heavy nurse outflow depletes domestic capacity; bilateral agreements lack equitable returns.

Way Ahead:

- **Scale up Training Capacity:** Expand nursing colleges with **adequate faculty and clinical infrastructure** (E.g., NEP's emphasis on vocational education).
- **Invest in Leadership and Governance:** Appoint **Chief Nursing Officers (CNOs)** and build state-level **nursing councils** to drive reforms.
- **Improve Retention Strategies:** Offer **better wages, safety**, mental health support, and career growth pathways.
- **Enhance Rural Deployment:** Implement **rural return incentives** and **bonded scholarships** to place nurses in underserved regions.
- **Leverage Digital & AI Tools:** Expand **blended learning**, digital records training, and AI-integrated curriculum for future-readiness.
- **Strengthen International Cooperation:** Secure **bilateral agreements** that compensate source countries like India for nurse outmigration (e.g., India–UK healthcare MoUs).

Conclusion:

The WHO's 2025 report reveals deep global nursing inequities, with Africa and Asia set to face the brunt of shortages. India must urgently invest in nursing education, employment, and leadership to meet SDG targets and ensure UHC. Empowering nurses today is key to building a resilient, equitable, and future-ready healthcare system.

PYQ:

"Besides being a moral imperative of a Welfare State, primary health structure is a necessary precondition for sustainable development." Analyse. (UPSC-2021)

WHO RECOGNISES 4 NATIONS FOR TRANS FAT ELIMINATION

Context:

The World Health Organization (WHO) recognised **Austria, Norway, Oman, and Singapore** for eliminating industrially produced trans fats from their national food supply.

About WHO Recognises 4 Nations for Trans Fat Elimination:

- **What is Trans Fat?**
 - **Definition:** Trans fats (trans-fatty acids) are **unsaturated fats** that undergo **hydrogenation**, turning liquid oils into solid fats.
 - **Types:**
 - **Naturally occurring:** Found in red meat and dairy (in small amounts).
 - **Industrially produced:** Found in **partially hydrogenated oils (PHOs)** used in processed foods.
- **Sources of Trans Fat:**
 - **Fried & processed foods:** Biscuits, cakes, margarine, vanaspati ghee
 - **Baked goods:** Pies, pastries, refrigerated dough
 - **Cooking fats:** Shortening, stick margarine
- **Health Hazards of Trans Fats:**
 - **Raises Bad Cholesterol (LDL):** Trans fats increase **low-density lipoprotein (LDL)** levels, which leads to cholesterol buildup in arteries.
 - **Lowers Good Cholesterol (HDL):** They simultaneously reduce **high-density lipoprotein (HDL)** levels, which normally helps remove excess cholesterol from the bloodstream.



- **Triggers Arterial Blockage:** The imbalance between LDL and HDL causes **plaque formation** in arteries, narrowing them and leading to stroke or coronary heart disease.
- **Increases Obesity and Diabetes Risk:** Being energy-dense (9 kcal/g), trans fats promote **weight gain**, and prolonged consumption can impair **insulin sensitivity**, triggering type 2 diabetes.
- **Massive Global Health Impact:** WHO (2024) estimates **278,000 annual deaths** from trans-fat consumption, accounting for nearly **7% of cardiovascular-related mortalities** worldwide.
- **Target:**
 - **Global Policy (WHO):** Launched in 2018, WHO aims to **eliminate industrial trans fats by 2025**, targeting **90% global** and **70% regional** population coverage.
 - **India's Policy:** Since January 2022, India enforces a **<2% trans-fat limit** in oils/fats under FSSAI's 2021 Regulations, aligning with WHO best practices.

ANTIMALARIAL AGENTS

Context:

A new study published in Nature, identified antimalarial agents that block *Plasmodium falciparum* development in mosquitoes, including insecticide-resistant strains.

About Antimalarial Agents:

- **What Are They?**
 - These are **chemical compounds** that **target the malaria parasite** inside **Anopheles mosquitoes**, without killing the mosquito itself.
- **Key Compounds Identified:**
 - **Endochin-like quinolones (ELQs):**
 - A class of antimicrobial agents effective against parasites.
 - **ELQ-456:** Fully blocks infection of *P. falciparum*.
 - **ELQ-331:** Significantly reduces infection levels.
 - **ELQ-453 + ELQ-613:** Prevent parasite maturation when used in combination.
 - **Mechanism of Action:**
 - These agents **target the parasite during oocyst development** in the mosquito.
 - They **do not rely on insecticidal action**, avoiding typical resistance routes.
- **Features of the New Agents:**
 - **Resistance-Proof:** Effective even in insecticide-resistant mosquito strains.
 - **Long-Lasting:** Remain potent after **a year of open-air exposure**.
 - **Contact-Based:** Work even if mosquitoes briefly touch treated surfaces.
 - **Cost-Effective:** Can be **easily synthesized and mass-produced**.
 - **Safe for Use in Bed Nets:** Incorporated into **polyethylene films** for mosquito nets.
- **Limitations:**
 - **Not yet in commercial use** – requires further trials and **regulatory approvals**.
 - **May induce resistance in the long term** within the parasite if **misused**.
 - **Initial infrastructure cost** for re-engineering bed nets with compound-infused polymers.



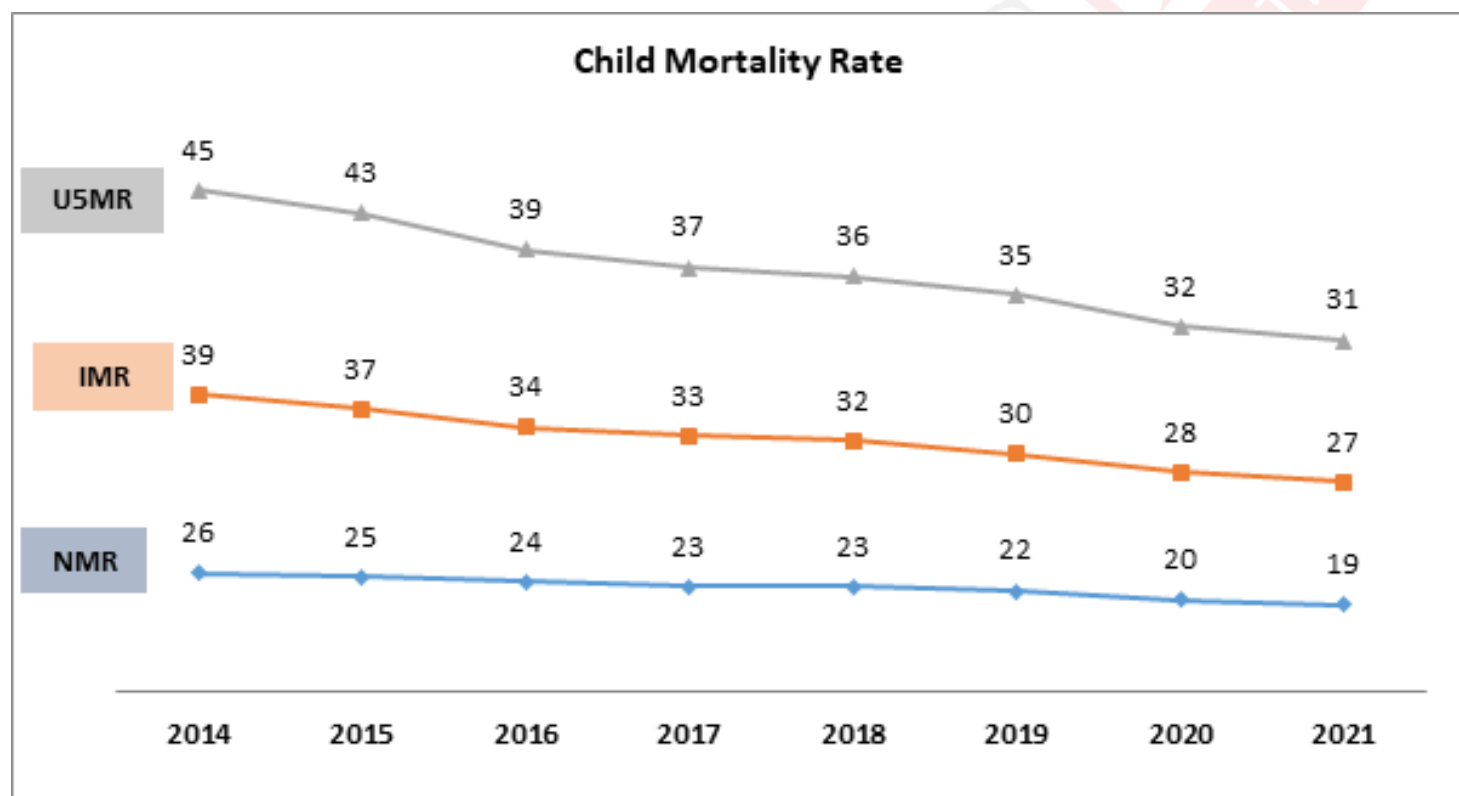
SAMPLE REGISTRATION SYSTEM (SRS) STATISTICAL REPORT 2021

Context:

The Sample Registration System (SRS) Statistical Report 2021, released by the Registrar General of India, shows significant demographic shifts, including falling birth rates and improved maternal and child health.

Summary of Sample Registration System (SRS) Statistical Report 2021:

- **Crude Birth Rate (CBR)** at national level is **19.3**, down from **19.5 in 2020**. Kerala (12.9) has the lowest, Bihar (25.6) the highest.
- **Crude Death Rate (CDR)** is **7.5**, with Chhattisgarh (10.1) highest and Delhi (5.4) lowest.
- **Infant Mortality Rate (IMR)** declined to **27 per 1,000 live births** (from 34 in 2016). Kerala has the best IMR (6), MP the worst (41).
- **Under-Five Mortality Rate (U5MR)** stands at **31**; Kerala again leads (8), while national female U5MR shows 2-point drop.
- **Neonatal Mortality Rate (NMR)** is **19**, down from 26 in 2014.
- **Sex Ratio at Birth** improved from **899 (2014)** to **913 (2021)**. Kerala leads with 962; Uttarakhand lowest (852).
- **Total Fertility Rate (TFR)** is **2.0**, down from **2.3 in 2014**. States like **Delhi and WB** have TFR of **1.4**, well below replacement level (2.1).
- **Medical attention at delivery** reached 91.1% in 2021; 39.3% of deceased received medical attention before death.



Analysis of the Report:

Positives:

Fertility Decline: TFR of 2.0 indicates India has reached **population stabilization**.

E.g. Delhi, WB, Kerala at 1.4–1.5 well below replacement level.

Decline in Infant and Child Mortality: IMR dropped from 34 (2016) to 27 (2021); **7-point fall in 5 years** shows strong maternal-child health efforts.

Improved Sex Ratio at Birth: An increase from 899 to 913 indicates progress in gender equity at birth.

State-Level SDG Achievement: 8 States achieved **MMR SDG target**, 12 States met **U5MR target**, and 6 States met **NMR target**.

Global Recognition: UN reports show India outperforms global average in **child mortality reduction** – U5MR down by **78%** since 1990.

Negatives:

Wide Inter-State Disparities: Bihar (TFR 3.0) and MP (IMR 41) lag behind, highlighting unequal healthcare access.

Sluggish Progress in High-Fertility States: States like Rajasthan, Bihar, and UP show **slowest decline in birth rates** (below 1% annually).

Limited Access to Pre-Death Medical Attention: Only **39.3%** of deceased received care before death, pointing to gaps in end-of-life services.

Urban-Rural Gap: Rural women still have TFR of **2.2** vs. 1.6 in urban areas, indicating differential reproductive behaviour.

Uttarakhand Anomaly: Only state with a **rise in birth rate**, contrary to the national trend.

Way Ahead:

- **Targeted Interventions:** Focus on **high TFR states** like Bihar and UP through behavioral change, incentives, and family planning.
- **Strengthen Rural Healthcare:** Bridge gaps in rural IMR and maternal care via infrastructure and skilled health workers.
- **Improve End-of-Life Care:** Enhance access to **palliative and emergency care** to increase pre-death medical attention.
- **Sustain Gender Equity Measures:** Continue **Beti Bachao Beti Padhao**, financial incentives, and education reforms.
- **Leverage Digital Health Tools:** Real-time maternal and child health tracking for responsive governance using **AI-based platforms**.

Conclusion:

The SRS 2021 report reflects India's **strong progress in population stabilization**, maternal and child health, and gender balance at birth. However, **regional disparities** and **unequal access to healthcare** demand focused policy and sustained investment. India's progress, if equitably extended, can serve as a global model for demographic transition.

PYQ: The increase in life expectancy in the country has led to newer health challenges in the community. What are those challenges and what steps need to be taken to meet them? (2022)

[Syllabus: Social Justice](#)

BONDED LABOUR IN INDIA

Context:

On International Labour Day, disturbing stories of bonded labour survivors from various states are in the spotlight, highlighting the continued prevalence of forced labour in India.

About Bonded Labour in India:

- Bonded labour refers to **forced work extracted under coercion** due to debt, advance payments, or social obligation, often without clear time limits.
- **Constitutional Provisions:**
 - **Article 23:** Prohibits **forced labour** and **begar**.
 - **Article 21:** Ensures the **right to life with dignity**, violated in bonded labour conditions.
- **Policy Evolution:**
 - **Bonded Labour System (Abolition) Act, 1976:** Criminalised all forms of bonded labour and extinguished debt obligations.
 - **Rehabilitation Scheme (2016):** Envisioned rescuing 1.84 crore bonded labourers by 2030. Only **12,760** were rescued between 2016–2021 (MoLE data, 2021).



Data on Bonded Labour in India:

- **Estimated Total Bonded Labourers:** 1.84 crore (as per Ministry of Labour & Employment, 2016 vision document).
- **Rescued & Rehabilitated (2016–2021):** 12,760 individuals (MoLE reply in Parliament, 2021).
- **Labour Sector Composition:** 39 Crore in unorganised sector out of 47 crore total workers (NSSO 2023).
- **Dominant Social Groups Affected:** Over 80% of bonded labourers are from **SC/ST/OBC communities** (various state studies).
- **International Ranking:** India among top countries with **modern slavery** (Global Slavery Index).

Persistence of Bonded Labour in India:

- **Poverty and Indebtedness:** Poor families take small advances for survival, leading to long-term bondage.
- **Caste-Based Discrimination:** SC/ST communities face structural exclusion, making them more vulnerable to exploitation.

E.g.: A Punjab study found 84% of bonded labourers were from backward castes.

- **Lack of Enforcement and Data:** Weak implementation of the Bonded Labour Act and poor monitoring hinder rescue efforts.

E.g.: Only 12,760 rescued between 2016–2021 out of 1.84 crore estimated cases.

- **Unregulated Informal Sector:** 90% of India's workforce is in the informal economy, with little legal or social protection.
- **State Denial and Policy Gaps:** Some states deny bonded labour exists, delaying rehabilitation and legal action.

E.g.: Maharashtra omitted bonded labour from its 40-point program post-Emergency.

Key Challenges in Eliminating Bonded Labour:

- **Caste-based Vulnerability:** Marginalised groups like **Dalits and Adivasis** are disproportionately represented in bonded labour (e.g., 84% from backward castes in Punjab – Manjit Singh study).
- **Lack of Political Will:** Parliament acknowledged 1.84 crore bonded labourers, yet less than **1%** have been rehabilitated.
- **Legal and Policy Gaps:** The **Trafficking of Persons Bill, 2018** largely excludes forced/bonded labour from its ambit (Kiran Kamal Prasad critique).
- **Organised Labour Trafficking:** Exploiters use **advances and social networks** to recruit workers systematically, as seen in **brick kilns of Karnataka and Punjab**.
- **Post-Rescue Vulnerability:** Rescued workers often **return to bondage** due to **social ostracism** or lack of economic alternatives.

Way Ahead:

- **Institutional Reforms:**
 - **Strengthen Enforcement Mechanisms:** Empower **District Vigilance Committees** under the 1976 Act with legal authority and digital tracking of complaints.
 - **Transparent Monitoring Frameworks:** Build a **central database** of rescued bonded labourers, integrated with **Aadhaar and job linkages**.
- **Social Reforms**
 - **Community-Based Rehabilitation:** Develop **social protection schemes** targeted at SC/ST groups vulnerable to debt bondage (e.g., skill training, land rights).
 - **Mass Awareness Campaigns:** Promote rights education in rural and tribal areas using **vernacular media and school programs**.
- **Legal Reforms:**
 - **Amend Labour Codes:** Reinstate robust **labour unionisation and collective bargaining rights**, eroded under the 2019-20 Labour Codes.
 - **Caste-Sensitive Legislation:** Introduce **intersectional legal safeguards** acknowledging caste, gender, and economic overlap in forced labour.

Conclusion:

Despite constitutional protection and legal bans, bonded labour persists in India due to **deep social, legal, and policy failures**. Real change demands **multi-layered reforms** combining enforcement, empowerment, and empathy. Without such a shift, India's economic growth will remain marred by **invisible slavery** and social injustice.

CHILD LABOUR IN INDIA

Context:

Despite having robust constitutional and legal frameworks to prohibit child labour, India continues to grapple with its widespread practice.

- From matchstick factories and brick kilns to leather units and construction sites, millions of children—particularly from disadvantaged socio-economic backgrounds—remain trapped in hazardous work.

About Child Labour in India:

What is child labour?

- Child labour refers to the employment of children in work that deprives them of their childhood, interferes with their education, and is mentally, physically, socially, or morally dangerous and harmful.

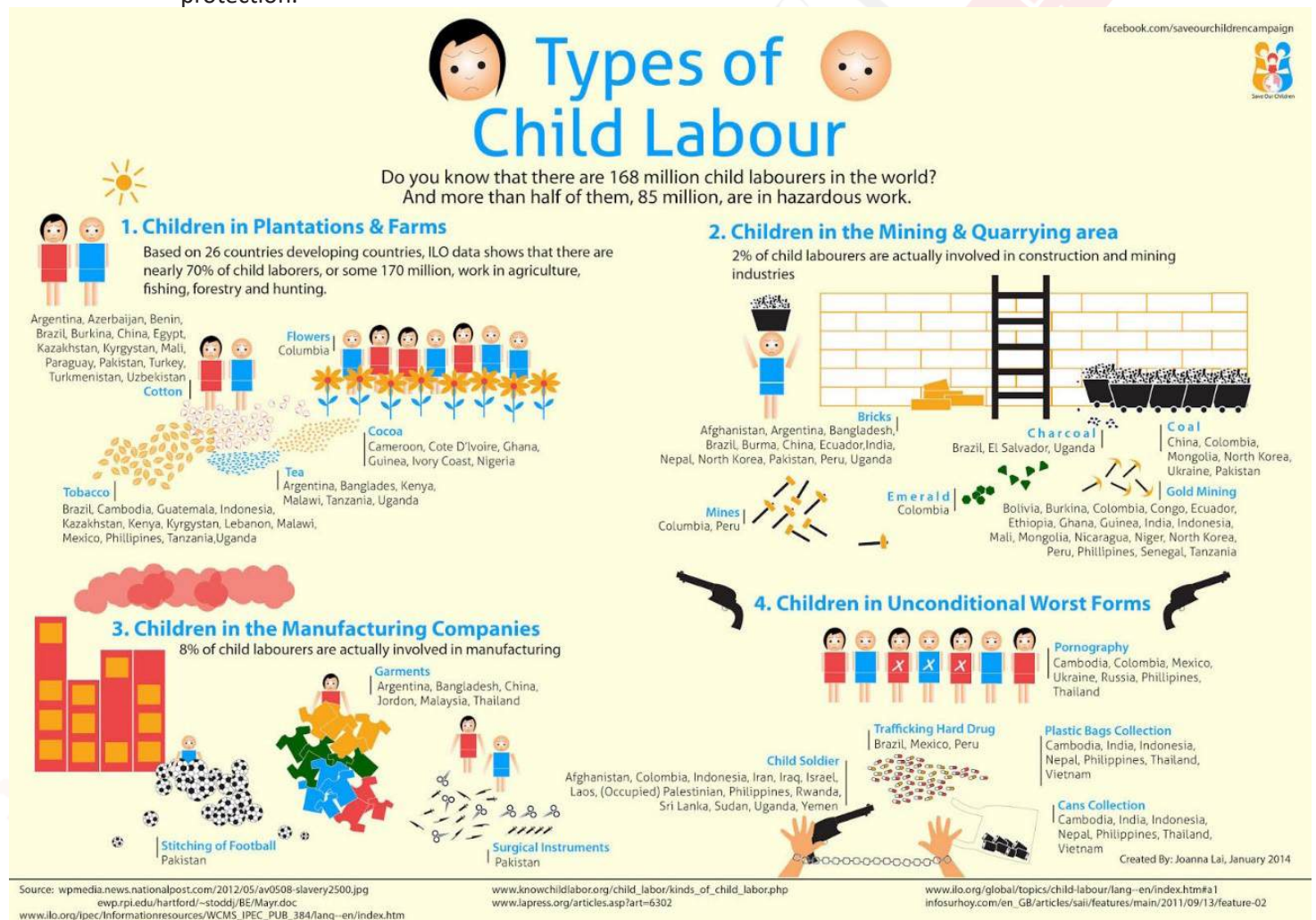
Legal Framework:

Constitutional Provisions:

- Article 24:** Prohibits employment of children below 14 years in factories, mines, or hazardous occupations.
- Directive Principles (Article 39(e) & (f)):** Mandate the State to ensure children are not abused and their childhood is protected.

Statutory Instruments:

- Child and Adolescent Labour (Prohibition and Regulation) Act, 1986 (Amended in 2016):**
 - Prohibits employment of children below 14 in any occupation.
 - Bans adolescents (14–18 years) from hazardous processes.
 - Allows work in family enterprises after school hours—a **controversial exception**.
- Juvenile Justice (Care and Protection) Act, 2015:** Treats child labour victims as children in need of care and protection.



Right to Education Act, 2009: Ensures free, compulsory education for 6–14-year-olds, indirectly reducing labour incidence.

Judicial Support

- The Supreme Court has upheld child rights as part of **Article 21 (Right to Life with dignity)** in multiple verdicts (**M.C. Mehta v. State of Tamil Nadu, 1996**).

The Ground Reality:

Magnitude of the Problem

- UNICEF analysis of PLFS (2018-19) estimates 18–33 lakh children engaged in labour.
- Nearly 50% of working children are employed within their families, making detection harder.

- Worst-affected sectors: agriculture, fireworks, glass-making, leather tanning, mining, construction.
- **Hazards and Exploitation**
 - Children are exposed to toxic chemicals, abusive conditions, injuries, and verbal and physical assault.
 - Lack of access to basic sanitation, healthcare, and education leads to long-term physical and mental damage.

Enforcement Crisis and Administrative Apathy:

- **Low Conviction, Lower Data**
 - In 2021, **only 613 cases** were registered under the Child Labour Act—a **shockingly low figure** given the actual scale.
 - Data gaps persist:
 - No updated **Census figures since 2011**.
 - Lack of **rural–urban, gender-wise disaggregation**.
 - Weak convergence between **labour departments, police, and child welfare agencies**.
- **Implementation Failure Examples**
 - **Madhya Pradesh distillery case (2024)**: 58 children rescued after 11-hour shifts with chemical burns—highlighting state-level inspection failures.

Root Causes:

- **Poverty Linkages**
 - As per the **ILO**, child labour is both a **cause and consequence of poverty**.
 - Families push children into work for **survival**, especially when **adult unemployment** is high (India had **35.6 million jobless adults** as per the recent Labour Force estimates).
 - Nutritional deprivations persist—**1 in 2 wasted children globally is Indian**, reinforcing the **poverty-malnutrition-child labour cycle**.

Way forward:

- **Strengthen Enforcement Mechanisms**
 - Create a **National Child Labour Enforcement Grid** integrating:
 - Labour inspectors
 - District magistrates
 - Juvenile Justice Boards
 - NGOs and Child Welfare Committees (CWCs)
- **Plug Legal Loopholes**
 - Re-evaluate the **“family enterprise” clause**, often misused to employ children informally.
 - Make **reporting and rehabilitation** mandatory for all employers under the Juvenile Justice Act, 2015.
- **Enhance Data Collection**
 - Fast-track the **2021 Census** and integrate **child labour modules** in **PLFS** and **NFHS**.
 - Use **geo-tagged rescue operations, mobile applications, and crowdsourced mapping** to track hotspots.
- **Link with Education and Welfare**
 - Strengthen **Samagra Shiksha, PM POSHAN, and Anganwadi coverage** in high-risk districts.
 - Provide **conditional cash transfers** to families withdrawing children from labour.
- **Awareness through Communication**
 - Campaigns like the **May Day advertisement by Ogilvy India**—“Lay off 7.8 million children”—should be scaled up to promote behavioural change.

Conclusion:

India has one of the world’s most well-articulated legal frameworks against child labour, but **enforcement and accountability lag behind**. Unless poverty is addressed holistically and implementation mechanisms are radically improved, the country risks perpetuating intergenerational injustice. The message is simple yet urgent: **Let adults work, and let children go to school**.

INDIA-PAKISTAN TENSION AND THE SUBCONTINENT'S CHALLENGE

Context:

Following the Pahalgam terror attack and killing 26 civilians, India launched Operation Sindoor across Pakistan and PoK, triggering retaliatory actions from Pakistan.

- Tensions have reached their highest point since **Balakot 2019**, with concerns about possible regional escalation and nuclear risks.

About India-Pakistan Tension and The Subcontinent's Challenge:

Historical Context of India-Pakistan Tensions:

<u>Year</u>	<u>Event</u>
1947–48	First war over Kashmir; Kashmir accedes to India.
1965	Second war after Pakistan's infiltration into Kashmir.
1971	India supports Bangladesh's liberation; Simla Agreement signed.
1999	Kargil War after Pakistani troops occupy Indian posts.
2001–08	Attacks on Parliament, Mumbai; increased LoC hostilities.
2016, 2019	Uri and Pulwama attacks; surgical and <u>Balakot</u> strikes.
2025	Pahalgam terror attack and retaliatory strikes mark a new threshold.

Strategic Implications:

- On India:**
 - Economic Costs:** Military escalation diverts resources; past wars have slowed down GDP growth by 0.5–1.2% (Source: RBI reports post-Kargil).
 - Security Recalibration:** India has demonstrated its ability to retaliate without cross-border movement (e.g., drone strikes), redefining deterrence norms.
 - Diplomatic Leverage:** India is pressing at IMF and multilateral forums to block Pakistan's bailout pathways.
- On the Global Stage:**
 - Nuclear Risk Concerns:** As nuclear states, India-Pakistan escalation draws global anxiety—UN and major powers have called for de-escalation.
 - China's Role:** Pakistan's strategic alliance with China raises the possibility of **multi-front conflict** (especially in Ladakh or Arunachal).
 - Regional Instability:** Repeated conflict in South Asia undermines global confidence in the region's investment climate and development trajectory.

Key Challenges to South Asia:

- Leadership Vacuum:** Absence of long-term visionary leadership has kept historical grievances unresolved.
- E.g.** Failed post-Musharraf dialogues on Kashmir autonomy.
- Terror as State Policy:** Pakistan's tolerance or support for non-state actors' fuels insecurity across borders.
- Lack of Regional Integration:** SAARC remains dysfunctional; trade within South Asia is only 5% of total trade.
- People-to-People Divide:** Nationalistic narratives overshadow cultural and human linkages, increasing hostility.
- External Power Play:** China's overt support to Pakistan and US disengagement from the region worsen strategic uncertainty.

Way Ahead:

- Backchannel Diplomacy:** Reinitiate confidential talks through Track II channels to create space for dialogue.
- Border Management:** Strengthen intelligence and technological surveillance to prevent terrorist infiltration.

- **Revive SAARC/BBIN Dialogues:** Focus on shared economic and environmental goals to rebuild trust.
- **IMF & FATF Leverage:** Use multilateral forums to push for action against terror financing networks.
- **Domestic Consensus:** Build cross-party unity in India on national security issues, avoiding politicization.

Conclusion:

India and Pakistan must recognize that **prolonged hostility benefits neither** and only hampers the region's economic and social progress. **Military options offer short-term tactical gains** but **political solutions remain the only sustainable path**. Regional peace is essential for realizing the potential of a **rising South Asia**.

PYQ: "Increasing cross-border terrorist attacks in India and growing interference in the internal affairs of several member-states by Pakistan are not conducive for the future of SAARC (South Asian Association for Regional Cooperation)." Explain with suitable.

WAR AND DISINFORMATION: A TACTICAL WEAPON

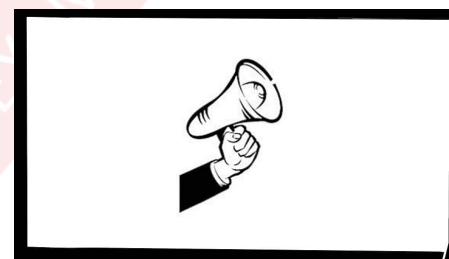
Context:

Amid a recent India-Pakistan ceasefire, Pakistan intensified a state-sponsored disinformation campaign through doctored visuals and fake narratives to distort global and domestic perceptions.

About War and Disinformation: A Tactical Weapon

What is Disinformation?

- Disinformation refers to **deliberate dissemination of false or misleading content** intended to manipulate public opinion or discredit opponents.
- In modern warfare, it is a **non-kinetic strategy** to influence enemy morale and **shape international narratives** without physical aggression.



Objectives of Disinformation During War:

- **Destabilize morale** of the adversary (e.g., false reports of Indian drone crashes).
- **Shape global opinion** to gain diplomatic space (e.g., showing fake civilian casualties).
- **Divide domestic populations** through communal misinformation (e.g., fake missile strike in Amritsar).
- **Undermine trust** in institutions, media, and democratic processes.

Modes of Disinformation:

- **Social Media Virality:** Doctored images, misattributed videos (e.g., Turkish drone video passed as Pakistani strike).
- **Fake Telegram Channels:** Circulating natural disaster footage as war-related.
- **Narrative Hijacking:** Use of news templates and fake official-looking handles.
- **Meme Warfare** and influencers amplifying emotion-laced propaganda.

Consequences of Disinformation in Wartime:

- **National Security Threat:** Disinformation can provoke panic, disrupt civil order, and influence military decision-making.
- **Erosion of Public Trust:** Constant exposure to falsehoods leads to **information fatigue** and **loss of faith in media**.
- **Diplomatic Fallout:** False narratives impact **international reputation**, affecting India's position in multilateral forums.
- **Communal Polarization:** Targeted lies can **trigger riots** or deepen sectarian rifts, as seen in false missile strike claims.

Challenges in Countering Disinformation:

- **Speed of Spread:** Fake news spreads faster than fact-checking; **virality outpaces verification**.
- **Deepfakes and AI Tools:** Technology enables **hyper-realistic fake content**, difficult to debunk in real-time.
- **Lack of Media Literacy:** A large population lacks **critical digital skills** to distinguish fact from fiction.
- **No Border for Propaganda:** Disinformation transcends national boundaries, making legal enforcement complex.

Case Study:

- **China's playbook** involves tight state control, content farms, and centralised narrative engineering.
- Pakistan's recent disinformation efforts mirror **China's tactics** — central control, emotional narratives, and cross-platform content flooding.
- China's silent role includes **media training, tech infrastructure**, and diplomatic shielding in UN forums.

Way Ahead:

- **Strengthen Fact-Checking Ecosystem:** Invest in **independent fact-checking networks** and partnerships with social media firms.
- **Media Literacy Campaigns:** Integrate digital literacy into school curricula (E.g., **Finland's model of critical media education**).
- **International Cooperation:** Build alliances to **trace cross-border info-warfare**; strengthen cyber diplomacy with like-minded nations.
- **Legal and Regulatory Tools:** Update IT Rules to tackle **deepfakes and coordinated disinformation networks**, ensuring free speech is not curbed.
- **Empower Institutions:** Equip Election Commission, defence agencies, and PIB Fact Check units with **real-time monitoring tools** and crisis response teams.

Conclusion:

Disinformation is not just digital noise; it is a **strategic weapon** in modern hybrid warfare. To protect national integrity and democratic discourse, India must proactively counter **narrative manipulation** both online and offline. **Media literacy, institutional capacity, and global partnerships** are vital to win the war of perception.

PYQ:

What do you understand about the concept of "freedom of speech and expression"? Does it cover hate speech also? Why do the films in India stand on a slightly different plane from other forms of expression? Discuss. (UPSC-2014)

SHUTDOWN OF LAND PORTS FOR APPAREL IMPORTS FROM BANGLADESH

Context:

India shut down all land ports for the import of readymade garments from Bangladesh, affecting cross-border trade.

About Shutdown of Land Ports for Apparel Imports from Bangladesh:

- **What It Is?**
 - India **banned readymade garment imports** from Bangladesh through **all land ports**, but allowed them via **Nhava Sheva and Kolkata seaports**.
 - Affected ports include those in Assam, Tripura, Meghalaya, and Mizoram, and West Bengal's Changrabandha and Fulbari.
- **Reason Behind the Move:**
 - **Reciprocity:** Bangladesh earlier restricted **cotton yarn imports** and **Indian rice transit** through its land ports.
 - **Security & Strategy:** India objects to **Dhaka's closer ties with China** and perceived undermining of the Northeast's strategic identity.
- **Key Features:**
 - Ban includes **processed food, plastic goods, wooden furniture**, cotton waste, etc.
 - **Exemptions:** Fish, LPG, edible oil, and crushed stone remain unaffected.
 - Aimed at correcting **trade asymmetry** and asserting **regional political leverage**.



Implications:

- **On Bangladesh:**

- **Major Textile Setback:** Bangladesh's \$700 million apparel exports to India face disruption, especially from land-dependent exporters.
- **Trade Diversion Risk:** Could impact orders to Nepal and Bhutan, increasing supply chain uncertainties in the subcontinent.
- **Investor Concerns:** The diplomatic friction may discourage FDI inflow, especially into Bangladesh's textile and export processing zones.
- **On India:**
 - **Northeast Market Reorientation:** Reduces Dhaka's dominance and promotes local entrepreneurship under Atmanirbhar Bharat in the Northeast.
 - **Diplomatic Strain:** Further erosion of trust with a key neighbour; raises concern about China–Bangladesh proximity.
 - **Logistical Costs:** Shifting trade from land ports to sea routes may increase transit time and freight costs for Indian importers.

Way Ahead:

- **Restore Dialogue Channels:** India and Bangladesh must re-engage through diplomatic platforms like the Joint Consultative Commission (JCC).
- **Review Trade Imbalances:** Both nations should calibrate trade policies ensuring fairness without hampering regional integration.
- **De-escalate via Multilateral Frameworks:** Use BIMSTEC and BBIN to manage transnational trade and transit issues constructively.

Conclusion:

The land port shutdown reflects the fragility of cross-border trade when **diplomatic trust falters**. While the move protects strategic interests, it also risks **economic backlash** and regional instability. Rebuilding cooperation is key for long-term subregional connectivity and peace.

PYQ:

The protests in Shahbag Square in Dhaka in Bangladesh reveal a fundamental split in society between the nationalists and Islamic forces. What is its significance for India? (UPSC-2013)

INDIA–USA ENERGY PROGRAMS

Context:

U.S. Vice-President J.D. Vance recently reaffirmed cooperation with India on energy and defence, while India highlighted energy security, technology transfer, and critical minerals as key bilateral focus areas.

About India–USA Energy Programs:

Measure so far:

- **Strategic Clean Energy Partnership (SCEP):** Covers biofuels, solar, hydrogen, and energy efficiency.
- **U.S.-India Initiative on Critical and Emerging Technology (iCET):** Focuses on clean tech, AI, quantum, and SMRs (Small Modular Reactors).
- **Nuclear Energy Cooperation:** Includes technology transfer and potential investment in India's 100 GW nuclear goal.
- **Critical Minerals MoU (2024):** Targets resilient mineral supply chains and third-country co-investment.



Why Is Such a Partnership Needed?

- **Energy Security:** India needs predictable energy supply with minimal disruption to fuel its \$5-trillion economy goal.

E.g. India's energy import bill crossed \$153 billion in FY24.

- **Climate Goals:** Net-zero by 2070 needs diversified low-carbon energy including **nuclear, renewables, and green hydrogen**.
- **Supply Chain Resilience:** China controls 90% of rare earth processing — India needs alternate, democratic mineral partnerships.
- **Infrastructure Financing:** Nuclear power alone may need **\$180 billion by 2047**, demanding global capital and technology infusion.

Challenges to India–USA Energy Cooperation:

- **Civil Liability Law Roadblock:** India's **2010 Nuclear Damage Act** hinders private U.S. investment in nuclear plants.
- **Slow Deployment Timelines:** Nuclear projects in India often take 9+ years; costly and delayed outcomes.
- **Geopolitical Uncertainties:** Global trade tensions, tariffs, and protectionism may stall mineral supply chains and joint ventures.
- **Lack of Private Sector Incentives:** Limited clarity on offtake guarantees, waste disposal norms, and return assurance for SMRs.
- **Data Silos & Tech Transfer Barriers:** No shared database or secure digital platforms for mineral traceability or R&D collaboration.

Way Ahead:

- **Reform Liability Law:** Amend the Civil Liability Act to allow foreign and private capital in India's nuclear sector.

E.g. Holtec's SMR tech transfer to L&T & Tata Consulting needs legal safeguards.

- **Joint Strategic Mineral Stockpiling:** Use India's **Petroleum Reserves** and **U.S. National Defense Stockpile** to hedge supply risks.
- **Launch India-U.S. Mineral Exchange:** Create a secure digital hub for **traceability, trade, and co-investment** using blockchain.
- **Quad as Multiplier:** Expand trilateral mineral partnerships with **Australia & Japan** for processing, R&D, and African outreach.
- **Fast-Track Nuclear Deployment:** Standardise designs, cut approval time, and build **5–6 GW of nuclear annually** by early 2030s.
- **Financing Frameworks:** Restructure domestic lending and enable **green bonds** or **multilateral funding** for nuclear and minerals.

Conclusion:

India–U.S. energy cooperation is crucial for a stable, green, and geopolitically resilient future. It requires long-term planning, patient execution, and institutional innovation. From critical minerals to modular reactors, this partnership can anchor India's net-zero journey and bolster strategic autonomy.

PYQ: How will I2U2 (India, Israel, UAE and USA) grouping transform India's position in global politics? (UPSC- 2022)

About Western Disturbance:

- **What it is?**
 - Western Disturbances (WDs) are **eastward-moving extra-tropical cyclones** that bring rain and snow to northern India, particularly in winter.
 - They originate over the **Mediterranean, Caspian, and Black Seas**, picking up moisture before reaching the Indian subcontinent.
- **How it forms?**
 - WDs form due to **interactions between polar and tropical air masses** and travel along the **subtropical westerly jet stream** over the Himalayas.
 - These systems are embedded in high-altitude winds and often accompanied by low-pressure areas.

Impact of Western Disturbances on India:

- **Winter Rainfall & Snow:** Primary source of winter precipitation in **North India**, crucial for **Rabi crops** in Punjab, Haryana, and western UP.
- **Moderates Heatwaves:** Frequent WDs reduce **summer heat intensity** across northwest and central India.
- **Triggers Extreme Weather:** Causes **hailstorms, flash floods, and landslides**, especially in **Himalayan states** like J&K and Himachal.
- **Affects Aviation & Transport:** Leads to **flight delays, road blockages, and urban flooding**, especially in metro cities like Delhi.
- **Alters Monsoon Behaviour:** Overlapping WDs during **pre-monsoon and monsoon months** disrupt rainfall patterns and intensify precipitation.

Recent Climate Change Impact on Western Disturbances:

- **Increased Frequency:** More WDs observed post-January 2025, especially in March–April.
- **Extended Seasonality:** WDs now occur in May–July, beyond their usual Dec–March peak. **E.g.** Weather and Climate Dynamics journal (2024) confirms this 70-year shift.
- **Stronger Jet Streams:** Climate change has **intensified subtropical westerly jet streams**, allowing WDs to travel wider and deeper. **E.g.** This causes more **meridional oscillations**, leading to erratic rain and snowfall.
- **Moisture Surge from Arabian Sea:** Rapid warming (1.2°C–1.4°C rise in SST) increases moisture availability. **E.g.** Heavier rainfall and flash floods across North and Central India.
- **Increased Extremes:** In 2025, WDs caused **hailstorms in Bihar, Himachal, Vidarbha**, and flooding in Telangana and Delhi, as per IMD warnings.

Way Ahead:

- **Enhance Weather Forecasting:** Strengthen satellite monitoring, radar coverage, and AI-based forecasting to track WDs more precisely.
- **Urban Flood Preparedness:** Cities like Delhi need WD-specific urban drainage and early warning systems to manage waterlogging and transport disruptions.
- **Climate-Adaptive Agriculture:** Modify sowing patterns and crop insurance schemes based on WD forecasts to protect Rabi crops.
- **Research & Modeling:** Boost interdisciplinary climate modeling of WD behaviour and integrate findings into India's climate adaptation policies.
- **Collaborative Climate Action:** Engage with **Hindu Kush-Himalayan regional partners** to address transboundary weather impacts of changing WDs.

Conclusion:

Western Disturbances are no longer seasonal visitors but year-round disruptors, reshaped by global warming. They now affect monsoon overlaps, cause extreme events, and challenge weather predictability in India. A climate-resilient policy framework, backed by science and inter-state coordination, is essential to mitigate future WD-linked disasters.

PYQ:

Discuss the concept of air mass and explain its role in macro-climatic changes. (UPSC 2016)

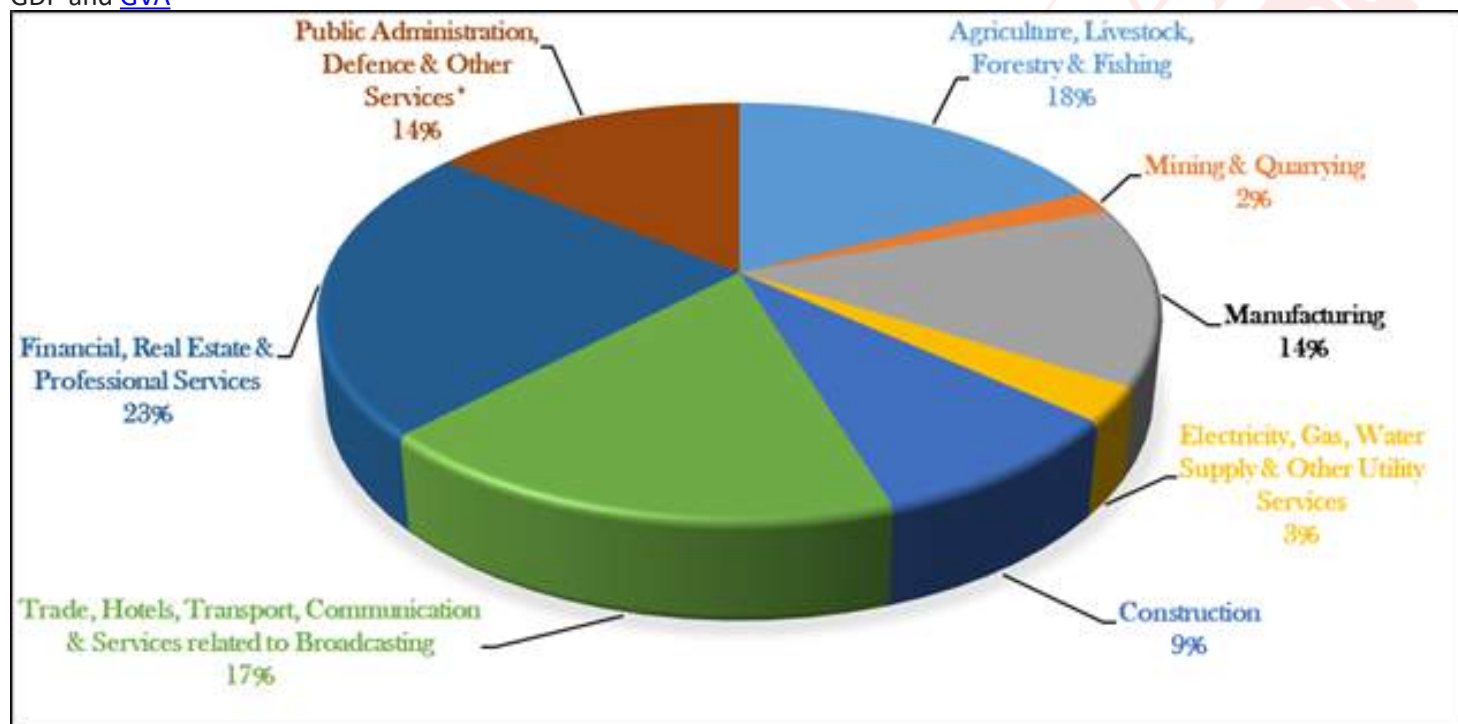
GENERAL STUDIES-III

Syllabus: Economy

PROVISIONAL ESTIMATE OF GDP

Context:

The Ministry of Statistics and Programme Implementation (MoSPI) released Provisional Estimates (PEs) for India's FY25 GDP and [GVA](#)



About Provisional Estimate of GDP:

What is Provisional GDP?

- **Definition:** Provisional GDP refers to national income and output data released at the end of the financial year, incorporating all four quarters. These figures are **subject to revision** as more accurate data becomes available.
- **Released by:** MoSPI (Ministry of Statistics and Programme Implementation).
- **Revision Cycle:**
 - First Advance Estimates: January
 - Second Advance Estimates: February
 - Provisional Estimates: May
 - Revised Estimates: Over the next two years

Key Summary of Provisional GDP Estimates FY 2024–25:

- **Real GDP** grew by **6.5%** in FY25, reaching ₹187.97 lakh crore, while **Nominal GDP** rose by **9.8%** to ₹330.68 lakh crore.
- In **Q4 FY25**, real GDP increased by **7.4%** and nominal GDP by **10.8%**, indicating strong year-end performance.
- **Real GVA** growth stood at **6.4%**, with notable sectoral performances in **construction (9.4%)**, **public services (8.9%)**, and **financial services (7.2%)**.
- **Primary sector** rebounded with **4.4% growth**, up from **2.7%** last year, and posted **5% growth** in Q4 alone.
- **Private Final Consumption Expenditure (PFCE)** saw a rise of **7.2%**, showing revival in demand, while **Gross Fixed Capital Formation (GFCF)** grew by **7.1%**.
- **Manufacturing sector** continues to lag with **lower CAGR (4.04%)** compared to **agriculture (4.72%)**, affecting employment dynamics.
- Estimates are compiled using benchmark-indicator methods with data from over a dozen key macro indicators like IIP, crop output, rail & port traffic, and tax data.

- These figures are **provisional** and will undergo further revision based on updated datasets in 2026 and 2027.

Analysis:

- Positives:**
 - Consistent economic expansion:** Despite global uncertainties, India remains one of the fastest-growing major economies.
 - Resilience in agriculture:** GVA in agriculture has grown faster than manufacturing since FY20.
 - Improved data integration:** The estimates now capture Q4 data, providing a fuller picture of the economy.
- Negatives:**
 - Slowing nominal GDP growth:** At 9.8%, FY25 shows the third-slowest nominal GDP growth since 2014.
 - Manufacturing lag:** Manufacturing GVA growth lags behind agriculture, highlighting industrial stagnation.
 - Employment concerns:** Sluggish manufacturing explains high urban youth unemployment and increased labour migration to rural areas.

Significance:

- The data offers **critical input for fiscal planning**, monetary policy, and investment strategies.
- It reflects **India's macroeconomic stability** but also exposes vulnerabilities in key growth engines like manufacturing.
- For international observers, the real GDP growth rate is essential for **cross-country comparisons**, as it adjusts for inflation.

Conclusion:

India's provisional [GDP data](#) shows moderate economic resilience with real growth at 6.5%, but deeper issues persist, especially in manufacturing. Addressing sectoral imbalances and revitalizing industrial growth are vital for sustainable development. The GDP trends offer a mirror to both progress and pending structural reforms.

PYQ:

- Faster economic growth requires increased share of the manufacturing sector in GDP, particularly of MSMEs. Comment on the present policies of the Government in this regard. (2023)

16TH FINANCE COMMISSION

Context:

As states demand greater fiscal autonomy and a larger share of the divisible tax pool, the [16th Finance Commission \(FC\)](#) faces a complex challenge.

About the 16th Finance Commission

The [16th Finance Commission \(FC\)](#) was constituted under [Article 280](#) in **December 2023**, chaired by **Dr. Arvind Panagariya**, to recommend **tax devolution and fiscal federalism reforms for 2026-31**.

Current Structure of Devolution:

- States' Share:** Fixed at 41% by the 15th FC (reduced from 42% post J&K's reorganization).
- De Facto Share:** States receive only about 32% of Centre's gross tax revenues due to the rise in cesses and surcharges (not shareable).

Key Issues Before the 16th Finance Commission:

- Shrinking Divisible Pool and Rising Cesses:** [Cesses and surcharges](#) have reduced the size of the divisible pool from 88.6% (2011–12) to 78.9% (2021–22) of the Centre's gross tax revenue (RBI data).
 - States argue for **restoring fairness by capping these levies** and increasing their share **to 50%**.
- Fiscal Constraints of the Union Government:**
 - High Demand on Centre's Budget:** It may not be feasible to raise total transfers without fiscal stress.
 - Borrowing for Transfers:** Centre is borrowing to fund grants, raising questions on spending priorities.
- Tied vs. Untied Transfers – Need for Rebalancing:**
 - Current Scenario:** Excessive reliance on [centrally-sponsored schemes \(CSS\)](#) ties states to Centre-dictated



spending.

- **Proposal:** Increase untied transfers to allow states more discretion within the existing transfer envelope.
- **Challenge:** Requires pruning of CSS, which are politically and developmentally sensitive.

Implications of Increasing Untied Transfers:

- **Quality of State Spending:**
 - **Rising Revenue Deficits:** Many states, including [Karnataka and Punjab](#), are facing worsening revenue balances.
 - **Risk of Misuse:** Untied funds may be diverted towards revenue expenditure or non-merit subsidies (e.g., free electricity, water), rather than capital investments.
- **Rise in Cash Transfer Schemes:**
 - **Quasi-Universal Transfers:** 14 states have launched income support schemes, totalling 0.6% of GDP (Axis Bank report).
 - **Concern:** More untied funds could be used for electoral populism instead of systemic improvements.
- **Equity in Public Service Delivery:**
 - **Inter-State Disparities:** Low-income states like **Bihar** spend significantly less per capita on public services.
 - **Question:** Will more untied funds lead to convergence in service delivery standards across states?
- **Devolution to Local Governments:**
 - **Neglect of the Third Tier:** Panchayats and municipalities receive a much smaller share of total public spending compared to countries like China and South Africa.
 - **Hope:** More untied funds could incentivize states to devolve more resources to local governments.

TYPES OF FREE TRADE AGREEMENT (FTA)S:

Free Trade Agreement (FTA):

Eliminates tariffs on most goods, e.g., India-UAE CEPA



Bilateral Trade Agreement (BTA):

Trade pact between two countries, e.g., India-Sri Lanka FTA.



Preferential Trade Agreement (PTA):

Reduces tariffs on specific goods, e.g., India-Thailand PTA.



Bilateral Trade Agreement (BTA):

Trade pact between two countries, e.g., India-Sri Lanka FTA.



Regional Trade Agreement (RTA):

Agreement between multiple nations in a region, e.g., India-ASEAN FTA.



Comprehensive Economic Cooperation Agreement (CECA): Broader than an FTA, includes economic and investment cooperation, e.g., India-Singapore CECA



Way Forward:

- **Reform Transfers Framework:** Consider capping cesses, rationalizing CSS, and increasing untied transfers with accountability safeguards.
- **Strengthen Institutional Capacity:** Build monitoring systems to ensure untied funds are spent on productive and equitable outcomes.
- **Incentivize Local Devolution:** FC can recommend performance-based grants to states promoting third-tier

empowerment.

- **Adopt Differentiated Approaches:** Tailor devolution mechanisms to reflect state capacity, developmental needs, and fiscal health.

Conclusion:

The 16th Finance Commission must navigate the fine line between enhancing fiscal autonomy for states and safeguarding national fiscal stability. A rebalanced transfer structure—one that ensures equitable, accountable, and convergent public service delivery—will be crucial in deepening India's cooperative federalism.

PYQ:

The public expenditure management is challenge to the Government of India in context of budget making during the post liberalization period. Clarify it. (UPSC 2019)

INDIA-U.K. FREE TRADE AGREEMENT

Context:

On **May 6, 2025**, India and the United Kingdom concluded a **historic multi-billion-pound Free Trade Agreement (FTA)** and a **Double Contribution Convention**, aiming to double bilateral trade and deepen economic integration.

About India- UK Free Trade Agreement (FTA):

What is a Free Trade Agreement (FTA)?

- A **Free Trade Agreement (FTA)** is a **bilateral or multilateral pact** between countries to reduce or eliminate **customs duties and non-tariff barriers** on the majority of traded goods and services.
- FTAs facilitate:
 - **Duty-free access** to partner markets
 - **Regulatory simplification**
 - **Cross-border investments**
 - **Mobility of professionals**
 - **Preferential treatment** over non-FTA competitors,
- Globally, over **350 FTAs** are operational, with most countries party to at least one.

Background of the India-U.K. FTA:

- Negotiations began in **January 2022** after Brexit, symbolising U.K.'s independent trade ambitions.
- Talks were delayed due to frequent political transitions in the U.K. and elections in both countries.
- After **14 rounds of negotiations**, the agreement was finalised in May 2025, followed by a conversation between **PM Narendra Modi** and **PM Keir Starmer**.
- The agreement now awaits **legal vetting and ratification by the British Parliament**.

Key Provisions of the India-U.K. FTA:

Provision Area	Details
1. Tariff Reductions	- India to reduce tariffs on 90% of U.K. goods. - Specific reductions: • Whisky/Gin: from 150% to 75%, then to 40% over 10 years • Automobiles: from 100%+ to 10% under quota • Other Goods: Cosmetics, medical devices, salmon, chocolates, biscuits - U.K. to offer 99% duty-free access to Indian exports, covering nearly 100% of trade value
2. Services & Mobility	- Annual quota of 1,800 skilled professionals (e.g., chefs, yoga instructors, musicians) - Covers sectors such as IT/ITeS, architecture, education, telecom, finance - Mutual Recognition Agreements (MRAs) for professional qualifications to be completed within 36 months
3. Double Contribution Convention	- Waiver of dual social security contributions for Indian professionals and employers on short-term assignments (up to 3 years) in the U.K. - Reduces operational costs for Indian service exporters

Provision Area	Details
4. Market Access Safeguards	- No Economic Needs Test (ENT) or numerical quotas by the U.K. for Indian service suppliers - U.K. commits access across 137 service sub-sectors , including private healthcare and education
5. Mutual Sensitivities Addressed	- India dropped its demand for post-study work visas - U.K. withdrew its demand for access to legal services sector in India (regulated under Advocates Act)

Potential Benefits for India

Sector	Expected Gains
Textiles & Apparel	Knitwear exports to U.K. may rise from 9% to 20% ; major boost to Tiruppur cluster
Leather & Footwear	Tariff-free access for SMEs and labour-intensive units
Gems & Jewellery	Enhanced access to high-value British markets
Automobiles & Components	Export growth via reduced tariffs under quotas
Pharma & Chemicals	Improved regulatory cooperation and entry of generic medicines
IT, Finance, Education	Preferential access in 137 service sectors ; includes startups and ed-techs
Skilled Professionals	Work access in niche fields (wellness, arts, engineering, etc.)

Concerns:

- **Farmer and MSME Protests:** Fears of being undercut by cheaper U.K. imports such as lamb, salmon, processed foods.
 - Past FTAs (e.g., ASEAN) seen as unfavourable to agriculture
- **Implementation and Awareness:** Complex compliance for small exporters (rules of origin, certification, standards).
 - Low awareness among rural exporters and artisans
- **Trade Deficits and Monitoring:** Need to prevent a rising trade imbalance if Indian exports do not scale up proportionately
- **Legal and Regulatory Delays:** MRAs may get stuck in bureaucratic negotiation, delaying service benefits

Way Forward:

- **Sectoral Handholding and Capacity Building**
 - Launch **FTA facilitation centres** across key sectors (textiles, pharma, auto)
 - Offer **technical support and export readiness training** for MSMEs
- **Strengthen Safeguards**
 - Operationalise **safeguard clauses** for sensitive agri-products
 - Create **adjustment funds** for affected farmers and micro-units
- **Fast-track MRAs**
 - Engage regulatory bodies (Bar Council, Medical Council, AICTE) to **negotiate MRAs swiftly**
- **Real-Time Monitoring and Review**
 - Establish a **bilateral FTA review mechanism** with performance dashboards and stakeholder grievance redressal
- **Public Communication**
 - Run campaigns to **educate exporters, startups, and professionals** on FTA benefits and eligibility

Conclusion:

The India–U.K. FTA is a **strategic and economic milestone**, offering **broad-based trade and service gains** while addressing **regulatory and political sensitivities**. Its success, however, hinges on **inclusive implementation, sector-specific support**, and **timely enforcement** of commitments. If navigated wisely, it can become a **model for India's future FTAs with the EU and Canada**, while boosting India's position in the global trade architecture.

PYQ:

What does a free trade agreement (FTA) entail, and why are they crucial for India? What complexities arise during the negotiation of FTAs, and how can these challenges be navigated effectively?

Syllabus: Agriculture

INDIA'S SMALL FARMERS

Context:

A detailed analysis published recently highlights the urgent need to transition small farmers from dependency to dignity by fostering agripreneurship, equity, and sustainable market access.

About India's Small Farmers:

- **Definition:** Small and marginal farmers are those who **own less than 2 hectares** of land (Agricultural Census 2015–16).
- **Extent:** They constitute over **85% of all farmers** but cultivate **just 45% of net sown area**.
- **Contribution:** Despite feeding the nation, most live in **vulnerability and poverty**, lacking adequate resources, voice, or market access.

**Challenges Faced by Small Farmers:**

- **Climate Vulnerability & Input Costs:**
 - Dependence on **erratic monsoons** with minimal irrigation.
 - **Rising costs** of seeds, fertilizers, and diesel shrink net income (RBI Handbook 2022).
- **Market Access & Price Realisation:**
 - Only **7% benefit from MSP** and most face **distress sales** to middlemen (Shanta Kumar Committee 2015).
 - Lack of storage and processing infrastructure worsens price volatility.
- **Institutional Credit & Indebtedness:**
 - Only **30% access formal credit** (NABARD 2016–17), while others depend on **high-interest informal loans**.
 - **₹10.09 lakh crore in corporate loan write-offs (RBI 2022)** highlight systemic credit inequality.
- **Dependency on Subsidies:** Subsidies and loan waivers offer **short-term relief**, but foster **long-term dependency** and discourage diversification.
- **Lack of Agripreneurial Skills:**
 - Limited access to **training in business planning, value chain management**, and digital platforms.
 - Infrastructure gaps hinder transformation to market-oriented production.

Key Government Schemes for Small Farmers:

1. **PM-KISAN (Pradhan Mantri Kisan Samman Nidhi):** Provides ₹6,000 per year in direct income support to small and marginal farmers in three equal instalments.
2. **PMFBY (Pradhan Mantri Fasal Bima Yojana):** Offers crop insurance to protect farmers against yield loss due to natural calamities at minimal premium.
3. **PMKSY (Pradhan Mantri Krishi Sinchai Yojana):** Focuses on improving irrigation efficiency and ensuring “Har Khet Ko Pani” for small landholders.
4. **e-NAM (National Agriculture Market):** A digital platform connecting mandis to offer better price discovery and reduce middlemen for small farmers.
5. **Formation of 10,000 FPOs (Farmer Producer Organisations):** Empowers smallholders to collectively access markets, inputs, and credit through organised producer groups.

Way Forward:

- **Promote Agripreneurship & Diversification:** Encourage farmers to transition from subsistence to business models, leveraging tools like AgriBazaar, Ninjacart, and e-NAM.
- **Strengthen FPOs & SHGs:** Support **10,000+ FPOs** with finance, training, and market linkages to **scale collective marketing** and value addition.
- **Reform Rural Credit Architecture:** Prioritise lending to **cooperatives, SHGs, and FPOs**, and scale up digital lending.

platforms with regulatory oversight.

- **Encourage Organic & Sustainable Farming:**
 - Promote **organic production** via schemes like PKVY, targeting **2 million hectares**, and **\$1.2 billion in exports (2024, APEDA)**.
 - Facilitate **certifications (NOP, Fairtrade)** and use **blockchain traceability** to build premium value chains.
- **Implement 4P Models (Public-Private-Producer Partnership):** Involve corporates in **equitable value chains** with legal safeguards, transparent procurement, and CSR-driven rural investment.
- **Invest in Rural Digital Infrastructure:** Bridge **rural-urban digital divides** through digital literacy, drone-based input delivery, and access to real-time agri-data.
- **Align with Sustainable Development Goals (SDGs):** Promote practices supporting **SDG 1 (No Poverty)**, **SDG 2 (Zero Hunger)**, and **SDG 13 (Climate Action)** via agroecology and value-added agriculture.

Conclusion:

India's agricultural progress hinges on uplifting its **small and marginal farmers** through dignity, opportunity, and enterprise. Post-COVID tools—e-commerce, FPOs, and digital platforms—offer the means to bridge gaps in credit, markets, and technology. A shift from **relief to resilience** can unlock India's true rural potential for a sustainable and just future.

PYQ:

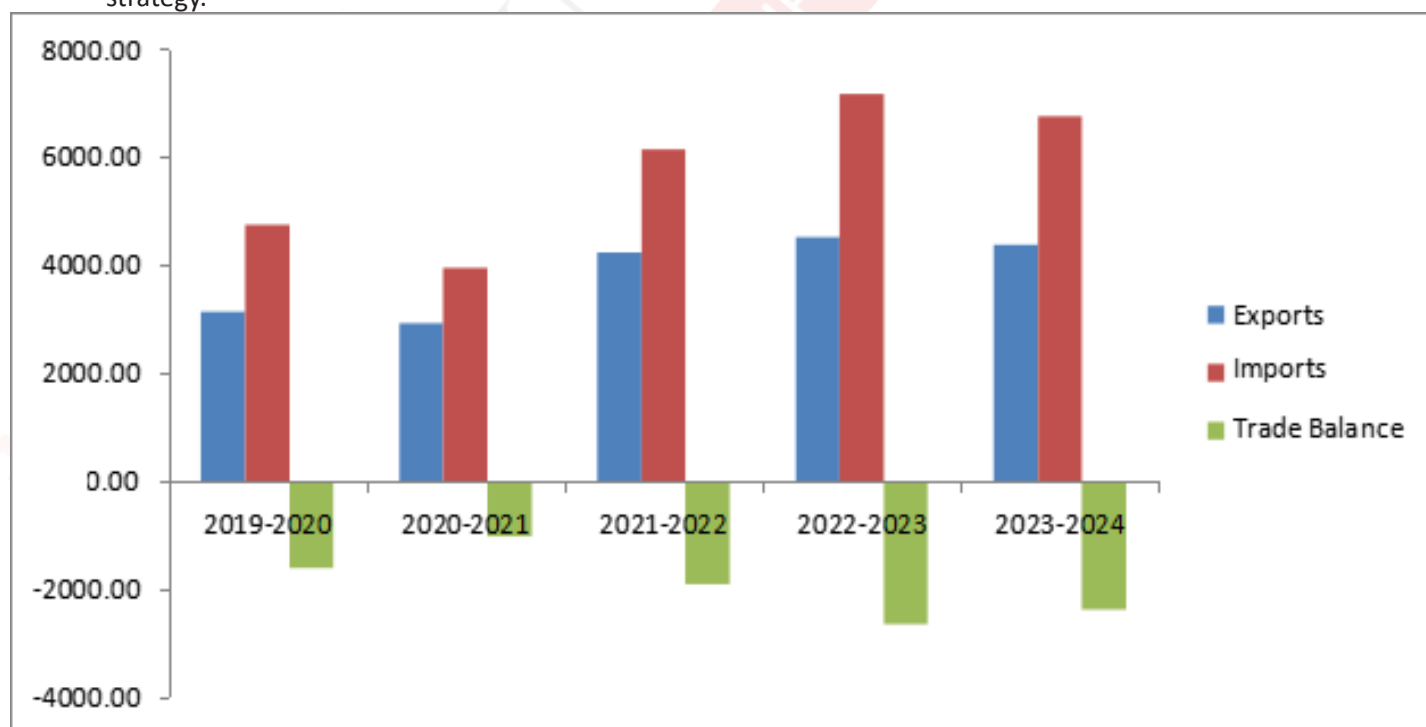
Explain various types of revolutions, took place in Agriculture after Independence in India. How have these revolutions helped in poverty alleviation and food security in India? (UPSC - 2017)

INDIA'S AGRI EXPORT REGIME

Context:

India recently signed multiple [Free Trade Agreements](#) (FTAs) with the UK, EFTA bloc, and finalized terms for an India-US trade deal.

- However, **agriculture remains excluded** from these deals, raising concerns over India's long-term Agri-export strategy.



About India's Agro-Export Regime:

- **What It Is?**
 - India's agro-export regime refers to the **framework of policies, infrastructure, and institutional mechanisms** guiding the **export of agricultural commodities**.

- **Current Status:**
 - **Agri-export value** fell to **\$48 billion in 2023–24**, from **\$52 billion in 2022–23**.
 - **Basmati rice** alone contributes to **21% of total agri exports**.
 - Institutions like **APEDA** and **ODOP-GI tags** support promotion and branding.
 - India has kept agriculture **largely out** of recent FTAs, including with **UK, EFTA**, and **US**, citing sensitivity concerns.
- **Challenges to India's Agri-Export Regime:**
 - **FTA Exclusions:** Agriculture is often in the **sensitive list** or given **long transition periods** in FTAs due to political and livelihood concerns.
 - **Export Rejections:** High rejection rates for products like **mangoes** and **peanuts** due to **pesticide residues** and **SPS non-compliance**.
 - **Fragmented Governance:** Trade is a **Union subject**, while agriculture is a **state subject**, causing frequent policy contradictions and delays.
 - **Low Value Addition:** Export focus remains on **raw commodities** instead of **processed and branded products**, limiting earning potential.
 - **Infrastructure Gaps:** Lack of **cold chains**, inland container depots, and export logistics in landlocked states like **UP and MP**.
 - **Investment Distortions:** High subsidies on **power, water, and fertilizers** reduce the incentive to shift toward **exportable high-value crops**.
- **Way Ahead – Strategic Solutions:**
 - **Promote Value Addition:** Create **agro-processing clusters near APMCs**, link them with export hubs, and incentivize with output-based schemes.
 - **Policy Synchronisation:** Form a **National Agri Trade Council** with representatives from the Centre, States, APEDA, FSSAI, and exporters to align regulatory processes.
 - **Switch to Direct Benefit Transfers (DBT):** Replace input subsidies with **unconditional cash transfers** to offer flexibility and encourage crop diversification.
 - **Agri-Tech Integration:** Scale up **AI-driven crop monitoring**, **vernacular mobile advisories**, and real-time data platforms for scheme access and market insights.
 - **Digital and Physical Infrastructure:** **Invest in GIS-based produce mapping**, **beneficiary tracking systems**, and pre-cooling logistics chains in hinterland zones.
 - **Improve Connectivity for Landlocked States:** Establish **inland ports**, **container depots**, and **cold storage linkages** to empower states like Uttar Pradesh and Madhya Pradesh.

Conclusion:

India's cautious stance on integrating agriculture with global trade needs a strategic rethink. Protectionism must evolve into **smart enablement** through technology, value addition, and infrastructure. Making Agri-exports competitive is essential for doubling farmer incomes and achieving trade resilience.

PYQ:

Account for the failure of manufacturing sector in achieving the goal of labour-intensive exports rather than capital-intensive exports. Suggest measures for more labour-intensive rather than capital-intensive exports. (UPSC-2017)

Syllabus: Energy

NATURAL HYDROGEN

Context:

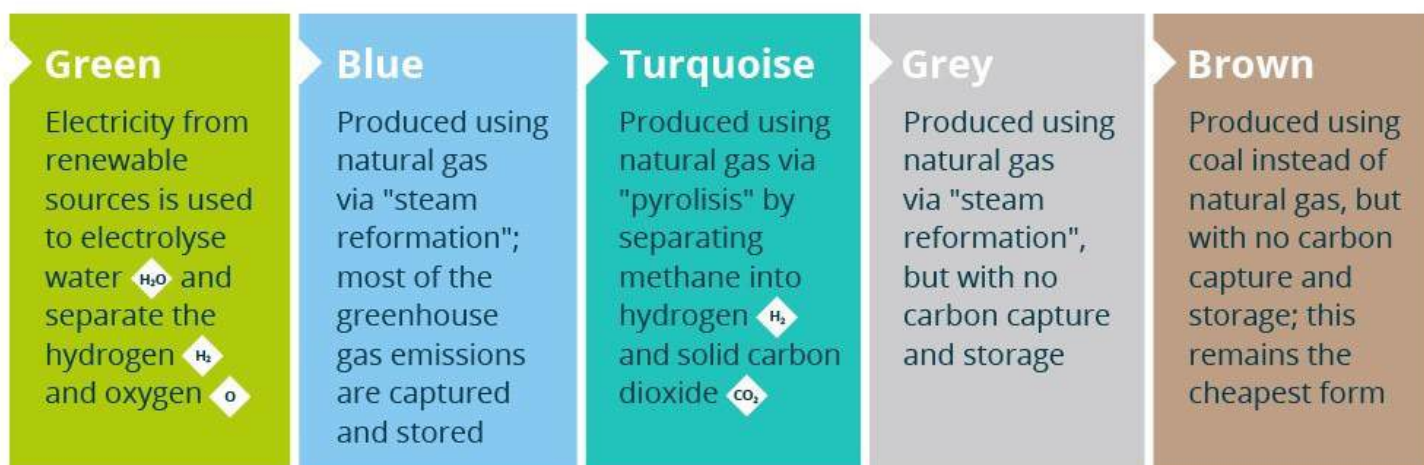
Governments and private firms across the globe are intensifying efforts to explore natural hydrogen as a low-cost, zero-emission fuel, with recent discoveries in France's Moselle region and strong interest from India.

About Natural Hydrogen:

- **Natural hydrogen** is free molecular hydrogen (H_2) that occurs **naturally underground** due to **geological processes**

like serpentinisation and radiolysis.

Five shades of hydrogen



- It is a **clean-burning, non-polluting**, and potentially **renewable** energy source if extracted sustainably.

Key Features of Natural Hydrogen:

- Zero-Emission Fuel:** Burns to produce only water vapor; no CO_2 emissions.
- Low-Cost Potential:** Estimated production cost **\$1/kg**, much cheaper than green hydrogen.
- Sustainable:** Naturally regenerates in geological formations.
- High Energy Efficiency:** Hydrogen fuel cells are **3 times more efficient** than gasoline.

How Does Hydrogen Occur in Nature?

- Found in **hard rock formations, ophiolite belts, and hydrothermal systems**.
- Generated by processes like:
 - Serpentinisation:** Reaction between water and ultramafic rocks.
 - Radiolysis:** Breakdown of water by natural radioactive decay.
 - Organic decomposition:** Release from deep carbonaceous material.
- Co-located with **helium** in some formations, indicating deep crustal origins.

Extraction Process of Natural Hydrogen:

- Exploration:** Detect hydrogen seeps using **geophysical tools** and **geochemical sampling** in favourable geological regions.
- Drilling:** Boreholes are drilled at identified sites (e.g., **Mali, France, U.S.**) to access underground hydrogen pockets.
- Capture & Compression:** Extracted hydrogen is **filtered, purified, and compressed** for safe storage and transport.
- Distribution:** The gas is delivered to **fuel cells, refineries, or industrial users** as a clean energy source.

Challenges in Natural Hydrogen Adoption:

- Unmapped Reserves:** Lack of extensive surveys makes **global hydrogen availability** uncertain.
- Scattered Deposits:** Economically unviable if reserves are too spread out.
- Storage & Transport:** Hydrogen's low energy density requires **high-pressure containment**, increasing cost.
- Safety Concerns:** Highly flammable and **odourless**, making leak detection difficult.
- Lack of Infrastructure:** Refuelling stations, pipelines, and distribution are still underdeveloped.

Way Ahead:

- National Mapping:** Conduct a **comprehensive geological survey** of hydrogen-bearing formations, especially in India's cratonic belts and ophiolites.
- Policy Push:** Develop a **Natural Hydrogen Exploration Policy** and include it in India's National Hydrogen Mission.
- Global Collaboration:** Leverage **USGS models**, and collaborate on R&D with nations like France and the U.S.
- Private Sector Incentives:** Attract investments through **PPP models**, tax breaks, and startup incubation in this sector.
- Infrastructure Development:** Build **safe storage, pipelines, and fuel cell refueling networks** alongside hydrogen hubs.

Conclusion:

Natural hydrogen offers a promising, low-emission, and scalable alternative to fossil fuels. Its success depends on effective **exploration, safety, and commercialization frameworks**. With India's untapped reserves, strategic focus can position it as a leader in next-generation hydrogen energy.

PYQ:

Describe the benefits of deriving electric energy from sunlight in contrast to the conventional energy generation. What are the initiatives offered by our government for this purpose? (UPSC-2020)

Syllabus: Infrastructure (Energy, Ports, Roads, Airports)

A FUNDAMENTAL RESET TO DRIVE MANUFACTURING GROWTH

Context:

The recent article highlights the urgent need for a structural reset in India's manufacturing sector to boost competitiveness and productivity in the context of global shifts towards high-tech, innovation-driven industries.

About A fundamental reset to drive manufacturing growth:**Status of Indian Manufacturing:**

- **Current Contribution:** Manufacturing contributes 16–17% to India's GDP and employs over 6 crore workers (MoSPI, 2023).
- **Export Performance:** Manufacturing exports reached an all-time high of **\$447.46 billion** in FY23, registering 6.03% growth over FY22.
- **Global Vision:** India aims to increase manufacturing's GDP share to **25% by 2025** and add **\$500 billion** to the global economy by 2030.
- **Industrial Growth Indicator:** The **HSBC Manufacturing PMI** touched a 16-year high of **59.1** in March 2024, reflecting robust growth in output and employment.
- **FDI Inflows:** India received **\$165.1 billion** FDI in manufacturing in the last decade, up 69%, showing strong investor confidence.

**Challenges Faced by Indian Manufacturing:**

- **Low Productivity and Value Addition:** India's per capita value added in manufacturing is **\$0.32K**, compared to the world average of **\$2K** (World Bank, 2023).
- **Inadequate R&D Investment:** R&D expenditure is only **0.7% of GDP**, much lower than South Korea (4.8%) or China (2.4%).
- **Skill Gaps and Education-Industry Mismatch:** Only **48.7%** of India's workforce is considered employable (India Skills Report 2023), with low exposure to industry 4.0 tools.
- **Weak Infrastructure and Logistics:** Logistics costs in India stand at **14–18% of GDP**, compared to 8–10% in developed economies.
- **Policy Instability and Bureaucratic Bottlenecks:** Delays in land acquisition and regulatory clearances deter investments; India ranks **63rd** in Ease of Doing Business.
- **Import Dependency:** India heavily depends on imports for semiconductors, electronics, and EV batteries, leading to trade imbalances (China trade deficit: **\$85 billion**, FY24).
- **Fragmented MSME Ecosystem:** Only **14%** of 64 million MSMEs in India have credit access; tech adoption remains minimal among them.

Key Government Initiatives:

- **Make in India (2014):** Promotes local manufacturing across 25 sectors; aims to transform India into a global manufacturing hub.
- **Production Linked Incentive (PLI) Scheme:** Covers 14 sectors and is expected to generate **\$500 billion** worth of additional manufacturing output.

- **Gati Shakti National Master Plan:** Integrates multi-modal transport and logistics to reduce supply chain bottlenecks.
- **FAME-II Scheme:** Boosts electric vehicle (EV) production with subsidies on vehicles and battery manufacturing.
- **PM Kaushal Vikas Yojana (PMKVY):** Offers skill development in advanced manufacturing aligned with global production standards.
- **Digital India and Industry 4.0 Push:** Encourages digitization of MSMEs and the adoption of IoT, AI, and robotics in manufacturing.

Way Ahead:

- **Scale Up R&D and Innovation Ecosystems:** Raise R&D spending to **2% of GDP** and set up **Manufacturing Innovation Fund** to support advanced research.
- **Upgrade Technical Education and Labs:** Reform engineering education with **50% focus on practical work**, advanced labs, and industry collaboration.
- **Strengthen Core Engineering Sectors:** Prioritize civil, mechanical, electrical, and chemical engineering for building indigenous industrial capabilities.
- **Build Industrial Infrastructure:** Invest an additional **1% of GDP** to create plug-and-play manufacturing parks with in-house design, testing, and certification units.
- **Enhance Global Value Chain (GVC) Integration:** Re-negotiate trade deals and focus on SEZs, export processing zones, and logistics infrastructure near ports.
- **Support MSMEs:** Provide credit guarantees, tech training, and global market access to uplift MSMEs' contribution to GDP and exports.
- **Adopt Green and Circular Manufacturing:** Incentivize renewable energy in factories and integrate **Extended Producer Responsibility (EPR)** policies across sectors.

Conclusion:

India stands at a critical juncture where structural reforms and bold investments in R&D, infrastructure, and skills are essential to uplift manufacturing. Global headwinds offer opportunities to position India as a credible alternative in global value chains. By aligning education, policy, and innovation with industrial goals, India can transition from an assembly economy to a global manufacturing powerhouse.

PYQ:

"Industrial growth rate has lagged behind in the overall growth of Gross-Domestic-Product (GDP) in the post-reform period" Give reasons. How far are the recent changes in Industrial Policy capable of increasing the industrial growth rate? (2017)

INDIA AND ROAD SAFETY

Context:

India recorded **1.68 lakh road fatalities in 2022**, the highest in five years, prompting urgent calls for reform in road safety governance.

- Road crashes cost India an estimated 3% of its GDP annually. This hampers national development and underscores the urgency for effective road safety measures.

About India and Road Safety:

Current Status:

- India has the **second-largest road network** globally, covering over **6.3 million km**.
- In **2022**, road accidents caused **1.68 lakh deaths**, translating to **12.2 deaths per 1 lakh population**.
- Compared to the **UK (2.6)** and **Japan (2.5)**, India's fatality rate is **alarmingly high**.
- Road crashes cost India **3% of its GDP annually**, impacting economic and human capital.



Issues Plaguing Road Safety in India:

1. **Driver Error Dominance:** Around **78%** of road accidents are due to **driver faults** (over speeding, intoxication, lane

indiscipline).

2. **Poor Infrastructure & Black Spots:** Lack of **pedestrian zones**, poor road design, and **5,000+ black spots** remain unrectified.
3. **Weak Enforcement Mechanisms:** Inconsistent rule enforcement and **low deterrence** despite high penalty provisions in [MV Act, 2019](#).
4. **Inadequate Emergency Response:** Delays in medical aid and **limited trauma care availability**, especially on rural and state highways.
5. **Fragmented Governance:** Road construction and safety responsibilities are divided between **Centre and States**, reducing accountability.

Government Initiatives Taken: (4 Es of road safety)

1. **Education:**
 - **National Road Safety Month**, campaigns under Road Safety Advocacy Scheme.
 - Establishment of **Driving Training Centres** and **Research Institutes**.
2. **Engineering:**
 - **Road Design:**
 - **Mandatory Road Safety Audits** at all NH project stages.
 - Rectification of **accident black spots**.
 - Implementation of **e-DAR system** for accident reporting.
 - **Vehicle Design:**
 - **Mandatory airbags, ABS, seat belt reminders, and reverse parking sensors.**
 - **Bharat NCAP** safety rating system introduced.
 - [Vehicle Scrappage Policy](#) launched to phase out unsafe vehicles.
3. **Enforcement:**
 - Strict penalties under **MV (Amendment) Act, 2019**.
 - **E-challan system** and **CCTV-based enforcement** in high-risk zones.
 - Rules for **electronic monitoring** and **automated testing stations**.
4. **Emergency Care:**
 - **Good Samaritan protection**, increased **compensation for hit-and-run** cases.
 - Deployment of **ambulances at toll plazas** with trained paramedics.
 - **Cashless treatment pilot scheme** in six states in collaboration with [National Health Authority](#).

Way Ahead – Strategic Roadmap:

- **Adopt the Safe System Approach:** Design roads forgiving of human error; prioritize **pedestrians, cyclists, and public transport users**.
- **Create a National Road Safety Authority:** Integrate state and central efforts under one umbrella for **policy coherence and accountability**.
- **CSR for Road Safety:** Mandate **automobile manufacturers** to contribute CSR funds for long-term road safety infrastructure and research.
- **Strengthen Data Systems:** Scale up **digital accident data management** to support evidence-based policymaking.
- **Invest in Infrastructure:** Adopt [World Bank's \\$109 billion investment](#) recommendation to halve road fatalities by 2030.

Conclusion:

Road safety is not just a technical or legal issue — it is a fundamental right under Article 21. India's vision of Viksit Bharat 2047 must include inclusive, people-centric, and safer mobility systems. A data-driven, coordinated, and long-term approach can transform road safety from a challenge into a success story.

PYQ:

Why is Public Private Partnership (PPP) required in infrastructural projects? Examine the role of PPP model in the redevelopment of Railway Stations in India. (UPSC-2022)

GHATAMPUR THERMAL POWER PROJECT

Context:

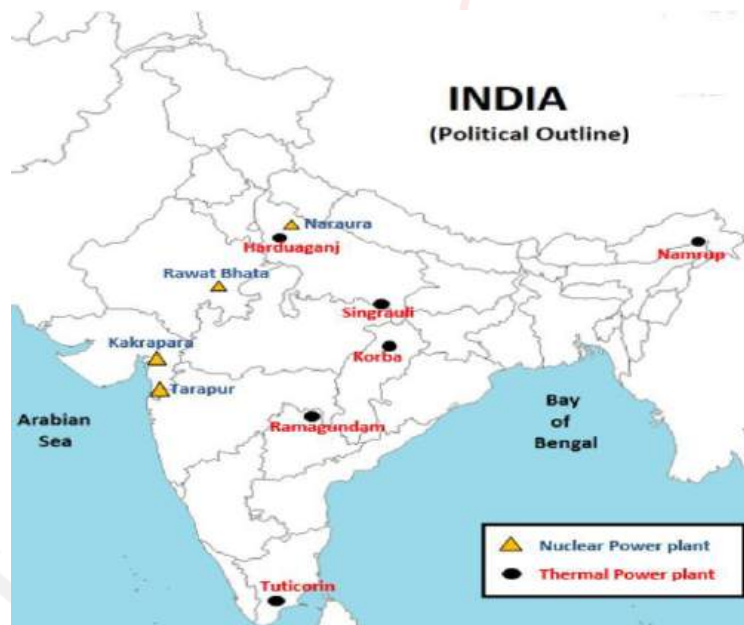
Prime Minister of India dedicated Unit-1 (660 MW) of the Ghatampur Thermal Power Project in Kanpur Nagar, Uttar Pradesh, marking a significant milestone in India's thermal energy expansion and [infrastructure development](#).

About Ghatampur Thermal Power Project:

- **Location:** The power plant is located in **Ghatampur**, in **Kanpur Nagar district, Uttar Pradesh**.
- **Implementing Agency:**
 - The project is managed by **Neyveli Uttar Pradesh Power Ltd (NUPPL)** — a joint venture between: NLC India Ltd (owns 51%) and UP Rajya Vidyut Utpadan Nigam Ltd (UPRVUNL) (owns 49%).
- **Power Capacity:**
 - The project has **3 power units**, each of **660 MW**.
 - Total capacity is **1,980 MW**.
- **Total Cost:** The project cost is **₹21,780.94 crore**.
- **Power Distribution:**
 - **75.12% (1487.28 MW)** of electricity will go to **Uttar Pradesh**.
 - **24.88% (492.72 MW)** will go to **Assam**, depending on the transfer of shares.
- **Main Features:**
 - **Efficient Technology:** Uses supercritical boilers with 88.81% efficiency, which saves fuel and increases output.
 - **No Wastewater Release:** The plant has a [Zero Liquid Discharge \(ZLD\)](#) system, so no water is released into rivers or land.
 - **Pollution Control:**

Uses modern systems to cut air pollution:

 - SCR (Selective Catalytic Reduction) reduces harmful **NO_x gases**.
 - FGD ([Flue Gas Desulphurization](#)) reduces **SO_x gases** from smoke.
 - CEMS & AAQMS track emissions and air quality 24/7.
 - **Water Saving:**
 - **288 km** of canal is lined to save **195 million litres** of water per day.
 - The plant stores up to **46 lakh cubic meters** of raw water.
 - **Coal Supply:**
 - Has its own coal mine producing **9 million tonnes per year**.
 - Can store coal for **30 days of full operation** (10.165 lakh tonnes).



Syllabus: Awareness in fields of IT, Space, Computers, Robotics, Nano-tech, Bio-Tech, IPR

COPYRIGHT CHALLENGES IN THE AGE OF GENERATIVE AI

Context:

A legal storm is brewing over copyright infringement by [generative AI models](#), as India's publishers sue OpenAI for unauthorized training on their content.

- This reignites the global debate on how copyright law adapts to artificial intelligence.

About Copyright Challenges in the Age of Generative AI:

- **What is Copyright?**
 - Copyright is a **legal right** granted to creators to protect **original literary, artistic, musical, and dramatic works** from unauthorized reproduction or commercial use.
- **Types of Works Protected:**
 - Literary (books, software code)
 - Artistic (paintings, designs)
 - Musical (songs, compositions)
 - Dramatic (plays, screenplays)
 - Cinematographic films, sound recordings
- **Key Features of Copyright Law:**
 - **Protection of Expression, Not Ideas:** Copyright safeguards the original expression (form, structure) of ideas, not the ideas or concepts themselves.
 - **Exclusive Economic and Moral Rights:** Authors get the right to reproduce, distribute, and monetize their work, along with moral rights like attribution and integrity.
 - **Duration of Protection:** In India, copyright generally lasts for **60 years after the author's death**, ensuring long-term economic benefit to their heirs.
 - **Exceptions – Fair Use & Education:** Some uses like private study or research are exempt; however, India's exceptions are narrowly defined compared to the broad U.S. 'fair use' doctrine.



Significance of Copyright in the AI Era:

- **Incentivizes innovation:** Assures returns to human creators whose content is used in AI training.
- **Maintains originality:** Prevents AI from mimicking styles or expressions without due credit/payment.
- **Regulates content ownership:** Establishes boundaries between machine assistance and creative authorship.
- **Protects the creative economy:** Essential for publishers, media, and artists facing deepfake and content reproduction risks.

Key Issues: AI and Copyright Law

- **Unauthorized Training on Protected Works:** Generative AI platforms train on copyrighted material like books and images without permission, violating creators' rights.

E.g. ANI and Federation of Indian Publishers sued OpenAI in Delhi HC.

- **Ambiguity in Fair Use:** The U.S. uses a flexible four-factor test for fair use, while India permits only specific exceptions, limiting adaptability to AI.

E.g. EU allows data mining for research but mandates opt-out for commercial AI

- **Lack of Human Authorship:** AI-generated content without substantial human input is not copyrightable, as courts mandate that only humans can be authors.
- **Non-expressive vs. Expressive Use:** AI can lawfully learn from factual, non-expressive data, but replicating artistic expressions like poems violates copyright.

E.g. Reproduction of style or specific works (e.g., Mickey Mouse) crosses legal limits.

- **Inequality Among AI Developers:** Larger companies with vast data access gain an edge, while smaller players are disadvantaged by opt-outs and costly licensing requirements.

Way Forward:

- **Update Legal Frameworks:** Amend [India's Copyright Act](#) to address AI-specific concerns like data mining, consent, and attribution norms.
- **Define AI-Generated Work Ownership:** Grant limited protection only when a human significantly contributes to AI-created output, distinguishing it from fully automated works.
- **Global Standardization:** India can adopt [EU's](#) balanced approach—allowing research data mining but requiring opt-outs for commercial use with clear regulations.
- **Ensure Transparency:** Mandate disclosure of AI training datasets and sources to protect authors' rights and encourage responsible AI development.
- **Encourage Licensing Ecosystems:** Promote structured, voluntary licensing markets for AI developers to access copyrighted content legally and fairly.

Conclusion:

The evolution of copyright law must align with the rise of generative AI, protecting creators without stifling technological progress. While courts debate infringement, policymakers must design a future-ready legal architecture. A balanced, transparent, and fair copyright regime is essential for [AI-driven creativity](#) to flourish.

PYQ:

Introduce the concept of Artificial Intelligence (AI). How does AI help clinical diagnosis? Do you perceive any threat to privacy of the individual in the use of AI in healthcare? (UPSC-2023)

Syllabus: Science and Technology- developments & Applications

US RESEARCH FUND CRUNCH AND INDIAN OPPORTUNITY

Context:

The US National Science Foundation (NSF) and National Institutes of Health (NIH) are facing unprecedented budget cuts, leading to large-scale termination of scientific research grants.

About US Research Fund Crunch and Indian Opportunity:

About US Fund Crunch:



- **Nature of Crisis:** The US FY26 budget proposes a 55% cut to NSF funding, leading to the termination of 1,400+ research grants and cancellation of 1,000 graduate fellowships.
- **Impacted Sectors:** Research in public health, climate science, digital innovation, and disaster resilience are all severely affected.
- **Economic Ripple:** NIH grant cuts alone could cause a **\$6.1 billion GDP loss** and **46,000 job cuts**, particularly impacting university towns and scientific communities.
- **Global Talent Migration:** European nations like France are opening refugee science programs to absorb displaced researchers.

Opportunity for India:

- **Reclaiming Talent:** India can attract top Indian-origin researchers in the US and global scientists seeking stable research environments. **E.g. VAIBHAV and VAJRA fellowships** can be scaled to encourage long-term relocation.
- **Bridge Funding:** India can take over **ongoing Indo-US NIH projects**, ensuring continuity in public health and biomedical research.
- **Boost Knowledge Economy:** Leveraging the crisis, India can position itself as a **global science hub** by offering infrastructure, autonomy, and funding.
- **Philanthropic Push:** With ₹1.31 lakh crore in [social philanthropy](#) in 2024, Indian private foundations can co-invest in global research excellence.

Challenges for India:

- **Limited Research Funding:** India's R&D spend is just **0.64% of GDP**, compared to the OECD average of 2.7%.
- **Bureaucratic Bottlenecks:** Complex grant procedures and delayed disbursements deter international talent.
- **Academic Rigidities:** Lack of autonomy, tenure uncertainty, and administrative interference affect innovation in Indian institutions.
- **Diversity and Inclusion Gaps:** Skewed representation across caste, gender, and region in academia limits broad-based scientific progress.

Way Ahead:

- **Expand Fellowship Programs:** Widen VAIBHAV/VAJRA into multi-year schemes with enhanced funding and transparent selection.
- **Ease Institutional Norms:** Grant more autonomy to research institutions, enable faster funding approvals, and foster collaborative labs.

- **Incentivize Relocation:** Offer infrastructure, tax benefits, and relocation support to foreign and diaspora scientists.
- **Public-Private Collaboration:** Encourage Indian corporates and philanthropists to co-fund basic science through [CSR](#) and endowments.
- **Global Collaboration Hubs:** Create interdisciplinary research clusters linked to SDGs and climate resilience to attract global partners.

Conclusion:

India stands at a historic crossroads where **global brain circulation** can be turned into **brain gain**. With timely reforms and strategic investments, the country can **leapfrog into the top tier of global science leaders**. This window may never reopen.

PYQ:

Discuss the changes in the trends of labour migration within and outside India in the last four decades. (UPSC-2015)

INDIA CRYPTO POLICY

Context:

A Trump-linked US firm, World Liberty Financial Inc (WLFI), has signed an MoU with Pakistan's Crypto Council to develop a crypto-based financial system, prompting geopolitical and security concerns for India.

About India Crypto Policy:

Pakistan's Crypto Pact with WLFI:

- **MoU Signed:** Pakistan's newly-formed **Crypto Council** and WLFI have agreed to introduce stablecoins, monetize rare earth assets, and position Pakistan as a **regional crypto hub**.
- **High-Level Support:** Endorsed by PM Shehbaz Sharif and Army Chief Asim Munir, the deal includes use of blockchain for **financial inclusion and trade**.
- **Diaspora Link:** Pakistan is leveraging its US-based diaspora to connect with Trump's team and global crypto investors.



Strategic Risks to India:

- **Terror Financing via Crypto:** The **decentralized** and **pseudo-anonymous** nature of cryptocurrencies makes them ideal for **illicit financing**, raising concerns akin to **hawala networks**, as highlighted by FATF.
- **Cross-border Laundering Risk:** Crypto assets can bypass formal banking channels, enabling **money laundering across jurisdictions**—a threat amplified by Pakistan's crypto pivot.
- **Geopolitical Influence Operations:** Through crypto deals like the **WLFI-Pakistan MoU**, Islamabad is leveraging **tech diplomacy** to gain US favor, which could reduce India's strategic tech advantage in the region.
- **Diaspora-led Influence Shift:** Pakistan is actively using its **US-based tech diaspora** to establish crypto alliances—contrasting India's diaspora focus on traditional tech sectors.
- **Strategic Oversight Parallels:** Just as India **underestimated Pakistan's nuclear capability** in the 1970s, ignoring the **early-stage crypto pivot** could similarly allow adversaries to reshape financial power balances.

India's Regulatory and Strategic Crypto Vacuum:

- **Tax Without Law:** India taxes crypto (30% + 1% TDS) but has no legal framework—flagged by the Supreme Court in May 2025.
- **User Boom, No Oversight:** With 100+ million users (Triple-A), there's no central regulator, exposing users to scams.
- **Cybersecurity Gaps:** Lacking compliance norms, India faces major frauds—e.g., ₹900 crore GainBitcoin scam.
- **No Investor Safeguards:** Unlike SEBI or RBI, crypto lacks grievance redressal or risk protection.
- **Slow CBDC Rollout:** The RBI's e₹ pilot lacks clear links to private crypto, limiting India's digital currency leadership.

Way Ahead for India:

- **National Crypto Strategy:** Develop a centralized strategy combining **monetary, cybersecurity, and geopolitical objectives**.
- **Regulatory Clarity:** Establish a **Digital Asset Regulatory Authority** to streamline compliance, prevent misuse, and guide innovation.

- **Financial Intelligence Monitoring:** Enhance **FIU-IND tracking** of crypto-linked transactions to identify risks and track terror financing.
- **Global Alignment:** Coordinate with **G20, FATF, and IMF** for global crypto standards and cross-border data-sharing.
- **CBDC Push:** Accelerate **RBI's ₹ project**, giving India a sovereign edge in digital currency without undermining the banking system.
- **Awareness Campaigns:** Educate youth and investors about **legal status, risks, and financial literacy** in crypto.

Conclusion:

India cannot afford to overlook the **emerging crypto-geopolitical nexus** involving Pakistan and the US. With over **100 million users**, India must urgently develop a clear, forward-looking **crypto strategy** that ensures **national security, financial integrity, and technological leadership**.

PYQ:

How is science interwoven deeply with our lives? What are the striking changes in agriculture triggered by science-based technologies? (10 M)

Syllabus: Conservation

INDIA'S FRA VS. GLOBAL CONSERVATION LAWS

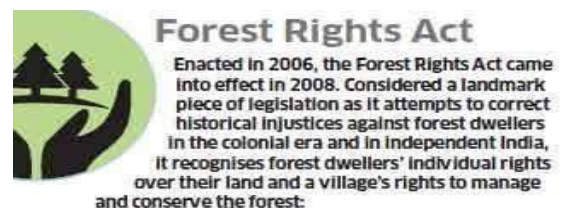
Context:

At CBD COP-16 (2025), a permanent subsidiary body for Indigenous Peoples and Local Communities (IPLCs) was created to uphold rights in biodiversity conservation.

- Amid global exclusionary trends, India's **Forest Rights Act (FRA) 2006** stands out for linking community forest governance with conservation.

About India's FRA vs. Global Conservation Laws:

- **FRA – A Rights-Based Conservation Model:**
 - The **Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006** legally recognizes **13 categories of forest rights**, empowering **Gram Sabhas** for community-led biodiversity conservation.
 - It acknowledges **historical injustice** faced by tribal communities and integrates **tenure security with ecosystem protection**.
- **Global Trends – Fortress Conservation Model:**
 - Many global laws (e.g., **Wildlife Acts in Africa and Latin America**) adopt an exclusionary **"protected area" model**, displacing **10–20 million IPLCs** worldwide (e.g.: Batwa in Uganda, Masai in Kenya).
 - This **"fortress conservation"** criminalizes traditional users and centralizes forest control under the state or private actors.
- **Constitutional and Legal Backing in India:**
 - India's Constitution provides **Articles 244 & 244A**, enabling tribal governance in Scheduled Areas.
 - Complemented by **PESA (1996)** and **BDA (2002)**, the FRA remains a rare global example linking **local autonomy with biodiversity stewardship**.



Individual Forest Rights: Any person belonging to a scheduled tribe can claim rights to live in and cultivate up to 4 ha if he occupied it and depended on it as of December 13, 2005. A non-tribal, in addition, will have to prove his family's residence in the vicinity of the forest for 75 years prior to December 2005

Community Forest Rights: The Act recognises the rights of a gram sabha over forest land within the village boundaries or seasonal use of landscape for pastoral communities. This allows the villagers to own and collect, use and dispose of minor forest produce besides timber, including the right to use grazing land and water bodies and the right to protect and regenerate any community resource, among others

Limitations of FRA Implementation:

- **Weak Institutional Convergence:** Despite FRA's decentralized vision, updated **National Biodiversity Strategy and Action Plans (NBSAPs 2024)** still **prioritize forest departments**, marginalizing **gram sabhas**.
- **Incomplete Recognition of Rights:** Over **1.4 crore claims** filed under FRA; however, only a fraction has been approved, often diluted or denied by forest authorities.
- **Non-Recognition of "Indigenous":** India avoids using "indigenous" in law, weakening its alignment with **UNDRIP**

(2007) which India supported globally.

- **Biodiversity Monetisation Risks:** BDA 2024 Draft Rules may commercialize biodiversity via Bioprospecting, risking corporate capture of traditional knowledge, unless integrated with FRA safeguards.
- **OECM Concerns:** Without clarity, **Other Effective Area-based Conservation Measures (OECMs)** risk becoming parallel protected areas, unless grounded in **prior informed consent of forest communities**.

Way Ahead: Strengthening FRA Through Global Learning

- **Integrate UNDRIP Principles:** Legally recognize **cultural autonomy** of IPLCs in national law, as done in **Peru's Ashaninka law** or **Canada's Indigenous Protected Areas framework**.
- **Institutional Synergy:** Merge BDA's **Biodiversity Management Committees (BMCs)** with **gram sabhas** under FRA to reduce conflict and enhance community participation.
- **Implement Article 8(j) of CBD:** Fully implement CBD's provision on **traditional knowledge and benefit-sharing**, ensuring **community-led documentation and control**.
- **Expand Legal Literacy and Tenure Mapping:** Invest in **community-led forest rights mapping**, using platforms like **Van Gujari GIS** or **Gram Sabha Biodiversity Registers (GSBRs)**.
- **Include IPLCs in Protected Area Governance:** Involve local communities through **co-management models** like **Joint Protected Area Committees** (as in parts of Mexico and Nepal).

Conclusion:

India's Forest Rights Act 2006 remains globally unique for integrating community rights with conservation goals. Aligning global safeguards with FRA's democratic spirit and ensuring institutional coherence can foster inclusive, sustainable forest governance rooted in justice and ecological wisdom.

RETROSPECTIVE ENVIRONMENTAL CLEARANCES

Context:

The Supreme Court of India struck down ([Vanashakti v. Union of India](#)) the Centre's 2017 notification and 2021 SOP that allowed retrospective environmental clearances to industries, calling them unconstitutional and violative of the right to a clean environment.

About Retrospective Environmental Clearances:

- **Definition:** Ex-post facto or retrospective green clearances allow industries to start projects without prior environmental clearance and seek approval later.
- **Legal Basis:** These clearances violate the mandatory pre-approval system under the Environment Impact Assessment (EIA) Notification, 2006, issued under the Environment (Protection) Act, 1986.

About 2017 EIA Notification:

- **Issued by:** Ministry of Environment, Forest and Climate Change (MoEF&CC)
- **Intent:** Provided a one-time 6-month amnesty window for violators to apply for environmental clearance post-facto.
- **Scope:** Covered industries that had commenced operations or changed scope without prior approval.
- **Process:** Appraisal was centralized; violations were still subject to action by State Pollution Control Boards.



Criticism of Retrospective Clearances:

- **Undermines Due Process:** Skips essential stages like public hearing, expert appraisal, and site inspection.
- **Weakens Environmental Governance:** Encourages violators by regularising illegal acts.
- **Violates Environmental Principles:** Contravenes the [“precautionary”](#) and [“polluter pays”](#) principles upheld by Indian environmental jurisprudence.
- **Leads to Irreparable Damage:** Example – Pollution in Delhi due to unchecked industrial activity cited by SC.

Supreme Court Judgment Highlights (Vanashakti v. Union of India):

- **Held Unconstitutional:** Declared the 2017 notification and 2021 SOP violative of **Article 21 (Right to Life)** and

Article 14 ([Right to Equality](#)).

- **Illegal Even as One-time Measure:** SC noted that even a “one-time” relaxation can’t override the public’s right to a healthy environment.
- **Violation of Past Orders:** Cited **Common Cause (2017)** and **Alembic Pharma (2020)** cases that denounced post-facto approvals.
- **Mandated Compliance:** Barred the Centre from issuing any such retrospective clearance mechanisms in the future.
- **Exposed Government Strategy:** SC flagged the SOP as a disguised attempt to bring in post-facto approvals without using the term.

Significance of Supreme Court Verdict:

- **Upholds Environmental Rule of Law:** Reinforces the mandatory nature of *prior* environmental clearance under the EIA 2006 framework.
- **Protects Right to Clean Environment:** Strengthens [Article 21](#) by affirming the citizen’s right to a pollution-free environment.
- **Discourages Regulatory Evasion:** Sends a strong message against regularising illegal industrial activities post-facto.
- **Boosts Judicial Oversight on Executive Actions:** Asserts constitutional limits on executive discretion, preventing dilution of environmental safeguards.
- **Ensures Environmental Justice:** Safeguards the rights of affected communities and ecosystems from unchecked industrial expansion.

Conclusion:

The judgment reaffirms that environmental compliance is non-negotiable. Development cannot come at the cost of ecological degradation. Upholding the sanctity of the EIA process is essential for safeguarding public health and [intergenerational equity](#).

PYQ:

How does the draft Environment Impact Assessment (EIA) Notification, 2020 differ from the existing EIA Notification, 2006? (UPSC-2020)

[Syllabus: Environment Pollution](#)

INDIA’S AIR POLLUTION STRATEGY NEEDS ATMANIRBHARTA

Context:

The lack of self-reliance in India’s air pollution strategy has come under scrutiny following global disruptions in climate research and continued foreign-led studies on India’s pollution crisis.

[About India’s Air Pollution Strategy Needs Atmanirbharta:](#)

- **India’s Air Pollution: Data & Status**
 - **Global Rankings:** Over 12 Indian cities consistently rank among the **world’s top 20 most polluted cities** (IQAir, 2024).
 - **Mortality:** Air pollution contributes to **1.6 million deaths annually in India** (Lancet, 2020).
 - **Ambient Monitoring:** Only **131 cities** are covered under the **National Clean Air Programme (NCAP)** despite over 4,000 cities and towns.



Key Initiatives & History:

- **1984:** Launch of the **National Ambient Air Quality Monitoring Programme (NAAQMP)**.
- **2001–2010:** Development of **SAFAR** (System of Air Quality and Weather Forecasting and Research), India’s first indigenous real-time forecasting system.
- **2019:** Implementation of **NCAP** targeting 20–30% reduction in PM2.5 and PM10 levels by 2024.

- **EV Push:** States like Delhi and Tamil Nadu lead the transition to **Electric Vehicles** to curb urban emissions.
- **Anusandhan NRF:** Promotes collaborative R&D between academia and industry for pollution solutions.

Challenges in Combating Air Pollution:

- **Over-reliance on Foreign Data:** India's climate models are heavily dependent on data from **foreign satellites and agencies**.
- **Limited Research Capacity:** Most global-funded studies on Indian pollution are led by **foreign institutions**, not Indian researchers.
- **Uneven Resource Allocation:** Elite institutions corner most of the funding; **regional R&D bodies remain under-resourced**.
- **Unspent Funds:** Despite air quality funds, **Pollution Control Boards (PCBs)** often return unused allocations.
- **City-Centric Focus:** Current strategies neglect **airshed-level pollution**, ignoring the inter-district and inter-state flow of pollutants.

Way Forward: Towards Atmanirbharta

- **Develop Indigenous Data Systems:** India should invest in **launching polar-orbiting satellites** for self-sustained climate data.
- **Expand SAFAR Nationwide:** Enhance and scale SAFAR to at least **100 cities** for real-time prediction and public access.
- **Integrate with Health Metrics:** Adopt **health-centric pollution control frameworks**, linking exposure data with public health outcomes.
- **Implement NARFI:** Accelerate the rollout of the **National Air Quality Resource Framework of India (NARFI)** to unify efforts across states and sectors.
- **Strengthen ESSO-IMD & CPCB Synergy:** Create a **joint air quality authority** leveraging the technical strengths of meteorology and pollution science.
- **Decentralise R&D Funding:** Promote **state-wise innovation hubs** and fund second-tier institutions for grassroots tech solutions.

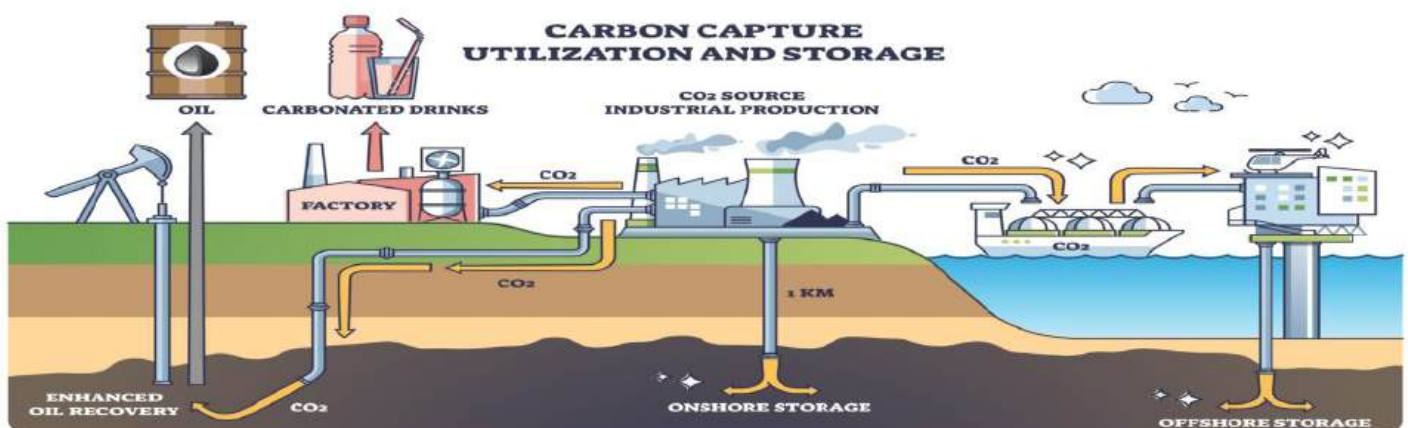
Conclusion:

India's battle against air pollution requires more than scattered projects — it needs systemic, indigenous innovation. Bridging research gaps, decentralising data capacity, and moving beyond city silos to regional airshed governance can deliver real self-reliance. Only then can we truly breathe easy.

PYQ:

Describe the key points of the revised Global Air Quality Guidelines (AQGs) recently released by the World Health Organisation (WHO). How are these different from its last update in 2005? What changes in India's National Clean Air Programme are required to achieve these revised standards?

CARBON CAPTURE AND UTILISATION (CCU)



Context:

The Government of India has approved the establishment of five Carbon Capture and Utilisation (CCU) testbeds to drive net zero industrial pathways in hard-to-abate sectors like cement, under a public-private partnership model.

About Carbon Capture and Utilisation (CCU):

What is CCU?

CCU refers to technologies that **capture carbon dioxide (CO₂)** from industrial emissions and **utilize it** either directly or after converting it into **value-added products**.

It is a sub-set of **Carbon Capture, Utilisation, and Storage (CCUS)**.

How It Works?

CCU comprises three key stages:

- **Capture** – CO₂ is separated from emission sources (e.g., flue gas or air).
- **Transport** – The captured CO₂ is compressed and transported via pipeline, road, or ship.
- **Utilisation** – CO₂ is converted into products like **synthetic fuels, urea, concrete aggregates, chemicals, or food-grade CO₂**.

Types of Carbon Capture:

- **Post-combustion**: Captures CO₂ after fuel is burned (retrofit-friendly).
- **Pre-combustion**: Captures CO₂ before combustion by gasifying fuel (better for new plants).
- **Oxy-fuel combustion**: Uses pure oxygen to burn fuel, simplifying CO₂ capture.
- **Direct Air Capture (DAC)**: Extracts CO₂ from ambient air using sorbents or solvents (high cost, low concentration).

Features of Indian CCU Testbeds:

- Five **pilot testbeds** to be set up in partnership with top academic and industrial institutions:
 - NCCBM + JK Cement (Haryana)
 - IIT Kanpur + JSW Cement
 - IIT Bombay + Dalmia Cement
 - CSIR-IIP + IIT Tirupati + IISc + JSW Cement
 - IIT Madras + BITS Pilani Goa + Ultratech Cement
- **Focus**: Translational R&D, CO₂ catalysis, vacuum-based gas separation, and industrial integration.
- **Funding**: Public-Private Partnership ([PPP model](#)).
- **Strategic intent**: Combat EU's Carbon Border Adjustment Mechanism ([CBAM](#)) and future-proof Indian industry.

Limitations of CCU:

- **Limited Market Size**: CO₂-based product markets are still small.
- **Energy Intensity**: High energy required, especially in DAC.
- **Variable Climate Benefit**: Impact depends on source of CO₂, end-product life cycle, and process carbon intensity.
- **Not a Substitute for Mitigation**: Best used to **complement** emissions reduction, not replace it.

IMO'S DRAFT NET-ZERO FRAMEWORK

Context:

The International Maritime Organization ([IMO](#)) has approved the draft Net-Zero Framework to combat climate change by reducing GHG emissions from shipping, aiming for net-zero emissions by around 2050.

About IMO's draft Net-Zero Framework:

What is the Framework?

- A **legally binding global plan** to regulate greenhouse gas emissions from the **maritime shipping sector**.
- First initiative to **combine global emissions limits with carbon pricing** for an entire industrial sector.



Key Features:

- **Legal Basis:** New Chapter 5 of **MARPOL Annex VI** (Prevention of Air Pollution from Ships).
- **Global Fuel Standard (GFI):** Mandates reduction in **GHG fuel intensity** per energy unit used by ships (well-to-wake model).
- **Carbon Pricing:** Ships exceeding GFI limits must purchase **remedial units**; low-GHG ships earn **surplus credits**.
- **IMO Net-Zero Fund:** Redistributes carbon revenues to:
 - Reward zero-emission ships.
 - Fund R&D, capacity building, and climate resilience in **SIDS & LDCs**.
- **Coverage:** Targets ships over **5,000 GT**—responsible for **85% of maritime CO₂ emissions**.
- **Compliance Mechanism:**
 - Transfer surplus units between ships.
 - Buy credits via IMO fund.
 - Bank own surplus credits.

Significance of the Draft IMO Net-Zero Framework:

- **First Global Sector-Wide Regulation:** Unifies emissions cap and carbon pricing across international waters.
- **Drives Low-Carbon Innovation:** Incentivizes adoption of **green fuels**, **onboard CCS**, and hybrid technologies.
- **Climate Alignment:** Supports **Paris Agreement** goals and 2023 IMO Strategy targets.
- **Equity Focused:** Assists vulnerable nations via climate financing and technology transfers.
- **Energy Transition Catalyst:** Spurs investment into **ammonia**, **methanol**, and **hydrogen-based fuels** in maritime logistics.

Limitations of the Framework:

- **Delayed Enforcement:** Actual implementation begins in **2027**, despite urgency.
- **Data Transparency Challenges:** Measuring “well-to-wake” emissions is complex and may face reporting gaps.
- **Equity Concerns:** Higher compliance costs may impact **developing maritime nations** disproportionately.
- **No Binding Rules on Ship Design:** Current measures focus on fuel; design innovations like wind propulsion remain voluntary.
- **Market Readiness:** Limited global availability of **zero-emission fuels** to meet upcoming GFI standards.

Way Forward:

- **Accelerate Fuel Innovation:** Boost global investments in **green methanol**, **ammonia**, and **electro fuels**.
- **Inclusive Dialogue:** Ensure **Small Island States (SIDS)** and **LDCs** get fair access to green tech and funding.
- **Real-Time Tracking Systems:** Deploy **blockchain-based emissions tracking** to improve compliance transparency.
- **Complementary Ship Design Rules:** Introduce parallel **Energy Efficiency Design Index (EEDI)** updates for new builds.
- **Capacity Building:** Support training, retrofitting programs, and local shipyard upgrades for clean technology assimilation.

Conclusion:

The IMO Net-Zero Framework marks a milestone in climate governance by regulating maritime emissions globally. While ambitious in structure and purpose, timely implementation, fuel innovation, and equitable mechanisms will be vital for success. This can set a global precedent for other high-emission sectors.

PYQ: ‘

Sea is an important Component of the Cosmos”. Discuss in the light of the above statement the role of the IMO (International Maritime Organisation) in protecting the environment and enhancing maritime safety and security. (UPSC-2023)

SOUTH AUSTRALIA ALGAL BLOOM

Context:

A massive bloom of toxic algae *Karenia mikimotoi* has killed over 200 species of marine life off the southern coast of Australia, affecting biodiversity and coastal tourism.

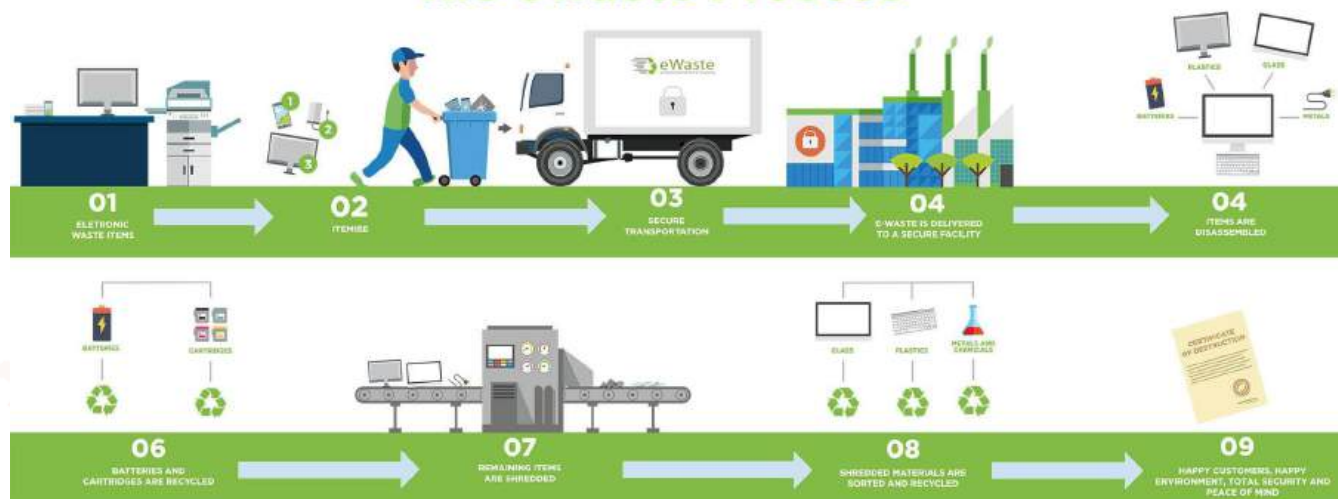
About South Australia Algal Bloom:

- **What It Is?**
 - *Karenia mikimotoi* is a species of **toxic dinoflagellate algae** that [forms harmful algal blooms](#) (HABs), commonly referred to as **red tides**.
- **Classification:**
 - **Kingdom:** Protista
 - **Phylum:** Dinoflagellata
 - It contains **photosynthetic pigments** but lacks protective thecal plates.
- **Historical Occurrence:**
 - First identified in **Japan in 1935**.
 - Since then, detected in **Norway, China, USA (east coast), English Channel, and Australia**.
 - **March 2025** marks the **largest bloom in South Australia** to date, spanning **4,400 sq. km**.
- **Recent 2025 Bloom:**
 - Coastline of **South Australia**, affecting: Kangaroo Island, Fleurieu Peninsula, and Yorke Peninsula
- **Key Features:**
 - Appears as **discoloured, foamy water** during warmer months.
 - Produces **toxins** (like **gymnocin A & B**) with low known toxicity but causes large-scale deaths.
 - Creates **oxygen-depleted (anoxic) zones** and blocks fish gills.
 - Affects marine life **directly through contact** and indirectly through **water chemistry alteration**.
 - Associated with **skin irritation, breathing issues, sore eyes** in humans near affected beaches.
- **Impacts:**
 - **Marine Life Deaths:** Over 200 species, including **sharks, rays, octopuses, and crabs** perished.
 - **Ecological Damage:** Long-term damage to **coastal food chains and biodiversity**.
 - **Economic Disruption:** Affects **fisheries, tourism, and local livelihoods**.
 - **Public Health Risk:** Causes **respiratory and skin problems** in beachgoers.
 - **Climate Linkage:** Triggered by **marine heatwaves**, intensified by **climate change** and calm sea conditions.



INDIA'S E-WASTE LANDSCAPE

The eWaste Process



Context:

India's e-waste surged by over 150% in six years, prompting experts like to advocate for a stable EPR floor price to formalise recycling and curb environmental and economic losses.

About India's E-Waste Landscape:

Current Status:

- E-waste refers to **discarded electronic products** (mobiles, laptops, TVs, etc.) containing toxic and precious metals.
- India generated **17.78 lakh metric tonnes of e-waste in 2023–24**, rising from 7.08 lakh metric tonnes in 2017–18 — a **151% increase** in six years.

Global Position:

- India is **one of the top five global e-waste producers**, alongside **China, USA, Japan, and Germany**.

Key Initiatives for E-Waste Management:

1. **E-Waste (Management) Rules, 2022:** Mandates Extended Producer Responsibility (EPR) for manufacturers to ensure **safe disposal and recycling**.
2. **EPR Certificate System:** Producers must buy certificates from authorised recyclers to meet EPR targets.
3. **Digital E-Waste Tracking:** Introduction of a **centralised portal** for traceability of e-waste movement and certification.
4. **Public Awareness Campaigns:** Emphasis on educating users and incentivising collection via e-stores, kiosks, and take-back policies.

EPR Floor Pricing:

- **What Is It?**
 - **Minimum guaranteed price** set for EPR certificates to ensure recyclers receive **fair compensation** for their work.
- **Key Features (as per E-Waste Rules 2022)**
 - Ensures **price predictability** for recyclers, encouraging formalisation.
 - Prevents **market collapse** and promotes investment in **eco-friendly technology**.
 - Aligns with global best practices (e.g., **Europe's high EPR fees** for producers).
- **Benefits:**
 - **Formal sector gains ground** over informal processing (which handles 95% of India's e-waste).
 - Reduces environmental hazards, encourages **material recovery** (e.g., gold, copper), and improves tax revenue.
 - Helps meet **circular economy goals** and Sustainable Development Goals (SDGs).

Challenges in E-Waste Collection:

- **Informal Sector Dominance:** 90% of e-waste handled by **unregistered recyclers**, lacking safety standards.
- **Low Consumer Awareness:** Lack of knowledge on safe disposal practices and take-back policies.
- **Weak Enforcement Mechanisms:** Regulatory bodies struggle with monitoring **informal and cash-based operations**.
- **Urban-Rural Divide:** Recycling infrastructure is concentrated in urban centres, leaving **tier-2 and rural areas uncovered**.
- **Design Complexity:** Modern electronics are hard to disassemble, making **safe recycling costly and complex**.

Way Ahead:

- **Implement Uniform Floor Pricing:** Ensure consistent pricing to protect **formal recyclers and prevent undercutting**.
- **Strengthen EPR Compliance:** Strictly monitor producer responsibilities, especially for **OEMs and importers**.
- **Incentivise Circular Product Design:** Encourage industries to adopt **recyclable, modular, and repairable products**.
- **Integrate Informal Sector:** Train and incorporate informal workers into **formal supply chains** through SHGs and cooperatives.
- **Boost Recycling Infrastructure:** Set up **state-level recycling hubs**, particularly in e-waste-intensive regions.

Conclusion:

India's growing e-waste mountain demands urgent and structured intervention. A **stable EPR floor price** is central to ensuring safe, profitable, and formal recycling that aligns with sustainability goals. Balancing environmental responsibility with economic opportunity is the cornerstone of **Viksit Bharat**.

PYQ:

What are the impediments in disposing the huge quantities of discarded solid wastes which are continuously being generated? How do we remove safely the toxic wastes that have been accumulating in our habitable environment? (UPSC-2018)

KERALA OIL SPILL INCIDENT

Context: A Liberian-flagged cargo vessel MSC ELSA 3, carrying hazardous material, capsized 38 nautical miles off Kochi, raising concerns of a major oil spill.

About Kerala Oil Spill Incident:

- MSC ELSA 3 sank due to flooding in one of its holds while en route from [Vizhinjam](#) to Kochi.
- The vessel was carrying **640 containers**, including **13 hazardous cargoes**, **84.44 MT diesel**, and **367.1 MT furnace oil**.
- **Hazards onboard:** *Calcium carbide, hazardous chemicals, and large fuel volumes.*



About Oil Spills:

- **What is an Oil Spill?**
 - An **accidental release of petroleum** or related substances into oceans, seas, or coastal waters.
 - Forms a **toxic film** that blocks sunlight, affects marine oxygen levels, and harms aquatic life.
- **Impacts of Oil Spills:**
 - **Marine Life Destruction:**
 - Coating of birds, mammals, and turtles disrupts thermoregulation and mobility.
 - Toxic exposure affects fish reproduction, growth, and survival.
 - **Ecosystem Disruption:**
 - Destroys phytoplankton, mangroves, coral reefs, and marine food chains.
 - Long-lasting contamination in **coastal areas** and **estuaries**.
 - **Economic Losses:**
 - Hits **fisheries, tourism, and shipping industries**.
 - Cleanup and compensation costs are extremely high.
- **Legal Framework Governing Oil Spills:**
 - **International Conventions:**
 - **MARPOL (1973/78):** Marine Pollution prevention by IMO; India is a signatory.
 - **OPRC Convention (1990):** Facilitates **global cooperation** in oil spill response.
 - **Indian Laws:**
 - **Merchant Shipping Act, 1958:** Governs pollution control in Indian waters.
 - **National Oil Spill Disaster Contingency Plan (NOS-DCP):**
 - ✓ Managed by **Indian Coast Guard** as the **nodal response agency**.
 - ✓ Ensures **monitoring, emergency response, and public safety**.
- **Technologies & Methods to Manage Oil Spills:**
 - **Skimmers:** Devices that physically **remove oil from the water surface**.
 - **Dispersants:** Chemicals that break oil into small droplets for **microbial degradation**.
 - **Oil Booms:** Floating barriers used to **contain oil spread**.
 - **In-situ Burning:** Controlled **burning of surface oil** in isolated patches.

Bioremediation: Use of **oil-eating microbes**, e.g., TERI's [Oil Zapper](#).

Syllabus: Disaster Management

BENGALURU URBAN FLOODING

Context:

Bengaluru witnessed over 130 mm rainfall in just 12 hours, leading to severe urban flooding that left 3 dead, 500 homes inundated, and major roads, underpasses, and lakes overwhelmed.

About Bengaluru Urban Flooding:

What is Urban Flooding?

- **Urban flooding** refers to the overflow of water in densely built environments due to poor drainage and excessive rainfall.
- Unlike rural floods, it occurs rapidly and overwhelms infrastructure—seen in cities like Mumbai (2005), Chennai (2015), and Hyderabad (2020).



Causes of Urban Flooding in Bengaluru:

- **Natural Causes:**
 - **Heavy Monsoon Rains:** [South-west monsoon](#) causes intense rainfall; July averages often exceed 100 mm in a day.
 - **Topography:** The city sits on an undulating terrain with natural low-lying basins like Hebbal, Koramangala-Challaghatta valleys.
- **Man-made Causes:**
 - **Encroachment of Lakes & Wetlands:** Bengaluru has lost 79% of its water bodies in the last 40 years (IISc data).
 - **Poor Drainage Maintenance:** Rajakaluves (storm drains) are choked, buried, or encroached, reducing water-carrying capacity.
 - **Outdated City Plans:** CDP and zoning regulations have not evolved with urban density and climate risks.
 - **Unregulated Construction:** Tech parks and apartments are often built over floodplains, violating environmental norms.
 - **Lack of Coordination:** Civic bodies function in silos, delaying response and long-term planning.

Impacts of Urban Flooding:

- **Loss of Life & Property:** Monsoon 2025 led to 3 deaths and submerged areas like Koramangala, Bellandur, and ORR.
- **Economic Disruptions:** IT corridor shutdowns cost crores; flooding impacts India's \$194B tech exports sector.
- **Public Health Crisis:** [Waterlogging spreads vector-borne diseases](#) and contamination-related infections.
- **Transport & Power Outages:** Prolonged disruption of metro, roads, and electrical systems during peak rains.

Global Best Practices:

- **Singapore's SWAN System:** Smart sensors detect water level rise and activate flood alerts in real-time.
- **Netherlands' "Room for the River":** Managed retreat and river expansion reduce flood pressure in cities.
- **China's "Sponge Cities":** Permeable pavements, green roofs, and wetlands absorb excess water sustainably.
- **FLOAT House (New Orleans):** Floating homes adapt to changing water levels, minimizing displacement.

Way Forward:

- **Restore Natural Drainage:** Reconnect lakes, wetlands, and rajakaluves following IISc & NDMA recommendations.
- **Regular Desilting:** Institutionalize desilting of secondary/tertiary drains before monsoons, with third-party audits.
- **Urban Planning Reform:** Revise Bengaluru's CDP to include flood zoning and green infrastructure mandates.
- **Smart Flood Management:** Use IoT-based water monitoring systems and integrate early warning dashboards.
- **Clear Political Accountability:** Strengthen BBMP's autonomy and conduct regular audits to fix administrative gaps.

Conclusion:

Bengaluru's repeated flooding is no longer a seasonal mishap but a governance failure. Restoring ecological wisdom and enforcing climate-resilient urban planning is not optional—it is a necessity. A city of lakes must not become a city under water.

PYQ:

The frequency of urban floods due to high intensity rainfall is increasing over the years. Discussing the reasons for urban floods, highlight the mechanisms for preparedness to reduce the risk during such events. (UPSC-2016)

LANDSLIDE

Context:

A tragic landslide on the Kedarnath National Highway in Rudraprayag, Uttarakhand killed one and injured five pilgrims from Chhattisgarh. Authorities have warned against travel due to ongoing extreme weather.

About Landslides:

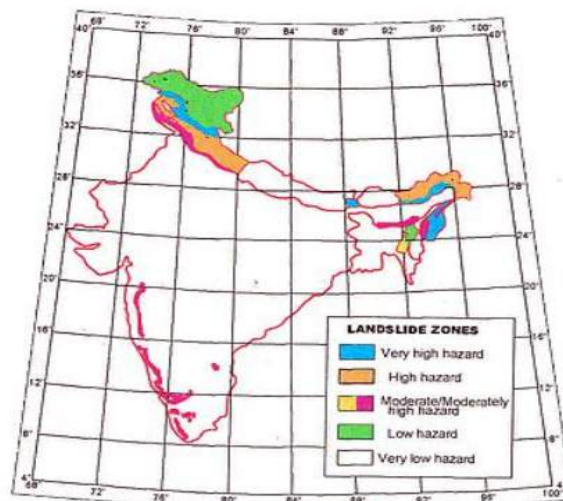
- **What is a Landslide?**
 - A landslide is the sudden downward movement of rock, earth, or debris due to gravity, often triggered by

heavy rainfall, seismic activity, or human interference.

- **India's Vulnerability:** Around **15% of India's landmass** is landslide-prone (NDMA), especially the **Himalayas, North-East, Western Ghats**, and Nilgiris.
- **Types of Landslides in India:**
 - **Debris Flow:** Common during monsoon in Western Ghats and Himalayas.
 - **Rockfalls:** Observed in steep Himalayan terrains.
 - **Creeping Landslides:** Slow and progressive, seen in Sikkim and Darjeeling.

Causes of Landslides in India:

1. **Geological Factors:** Fragile rock structures due to **tectonic movement** of the Indian plate at ~5 cm/year (Geological Survey of India).
2. **Heavy Rainfall:** Intense and prolonged rainfall triggers slope failures, e.g., Malpha (Pithoragarh) and Okhimath (Chamoli).
3. **Seismic Activity:** Earthquakes in Himalayan zones weaken slopes and trigger landslides.
4. **Deforestation & Urbanisation:** Removal of vegetation and unregulated construction destabilizes soil layers.
5. **Road Construction & Mining:** Blasting and excavation alter natural slopes, making them prone to collapse.



Impacts of Landslides:

- **Short-term Impacts:**
 - **Loss of life and injuries**, e.g., Kedarnath NH landslide (May 2025).
 - **Damage to infrastructure and crops** causing economic loss.
 - **Obstruction to transport**, especially in remote and hilly terrain.
- **Long-term Impacts:**
 - **River sedimentation**, leading to downstream flooding.
 - **Reduced reservoir life** due to siltation in hydropower projects.
 - **Displacement of population** and loss of arable land.
 - **Geographic isolation** leading to underdevelopment.

NDMA Guidelines for Landslide Management:

- **Hazard Zonation Maps:** LHZ maps at 1:50,000 scale being prepared by NRSC, IITs, DST. E.g., NRSC Atlas for Uttarakhand corridors.
- **Early Warning Systems (EWS):** Use of **real-time monitoring**, stress sensors, remote sensing, and GIS for timely alerts.
- **Land Use Regulation:** No construction in vulnerable zones, excavation norms, and slope stability measures like **rock bolting and retaining walls**.
- **Preparedness & Capacity Building:** Disaster training in schools, simulation drills, and awareness campaigns in hilly districts.
- **Infrastructure Measures:** Drainage improvement, vegetation cover restoration, and slope reengineering.
- **Insurance & Compensation:** Encouraging **landslide insurance** and quick relief disbursements to affected families.
- **Research & Development:** DST supports over 30 research projects to improve landslide prediction and mitigation technologies.

Conclusion:

Landslides are a persistent threat in India's **geologically fragile zones**. With changing climate and unplanned development, their frequency is rising. Strengthening early warning systems, enforcing regulations, and raising public awareness are key to reducing future risk and impact.

PYQ:

1. Describe the various causes and the effects of landslides. Mention the important components of the National Landslip Risk Management Strategy. (2021)

CLIMATE PHYSICAL RISK (CPR)

Context:

Union Home Minister recently emphasized the need for proactive climate risk assessments amidst rising extreme weather events. The article highlighted India's fragmented approach to Climate Physical Risk (CPR) and called for a unified national framework.

About Climate Physical Risk:

What is Climate Physical Risk (CPR)?

Definition: CPR refers to potential damage from acute (e.g. floods, heatwaves) and chronic (e.g. shifting rainfall patterns, droughts) climate events.

Formula:

As per IPCC, $CPR = Hazard \times Exposure \times Vulnerability$.

Features:

Hazard: Refers to climate-induced events like floods, cyclones, droughts, or wildfires that pose direct environmental threats.

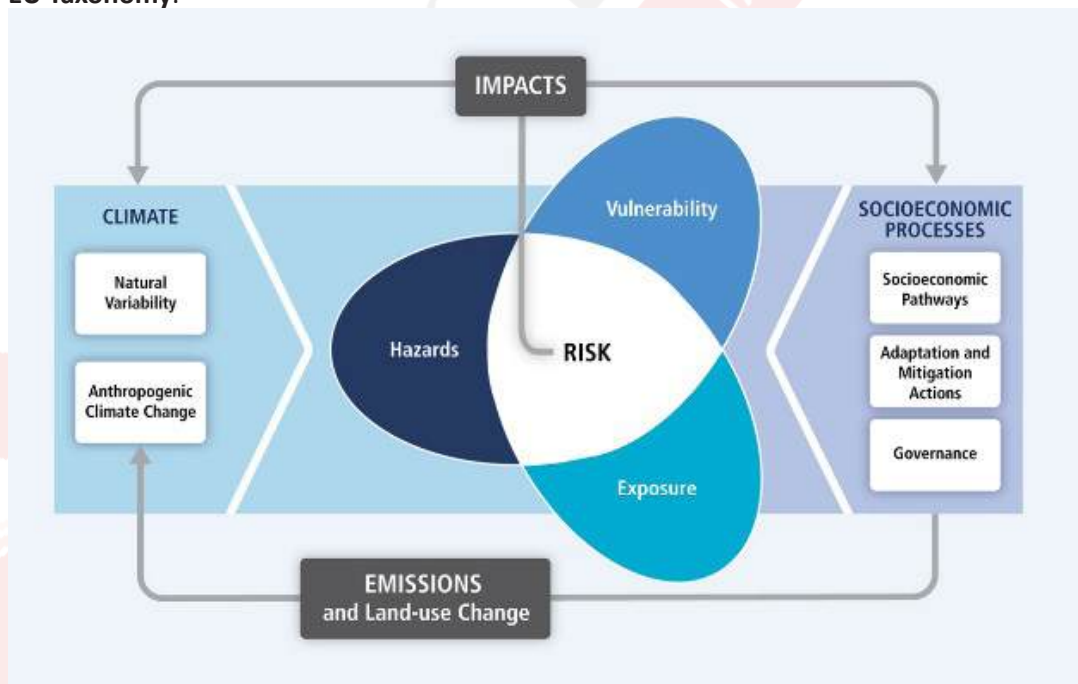
Exposure: Denotes the presence of people, infrastructure, or economic assets in areas susceptible to hazards.

Vulnerability: Captures the ability of systems, communities, or infrastructure to withstand and bounce back from these hazards.

Global & Indian Context:

Global Context:

Mandatory Climate Disclosures: Countries now require companies to disclose physical climate risks under standards like ISSB S2 and the EU Taxonomy.



Universal Relevance: Both Global North and South face extreme events—e.g., heatwaves in Europe and wildfires in the US.

Indian Context:

High Exposure: Over 80% of Indians live in districts prone to climate disasters, including floods, droughts, and heatwaves (World Bank).

Fragmented Framework: CPR data is dispersed across [IMD](#), [IITs](#), and [NIDM](#) without a standardised, national-level risk assessment system.

Key Challenges in India's CPR Management:

- **Fragmentation:** CPR studies are isolated across ministries, lacking standardisation.
- **Modelling Issues:** Global models like RCPs/SSPs miss India's hyper-local climate variations.
- **Data Gaps:** No central repository for risk metrics at district or panchayat level.
- **Private Sector Barriers:** Limited tools for businesses to assess value chain exposure.

Initiatives Taken So Far:

- **Adaptation Communication (2023):** India submitted its first climate adaptation report to UNFCCC under Article 7 of the Paris Agreement.
- **National Adaptation Plan (NAP):** Work is underway for a full NAP covering nine sectors with district-level detailing.
- **RBI Framework:** Incorporating climate risks into India's financial sector supervision mechanisms.

Way Forward:

- **India-Specific CPR Tool:** Must include local climate modelling, real-time risk dashboards, and sector-wise vulnerability indices.
- **Central Risk Repository:** Enable data-sharing across ministries, states, and private entities.
- **Financial Alignment:** Direct climate finance to adaptation (e.g. resilient roads, heat-resilient crops).
- **Public-Private Partnerships:** Empower industries to map risks and integrate climate resilience in ESG and sustainability audits.
- **Transparent Standards:** Use science-based methodologies with real-time data integration and citizen feedback loops.

Conclusion:

India's development must be climate-proofed. CPR is not just a risk metric — it's a governance imperative. A unified, locally rooted, and future-ready system is essential to turn resilience from buzzword to blueprint.

PYQ:

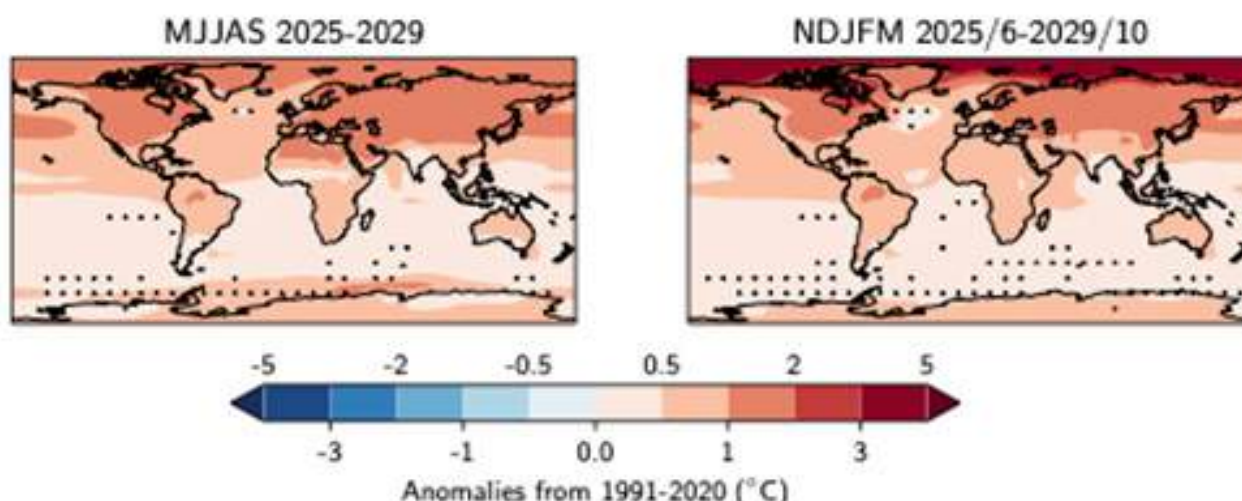
Discuss about the vulnerability of India to earthquake related hazards. Give examples including the salient features of major disasters caused by earthquakes in different parts of India during the last three decades. (UPSC-2021)

WMO GLOBAL CLIMATE FORECAST 2025–2029

Context:

The World Meteorological Organization ([WMO](https://www.wmo.int)) has released a new decadal climate forecast, warning that global temperatures between 2025 and 2029 are expected to remain at or above record levels, significantly increasing climate-related risks and development challenges.

Ensemble mean forecast of near-surface temperature



About WMO Global Climate Forecast 2025–2029:

- **Temperature Range:** Annual global mean surface temperature is projected to be 1.2°C to 1.9°C above pre-industrial (1850–1900) levels.
- **Record-Breaking Heat:**
 - **80% chance** that one year between 2025–2029 will **exceed 2024**, the hottest year on record.
 - **86% chance** that one year will cross the **1.5°C threshold**.
- **Five-Year Average Warming:**
 - **70% probability** that 2025–2029 average will **exceed 1.5°C**, up from 47% in last year's report.
- **Long-Term Context:** 1.5°C target in Paris Agreement refers to **multi-decade averages**, but short-term overshoots are now increasingly likely.

Key Issues Highlighted in the Report:

- **Accelerated Arctic Warming:** Winter temperatures in the Arctic are expected to be 2.4°C above the 1991–2020 average, over 3.5× faster than global average.
- **Decline in Sea Ice:** Further reductions predicted in the Barents Sea, Bering Sea, and Sea of Okhotsk, impacting biodiversity and indigenous livelihoods.
- **Changing Precipitation Patterns:**
 - Wetter conditions expected in Sahel, Alaska, Northern Europe.
 - Drier conditions over the Amazon and parts of South Asia, intensifying drought risks.
- **Regional Variability:** South Asia may witness continued wet years, though not uniformly across seasons.

Consequences of Predicted Warming:

- **Extreme Weather Intensification:** Every fraction of warming drives stronger heatwaves, floods, and droughts, impacting both urban systems and agrarian economies.
- **Melting Ice and Rising Seas:** Sustained warming leads to glacial melt, contributing to sea-level rise and coastal threats.
- **Ocean Heating & Acidification:** Increased temperatures cause marine ecosystem degradation, endangering fisheries and food chains.
- **Threat to Sustainable Development:** Warming undermines SDGs, especially food security, water access, and public health in vulnerable regions.

Way Ahead:

- **Strengthen Climate Action (NDCs):** Nations must revise and scale up their Nationally Determined Contributions (NDCs) at COP30 for alignment with Paris targets.
- **Accelerate Renewable Transitions:** Shift to clean energy and net-zero pathways is vital to reduce GHG emissions.
- **Boost Adaptation Planning:** Implement climate-resilient infrastructure and early warning systems in high-risk zones.
- **Enhance Global Climate Monitoring:** Expand WMO-led efforts for decadal forecasting, regional risk assessments, and public policy guidance.
- **Protect Natural Carbon Sinks:** Preserve forests, wetlands, and oceans which act as critical buffers against rising CO₂ levels.

Conclusion: The WMO's forecast reinforces the urgency of aggressive climate action. The likelihood of surpassing **1.5°C even temporarily** signifies increasing systemic risks. Without immediate global commitment, **climate extremes** will become the new normal.

PYQ:

Bring out the relationship between the shrinking Himalayan glaciers and the symptoms of climate change in the Indian sub-continent. (UPSC- 2014)

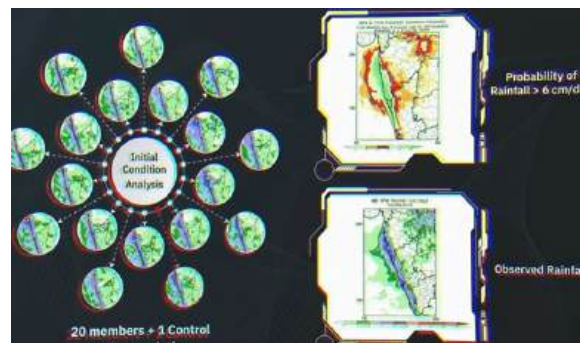
BHARAT FORECASTING SYSTEM (BFS)

Context: The Union Ministry of Earth Sciences launched the Bharat Forecasting System (BFS) on May 26, 2025.

- It is the world's highest-resolution weather prediction model using a **6 km x 6 km grid**, powered by India's supercomputer **Arka**.

About Bharat Forecasting System (BFS):

- **What is BFS?**
 - BFS is India's most advanced numerical weather prediction system.
 - It provides **highly localized, short-term weather forecasts** up to panchayat level using ultra-high-resolution grids.
- **Developed by**
 - Developed by scientists at the Indian Institute of Tropical Meteorology (IITM), Pune.
 - Led by researcher **Dr. Parthasarathi Mukhopadhyay**.
- **How It Works?**
 - Utilizes **supercomputer Arka** (11.77 PetaFLOPS, 33 Petabyte storage) to run simulations faster (within 4 hours).
 - Uses real-time inputs from **40+ Doppler Weather Radars**, which will soon expand to 100.
 - Processes data for regions **between 30° South to 30° North** latitude, covering tropical zones including India.
- **Key Features:**
 - **Highest global resolution:** 6 km grid (compared to 9–14 km used by EU, UK, US models).
 - **Faster processing:** Cuts prediction time by 60% compared to previous model *Pratyush*.
 - **Covers India comprehensively:** Including small villages and blocks.
 - **Supports nowcasting** – forecasts for the **next 2 hours**.
- **Significance:**
 - **Disaster Risk Reduction:** Enables quicker evacuation and flood alerts.
 - **Agricultural Resilience:** Assists farmers with timely rainfall, heatwave, and drought warnings.
 - **Water Resource Planning:** Better irrigation management and reservoir operations.
 - **Food Inflation Management:** Helps stabilize prices by reducing crop losses.
 - **Public Health:** Early warning for heatwaves and pollution episodes.



Syllabus: Internal Security & its Challenges

INDIA'S CHANGING MILITARY STRATEGY

Context:

Prime Minister outlined a new military doctrine, signalling a shift in India's strategic posture against [cross-border terrorism](#) and nuclear blackmail.

About India's Changing Military Strategy:

Operation Sindoor: India's Decisive Strike

- **What it is:** A calibrated, deep-strike air and drone offensive targeting terrorist infrastructure in PoJK and Pakistani Punjab.
- **Conducted by:** Joint operations by the **Indian Army, Air Force, Navy, and intelligence agencies**.
- **Key Targets:** Nine terror facilities including Jaish-e-Mohammed HQ in Bahawalpur and LeT base in Muridke.
- **Precision Tools Used:** SCALP cruise missiles, [HAMMER precision-guided bombs](#), kamikaze drones.
- **Doctrine Highlight:** The operation avoided ground invasion, used **tech-based deterrence**, and denied Pakistan plausible deniability.



Core Elements of New Military Strategy of India:

- **Response on India's Terms:** Strikes at timing and targets of India's choosing, without waiting for escalation.
- **No Tolerance for Terror & Nuclear Blackmail:** PM Modi stated Pakistan's nuclear threats won't deter India's

actions.

- **No Distinction Between State & Non-State Actors:** Terrorists, their handlers, and state sponsors treated alike.

How India's Military Strategy Is Changing?

- **Strategic Shifts:**
 - **Tech-Driven Warfare:** Post-Galwan, India has prioritised **multi-domain capabilities** – cyber, space, drones, satellites.
 - **Standoff Strike Capability:** India's use of **air-launched precision weapons** allows deep strikes with low risk.
 - **Escalation Control:** Strategy is calibrated to avoid full-scale war while imposing costs on adversaries.
- **Defence Enhancements:**
 - **Improved Air Defence:** India intercepted Pakistani drones/missiles, showcasing superior air surveillance.
 - **Smart Deterrence:** Combines kinetic power with psychological pressure, demonstrated by real-time response and damage control.
 - **Operational Readiness:** India has moved closer to a **Cold Start-like posture** without officially adopting it.

Implications for India's Future Warfare:

- **New Normal in Indo-Pak Relations:** India may now **strike first, strike deep** if provoked—setting a stronger redline.
- **Geopolitical Assertiveness:** India now positions its counter-terror operations within the **global war on terror** narrative.
- **Strengthened Strategic Credibility:** India's shift from reactive to **proactive doctrine** could deter proxy threats.
- **Focus on PoJK:** PM Modi clarified **PoJK is the only agenda** for future talks with Pakistan, not trade or diplomacy.
- **Civil-Military Integration:** Strong alignment between political will and military execution indicates a **doctrinal shift**.

Conclusion:

Operation Sindoor marks a pivotal shift in India's counter-terror doctrine by fusing technology, precision, and assertiveness. India's readiness to strike beyond borders—despite nuclear threats—reflects evolving strategic confidence. Future warfare will be shaped more by **tech superiority and swift retaliation** than traditional battlegrounds.

PYQ:

Discuss the types of organized crimes. Describe the linkages between terrorists and organized crime that exists at the national and transnational levels. (UPSC-2022)

INDIA'S SPATIAL INFRASTRUCTURE FOR NATIONAL SECURITY

Context:

China's **Beidou satellite navigation system** is under scrutiny after reports suggested it may have been used by militants during the Pahalgam terror attack in India, raising serious national security concerns for India.

About India's Spatial Infrastructure for National Security:

About Spatial Infrastructure:

- **Definition:** Spatial infrastructure includes satellite-based systems for positioning, navigation, and timing (PNT), such as GPS, India's NavIC, and China's Beidou.
- **Governing Rules:** Governed by international treaties (e.g., ITU, **COPUOS**) and domestic space/telecom regulations like India's Satcom Policy.
- **Core Features:**
 - High-precision real-time tracking and location services.
 - Integration with communication networks and AI-based surveillance tools.
 - Offers Short Messaging Services (SMS), encrypted communications, and location analytics (as in Beidou).



Role in National Security:

- **Tactical Military Operations:** Enables secure communications and troop coordination in surveillance-heavy or

mobile-network-denied regions.

E.g. Beidou SMS capability was likely used in Pahalgam attack to evade detection.

- **Border Monitoring & Drone Navigation:** Crucial for precision drone strikes and patrol management.
- **Disaster Management & Infrastructure Security:** Used in coordination with telecom networks and IoT sensors for early warning systems.
- **Cybersecurity Backbone:** Supports encryption, network resilience, and secure data routing through quantum-safe protocols.

India's Spatial Infrastructure Initiatives for National Security:

- **NavIC & GAGAN Systems:**
 - **NavIC** offers indigenous navigation services across India and nearby regions.
 - **GAGAN** augments GPS signals for high-precision use in aviation and defense sectors.
- **Defence Space Agency (DSA):** Coordinates space-based assets for military use, enhancing surveillance, navigation, and secure communications.
- **RISAT & EOS Satellite Series:** Provide real-time radar imaging for border monitoring, terrain mapping, and disaster response.
- **Samvad & Netra Projects:**
 - **Samvad** secures military satellite communication.
 - **Netra** tracks space threats and enemy satellites, strengthening space situational awareness.
- **Quantum Satellite Communication:** ISRO-DRDO initiative to develop quantum-encrypted communication for tamper-proof defence networks.

Key Issues Surrounding Spatial Infrastructure:

- **Foreign GNSS Dependence:** Overreliance on external systems like GPS or Beidou compromises sovereignty and data integrity.
- **Use by Non-State Actors:** Beidou's high-accuracy services may be exploited by terrorists in border regions (e.g., Pakistan & J&K).
- **Geo-Tech Dominance by China:** China's promotion of Beidou in Sri Lanka, Nepal, and Bangladesh may reduce India's regional tech leverage.
- **Lagging Indigenous Systems:** NavIC lacks global coverage and commercial adoption remains low.
- **Spoofing and Signal Jamming:** Limited real-time capabilities to counter satellite spoofing or jamming threats.

Way Ahead:

- **Upgrade NavIC Infrastructure:** Expand NavIC's global coverage and integrate it into smartphones, vehicles, and defense platforms.
- **Strengthen Space Surveillance:** Accelerate RISAT-type missions to track cross-border movements in real-time.
- **Deploy Counter-Interference Tech:** Invest in signal spoofing detection, jamming devices, and GNSS firewalls near sensitive zones.
- **Promote Regional GNSS Adoption:** Offer technical and financial support to neighbors to adopt NavIC as a strategic alternative to Beidou.
- **Raise Multilateral Concerns:** Use forums like UN COPUOS and ICG to flag the dual-use nature of satellite systems being misused by non-state actors.

Conclusion:

The misuse of spatial infrastructure like Beidou by state and non-state actors poses new security risks for India. Strengthening indigenous capabilities like NavIC and deploying proactive countermeasures will be crucial for securing national sovereignty and ensuring strategic autonomy in a rapidly evolving digital battlespace.

PYQ:

Discuss India's achievements in the field of Space Science and Technology. How the application of this technology has helped India in its socio-economic development? (UPSC-2016)

GENERAL STUDIES-IV

Syllabus: Ethics and Human Interface

ETHICAL OBLIGATION TO REFUGEE

Context:

The World [Refugee Crisis](#) is once again in focus after a 3-year-old refugee girl died during forced displacement, reviving global debates on ethical responsibilities and humanitarian obligations.

About Ethical Obligation to Refugees:

- **Definition & Moral Claim:** Ethical obligation refers to the moral responsibility of states and individuals to protect innocent people fleeing persecution, war, or violence.
- **Global Refugee Data:** As of 2025, there are **43.7 million** refugees worldwide (UNHCR). 75% remain in the Global South in precarious conditions.
- **Types of Refugees:**
 - **Conflict Refugees:** Flee war zones (e.g., Syria, Ukraine, Afghanistan).
 - **Persecuted Minorities:** Escape religious or ethnic oppression (e.g., Rohingya, Yazidis).
 - **Climate Refugees:** Displaced by rising seas, droughts (e.g., small island nations, Sub-Saharan Africa).



Obligations of States Towards Refugees:

1. Negative Obligations: Do No Harm

- **Border Abuse:** Many Global North states inflict violence at borders (e.g., Calais, EU-Turkey border, US-Mexico wall).
- **Containment Policies:** Policies like the **EU-Libya agreement** trap refugees in unsafe zones, violating rights.
- **Detention & Encampment:** Indefinite detention in Libya and forced camps in Greece breach the right to movement and dignity.

2. Positive Obligations: Protect and Assist

- **Resettlement Programs:** Accepting refugees through humanitarian visas ensures autonomy and dignity (e.g., **Ukrainian visa schemes** by UK/EU in 2022).
- **Safe Routes & Rights Access:** Facilitate legal travel, employment, and education for refugees (e.g., Eurostar free travel for Ukrainians).
- **Infrastructure Aid to Host Countries:** Invest in refugee support in Global South nations to prevent desperation-led migration (e.g., Jordan, Turkey, Lebanon).

Philosophical Justifications:

- **Singer's Samaritan Principle:** If you can prevent great suffering without significant sacrifice, it is morally wrong not to act.
- **Arendt's Theory of Rightlessness:** Refugees lose rights not due to lack of humanity but lack of national protection — denying them redress and dignity.
- **Moral Equality Principle:** The moral worth of all refugees (Ukrainian or not) is equal; ethical response must be consistent and universal.

Significance of Ethical Obligations Toward Refugees:

1. Individual Level

- **Moral Responsibility:** Upholding compassion and moral universality by aiding those fleeing persecution affirms our shared humanity.

- **Ethical Agency:** Enables individuals to act with moral courage and resist bystander apathy in the face of human suffering.

2. Institutional Level:

- **Democratic Legitimacy:** Institutions that respect refugee rights strengthen rule of law, social justice, and procedural fairness.
- **Ethical Governance:** Promotes accountability, human dignity, and equitable policy-making based on Kantian respect for persons.

3. Global Level:

- **Global Justice & Solidarity:** Reinforces cosmopolitan ethics and fosters collective moral responsibility under international human rights frameworks.
- **Moral Leadership:** Ethical refugee policies enhance soft power and global norm entrepreneurship, setting standards for humane governance.

Conclusion:

Global North states cannot ignore or actively harm refugees under the guise of border control. Ethical obligations—both to refrain from harm and to actively protect—are grounded in universal moral principles. A humane, rights-respecting approach, as extended to Ukrainian refugees, must be institutionalised for all.

Syllabus: Human Values Lessons from the Lives & Teachings

EXPERIENTIAL LEARNING

Context:

Article in newspaper highlights India's exam-centric education and advocates experiential learning for cultivating higher-order thinking skills.

- Aligns with **NEP 2020** reforms promoting critical thinking and real-world application of knowledge.



About Experimental Learning:

What is Experiential Learning?

- A learner-centric approach where knowledge is gained through experience, reflection, and application (David Kolb, 1984).
- **Key Features:**
 - "Learning by Doing" through **hands-on activities**.
 - Builds skills like **problem-solving, teamwork, and creativity**.
 - Follows a **four-stage cycle**:
 - Starting with a concrete experience
 - Moving to reflective observation
 - Followed by abstract conceptualisation
 - Finally leading to active experimentation.

Why India Needs Experiential Learning:

- **Exam-Centric Limitations:** 80% of students in India struggle with application-based questions (ASER Report 2023).
- **Unequal Learning Outcomes:** Urban-rural and public-private divides hinder holistic education access.
- **Low Higher-Order Thinking:** Present rote learning model restricts skills like analysis, evaluation, and innovation.
- **Cognitive Diversity:** As per Gardner's Theory of Multiple Intelligences, different students learn differently—visual, kinaesthetic, or auditory.

Implementing Experiential Learning in India:

- **Pedagogical Strategies:**

- **Flipped Classrooms:** Students learn theory at home; apply and discuss in class.
- **Field Projects:** Linking science with real-world problems via outdoor experiments.
- **Collaborative Learning:** Group tasks, role-playing, and peer feedback.
- **Simulation & Tech:** Use of AR/VR in history, geography, and [STEM](#) simulations.
- **Best Practices:**
 - **Inquiry-based learning** in Navodaya Vidyalaya's.
 - **Activity-based learning** adopted in Tamil Nadu schools has improved retention and engagement.

Challenges:

- **Logistics & Training:** Shortage of trained educators; lack of labs and digital tools in rural schools.
- **Contextual Readiness:** Not all students may be prepared; e.g., Grade 8 students reading at Grade 2 level ([ASER 2022](#)).
- **Uniform Policy Pitfalls:** One-size-fits-all frameworks ignore socio-economic and cultural diversity.

Way Ahead:

- **Policy Integration:** Embed experiential modules within existing curriculum without disrupting current structure.
- **Capacity Building:** Train teachers under [DIKSHA](#) and NCERT's new training modules.
- **Tech + Community:** Use digital platforms and local knowledge holders (farmers, artisans) for learning activities.
- **Assessment Reform:** Shift from memory-based tests to portfolio-based, outcome-focused evaluation.
- **Public-Private Partnerships:** Leverage NGOs and Ed-Techs for scalable implementation.

Conclusion:

Experiential learning transforms the classroom into a laboratory of life. It nurtures curious, self-driven learners ready to face real-world challenges. Integrating it within India's education system is not just desirable but essential for equitable, quality learning.

PYQ:

'Earn while you learn' scheme needs to be strengthened to make vocational education and skill training meaningful." Comment. (UPSC - 2021)

[Syllabus: Public Civil Service Values & Ethics in Public Administration](#)

WHISTLEBLOWING

Context:

The [World Economic Forum](#) (WEF) is conducting an internal investigation into its founder Klaus Schwab after whistleblower allegations of ethical and financial misconduct.

About Whistleblowing:

- **Definition:** Whistleblowing is the lawful disclosure of misconduct or unethical activity within an organization to authorized entities.
- **Ethical Basis:**
 - **Aristotelian Ethics:** Focuses on *moral character* rather than just rules or consequences.
 - **Ross's Prima Facie Duty Theory:** In whistleblowing, the duty to prevent harm and promote justice outweighs the duty of loyalty to one's employer.
 - **Bhagavad Gita** – "*Karmanye vadhikaraste*" meaning one must perform one's duty without attachment to results, even in face of adversity.



Key Features of Whistleblowing:

- **Right Information:** Involves exposing violations of law, fraud, corruption, abuse of authority, or threats to public safety.
- **Protected Disclosure:** Done through authorized channels like an [internal ombudsman](#), regulator, or court.
- **Scope:** Applies to both government and corporate wrongdoing (e.g. insider trading, embezzlement, toxic workplace).
- **Anonymity and Protection:** Effective mechanisms often ensure identity safeguards and protection from retaliation.

Importance of Whistleblowing in Ethics:

- **Promotes Accountability:** 2018 whistleblower complaint in a major bank led to top-level resignations and internal audits.
- **Protects Public Interest:** Helps avert systemic failures (e.g. housing finance fraud exposed in 2020).
- **Reinforces Governance:** Whistleblower complaints are a top tool in detecting corporate fraud, according to ACFE studies.
- **Saves Costs:** KPMG (2023) found companies with proactive mechanisms were 70% better at early fraud detection.

Global & Indian Legal Frameworks:

- **Global Laws:**
 - **US SEC Whistleblower Program:** \$600 million awarded in FY 2023, incentivising ethical disclosures.
 - **EU Whistleblower Protection Directive:** Ensures confidentiality, non-retaliation, and right to legal redress.
 - **UN Convention Against Corruption:** Recognizes whistleblowing as a key anti-corruption tool.
- **Indian Laws:**
 - **Whistleblower Protection Act, 2014:** Covers public servants; lacks corporate coverage and anonymity.
 - **Companies Act 2013:** Mandates vigil mechanisms in certain companies to report ethical violations and fraud.
 - **SEBI Guidelines (2021):** AMCs must adopt whistleblower policies, especially for insider trading and market abuse.
 - **RTI Act, 2005:** Empowers citizens to expose corruption in public offices.

Challenges to Whistleblowing:

- **Fear of Retaliation:** 51% of Indian whistleblowers face victimisation (Global Integrity Report 2024).
- **Lack of Confidence:** Over 50% cite distrust in complaint resolution or fear of professional backlash.
- **No Corporate Protection Law:** Private sector whistleblowers remain vulnerable.
- **Social Stigma:** Cultural hesitance and peer loyalty prevent internal disclosures.

Way Forward:

- **Enforce Whistleblower Protection Act:** Bring it into force with amendments to cover private sector and anonymous tips.
- **Strengthen Vigil Mechanisms:** Every organization must ensure independent hotlines, legal support, and training.
- **Reward Ethical Action:** [SEBI model](#) of monetary rewards should be extended across regulators.
- **Transparency Culture:** Strong leadership must encourage ethical disclosures and recognize whistleblowers.

Conclusion:

Whistleblowing remains a cornerstone of ethical governance, exposing corruption and promoting transparency. However, without legal protection and cultural change, whistleblowers risk serious retaliation. India must institutionalize protections and promote ethical courage to uphold accountability in public and corporate life.

PYQ:

Whistleblower, who reports corruption and illegal activities, wrongdoing and misconduct to the concerned authorities, runs the risk of being exposed to grave danger, physical harm and victimization by the vested interests, accused persons and his team. What policy measures would you suggest to strengthen the protection mechanism to safeguard the whistleblower? (UPSC-2022)

FACT FOR PRELIMS (FFP): GS-1

Syllabus: Indian Culture-Salient aspects of Art Forms

SATAVAHANA DYNASTY

Context:

Archaeological Survey of India (ASI) discovered 11 Satavahana-era inscriptions in the Gundaram Forest of Telangana's Peddapalli district.

- Among them, two inscriptions reveal links to the **Chutu dynasty and Satavahana prince Kumara Hakusiri**, highlighting early Brahmi script and religious-political symbolism.

About Satavahana Dynasty:

- Founded by:** *Simuka*, post-Mauryan period (mid-1st century BCE).
- Etymology:** "Satavahana" in Prakrit means "driven by seven" (symbolic of the Sun God's chariot).

CHUTU (CUTU) DYNASTY:

- Time Period:** Circa 200–300 CE
- Region Ruled:** Kuntala Rajya (modern-day Karnataka)
- Capital:** Banavasi
- Political Status:** Subordinate to Satavahanas and some scholars consider them independent due to use of royal title "Rājño" on coins.
- Notable Kings:** Cuṭukulānanda, Sātakarṇi I & II, Muḍānanda, Śivalānanda
- The dynasty was eventually absorbed by the Kadambas.
- Despite rich archaeological evidence, historical details remain scarce.



- Core regions:** Andhra Pradesh, Telangana, Maharashtra.
- Capitals:** Pratishthana (Paithan) and Amaravati.

Key Rulers:

- Simuka: Founder**, built *Jain and Buddhist temples*.
- Satakarni I (70–60 BCE):** Conquered *Kalinga*, performed *Ashvamedha*, and took the title *Dakshinapathapati*.
- Hala:** Authored *Gatha Saptashati*, a collection of 700 Prakrit love poems.
- Gautamiputra Satakarni (106–130 CE):**
 - Greatest king; **defeated Shakas and Nahapana**.
 - Described as *Ekabrahmana* and "destroyer of Kshatriya pride".
 - Expanded from *Krishna River to Malwa*.
- Yajna Sri Satakarni (165–194 CE):** Promoted *trade and maritime navigation*; coins feature **ship motifs**.

Administrative Framework:

- Senapati as Provincial Governor:** Military chiefs were appointed as governors to control semi-Brahmanised tribal regions, blending civil and military administration.
- Feudatory System:** The empire had a three-tier system—*Raja* (independent coinage), *Mahabhoja*, and *Senapati*—ensuring localized governance.
- Tax-free Land Grants:** Satavahanas granted tax-exempt lands to Brahmins and Buddhist monks, promoting religion and education.

Economic Contributions:

- Agriculture:** The Krishna-Godavari delta was a fertile rice-producing zone, sustaining the empire's agrarian base.
- Mining & Trade:** Rich in minerals like iron (Warangal) and gold (Kolar), the region thrived through inland and maritime trade routes.
- Coinage:** They were the first native rulers to issue portrait coins with legends in Prakrit and regional symbols.

Cultural and Religious Legacy:

- Architecture:** Rock-cut temples like *Karle Chaitya* and stupas at *Amaravati* and *Nagarjunakonda* showcased a blend of art and devotion.
- Language:** *Prakrit* was the administrative language, inscribed using *Brahmi script*, ensuring wider reach among common people.

SACRED RELICS OF LORD BUDDHA

Context:

The Sacred Relics of Lord Buddha arrived in **Ho Chi Minh City, Vietnam**, ahead of **UN Vesak Day 2025**.



About Sacred Relics of Lord Buddha

What Are Sacred Relics?

- Sacred Relics of Lord Buddha are revered physical remains or personal items associated with **Gautama Buddha**, preserved and venerated by followers across the world.
 - They symbolize **Buddha's teachings**, spiritual enlightenment, and serve as focal points of devotion and pilgrimage.
 - They are preserved and curated by the **National Museum of India**.
 - Supported by the **Ministry of Culture** and **International Buddhist Confederation (IBC)**.

Types of Relics Associated with Buddha

- **Saririka Relics**: Physical remains such as bones, teeth, and ashes.
- **Paribhogika Relics**: Objects used by Buddha such as his robe, bowl, or walking stick.
- **Uddesika Relics**: Symbols representing Buddha like stupas, images, and sculptures.

Major Relics Associated with Buddha

1. **Mahabodhi Temple (Bodh Gaya)** – Site of Buddha's enlightenment.
2. **Kapilavastu Relics** – Discovered in Piprahwa (UP), linked to Buddha's Shakya clan.
3. **Tooth Relic (Sri Lanka)** – Housed in **Kandy's Temple of the Sacred Tooth Relic**.
4. **Sarnath Relics** – Where Buddha gave his first sermon (Dhammacakkappavattana Sutta).

Significance of the Relics

- **Symbolize Buddha's teachings** of peace, non-violence, and enlightenment.
- **Promote cultural diplomacy**—India has shared relics with **Mongolia, Thailand, and now Vietnam**.
- **Strengthen Buddhist heritage ties** between nations.

- **Adornments like gold ornaments, pearls, rubies, topaz, and sapphires**

- Excavated in **1898** by **William Claxton Peppé** in **Piprahwa**, Siddharthnagar district, Uttar Pradesh, near the Nepal border.
- The Site was identified as part of **ancient Kapilavastu**, capital of the **Shakya republic**, the clan of **Prince Siddhartha (Buddha)**.

Historical Significance:

- Peppé unearthed what is believed to be **one of the original eight stupas** containing Buddha's remains after his cremation (~480 BCE).
- The **Sakya clan**, Buddha's kin, are believed to have constructed the stupa to enshrine his relics.
- The relics are **spiritually revered** by Buddhists globally and considered **intangible religious heritage**.

Legal and Ethical Dispute:

- Under the **Indian Treasure Trove Act, 1878**, most relics went to the **Indian Museum, Kolkata**.
- However, **1/5th of the find**, considered duplicates, was retained by Peppé's family—these are now being auctioned.

Reasons behind India's objection:

- India argues the relics are **sacred and inalienable cultural property**.
- The sale **violates international norms**, including:
 - UNESCO Conventions on Cultural Property
 - UNIDROIT Convention on Stolen or Illegally Exported Cultural Objects.
- Buddhist scholars and institutions worldwide object, saying **commodifying sacred objects is unethical**.

PIPRAHWA RELICS

Context:

India has issued a legal notice to **Sotheby's auction house** and the **Peppé family**, demanding the **immediate halt of an auction** of ancient relics from **Piprahwa Stupa**, believed to be linked to **Lord Buddha's cremated remains**.

About Piprahwa Relics:

- **What are Piprahwa Relics?**
 - The **Piprahwa relics** comprise:
 - **Bone fragments** believed to be those of Lord Buddha
 - **Crystal and soapstone caskets, a sandstone coffer**



ARCHAEOLOGICAL SURVEY OF INDIA

Context:

The Archaeological Survey of India (ASI) plans to expand its Underwater Archaeology Wing (UAW) after its revival, to explore submerged cultural sites in states like Maharashtra.



About Archaeological Survey of India (ASI):

- **What it is?**
 - ASI is the **premier government agency** responsible for archaeological research, protection, preservation, and conservation of India's cultural heritage.
- **Founded:** 1861 by **Alexander Cunningham** under Lord Canning's statute.
- **Revived:** As a separate department in 1871, with Cunningham as the **first Director-General**.
- **Headquarters:** Located at **24, Tilak Marg, New Delhi, India**.
- **Parent Ministry:** Operates under the **Ministry of Culture, Government of India**.
- **ASI Logo:** The logo is inspired by the **Sanchi Stupa**, symbolizing India's ancient architectural and archaeological legacy.
- **Aims & Objectives:**
 - To **protect and conserve ancient monuments** and archaeological sites of national importance.
 - To **excavate and document** historically significant locations, including terrestrial and now **underwater sites**.
- **Core Functions:**
 - **Survey & Excavation:** Carries out scientific excavation and exploration of archaeological remains.
 - **Conservation:** Maintains and restores over **3,600+ monuments** notified under the Ancient Monuments and Archaeological

Sites and Remains Act, 1958.

- **Research & Publication:** Publishes excavation reports, conservation manuals, and journals such as *Indian Archaeology – A Review*.
- **Underwater Archaeology:** Through the **Underwater Archaeology Wing (UAW)**, it explores submerged heritage along coastlines and inland water bodies.
- **Collaboration:** Partners with state departments, Indian Navy, IITs, and international bodies for advanced archaeological research.

VIKRAMADITYA I OF BADAMI CHALUKYAS

Context:

A rare 7th-century Old Kannada inscription from the reign of Vikramaditya I of Badami Chalukyas has been unearthed at Madapura Lake in Davangere, Karnataka.

- It offering insights into taxation, land donation, and regional administration during his rule.



About Badami Chalukyas:

- Originated as a local Kannada power, and claimed descent from Ayodhya for legitimacy.
- **Capital:** Vatapi (Modern Badami) in Karnataka.
- **Political History:**
 - **Pulakesin I (543–566 CE):** Founded the dynasty and fortified Badami.
 - **Pulakesin II (609–642 CE):** Greatest ruler and defeated Harshavardhana at Narmada.
 - Sent envoys to Persia and received a mission back, depicted in Ajanta caves.
 - **Vikramaditya I (644–681 CE):** Reclaimed Badami from Pallavas and expanded rule over Cholas, Pandyas, and Keralas.
- **Contribution to Administration:**
 - Centralised monarchy with limited village

autonomy.

- Plateau kingdom—land revenue was limited and relied on military expansion.
- Maintained a maritime fleet, and Pulakesin II had 100 ships.

• **Religious Contributions:**

- Supported Shaivism, Vaishnavism, Shaktism, and Jainism.
- Vikramaditya and others donated to Jain establishments and Pulakesin I performed Ashvamedha Yajna.

• **Art and Architecture:**

- Introduced **Vesara style**, blending Nagara and Dravida elements.
- Built rock-cut and structural temples at Aihole, Badami, Pattadakal.

About Vikramaditya I:

- Vikramaditya I was the son of **Pulakesin II**, the most illustrious Chalukya king.
- He ascended the throne after a **political crisis and Pallava invasion** post his father's death.
- Known for **reclaiming Vatapi (Badami)** from the Pallavas and **restoring the Chalukya kingdom**.

Contributions to Chalukya Dynasty:

• **Military Achievements:**

- Defeated **Narasimhavarman I of the Pallavas** who had earlier captured Badami.
- His military campaigns **reunified the fractured Chalukya empire** and restored lost prestige.
- Subdued southern powers like **Cholas, Pandyas, and Keralas** – strengthening southern Deccan control.

• **Political Consolidation:**

- Revived **centralised authority** and re-established administrative control over Karnataka and adjoining areas.
- Appointed loyal feudatories like **Singhavenna** (as per recent Davangere inscription) to govern local regions.

• **Legacy:**

- Known as "**Rajamalla**" and "**Yuddhamalla**" (Warrior among kings).
- His reign marked a **turning point in reviving Chalukya power** after earlier defeats.
- Set the stage for the architectural and cultural flourishing seen during the reign of **Vikramaditya II** and **Kirtivarman II**.

leftover sacred wood from Puri's Nabakalebara ritual for idol-making.



About Nabakalebara Ritual:

• **What is Nabakalebara?**

- **Nabakalebara** (meaning "new body") is a sacred ritual associated with **Lord Jagannath's idols** in Puri, Odisha.
- It involves the **replacement of wooden idols** of Lord Jagannath, Balabhadra, Subhadra, and Sudarshana with new ones.
- Conducted every **12 or 19 years**, based on the lunar calendar (when two **Asadha months** occur in a year).

• **Key Features & Significance:**

- **Astrological Basis:** Timing depends on the extra **Adhimasa (leap month)** in the Hindu calendar.
- **Sacred Wood (Daru):**
 - Four specific **neem trees** are selected based on divine signs.
 - Logs must have certain marks (e.g., conch, disc, etc.) to be deemed suitable.
- **Ritual Process:**
 - **Banajaga Yatra:** Search for holy trees by Daitapati servitors.
 - **Log Transportation:** Logs brought to Puri via ceremonial procession.
 - **Idol Carving:** Done secretly by **Biswakarma** artisans.
 - **Brahma Transfer:** The divine essence (**Brahma Padartha**) is transferred from old to new idols in a midnight ritual.
 - **Burial of Old Idols:** Deities are buried in **Koili Baikuntha** (temple premises).

• **Cultural Importance:**

- Symbolizes **rebirth and cyclical time** in Hindu philosophy.
- Draws millions of devotees during **Nabakalebara Rath Yatra**.

NABAKALEBARA RITUAL

Context: The recent inauguration of the Digha Jagannath Temple in West Bengal has sparked controversy over its designation as "Jagannath Dham" and allegations of using

- **Controversy in Digha Temple:**
 - Allegations suggest leftover wood from **2015 Nabakalebara** was used for Digha's idols, violating rituals.
 - Odisha's government has ordered a probe into the matter.

AYURVEDA DAY

Context:

The Government of India has officially declared **23rd September** as **Ayurveda Day** through a Gazette notification.

About Ayurveda Day:

What it is:

Ayurveda Day is a national observance to **honour India's ancient system of medicine** and promote it as a **scientific and holistic health tradition**.



New Celebration Date:

From 2025 onwards, **23rd September** will be observed annually as **Ayurveda Day**, coinciding with the **autumnal equinox**, a day symbolising balance — core to Ayurvedic philosophy.

Aim:

- To **create awareness** about Ayurveda as a **preventive and sustainable healthcare system**.
- To embed Ayurveda in **global health dialogues** as a science-based wellness approach.
- To enable better **planning and participation** through a fixed calendar date.

About Ayurveda:

- **What it is:**
 - Ayurveda is an **ancient Indian system of medicine** rooted in the **Vedas**, particularly the **Atharva Veda**, dating back over **5000 years**. The term is derived from “Ayu” (life) and “Veda” (knowledge) — meaning “Science of Life”.
- **Core Principles:**

- **Swasthasya Swasthya Rakshanam:** Preserving the health of the healthy.
- **Aturasya Vikara Prashamanam:** Curing the illness of the sick.
- Emphasis on **balance between body, mind, spirit, and environment**.
- Healing through **natural herbs, diet, lifestyle, and therapies**.

Features of Ayurveda:

- Focus on **preventive care** over reactive treatments.
- Promotes **mind-body harmony** and seasonal routines.
- Uses **herbal medicines**, detox therapies, yoga, and meditation.
- Applies a **customised health approach** based on individual constitution (Prakriti).

KEEZHADI EXCAVATION



Context:

The Archaeological Survey of India (ASI) has asked archaeologist Amarnath Ramakrishna to resubmit the Keezhadi excavation report with revisions, citing the need for scientific accuracy and better period classification.

About Keezhadi Excavation:

- **What Is Keezhadi?**
 - Keezhadi is an **archaeological site** near **Madurai, Tamil Nadu**, along the **Vaigai river basin**, explored by ASI and later by the Tamil Nadu State Archaeology Department.
- **Discovered In:** Initial excavations began in **2015**, following surveys conducted across **293 sites** in the Vaigai valley during 2013–14.
- **Location:**
 - **Excavation site:** Pallichanthai Thidal, Sivaganga district.
 - Excavated area: Only **1 out of 100 acres**, yet over **4,000 artefacts** have been unearthed.
- **Key Findings**
 - **Carbon dating** (AMS) of charcoal shows urban habitation existed by **200 BCE**.
 - Discovery of **urban features:** brick

structures, ring wells, pottery, graffiti, beads, and water storage facilities.

- **Artefacts** suggest links with **North India and Western trade networks** during the **Sangam Age**.
- A large, **decorative pot**, unique to Tamil excavations, was also unearthed—highlighting artistic and cultural advancement.
- **Cultural Significance:**
 - Supports theories of a **pre-Sangam urban Tamil civilisation**.
 - Mention of settlements like **Manalur** and **Konthagai** in **Tiruvilayadal Puranam** links the site to classical Tamil texts.
 - Establishes **Keezhadi** as a centre of literacy, trade, and craftsmanship, challenging North-centric civilisational narratives.

Syllabus: Modern Indian History

GURUDEV RABINDRANATH TAGORE

Context:

Prime Minister of India paid tribute to Gurudev Rabindranath Tagore on his birth anniversary (Tagore Jayanti), lauding his impact on India's cultural, literary, and educational landscape.



About Rabindranath Tagore:

- **Birth and Background:**
 - Born on **7 May 1861** in Kolkata (then Calcutta), Bengal Presidency.
 - Son of **Debendranath Tagore**, a prominent Brahmo Samaj reformer.
 - Grew up in a culturally rich household that

inspired his literary journey.

- **Education:**
 - Educated at home with strong emphasis on Sanskrit, English, and Upanishadic texts.
 - Sent to England at age 17 but did not complete formal education.
 - Advocated **holistic education**, later founding **Santiniketan** to promote integrated learning.
- **Contribution to India's Freedom Movement:**
 - Supported the **Swadeshi Movement** through writings and songs.
 - Opposed British repressive policies and renounced his **Knighthood in 1919** after the **Jallianwala Bagh massacre**.
 - Maintained ideological differences with Mahatma Gandhi, yet deeply respected him.
- **Contribution to Literature:**
 - Authored over **50 volumes of poetry**, 12 novels, numerous plays, short stories, and essays.
 - Key works include:
 - *Gitanjali* (Nobel Prize, 1913)
 - *Gora*, *Ghare Baire*, *The Post Office*, *Raktakaravi*
 - Composed **over 2,000 songs**, including **India's national anthem**, *Jana Gana Mana*.
- **Global Recognition:**
 - First non-European **Nobel Laureate in Literature (1913)**.
 - Built bridges of understanding with literary figures like W.B. Yeats and Romain Rolland.
- **Philosophy and Vision:**
 - Promoted **Universal Humanism**, blending Eastern spiritual values with Western liberalism.
 - Advocated for **harmony between man and nature**, **freedom in education**, and **dignity of individuals**.
 - Believed in **anti-dogmatic spirituality** rooted in the Upanishads.

BIJU PATNAIK & BATTLE OF STALINGRAD

Context:

Russia honoured Biju Patnaik with a memorial plaque at its embassy in New Delhi for his crucial role during the Battle of Stalingrad (1942–43).



About Biju Patnaik:

- **Early Life and Profession:**
 - Born in **Cuttack (1916)**, Biju Patnaik was a renowned **freedom fighter, aviator, and politician**.
 - Joined the **Royal Indian Air Force in 1936** as a transport and rescue pilot.
- **Contribution to Russia in WWII:**
 - Flew **supply missions** during the **Battle of Stalingrad**, aiding the **besieged Soviet Red Army**.
 - Risked German air defences to deliver **essential arms and supplies** under extreme combat conditions.
- **Role in India's Freedom Movement:**
 - Supported the **Quit India Movement** by flying secret missions for nationalist leaders.
 - Helped rescue freedom fighters from Burma and facilitated **Indonesia's fight for independence**, for which he was honoured by Indonesia as well.

About Battle of Stalingrad (1942–1943)

- **Overview:**
 - A **major World War II battle** fought between **Nazi Germany and the Soviet Union in Stalingrad (now Volgograd)** from July 17, 1942 to February 2, 1943.
- **Strategic Aims:** Hitler sought control of **Stalingrad** to secure **oil-rich Caucasus**, cut off Soviet logistics via the **Volga River**, and win a symbolic victory by capturing the city named after **Josef Stalin**.
- **Key Features:**
 - Urban warfare at its bloodiest: **House-to-house combat**, massive civilian casualties, and near-total destruction of the city.
 - German forces controlled **90% of the city** by late 1942.
 - Soviet **Operation Uranus** in November encircled 300,000 Axis troops, cutting them

off from supplies.

- **Outcome and Significance:**
 - **Soviet victory** marked a **turning point in WWII**; German forces began retreating thereafter.
 - Nearly **100,000 German soldiers** captured, including **Gen. Friedrich Paulus**.
 - The battle bolstered Soviet morale and **marked the beginning of the Nazi collapse** on the Eastern Front.

50TH ANNIVERSARY OF SIKKIM

Context:

Prime Minister of India greeted the people of Sikkim on the 50th anniversary of its statehood. This milestone commemorates the peaceful integration of the Himalayan kingdom into the Union of India in 1975.

About Sikkim:

- **Location:** Part of Northeastern India and shares international borders with Nepal (west), Bhutan (east), China (north), and Indian state West Bengal (south).
- **Capital:** **Gangtok**, known for its fusion of **Tibetan Buddhist culture** and modernity.
- **Statehood:** Became the **22nd state of India** through the **36th Constitutional Amendment in 1975**.



- **Historical Background:**
 - Originally ruled by the **Namgyal dynasty** (Chogyals) from **1642–1975**.
 - Became a **British protectorate** in 1861 under the Treaty of Tumlong.
 - Post-independence, remained an **Indian protectorate** through the 1950 Indo-Sikkim Treaty.
 - Merged with India following a **1975 referendum**, where over 97% voted for abolishing monarchy and joining India.
- **Key Features of Sikkim:**
 - **First 100% Organic State** in India —

- pioneered sustainable agriculture.
- **Ecological Richness:** Part of the **Eastern Himalayas biodiversity hotspot**, home to species like the **red panda** and **Himalayan blue poppy**.
- **Cultural Diversity:** Home to **Lepchas, Bhutias, and Nepalis**; preserves vibrant Buddhist traditions.
- **Strategic Importance:** Acts as a **buffer state** between India and China; region of historical and geopolitical significance, especially near **Doklam**.
- **Tourism & Development:** Focus on **eco-tourism, clean energy, and heritage preservation**.

[Syllabus: Salient features of Indian Society](#)

DONGRIA KONDH TRIBE

Context:

The Dongria Kondh tribe of Odisha was recently featured for showcasing their vibrant identity and cultural resilience during a festival near the Niyamgiri Hills.



About Dongria Kondh Tribe:

- **Who They Are?**
 - The **Dongria Kondh** are an indigenous tribal community, classified as a **Particularly Vulnerable Tribal Group (PVTG)**.
 - They are renowned for their **environmental stewardship** and successful resistance against bauxite mining in the Niyamgiri hills.
- **Habitat:**
 - Reside in **scattered hamlets** within the **Niyamgiri hill range**, spread across **Rayagada and Kalahandi districts** in southwestern Odisha.

- These hills are ecologically rich and spiritually sacred to the tribe, home to their revered deity, **Niyam Raja**.
- **Key Features:**
 - **Language and Script:**
 - Speak **Kui**, an oral **Dravidian language** closely related to Gondi.
 - Kui does **not have a written script**, though it is sometimes transcribed in the **Odia script**.
 - **Physical and Cultural Traits:**
 - Known for their **distinctive dress and adornment:**
 - ✓ Women wear minimal clothing, metallic nose pins, tattoos, and long rows of earrings.
 - ✓ Men wear colourful turbans and loincloths with traditional body tattoos.
 - Use traditional knowledge to practise **podu (shifting) cultivation**, growing millets, turmeric, pineapples, and other crops.
 - **Social and Religious Life:**
 - Follow **animism, ancestor worship, and nature-centric spiritual beliefs**.
 - The tribe includes **sub-groups** like Kovi, Kuttia, Languli, Penga, and Jharnia.
 - Uphold traditions through **oral storytelling, song, dance, and community rituals**.

JENU KURUBA TRIBE

Context:

Tension erupted in Nagarhole Reserve, Karnataka, as 52 evicted Jenu Kuruba tribal families attempted to reclaim ancestral forest land under the Forest Rights Act, 2006.



About Jenu Kuruba Tribe:

Origin:

- The **Jenu Kuruba** (meaning “honey collectors” in Kannada) are a forest-dwelling **PVTG** primarily in

Kodagu and Mysuru districts of Karnataka.

- They are also known as **Then Kurumba** or **Kattu Naikar**, living in small forest hamlets called **Hadi**.

Habitat Status:

- Found across the forest belts of **Karnataka, Kerala, and Tamil Nadu**.
- Recognized as a **Particularly Vulnerable Tribal Group (PVTG)** under the Ministry of Tribal Affairs.

Features of the Jenu Kuruba Tribe:

- **Livelihood:**
 - Traditional livelihood includes **honey collection, tuber gathering**, and minor forest produce harvesting.
 - Post-eviction, many work as **plantation labourers**, often in coffee estates, facing deep poverty and poor access to services.
- **Social Life:**
 - Semi-nomadic with a **decentralised community structure** led by a **headman (Yajamana)** and **ritual chief (Gudda)**.
 - Their **decision-making is localised**, independent of external religious or political authorities.
- **Culture & Belief System:**
 - **Rich oral traditions:** songs, dances, and myths revolving around nature, marriage, and rituals.
 - Deep reverence for **sylvan deities**, nature spirits, and ancestral forces—distinct from mainstream Hinduism.
 - Religion includes practices rooted in **animism** with **Hindu overlays** in festivals like Holi, Diwali, and Navratri.

About Kandha Tribe:

- **Who are the Kandha?**
 - Kandha (or Khond) is the largest tribal community in Odisha, mainly residing in **Kandhamal, Rayagada, Kalahandi, and Koraput districts**.
 - They speak **Kui** or **Kuvi** — both Dravidian languages.
 - The term “Kandha” is derived from Telugu “Konda” meaning **hill**, denoting their origins as forest dwellers.
- **Sub-Groups:** Include Desia Kandha, Dongria Kandha, Kutia Kandha (the latter two classified as Particularly Vulnerable Tribal Groups - PVTGs).

About Facial Tattoo Tradition among Kandha Women:

- **Origin and Purpose:**
 - **Began as a protective practice:** Women tattooed their faces with dark, geometric patterns to appear unattractive and avoid **sexual exploitation** by local landlords and colonial forces.
 - It later evolved into a **cultural identity marker** — tattoos became essential for marital eligibility and community acceptance.
- **Painful Ritual:**
 - Girls, usually around **10 years old**, endured hours of facial piercing with crude tools.
 - The painful process led to **severe swelling and infection**, lasting weeks.
 - **Silver ear-rings** were also worn to denote marital status.
- **Current Status:**
 - **Practically vanished among women under 40**, due to awareness campaigns and educational interventions since the 1990s.
 - The practice is no longer seen as necessary or relevant by younger generations.

KANDHA TRIBE

Context:

Kandha women in Odisha's Kandhamal district are increasingly abandoning the centuries-old tradition of facial tattooing, once practiced as a form of protection against exploitation.



SHIRUI LILY FESTIVAL

Context:

The Shirui Lily Festival resumed in Manipur after a two-year hiatus due to ethnic conflict, marking the first major movement of Meiteis through Kuki-Zo regions amid tight security.



About Shirui Lily Festival:

- **What is the Shirui Lily Festival?**
 - **Organised by:** Manipur Tourism Department
 - **First Held:** 2017
 - **Venue:** Ukhrul district, home to the Tangkhul Naga tribe
 - **Occasion:** Coincides with the blooming season of the Shirui Lily in May
 - **Objective:** Promote eco-tourism and raise awareness about the endangered lily species
- **Key Features of the Festival:**
 - **Cultural Programs:** Traditional dances, music, and folk performances.
 - **Eco-Initiatives:** Trash collection drives and awareness campaigns.
 - **Competitions:** Cooking contests, beauty pageants, and sports events.
 - **Duration:** Held from **May 20 to May 25** annually during bloom season.

About Shirui Lily (*Lilium mackliniae*):

- **What is the Shirui Lily?**
- **Botanical Name:** *Lilium mackliniae*, named by botanist Frank Kingdon-Ward after his wife Jean Macklin
- **Local Name:** Kashong Timrawon
- **Found In:** Shirui Hills, Ukhrul District, Manipur at **2,673 m elevation**
- **Discovery:** Identified in **1946**, though locally known for centuries
- **Features & Significance:**
 - **Unique Habitat:** Endemic to a narrow altitudinal range in Shirui Hill range.
 - **Conservation Status:** Endangered due to habitat loss, climate change, and invasive species.
 - **Cultural Symbolism:** Protected by mythic deity Philava, spiritual and ecological emblem of the Tangkhul community.
 - **State Flower:** Recognised as the official **state flower of Manipur**.
 - **Scientific Efforts:** ICAR-NEH scientists led by Dr. Manas Sahoo undertook lab-to-land micropropagation to conserve the species.

About Tendu Leaves:



- **What are Tendu Leaves?**
 - **Tendu (*Diospyros melanoxylon*)**, often termed “**Green Gold**”, is a Non-Timber Forest Produce (NTFP) predominantly used for **wrapping beedis** (hand-rolled cigarettes).
- **Regional Growth:**
 - Found widely in **central India**, mainly in:
 - Madhya Pradesh (25% of India's production)
 - Chhattisgarh (20%)
 - Odisha (15–20%)
 - Maharashtra (10%)
- **Key Features:**
 - Grows as a **shrub or small tree**, easily identifiable by its broad leaves.
 - A **standard bag** contains **1,000 bundles**, each with **50 leaves**.
 - Best quality tendu leaves are reported from **southern Chhattisgarh** (e.g., Dantewada, Sukma).
- **Uses and Applications:**
 - Primarily used in **beedi-making**, supporting the **rural tobacco economy**.
 - Generates **employment for tribal communities**, contributing over **100 million person-days annually** in collection and processing.
- **Challenges & Issues:**
 - **Smuggling:** Higher prices in Chhattisgarh (₹5,500/bag) vs. neighboring states fuel illegal trade.
 - **Exploitation:** Low wages (₹60/day) for collectors despite lucrative trade.
 - **Declining Demand:** Health concerns over smoking, rising taxes, and alternative products.

TENDU LEAVES

Context:

Chhattisgarh has raised concerns over tendu leaf smuggling from adjoining states due to its highest procurement price of ₹5,500 per standard bag, which has incentivized illegal trade during the peak collection season.

Syllabus: World Physical Geography & Resources

CHENAB RIVER

Context:

India has halted the flow of water from the Chenab River through the Baglihar Dam in Jammu and Kashmir following the suspension of the Indus Waters Treaty after the Pahalgam terror attacks.



About Chenab River:

- Formed by the **confluence of Chandra and Bhaga rivers** at Tandi in Lahaul & Spiti, Himachal Pradesh.
- Chandra originates near **Bara-lacha la Pass** (east), Bhaga from **Surya Taal lake** (west of the pass).
- Known as **Chandra-Bhaga** in upper reaches, it becomes **Chenab** downstream.
- Flows through **Himachal Pradesh** and **Jammu & Kashmir**, enters **Pakistan** in Punjab province, and joins **Sutlej River** to form **Panjnad River**.
- Major Tributaries:**
 - Right Bank:** Marusudar (largest tributary), Miyar Nalla, Bhut Nalla, Bichleri, Ans, and Kalnai
 - Left Bank:** Niru, Tawi, Neeru, and Liddrari
 - Major Hydroelectric Projects on Chenab River (Run-of-the-River Projects):** Baglihar Dam, Salal Dam, Dul Hasti, Ratle Project, Pakal Dul Dam, Kiru Project, and Kishtwar Project.
- Historical Significance:**
 - Known since **Vedic period**, part of **Rigvedic Sapta Sindhu**.
 - Cited in accounts of **Alexander the Great's Indian campaign** (325 BCE).
 - Site of the historic **Battle of Chenab** between Sikhs and Afghans.

About Baglihar Dam:

- Location:** Ramban district, Jammu & Kashmir, on the Chenab River.
- Type:** Run-of-the-river hydroelectric project with limited storage capacity.
- Installed Capacity:** Around 900 MW (in two

phases).

- Commissioned By:** NHPC Limited, supported by Government of India.
- Controversy:**
 - Opposed by Pakistan for alleged **treaty violations** under **Indus Waters Treaty (1960)**.
 - Subject to **World Bank arbitration**, which ruled in India's favour for certain technical modifications.

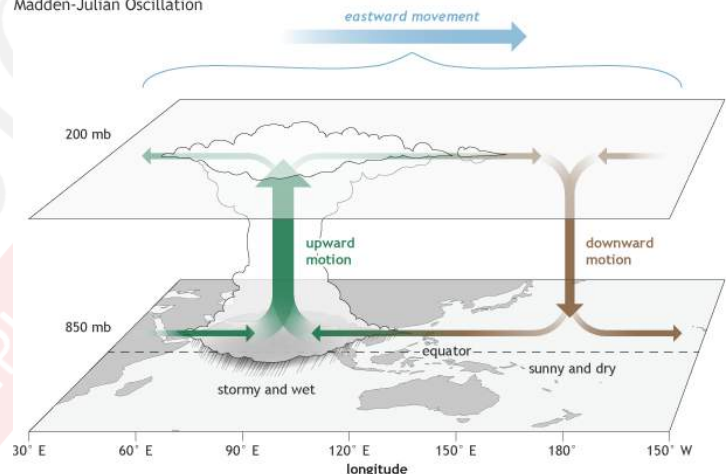
MADDEN-JULIAN OSCILLATION (MJO)

Context:

The Madden-Julian Oscillation (MJO) played a key role in triggering the early onset of the southwest monsoon in Kerala and Mumbai.

About Madden-Julian Oscillation (MJO):

Madden-Julian Oscillation



What is MJO?

The **MJO is an eastward-moving tropical atmospheric disturbance** involving clouds, rainfall, winds, and pressure patterns.

Discovered in **1971 by Roland Madden and Paul Julian**, it typically completes a global circuit every **30–60 days**.

It features two alternating phases:

Enhanced Convective Phase: Characterized by **increased rainfall** and **greater cloud formation** due to rising air and moisture convergence.

Suppressed Convective Phase: Marked by **reduced rainfall** and **clearer skies**, as sinking dry air inhibits cloud development.

How is MJO Formed?

- Surface convergence** of winds initiates rising air motion in the tropics.
- This leads to **condensation and cloud formation**,

supported by upper-level divergence.

- The entire dipole system moves from west to east across the equator, especially between **30°N and 30°S** latitude.

Factors Influencing MJO:

- **Sea Surface Temperature (SST)** anomalies, particularly in the Indian and Pacific Oceans.
- **Atmospheric moisture content** and **zonal wind anomalies**.
- Seasonal conditions like **El Niño**, which can amplify or suppress MJO activity.

Impacts of MJO:

- **On Indian Monsoon:**
 - MJO in its **active phase over the Indian Ocean** can:
 - ✓ Trigger **early monsoon onset**, as seen in **2024 and 2025**.
 - ✓ Boost cyclogenesis and **increase rainfall intensity** during its passage.
 - ✓ Improve **intra-seasonal rainfall variability** and **monsoon breaks**.
- **Global Influence:**
 - Modulates **cyclone frequency** and strength across ocean basins.
 - Alters **jet streams**, influencing **weather extremes** in the U.S., Europe, and Australia.
 - Can cause **cold surges, heatwaves, and floods** in mid-latitude regions.
 - Acts as a **short-term climate modulator** unlike ENSO, which has seasonal effects.

Syllabus: Miscellaneous

JNANPITH AWARD

Context:

President of India presented the 58th Jnanpith Award to Jagadguru Rambhadracharya (Sanskrit) in New Delhi.

- Renowned poet Gulzar (Urdu poet) also received the award but could not attend due to health reasons.



About Jnanpith Award:

- **What is the Jnanpith Award?**
 - India's **highest literary honour**, awarded annually for outstanding contribution to Indian literature.
- **Established in:** 1961 by the **Bharatiya Jnanpith Trust**, founded by industrialist Sahu Shanti Prasad Jain.
- **Objective:** To **honour literary excellence** in Indian languages and promote the cultural and intellectual heritage of India.
- **Historical Background:**
 - Idea conceived on **Sahu Shanti Prasad Jain's 50th birthday** (22 May 1961).
 - First award conferred in **1965**.
- **Eligibility Criteria:**
 - **Only Indian citizens** are eligible.
 - The award is open to **all Indian languages listed in the Eighth Schedule of the Constitution**, and **English**. (from the 49th award).
 - A language becomes **ineligible for 3 years** once awarded.
- **Selection Process:**
 - **Proposals Invited:** From universities, literary bodies, critics, and readers across the country.
 - **Language Advisory Committees (LACs):**
 - Each language has a 3-member committee of literary experts.
 - LACs are **reconstituted every 3 years**.
 - Free to consider names beyond submitted proposals.
 - **Evaluation Criteria:**
 - Comprehensive assessment of an author's **entire literary contribution**.
 - Must reflect **contemporary relevance and cultural impact**.
 - **Selection Board:**
 - Comprises **7 to 11 eminent scholars** of high integrity.
 - Recommendations from LACs are reviewed for final decision.
- **Award Details:**
 - **Award Components:**
 - **Cash prize** (currently ₹11 lakh),
 - **Citation and plaque**.
 - Earlier awarded for a **specific work** (first 17 awards); now recognizes **overall literary contribution**.

INTERNATIONAL BOOKER PRIZE - 2025

Context:

Banu Mushtaq, Kannada author and activist, has won the International Booker Prize 2025 for her short story collection *Heart Lamp*, translated into English by Deepa Bhashti.

About International Booker Prize, 2025:

- **Established:** 2005
- **Given By:** Booker Prize Foundation, UK
- **Frequency:** Annually awarded
- **Purpose:** Honors the **best translated work of fiction** into English from any language.
- **Award Amount:** £50,000 (shared equally between author and translator)



- **Key Features:**
 - Focuses exclusively on **translated fiction**, unlike the **Booker Prize** which is for English-original works.
 - Recognizes **literary excellence**, cultural richness, and **the art of translation**.
- **Indian Winners (International Booker)**
 - **Geetanjali Shree** – *Tomb of Sand* (2022), translated by Daisy Rockwell (First Hindi work to win)
 - **Banu Mushtaq** – *Heart Lamp* (2025), translated by Deepa Bhashti (First Kannada work to win)

About Banu Mushtaq:

- **Born:** April 3, 1948, Hassan, Karnataka
- **Professions:** Advocate, journalist, writer, women's rights activist, former municipal councillor
- **Associated with:** Bandaya Movement – Kannada protest literature for social justice
- **Literary Career:**
 - Began writing in **1974**, first published in *Prajamatha*.
 - Reported for **Lankesh Patrike** (1981–1990), mentored by P. Lankesh.
 - Transitioned to law and continued writing on **gender, caste, and religious issues**.
- **Heart Lamp (2025 Winner):**

- A **collection of 12 short stories** written between 1990 and 2023.
- Portrays the **lives of ordinary South Indian Muslim women**, dealing with **patriarchy, faith, family, and autonomy**.
- Translated from Kannada by **Deepa Bhashti**, who also became the **first Indian translator to win this prize**.

Other Notable Works:

- Benki Male (1999) – Karnataka Sahitya Academy Award
- Haseena Mattu Itara Kathegalu (2015) – Translated as Haseena and Other Stories
- Her short story **"Black Cobra"** was adapted into the award-winning film *Hasina* by Girish Kasaravalli.

NATIONAL FLORENCE NIGHTINGALE AWARDS 2025

Context:

President Droupadi Murmu presented the National Florence Nightingale Awards 2025 to 15 exceptional nursing professionals at Rashtrapati Bhavan.



About National Florence Nightingale Awards 2025:

- **What It Is?**
 - A prestigious national award recognizing meritorious services of nurses and midwives in India.
- **Awarded By:** Ministry of Health and Family Welfare, Government of India.
- **Established:** Instituted in the year **1973** as a tribute to **Florence Nightingale**, the founder of modern nursing.
- **Key Features:**
 - **Award Components:**
 - **Cash prize** of ₹1,00,000.
 - **Medal and Certificate of Merit**.

- **Eligibility:**
 - Open to **Auxiliary Nurse Midwives (ANM), Staff Nurses, Lady Health Visitors (LHV)**, and others engaged in **nursing and public health services**.
 - Candidates are nominated by **state governments, UTs, and healthcare institutions**.
- **Selection Process:**
 - Involves **rigorous evaluation** by expert panels from the health sector.
 - Based on service record, dedication, innovation, and public health impact.
- **Awardees 2025:**
 - Recognized nurses from **15 states and UTs** including Delhi, Karnataka, Mizoram, Tamil Nadu, and Andaman & Nicobar Islands.
 - Notably includes the **Devrani sisters from Uttarakhand** for their four-decade-long service.
- **Significance:**
 - **Promotes excellence** in the healthcare sector by motivating frontline workers.
 - Highlights the **role of nurses in public health**, maternal care, immunization, and rural outreach.
 - Strengthens the **spirit of service, empathy, and dedication**, especially in **resource-limited settings**.
 - Encourages more youth to **pursue nursing as a noble profession**, essential to India's health system resilience.

FACTS FOR PRELIMS (FFP): GS-2

Syllabus: Constitutional, Statutory, Quasi-Judicial Bodies

ECINET INITIATIVE

Context:

The Election Commission of India (ECI) has announced the development of **ECINET**, a unified digital platform, to simplify and streamline election-related service.



About ECINET

- **ECINET** is a **comprehensive digital interface** being created by the ECI to unify more than **40 existing mobile and web applications** into a single, user-friendly platform.
 - It is designed to provide easy access to election-related services for voters, election officials, political parties, and civil society organisations.

Objectives of ECINET

- **Simplify Access** to electoral services through a single window.
- **Eliminate Redundancy** of using multiple applications with different logins.
- Ensure **Real-Time Access** to verified **election data for all stakeholders**.
- **Strengthen Electoral Infrastructure** through digital innovation and integration
- **Enhance Cybersecurity** of electoral platforms through robust trials and protocols.

Key Features

- **Unified Platform:** Merges over **40 ECI apps** including Voter Helpline, **cVIGIL**, **Suvidha 2.0**, **ESMS**, **Saksham**, **KYC App**, etc.
- **Single Sign-On:** One login for all services, reducing

user confusion and friction.

- **Cross-Device Compatibility:** Accessible on both desktops and smartphones.
- **Modern User Interface:** Clean, aesthetic design for an intuitive user experience.
- **Data Integrity Assurance:** Only authorised EC officials can input data. In case of discrepancies, **statutory forms prevail**.
- **Enhanced Cybersecurity:** Undergoes **rigorous testing** for safety, performance, and ease of use.
- **Nationwide Reach:** Aimed to serve **nearly 100 crore voters** and the entire electoral administration

NATIONAL HUMAN RIGHTS COMMISSION



Context:

The National Human Rights Commission (NHRC) has urged 11 heatwave-prone states to take pre-emptive measures to protect vulnerable populations.

About National Human Rights Commission (NHRC):

- **What it is?**
 - NHRC is India's **premier statutory body** for promoting and protecting **human rights**, defined under **Section 2(1)(d)** of the Protection of Human Rights Act (PHRA), 1993.
- **Established In:** 12 October 1993.

- **Legal Backing:** Protection of Human Rights Act, 1993 (amended in 2006)
 - Complies with **UN Paris Principles (1991)** on national human rights institutions.
- **Objectives:**
 - Investigate human rights violations or negligence by public officials.
 - Strengthen national efforts to safeguard the dignity and rights of individuals.
 - Promote literacy, research, and legal awareness on human rights issues.
- **Members & Composition:**
 - **Chairperson:** Retired Chief Justice of India or Supreme Court Judge.
 - **Other Members:**
 - 1 Supreme Court/High Court judge (serving or retired)
 - 3 members with knowledge in human rights (including 1 woman)
 - **Ex-officio members:** Chairpersons of 7 national commissions (Women, SCs, STs, BCs, Minorities, Child Rights, Disabilities).
- **Appointment Process:**
 - **Appointing Authority:** President of India
 - **Selection Committee:** Headed by the **Prime Minister**, includes: Lok Sabha Speaker, Rajya Sabha Deputy Chairperson, Leaders of Opposition in both Houses, and Union Home Minister.
 - **Judicial appointments** require consultation with the **Chief Justice of India**.
- **Tenure & Service Conditions:**
 - **Term:** 3 years or until **70 years** of age (whichever earlier)
 - **Reappointment:** Allowed
 - **Post-tenure employment** with government is prohibited.
- **Powers:**
 - Functions like a **civil court** under CrPC during inquiry.
 - Can summon, demand reports, and access records from Centre/state governments.
 - Can recommend **compensation, legal action, or interim relief**.
- **Functions:**
 - Suo motu or petition-based inquiry into human rights violations.
 - Visit **prisons and detention centres** for inspection.
 - Promote **human rights education, research, and treaties compliance**.
 - Review constitutional and legal safeguards.

- Recommend preventive and remedial measures in terrorism-related violations.
- **Exemptions & Limitations:**
 - NHRC cannot investigate cases after **1 year** of the alleged violation.
 - **Limited jurisdiction** over the **armed forces** — can only seek government reports.
 - Recommendations are **non-binding**.

UNION PUBLIC SERVICE COMMISSION (UPSC)

Context:

Retired IAS officer and former Defence Secretary Dr. Ajay Kumar has been appointed as the Chairman of the Union Public Service Commission (UPSC) by the President of India.



About Union Public Service Commission (UPSC):

- **What is UPSC?**
 - The **Union Public Service Commission (UPSC)** is a **constitutional body** under **Article 315** of the Indian Constitution. It conducts **recruitment exams** for All India Services, Central Services, and other Group A & B positions.
- **Composition of UPSC:**
 - Composed of a **Chairman and other members**.
 - The **President determines the strength** and structure of the Commission.
 - Usually consists of **9 to 11 members**.
 - At least **50% of members must have 10 years' experience** in government service.
- **Appointment Process:**
 - The **President appoints** the Chairman and members under **Article 316(1)**.
 - The President also decides **conditions of service and tenure**.
 - **Tenure:** 6 years or until the age of 65, whichever is earlier.
- **Removal Process:**
 - Members may resign or be removed in the following ways:

- **By Resignation:**
 - Addressed to the President.
- **By Removal by the President:**
 - If adjudged **insolvent**.
 - If engaged in **paid employment** during tenure.
 - If declared **physically or mentally unfit**.
- **For Misbehaviour (Article 317):**
 - The President refers the matter to the **Supreme Court**.
 - The Court's advice is **binding**.
 - Suspension is allowed during the enquiry.
 - Misbehaviour includes **personal interest in government contracts** or gaining benefits thereof.
- **Functions of UPSC:**
 - Conducts exams like Civil Services, Engineering Services, CDS, NDA, etc.
 - Advises government on recruitment methods, promotions, transfers, and disciplinary cases.
 - Oversees appointments to civil services and inter-service transfers.
 - Ensures merit-based recruitment and upholds administrative integrity.

statutory body in India mandated to protect and promote human rights, including **rights to life, liberty, equality, and dignity**.

- **Established:** 12th October 1993 under The Protection of Human Rights Act, 1993
- **Amended Act:** The Protection of Human Rights (Amendment) Act, 2019
- **Status:** Statutory, autonomous, non-constitutional body
- **Headquarters:** New Delhi

Composition:

- **Chairperson:** A retired Chief Justice of India
- **Members:**
 - One serving or retired judge of the Supreme Court
 - One serving or retired Chief Justice of a High Court
 - Two persons with knowledge of human rights
 - Ex-officio members: Chairpersons of National Commissions (SC, ST, Women, Minorities, etc.)

Powers and Functions

- **Inquiry:** Investigates complaints of human rights violations or negligence by public servants, it can act *suo motu* or on petition.
- **Visits:** Visits jails or detention centres to study conditions and recommend reforms
- **Advisory Role:** Recommends steps for effective implementation of safeguards under the Constitution and international human rights treaties
- **Research and Promotion:** Spreads awareness about human rights through publications, seminars, and training
- **Judicial Powers:** Has powers of a civil court under the **Code of Civil Procedure, 1908** for summoning, examining witnesses, and collecting evidence
- **Recommendations:** Can recommend relief or compensation to victims; however, its recommendations are not legally binding.

NATIONAL HUMAN RIGHTS COMMISSION (NHRC)

Context:

The **National Human Rights Commission (NHRC)** took **suo motu cognizance** of a report revealing **poor infrastructure and lack of manpower** in Kerala jails, hindering inmates' access to education.



National Human Rights Commission (NHRC)

About National Human Rights Commission (NHRC)

What is NHRC?

The National Human Rights Commission is an **independent**

NATIONAL SECURITY ADVISORY BOARD

Context:

The Government of India has reconstituted the National Security Advisory Board (NSAB), appointing former R&AW Chief Alok Joshi as its Chairman, with 7 new members inducted amid heightened national security concerns.

About National Security Advisory Board (NSAB):

- **What is NSAB?**
 - NSAB is an **advisory body** under the **National Security Council (NSC)** that provides long-term strategic inputs on **national security issues**.
 - It comprises experts from various fields **outside the government**.
- **Established In:** Constituted in **December 1998** during the tenure of National Security Advisor **Brajesh Mishra**.



Tenure:

- Initially, members were appointed for **one year**.
- Since **2004-06**, it has been reconstituted for a **two-year term**.

• Objectives:

- Provide **independent, non-partisan analysis** on security matters.
- Offer **policy options and long-term strategic perspectives** to the National Security Council.
- Assist in preparing key documents like the **Nuclear Doctrine (2001)** and **National Security Review (2007)**.

• Composition:

- Current strength: **16 members**
- Includes **retired military officials, diplomats, IPS officers, academics**, and civil society members.

• Organizational Structure:

- Functions under the **National Security Council Secretariat (NSCS)**.
- It has **2 subordinate bodies**: National Information Board (NIB) and Technology Coordination Group (TCG)

• Key Functions:

- Hold monthly or emergency meetings to assess **national and global threats**.
- Provide **independent reports** to the **National Security Adviser (NSA)**.
- Aid in formulating **comprehensive security doctrines**.
- Recommend **defence, cyber, diplomatic, and internal security measures**.

- Bridge the gap between **government machinery and academic expertise**.

CENTRAL BUREAU OF INVESTIGATION (CBI)

Context:

The Appointments Committee of the Cabinet (ACC) has approved a one-year extension for CBI Director **Praveen Sood**, an IPS officer of Karnataka cadre, beyond his scheduled retirement.



About Central Bureau of Investigation (CBI):

• What is the CBI?

- The **CBI** is India's **premier investigating agency**, tasked with probing **high-profile cases** of corruption, economic offences, and serious crimes.
- It is **neither a constitutional nor a statutory body**, but derives its powers from the **Delhi Special Police Establishment (DSPE) Act, 1946**.

- **Origin:** Traces back to **1941**, when the **Special Police Establishment (SPE)** was set up during WWII.

- **Formed as CBI:** Officially established by a **Home Ministry resolution on 1 April 1963**, following the recommendations of the **Santhanam Committee** on Prevention of Corruption.

- **Administrative Control:** Works under the **Ministry of Personnel, Public Grievances and Pensions, Government of India**.

• Organizational Structure:

- Headed by a **Director** (rank: DGP, IPS).
- Supported by Special Directors, Joint Directors, Deputy Inspectors General (DIGs), and Superintendents of Police (SPs).

• Director Appointment Process:

- Appointed by a **three-member Selection**

Committee under the DSPE Act:

- Prime Minister (Chairperson)
- Leader of Opposition in Lok Sabha
- Chief Justice of India or his nominee
- **Tenure:** Fixed **2 years**, extendable annually up to **5 years** (as per DSPE Amendment Act, 2021).
- **Key Functions of CBI:**
 - **Anti-Corruption:** Probes corruption and misconduct by Central Govt employees, PSU staff, and Union Territory officials.
 - **Economic Offences:** Investigates bank frauds, money laundering, and financial scams.
 - **Special Crimes:** Handles sensational cases like **murder, terrorism, kidnapping**, when referred by states or courts.
 - **Interpol Nodal Agency:** Acts as **India's liaison** with **Interpol** for international crime coordination.
 - **Judicial Assignments:** Investigates cases on the direction of **Supreme Court or High Courts**.
 - **Data & Intelligence:** Maintains criminal records, crime statistics, and helps in inter-state police coordination.

Ministry of Power (MoP)

- **Objectives:**
 - Ensure **transparent, flexible, and demand-based** coal allocation.
 - Promote **long-term thermal power capacity planning**.
 - Encourage **coal import substitution** and optimize logistics.
 - Enable **market-driven electricity pricing** and deeper power markets.
- **Key Features of Revised SHAKTI Policy**
 - **Two-Window Structure**
 - **Window-I (Notified Price):**
 - ✓ For **Central/State Gencos and IPPs with PPAs** (Power Purchase Agreements).
 - ✓ Coal allocated on nomination or tariff-based bidding.
 - **Window-II (Premium Basis):**
 - ✓ Open to **any power generator**, including imported coal-based (ICB) plants.
 - ✓ No PPA required. Flexibility to sell power in markets or bilateral deals.

Syllabus: Government Policies & Interventions

REVISED SHAKTI POLICY 2025



Context:

The Cabinet Committee on Economic Affairs (CCEA) has approved the Revised SHAKTI Policy 2025 to streamline coal allocation for thermal power plants through two simplified windows, enhancing transparency and flexibility.

About Revised SHAKTI Policy 2025:

- **Nodal Ministries:** Ministry of Coal (MoC) and

• **Key Reforms and Highlights**

- **Simplification:** Previous 8 coal linkage categories now mapped to just two windows.
- **No PPA Mandate (Window-II):** Empowers plants to sell power freely in power exchanges or contracts.
- **Encouragement for Private Sector:** Boosts **Independent Power Producers (IPPs)** and private investment in thermal sector.
- **Support for Greenfield and Brownfield Projects:** Especially near **pithead locations** for cost efficiency.
- **Import Substitution:** ICB plants can switch to domestic coal, reducing forex outgo.
- **Coal Rationalization:** Lower landed cost and efficient rail logistics reduce final tariffs.
- **Flexibility for FSA Holders:** Can bid for coal beyond annual quota under Window-II.
- **Market Linkages:** Allows sale of surplus electricity in **power markets**, enhancing market liquidity.
- **Empowered Committee:** Headed by Secretaries of Power, Coal, and Chairperson of CEA to resolve implementation issues swiftly.

- **Zero Additional Expenditure:** No financial burden on coal companies.

DHRUVA (DIGITAL HUB FOR REFERENCE AND UNIQUE VIRTUAL ADDRESS)

Context:

The Department of Posts released the policy framework for DHRUVA (Digital Hub for Reference and Unique Virtual Address). It marks a critical step toward developing a national digital addressing public infrastructure using geospatial technology.

About DHRUVA (Digital Hub for Reference and Unique Virtual Address):

What is DHRUVA?



- DHRUVA is a national policy framework for creating a standardized, geo-coded, and digital address infrastructure, serving as **Address-as-a-Service (AaaS)** for secure, efficient data sharing.
- **Launched in:** May 2025, by the **Department of Posts**, under the Ministry of Communications.
- **Objective:**
 - To transform **address information management** into a **digital public good**.
 - Enable **interoperable, secure, and user-consent-based** access to address data.
 - Foster **public-private collaboration** in sectors like e-governance, e-commerce, logistics, and emergency response.
- **Key Features:**
 - **DIGIPIN Integration:** Builds upon the geo-tagged Digital Postal Index Number (DIGIPIN) system for national-level consistency.
 - **Address-as-a-Service (AaaS):** Allows address data to be securely managed, shared, and validated across platforms.
 - **User Autonomy:** Citizens have control over their digital address data, enhancing

privacy and user experience.

- **Open and Accessible:** Designed as freely accessible infrastructure for public and private stakeholders.
- **Consent-Driven Framework:** Enables address data to be shared securely, only with user approval.
- **Significance:**
 - **Geospatial Governance:** Supports better planning, disaster response, and targeted public delivery.
 - **Inclusive Access:** Streamlines KYC, banking, subsidy delivery, and rural service reach.
 - **Boost to Logistics & E-commerce:** Improves last-mile delivery efficiency and transparency.
 - **Digital Economy Push:** Aligns with Digital India and ease of living goals through smart, location-based services.
 - **Public-Private Synergy:** Encourages collaborative innovation in address-linked solutions.

HONEY MISSION

Context:

Prime Minister highlighted India's rise as a global honey-producing leader, citing a 60% surge in production and the success of the Honey Mission.



About Honey Mission:

- **Launched By:** Khadi and Village Industries Commission (KVIC) under the Ministry of **MSME**, in **2017**.
- **Objective:** To promote sustainable beekeeping, ensure **pollination support**, enhance **income of farmers**, and strengthen **rural entrepreneurship**.
- **Key Features:**
 - **Skill Development:** More than **50,000 beekeepers trained** through CBRTI, Pune in modern apiculture.
 - **Income Generation:** Beekeepers earned

₹325 crore from 20,000 MT honey, with ₹25 crore in exports in FY 2024–25.

- **Holistic Model:** Supports production, processing plants, marketing, and digital access (e.g., selling on GeM portal).
- **Empowerment Focus:** Engages youth, tribal farmers, and women, boosting self-reliance.

About Honey Production in India:

- **Ministry Involved:** Khadi and Village Industries Commission (KVIC), under the **Ministry of MSME**.
- **Key Mission:** Honey Mission – launched to promote beekeeping as a tool for income and self-reliance.
- **Data Snapshot:**
 - Honey production has risen from ~75,000 MT to 1.25 lakh MT in the last 11 years (~60% growth).
 - India now ranks among the **top honey-producing countries globally**.
 - In FY 2024–25, honey exports under KVIC touched ₹25 crore.
- **Top States in Honey Entrepreneurship:** Uttar Pradesh, Gujarat, Jammu & Kashmir, West Bengal, and Arunachal Pradesh.
- **Export Status:** India is among the **top 10 honey exporters globally**.
- **Organic Honey Success:** Tribal honey like 'Sonhani' from Korea district (Chhattisgarh) showcases value addition and global outreach.

QUALITY COUNCIL OF INDIA (QCI)

Context:

Minister of State for Commerce and Industry inaugurated the new unified headquarters of the Quality Council of India (QCI) at the World Trade Centre, New Delhi.



About Quality Council of India (QCI):

- **What is QCI?**

- QCI is an **autonomous national accreditation body** responsible for ensuring **quality assurance** in products, services, and processes across sectors, through independent third-party assessments.
- **Established In:** 1996, based on recommendations from an EU Expert Mission and inter-ministerial consultations.
- **Nodal Ministry:** Ministry of Commerce and Industry (Department for Promotion of Industry and Internal Trade – DPIIT)
- **Headquarters:** Now located at World Trade Centre (WTC), New Delhi
- **Objectives of QCI:**
 - Promote quality standards across public and private sectors.
 - Provide independent accreditation and third-party assessment.
 - Enhance quality of life and public service delivery through better governance standards.
 - Act as a nodal body to implement National Quality Campaigns aligned with global benchmarks.
- **Structure and Governance**
 - **Public–Private Partnership (PPP) model** involving the government and industry associations — CII, FICCI, ASSOCHAM.
 - Registered under **Societies Registration Act, 1860**.
 - **Governing Council of 39 members** with equal representation from government, industry, and stakeholders.
 - The **Chairperson** is nominated by the **Prime Minister of India**.
- **Key Functions of QCI:**
 - **Accreditation Services:** Through bodies like NABL, NABH, NABET, NBQP, ensuring quality in labs, healthcare, environment, etc.
 - **Third-party Assessments:** Independent evaluation of services, infrastructure, and government programs.
 - **Policy Implementation:** Supports quality mandates under schemes like Swachh Bharat, Ayushman Bharat, etc.
 - **Capacity Building:** Trains personnel for quality audits and quality improvement across sectors.
 - **Global Collaboration:** Aligns India's quality ecosystem with international benchmarks and WTO standards.

ENHANCING COMPETITIVENESS OF MSMEs IN INDIA REPORT

Context:

NITI Aayog released a report on “Enhancing MSMEs Competitiveness in India”, highlighting key reforms needed in financing, skilling, and technology adoption.

About Enhancing MSMEs Competitiveness in India Report

- **Released by:** NITI Aayog in collaboration with Institute for Competitiveness (IFC).
- **Objective:** Provide a blueprint for MSME growth through policy reforms in credit access, skilling, innovation, and market linkages.

Key Findings

1. Credit Access Improvement (2020-24)

- Share of micro and small enterprises accessing **formal credit rose from 14% (2020) to 20% (2024)**.
- **Medium enterprises** increased from 4% to 9% in the same period.
- However, only **19% of total MSME credit demand was met**, leaving a ₹80 lakh crore gap.

2. Skill & Technology Challenges



- Highlights lack of **formal vocational training**.
- Urges R&D investment and upgradation of outdated technology.
- Recommends support for **digital marketing, branding, and cluster-based technology adoption**.

3. Policy Awareness Gap

- Many MSMEs unaware of govt schemes.

- Advocates for **better data integration, stakeholder engagement, and state-level monitoring**.

4. Regional Focus

- Calls for increased support to MSMEs in **Northeast and Eastern India** with targeted incentives and logistics partnerships.

About NITI Aayog

What is NITI Aayog?

- NITI Aayog (National Institution for Transforming India) is India's **apex public policy advisory body**, replacing the Planning Commission in 2015 to promote **cooperative and competitive federalism**.
- **Established:** January 1, 2015
- **Mandate:** To foster evidence-based policymaking, innovation, and sustainable development
- **Chairperson:** Prime Minister of India
- **Vice Chairperson:** Appointed by the Government.

Structure

- **Governing Council:** Includes all Chief Ministers, Lieutenant Governors, and Union Ministers
- **Full-time and part-time members** drawn from academia, industry, and administration

Other Notable Reports by NITI Aayog:

- **Strategy for New India @75, India Innovation Index, SDG India Index, Export Preparedness Index, School Education Quality Index (SEQI), Ease of Doing Business: State Rankings, National Multidimensional Poverty Index.**

CREDIT GUARANTEE SCHEME FOR STARTUPS (CGSS)

Context:

The Government has notified an expansion of the Credit Guarantee Scheme for Startups (CGSS), doubling the guarantee limit from ₹10 crore to ₹20 crore and reducing guarantee fees for startups in Champion Sectors.

About Credit Guarantee Scheme for Startups (CGSS):

- **What is CGSS?**
 - A flagship **credit guarantee initiative** aimed at providing collateral-free funding support to DPIIT-recognised startups.
 - Designed to enable **term loans, working capital, venture debt**, and other fund-based/non-fund-based instruments.
- **Established In:**
 - **October 2022**, under the Startup India

Action Plan.

- Operationalised by **National Credit Guarantee Trustee Company (NCGTC)**.



Ministry:

Department for Promotion of Industry and Internal Trade (DPIIT), **Ministry of Commerce and Industry**.

- Objective and Significance:**

- Lower perceived risk for lenders financing startups.
- Enable debt-based early-stage funding without collateral.
- Foster R&D, innovation, and domestic manufacturing in priority sectors.
- Aligns with the Viksit Bharat vision and Startup India movement.

- Eligibility Criteria for Startups:**

- Recognised by DPIIT as per official notifications.
- Not classified as **Non-Performing Asset (NPA)** and not in default to any lender.
- Eligibility certified by the lending institution.

- Eligible Lenders:**

- Scheduled Commercial Banks**
- Non-Banking Financial Companies (NBFCs)** rated BBB and above with ₹100+ crore net worth
- SEBI-registered Alternative Investment Funds (AIFs)**

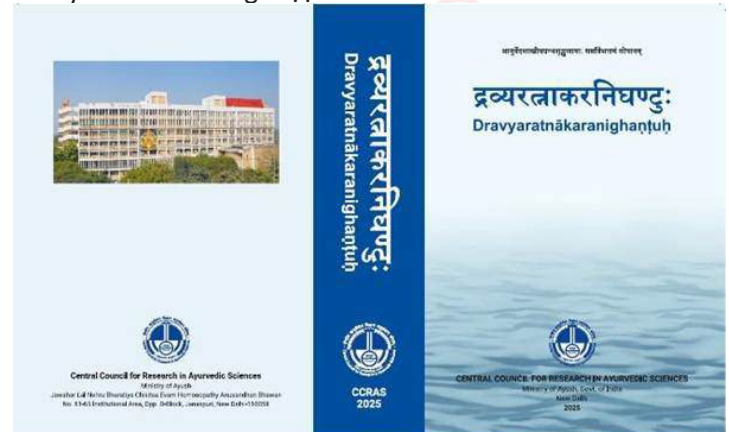
- Key Features of the Expanded Scheme:**

- Guarantee Limit Raised:** From ₹10 crore to **₹20 crore per borrower**.
- Guarantee Coverage:**
 - 85% of amount in default for loans up to ₹10 crore.
 - 75% for loans exceeding ₹10 crore.
- Annual Guarantee Fee (AGF)** reduced to **1% for 27 Champion Sectors** (earlier 2%).
- Coverage through Trustee (NCGTC)** for eligible fund instruments (venture debt, subordinated debt, debentures, etc.).
- Operational Reforms:** Streamlined process, automatic guarantee issuance via NCGTC portal.
- Umbrella-based Guarantee:** Covers pooled investments, up to 5% of investment or ₹20 crore cap, based on actual losses.

AYURVEDIC MANUSCRIPTS

Context:

The Central Council for Research in Ayurvedic Sciences (CCRAS) under the Ministry of AYUSH has revived two rare Ayurvedic manuscripts: Dravyaratnakara Nighaṇṭu and Dravyanamakara Nighaṇṭu.



About Ayurvedic Manuscripts:

What are Ayurvedic Manuscripts?

- Ancient manuscripts in Ayurveda serve as **textual repositories of medicinal knowledge** including plant names, therapeutic uses, formulations, and pharmacological actions.
- Nighaṇṭus** are traditional lexicons in Ayurveda that list and explain the **properties of medicinal substances**, drawn from plant, mineral, and animal sources.

About Dravyaratnakara Nighaṇṭu:

- Author:** Mudgala Paṇḍita
- Composed:** 1480 AD
- Key Features:**
 - Contains **18 chapters** offering deep insights into **drug synonyms, actions, and compositions**.
 - Draws references from **Dhanvantari and Raja Nighaṇṭus**.
 - Introduces **novel therapeutic substances** used across classical Ayurvedic disciplines.
 - Widely referenced in **Maharashtra till the 19th century**.
 - Revived and edited by **Dr. S.D. Kamat**, a noted Ayurveda scholar.

About Dravyanamākara Nighaṇṭu:

- Attributed to:** Bhisma Vaidya
- Period:** Undated, considered a **post-Dhanvantari supplement**
- Key Features:**
 - Acts as a **specialised appendix** to the Dhanvantari Nighaṇṭu.
 - Comprises **182 verses**, dealing specifically with **homonyms** in drug names.

- Valuable for disciplines like **Rasashastra** and **Bhaishajya Kalpana**.
- Offers clarity on **complex naming overlaps**, vital for Ayurvedic pharmacology.
- Edited and annotated by **Dr. S.D. Kamat**, known for reviving other Nighaṇṭus as well.

GYAN BHARATAM MISSION

Context:

Prime Minister Narendra Modi will launch the revamped Gyan Bharatam Mission (formerly National Manuscripts Mission) on June 9, 2025.

About Gyan Bharatam Mission:



- **What it is:** A revamped national initiative for identifying, conserving, digitising, and sharing India's vast manuscript wealth.
- **Announced in:** Union Budget 2025–26, under the Ministry of Culture.
- **Ministry Involved:** Ministry of Culture; anchored by **Indira Gandhi National Centre for the Arts (IGNCA)**.
- **Objective:** To survey, catalogue, preserve, and provide access to over **one crore manuscripts** from academic institutions, museums, libraries, and private collectors.
- **Key Features:**
 - Budget allocation increased from ₹3.5 crore to ₹60 crore.
 - Encourages private manuscript holders to collaborate through access policies.
 - Focuses on digitisation and metadata creation for rare texts.
 - Aims to promote **Sanskrit and Indian classical knowledge systems**.
 - Linked with institutions like **CIIL, IIT Bombay, Samskriti Foundation**.

About National Manuscripts Mission (NMM):

- **What it is:** A national initiative launched to **document, conserve and digitise** India's ancient manuscript heritage.
- **Launched in:** February 2003.
- **Parent Organisation:** Operates under **IGNCA**, Ministry of Culture.
- **Aim:** To preserve India's intellectual legacy and make manuscripts accessible to researchers and the public.
- **Key Features:**
 - India's manuscript wealth estimated at **1 crore+**, across 80+ scripts and 60+ languages.
 - Till 2025, digitised metadata for **52 lakh manuscripts**, but only ~1.3 lakh uploaded.
 - 80% of manuscripts lie with **private collectors** and NMM promotes incentives for sharing.
 - Conservation of over **9 crore folios** achieved in 21 years.
 - Emphasis on **universal access**, awareness, and collaboration with global digital platforms like Google Arts & Culture.

HONORARY RANK PROMOTION SCHEME

Context:

The Ministry of Home Affairs has introduced a policy granting honorary rank promotions to retiring personnel of CAPFs and Assam Rifles from Constable to Sub-Inspector.

About Honorary Rank Promotion Scheme:

The **Honorary Rank Promotion Scheme** is a recognition initiative by the Ministry of Home Affairs under the leadership of Union Home Minister Amit Shah. It awards a one-rank higher honorary title to retiring personnel of **Central Armed Police Forces (CAPFs)** and **Assam Rifles**, from **Constable to Sub-Inspector** rank.

Objective:

- To uplift morale, pride, and self-respect of retiring security personnel.
- To honour long and commendable service without altering financial entitlements.
- To recognize dedication and integrity through symbolic promotion.

Key Features:

- **Ministry:** Ministry of Home Affairs (MHA), Government of India.
- **Coverage:** Applies to all eligible CAPF and Assam

Rifles personnel below officer rank.

- **Timing:** Conferred on the **day of retirement**.
- **Nature:** No financial or pension benefits attached.
- **Category Constraint:** Applicable only if the rank to be granted exists within the service's organizational structure.
- **Seniority:** Does not alter the inter-se seniority order of personnel.

Eligibility Criteria:

- Personnel must fulfil **all promotion prerequisites** at the time of retirement.
- Must have a **clean record** with no major disciplinary actions in the last five years.
- The **Annual Performance Appraisal Report (APAR)** for the last 5 years should be rated at least '**Good**'.
- **Integrity certification** must be beyond doubt.
- Clearance from **departmental inquiries and vigilance** is mandatory.
- **Recommendation** by the commanding officer is required.

Eligible personnel of the Central Armed Police Forces (CAPFs) and Assam Rifles (AR) will be granted honorary ranks as follows:

Central Armed Police Forces (CAPFs)		Assam Rifles (AR)	
Retired Rank	Honorary Rank	Retired Rank	Honorary Rank
Constable	Head Constable	Rifleman	Havildar
Head Constable	Assistant Sub-Inspector	Havildar	Warrant Officer
Assistant Sub-Inspector	Sub-Inspector	Warrant Officer	Naiib Subedar
Sub-Inspector	Inspector	Naiib Subedar	Subedar

SWACHH SURVEKSHAN GRAMEEN 2025

Context:

Union Jal Shakti Minister launched Swachh Survekshan Grameen (SSG) 2025, India's largest rural sanitation survey.

About Swachh Survekshan Grameen 2025:

- **What It Is?**
 - A nationwide rural sanitation ranking survey covering **21,000 villages** across **761 districts** in **34 States/UTs**.



Anchored under Swachh Bharat Mission (Gramin) Phase-II to assess the sustainability of ODF Plus outcomes.

- **Organisation & Ministry:** Conducted by the Department of Drinking Water and Sanitation (DDWS) under the Ministry of Jal Shakti.
 - An **independent agency** is engaged for field verification, ensuring data authenticity and transparency.
- **Key Objectives:**
 - To **measure sanitation progress** in rural areas using structured and technology-driven methods.
 - To **strengthen citizen engagement** and reward high-performing villages and states.
 - To promote a **people-led movement (Jan Bhagidari)** towards a clean and healthy India.

Survey Criteria & Components:

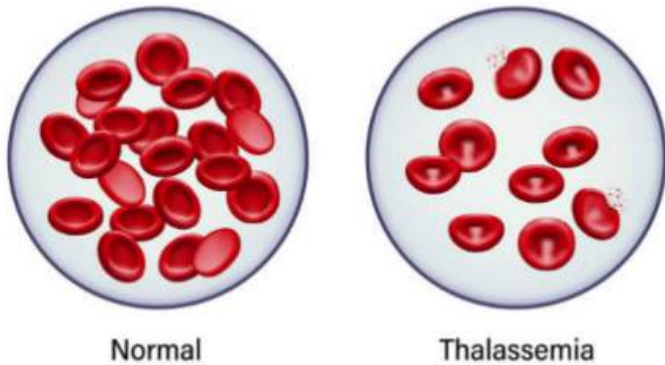
- SSG 2025 ranks rural regions based on four **performance-based components**:
 - **Service-Level Progress (SLP):** Based on district self-assessment and desktop validation of ODF Plus Model Verified Villages.
 - **Direct Observation of Sanitation Status of Villages:** Field visits to households, public places (schools, CSCs, Panchayat Bhavans) to verify cleanliness practices.
 - **Direct Observation – Infrastructure Functionality:** Evaluation of Plastic Waste Management Units (PWMU), Faecal Sludge Management (FSM) plants, GOBARDhan units, etc.
 - **Citizen Feedback:** Collected through **mobile applications and face-to-face surveys**, promoting inclusive participation.
- **Key Features:**
 - **Geo-fencing Enabled Data Collection:** Ensures **authenticity** and location-verified entries.
 - **Swachhata Green Leaf Rating (SGLR):** Tracks quality of sanitation services.
 - **Best Practices Documentation:** Launch of Swachhata Chronicles Vol. III as a compendium of successful State interventions.
 - **Technology Integration:** Mobile app for feedback, real-time data monitoring, and transparency.
 - **Inclusivity & Capacity Building:** Mobilises Swachhagrahis, Training Units, and local governance structures.

Syllabus: Social Sector Services relating to Health, Education

THALASSEMIA

Context:

On World Thalassaemia Day, experts revealed that West Bengal's Thalassaemia carrier rate (6–10%) is well above the national average (3–4%), due to low awareness and limited genetic screening.



About Thalassaemia:

- **What is Thalassaemia?**
 - Thalassaemia is an **inherited blood disorder** where the body produces insufficient or abnormal haemoglobin, impairing oxygen delivery.
 - It is one of the **most common single-gene disorders globally**, especially prevalent in South Asia.
- **Caused By:**
 - Result of **mutations or deletions in genes** that produce haemoglobin chains (alpha or beta).
 - Passed genetically from **both parents**, either as a carrier (minor) or a full expression (major).
- **Types of Thalassaemia:**
 - **Alpha Thalassaemia:**
 - Involves **up to 4 gene deletions**; severity depends on how many are missing.
 - Most common in people of **Southeast Asian, Middle Eastern, and African** ancestry.
 - **Beta Thalassaemia:**
 - Caused by **mutations in the beta-globin gene**.
 - Prevalent among people of **Mediterranean, South Asian, and Chinese** descent.
 - Includes:
 - ✓ **Thalassaemia Minor** (carrier, mild or no symptoms)
 - ✓ **Thalassaemia Major / Cooley Anaemia** (severe

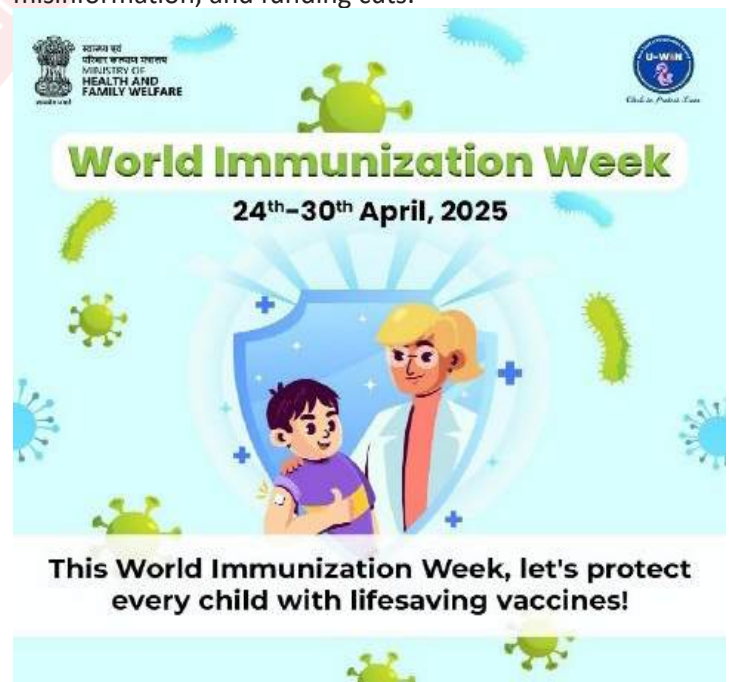
form needing lifelong transfusions)

- **Symptoms:** Fatigue and weakness, Pale or yellow skin (jaundice), Facial bone deformities, Growth retardation, Enlarged spleen and liver, and Shortness of breath
- **Impacts:**
 - Affects **quality and longevity of life**; untreated major cases may result in death before age 30.
 - Leads to **social, emotional, and financial burden**, especially in high-prevalence regions.
- **Treatment:**
 - **Regular blood transfusions** to maintain haemoglobin levels.
 - **Iron chelation therapy** to prevent iron overload.
 - **Bone marrow/stem cell transplantation:** only curative option in select cases.
 - **Supportive care:** vaccinations, nutritional support, and mental health counselling.

VACCINE-PREVENTABLE DISEASES

Context:

Global health bodies — WHO, UNICEF, and Gavi — have issued a warning about the rise in vaccine-preventable diseases due to missed immunisation schedules, misinformation, and funding cuts.



About Vaccine-Preventable Diseases:

Key Data on Rise of Vaccine-Preventable Diseases (VPDs):

- **14.5 million** children missed all routine vaccines in **2023** (Source: WHO-UNICEF).

- **Over 50%** of WHO-monitored countries reported **moderate to severe disruptions** in immunisation services (2024).
- **Measles cases in the U.S. (2025):** 935 cases as of May, *more than triple* compared to total cases in 2024
- **Polio resurgence** in **several African countries** due to delayed vaccination (GPEI, 2023)
- **UNICEF:** Global vaccine delays are threatening **15 million children** in fragile/conflict-hit regions

What is Vaccination?

- **Vaccination** is the process of introducing a **weakened or inactive pathogen** into the body to stimulate the immune system.
- It **trains the immune system** to recognize and combat harmful diseases without causing illness.

Importance of Vaccination Globally:

- **Saves Lives:** Vaccines save 4.2 million lives annually, preventing 14 major diseases.

E.g. Measles vaccine alone accounts for 60% of lives saved globally.

- **Boosts Infant Survival:** Vaccination has contributed to **40% improvement in child survival rates** since 1974.
- **High Return on Investment:** WHO estimates a **\$54 return for every \$1 spent** on vaccines.
- **Prevents Disease Outbreaks:** Countries with high vaccine coverage face **lower mortality rates** and healthcare burden.
- **Builds Herd Immunity:** Protects vulnerable populations unable to be vaccinated, including infants and immunocompromised individuals.

Challenges to Global Vaccination Efforts:

- **Pandemic Disruptions:** COVID-19 delayed routine immunisations; 14.5 million children missed vaccines in 2023.
- **Funding Shortfalls:** Reduced global health budgets threaten continuity of programs like Gavi and COVAX.
- **Misinformation & Hesitancy:** Myths and anti-vaccine campaigns, especially on social media, decrease acceptance.

E.g. Measles cases tripled in the U.S. in 2025.

- **Conflict & Fragility:** Insecurity in regions like **Africa, Middle East, South Asia** hinders vaccine outreach.
- **Supply Chain Gaps:** Weak cold-chain infrastructure in rural and low-income areas delays vaccine delivery.

Vaccination Status in India:

- **Universal Immunisation Programme (UIP):** Largest public health programme, targets **26 million children** and **34 million pregnant women** annually.

Progress Achieved:

- India declared **polio-free in 2014**
- Eliminated **maternal and neonatal tetanus** in 2015
- Introduced vaccines like **Measles-Rubella, PCV, RVV** under UIP

Coverage Data:

- **76.1% full immunisation coverage** (NFHS-5, 2019–21)
- 1 in 4 children still misses essential vaccines

- **Mission Indradhanush (2014):** Targets unvaccinated and partially vaccinated children and pregnant women in underserved areas.

Way Forward:

- **Strengthen Primary Healthcare:** Improve delivery systems and cold chains at grassroots level.
- **Tackle Misinformation:** Use **AI tools, community outreach, and education campaigns** to combat vaccine myths.
- **Ensure Political Commitment:** Immunisation needs sustained funding and policy attention at all governance levels.
- **Promote Public-Private Partnerships:** Collaborate with NGOs, civil society, and tech platforms for outreach.
- **Support Global Frameworks:** Countries must commit to **Immunisation Agenda 2030** and support **Gavi's \$9 billion pledge** to protect 500 million children.

Conclusion:

Vaccination is one of the **most cost-effective health interventions** in human history. Despite progress, rising vaccine-preventable diseases call for **renewed global efforts**. India must **strengthen routine immunisation**, address hesitancy, and scale outreach to protect every child.

PYQ: "Besides being a moral imperative of Welfare State, primary health structure is a necessary pre-condition for sustainable development." Analyse (UPSC 2021)

PROSTATE CANCER



Context:

Former US President Joe Biden has been diagnosed with Stage 4 metastatic prostate cancer, drawing global attention to the disease, its symptoms, and treatment options.

About Prostate Cancer:

- **What is Prostate Cancer?**
 - Prostate cancer arises in the **prostate gland**, a small organ in men that produces seminal fluid.
 - It is one of the **most common cancers in men**, particularly after age 50.
- **Global and Indian Scenario:**
 - **Globally:** Prostate cancer is the **2nd most diagnosed cancer in men** with over 1.4 million new cases and nearly 400,000 deaths in 2022 (GLOBOCAN).
 - **India:** It ranks among the **top 10 cancers in men**, with 37,948 new cases and 18,386 deaths in 2022, and rising incidence in urban areas.
- **Causes and Risk Factors:**
 - **Age:** Risk increases sharply after age 50.
 - **Family History:** A close relative with prostate cancer doubles one's risk.
 - **Genetics:** BRCA1/2 mutations and Lynch syndrome increase vulnerability.
 - **Race:** Men of African ancestry have higher risk and severity.
 - **Diet & Lifestyle:** High intake of red meat, fats, and sedentary habits contribute.
- **Common Symptoms of Prostate Cancer:**
 - **Frequent or painful urination:** Indicates urinary tract irritation due to prostate enlargement or tumor pressure.
 - **Weak urine flow or dribbling:** Caused by blockage in the urethra due to prostate gland swelling.
 - **Erectile dysfunction:** Tumor or treatment may impair nerves or blood vessels linked to erection.
 - **Blood in urine or semen:** A sign of inflammation, prostate damage, or tumor-related bleeding.
 - **Bone pain (in advanced stages):** Metastatic cancer often spreads to bones, causing persistent pain.
- **Diagnosis Methods:**
 - **PSA Blood Test:** Detects elevated prostate-specific antigen, often a marker of cancer presence.
 - **Digital Rectal Exam (DRE):** A doctor manually examines the prostate for lumps or hardness.
 - **Biopsy:** Tissue samples from the prostate confirm cancer by microscopic analysis.

- **Imaging (MRI/Bone Scans):** Helps determine how far the cancer has spread within the body.

• Treatment Options:

- **Active Surveillance:** Regular monitoring without immediate treatment for low-risk cancers.
- **Surgery (Prostatectomy):** Surgical removal of the prostate to eliminate localized cancer.
- **Radiation Therapy:** Targets and destroys cancer cells using focused radiation beams.
- **Hormone Therapy:** Lowers testosterone levels to slow or stop cancer cell growth.
- **Chemotherapy & Immunotherapy:** Used when cancer is advanced or unresponsive to other treatments.

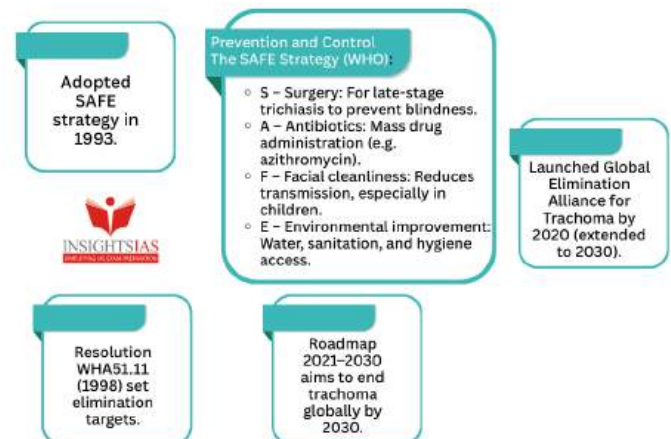
ELIMINATION OF TRACHOMA

Context:

India has officially received the WHO Certificate of Elimination of Trachoma as a Public Health Problem at the 78th World Health Assembly in Geneva.

- India is now the third country in WHO South-East Asia Region (after Nepal and Myanmar) to eliminate trachoma.

WHO INITIATIVES:



About Elimination of Trachoma:

What is Trachoma?

Definition: A contagious bacterial eye disease caused by *Chlamydia trachomatis*.

Transmission: Spread via direct contact (hands, clothes, bedding) and vectors like flies carrying discharge from infected eyes/nose.

Reservoir: Children are the main source of transmission in endemic communities.

Global and Indian Data:

Global burden:

Endemic in **38 countries**.

Affects **1.9 million people** with visual impairment or blindness.

In 2023, 130,746 surgeries and 32.9 million antibiotic treatments were conducted globally.

Recently **Papua New Guinea (PNG) and Mauritania** has been validated by the WHO for eliminating trachoma as a public health problem.

India:

Active surveillance through NPCBVI since 2019.

National Trichiasis Survey conducted in **200 districts (2021–24)**.

Declared trachoma-free in October 2023, certified in May 2025.

- **Symptoms and Impact:**

- **Early:** Red eyes, discharge, eye pain, photophobia.
- **Advanced:** Trichomatous trichiasis (inward eyelashes scraping cornea) leads corneal opacity which in turn lead to irreversible blindness.
 - Women are 4 times more likely to be affected due to frequent exposure from caregiving roles.

- **Transmission and Risk Factors:**

- **Close contact in crowded homes:** Living in close quarters increases the likelihood of direct transmission of eye and nasal discharges.
- **Poor hygiene, lack of water and sanitation:** Unclean environments support bacterial survival and spread due to infrequent face washing and poor waste disposal.
- **Spread mainly among preschool-aged children in endemic zones:** Young children are frequent carriers due to repeated infections and close interactions.
- **Flies act as vectors in unsanitary settings:** Eye-seeking flies transfer the bacteria from infected discharges to others in unhygienic environments.

- **Distribution:**

- Endemic in Africa, South Asia, parts of Latin America, Australia, and the Middle East.
- **21 countries** validated by WHO as having eliminated it, including India, China, Nepal, Pakistan, Iran, Morocco, and Vietnam.

its launch.



About National Medical Register (NMR):

- **What is the NMR?**

- The **National Medical Register (NMR)** is a **centralised digital database** of all licensed **allopathic (MBBS) doctors** in India.
- It is designed to bring transparency, authenticity, and accountability to the medical profession.

- **Launched In:** August, 2024

- **Established Under:** Section 31 of the National Medical Commission (NMC) Act, 2019

- **Nodal Ministry:** Ministry of Health and Family Welfare, Government of India

- **Objectives:**

- Create a **comprehensive, digital registry** of all allopathic doctors across India.
- Enhance **public trust and governance** in the healthcare system.
- Facilitate better **credential verification and policy planning**.

- **Key Features:**

- **Mandatory Enrolment:** All registered medical practitioners (RMPs) must register in the NMR.
- **Aadhaar Linkage:** Each doctor's record is linked to their **Aadhaar ID** to verify authenticity.
- **Public & Private Data Access:** Some data is public-facing; sensitive data remains secure for use by EMRB, SMCs, NBE, and institutions.
- **Real-Time Updates:** The portal will be **dynamically updated** for transparency and governance.
- **Central + State Collaboration:** State Medical Councils (SMCs) are responsible for verifying degrees and facilitating the process.

- **Functions:**

- Serve as the **single source of verified data**

NATIONAL MEDICAL REGISTER

Context:

Less than 1% of India's doctors have applied for enrolment in the National Medical Register (NMR) eight months after

- on licensed doctors.
- Enable **policy planners**, regulators, and medical institutions to access accurate and timely data.
- Strengthen **digital health infrastructure** in line with India's broader Digital Health Mission.

HUMAN DEVELOPMENT INDEX (HDI)

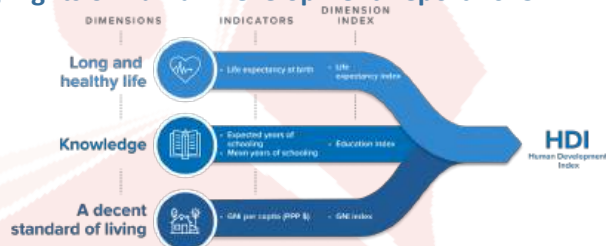
Context:

India has climbed **three positions to rank 130 out of 193 countries** in the **2023 Human Development Index (HDI)**, according to the **2025 Human Development Report** by the **United Nations Development Programme (UNDP)**.

About Human Development Index (HDI):

- What is Human Development Index (HDI)?**
 - The **Human Development Index (HDI)** is a **composite statistical measure** that assesses a country's average achievements in **three key dimensions**:
 - Health** – Measured by **life expectancy at birth**
 - Education** – Measured by **mean years of schooling** and **expected years of schooling**
 - Standard of Living** – Measured by **Gross National Income (GNI) per capita (PPP adjusted)**
- Published by:** United Nations Development Programme (UNDP)
- First introduced:** In **1990**, in the first Human Development Report authored by Mahbub ul Haq and Amartya Sen.

Key Highlights of Human Development Report 2025:



India-Specific Insights:

- India's 2023 HDI Rank: 130 out of 193** (up from 133 in 2022)
- HDI Value (2023): 0.685** (up from 0.676 in 2022)
- Category:** Still under Medium Human Development; nearing the High Development threshold (**0.700**)
- Comparison:** Same HDI value as Bangladesh, but with differing indicators; India ahead of **Pakistan (168th, 0.544)** and **Nepal (145th, 0.622)**.

Progress Made:

- Life Expectancy:** Increased to 72 years in 2023, (from 67.7 years in 2022).
- Expected Years of Schooling:** Rose to **13 years** (from 12.6 years).
- Mean Years of Schooling:** Improved to **6.9 years** (from 6.57 years).
- GNI per capita:** Rose to \$9,046.76 in 2023 (from \$6,951 in 2022)
- Multidimensional Poverty:** 135 million Indians exited poverty between 2015-16 and 2019-21

Persisting Inequality:

- Inequality-adjusted HDI:** India faces a 30.7% loss due to inequality, one of the highest in Asia
- Gender Inequality:** Female labour force participation and political representation remain low (**India ranks 102nd** with a score of **0.403**.)
- GNI per Capita Rank: 7 ranks below** HDI rank → income remains a weak spot.

Global Trends:

- Top performer:** Iceland (0.972), Norway (0.970), Switzerland (0.970).
- Bottom:** South Sudan, Somalia, Central African Republic.
- BRICS Comparison:** Brazil (89), Russia (59), China (75), South Africa (110) all ahead of India.
- The pace of HDI growth globally is the slowest since 1990.
- Inequality between low and very high HDI countries has worsened for the fourth consecutive year.

Syllabus: Social Justice

THREE JAN SURAKSHA SCHEMES

Context:

The three Jan Suraksha Schemes—PMJJBY, PMSBY, and APY—have completed 10 years of providing life insurance, accident insurance, and pension support to India's underprivileged.

About Three Jan Suraksha Schemes:

- Pradhan Mantri Jeevan Jyoti Bima Yojana (PMJJBY)**
 - Launched:** 9th May 2015
 - Aim:** To provide life insurance coverage in case of death from any cause.
 - Key Features:**

- **Eligibility:** Individuals aged 18–50 years with a bank or post office account.
- **Coverage:** ₹2 lakh payable on death from any cause.
- **Premium:** ₹436 per annum.
- **Duration:** 1-year cover from 1st June to 31st May (auto-renewable).
- **Implementing Agencies:** LIC and other approved life insurers via banks/post offices.
- **Pradhan Mantri Suraksha Bima Yojana (PMSBY)**
 - **Launched:** 9th May 2015
 - **Aim:** To offer affordable accident insurance for death or disability.
 - **Key Features:**
 - **Eligibility:** Individuals aged 18–70 years with a bank or post office account.
 - **Coverage:**
 - ✓ ₹2 lakh for death or total disability
 - ✓ ₹1 lakh for partial disability
 - **Premium:** ₹20 per annum.
 - **Duration:** 1-year cover from 1st June to 31st May (auto-renewable).
 - **Implementing Agencies:** Public and private general insurance companies via banks/post offices.



- **Atal Pension Yojana (APY)**
 - **Launched:** 9th May 2015
 - **Aim:** To provide guaranteed pension to workers in the unorganised sector.
 - **Key Features:**
 - **Eligibility:** Individuals aged 18–40 years, not paying income tax.
 - **Pension Benefits:** ₹1,000 to ₹5,000 per month after age 60, based on contribution.
 - **Contribution Frequency:** Monthly,

quarterly, or half-yearly.

- **Implementing Agency:** PFDA under the National Pension System (NPS).
- **Premature Death:** Spouse can continue contributions till age 60 of the original subscriber.

Syllabus: International Relations

OPERATION GIDEON CHARIOTS

Context:

Israel launched Operation Gideon Chariots in Gaza to pressure Hamas into releasing hostages. The operation follows failed negotiations and intensified strikes amidst global humanitarian concerns.



About Operation Gideon Chariots:

- **What is It?**
 - A large-scale **military offensive** launched by the **Israel Defense Forces (IDF)** in **Gaza Strip**.
 - It marks a **renewed escalation** in the conflict, especially after the breakdown of ceasefire negotiations in Doha.
- **Launched By:** Israel.
- **Objective:**
 - **Primary aim:** Secure the release of remaining Israeli hostages held by Hamas.
 - **Secondary aim:** Intensify military pressure to neutralize Hamas's operational capability.
- **Areas Affected:**
 - Northern Gaza, including **Jabaliya refugee camp**, witnessed heavy bombardment.
 - Over **150 people killed in 24 hours** (Gaza Health Ministry) and **3,000+ deaths since March** escalation.

Relevance in UPSC Exam Syllabus:

- **GS Paper 2 – International Relations**
 - **India–West Asia Relations:** Strategic interests, diaspora, and humanitarian

- diplomacy.
- **International Peace & Security:** Role of UN and international community in conflict resolution.
- **Global Conflict Hotspots:** Understanding contemporary geopolitical flashpoints like Gaza.
- **Essay / Ethics:**
 - Themes of **just war, humanitarian law, and peacebuilding.**
 - Ethical dilemmas in **military interventions vs. civilian protection.**

OPERATION SINDOOR

Context:

In response to the **Pahalgam terrorist attack** that killed 25 Indians and one Nepali citizen on April 22, 2025, India launched '**Operation Sindoor**', a precise military offensive targeting **nine terrorist camps** across **Pakistan and Pakistan-occupied Kashmir (PoK).**

About Operation Sindoor:

- **Background:**
 - **Trigger:** A terror attack in Pahalgam (J&K) attributed to The Resistance Front (TRF), linked to Lashkar-e-Taiba.
 - Attack resulted in 26 civilian deaths, including one foreign national.
 - Marked the most serious civilian-targeted attack since 26/11 Mumbai attacks.
- **Objectives of Operation Sindoor:**
 - **Neutralise cross-border terror infrastructure.**
 - Deliver **justice to the victims** of the Pahalgam attack.
 - Prevent **imminent future attacks**, as indicated by actionable intelligence.
 - Reassert India's **right to self-defence** under international law.
- **Operation Details**
 - **Targets:** 9 terror camps — 4 in **mainland Pakistan**, 5 in **PoK.**

OPERATION KELLER

Context:

The Indian Army neutralised Shahid Kuttay, chief of The Resistance Front (TRF) and mastermind of the Pahalgam terror attack, in Operation Keller in Shopian, Jammu & Kashmir.



About Operation Keller:

- **What is Operation Keller?**
 - A **search and destroy mission** initiated on **13 May 2025** in **Shoekal Keller, Shopian**, based on **intelligence from the Rashtriya Rifles.**
- **Conducted by:** Indian Army, in coordination with **J&K Police and CRPF.**
- **Objectives:**
 - Neutralise TRF terrorists responsible for **Pahalgam attack** (26 civilian deaths).
 - Eliminate Shahid Kuttay, a top commander and proxy of **Pakistan-backed LeT.**
 - Prevent retaliatory threats and secure volatile areas.

About Shopian District:

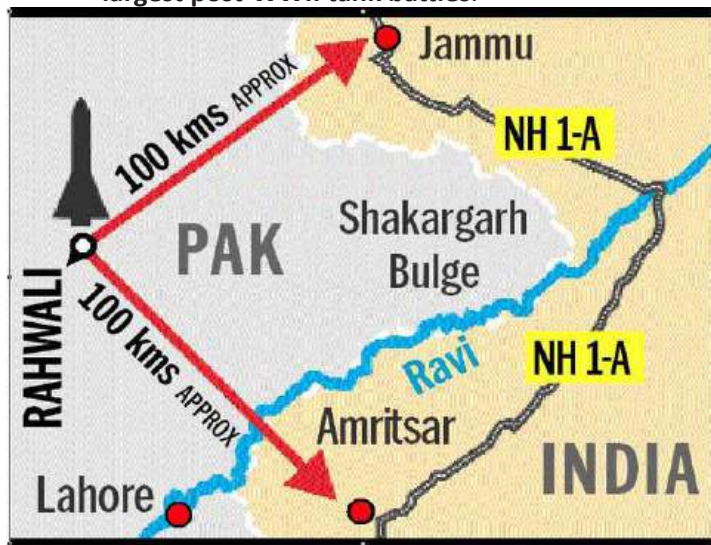
- **Location & Geography**
 - Located in the southern part of **Kashmir Valley, Jammu & Kashmir.**
 - **Bordered by:** Pulwama, Anantnag, Kulgam, and Pir Panjal mountains.
 - **Altitude:** 2,146 metres above sea level; experiences sub-zero winters (as low as **-7°C**).
- **Historical & Economic Importance:**
 - Granted **district status in 2007** (formerly a tehsil of Pulwama).
 - **Ancient trade route:** Part of the **Mughal Road** linking Lahore to Srinagar.
 - **Economy:** Primarily driven by **apple orchards** and **agriculture.**
 - **Local etymology:** Believed to derive from "**Shah-payan**" (royal stay) or "**Shin-van**" (snow forest).

SHAKARGARH BULGE

Context: Following the Pahalgam terror attack, Pakistan has amassed troops, tanks, and artillery near the Shakargarh Bulge, triggering heightened military alertness along the western front.

About Shakargarh Bulge:

- **What It Is?** The Shakargarh Bulge is a protruding landmass in Pakistan's Sialkot district, bordered by the **Ravi and Chenab Rivers**.
- **Geographical Importance:** This flat terrain with access to road and rail corridors offers strategic depth for offensive manoeuvres.
- **Why It Mattered?**
 - **For India:** Protecting the Jammu–Pathankot axis was vital to maintain land connectivity with **Jammu & Kashmir**.
 - **For Pakistan:** Capturing it could have **cut off Indian forces** from the Kashmir region, giving it leverages on the western front.
- **Key Point:** The region became the site of one of the **largest post-WWII tank battles**.



Map not to scale

About Battle of Basantar:

- **Year & Duration:** Fought from **December 4 to 16, 1971** during the Indo-Pak war.
- **Involved Nations:** India and Pakistan.
- **Location:** Around **Basantar River**, in the **Shakargarh Bulge**.
- **Objective:** Pre-empt a Pakistani offensive and protect Indian supply lines in the north.
- **Features of the Battle:**
 - **Major Units:** 54 Infantry Division, 16 Independent Armoured Brigade, and 75 Medium Regiment.
 - Indian tanks (Centurions and AMX-13) destroyed over **60 Pakistani Pattons**.
 - India used **night operations**, diversionary tactics, and **air-land coordination**.
 - Boosted India's **negotiation leverage** in the **Shimla Conference**
 - Prevented Pakistani strategic thrust into Jammu and Kashmir

RIGHT TO SELF-DEFENCE

Context:

India and Pakistan agreed to halt military action after India conducted precision strikes in response to the Pahalgam terror attack that killed 26 civilians.



- The strikes revived international debates around *self-defence* and the '*unwilling or unable*' doctrine.

About Right to Self-Defence in International Law:

- **What it is:**
 - **Right to self-defence** is a principle under **UN Charter** that allows a nation to use force in response to an armed attack.
 - It must meet the conditions of **necessity** and **proportionality**, and be immediately reported to the UN Security Council.
- **Legal Basis:** Codified in **Article 51 of the UN Charter**, which permits the use of force in self-defence if an armed attack occurs.
- **Key Features:**
 - Acts as an exception to Article 2(4), which prohibits the use of force by states.
 - Requires immediate **notification to the UN Security Council** after defensive action.
 - Must meet **necessity and proportionality** standards.
 - The ICJ restricts application to armed attacks "by or on behalf of a state" (e.g., *Nicaragua v. US*, 1986).

About 'Unwilling or Unable' Doctrine:

- **What It Is:** A **contested international law doctrine** that allows a state to use force against non-state actors (NSAs) within another state's territory if that state is unwilling or unable to stop them.
- **Key Features:**
 - Removes the need for state attribution of an attack to invoke self-defence.
 - Justifies cross-border strikes if the host country harbours or fails to act against terrorist groups.
 - Championed by the **United States** in operations like the 2011 Osama bin Laden raid (Pakistan) and 2014 IS strikes (Syria).
 - Lacks wide **state practice or opinio juris**, and is **not yet customary international law**.

- Opposed by countries like **China, Russia,** and **Mexico** for violating sovereignty norms.

GOLDEN TEMPLE

Context:

The Indian Army has denied media reports about deploying air defence guns at the Golden Temple during Operation Sindoor.



About Golden Temple (Sri Darbar Sahib, Amritsar):

- **What is the Golden Temple?**
 - The Golden Temple, or **Sri Darbar Sahib**, is the holiest Sikh shrine located in **Amritsar, Punjab**. It represents Sikhism's core values of equality, humility, and service.
- **Foundation Laid:** 1577 CE by **Guru Ram Das Ji**, the fourth Sikh Guru.
- **Constructed by:** **Guru Arjan Dev Ji**, the fifth Guru, completed in **1604**.
- **Land Acquisition:** Land bought from local landlords (zamindars).
- **Foundation Laid by:** Hazrat **Mian Mir**, a Muslim saint from Lahore, showing interfaith harmony.
- **Key Personalities Involved:**
 - **Guru Arjan Dev Ji:** Architect and visionary of the central Sikh shrine.
 - **Baba Budha Ji:** First appointed granthi (reader of Guru Granth Sahib).
 - **Maharaja Ranjit Singh:** Beautified the temple with golden plating in the 19th century.
- **Architectural Features:**
 - **Design:** Built on a lower level to symbolize humility; has four entrances for universal access.
 - **Structure:** Constructed on a 67 ft square platform in the Amrit Sarovar (holy pool).
 - **Materials:** Features gold-covered domes and marble architecture with inlay work.

- **Dome:** Fluted, lotus-shaped with a "kalash" and canopy on top.
- **Langar (Community Kitchen):** Serves free meals to over 1 lakh people daily, upholding Sikh values of equality.

- **Historical Significance:**

- **Repeatedly attacked** during Mughal and Afghan invasions in the 18th century.
- **Operation Blue Star (1984):** Military action to remove militants caused major damage and public unrest.

OFFICIAL SECRETS ACT, 1923

Context:

Haryana-based YouTuber Jyoti Rani was arrested, for allegedly leaking sensitive information to a Pakistani High Commission official during Operation Sindoor, under the Official Secrets Act, 1923, and Section 152 of the BNSS.



About the Official Secrets Act, 1923 (OSA):

- **Came into force:** 1923 (British colonial era), modeled on the British **OSA 1911**.
- **Objective:** To protect the **sovereignty, defence, and intelligence infrastructure** of India from espionage and unauthorized disclosures.
- **Key Features:**
 - **Scope:** Applies to **government officials, civilians, foreign nationals**, or any individual in possession of classified information.
 - **Secrecy Scope:** Covers official codes, passwords, maps, documents, military locations, sketches, plans, and any **sensitive government information**.

- **Wide Interpretation:** Any action that may prejudice national safety or aid an enemy is considered an offence.
- **Prohibited Acts under the Act:**
 - **Spying** (Section 3): Unauthorized collection, communication, or publication of secret data useful to enemies.
 - **Wrongful Communication** (Section 5): Even unintentional or careless handling leading to disclosure is punishable.
 - **Other Acts:**
 - Wearing unauthorized uniforms (Section 6)
 - Forgery of official documents
 - Attempting or abetting any OSA offence (Section 9)
- **Powers of Authorities:**
 - **Search and Seizure:** Officers have powers to raid premises and seize documents suspected of violating the Act.
 - **No Need for Public Disclosure:** Prosecutions under OSA can be kept confidential for national interest.
- **Penalty Provisions:**
 - **Section 3 (Spying):**
 - Up to **14 years** imprisonment for offences related to defence/armed forces.
 - Up to **3 years** in other cases.
 - **Section 5 (Wrongful Communication):** Up to **3 years**, or **fine**, or both.
 - **Section 9:** Covers attempt, abetment, or incitement—treated as same offence.
- **Additional Charge under Bharatiya Nyaya Sanhita (BNS):**
 - **Section 152 – Act Endangering Sovereignty, Unity and Integrity**
 - **Offence:** Promoting secession, rebellion, or separatist activities through speech, media, or financial means.
 - **Punishment:** Life imprisonment, or up to 7 years and fine.
 - **Exemption:** Peaceful criticism of government actions for lawful reform is not punishable.

Kashmir in response to the Pahalgam terror attack.



- The strikes used precision-guided missiles like SCALP, HAMMER, BrahMos, and loitering munitions, ensuring minimal collateral damage.

About Precision-Guided Missiles in Operation Sindoor:

- **What is Operation Sindoor?**
 - A **retaliatory military operation** carried out by India using **precision missile strikes** against terrorist infrastructure.
 - It demonstrated **India's resolve against cross-border terrorism**, with strategic restraint to avoid civilian/military casualties.

Key Missiles Used in Operation Sindoor

1. **SCALP Cruise Missile (Storm Shadow)**
 - **Manufacturer:** MBDA (France)
 - **Range:** ~450 km
 - **Features:**
 - Air-launched, deep-strike cruise missile with **stealth capabilities**.
 - Guided by **INS + GPS + terrain referencing + infrared seeker**.
 - Ideal for **fixed hardened targets** like command centres or bunkers.
 - Operates in **all weather and at low altitude**, reducing radar detection.
2. **HAMMER (Highly Agile Modular Munition Extended Range)**
 - **Manufacturer:** Safran (France)
 - **Range:** ~70 km
 - **Features:**
 - **All-weather guided glide bomb** usable from Rafale aircraft.
 - Compatible with **various bomb weights** (125–1000 kg).
 - Resistant to jamming, **autonomous with INS/GPS/laser/IR guidance**.
 - Effective for **close air support and deep-strike missions**.
3. **BrahMos Supersonic Cruise Missile**
 - **Manufacturer:** BrahMos Aerospace (India-Russia JV)
 - **Speed:** ~Mach 2.8–3

PRECISION-GUIDED MISSILES IN OPERATION SINDOOR

Context:

India conducted 'Operation Sindoor', targeting 21 terror camps across 9 locations in Pakistan and Pakistan-occupied

- **Range:** Up to 450–500 km (recently extended)
- **Features:**
 - Operates on “fire-and-forget” principle.
 - Carries **200–300 kg conventional warhead**.
 - Penetrates deep and strikes targets within **minutes**.
 - Used by all three services: **Army, Navy, and Air Force**.

4. **Loitering Munitions (Kamikaze Drones)**

- **Use:** Surveillance + precise attack after target identification.
- **Features:**
 - Can **hover** over a battlefield and **strike opportunistically**.
 - Effective against **mobile or time-sensitive targets**.
 - Enhances **tactical advantage with minimal risk to personnel**.
- Terror groups targeted: **Jaish-e-Mohammed, Lashkar-e-Taiba, Hizbul Mujahideen**.

Carried out by **Indian Air Force and Special Forces**, avoiding civilian zones and Pakistani military installations.

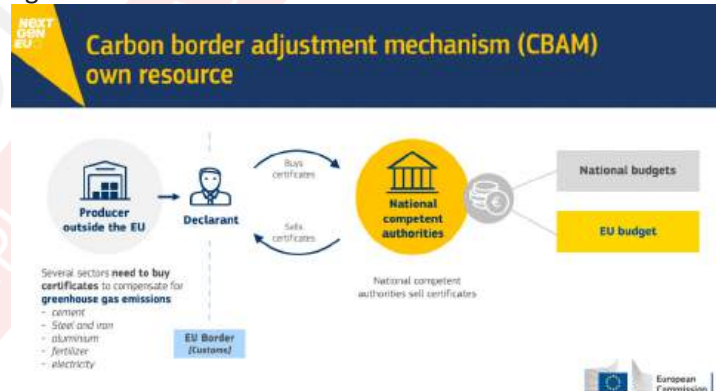
Strategic and Diplomatic Implications:

- Sends a **strong deterrent message** to terror sponsors and their safe havens.
- Draws global attention to **Pakistan’s continuing support** to UN-designated terrorists like **Sajid Mir**.
- Reinforces India’s shift towards **pre-emptive counter-terrorism doctrine** post-Uri and Balakot strikes.
- Likely to increase **international diplomatic support** for India’s right to protect its civilians.

UK’S PROPOSED CARBON BORDER TAX (CBAM)

Context:

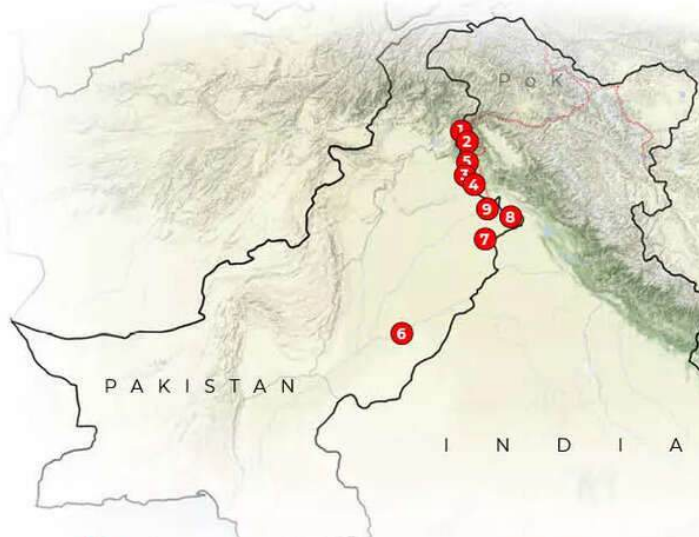
India has stated it will **retaliate** if the UK imposes a **carbon tax (CBAM)** on Indian exports starting January 2027, calling it a violation of the **CBDR (Common But Differentiated Responsibilities)** principle under international climate agreements.



About CBAM (Carbon Border Adjustment Mechanism):

- **What is CBAM?**
 - It is a form of **carbon tax on imports** imposed by developed countries (like the EU or UK) based on the **carbon intensity of production** in the exporting country.
 - Aims to **prevent carbon leakage** by equalizing carbon prices between domestic and imported goods.
 - The UK’s version of CBAM is expected to start **from January 1, 2027**.
 - Sectors like **steel, aluminium, cement, and energy-intensive goods** are likely to be affected first.
- **India’s Key Concerns:**
 - **Unfair Discrimination:** CBAM disproportionately affects developing countries like India that have **lower per capita emissions** but higher carbon

SITES TARGETED IN OPERATION SINDOOR



- 1 Shawai Nalla Camp, Muzaffarabad (LeT)
- 2 Syedna Bilal Camp, Muzaffarabad (JeM)
- 3 Gulpur, Kotli
- 4 Barnala, Bhimber
- 5 Abbas Kotli
- 6 Bahawalpur
- 7 Muridke
- 8 Sarjal
- 9 Mehmoona Joya

intensity due to developmental needs.

- **Violation of CBDR:** It goes against the UNFCCC and Paris Agreement principle of “**common but differentiated responsibilities**”, which acknowledges that developing countries require more time and support to decarbonize.
- **Double Taxation Risk:** Indian industries may have to **pay both a UK border carbon tax and domestic environmental levies**, reducing competitiveness.
- **Impact on MSMEs:** India sought a **carve-out or exemption for labour-intensive MSME sectors** such as textiles and leather, which was not granted.
- **Implications for Indian Trade:**
 - Even with **FTA tariff cuts**, exports could face **effective protectionist barriers** due to CBAM.
 - Indian exports in **textiles, ceramics, engineering goods, steel** may be disproportionately hit due to **sustainability compliance costs**.
 - Could necessitate **new regulations, ESG standards**, and carbon tracking mechanisms within India.
 - Risk of CBAM expanding to cover **labour, IPR, and environmental compliance clauses**, impacting India’s **trade sovereignty**.

About HAROP – India’s Kamikaze Drone:

HAROP is an advanced **loitering munition** (or suicide/kamikaze drone) developed by **Israel Aerospace Industries (IAI)**.

Combines the functions of both a **missile** and a **UAV** — it loiters over an area, selects a target, and crashes into it with an **explosive payload**.

It is designed to destroy **high-value targets** like **radars, command posts, tanks, SAMs**, and even **moving assets**.

Unlike conventional precision-guided missiles that require exact target coordinates, HAROPs can **search, track, and engage dynamically**.

Key Technical Features:

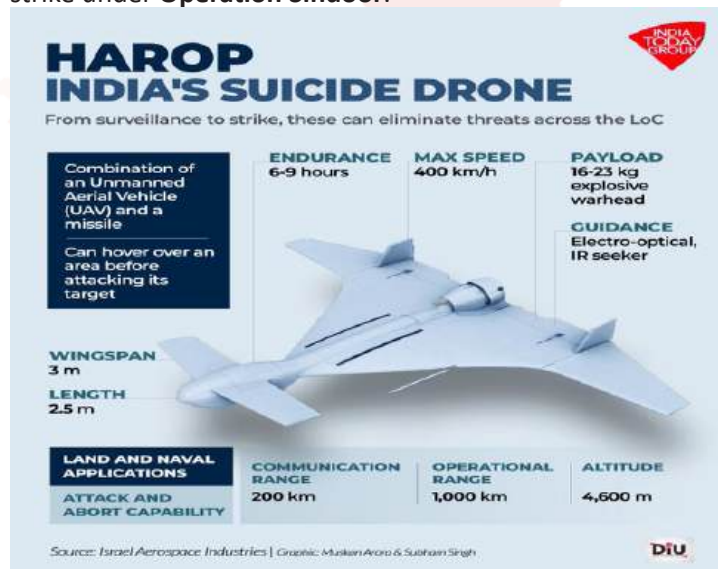
- **Electro-optical (EO) sensor** allows real-time visual identification and target acquisition.
- Endurance of up to **9 hours**, enabling **wide-area scanning and deep-target strikes**.
- Can be launched from **truck-mounted canisters, naval vessels, or fixed ground platforms**.
- Capable of operating in **GNSS-denied environments** (immune to GPS jamming).
- It has **autonomous and manual attack capabilities** with a fire-and-forget profile.

Syllabus: Bilateral, regional and global groupings

HAROP DRONES

Context:

India reportedly used **Israeli HAROP drones** — a form of **loitering munition** — to destroy a **Pakistani air defence system in Lahore** on May 8, 2025, as part of its retaliatory strike under **Operation Sindoor**.



SEAVISION SOFTWARE



Context:

The United States has approved a \$131 million defense sale to India, including SeaVision maritime domain awareness software, training, and support.

About SeaVision Software:

- **What is SeaVision Software?**
 - SeaVision is a **web-based maritime domain awareness (MDA) tool** that aggregates and visualizes vessel tracking data to

support security, safety, and environmental missions.

- **Developed by:** Originally developed by the **U.S. Department of Transportation**, now operated in collaboration with **Hawkeye 360**, a Virginia-based defense analytics company.
- **Purpose:** To **enhance maritime surveillance, coordination, and decision-making** among allied and partner navies in key strategic waterways.
- **Key Features of SeaVision Software:**
 - **Live Tracking:** Integrates multiple sources such as Automatic Identification System, satellite, and radar for real-time vessel monitoring.
 - **User-Friendly Interface:** Web-based platform requiring no installation, accessible globally.
 - **Multi-user Collaboration:** Enables **joint maritime operations and data sharing** among partner nations.
 - **Custom Alerts & Analytics:** Detects suspicious patterns, illegal fishing, smuggling, or unauthorized entries.
 - **Geo-Fencing:** Users can create zones to monitor activities and receive alerts on breaches.
- **Significance for India:**
 - **Enhanced Indo-Pacific Surveillance:** Boosts India's ability to monitor movements in the Indian Ocean, South China Sea, and other critical sea lanes.
 - **Strategic Deterrence:** Strengthens deterrence posture through better maritime intelligence and early warning.
 - **Interoperability with Allies:** Facilitates coordination with US, QUAD, and IOR partner navies for joint maritime exercises and information sharing.
 - **Support to Sagarmala & Blue Economy:** Supports national initiatives like Sagarmala Project and deep-sea monitoring for economic and environmental safety.

INDO-PACIFIC LOGISTICS NETWORK (IPLN)



Context:

The Quad countries—India, Australia, Japan, and the US—conducted a Tabletop Exercise in Hawaii to simulate the launch of the Indo-Pacific Logistics Network (IPLN).

About Indo-Pacific Logistics Network (IPLN):

- **What is IPLN?**
 - IPLN is a **multilateral initiative** to develop a shared logistics framework that enables **civilian disaster response coordination** across the Indo-Pacific region.
 - It supports faster, efficient deployment of humanitarian aid through **shared logistics infrastructure and interoperability**.
- **Participating Countries:** India, United States, Japan, and Australia.
- **Launch:**
 - Simulated via a **Tabletop Exercise (TTX)** hosted at the **Asia-Pacific Centre for Security Studies, Honolulu, Hawaii**.
 - Complementary to the **Indo-Pacific Partnership for Maritime Domain Awareness (IPMDA)** and the **Quad Pandemic Preparedness Workshop**.
- **Key Features:**
 - **Shared Logistics Coordination:** Enhances supply chain responsiveness for humanitarian assistance and disaster relief (HADR) missions.
 - **Civilian-First Focus:** Targets **natural disaster preparedness**, including response to cyclones, tsunamis, and health emergencies.
 - **Interoperability and Trust:** Builds **mutual logistical support systems** and strengthens operational coordination among Quad partners.
 - **Technology-Driven:** Emphasizes **digital logistics mapping**, joint resource planning, and real-time tracking systems.
 - **Flexible and Scalable:** Applicable across **Indo-Pacific islands, coastal states**, and remote zones needing rapid crisis response.
- **Strategic and Humanitarian Significance:**
 - Strengthens **regional disaster resilience** and emergency preparedness architecture.
 - Reinforces Quad's image as a **force for good** beyond security—focused on health, disaster relief, and humanitarian values.
 - Builds synergy with initiatives like **One Health approach** and Quad-led Pandemic Preparedness Program.

EXTENDED FUND FACILITY (EFF)

Context:

The IMF Executive Board approved an immediate disbursement of \$1 billion to Pakistan under the Extended Fund Facility (EFF).



About Extended Fund Facility (EFF):

- **What is the Extended Fund Facility (EFF)?**
 - EFF is an **IMF lending mechanism** designed to help countries facing **prolonged balance of payments problems** due to deep structural economic weaknesses.
- **Key Features:**
 - **Governed by:** International Monetary Fund (IMF), part of Bretton Woods institutions.
 - **Loan Type:** *Repayable loan*, not a grant or financial aid.
 - **Tenure:** Extended period (3+ years), with longer repayment timelines than standard IMF loans.
 - **Purpose:** Facilitates **medium-term structural reforms** — e.g., improving tax systems, reducing inflation, curbing unsustainable fiscal deficits.
 - **Disbursement:** Tranches released based on **periodic reviews** of policy implementation by the borrowing country.
- **Eligibility Criteria for EFF Loans:**
 - Persistent current account deficits or **balance of payments stress**.
 - Deep-rooted issues in governance, investment, tax systems, or financial sectors.
 - Willingness and ability to implement **IMF-monitored structural reforms**.
- **EFF Approval Process**
 - **Country Request:** Government approaches IMF, outlining economic needs and reform proposals.

- **Staff-Level Agreement:** IMF negotiates a program based on reform commitment.
- **Executive Board Review:** Approves loan after evaluating macroeconomic performance and fiscal roadmap.
- **Tranche Disbursement:** Funds are released in phases, conditional on reform compliance and progress.

WHO PANDEMIC AGREEMENT

Context:

The World Health Assembly formally adopted the WHO Pandemic Agreement, a global legal treaty to improve preparedness for future pandemics.



About WHO Pandemic Agreement:

- **What is the WHO Pandemic Agreement?**
 - A **legally binding international treaty** under **Article 19** of the WHO Constitution — only the second such treaty after the **2003 Framework Convention on Tobacco Control**.
- **Aim:** To ensure **equitable access to vaccines, diagnostics, and therapeutics**, and build a coordinated global response mechanism during future pandemics.
- **Binding Nature:** Becomes enforceable **once 60 countries ratify it**.
 - Countries retain sovereignty over domestic health decisions and WHO cannot mandate laws or restrictions.
- **Members Involved:** Adopted by **124 countries**, with **11 abstentions**. **The US withdrew** from negotiations following policy shifts under President Trump.

Need for the Pandemic Treaty:

- **COVID-19 exposed systemic failures** in global health equity and coordination.

E.g. A 2022 Nature study found **1 million deaths** could have been avoided with fair vaccine distribution.

- **Vaccine hoarding** by wealthy nations left poorer

countries behind.

- The **Independent Panel Report (2021)** cited “uncoordinated global response and inequalities” as reasons for avoidable human loss.
- The treaty aims to prevent such **global disparities in future pandemics**.

Key Features of the WHO Pandemic Treaty:

1. **Pathogen Access and Benefit Sharing (PABS):**
 - Countries must **share pathogen samples and genome data**; in return, pharma companies must provide:
 - **10% of vaccine output free to WHO**
 - **10% at affordable prices** to low-income countries.
2. **Technology Transfer & Capacity Building:**
 - Encourages **knowledge-sharing** and **tech transfer** to enable **local production** of vaccines and treatments in developing nations.
3. **Equity-Based Distribution Framework:**
 - Prioritises **public health risk** over geopolitics in vaccine allocation.
 - Prevents **vaccine hoarding** and promotes **transparent supply chains**.
4. **Global Supply Chain & Financing Mechanism:**
 - Calls for a **Coordinated Financial Mechanism** and a **Global Supply Chain and Logistics Network (GSCL)** for emergency response.
 - Ensures countries in crisis receive **timely access** to life-saving resources.
5. **National Health Policy Alignment:**
 - Countries must develop frameworks to **guarantee access to pandemic-related innovations** derived from public funding.
6. **One Health Approach:**
 - Emphasises interconnectedness of **human, animal, and environmental health**, promoting early detection and prevention of zoonotic diseases.

Significance of the Pandemic Treaty:

- **Enhances Global Solidarity:** Builds trust in **multilateral health systems** for coordinated action.
- **Boosts Pandemic Readiness:** Creates an enforceable global framework for **early detection, equitable distribution, and response**.
- **Protects Developing Nations:** Ensures **access to innovation and treatment**, bridging the North–South divide.
- **Limits of Power:** WHO **cannot override national laws**, maintaining state sovereignty while ensuring international cooperation.
- **Economic Protection:** Reduces global health

and economic disruptions by institutionalising **preparedness mechanisms**.

Conclusion:

The WHO Pandemic Agreement is a landmark in international public health diplomacy. It reflects lessons from COVID-19 and aims to correct past inequities in global health responses. Implementation and ratification will now be key to transforming this global consensus into meaningful protection for all.

PYQ: “Besides being a moral imperative of a Welfare State, primary health structure is a necessary precondition for sustainable development.” Analyse. (UPSC - 2021)

GOLDEN DOME

Context:

US President Donald Trump announced the final design selection for the ‘Golden Dome’ missile defence shield.

About Golden Dome:

- **What is the Golden Dome?**
 - A proposed **next-gen missile defence system** integrating **space-based and terrestrial** technologies.
 - Conceptualized as a **strategic shield** for intercepting ballistic and hypersonic missiles at launch.



- **Launched By:** Announced by **Donald Trump** in January 2025, under the US Department of defence.
- **Objective:**
 - To **protect US territory** from long-range missile threats including **ICBMs** from rival nations like **Russia and China**.
 - Aims to **operationalize space-based weapons** for early missile interception — effectively **realizing space warfare capability**.

- **Key Features of the Golden Dome:**
 - **Space-Based Interceptors:** Thousands of small satellites in low Earth orbit (LEO) to track and intercept threats at launch phase.
 - **Satellite-Enabled Targeting:** Advanced surveillance, detection, and response systems leveraging AI and real-time data.
 - **Ground and Sea Integration:** Complements satellite systems with radar arrays, sensor grids, and naval/missile units on Earth.
 - **Inspired by Iron Dome, Beyond in Scope:** Unlike Israel's Iron Dome, it targets **long-range, high-altitude, and spaceborne threats**, not just short-range projectiles.
 - **Strategic Scale:** Designed to cover the **entire continental US**, unlike the Iron Dome which defends compact territories.
- **Significance:**
 - **Strategic Superiority:** Positions the US ahead in **space militarization** amidst growing threats from China and Russia.
 - **Technological Leap:** Would become the **first true space-based missile defence** system if operationalized.

[Syllabus: Important International Institutions](#)

INTERNATIONAL MONETARY FUND (IMF)

Context:

India abstained from an IMF vote approving new financial assistance to Pakistan and raised concerns over Pakistan's repeated misuse of IMF funds, and its poor reform record linked to cross-border terrorism risks.



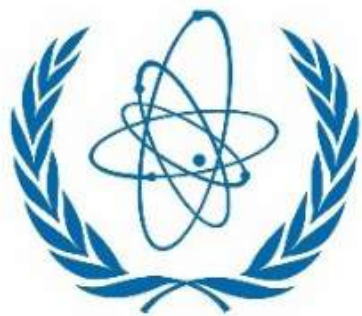
About International Monetary Fund (IMF):

- **What is the IMF?**
 - The **International Monetary Fund (IMF)** is a global financial institution that promotes **international monetary cooperation**, economic stability, and trade expansion.
 - It was established as part of the **Bretton Woods Agreement** to maintain global economic order post-World War II.
- **Established In:**
 - Year: 1945
 - Operational Since: 1947
- **Headquarters:** Located in **Washington D.C., United States**
- **Key Functions:**
 - **Surveillance:** Monitors global and national economic developments via reports like *World Economic Outlook* and *Global Financial Stability Report*.
 - **Capacity Building:** Provides technical training and policy advice on public finance, monetary policy, data analytics, and governance.
 - **Lending:** Offers short- and long-term financial support to help countries manage balance-of-payment crises.
- **Sources of Funding:**
 - IMF's primary resources come from **member country quotas**, determined by each country's relative size in the world economy.
 - **Special Drawing Rights (SDRs)** supplement reserves and enhance liquidity.
- **Loan Instruments:**
 - **Extended Fund Facility (EFF):** For structural economic reforms.
 - **Resilience and Sustainability Facility (RSF):** Aims to strengthen long-term economic sustainability.
 - **Stand-by Arrangements (SBA):** Provides rapid crisis support.
 - Loans often carry **conditionalities**, termed **Structural Adjustment Programs**, which require recipient countries to implement economic reforms.

INTERNATIONAL ATOMIC ENERGY AGENCY (IAEA)

Context:

The International Atomic Energy Agency (IAEA) confirmed no radiation leak occurred from any nuclear facility in Pakistan, following media reports suggesting a potential incident at Kirana Hills amid India's Operation Sindoor airstrikes.



IAEA

International Atomic Energy Agency

About International Atomic Energy Agency (IAEA):

- **What is IAEA?**
 - The IAEA is the **global nuclear watchdog** promoting safe, secure, and peaceful use of nuclear technology.
 - Also known as the “**Atoms for Peace and Development**” agency within the UN system.
- **Headquarters:** Located in Vienna, Austria.
- **Statute adopted:** 23 October 1956.
- **Came into force:** 29 July 1957.
- **Membership:** Currently comprises **178 member countries** (as of 2025).
- **Historical Context:**
 - Established after WWII to **prevent nuclear weapon proliferation** and encourage peaceful nuclear cooperation.
 - Functions independently but reports to both the **UN General Assembly and Security Council**.
- **Key Functions of the IAEA:**
 - **Nuclear Safeguards:** Verifies that nuclear materials are not diverted to weapons.
 - **Emergency Response:** Manages nuclear and radiological emergencies through its **Incident and Emergency Centre (IEC)**.
 - **Capacity Building:** Provides technical support and training for peaceful nuclear use.
 - **Safety and Security:** Sets global standards for nuclear safety.
 - **Research & Development:** Facilitates international R&D collaboration.
 - **Monitoring and Reporting:** Sends regular updates and assessments to the international community.

ASIAN PRODUCTIVITY ORGANIZATION (APO)

Context:

India has formally assumed the Chairmanship of the Asian Productivity Organization (APO) for the 2025–26 term during the 67th Governing Body Meeting.

About Asian Productivity Organization (APO):

- **What It Is?**
 - APO is a **Tokyo-based intergovernmental body** working to **boost productivity** across the **Asia-Pacific region**.
- **Established:** Founded in **1961**, with India as a **founding member**.

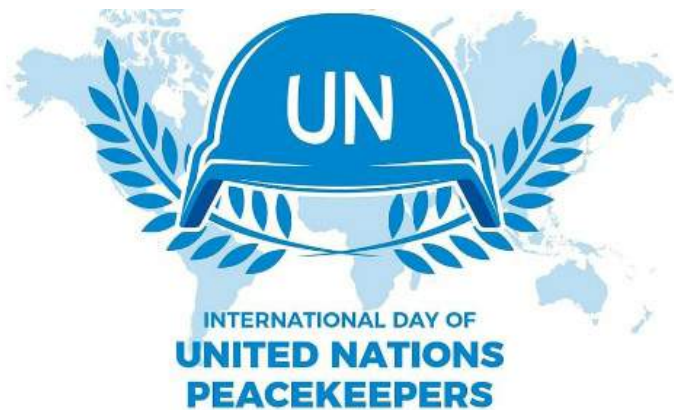


- **Headquarters:** Tokyo, Japan
- **Current Members:** **21 member economies** including India, Japan, Iran, Indonesia, Philippines, Singapore, South Korea, Vietnam, Bangladesh, and others.
- **Objectives:**
 - Promote **sustainable socioeconomic growth** through **enhanced productivity**.
 - Support **inclusive, innovation-led development** across industry, agriculture, services, and public sectors.
- **Core Functions:**
 - **Policy Advisory:** Guides governments on national productivity strategies.
 - **Capacity Building:** Organizes training, workshops, and research programs.
 - **Centres of Excellence:** Supports innovation and excellence across member economies.
 - **Green Productivity:** Promotes environmentally sustainable practices.
 - **Digital and Innovation Ecosystem:** Enhances regional cooperation on digital productivity and entrepreneurship.

TWO INDIAN PEACEKEEPERS AWARDED DAG HAMMARSKJÖLD MEDAL

Context:

Two Indian peacekeepers Brigadier General Amitabh Jha and Havildar Sanjay Singh will be posthumously awarded the Dag Hammarskjöld Medal on the International Day of UN Peacekeepers.



About Two Indian Peacekeepers Awarded Dag Hammarskjöld Medal:

About India and UN Peacekeepers:

- **India's Global Role:** India is the **4th largest contributor** of uniformed personnel to UN peacekeeping, with over **5,300 Indian troops** serving in missions across Africa, Asia, and the Middle East.
- **Honoured Peacekeepers 2025:**
 - **Brig. Gen. Amitabh Jha** served under **UNDOF (Golan Heights)**.
 - **Hav. Sanjay Singh** served under **MONUSCO (Congo)**.
 - Both will receive the **Dag Hammarskjöld Medal** for laying down their lives in the pursuit of global peace.
- **Legacy of Recognition:** In 2023, **Major Radhika Sen** was honoured as the UN Military Gender Advocate of the Year.
- **Cumulative Contribution:** Since 1948, more than **179 Indian peacekeepers** have made the supreme sacrifice — the highest among all UN member states.

About UN Peacekeepers:

- **Established In:** 1948, with the first mission in the **Middle East (UNTSO)**.
- **Coordinated By:** Department of Peace Operations (DPO) under the UN Secretariat.
- **Personnel Involved:** Currently, 68,000+ military, police, and civilian personnel from 125 countries serve in 11 active UN missions.

• **Key Objectives:**

- **Conflict Management:** Monitor ceasefires and support peace agreements in volatile regions.
 - **Civilian Protection:** Safeguard at-risk populations, particularly in conflict zones.
 - **Rule of Law & Institution Building:** Assist with elections, judicial systems, and public institutions.
 - **Disarmament and Reintegration:** Help ex-combatants reintegrate into civilian life through DDR programmes.
 - **Humanitarian Assistance:** Support humanitarian agencies and aid delivery in post-conflict recovery.
- **Legal Mandate:** Operates under Chapter VII of the UN Charter, empowered by the UN Security Council.
 - **Instruments of Peace:** Peacekeepers are often called **Blue Helmets** and represent military, police, and civilian roles in missions authorized by the UN.

FACTS FOR PRELIMS (FFP): GS-3

Syllabus: Economy

INDIA - 4TH LARGEST ECONOMY IN WORLD

Context:

India surpassed Japan to become the 4th largest economy in the world, as confirmed by NITI Aayog CEO B.V.R. Subrahmanyam citing IMF data.

About India - 4th Largest Economy in World:

- **What is it?**
 - As per the IMF [World Economic Outlook \(April 2025\)](#), India's nominal GDP is projected at **\$4.19 trillion**, surpassing Japan's GDP of \$4.18 trillion.
 - This marks a major shift in global economic order and India's rising influence.



India's New Economic Status

- **Current Rank:** 4th largest economy globally
- **Previous Rank (2024):** 5th, behind Japan
- **New Rank Order (2025):** United States, China, Germany, India, and Japan
- **Significance of the Achievement:**
 - **Global Confidence Boost:** Reinforces India's role as a key global economic power, attracting increased FDI and international partnerships.
 - **Domestic Economic Growth:** India's GDP doubled from \$2 trillion (2014) to \$4+ trillion (2025) and per capita income rose from \$1,438 (2014) to \$2,880 (2025).
 - **Strategic Manufacturing Hub:** India remains a cost-effective production base despite global reshoring discussions, such

as Apple's US manufacturing push.

- **Leadership Impact:** Economic trajectory credited to policy reforms, infrastructure growth, and Digital India & [Atmanirbhar Bharat](#) missions.
- **Future Potential:** Projected to overtake Germany in the next 2.5–3 years and become the third-largest economy globally, as per NITI Aayog projections.

NIVESHAK SHIVIR INITIATIVE

Context:

IEPFA and SEBI jointly convened a strategic meeting, to launch the "Niveshak Shivir" initiative to help investors reclaim unclaimed dividends and shares.

About Niveshak Shivir Initiative:



What it is: A nationwide investor assistance and outreach program to help investors reclaim unclaimed dividends and shares with ease.

- **Launched by:** Investor Education and Protection Fund Authority ([IEPFA](#)) under the **Ministry of Corporate Affairs**, in collaboration with **SEBI**.
- **Key Features:**
 - **Investor Helpdesks:** On-ground support for investors to directly interact with company representatives and RTAs.
 - **Digital Search Tool:** IEPFA provides a portal to track share status and file claims (Form IEPF-5).
 - **Streamlined Claim Process:** Guidance for shareholders in demat and physical form to recover unclaimed assets.

- **Significance:**
 - Reduces dependency on intermediaries.
 - Enhances transparency in the investor recovery process.
 - Boosts [financial literacy](#) and trust in the financial ecosystem.
 - Supports faster resolution of investor grievances.

About [Investor Education and Protection Fund Authority \(IEPFA\)](#):

- **What it is:** A statutory authority established under Section 125 of the Companies Act, 2013.
- **Ministry:** Functions under the **Ministry of Corporate Affairs**, Government of India.
- **Functions:**
 - Protects interests of investors.
 - Promotes financial literacy and education.
 - Facilitates refund of unclaimed dividends, matured deposits, and shares.
 - Manages the IEPF corpus comprising unclaimed amounts transferred by companies.

WHOLESALE PRICE INDEX (WPI)

Context:

India's WPI inflation eased to a 13-month low of 0.85% in April 2025, sharply down from 2.05% in March, driven by falling fuel and primary article prices.



About [Wholesale Price Index \(WPI\)](#):

- **What is WPI?**
 - The **Wholesale Price Index (WPI)** measures the **average change in prices of goods traded in bulk** by wholesalers to other businesses.
 - It reflects **inflation at the producer level**, before the goods reach the end consumer.
- **Administering Body:**

- Published monthly by the **Office of Economic Adviser**, under the **Department for Promotion of Industry and Internal Trade (DPIIT)**, Ministry of Commerce and Industry.

- **Objective:**
 - To track **price movements** in wholesale markets and assess **cost pressures** faced by producers and industries.
 - Aids in understanding **supply-demand dynamics** across primary, energy, and manufacturing sectors.
- **Base Year and Calculation:**
 - **Base Year:** Updated to **2011–12** (from 2004–05) for alignment with GDP and IIP data.
 - **Method:** Weighted average of prices from a **basket of 697 items**, across three main groups:
 - Primary Articles (22.62%)
 - Fuel and Power (13.15%)
 - [Manufactured Products](#) (64.23%)
- **Key Features of WPI:**
 - Covers only **goods**, not services.
 - Reflects **price trends before retail level**, unlike Consumer price index (CPI) which tracks consumer prices.
 - Published **monthly**, showing price changes **over the entire month**.
 - Useful for **industry cost analysis**, but **not used** by the RBI for monetary policy decisions.
- **Significance of WPI in India:**
 - Serves as an **early indicator** of inflation trends.
 - Helps in analysing **input cost pressures** on producers.
 - Essential for **fiscal planning, business forecasting**, and policymaking.
 - Provides insights into **sector-specific inflation**—crucial for agriculture, mining, energy, and industry.
 - Complements CPI in **macro-economic analysis**, though RBI prefers [CPI](#) for interest rate decisions.

RBI SURPLUS TRANSFER

Context:

The RBI may transfer a record ₹2.5 to ₹3 lakh crore as surplus to the government for FY 2024–25.

- The Central Board reviewed the [Economic Capital Framework](#) (ECF) on May 15, 2025, ahead of deciding the transfer amount.



About RBI Surplus Transfer:

- **What is Surplus Transfer?**
 - The RBI transfers its **net profit**—i.e., total income minus expenditure—to the **Central Government**, after making necessary provisions.
 - This process is termed as **surplus transfer** and **not dividend payment**, since RBI is not a commercial entity.
- **Legal Framework:**
 - Governed by **Section 47 of the RBI Act, 1934**.
 - The Act mandates that, after making provisions for:
 - **Bad and doubtful debts,**
 - **Depreciation in assets,**
 - **Staff benefits and superannuation,**
 - **And other routine banking contingencies,** the remaining surplus must be **transferred to the Government of India**.
- **Major Sources of RBI's Income:**
 - RBI earns income primarily through:
 - **Interest from foreign assets** like bonds, treasury bills, and deposits with other central banks.
 - **Interest on domestic securities,** mainly government bonds.
 - **Short-term lending to banks** (e.g., [repo operations](#)).
 - **Commission for managing borrowings** of Central and State governments.
 - **Service charges** for managing the currency and payment systems.
- **Key Expenditures of RBI:**
 - Printing of currency notes.
 - Staff salaries and retirement benefits.

- Commission to banks and primary dealers involved in public debt transactions.

• How is the RBI Surplus Transfer Amount Decided?

- **Based on Economic Capital Framework (ECF):** Adopted on August 26, 2019, following the recommendations of the **Bimal Jalan Committee**.
- **Contingent Risk Buffer (CRB) Range:** Risk provisioning is maintained within **5.5%–6.5%** of the RBI's balance sheet.
- **Surplus = Income – Expenditure – Risk Provisions:** After accounting for operational expenses and CRB provisioning, the remaining balance is the transferable surplus.
- **Approved by RBI Central Board:** Final decision taken in the **Board meeting** post financial year-end (July–June).

DESIGNING A POLICY FOR MEDIUM ENTERPRISES REPORT

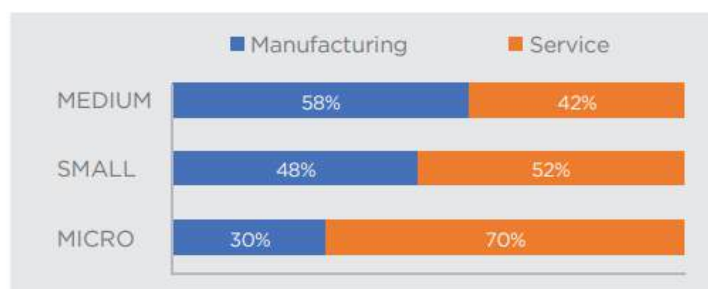
Context:

NITI Aayog has released a landmark report titled “Designing a Policy for Medium Enterprises”, aimed at empowering medium enterprises to become future industrial giants and drive India's vision for [Viksit Bharat @2047](#).

Summary of the Report “Designing a Policy for Medium Enterprises”:

What are Medium Enterprises?

- Medium Enterprises are defined (as of April 2025) as businesses with:
 - Investment up to ₹125 crores
 - Turnover up to ₹500 crores
- They form 0.3% of MSMEs but contribute 40% of [MSME exports](#), indicating their strategic role.

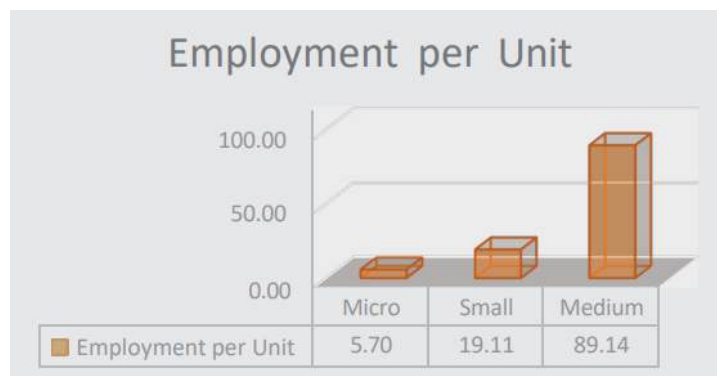


Sector Overview:

- **GDP Contribution:** MSMEs contribute 29% to GDP and medium enterprises form a vital manufacturing backbone.
- **Employment:** Medium enterprises generate 89 jobs per unit on average—more than micro (5.7) or

small (19.1).

- **Export Impact:** Contribute ~₹50,562 crore in forex income annually.
- **R&D Investment:** Medium enterprises account for 81% of total R&D expenditure by MSMEs.



Analysis of the Report:

- **Positive Aspects:**
 - **High Productivity Units:** High per-unit profitability and employment generation rates.
 - **Export Engines:** 40% of MSME exports come from this 0.3% group.
 - **Innovation Focused:** Spend more on R&D per unit than micro/small enterprises.
 - **Untapped Growth Multiplier:** A 20% increase in medium enterprises could generate ~₹5.4 lakh crore extra in forex and create 12 lakh jobs.
 - **Strong Case for Policy Realignment:** Emphasizes missed potential due to a skewed incentive structure in favour of micro and small enterprises.
- **Key Challenges Identified:**
 - **Low Awareness:** Only 10% use government scheme portals and most unaware of tailored support.
 - **Finance Gap:** No dedicated working capital scheme and over-reliance on personal savings.
 - **Tech Backwardness:** 82% lack access to Industry 4.0 tools like AI and IoT.
 - **Skill Deficit:** Existing training doesn't meet sector-specific enterprise needs.
 - **R&D Support Lacking:** Absence of central R&D mechanism tailored for medium units.
 - **Compliance Complexity:** [Red tape](#) and fragmented information ecosystem.

Way Ahead:

- **Tailored Finance:**
 - ₹5 crore credit card facility at market rates.
 - Working capital scheme linked to turnover.
- **Industry 4.0 Integration:** Upgrade Technology Centres into SME 4.0 Competence Centres.
- **Cluster-Based Testing:** Add sector-specific facilities

under MSE-CDP for medium enterprises.

- **Skilling Reform:** Custom training linked to region, industry, and growth stages.
- **R&D Push:** Create 3-tier R&D framework with national-level project funding.
- **Digital One-Stop Portal:** AI-powered sub-portal within [Udyam](#) for scheme discovery, compliance help.

Conclusion:

The NITI Aayog report rightly focuses on a dedicated policy that addresses long-standing gaps in support for this high-impact segment. A focused, innovation-led, and tech-integrated policy approach can turn them into drivers of exports, jobs, and economic growth.

PYQ:

Faster economic growth requires increased share of the manufacturing sector in GDP, particularly of MSMEs. Comment on the present policies of the Government in this regard. (10 M)

ADVANCE AUTHORISATION SCHEME

Context:

The government decided to ease rules under the Advance Authorisation (AA) Scheme, allowing exporters to claim duty-free benefits even if goods were shipped before licence issuance, provided the Bill of Entry is filed post licence date.



About Advance Authorisation Scheme:

- **What It Is?**
 - A foreign trade policy initiative allowing **duty-free import of inputs** used in manufacturing export products.
- **Administered By:** Directorate General of Foreign Trade ([DGFT](#)) under the Ministry of Commerce and Industry.
- **Aim:** To reduce input costs for exporters, thereby improving the global competitiveness of Indian goods.

- **Key Features of the Scheme:**

- **Duty-Free Import:** Allows import of raw materials, packaging, fuel, oil, and catalysts without payment of Customs duties.
- **Standard Input-Output Norms (SION):** Exports must conform to sector-wise norms issued by DGFT. Exporters can also seek ad-hoc norms if SION doesn't apply.
- **Eligibility:** Open to manufacturer exporters and merchant exporters linked with supporting manufacturers.
- **Physical Incorporation Principle:** Inputs must be physically consumed or used in the manufacture of the final export product.

- **Recent Relaxation:**

- **Previous Rule:** If goods were shipped before the AA licence was issued, **duty exemption was denied** even if the [Bill of Entry](#) was filed later.
- **New Rule:** Exporters can now avail benefits as long as the Bill of Entry is filed after licence issuance, regardless of shipment date.
- **Restriction:** Relaxation does **not apply** to restricted or canalised goods unless **special DGFT approval** is granted.
- **Impact:** Removes ambiguity, **streamlines Customs clearance**, and boosts exporter confidence amid rising logistics challenges.

[Syllabus: Agriculture, its Marketing & Livestock](#)

DEPOT DARPAN PORTAL

Context:

The Ministry of Consumer Affairs, Food & Public Distribution will launch the Depot Darpan portal, for real-time monitoring of food storage depots.



About [Depot Darpan Portal](#):

- **What It Is?**

- **Depot Darpan** is a **digital monitoring portal and mobile app** that enables real-time oversight of food grain depots using **geo-tagged data, IoT, and AI technologies**.
- **Launched By:** Ministry of Consumer Affairs, Food & Public Distribution.
- **Objective:**
 - To **digitize and modernize** India's food storage infrastructure through **scientific warehousing**, enhancing **efficiency, transparency, and food safety**.
- **Key Features:**
 - **Real-Time Monitoring:** Tracks infrastructure, operational efficiency, and financial metrics through IoT sensors and CCTV surveillance.
 - **Geo-Tagged Auditing:** Depot managers upload geo-tagged infrastructure data validated by supervisory officers and third-party audits.
 - **Automated Ratings & Feedback:** Warehouses receive **star ratings** based on infrastructure and operational performance using a composite scoring model.
 - **Smart Tech Integration:** Includes **CO₂ and phosphine gas monitoring, humidity and temperature sensors, and fire hazard detection**.
 - **AI-Based Tools:** Pilots include **bag counting, Face Recognition Systems (FRS), and Automatic Number Plate Recognition (ANPR)** for tracking vehicle and personnel movements.
 - **Wide Coverage:** Covers **2,278 warehouses**, including those of **FCI, CWC**, and state/private agencies.
 - **Mobile App Support:** Enables supervisory officials to conduct **on-the-go performance reviews** and generate **automated reports** for prompt action.
- **Significance:**
 - **Enhances Food Security:** Ensures quality storage for food grains distributed to over **80 crore beneficiaries** under the [National Food Security Act \(NFSA\)](#).
 - **Boosts Efficiency:** Reduces wastage, improves turnover, and optimizes storage space and manpower use.
 - **Supports Digital Governance:** Strengthens India's digital public infrastructure in the logistics and supply chain sector.

THREE DIGITAL INITIATIVES TO STREAMLINE PDS

Context:

Union Minister launched three new digital platforms—Depot Darpan, Anna Mitra, and Anna Sahayata—to streamline India's [Public Distribution System](#) (PDS), ensuring transparency, efficiency, and accountability.



About Three Digital Initiatives to Streamline PDS:

About the Three Digital Initiatives:

The Ministry of Consumer Affairs, Food and Public Distribution has unveiled three tech-driven initiatives to modernize warehousing, empower frontline workers, and improve grievance redressal under [PM-GKAY](#) and [NFSA](#).

1. Depot Darpan Initiative:

- **Aim:** Improve infrastructure and operational performance of food grain depots under [FCI](#) and CWC.
- **Key Features:**
 - i. Digital self-assessment portal for depot-level performance tracking.
 - ii. Composite ratings based on a **60:40 ratio** (Operations: Infrastructure).
 - iii. IoT integration for **real-time monitoring, CCTV surveillance, and live analytics**.
 - iv. **Capital infusion:** ₹1000 crore (FCI) & ₹280 crore (CWC) for depot upgrades.

2. Anna Mitra Initiative:

- **Aim:** Empower field-level PDS stakeholders through real-time data access.
- **Key Features:**
 - i. Mobile app launched for [FPS dealers](#), [DFSO officers](#), and [food inspectors](#).
 - ii. Enables access to stock details, sales reports, alerts, and FPS performance.
 - iii. Conducts geo-tagged inspections and stock verifications.

- iv. Currently rolled out in **Assam, Uttarakhand, Tripura, and Punjab** in Hindi and English.

3. Anna Sahayata Initiative:

- **Aim:** Provide advanced, accessible grievance redressal for [PMGKAY](#) beneficiaries.
- **Key Features:**
 - i. Utilizes **WhatsApp, IVRS, and Automatic Speech Recognition (ASR)** for filing complaints.
 - ii. Built for accessibility, speed, and multilingual reach.
 - iii. Pilot phase in **Gujarat, Jharkhand, Telangana, Tripura, and Uttar Pradesh** in 5 languages.

VIKSIT KRISHI SANKALP ABHIYAN

Context:

Union Agriculture Minister launched the Viksit Krishi Sankalp Abhiyan (VKSA-2025) at ICAR-CIFA, Bhubaneswar, to empower over 1.5 crore farmers across India.

About Viksit Krishi Sankalp Abhiyan:



- **What it is:** The campaign aims to accelerate India's agricultural transformation by linking advanced agri-tech and fisheries innovations with grassroots adoption.
- **Ministry Involved:** Ministry of Agriculture and Farmers' Welfare
 - Coordinated by **ICAR-CIFA** ([Central Institute of Freshwater Aquaculture](#))
- **Objectives:**
 - To disseminate **cutting-edge agricultural and fisheries technologies** to rural communities.
 - To promote **self-reliance, sustainability, and resilience** in the farming and aquaculture sectors.
 - To align agricultural transformation with the broader vision of a **Viksit Bharat (Developed India)**.
- **Key Features:**

- **Nationwide Reach:** Targets over **1.5 crore farmers** across all districts.
- **Tech Transfer & Capacity Building:** Promotes lab-to-land transfer of innovations through training, scientist-farmer interaction, and demonstrations.
- **Integration of Fisheries & Agriculture:** Recognizes fisheries as a core component of livelihood security and rural development.
- **Launch of CIFA Argu VAX-I:** A novel fish vaccine developed by ICAR-CIFA to prevent parasitic infections in aquaculture.
- **Community Engagement:** Involves Self Help Groups, KVKs, and rural institutions through exhibitions and stakeholder interactions.
- **Significance:**
 - **Bridges research and rural needs** by localizing scientific solutions.
 - **Enhances food and nutritional security** through diversified farming models.
 - **Boosts rural incomes** by promoting technology adoption and best practices.
 - Encourages **grassroots innovation** and **Jan Bhagidari**, crucial for participatory agricultural reforms.
 - Supports the vision of **doubling farmers' income** and **climate-resilient agriculture**.
- **Headquarters:** Kolkata, West Bengal.
- **Established in:** 1971 under Companies Act, 1956.
- **Parent Ministry:** Ministry of Textiles, Government of India.
- **Organisational Structure:** Operates through **Departmental Purchase Centres (DPCs)** and cooperatives.
- **Key Functions and Initiatives**
 - **MSP Procurement:**
 - Buys raw jute/mesta from farmers **without quantitative limit** at MSP fixed by GoI on **CACP's** recommendation.
 - Helps stabilize market prices and insulates farmers from middlemen.
 - **Price Stabilisation:** Intervenes in the market via commercial and MSP operations to maintain **optimal price range** across the jute year.
 - **Sales and Linkages:** Conducts sales through **B-Twill linkage, e-auctions, and tenders** for mills and industries.
 - **Jute I-CARE Project:**
 - Implements **scientific retting, seed certification, and modern farming technologies** across jute-growing regions.
 - Partners with CRIJAF to promote **enzyme-based retting** and use of **certified seeds**.
 - **Farmers' Outreach and Training:**
 - Organises **Krishi Melas** and DPC-level training on **grading, yield enhancement, and government schemes** (PMFBY, **PMKSY**).
 - Promotes **cashless payments, digital awareness, and inclusive farming practices**.
 - **Diversified Products Promotion:** Markets eco-friendly products like **jute bags, stationery, upholstery**, enhancing farmer income and sustainable consumption.
 - **Remote Sensing with ISRO:** Uses space-based data to assess **soil, moisture, and crop health** for strategic MSP operations.

JUTE CORPORATION OF INDIA (JCI)



Context:

The Jute Corporation of India (JCI) raised the Minimum Support Price (MSP) for raw jute from ₹5,335 to ₹5,650 per quintal for the 2025–26 crop year to curb distress selling by farmers.

About Jute Corporation of India (JCI):

- **What it is:** JCI is a **government-owned price support agency** tasked with procuring raw jute at MSP from farmers to ensure fair prices and prevent exploitation.

MINIMUM SUPPORT PRICES (MSP)

Context:

The Cabinet Committee on Economic Affairs (CCEA) approved revised Minimum Support Prices (MSP) for 14 Kharif crops for the 2025–26 marketing season.



About Minimum Support Prices (MSP):

- **What is MSP?**
 - MSP is the **minimum guaranteed price** offered by the government to farmers for their crops, even if market prices fall. It protects farmers from distress sales and ensures income stability.
- **Who Determines It?**
 - MSP is **recommended by the Commission for Agricultural Costs and Prices (CACP)** and approved by the Cabinet Committee on Economic Affairs (CCEA).
- **When was MSP Introduced?**
 - First introduced in **1966–67** during the **Green Revolution**, primarily for **wheat and paddy**.
- **MSP Calculation Method**
 - **A2+FL Formula:**
 - **A2** = Paid-out costs (labour, seeds, irrigation, etc.)
 - **FL** = Imputed value of **family labour**
 - **Margin:** Government ensures **50% or more margin** over production costs.
- **Crops Covered Under MSP**
 - **Kharif Crops:**
 - **Cereals:** Paddy, Jowar, Bajra, Ragi, Maize
 - **Pulses:** Tur (Arhar), Moong, Urad
 - **Oilseeds:** Groundnut, Sunflower, Soyabean, Sesamum, Niger-seed
 - **Commercial:** Cotton
 - **Rabi Crops:**
 - Wheat, Barley, Gram, Lentil (Masur), Rapeseed & Mustard, Safflower
 - **Commercial Crops:**
 - Copra, Jute and Toria and De-husked Coconut also covered under related MSPs.
- **Key Features of MSP:**
 - **Announced Twice Yearly:** Declared before

the **Kharif and Rabi sowing seasons** to guide farmers' planting decisions.

- **Prevents Exploitation:** Ensures a **minimum guaranteed price** to protect farmers from market volatility and distress sales.
- **Encourages Crop Diversification:** Offers **higher MSPs for pulses and oilseeds** to shift focus from water-intensive cereals.
- **Budget 2018–19 Mandate:** MSP fixed at **1.5 times the cost of production (A2+FL)** to ensure fair profits for farmers.
- **Promotes Nutritional Crops:** Higher **MSP for millets and Shree Anna** supports healthier diets and climate-resilient farming.

MODIFIED INTEREST SUBVENTION SCHEME (MISS)

Context:

The Union Cabinet has approved the continuation of the Modified Interest Subvention Scheme (MISS) for FY 2025–26, maintaining a 1.5% interest subvention on short-term Agri loans to promote affordable **credit access** for farmers.



About Modified Interest Subvention Scheme (MISS):

- **What is MISS?**
 - MISS is a **central sector scheme** that offers concessional short-term crop loans to farmers via the **Kisan Credit Card (KCC)** at reduced interest rates, incentivizing timely repayment.
- **Launched In:** Originally introduced in **2006–07** to improve credit availability and reduce rural indebtedness.
- **Implementing Agencies:** Jointly implemented by the **Reserve Bank of India (RBI)** and **NABARD** through Public Sector Banks, RRBs, Cooperative Banks, and Private Sector Banks.
- **Nodal Ministry:** Ministry of Agriculture and Farmers' Welfare

Objectives of MISS:

- **Enhance credit flow** to agriculture and allied

- sectors.
- Provide **short-term working capital** for farming, dairy, animal husbandry, and fisheries.
- **Reduce borrowing costs** for small and marginal farmers.
- **Encourage prompt repayment** through interest incentives.
- Offer **financial relief** during [natural calamities](#).

Key Features of MISS (2025–26):

- **Subsidised Interest Rate:**
 - Farmers get loans up to **₹3 lakh** at **7% interest**.
 - An interest subvention of **1.5%** is given to lending institutions.
 - **Prompt repayment incentive (PRI)** of **3%** lowers the effective rate to **4%**.
- **Sectoral Coverage:** Applicable to crop loans, animal husbandry, and fisheries (up to ₹2 lakh).
- **Loan Limit Enhancement:** Under Budget 2025–26, limit proposed to be raised to ₹5 lakh for expanding agri-needs.
- **Calamity Support:** 2% subvention on restructured loans in the event of natural disasters.
- **Massive Outreach:** Covers over 7.75 crore KCC accounts nationwide, fostering rural credit inclusion.
- **Digital Reforms:** Kisan Rin Portal (KRP) launched in 2023 for fast and transparent claim processing.

WORLD FOOD PRIZE

Context:

Mariangela Hungria, Brazilian microbiologist, won the 2025 World Food Prize for pioneering biological nitrogen fixation and reducing reliance on chemical fertilizers.



- Her innovations sparked Brazil's '**Micro Green Revolution**', significantly boosting crop yields and lowering input costs.

About Micro Green Revolution:

- **What is It?**
 - A movement led by microbiologist **Mariangela Hungria**, focusing on **biological**

solutions to agricultural productivity, particularly **microbial seed and soil inoculants**.

Key Features:

- **Biological Nitrogen Fixation (BNF):** Using microorganisms like [rhizobia](#) and **Azospirillum brasilense** to naturally convert atmospheric nitrogen into soil-absorbable form.
- **Reduced chemical fertilizer dependency:** Saving farmers up to \$40 billion annually in Brazil.
- **Enhanced crop productivity:**
 - Soybean yield surged from 15 million tonnes (1979) to 173 million tonnes (2025).
 - Common beans and pastures saw significant yield gains.
- **Restoring degraded lands:** First microbial inoculants for **pasture grasses**, improving biomass and livestock forage.

About World Food Prize:

- **What is It?**
 - The **World Food Prize** is the most prestigious global award recognizing contributions to **enhancing food quantity, quality, and accessibility**.
- **Established:** In **1986** by Nobel Laureate **Norman Borlaug**, supported initially by General Foods Corporation.
- **Administered by:** **World Food Prize Foundation**, headquartered at the **Hall of Laureates**, Des Moines, Iowa, USA.
- **First Laureate:** **M.S. Swaminathan (1987)** – Pioneer of India's Green Revolution.
- **Award Features:**
 - **\$500,000 cash prize**, diploma, and commemorative sculpture by Saul Bass.
 - Awarded annually in **Des Moines, Iowa**, during the Borlaug Dialogue Symposium.
 - Recognizes individuals in agriculture, nutrition, food technology, policy, soil science, and hunger alleviation.

Syllabus: Energy

METAL-FREE CATALYST FOR HYDROGEN FUEL PRODUCTION

Context:

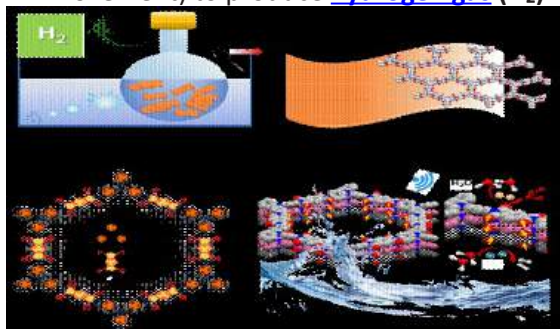
Indian researchers have developed a **metal-free catalyst** for hydrogen fuel production using mechanical energy, marking a major breakthrough in clean energy innovation.

- This aligns with India's [National Green Hydrogen](#)

Mission and advances sustainable hydrogen technology.

About Metal-Free Catalyst for Hydrogen Fuel Production:

- **What is It?**
 - A **donor-acceptor covalent organic framework (COF)** that functions as a metal-free piezocatalyst.
 - Capable of **splitting water molecules** under mechanical pressure (vibrations, movement) to produce **hydrogen gas (H₂)**.



- **Developed by:**
 - Jawaharlal Nehru Centre for Advanced Scientific Research (JNCASR), Bengaluru, led by Prof. Tapas K. Maji.
 - In collaboration with **IISER Pune** and Wrocław University of Science and Technology, Poland.
- **Key Features:**
 - **Metal-Free:** Uses organic molecules—**TAPA** (donor) and **PDA** (acceptor)—linked via imide bonds.
 - **Ferrielectric Ordering (FiE):** Generates intense internal electric fields that drive the catalytic process.
 - **Sponge-like Porous Architecture:** Promotes easy water flow and charge separation.
 - **Mechanically Stimulated:** Produces electron-hole pairs under pressure, enabling efficient water splitting.
- **Significance:**
 - **Eco-Friendly:** Replaces costly, toxic metals with sustainable organic materials.
 - **Energy Efficient:** Taps into **ambient mechanical energy**—such as vibration or pressure—for hydrogen production.
 - **Supports National Green Hydrogen Mission:** Enhances India's clean energy leadership and energy independence.
 - **Scalable Innovation:** Offers a **cost-effective and practical alternative** to current metal-based hydrogen technologies.

MAIZE FOR ETHANOL PRODUCTION: FUEL VS FEED CRISIS

Context:

The rapid diversion of maize for **ethanol production** in India has triggered a Fuel vs Feed crisis, forcing dependence on imports and raising concerns over genetically modified (GM) maize use for biofuel.

- India's maize ethanol demand surged from **0.8 MT in 2022-23 to 12.7 MT in 2024-25**, significantly reducing feed grain availability.

About Maize for Ethanol Production:

What Are Biofuels?

- **Biofuels** are renewable fuels derived from **biological materials like crops, waste, or residues** used as substitutes for petrol and diesel.
- They help reduce dependence on fossil fuels and mitigate greenhouse gas emissions.

Food Crops Powering Biofuel:

- **Maize and sugarcane** are the primary feedstocks for ethanol in India.
- **1 tonne of maize** yields **~380 litres** of ethanol; 7.5 MT of maize produced **286 crore litres in 2023-24**.
- Post-fermentation residue (DDGS) from maize is used as **animal feed**, but **not a full substitute** for lost grain volume.
- India is the **5th largest ethanol producer**, with 10% blending target moving to **20% by 2025** under the **Ethanol Blended Petrol (EBP) Programme**.

The Food vs. Fuel Dilemma:

- **Disrupted Grain Balance:**
 - **Before 2021-22**, India produced **32–33 million tonnes (MT)** of maize, with domestic demand at only **28 MT**, allowing surplus for exports.
 - With **12.7 MT maize** now diverted to ethanol production (2024-25), the **balance is broken**, making India a **net importer** of maize.

	1st Generation Biofuel • It has High Carbon Content . • Made from Edible Items. Eg- Sugar, Corn, Starch etc.
	2nd Generation Biofuel • Greenhouse Gas content less than 1st Generation Biofuel . • Made from leftover of Food Crops. Eg- Rice Husk, Wood Chips etc.
	3rd Generation Biofuel • It is Carbon Neutral in. (CO ₂ Emitted = CO ₂ Sequestered) • Produced using Microorganisms. Eg. Algae
	4th Generation Biofuel • Made from ' Genetically Engineered Crops '. • They are Carbon Negative .

Prices surged from ₹15,000 to ₹25,000 per tonne, affecting both consumers and industries relying on maize.

- **Feed Shortages for Poultry and Cattle:**
 - **Livestock feed** (especially poultry and dairy) consumes over **20 MT of maize annually**.
 - The grain shortage has created a **supply crisis for feed industries**, who are now demanding **import of genetically modified (GM) maize** for exclusive ethanol use to protect feed availability.
- **Price Distortions in Soy Market:**
 - Post-ethanol processing, maize yields **Distillers' Dried Grains with Soluble (DDGS)**, a **protein-rich byproduct**.
 - While DDGS offers cheaper protein (₹16,000–₹19,000/tonne), it **undercuts soybean De-Oiled Cake (DOC)**, causing prices to fall from ₹32,000 to ₹22,000/tonne.
 - Consequently, **soybean trades below MSP** (₹4,300 vs. ₹4,892), harming **soybean farmers' income stability**.
- **Global Parallels:**
 - The **U.S. Renewable Fuel Standard (RFS)** diverted **over 40% of corn** to ethanol, triggering **global price hikes** during crises like 2007–08, 2010–11, and 2022.
 - Similar biofuel mandates across countries **intensified food price inflation** and triggered **trade restrictions**, worsening global food insecurity.

Way Forward:

- **Balanced Blending Targets:** Introduce **flexible ethanol blending policies** with “off-ramps” temporary suspension mechanisms during **food/feed inflation**.
E.g. EU and Brazil **lowered blending mandates** in 2022 to ease domestic food inflation.
- **Promote 2G and 3G Biofuels:** Shift to **non-food feedstocks** like agri-waste, crop stubble, used cooking oil, and cellulosic biomass.
E.g. Used cooking oil now makes up **21% of global biodiesel feedstock**, easing pressure on food crops.
- **Rationalize Import Policy:** Permit **duty-free GM maize imports** solely for ethanol use, with non-diversion safeguards (not for feed or seed).
- **Support Feed Industry:** Create a **national feed buffer stock** and subsidize **low-cost protein alternatives** like DDGS, oilseed meals, and insect-based proteins for poultry and cattle industries.
- **Protect Farmer Interests:** Ensure strict enforcement of **Minimum Support Prices (MSP)** for soy and maize to prevent farmer distress.

- Encourage **crop diversification** and **direct benefit transfers** to maintain **agricultural income** amidst policy transitions.

Conclusion:

Agriculture provides 4 F's - **food, feed, fibre, and fuel**, but the growing biofuel push raises trade-offs in resource allocation. Ethanol supports clean energy goals, yet it must not undermine food and feed security. A flexible, research-driven policy focused on advanced biofuels is essential for balanced growth.

PYQ:

Discuss several ways in which microorganisms can help in meeting the current fuel shortage. (UPSC-2023)

Syllabus: Infrastructure (Energy, Ports, Roads, Airports)

INLAND WATERWAY TRANSPORT

Context:

The **Inland Waterways Authority of India (IWAI)** has signed a strategic **MoU with Rhenu Logistics India**, a global logistics firm, to operate 100 cargo barges and pusher tugs across multiple national waterways, starting in late 2025.

- This aims to **boost multimodal cargo movement and private participation** in India's inland water transport sector.

About Inland Waterway Transport (IWT):

- **What is Inland Waterway Transport (IWT)?**
 - IWT refers to the **movement of goods and passengers through navigable rivers, canals, backwaters, and creeks** using boats, barges, or ferries.
 - It is a **fuel-efficient, environment-friendly, and cost-effective** mode of transportation.



Key Initiatives to Promote IWT in India:

- **Jal Marg Vikas Project (JMVP):** World Bank-funded

initiative to **augment capacity of NW-1 (Ganga)**

- Includes dredging, terminal development, and navigational aids
- **Sagarmala Programme:** Integrated with IWT to **boost port-led development** and hinterland connectivity
- **National Waterways Act, 2016:** Declared **111 waterways as National Waterways (NWs)** for development
- **Jal Vikas Marg Society (JVMS):** Institutional mechanism under IWAI for managing World Bank-assisted projects
- **'Jalvahak' Cargo Promotion Scheme (2024):** Provides up to **35% operating cost reimbursement** to cargo movers using IWT
- **Ganga Vilas Cruise and River Tourism Initiatives:** Boosts passenger traffic and tourism potential on NW-1 and NW-2

About Inland Waterways Authority of India (IWAI):

- **Established:** 1986 under IWAI Act, 1985
- **Nodal Ministry:** Ministry of Ports, Shipping and Waterways (MoPSW)
- **Headquarters:** Noida, Uttar Pradesh
- **Objectives:**
 - **Develop and regulate national waterways**
 - **Enhance infrastructure** for navigation
 - Ensure **eco-friendly and cost-effective** logistics and transport solutions
 - Promote **PPP models and private sector investment** in IWT.

- KRCL is a **special purpose vehicle** created under the **Ministry of Railways** in **1990**, distinct from Indian Railways.

- **Coverage:** The line stretches **741 km** through **Maharashtra, Goa, Karnataka, and coastal Kerala**, connecting **Roha to Mangaluru**.

Strategic Importance:

- Built across the **Western Ghats**, it overcame extreme terrain with **engineering innovation**, showcasing Indian technical expertise.
- Acts as a **lifeline for passengers and freight**, reducing travel time significantly and enabling economic integration of the Konkan region.

Why Separate from Indian Railways?

- KRCL was structured as a **joint venture model**:
 - **GOI (51%), Maharashtra (22%), Karnataka (15%), Goa and Kerala (6% each).**
- Its separation allowed **independent decision-making** and faster project execution in difficult geography.

Additional information:

- The Indian Railways have 70 divisions under its 17 zones.
 - Recent addition is **Jammu Railway division**.
 - If you include Metro Railway and Kolkata India has 19 zones in total.
- Each zone has a General Manager (GM) in charge. A Divisional Railway Manager (DRM) leads each division.

KONKAN RAILWAY CORPORATION LIMITED (KRCL)

Context:

The Maharashtra government officially approved the merger of Konkan Railway Corporation Limited (KRCL) with Indian Railways, clearing the last hurdle for full integration.



About Konkan Railway Corporation Limited (KRCL):

- **What It Is?**

AMRIT BHARAT RAILWAY STATIONS

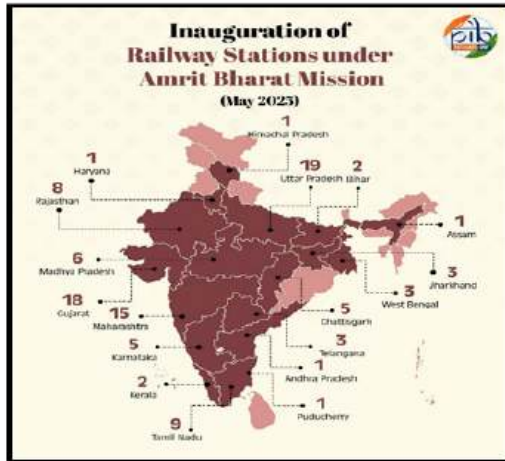
Context:

Prime Minister inaugurated 103 Amrit Bharat railway stations across 86 districts in 18 States/UTs via video conference from Deshnok, Rajasthan.

About Amrit Bharat Railway Stations:

- **What It Is?**
 - A centrally sponsored initiative to **redevelop and modernize 1,275 railway stations** across India with a **long-term, phased vision**.
- **Launched In:** 2022 by the **Ministry of Railways**, Government of India.
- **Objectives:**
 - Enhance **passenger experience** through

- improved infrastructure.
- Promote **heritage preservation**, tourism, and regional economic development.



- Integrate stations into **multimodal urban mobility hubs**.

Key Features of Amrit Bharat Railway Stations:

Master Plan Approach: Development carried out in phases based on future needs.

Passenger Amenities:

Improved **accessibility**, waiting halls, executive lounges, toilets, lifts, escalators.

Free Wi-Fi, better signage, digital passenger information systems.

Business lounges, retail kiosks (under [One Station One Product](#)), and roof plazas.

- **Architectural Integration:** Reflects local art, culture, and heritage in station design.
- **Green Infrastructure:** Focus on **eco-friendly buildings**, sustainable materials, and Divyangjan-friendly facilities.
- **Multimodal Connectivity:** Seamless links with **metro**, **bus terminals**, and city transport systems.
- **Economic Boost:** Expected to generate **employment**, enhance **tourism**, and promote local handicrafts.

Significance of the Scheme:

- **Cultural Preservation:** Protects and showcases India's regional heritage and traditions.
- **Tourism Promotion:** Station aesthetics attract tourists, especially in heritage zones.
- **Urban Transformation:** Converts railway premises into **vibrant public spaces** and city centres.
- **Digital & Physical Modernization:** Bridges the gap between traditional rail infrastructure and future-ready smart

transport hubs.

- **Inclusive Development:** Special focus on facilities for **persons with disabilities**, women, and senior citizens.

NATIONAL CAPITAL REGION TRANSPORT CORPORATION

Context:

The National Capital Region Transport Corporation (NCRTC) has commenced trial runs of the Namo Bharat train on the final leg of the Delhi-Ghaziabad-Meerut corridor.



About Namo Bharat Train (Formerly RRTS / Vande Metro)

- **What it is?**
 - Namo Bharat is a **regional rapid rail system** designed for fast, intercity travel across **NCR cities within 100–250 km range**.
- **Organizations involved:** Implemented by **NCRTC** – a joint venture company of Govt of India and States of Delhi, Haryana, Rajasthan and U.P, under the administrative control of Ministry of Housing and Urban Affairs.
- **Objectives:**
 - Enhance **commuter mobility** in NCR.
 - Promote **decongestion**, **urban integration**, and **green transit**.
 - Support the **Make in India** initiative through indigenous rail production.
- **Key Features:**
 - **High-speed:** Operates at 160 km/h with average speed ~100 km/h.
 - **Smart Coaches:** Equipped with **Wi-Fi**, **CCTV**, **automatic doors**, and dynamic route displays.
 - **Environmentally Friendly:** Regenerative braking, energy-efficient systems.
 - **First Train Rolled Out:** April 2024, Rail Coach Factory, Kapurthala.

About National Capital Region Transport Corporation (NCRTC)

- **What it is?**
 - A **special purpose vehicle (SPV)** tasked with implementing **regional rapid transit systems (RRTS)** in NCR.
- **Established in:** Incorporated on **21st August 2013** under the Companies Act, 1956.
- **Established by:** Ministry of Housing & Urban Affairs (MoHUA).
- **Objectives:** Build a **multi-modal high-speed rail network** across the NCR to boost balanced urban growth and ease pressure on Delhi.
- **Functions:**
 - Plan, finance, construct, operate, and maintain **Namo Bharat corridors**.
 - Ensure **last-mile integration**, station area development, and smart mobility services.

- **Social Inclusiveness:** Encourages community participation, women empowerment, and local governance via co-management societies.
- **Post-Harvest Efficiency:** Focus on safe fish handling, cold storage, and hygienic practices to improve seafood quality and exports.
- **Climate Resilience:** Incorporates marine debris removal, environmental standards, and climate-adaptive design for coastal sustainability.

About Blue Ports Initiative:

- **Launched by:** Government of India in partnership with **FAO**.
- **Under:** Pradhan Mantri Matsya Sampada Yojana (**PMMSY**).
- **Objective:** To establish **model fishing harbours** that integrate **blue economy principles** for sustainable marine growth.

ECO-FISHING PORTS

Context:

The Department of Fisheries and [Agence Française de Développement](#) (AFD) held a Technical Dialogue on Eco-Fishing Ports in New Delhi to promote sustainable, smart, and inclusive fishing harbour infrastructure under India's Blue Economy framework.



About Eco-Fishing Ports:

- **Launched by:** Department of Fisheries, Ministry of Fisheries, Animal Husbandry & Dairying.
- **Objective:** To develop **environmentally sustainable** and **economically viable fishing harbours** with minimal ecological footprint.

Key Features:

- **Green Design Elements:** Integration of eco-friendly breakwaters, STPs, rainwater harvesting, and renewable energy (solar/wind).
- **Smart Infrastructure:** Use of IoT, sensor networks, and predictive modelling for real-time monitoring and harbour operations.

Key Features:

- **Three Pilot Harbours:** Vanakbara (Daman & Diu), Karaikal (Puducherry), and Jakhau (Gujarat).
- **Smart Technologies:** Use of AI, data analytics, and remote sensing for efficient port management.
- **Eco-Infrastructure:** Emphasis on energy-efficient lighting, electric equipment, composting, and waste recycling.
- **Value Chain Enhancement:** Improves fish landing, processing, storage, and market linkage to boost coastal livelihoods.
- **International Collaboration:** Aligns with FAO's Blue Growth agenda to leverage global best practices in marine conservation.

Syllabus: Awareness in fields of IT, Space, Computers, Robotics, Nano-tech, Bio-Tech, IPR

AI MATRYOSHKA

Context:

Google unveiled its **AI-first restructuring strategy** called AI Matryoshka at the I/O Developers Conference 2025.

- This layered AI ecosystem is built around **Gemini 2.5 models**, reshaping how users, developers, and enterprises interact with technology.



About AI Matryoshka:

- **What is AI Matryoshka?**
 - A **multi-layered AI ecosystem** where Google's core artificial intelligence acts as the central brain (like a Matryoshka doll), powering every layer from APIs to user applications.
- **Launched By:** Google.
- **Aim:**
 - To **embed AI deeply and uniformly** across Google's platforms.
 - To build **agentic, intelligent, and autonomous systems** for real-time user, developer, and enterprise interactions.
- **Key Features of AI Matryoshka**
 - **Gemini 2.5 Models:**
 - **Pro version** excels in complex reasoning and coding, achieving top scores in USAMO.
 - **Flash version** is 20–30% more efficient, supports multi-speaker TTS in 24 languages.
 - **Ironwood TPUs:** 7th-gen TPUs deliver **42.5 exaFLOPS** of computing power for deep learning at scale.
 - **Data & Media Models:** **Imagen 4** (images), **Veo 3** (video), and **Lyria 2** (music) create high-quality outputs, while **SynthID tools** watermark and verify content for copyright.
 - **Gemini API & Vertex AI:** Supports **Model Context Protocol (MCP)** for agent interactions and **thinking budgets** for better resource management.
 - **User Integration:** **AI Mode in Search** provides deep, cited search results; **Gemini App** enables private data analysis, raising privacy concerns.
- **Significance:**
 - **Ethics & Governance:** Raises questions on **privacy, consent, and data rights**.
 - **Digital Economy:** Shows evolution of AI in **commerce, content, and automation**.

- **Science & Tech:** Highlights **AI scaling, TPU innovation, model interaction**, and global competitiveness.

INDIA AI MISSION

Context:

Union Minister announced a major expansion of India's national AI infrastructure, adding 15,916 new **GPUs**, while the Cabinet approved ₹10,300+ crore for the IndiaAI Mission to boost AI startups.

About India AI Mission:

- **What it is?**



- IndiaAI is a national program by the Government of India to develop indigenous Artificial Intelligence capabilities, infrastructure, datasets, and startups under a structured public-private partnership model.
- **Launched by:** Ministry of Electronics and Information Technology (MeitY)
- **Launched in:** Approved by Cabinet in **March 2024**
- **Objectives:**
 - **Make AI in India** and **Make AI work for India**
 - Democratize AI access and use for governance, startups, and citizens
 - Build indigenous foundation and language models
 - Promote ethical, safe, and responsible AI
 - Create a self-reliant AI innovation ecosystem
- **Key Features:**
 - **Massive Compute Boost:** India now has over 34,000 GPUs, enabling training of large AI models.
 - **Foundational Model Development:** Selection of startups like Sarvam AI, Soket AI, Gnani AI, and Gan AI to build India-specific multilingual LLMs and Voice AI models.

- **AI Innovation Centre (IAIC):** A leading academic institution to drive research, foundational models, and talent retention.
- **Open Datasets Platform (AI Kosh):** Over 367 datasets already uploaded; aims to improve access to public data for AI research and governance.
- **Startup Financing & Talent Pipeline:** Includes startup funding, AI labs in Tier-II cities, and AI skill development programs for graduates and postgraduates.
- **Ethical & Safe AI:** Development of frameworks for safe, trusted, and inclusive AI deployment across sectors.
- **Global AI Leadership:** Aims to place India in the top league of AI-powered nations through indigenous innovation and global collaborations.

JAROSITE

Context:

A team of Indian scientists has discovered that Jarosite, a mineral common on Mars, can act as a natural [luminescent clock](#), recording geological events from the last 25,000 years.

- The study was conducted on jarosite samples from **Kachchh, Gujarat**, simulating Mars-like conditions and testing their luminescence response to radiation.

About Jarosite:

- **What is Jarosite?**
 - Jarosite is a **hydrous sulfate mineral** composed of **potassium, ferric iron (Fe^{3+}), and sulfate**, with the formula $\text{KFe}_3(\text{SO}_4)_2(\text{OH})_6$.



- It is commonly associated with **acid mine drainage**, [oxidized ore deposits](#), and **acidic sulfate soils**.
- **Where is Jarosite Found?**
 - **On Earth:** Found in **arid regions, mine tailings, Antarctica ice cores**, and acidic

clay-rich environments like [Kachchh](#) (India) and Sierra Peña Blanca (Mexico).

- **On Mars:** Detected by **NASA's Spirit, Opportunity, and Curiosity** rovers, indicating oxidizing and acidic conditions on the Martian surface.
- **Physical & Chemical Properties:**
 - **Crystal Structure:** Trigonal system and brittle with basal cleavage.
 - **Colour:** Dark yellow to yellow-brown.
 - **Hardness:** 2.5–3.5 (Mohs scale).
 - **Lustre:** Vitreous to dull and translucent to opaque.
 - **Thermal Stability:** Retains luminescence up to **450°C**, ideal for Martian rover operations.
 - **Chemical Property:** Iron analogue of alunite and formed by oxidation of iron sulfides (like pyrite).
- **Applications:**
 - **Planetary Dating Tool:** Can act as a natural radiation clock to date Martian dust storms, floods, or volcanic events within a 25,000-year window.
 - **Mars Missions:** Ideal for use in Mars rovers with heaters and LEDs to detect age without damaging sample.
 - **Environmental Indicator:** Used to trace **oxidation stages** in mining or glacial processes on Earth and Mars.
 - **Geological Marker:** Can help detect ice age layers in deep Earth cores.

ASTEROID YR4

Context:

NASA updated its projections for [asteroid 2024 YR4](#), reducing its chances of striking Earth but noting a 3.8% probability of colliding with the Moon on December 22, 2032.

About Asteroid YR4:

- **What is Asteroid YR4?**
 - **Discovery:** Identified in December 2024 by the [ATLAS telescope](#) in Chile as a near-Earth object (NEO).
 - **Type:** **Near-Earth asteroid** with a solar orbit that brings it within 1.3 AU of the Sun.
 - **Size Estimate:** Approximately **65 meters wide**, comparable to a **10-storey building**.
 - **Notable Alert:** Initially triggered NASA's **highest-ever impact alert** in February 2025 (3.1% Earth impact probability), later revised to negligible.

- **Potential Impact & Risk:**
 - **Earth Risk:** Now considered **no significant threat** to Earth based on updated trajectory data.
 - **Moon Risk:** Holds a **3.8% chance of hitting the Moon** in 2032; 96.2% chance it will miss.
 - **Impact Effects:** If it strikes, it could create a **500–2,000-meter crater** and release energy **340x the Hiroshima bomb**.
- **Scientific and Strategic Significance:**
 - **Planetary Defense:** Highlights importance of **automated detection** and **early warning systems** for NEOs.
 - **Observation Opportunity:** If YR4 hits the **Moon's near side**, spacecraft like **Chandrayaan-2** could observe the impact flash.
 - **Asteroid Monitoring:** Underlines ongoing risks from small-to-medium-sized space rocks, like the **Chelyabinsk event (2013)**.
 - **Public Awareness:** Reinforces the fact that **asteroids** are the **only natural disaster we can prevent**, according to experts.

- **Organizations Involved:** Conducted by **NASA's Jet Propulsion Laboratory (JPL)** in collaboration with **MIT** for scientific oversight.
- **Key Features:**
 - Consisted of **two spacecraft**, named **Ebb and Flow**, flying in tandem around the Moon.
 - Measured **minute variations in gravitational pull** to reveal [the Moon's internal composition](#).
 - Ended with a **controlled impact** on the lunar surface after successful mission completion.

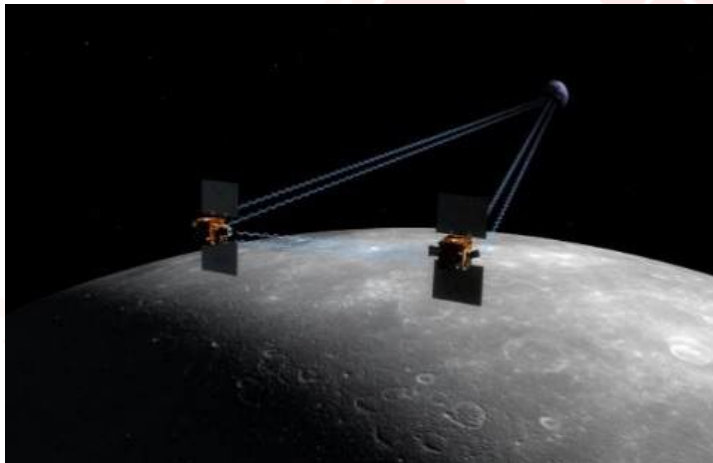
Key Discoveries from GRAIL:

- **Tidal Deformation & Gravitational Asymmetry:** The Moon's nearside flexes more than the far side due to **Earth's gravitational pull**, indicating **asymmetry in internal structure**.
- **Volcanic History & Heat Distribution:**
 - The **nearside was more volcanically active**, with dark basaltic plains ("known as **mare**").
 - Higher concentrations of **heat-producing elements** like **thorium and titanium** warmed the nearside mantle up to **200°C more** than the farside.
- **Crustal Thickness Variation:**
 - **Nearside crust is thinner**, allowing magma to erupt more easily, forming **flat plains**.
 - Far side remains **rough and cratered** due to thicker crust and less volcanic activity.

GRAIL MISSION

Context:

A new NASA study using data from the GRAIL mission has revealed why the Moon's nearside and far side look so different, solving a decades-old lunar mystery.



About GRAIL mission:

- **What is GRAIL?**
 - GRAIL (Gravity Recovery and Interior Laboratory) was a **NASA lunar science mission** aimed at mapping the **Moon's gravitational field in high resolution**.
- **Launch Year:** Launched in **2011** using a Delta II rocket from Cape Canaveral.

LICONN (LIGHT-MICROSCOPY-BASED CONNECTOMICS)

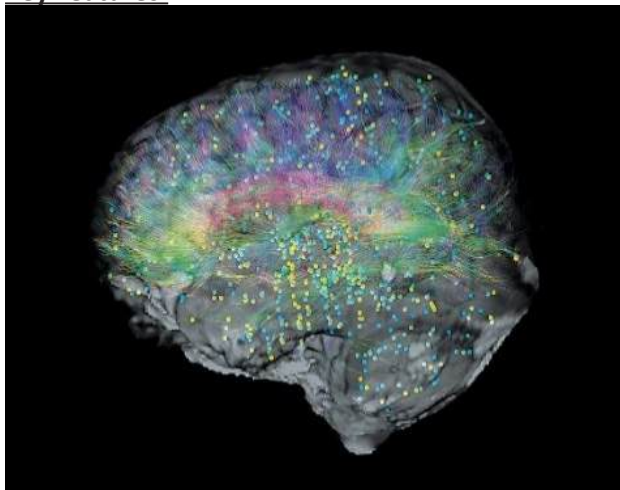
Context:

Scientists have developed *LICONN*, a new technique for nanoscale brain mapping using light microscopes.

About LICONN (Light-Microscopy-Based Connectomics):

- **What it is:**
 - *LICONN* stands for **Light-Microscopy-Based Connectomics**, a cutting-edge imaging technique to map neuronal connections at the synapse level.
 - Developed by researchers integrating **hydrogel expansion**, **protein staining**, and **AI-based segmentation**.

• Key Features:



- Expands brain tissue up to **16 times** using special hydrogels.
 - Uses **fluorescent tagging** to highlight molecular features and **deep learning** for neural segmentation.
 - Achieves **nanoscale resolution** using diffraction-limited light microscopy—earlier achievable only via electron microscopy.
- **Applications:**
- Enables **synapse-level connectome mapping** for neuroscientific research.
 - Facilitates **molecular characterization** of neural pathways.
 - Can be widely adopted in **brain disorder research**, drug development, and understanding memory processing.

About Nanoporous Multi-Layered Polymeric Membrane:

What it is?

A **high-performance filtration membrane** designed to purify seawater by filtering out salts and contaminants using **nanoporous polymer layers**.

Developed by:

Defence Materials Stores and Research & Development Establishment (DMSRDE), Kanpur – a premier **DRDO** lab – in collaboration with the Indian Coast Guard.

Key Features:

- **Nanoporous layers:** Enable efficient separation of salts and fine impurities.
- **Multi-layered structure:** Increases durability against high salinity and chloride ion degradation.
- **High-pressure resistance:** Suitable for harsh marine environments.
- **Quick development:** Completed in a **record 8 months**.
- **Field-tested:** Successfully trialed on an **Offshore Patrolling Vessel (OPV)** with further **500-hour operational tests** underway.
- **Scalable:** Adaptable for **civilian use** with minimal modifications

About Desalination Process:

• What it is?

- **Desalination** is the process of removing dissolved salts and minerals from **saline or seawater** to produce **freshwater** for drinking or agriculture.

• How it Works?

Major techniques include:

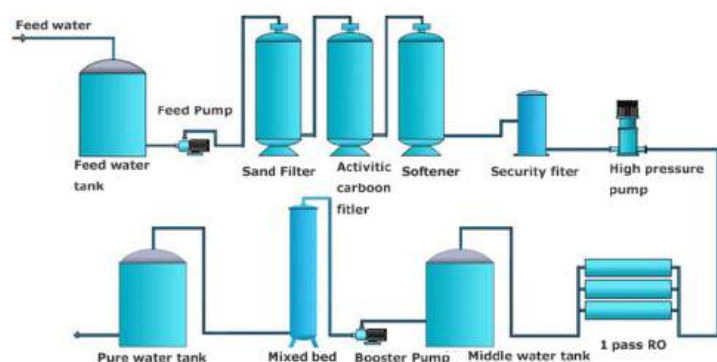
- **Reverse Osmosis:** Most widely used; uses semipermeable membranes to filter out salt; energy-efficient but prone to bacterial contamination.
- **Solar Distillation:** Mimics the natural water cycle; environmentally friendly but requires large land areas.
- **Nanofiltration:** Uses nanotube membranes with high permeability; removes salts and trace pollutants with lower energy use.
- **Electrodialysis:** Moves salts through electrically charged membranes; effective especially for brackish water treatment.
- **Gas Hydrate Formation:** Forms solid hydrates by combining gas with seawater; as temperature rises, gas is released, leaving purified water behind.

• Limitations of Desalination:

NANOPOROUS MULTI-LAYERED POLYMERIC MEMBRANE

Context:

DRDO has successfully developed a high-pressure nanoporous multi-layered polymeric membrane for seawater desalination in just eight months.



- **High Energy Demand:** Especially for heating/pressurizing water.
- **Brine Disposal:** Produces concentrated **brine waste** harmful to marine ecosystems.
- **Cost Issues:** Expensive infrastructure and operation, unaffordable for many low-income regions.
- **Environmental Impact:** Risk of [aquifer contamination](#) and **marine pollution**.
- **Solution Pathways:** Use of **renewables**, **biotech** (e.g., cyanobacteria), and **brine reuse** in energy or metal recovery can improve sustainability.

- Because it grows faster, it also **releases less methane** into the environment.

About Pusa DST Rice 1:

It is another new rice variety developed by **ICAR-IARI in New Delhi**, using the **MTU 1010 variety** as its base. This variety has been edited to improve its tolerance to drought and salty soils by targeting the DST gene.

It performs better in tough soil conditions and **can give up to 30.4% more yield** in such areas.

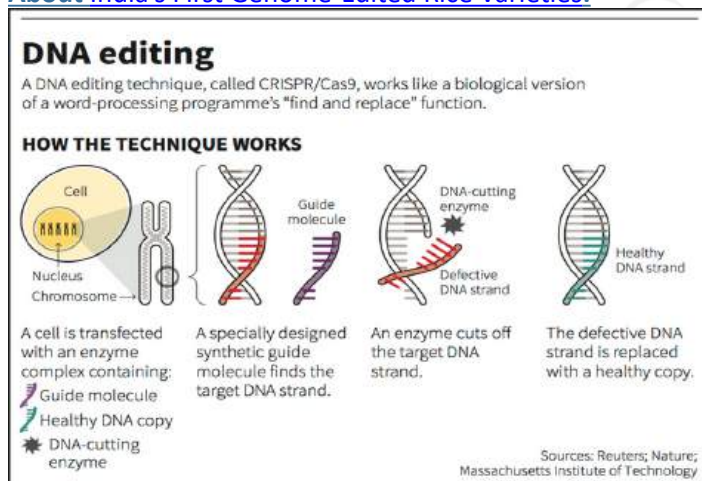
It does **not contain any foreign DNA** and is genome-edited using the SDN1 method, which means it does **not fall under strict GMO rules**.

INDIA'S FIRST GENOME-EDITED RICE VARIETIES

Context:

India has launched its **first genome-edited rice varieties**, DRR Dhan 100 (Kamala) and Pusa DST Rice 1, developed by ICAR using **CRISPR-Cas9 technology**.

About India's First Genome-Edited Rice Varieties:



About DRR Dhan 100 (Kamala):

- It is a new rice variety developed by **ICAR-IIRR in Hyderabad**.
- It is based on the popular **Samba Mahsuri (BPT 5204) variety**.

Features:

- This new variety gives **19% more yield and matures about 20 days earlier**, taking only 130 days.
- It has a **strong stem** that prevents the plant from falling, and it saves a large amount of irrigation water—around 7,500 million cubic meters.
- It uses genome-editing to **change the CKX2 (Gn1a) gene**, which helps produce more grains per plant.

INDIA'S FIRST GENE-EDITED SHEEP

Context:

Sher-e-Kashmir University of Agricultural Sciences and Technology (SKUAST-Kashmir) has successfully produced India's first gene-edited sheep, enhancing muscle mass by 30%.

About India's First Gene-Edited Sheep:



What It Is?

- A **genetically modified lamb** with enhanced muscle mass, developed by **editing the myostatin gene**, which regulates muscle growth in sheep.

- **Developed By:** Sher-e-Kashmir University of Agricultural Sciences and Technology (SKUAST-Kashmir)

Technology Used:

- **CRISPR-Cas9 gene editing** – a Nobel Prize-winning precision genome editing technique.
- Conducted under **international biosafety protocols**, ensuring no foreign DNA was inserted.

- **Key Features:**

- **Muscle Enhancement:** 30% higher muscle mass than Indian breeds — a trait found in European breeds like Texel.
- **Non-Transgenic:** Does not involve foreign DNA insertion, different from GMOs, increasing chances of regulatory acceptance.
- **Multipurpose Use:** Can be extended for disease resistance, improved reproduction, and even animal twinning.
- **Efficient Research Output:** Result of 4 years of dedicated research, supported by Indian Council of Agricultural Research (ICAR).

- **Significance of the Achievement:**

- **Boost to India's Livestock Sector:** Offers a blueprint for improving meat yield and quality in Indian sheep breeds.
- **Global Recognition:** Positions India on the global map of advanced genome editing research.
- **Biotech Policy Alignment:** Supports India's evolving regulatory framework for gene-edited organisms, which is distinct from [GMO laws](#).
- **Sustainability & Food Security:** Enhances productivity per animal, reducing resource use and supporting sustainable livestock farming.
- **Foundation for Future Innovation:** Builds on SKUAST's earlier success of cloning **Noori**, the world's first cloned Pashmina goat (2012).

- **Organisation Involved:** Developed by **University of Pennsylvania** and Children's Hospital of Philadelphia.

- **Procedure:**

- **Diagnosis:** The child (KJ) was found to have a mis paired base in his DNA, leading to CPS1 deficiency.
- **Programming the Edit:** Scientists designed a [guide RNA](#) and attached it to a **base-modifying enzyme** fused with **Cas9**.
- **Targeted Delivery:** The tool identified the faulty base and **converted it to the correct base** without making a double-strand cut.
- **Analogy:** Base editing is like using a **pencil and eraser**, whereas CRISPR is like **scissors and glue**.

- **Gene editing vs Base Editing:**

Feature	Gene Editing (CRISPR-Cas9)	Base Editing
Discovery	Developed in 2012 by Doudna and Charpentier	Developed later as an advanced form of CRISPR-Cas9
Mechanism	Introduces double-strand breaks in DNA	Alters single DNA base without breaking both DNA strands
Enzyme Used	Cas9 endonuclease	Cas9 fused with base-modifying enzyme (e.g., deaminase)
Process Analogy	Like using scissors and glue (cut-paste mechanism)	Like using a pencil and eraser (precise correction)
Need for Donor DNA	Requires external donor DNA to insert correct sequence	No external DNA needed; edits directly
Precision	Less precise, may cause off-target effects	Highly precise, reduces off-target mutations

- **Significance:**

- **First Human Success:** Pioneering example of real-time [precision medicine](#) in rare genetic disorders.
- **No Foreign DNA Required:** Unlike older CRISPR methods, this does not require external DNA insertion.
- **Compact Delivery:** Easier to deliver using viral vectors due to fewer components.
- **Potential Reach:** Can treat thousands of **genetic conditions** once personalised sequencing is done.

- **Limitations:**

- **High Cost:** Currently costs **hundreds of thousands of dollars**, making it unaffordable for most.
- **One-Time Customisation:** Each tool is **unique to the patient**, making mass-scale application difficult.
- **Lack of Regulatory Clarity:** Countries like **India** face **regulatory bottlenecks**, delaying clinical use.
- **Low Pharma Incentive:** Not commercially viable for pharmaceutical firms due to individual-specific design.

CUSTOMISED GENE-EDITING TREATMENT

Context:

A nine-month-old boy suffering from a rare CPS1 deficiency became the first known human to receive a customised gene-editing treatment using a base editing technique.

About Custom Gene Editing Technique:

- **What It Is?**

- A **personalised gene therapy** based on an evolved form of [CRISPR-Cas9](#), known as **base editing**.
- It allows for **single-base correction** in DNA without breaking both strands, unlike traditional CRISPR.

NICE CLASSIFICATION FOR TRADEMARK

Context:

Reliance Industries has withdrawn its trademark application for “Operation Sindoor”, stating that it was an unauthorised filing by a junior employee.

- The term, seen as a symbol of **national military bravery**, was applied for under **Class 41** of the **Nice Classification**, which covers entertainment and media services.

Trademark Classification



About Nice Classification for Trademark:

- What is the Nice Classification?**
 - An **international classification system** for goods and services used in **trademark registration**.
 - Developed under the **Nice Agreement (1957)** and administered by the **World Intellectual Property Organization (WIPO)**.
- Objective:**
 - To ensure a **standardised classification** for trademarks across jurisdictions.
 - Facilitates **international trademark searches**, comparisons, and registrations.
- Structure:**
 - 45 classes total:**
 - Classes 1–34:** Goods
 - Classes 35–45:** Services
 - Each class covers a specific domain, e.g., pharmaceuticals, software, education.
- What is Class 41?**
 - Class 41** covers:
 - Education and training services
 - Film production, OTT content, live events
 - Media, digital publishing, and cultural activities
 - Frequently used by **film studios**, **OTT platforms**, and **event organizers**.
- Indian Context:**
 - India follows the **Nice Classification** under

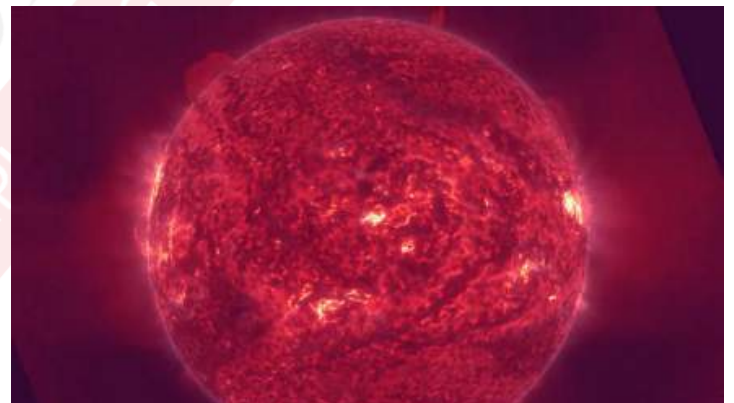
the **Trade Marks Act, 1999**.

- The system is mandatory for **filing and examining** all trademark applications.
- Legal Relevance in the Case:**
 - Though the **Ministry of Defence** does not register names of military operations as intellectual property, there is **no automatic legal protection** unless formally objected to.
 - Sections **9(2)** and **11** of the Trade Marks Act, 1999 empower the Registrar to:
 - Reject deceptive or misleading applications**
 - Prevent names that **misrepresent government association**
 - Disallow trademarks that **offend public or national sentiment**

BIRD-WING ERUPTION

Context:

A massive solar flare event, named the “bird-wing” eruption, was observed on the Sun’s northern hemisphere and is expected to impact Earth.



About Bird-Wing Eruption:

- What is the “Bird-Wing” Event?**
 - A visually dramatic **solar eruption** with plasma shaped like wings, observed by **NASA satellites**.
 - The ejected plasma stream spanned over **1 million km**, twice the Earth-Moon distance.
- Features of the Event:**
 - Involved both a **solar flare** and a **coronal mass ejection (CME)**.
 - Plasma ejection occurred on the Sun’s **northern hemisphere**.
 - Radiation already caused **radio blackouts** across parts of Asia, Africa, Europe, and the Americas.
- What Are Solar Flares?**
 - Solar flares** are intense bursts of **electromagnetic radiation** released due to

reconnection of magnetic field lines.

- Often accompanied by **CMEs**, which are explosive outflows of charged solar plasma.
- **Speed:** Flares travel at **light speed**, CMEs take **1–3 days** to reach Earth (speed: 250–3000 km/s).

- **Impact on Earth:**

- **Geomagnetic Storms:** Disrupt satellite operations, GPS systems, radio communication, and power grids.
- **Auroras:** Enhanced Northern/Southern Lights activity possible at lower latitudes.
- **Space Weather Alerts:** Agencies on high alert for further space-based disruptions.

Syllabus: Science and Technology- developments & Applications

SATELLITE COMMUNICATION REGULATION IN INDIA

Context:

India has framed [new regulatory guidelines](#) for **satellite communication companies** mandating **local manufacturing, data localisation, NavIC compliance**, and enhanced national security cooperation.

Securing Indian Space

- DoT mandates 29 security conditions for satcom players
- For first time, rules notified for satcom mobility services
- Rules applicable to all existing and upcoming satcom firms

- Firms need to ensure provisioning for NavIC in a time-bound manner
- Websites blocked in India need to be blocked on satellite services too



- Inter satellite communications links allowed but traffic has to route through Indian gateways only
- Satcom firms need to provide real time monitoring of services

Network control and monitoring centre has to be located in India

About Satellite Communication Regulation in India:

- **What is Satellite Communication?**
 - Satellite communication (satcom) enables **wireless transmission of signals** using satellites orbiting the Earth. It supports broadband, TV broadcasting, GPS navigation, and remote area connectivity.
- **Regulating Agencies:**
 - **Department of Telecommunications (DoT)** – Issues operational guidelines and approvals.
 - **Telecom Regulatory Authority of India (TRAI)** – Finalises policy framework including **spectrum allocation** and pricing.

- **Key Provisions under [New Satcom Guidelines \(2025\):](#)**

- **Local Manufacturing & Indigenisation**
 - Satcom firms must submit a **5-year phased manufacturing plan**.
 - At least **20% of the ground segment** should be **indigenously produced** by Year 5.
- **Data Localisation & Monitoring:**
 - No user traffic should be routed through **foreign gateways or PoPs**.
 - All **user data, DNS services, and control systems** must be located in **India**.
 - Mandatory **lawful interception**, user monitoring, and data security protocols.
- **NavIC Compliance**
 - User terminals should support **NavIC** (India's regional navigation system) on a **best-effort basis**.
 - Full implementation deadline set for **2029**.
- **National Security Provisions**
 - Must enable **service restrictions** during hostilities or emergencies.
 - Establish **Special Monitoring Zones** (within 50 km of borders and coastal EEZ).
 - Report unregistered/foreign user terminals **in real-time** to law enforcement agencies.
- **Service-Specific Security Clearance**
 - Separate **security clearance** needed for **voice and data services**.

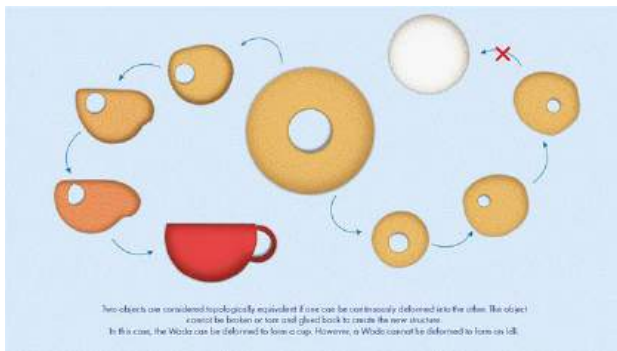
A NEW METHOD TO DETECT TOPOLOGICAL INVARIANTS IN QUANTUM MATERIALS

Context:

Scientists at Raman Research Institute (RRI), Bengaluru, have discovered a new method to detect topological invariants in quantum materials using spectral function.

About A New Method to Detect Topological Invariants in Quantum Materials:

What is Spectral Function?



- The **spectral function** is a quantum tool that describes how energy and particles like electrons behave inside a material.
- It's widely used to study **electronic structure**, such as **density of states** and **dispersion relations**.
- **Developed By:** Developed by **Raman Research Institute (RRI)**, under the Department of Science and Technology.
- **How It Works?**
 - The team analysed **momentum-space spectral function (SPSF)**, which acts like a **quantum fingerprint**.
 - SPSF maps how electrons distribute over energy and momentum, revealing **hidden topological features**.
- **Key Features:**
 - **Topology Detection:** Unveils invariants like **winding numbers** (1D) and **Chern numbers** (2D).
 - **Non-Invasive Technique:** Avoids complex physical manipulation or destructive probing.
 - **Faster and Accessible:** Easier than traditional tools like **ARPES** (Angle-Resolved Photoemission Spectroscopy).
 - **Universal Application:** Can be applied across different classes of topological materials.
 - **Quantum Insight:** Provides deeper understanding of **electron dynamics** and material behaviour at the quantum level.
- **Significance:**
 - **Revolutionizes Quantum Research:** Opens new avenues in condensed matter physics.
 - **Boosts Quantum Technology:** Aids development of quantum computing, energy-efficient devices, and fault-tolerant electronics.

- **Simplifies Material Classification:** Helps identify topological materials without advanced experimental setups.

NON-CONTACT WEARABLE DEVICE

Context:

A new non-contact wearable developed by researchers from the U.S. and South Korea can monitor health by measuring skin flux without direct contact.

About Non-Contact Wearable:

What it is?



- A small, smartphone-sized wearable device that tracks **molecular flux** through skin—measuring outward vapour and inward chemical entry—without touching the skin.
- Developed by a team led by **Prof. John A. Rogers** at **Northwestern University, USA**.
- **How it works?**
 - Contains a **sealed chamber** adjacent to the skin, forming a **microclimate**.
 - Equipped with **wireless electronics** and **miniature sensors** to measure: Water vapour, Carbon dioxide (CO₂), and Volatile organic compounds (VOCs).
 - A **remote-controlled valve** regulates the chamber's openness, allowing comparative flux measurements between closed and open states.
- **Applications:**
 - **Wound healing** in diabetes and chronic skin conditions.
 - **Dermatological diagnostics**—monitoring barrier function and hydration.
 - **Hazardous chemical exposure** tracking for industrial workers.
 - **Remote patient monitoring**, especially post-COVID healthcare adaptations.
 - **Perfume and cosmetics** industry interest in VOC monitoring.

- **Significance:**
 - **Non-invasive:** Avoids damage to fragile or healing skin.
 - **Dual flux monitoring:** Tracks both what leaves and enters the skin.
 - **Low-cost, scalable:** Potential for mass adoption in remote and rural health setups.
 - **New clinical metric:** Could become an additional “vital sign” in health diagnostics.

BATTERY AADHAAR INITIATIVE

Context:

At the Battery Summit 2025, Tata Elxsi, in partnership with Tata Motors, Tata AutoComp, and IIT Kharagpur, unveiled the Battery Aadhaar initiative to key government stakeholders.



- The project aligns with India’s green mobility and [circular economy](#) goals.

About Battery Aadhaar Initiative:

- **What It Is?**
 - Battery Aadhaar is a digital identification system for batteries, designed to enable full traceability across their lifecycle using secure, blockchain-backed technologies.
- **Developed By:** Spearheaded by **Tata Elxsi** through its MOBIUS+ platform, in collaboration with Tata Motors, Tata AutoComp Systems, and IIT Kharagpur.
- **Objective:**
 - To assign **unique digital IDs** to each battery, enabling **safe use, regulated reuse, and efficient disposal**.
 - To align battery usage with **national and global compliance standards** like the [EU Battery Regulation](#).
- **Key Features:**
 - **Blockchain Integration:** MOBIUS+ ensures tamper-proof, real-time data logging for each battery unit.
 - **Lifecycle Transparency:** Tracks manufacturer details, usage history, and

material content.

- **Regulatory Compliance:** Automates reporting for both Indian and international policy frameworks.
- **Sustainability Link:** Supports circular economy models by reducing battery waste and environmental risks.
- **Significance:**
 - **Prevents unsafe reuse** of old or degraded batteries, ensuring safety in [EV ecosystems](#).
 - Strengthens India’s **battery supply chain visibility** and sustainability commitment.
 - Encourages **eco-conscious innovation** across mobility, energy storage, and electronics industries.
 - Promotes India’s position in **green tech leadership** and aligns with the **National Electric Mobility Mission Plan (NEMMP)**.

INDIA’S FIRST INDIGENOUS THROMBECTOMY DEVICE

Context:

The Technology Development Board (TDB) under DST has funded India’s first indigenously developed mechanical thrombectomy device for stroke treatment.

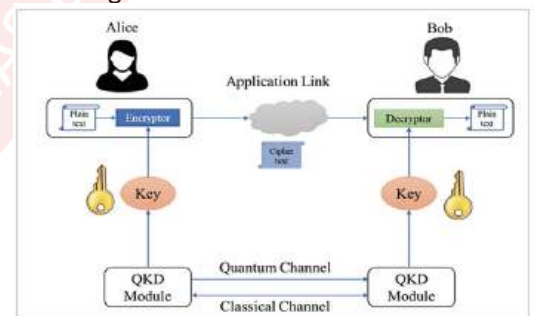
About India’s First Indigenous Thrombectomy Device:



- **What is it?**
 - A **Mechanical Thrombectomy Kit** used to treat **acute ischemic stroke** caused by large vessel blockage. It offers quicker and more effective recovery than traditional clot-busting drugs.
- **Developed by:** M/s **S3V Vascular Technologies Limited**, Mysuru — with financial assistance from the [Technology Development Board](#) (TDB), Department of Science & Technology.
- **How It Works:**

- The device is put into a blocked artery in the brain during a stroke.
- It removes the blood clot using special tools like stent retrievers and aspiration catheters.
- This helps restore blood flow to the brain, preventing paralysis or permanent brain damage.
- **Key Features:**
 - **Indigenous Innovation:** First Indian company to design and manufacture stroke-care tools like microcatheters, aspiration catheters, guidewires, and stent retrievers.
 - **Advanced Manufacturing:** Built at Medical Devices Park, Oragadam, with an integrated facility for [high-precision production](#).
 - **Patent-Driven R&D:** Patent filings underway for innovations like clot retriever head design and advanced catheter structures.
 - **Skill Development:** Offers simulator-based training programs for young doctors, especially in Tier-II cities.
 - **Global Standards:** Targeting CE and USFDA certifications to enable global exports and ensure world-class quality.
- **Why It Matters?**
 - Helps India **reduce its need to import** expensive stroke-care devices.
 - Makes stroke treatment **more affordable and easier to access** for patients.
 - Will be part of [Ayushman Bharat](#), supporting public health programs.
 - Strengthens India's **global presence** in medical technology.

- **How QKD Works?**
 - **Photons** (light particles) with random quantum states are transmitted over a channel.
 - The **no-cloning theorem** and **measurement disturbance principle** ensure any eavesdropping is detectable.
 - After transmission, both parties compare a subset to detect errors or interception.
 - Final keys are extracted after **error correction** and [privacy amplification](#).
- **Types of QKD:**
 - **Prepare-and-Measure Protocols:**
 - Sender prepares photons in known states (e.g., **BB84 protocol**).
 - Used to detect interception.
 - **Entanglement-Based Protocols:**
 - Relies on [quantum entanglement](#).
 - Change in one entangled particle affects its pair, enabling tamper detection.
 - **Discrete Variable QKD (DV-QKD):** Uses individual photons and polarization for data encoding.



Continuous Variable QKD (CV-QKD): Uses laser properties like amplitude and phase for encoding (e.g., [Silberhorn protocol](#)).

- **Key Features:**
 - **Tamper detection:** Any interception is instantly detectable.
 - **Provable security:** Based on physical laws, not computational complexity.
 - **Quantum-resilient:** Immune to future threats from quantum computers.

DRONE-BASED QUANTUM KEY DISTRIBUTION

Context:

The Centre for Development of Telematics (C-DOT) signed an MoU with Synergy Quantum India to jointly develop drone-based Quantum Key Distribution (QKD) systems.

About Quantum Key Distribution (QKD):

- **What is Quantum Key Distribution (QKD)?**
 - QKD is a **secure method of key exchange** that uses [quantum mechanics](#) instead of mathematical encryption algorithms to share cryptographic keys.

About Drone-Based Quantum Key Distribution Technology:

- **What is Drone-Based Quantum Key Distribution Technology?**
 - A futuristic application of **QKD via drones**, enabling **secure key exchange** over dynamic and remote locations without dependency on fixed fiber-optic infrastructure.
- **Features:**
 - **Mobility & Flexibility:** Can be deployed quickly in **disaster zones, border areas, or rural setups**.

- **Uses Decoy-State BB84 Protocol:** Enhances security and efficiency using polarization encoding.
- **Targeted for TRL 6+:** Demonstrates a system prototype in a relevant environment.
- **Boosts Secure Communication:** Especially vital for defense, surveillance, and confidential data transfer.
- **Atmanirbhar Bharat-Aligned:** Promotes indigenous research and innovation in quantum technologies.

2D METAL

Context:

Scientists in China have successfully fabricated atomically thin 2D metal sheets of bismuth, gallium, tin, and lead using a novel high-pressure technique.



About 2D Metal:

- **What are 2D Metals?**
 - 2D metals are **ultra-thin layers of metal atoms**, usually just **1–2 atoms thick**, where electrons are confined to move only in **two dimensions**.
 - Unlike bulk metals, they exhibit unique **quantum properties** due to **quantum confinement effects**.
- **New Breakthrough:**
 - A team in China (Beijing and Dongguan) successfully created atomically thin 2D sheets of bismuth, gallium, indium, tin, and **lead**.
- **Technique:**
 - Metal powder is melted between two layers of MoS₂-coated sapphire plates.
 - Under 200 million Pa pressure, the metal flattens into an ultra-thin sheet.
 - **The result:** bismuth sheets only 6.3 Å thick — around 2 atoms deep.
- **Key Features:**
 - **Thickness:** Just a few angstroms (Å) — atomically thin.
 - **Quantum Confinement:** Alters energy

levels of electrons, leading to novel electrical behaviours.

- **Strong Field Effect:** Electrical conductivity can be externally modulated.
- **Nonlinear Hall Effect:** Generates perpendicular voltage under electric fields — a property not seen in 3D metals.
- **Topological Properties:** Some 2D metals act as **topological insulators**, conducting only along edges.
- **Applications:**
 - **Quantum Computing:** Enables creation of faster, low-energy computing systems.
 - **Flexible Electronics:** Ideal for use in **next-gen sensors, transistors, and wearable devices**.
 - **Photonics and Optoelectronics:** Suitable for high-efficiency **LEDs, lasers, and photodetectors**.
 - **Medical Diagnostics:** Could power **super-sensitive biosensors and imaging tools**.

HIGH-ALTITUDE PLATFORM (HAP) PROTOTYPE

Context:

India's indigenously developed High-Altitude Platform (HAP) prototype, designed by NAL, successfully completed pre-monsoon flight tests using a certified autopilot system.



About High-Altitude Platform (HAP) Prototype:

- **What is HAP?**
 - A **High-Altitude Platform (HAP)** is a solar-powered, unmanned stratospheric aircraft that operates at **17–22 km altitude**, bridging the gap between terrestrial systems and satellites.
- **Developed By:**
 - **National Aerospace Laboratories (NAL)**, Bengaluru under CSIR.
 - Supported by **Aeronautical Test Range (ATR)**, Chitradurga, Karnataka.

- **Objectives:**
 - **Border patrolling and surveillance** over sensitive and remote terrains.
 - To provide **persistent aerial coverage** for military and civil applications.
 - Serve as a **telecommunication relay** and **meteorological platform**.
- **Key Features of India's HAP:**
 - **Solar-Powered Platform:** Enables extended, high-endurance flight.
 - **Certified Autopilot System:** Fully autonomous flight with **fail-safe algorithms** and **redundant control sensors**.
 - **Altitude Achieved:** Up to **24,000 ft (FL240)** in recent tests and full-scale version can operate at **65,000 ft (20 km)**.
 - **Payload Capacity:** Subscale – 1kg and Full-scale – 10kg (including radiosondes, 5G base stations).
 - **Endurance:** 8.5+ hours in test flights and longer duration planned in final model.
 - **Wingspan:** 12 metres (subscale model) and light-weight under 22kg.
- **Applications of HAP:**
 - **Defence:** Border surveillance, intelligence gathering, disaster response.
 - **Meteorology:** Radiosonde deployment, monsoon cloud measurements ([IITM, Pune](#) use case).
 - **Telecommunications:** Temporary or mobile 5G connectivity in remote or disaster-hit areas.
 - **Geoinformatics:** Real-time mapping, environmental monitoring.
 - **Crowd Monitoring:** Public safety during large events or protests.

ATOMISER

Context:

The atomiser, a vital yet overlooked device, has come under focus for its vast industrial, medical, and environmental applications, especially in fields ranging from aerosol medicine to spray-drying and firefighting.

About Atomiser:

- **What is an Atomiser?**
 - An **atomiser** is a device that breaks a liquid into fine **droplets (spray)** for even distribution over a surface or space.
 - It allows conversion of **liquid storage** into **mist delivery**, balancing ease of handling and maximum surface coverage.

How Does an Atomiser Work?

- Works on **pressure-drop, turbulence, or external force** to shatter liquid into droplets.
- **Types of atomisers** include:
 - **Pressure-swirl atomisers:** Create a vortex, ejecting liquid in conical patterns.
 - **Air-assisted atomisers:** Use compressed air to tear the liquid into fine mist.
 - **Ultrasonic atomisers:** Use high-frequency vibrations to generate nano-droplets.
 - **Narrow-channel atomisers:** Use geometric constriction to break fluid into a spray.

Key Features of Atomisers:

- **Drop Size:** Smaller drops for aerosols, larger ones for surface coating.
- **Spray Pattern:** Can be flat, circular, or conical.
- **Application Angle:** Tailored for maximum efficiency and coverage.
- **Relative Span Factor (RSF):** Indicates drop size uniformity (closer to 1 is better).
- **Customisation:** Atomisers are tuned for pressure, particle size, and spray geometry.

Applications of Atomisers:

- **Industrial Use:** Used in fuel injection, [machinery lubrication](#), and spray drying in food and pharma sectors.
- **Agriculture:** Essential for efficient spraying of pesticides, fertilizers, and precision irrigation in poor-soil areas.
- **Healthcare:** Enables [drug delivery](#) via nasal and aerosol sprays; used in disinfectants and pain-relief sprays.
- **Disaster & Safety Management:** Supports fire suppression with foam sprays and public health safety during pandemics.
- **Household & Environment:** Found in deodorants and cleaners; also used in climate studies for aerosol modelling.

SUPER-FAST CHARGING SODIUM-ION BATTERY

Context:

Indian scientists at JNCASR, Bengaluru, have developed a super-fast charging sodium-ion battery that can reach 80% charge in just 6 minutes and last over 3,000 cycles, potentially revolutionising India's energy storage sector.



About Super-Fast Charging Sodium-Ion Battery:

- **What it is:**
 - A next-generation **sodium-ion battery (SIB)** designed to charge ultra-fast and offer extended durability, using indigenous materials and nanotech-based design.
- **Developed by:** Jawaharlal Nehru Centre for Advanced Scientific Research (JNCASR), an autonomous institute under the **Department of Science and Technology (DST)**, Govt of India.
- **How It Works?**
 - **NASICON-type Material:** Provides a stable crystal framework for fast sodium-ion movement in both cathode and anode.
 - **Anode Composition** ($\text{Na}_{1.0}\text{V}_{0.25}\text{Al}_{0.25}\text{Nb}_{1.5}(\text{PO}_4)_3$): This specially engineered compound enhances energy storage and improves ion conductivity.
 - **Nanoscale Particle Engineering:** Reducing particle size increases surface area, allowing sodium ions to travel faster during charge and discharge.
 - **Carbon Coating:** A **thin carbon layer** on particles boosts electrical conductivity and protects from degradation.
 - **Aluminium Doping:** Adding small amounts of aluminium improves structural integrity and helps maintain battery performance over time.
- **Key Features:**
 - **Rapid Charging (80% in 6 minutes):** Enables ultra-fast energy refill, ideal for high-demand applications like electric vehicles.
 - **Long Life (3,000+ cycles):** Provides high durability, lowering the need for frequent replacements and reducing lifecycle costs.
 - **High Safety:** Reduces risk of thermal runaway and fire, unlike lithium-ion batteries which are heat-sensitive.
 - **Tested Reliability:** Proven using advanced techniques like electrochemical cycling

and quantum simulations for real-world readiness.

- **Superiority Over Lithium-Ion Batteries:**

- **Abundant Resource:** Sodium is **plentiful and cheap in India**, unlike lithium which is imported.
- **Self-Reliance:** Boosts **Atmanirbhar Bharat** by reducing battery import dependency.
- **Eco-Friendly:** Less environmentally invasive mining processes.
- **Scalable Applications:** Ideal for **EVs, drones, solar grids, and rural electrification**.
- **Geopolitical Independence:** Reduces reliance on volatile lithium supply chains.

BREAKTHROUGH PRIZE PHYSICS 2025

Context:

The 2025 Breakthrough Prize in Fundamental Physics has been awarded to major experimental teams at CERN—ATLAS, CMS, ALICE, and LHCb—based on their findings from the Large Hadron Collider (LHC) Run-2 data (2015–2024).



About Breakthrough Prize Physics 2025:

- **What It Is?**
 - Often dubbed the “**Oscars of Science**,” the Breakthrough Prize honors transformative achievements in fundamental physics.
- **Awarded by:** Given annually by the Breakthrough Prize Foundation.
- **Awarded to:** Teams behind ATLAS, CMS, ALICE, and LHCb experiments at **CERN**, comprising over 13,500 researchers.
- **Prize Amount:** \$3 million awarded jointly to the four LHC experiments.
- **Eligibility Criteria:**
 - Recognizes major discoveries and data-driven contributions that **advance**

understanding of the Universe.

- **Awarded For:** Work contributing to understanding the:
 - [Higgs boson](#)
 - Quark-gluon plasma
 - Matter-antimatter asymmetry
 - Physics beyond the Standard Model
- **India's Contributions:**
 - Indian institutions like **TIFR**, [BARC](#), **IITs**, **IISc**, **VECC**, **IUAC**, **IOP** etc., made crucial contributions in:
 - Detector R&D
 - Data analysis
 - Worldwide LHC Computing Grid
 - Manpower training
 - India plays an active governance role in **CERN's scientific boards** and decision-making.

About the [Large Hadron Collider \(LHC\)](#):

- **What It Is?**
 - The **LHC** is the world's most powerful particle accelerator used to probe the **fundamental structure of matter**.
- **Developed By:** Built and operated by **CERN** (European Organization for Nuclear Research) near Geneva, Switzerland.
- **Key Features:**
 - **Structure:** 27-km underground ring using 1232 superconducting dipole magnets.
 - **Cooling:** Operates at -271.3°C using liquid helium—colder than outer space.
 - **Collisions:** Sends two beams of protons or heavy ions near light-speed in opposite directions for high-energy collisions.
 - **Experiments:** Four major detectors—**ATLAS**, **CMS**, **ALICE**, **LHCb**—placed at beam collision points.
 - **Magnets and Control:** Uses dipoles to bend and quadrupoles to focus beams, controlled centrally from the **CERN Control Centre**.
- **Significance:**
 - Helped confirm the **existence of the Higgs boson** (2012).
 - Enabled study of **early universe conditions** via quark-gluon plasma.
 - Essential for progress in [quantum field theory](#), **supersymmetry**, and **dark matter research**.
 - Strengthens international science diplomacy and **India's global scientific stature**.

[Syllabus: Conservation](#)

INTERNATIONAL CONFERENCE ON GLACIERS' PRESERVATION – 2025

Context:

In 2025, the International Year of Glacier Preservation is being marked through a UN-backed global conference, International Conference on Glaciers' Preservation – 2025 in Tajikistan.



2025
International
Year of Glaciers'
Preservation

About International Conference on Glaciers' Preservation – 2025:

- **What is it?**
 - A **high-level global summit** focusing on urgent action to combat glacier retreat and ensure sustainable freshwater supplies from cryospheric sources.
- **Held in:** Dushanbe, **Tajikistan**
- **Organised by:** Republic of Tajikistan, with support from **United Nations agencies**
- **Declared under:** UN Resolution declaring 2025 as the *International Year of Glaciers' Preservation*
- **Objectives:**
 - Promote **climate-resilient water resource management**.
 - Raise global awareness of the **threats posed by glacier melt**.
 - Encourage strong **multilateral climate action** aligned with the **Paris Agreement** and [SDGs](#).
- **Key Features:**
 - **Scientific Collaboration:** Foster glacier monitoring, cryospheric data sharing, and research coordination across nations.
 - **Policy Integration:** Align NDCs and [NAPs](#) with practical water governance and climate-resilient investments.
 - **Early Warning Systems:** Develop roadmaps for mountain-specific climate risk prediction and disaster response.
 - **Knowledge Exchange:** Disseminate best

practices, case studies, and adaptive innovations in glacial risk zones.

- **Gender Inclusion:** Promote women's participation in glacier-related water policy and decision-making.
- **UN Trust Fund:** Propose formation of a UN-supported [Glacier Preservation Fund](#) for long-term financing.
- **Urban Water Security:** Prioritize resilient urban and agricultural water supply systems through smart investments.
- **Expected Impact:** Ensure targeted hydro-meteorological services for glacier-reliant communities and boost global cryosphere protection efforts.

CHAMBAL RIVER

Context:

Illegal sand mining is rampant in the [Chambal River](#) region across states, threatening biodiversity and endangering officials and journalists.



- It jeopardises the conservation efforts in the National Chambal Sanctuary, home to rare and endangered species like the [Gharial](#) and Ganges dolphin.

About Chambal River:

- **Origin:** Bhadakla Falls near Janapav Hills (843 m elevation), Indore district, Madhya Pradesh.
- **Length:** Approx. **1,024 km**.
- **Mouth:** Confluences with the **Yamuna River** in Jalaun district, Uttar Pradesh.
- **States Flowing Through:** Madhya Pradesh, Rajasthan, and Uttar Pradesh
- **Major Tributaries:**
 - **Right Bank:** Banas, Kali Sindh, Parbati, Shipra
 - **Other Tributaries:** Kuno, Seep, Kuwari, Mej, Gambhir, etc.

- **Chambal is a Tributary of:** Yamuna River, hence part of the Ganga drainage system.
- **River Characteristics:**
 - Known as **India's cleanest river**.
 - **Ancient name:** Charmanvati (Mahabharata).
 - Flows through **Vindhyan scarplands, badlands, ravines**, forming deep gorges.
 - **Major dams:** Gandhi Sagar, Rana Pratap Sagar, Jawahar Sagar.

About National Chambal Sanctuary:

- **Tri-state protected riverine zone** (Madhya Pradesh, Rajasthan, Uttar Pradesh).
- Spread over **5,400 sq. km** along **425 km** of Chambal River.
- Established to conserve **critically endangered and riverine species**.
- **Key Features:**
 - **Primary Focus:** Conservation of Gharial (world's largest population), Ganges Dolphin, and Red-crowned Roof Turtle
 - **Other Wildlife:**
 - Mugger crocodile, smooth-coated otter, striped hyena, Indian wolf
 - 8 rare turtle species like Indian narrow-headed softshell turtle
 - **Mammals:** Sambhar, Nilgai, Indian gazelle, Bengal fox, langur, etc.
 - **Flora:** Dry deciduous forests (Kathiar-Gir ecoregion).
 - **Topography:** Ravines, sandy stretches, and hilly terrain.
 - Recognised as an **Important Bird Area (IBA)**.

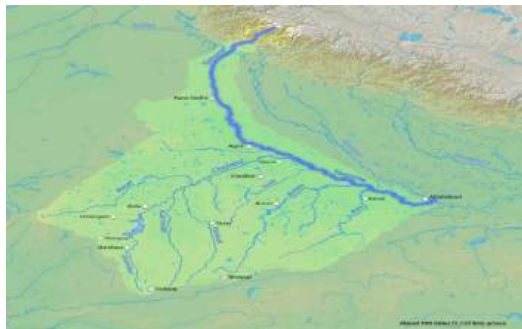
YAMUNA RIVER

Context:

A report by Haryana's irrigation department confirms that illegal sand mining in Sonipat has diverted the [Yamuna's natural course](#), violating NGT orders and environmental laws.

About Yamuna River:

- **Location:**
 - Originates from the **Yamunotri Glacier** in the **Uttarkashi district** of **Uttarakhand**, at an altitude of **4,421 meters** in the **Himalayas**.



- **States it Flows Through:** The Yamuna basin covers Uttarakhand, Himachal Pradesh, Haryana, Delhi, Uttar Pradesh, and parts of Rajasthan.
- **Total Length:** Spans approximately 1,376 km, making it the longest river in India that does not drain directly into the sea.
- **Major Tributaries**
 - **Himalayan Region:**
 - Rishi Ganga, Hanuman Ganga, Tons, Giri.
 - **Tons River** is the largest tributary, contributing about 60% of total Yamuna discharge.
 - **Plains:** Hindon, **Chambal**, Sind, Betwa, Ken.
- **Key Cities Along the River:**
 - **Delhi stretch:** Enters at Palla Village, exits at Jaitpur (covers 52 km).
 - **Other cities:** Noida, Mathura, Agra, Firozabad, Etawah, Kalpi, Hamirpur, and Prayagraj.
 - **Confluence:**
 - Merges with **Ganga at Prayagraj (Allahabad)**, forming the **Sangam**, one of Hinduism's most sacred sites.

GEOTUBING

Context:

A joint study by **NIOT** and KSCADC confirmed that geotubing offshore breakwaters at Poonthura (Kerala) effectively controlled coastal erosion and promoted sustainable beach formation.



About Geotubing:

- **What is Geotubing?**
 - **Geotubing** uses large, tubular **geotextile** containers (geotubes) filled with sand or slurry, placed underwater to **reduce wave energy** and **prevent erosion**.
 - In Poonthura, three vertical layers of **15-meter circumference geotubes** were installed **perpendicular to the coast**, forming submerged breakwaters that trap and deposit sand.
- **Materials Used:**
 - Made from **high-performance woven geotextiles**, typically **polypropylene (PP)** or **polyester (PET)**.
 - These textiles offer **permeability**, **durability**, and **resistance to UV rays**, **chemicals**, and **microbial degradation**.
- **Key Features of Geotubes:**
 - **Submerged Barrier:** Absorbs and dissipates wave energy before it reaches the shore.
 - **Sand Accumulation:** Facilitates **natural beach nourishment** by promoting sand deposition.
- **Advantages of Geotubing:**
 - **Durability:** High resistance to tension, UV radiation, chemicals, and microbial erosion.
 - **Eco-Friendly:** Non-polluting and helps in **wetland and coastal restoration**.
 - **Cost-Effective:** Cheaper than concrete or steel structures; **easy to install**.
 - **Customisable:** Tubes can be tailored to project needs, suitable for **varied terrain**.
 - **Multi-purpose Use:** Effective in **flood control**, **riverbank reinforcement**, **sludge dewatering**, and **landfill containment**.
- **Applications of Geotubes:**
 - **Coastal Protection:** Breakwaters, seawalls, and dune reinforcements.
 - **River & Lake Management:** Riverbank stabilisation and sediment control.
 - **Wastewater Treatment:** Dewatering sludge in industrial and municipal setups.
 - **Infrastructure Projects:** Foundations for roads, railways, ports, and reservoirs.
 - **Environmental Remediation:** Site isolation and pollution control.

UNITED NATIONS FORUM ON FORESTS

Context:

India actively participated in United Nations Forum on Forests (UNFF20) held at UN Headquarters, New

York, presenting achievements in sustainable forest management.



About United Nations Forum on Forests (UNFF):

- **What is UNFF?**
 - UNFF is a **functional commission under ECOSOC**, dedicated to forest policy dialogue and coordination.
 - It provides a platform for all countries to **discuss and promote sustainable forest management (SFM)** globally.
- **Established year:** 2000
- **Established by:** UN Economic and Social Council (ECOSOC) through Resolution 2000/35
- **Headquarters:** New York, United States (UN Headquarters)
- **Objectives:**
 - Promote **management, conservation, and sustainable development** of all types of forests.
 - Strengthen **long-term political commitment** for forests.
 - Support implementation of **Agenda 21, Rio Forest Principles**, and global forest goals.
- **Key Functions:**
 - Coordinate forest policy across **UN member states**.
 - Oversee the **UN Strategic Plan for Forests 2017–2030**.
 - Foster global cooperation to **halt deforestation and forest degradation**.
 - Organize biennial sessions:
 - **Odd years:** Technical exchange, implementation reviews.
 - **Even years:** Policy development, decision-making.

India and United Nations Forum on Forests:

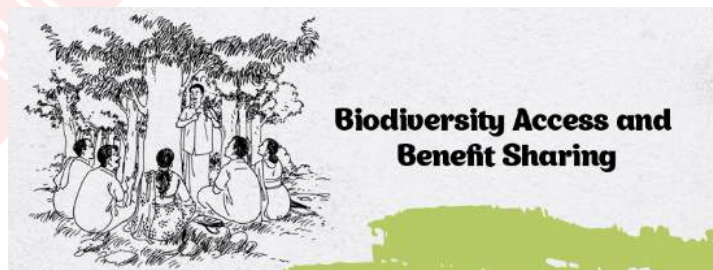
- **India's Participation at UNFF20:**
 - Highlighted commitment to **Voluntary National Contributions (VNCs)** under the **UN Strategic Plan for Forests 2017–2030**.
 - Reported that **forest and tree cover** has increased to **25.17%** of geographical area.
- **Key National Achievements Shared:**

- Restoration under **Aravalli Green Wall Project**.
- **7.86% rise in mangrove cover** over the last decade.
- **1.55 lakh hectares afforested** under Green India Mission.
- **1.4 billion seedlings** planted under the *Ek Ped Maa Ke Naam* campaign.
- **Major Global Contributions:**
 - Invited nations to join the **International Big Cat Alliance (IBCA)**.
 - Pushed for inclusion of **Dehradun CLI (2023)** outcomes on **forest fire management and certification** in global mechanisms.
 - Applauded CLI contributions by **Congo, DPR Korea, and Austria**.

BIODIVERSITY BENEFIT SHARING REGULATIONS 2025

Context:

The National Biodiversity Authority has notified the **Biodiversity Benefit Sharing Regulations 2025**, introducing new rules to regulate **equitable benefit sharing** from the use of India's biological resources, including **digital sequence information**.



About Biodiversity Benefit Sharing Regulations 2025:

- These are updated rules under the **Biological Diversity Act**, aimed at ensuring that users—especially industries—share a part of their economic benefits with local communities and biodiversity conservers.
 - This aligns **India with global Access and Benefit Sharing (ABS)** principles.

Key Provisions

- **Turnover-Based Slabs for Benefit Sharing:**
 - ₹0–5 crore: No sharing
 - ₹5–50 crore: 0.2% of ex-factory turnover
 - ₹50–250 crore: 0.4%
 - Above ₹250 crore: 0.6%
- **Mandatory Reporting:**
 - Firms with **turnover over ₹1 crore** must

disclose annual biodiversity usage.

- **Cultivated Plant Exemption:**
 - Medicinal plant cultivators **exempted** from sharing benefits—aligns with [Biological Diversity \(Amendment\) Act 2023](#).
- **High-Value Species Clause:**
 - For species like **red sanders, sandalwood, agarwood**, minimum benefit sharing is **5%**, extendable to **20% or more**.
- **Digital Sequence Information (DSI):**
 - **Now covered** under the benefit-sharing regime—critical update from the 2014 guidelines.
- **IPR and Research Use:**
 - Researchers and IPR applicants must comply with benefit-sharing norms.
- **Revenue Utilization:**
 - **10–15% retained** by National Biodiversity Authority (NBA); remainder to benefit claimant communities.

- Regulate transfer of research results on Indian biodiversity to non-Indian entities

- **Benefit Sharing Mechanism:** Ensure fair and equitable sharing of **benefits** with **local communities and knowledge holders**
- **Advisory Role:** Advise the Central Government on biodiversity conservation, sustainable use, and policy matters
- **Oversight of State Biodiversity Boards (SBBs):** Coordinate and oversee the functioning of **SBBs and Biodiversity Management Committees (BMCs)**
- **Promotion of Conservation:** Support documentation, preservation, and promotion of **biological heritage** and associated traditional knowledge
- **Compliance with International Conventions:** Ensure national alignment with protocols like the [Nagoya Protocol](#) under the **Convention on Biological Diversity (CBD)**.

Global Context: COP16 & Multilateral Sharing

- At COP16 of the [Convention on Biological Diversity \(CBD\)](#) in [Cali, Colombia](#) (2024), member countries adopted a mechanism for sharing **DSI-related benefits multilaterally**.
- Industries like pharma, cosmetics, agriculture, and biotech were asked to equitably compensate indigenous communities and biodiversity custodians.

INDIA'S FIRST INTER-STATE CHEETAH CONSERVATION CORRIDOR

Context:

Rajasthan has agreed to join India's first inter-state cheetah conservation corridor with Madhya Pradesh.

About National Biodiversity Authority (NBA):

- The **National Biodiversity Authority** is a **statutory body** constituted in 2003 to implement the provisions of the [Biological Diversity Act, 2002](#), and ensure **equitable benefit sharing** from the use of India's biological resources.
- **Headquarter:** Chennai

About India's First Inter-State Cheetah Conservation Corridor:

- **What is it?**
 - A **wildlife corridor project** designed to connect protected habitats in **Madhya Pradesh and Rajasthan** for the [reintroduced cheetahs](#) to roam safely and naturally across a vast ecosystem.
- **Geographical Coverage:**
 - **Total area:** 17,000 sq. km is covered between Madhya Pradesh (10,500 sq. km) and Rajasthan (6,500 sq. km).

Organizational structure:

- **Chairperson** (nominated by Central Government)
 - Must have knowledge or experience in biodiversity conservation, sustainable use of biological resources, or equitable benefit sharing
- **Ex-officio members:** Representatives from Ministries of Environment, Agriculture, Science & Technology, AYUSH, Tribal Affairs, etc.
- **Expert members** from fields like ecology, biotechnology, and law

Key Locations Involved:

- **Palpur Kuno National Park, Madhya Pradesh:** Located in Sheopur district, Kuno is the main site for India's cheetah reintroduction project.
- **Gandhi Sagar Sanctuary, Madhya Pradesh:** Situated along the Chambal River in Mandasaur district, this sanctuary is rich in hilly terrain and diverse wildlife.
 - It is being developed as the second habitat for cheetahs in Madhya Pradesh.

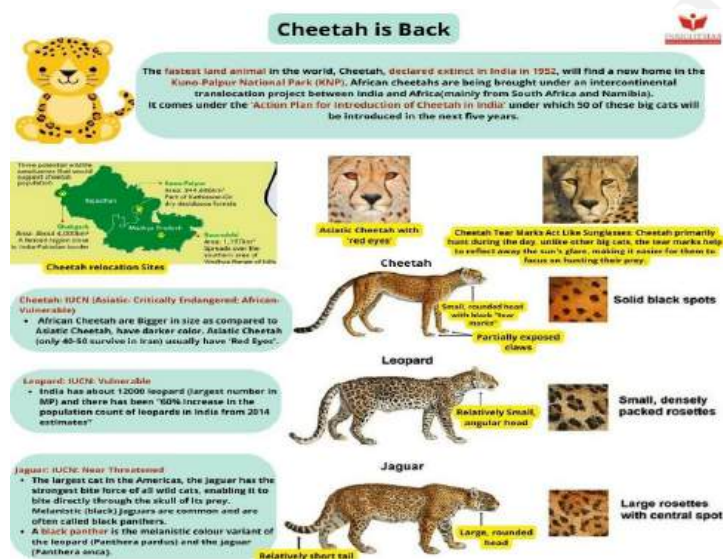
Key Functions and Powers

- **Regulatory Role:** Grant approvals for access to **biological resources** and **associated traditional knowledge** by foreign nationals, companies, and NRIs

- **Mukundara Hills Tiger Reserve, Rajasthan:** Located in Kota division, it comprises parts of Darrah, Jawahar Sagar, and Chambal sanctuaries.
 - The reserve has been identified as a potential cheetah habitat due to its arid grassland ecosystem.
- **Rajasthan districts:** Kota, Bundi, Baran, Jhalawar, Sawai Madhopur, Karauli, Chittorgarh.
- **Proposed inclusion:** Forest areas of Jhansi and Lalitpur (Uttar Pradesh)

Significance for India:

- **Revives Native Species:** Strengthens India's cheetah reintroduction mission.
- **Strengthens Federal Conservation:** Reflects cooperative federalism in ecological governance.
- **Aligns with Global Goals:** Supports Convention on Biological Diversity (CBD) targets.



Key Features of the Corridor:

- **Inter-State Connectivity:** First-of-its-kind wildlife linkage across two major states.
- **Seamless Movement:** Enables cheetahs to migrate naturally between reserves.
- **Ecological Restoration:** Aims to restore and conserve the grassland ecosystem.
- **Strategic Collaboration:** Supported by NTCA and Wildlife Institute of India, with expected MoU between states.
- **Model for Asia:** Recognised as a unique conservation model in Asia by experts.

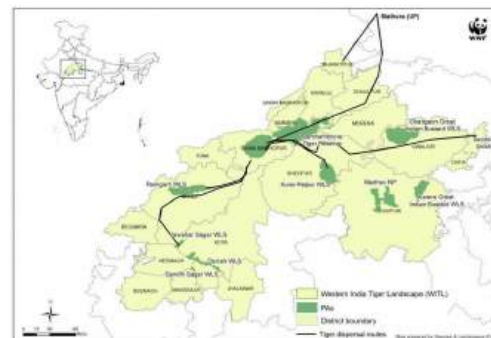
PALAMU TIGER RESERVE

Context:

Jharkhand's Jaigir village has become the first village to be fully relocated from the core of Palamu Tiger Reserve (PTR), reducing human pressure on wildlife.

About Palamu Tiger Reserve (PTR):

- **What it is?**
 - Palamu Tiger Reserve is one of India's first nine Project Tiger reserves, notified in 1974, and the only one in Jharkhand.



- It includes parts of the Betla National Park and is known for its rich biodiversity and conservation legacy.
- **Location:** Situated in the Chhotanagpur Plateau, Latehar district, Jharkhand.
- **Total Area:** 1129.93 sq. km
- **History:**
 - Declared under Project Tiger in 1974.
 - Site of the world's first tiger pugmark-based census in 1932, led by J.W. Nicholson.
- **Flora and Fauna**
 - **Flora:** Dominated by Northern Tropical Dry Deciduous forests, especially Sal (Shorea robusta).
 - **Fauna:** Keystone species include Tiger, Asiatic Elephant, Leopard, Sloth Bear, Grey Wolf, Four-horned Antelope, Indian Pangolin, Otter.
- **Rivers:** Drained by three major rivers: North Koel, Burha (perennial), and Auranga.
- **Rock types:** Gneiss, Quartzite, Amphibolite, and Laterite.
 - **Gondwana formations:** sandstone, shale, haematite.

ADVANCED INSTITUTE FOR WILDLIFE CONSERVATION (AIWC)

Context:

Tamil Nadu has transferred the management of its ₹50

crore Endangered Species Conservation Fund from the defunct SFDA to the Advanced Institute for Wildlife Conservation (AIWC).



- This aims to fast-track urgent conservation projects for species like Malabar civet and Salim Ali's fruit bat.

About Advanced Institute of Wildlife Conservation (AIWC):

- **What it is:** A research and conservation institute under the Tamil Nadu Forest Department providing science-backed solutions for wildlife protection.
- **Established in:** October 2017, located in Vandalur, Chennai.
- **Objective:** To promote **evidence-based conservation**, research, and capacity building for protecting wildlife across Tamil Nadu.
- **Core Functions:**
 - Conduct **field-based and captive [wildlife research](#)**.
 - Collaborate with **zoological parks and institutions** for training and education.
 - Offer scientific advisories and facilitate conservation technology deployment.
 - Support grant-funded research on threatened species under the new fund.
- **Recent Focus:** Studying and conserving rare species like **Salim Ali's fruit bat** and the **Malabar large-spotted civet**.

About Malabar Large-Spotted Civet:

- **What it is:** A critically endangered carnivorous mammal found in the Western Ghats, also known as Viverra civettina.
- **IUCN Status:** Critically Endangered (CR)
- **Physical Traits:**
 - Weighs around **18–20 lbs** and estimated to be **4 feet** in length.
 - Features include grey fur with dark spots, five white tail rings, and a distinct black dorsal crest.
- **Biological Traits:**
 - **Nocturnal** and **solitary** in behaviour.

- Females usually bear **2–3 offspring** per litter.

- **Habitat:** Previously in lowland forests, now confined to cashew plantations and fragmented habitats due to deforestation.
- **Dietary Habits:** Feeds on reptiles, birds, amphibians, fish, small mammals, eggs, and fruits.

BLUE TALKS

Context:

India hosted the **Second Blue Talks** in collaboration with France and Costa Rica to support global marine conservation goals.



- The event aimed to strengthen dialogue ahead of the **3rd United Nations Ocean Conference (UNOC3)** scheduled in **Nice, France**.

About Blue Talks:

- **What It Is?**
 - A **multilateral consultation platform** that brings together governments, scientists, and civil society to build consensus for sustainable ocean use.
- **Held At:** New Delhi, hosted by **Ministry of Earth Sciences (MoES)**, in partnership with the Embassies of France and Costa Rica.
- **Objectives:**
 - Foster stakeholder dialogues on the future of ocean sustainability.
 - Accelerate progress on **SDG 14** (Life Below Water).
 - Promote global cooperation in marine research, education, and innovation.
 - Launch strategic knowledge tools.

About 3rd United Nations Ocean Conference (UNOC3)

- **What It Is?**
 - A global UN event to advance **marine**

conservation and sustainable use of ocean resources under **SDG 14**.

- **Hosted by:** France and Costa Rica
- **Organised by:** United Nations with participation from member states, NGOs, academia, civil society, private sector, and international bodies.
- **Objectives:**
 - Support actions to **conserve oceans**, **reduce marine pollution**, and build **global partnerships**.
 - Promote **BBNJ Agreement** ratification for **biodiversity governance in high seas**.
 - Adopt the “**Nice Ocean Action Plan**” — a legally non-binding but politically impactful declaration.
- **Conference History:**
 - **1st UNOC (2017)** – Held in **New York, USA** focused on raising awareness and voluntary commitments.
 - **2nd UNOC (2022)** – Hosted by **Portugal**, emphasized innovation and science-led solutions.
 - **Upcoming 3rd UNOC (2025)**
 - **Venue:** Nice, France
 - **Theme:** “Accelerating action and mobilizing all actors to conserve and sustainably use the ocean.”

Syllabus: Species & Plant in News

SAOLA

Context:

An international team of scientists has successfully mapped the genome of the **Saola** (*Pseudoryx nghetinhensis*), the world’s rarest large land mammal, offering new hope for its conservation through genetic rescue and captive breeding.



About Saola:

- **What is Saola?**
 - A **critically endangered bovine species**, often called the “**Asian unicorn**” due to its extreme rarity.
- **Scientific name:** *Pseudoryx nghetinhensis*
- **First described:** 1993, after a skull discovery in Vietnam in 1992.
 - Closely related to cattle, but **resembles an antelope** in appearance.
- **Habitat:**
 - **Endemic** to the **Annamite Mountains**, on the **Laos–Vietnam border**.
 - Found in **evergreen forests** with **high humidity** and **minimal dry seasons**.
- **IUCN Red List Status:** Critically Endangered
- **Population estimate (2015):** 50–300 individuals
- **Threats:** Habitat loss, poaching, and indiscriminate snaring
- **Physical Features:**
 - **Height:** ~**33 inches** at the shoulder
 - **Horns:** Straight, parallel horns (~20 inches) found in both sexes
 - Unique **facial white markings** and **muzzle scent glands**
- **Importance of Genome Sequencing:**
 - **Genome of 26 individuals sequenced** from remains found in hunter households.
 - Revealed **population split** occurred **5,000–20,000 years ago**, likely due to climate and human-induced habitat change.
 - Genetic data shows **complementary diversity** between populations, suggesting they can be **combined for a stronger gene pool**.
 - Paves the way for **captive breeding programs** and **future reintroduction efforts**.
 - Offers scientific tools to **prevent extinction** through **targeted conservation**.

PHAYRE’S LANGUR AND WESTERN HOOLOCK GIBBON

Context:

The ‘Primates in Peril 2023–2025’ report has listed Cross River Gorilla and Tapanuli Orangutan among the 25 most endangered primates globally.

- Two Indian species — **Phayre’s Langur** and **Western Hoolock Gibbon** — were considered for the

final list, highlighting their growing conservation concern.

About Primates in Peril 2023–2025:

What It Is?

- A biennial global report identifying the **25 most endangered primates** worldwide based on scientific assessments.

Published By:

- An international team of **primatologists**, supported by institutions like **IUCN**, **Bristol Zoological Society**, and **Conservation International**.

Global Distribution of Threatened Species

- **Africa:** 6 species
- **Asia:** 9 species
- **Madagascar:** 4 species
- **Neotropics (South America):** 6 species
- 15 primates are newly added. (Of them **8 features** for the first time).

About Phayre's Langur (*Trachypithecus phayrei*):

- **Status:**
 - **IUCN Red List:** Endangered
 - **Distribution:** Northeast India, East Bangladesh, and Western Myanmar
 - **Habitat:** Tropical evergreen, deciduous, and bamboo-dominated forests
- **Features:**
 - **Physical:**
 - Deep bluish-brown coat, **spectacle-like white rings** around eyes
 - Males weigh ~7.9 kg; females ~6.9 kg
 - Tail longer than body, aiding arboreal movement
 - **Biological & Social:**
 - Lives in **arboreal groups**, mainly diurnal and folivorous.
 - Distinct sagittal crest on head; vocal and territorial behavior.
 - **Diet:**
 - Primarily **leaf-eating (colobine)**; also consume fruits and seeds
 - Shows **specialized craniodental adaptations** for seed consumption.



About Western Hoolock Gibbon (*Hoolock hoolock*):

- **Status**
 - **IUCN Red List:** Endangered
 - **WPA:** Schedule I
 - **CITES:** Appendix II
 - **Distribution:** Northeast India, Eastern Bangladesh, Western Myanmar
 - **Habitat:** Tropical evergreen and semi-evergreen forests
- **Features:**
 - **Physical:**
 - Males are black with **white brows**, females are grey-brown
 - Known for **vocal duets** and white rings around eyes and mouth
 - **Biological & Social:**
 - Lives in **monogamous pairs** with strong territorial behavior
 - Moves by **brachiation** at speeds up to 55 km/hr
 - **Diet:**
 - Primarily **frugivorous**, supplemented by insects and leaves
 - Arboreal and diurnal, relying heavily on **tall canopy cover**

NAGSHANKAR TEMPLE MODEL FOR TURTLE CONSERVATION

Context:

On World Turtle Day, Nagshankar Temple in Assam was officially declared a model temple for turtle conservation.

About Nagshankar Temple Model for Turtle Conservation:

- **Location:** Situated in **Biswanath district**, near **Sootea town**, approximately **70 km from Tezpur**, Assam.
- **Historical Background:**
 - Believed to be built in the **4th century AD** by **King Nagashankar of Nagakha dynasty**.
 - Dedicated to **Lord Shiva**, but also honours turtles as incarnations of Lord Vishnu.
- **Key Features:**



- Houses a **large pond** home to **250–300 turtles**, including **critically endangered black softshell turtles**.
- Also, home to **peacocks, pythons, deer**, making it a micro-wildlife sanctuary.
- The temple serves both **religious** and **ecological** purposes.
- **Turtle Conservation Efforts:**
 - **Biodiversity Preservation:**
 - Pond supports three rare species: **Black Softshell, Indian Softshell, and Malayan Softshell turtles**.
 - The pond is fed by the **Brahmaputra River** basin, offering a suitable habitat.
 - **Community-Led Protection:** Nagshankar Temple Committee works with Turtle Survival Alliance (TSA) India, Help Earth, and Kaziranga National Park.
 - **Scientific Intervention:** Forest department artificially **incubates turtle eggs** and releases hatchlings into the wild.
 - **Replication Across Assam:** Around **25 temples across Assam** now serve as **turtle conservation hubs**, including Hajo's Hayagriva Madhav Temple.

troglophile loach, capable of living both **underground (hypogean)** and **aboveground (epigean)** environments.

- Belongs to the **Nemacheilidae family** (stone loaches).
- **Scientific Name:** *Schistura densiclava*
 - *Densiclava* means “thick stripe” in Latin, referring to the **bold band near its dorsal fin**.
- **Key Features:**
 - **Dual Habitat Adaptation:** Thrives in **low-oxygen, 18°C cave waters**, yet retains pigmentation and vision, unlike most cave fish.
 - **Distinct Appearance:**
 - Pale yellow-green body with **14–20 black bars**.
 - Males are slimmer with puffed cheeks, while females are broader with consistent markings.
 - **Unique Diet:** Feeds on **copepods, insect parts, shrimps, and bat droppings**, indicating resilience in nutrient-scarce habitats.
 - **Ecological Endemism:** Found exclusively inside **Krem Mawjymbuin**, suggesting it is **endemic to this cave system**.
 - **Genetic Distinction:** DNA analysis confirms it is **genetically separate** from other *Schistura* species in Northeast India.

MEGHALAYA'S NEW CAVE-DWELLING FISH

Context:

A team of Indian zoologists discovered a new cave-dwelling fish species, *Schistura densiclava*, in Krem Mawjymbuin Cave, East Khasi Hills, Meghalaya.



About Meghalaya's New Cave-Dwelling Fish:

- **What Is It?**
 - *Schistura densiclava* is a newly discovered

About Mawjymbuin Cave:

- **Located In:** Mawjymbuin Cave, also known as **Krem Mawjymbuin**, is situated in **Mawsynram village**, East Khasi Hills district of **Meghalaya**.
- **Key Features of the Cave:**
 - **Natural Limestone Formation:** The cave is made of **calcareous sandstone** and housing numerous stalagmites formed by calcium carbonate deposition.
 - **Geological Interest:** Hosts **unique stalagmite and stalactite formations**, attracting **geologists** and researchers for field studies.
 - **Symper Rock:** A notable **dome-shaped rock** with a flat top within the cave structure, known as **Symper Rock**.

LONGEST BANANA INFRACTESCENCE (MUSA INDANDAMANENSIS)

Context:

A **wild banana species** *Musa indandamanensis* from the

Andaman and Nicobar Islands has recorded the world's longest banana infructescence at 4.2 metres.



About Longest Banana Infructescence (*Musa indandamanensis*):

- **What it is:**
 - An **infructescence** is the complete fruiting part of a plant.
 - The 4.2-metre-long infructescence was found in *Musa indandamanensis*, a wild banana species endemic to [Andaman and Nicobar Islands](#).
- **Key Features:**
 - Found in **Campbell Bay**, Nicobar group; tree height ~11 m, stem girth ~110 cm.
 - Previously, infructescences up to 3 m were recorded; the new one sets a **world record**.
 - Specimens are displayed in **Indian Museum, Kolkata**, and regional botanical museums.
- **IUCN Status:** Critically Endangered — according to recent conservation assessments.
- **Significance:**
 - Serves as a **genetic reservoir** for developing [disease-resistant](#) and **high-yield** banana varieties.
 - Conserved ex-situ at **A.J.C. Bose Indian Botanic Garden** and other regional botanical centres.

INDIAN YAK

Context:

Indian scientists have achieved a breakthrough in yak genomic research by assembling the first-ever chromosome-level genome of the Indian yak (*Bos grunniens*).

- The initiative, led by [ICAR-NRC on Yak, Dirang](#), will bolster breeding programs and improve conservation of this high-altitude livestock species.

About Indian Yak:

- **What It Is:**
 - The **Himalayan yak** is a **long-haired, high-altitude bovine species** belonging to the **Bovini tribe** (includes cattle, buffalo, and bison).
 - Scientifically known as ***Bos grunniens***, it is revered as the '**ship of the Himalayas**' for its transport and livelihood utility.
- **Habitat & Distribution:**
 - **Endemic to the Tibetan Plateau** and surrounding high-altitude zones.
 - Comfortable at altitudes **above 14,000 feet**.
 - In India, yaks are reared in:
 - Arunachal Pradesh, Sikkim, Uttarakhand, Himachal Pradesh, Jammu & Kashmir, and Ladakh.
- **Key Features:**



Arunachal yak

- **Extreme Cold Resistance:** Tolerates temperatures as low as **-40°C**.
- **Adapted Physiology:** Possesses an **enlarged rumen** to digest **low-quality forage** efficiently.
- **Thick Coat:** Long, hanging hair forms an insulating layer against cold winds.
- **Transhumance Rearing:** Traditionally managed under **primitive nomadic systems**.
- **Lifeline of Nomads:** Critical for **milk, meat, wool, hide, dung fuel, and transport** in Himalayan economies.
- **Significance:**
 - **Livelihood Security:** Backbone of [pastoral communities](#) in eco-fragile zones.
 - **Genetic Resource:** Offers traits like **cold resilience** and **disease resistance**, vital for

- climate-smart livestock breeding.
- **Economic Importance:** Supports eco-tourism, dairy cooperatives, and wool industry in hill economies.
- **Ecological Role:** Integral to maintaining grassland balance and pastoral sustainability in alpine meadows.

NARAYANPATNA GOAT

Context:

The Narayanpatna goat, native to [Odisha's Eastern Ghats](#), has drawn attention for its disease resistance and climate resilience, but faces threats due to unscientific crossbreeding and lack of breed recognition.



About Narayanpatna Goat:

- **What is It?**
 - A non-descriptive [native goat breed reared](#) by tribal communities in **Koraput district**, Southern Odisha.
 - Known for its **hardiness**, **reproductive efficiency**, and **adaptability to harsh agro-climatic conditions**.
- **Native Region:**
 - Found in **Narayanpatna and Bandhugaon blocks** of Koraput (Odisha), within the **Eastern Ghats**.
 - Reared under **extensive**, [low-input systems](#) in **hilly, forested terrains** with tropical monsoon climate.
- **Key Features:**
 - **Physical Traits:**
 - Medium-to-large size; coat colours vary from **white with black/brown patches** to pure shades.
 - **Curved horns**, drooping ears, and robust frame.
 - Bucks weigh **30–35 kg**, does **25–30 kg**.
 - **Reproductive Traits:**

- First kidding at 16–18 months.
- Kidding interval: **8–10 months**.
- **Twins are common**, increasing productivity.
- **Disease Resistance:**
 - **Naturally selected** for resistance to common endo- and ecto-parasites.
 - Requires **minimal veterinary intervention**.
- **Economic Importance:**
 - Source of **meat, income**, and **cultural exchange** during rituals and marriages.
 - Acts as a **financial buffer** during crop failures.
 - **Women and children** play active roles in rearing, [promoting gender-inclusive livelihoods](#).

OPERATION OLIVIA

Context:

The [Indian Coast Guard](#), under Operation Olivia, successfully protected a record 6.98 lakh Olive Ridley turtles during their mass nesting at the Rushikulya river mouth in Odisha.



About Operation Olivia:

- **What it is:** A flagship marine conservation initiative launched annually by the **Indian Coast Guard (ICG)** from **November to May** to protect **Olive Ridley turtles** during their mass nesting season.
- **Organisation Involved:** Indian Coast Guard in collaboration with **State Pollution Control Boards**, **NGOs**, and **local fishing communities**.
- **Objectives:**
 - Prevent illegal fishing during turtle breeding season.
 - Ensure **safe nesting** along Odisha's key beaches (Gahirmatha, Rushikulya, Devi).
 - Promote use of [Turtle Excluder Devices \(TEDs\)](#) among fishing communities.

- **Key Features:**
 - 5,387+ surface patrol sorties and 1,768+ aerial missions since inception.
 - Extensive community outreach, educational awareness, and MoUs with NGOs.
 - Use of modern surveillance systems and inter-agency coordination for enforcement.

About Olive Ridley Turtles:

- **Scientific Name:** *Lepidochelys olivacea*
- **IUCN Status:** Vulnerable
- **Habitat & Distribution:**
 - Found in **warm waters** of the Pacific, Indian, and Atlantic Oceans.
 - **Major nesting sites in India:** Odisha ([Gahirmatha](#), Rushikulya, Devi), Tamil Nadu, Andhra Pradesh, Andaman & Nicobar Islands.
- **Biological Features:**
 - Smallest sea turtle species, weighing up to **45 kg**, olive-coloured, heart-shaped carapace.
 - **Arribada (mass nesting):** Thousands of turtles nest simultaneously, especially from **Nov–Apr**.
 - **Omnivorous diet:** Feeds on crustaceans, jellyfish, algae, molluscs.

DUGONG

Context:

World Dugong Day was observed to raise awareness about the conservation needs of dugongs, with India reaffirming its focus on habitat protection in areas like Palk Bay and [Gulf of Mannar](#).



About Dugongs:

- **What it is:** Dugongs (*Dugong dugon*) are large, herbivorous marine mammals often called “sea cows.” They are the only extant species of the Dugongidae family and closely related to manatees.
- **Habitat in India:**
 - Warm shallow coastal waters
 - **Found in:** Gulf of Mannar, [Palk Bay](#), Gulf of Kutch, Andaman & Nicobar Islands

IUCN Status:

- **Global:** Vulnerable
- **India:** Regionally Endangered
- Schedule I species under [Wildlife \(Protection\) Act, 1972](#) (highest legal protection)

Features of Dugongs:

- **Physical Characteristics:**
 - **Body shape:** Dugongs have a torpedo-shaped body with flipper-like forelimbs and no dorsal fin for streamlined swimming.
 - **Size:** They can grow up to 3 meters long and weigh around 300 kg.
 - **Lifespan:** Dugongs can live up to 70 years in the wild.
- **Biological Traits:**
 - **Diet:** Dugongs are herbivores that feed mainly on seagrass, consuming 20–30 kg daily.
 - **Teeth:** Their teeth regenerate throughout life due to constant wear from abrasive seagrass.
- **Reproductive Traits:**
 - **Maturity:** They reach [reproductive maturity](#) at around 9–10 years of age.
 - **Birth cycle:** Dugongs give birth once every 3–5 years, making reproduction slow.
 - **Population growth:** Their population increases at a maximum rate of about 5% per year.
- **Social Behaviour:**
 - **Grouping:** Dugongs are usually solitary or seen in mother-calf pairs.
 - **Habitat preference:** Unlike manatees, dugongs live strictly in marine environments and avoid human interaction.
- **Ecological Importance:**
 - Known as “**gardeners of the sea**” for maintaining healthy seagrass beds.
 - Promote biodiversity by nurturing fish nurseries.
 - Play a vital role in [carbon sequestration](#) and coastal ecosystem stability.

BIRD FLU

Context:

Brazil, the world’s largest chicken exporter, reported its first case of bird flu on a commercial poultry farm, raising alarms

over global poultry supply chains.

About Bird Flu:

- **What is Bird Flu (Avian Influenza)?**
 - Bird flu is a **viral infection** caused by **influenza Type A viruses**, primarily affecting **birds**, but it can also infect **mammals**, including humans.
- **Symptoms:**
 - **In birds:** Sudden death, respiratory distress, swelling, reduced egg production.



- **In humans (rare):** Fever, cough, sore throat, **respiratory issues**, sometimes leading to severe complications or death.
- **Transmission:** Spreads via **direct contact** with infected birds, droppings, or contaminated surfaces.
- **Zoonotic:** Can cross species barrier, typically bird-to-human.
 - **Limited human-to-human transmission** reported globally (CDC), but not yet in the US.
- **Other Affected Species:**
 - Detected in **cats, dogs, dairy cows, sheep**, and some **wild mammals**.
 - Notably, **house cats** and **livestock** have shown increasing vulnerability in recent outbreaks.
- **Vaccine Availability:**
 - **No approved human vaccine** exists currently.
 - **Poultry vaccines** are available and used in countries like **France and the US** to curb outbreaks.



About 16th Asiatic Lion Census:

- **Conducted By:** Gujarat Forest Department under the supervision of the State Wildlife Division.
- **Total Lion Population:** **891 lions**, including 196 adult males and rest include females, sub-adults, and cubs.
- **Area Coverage:** Spanned 35,000 sq km across **58 talukas in 11 districts**.
- **Census Methodology:**
- Conducted in **two phases**:
 - **Phase 1:** Direct Beat Verification
 - **Phase 2:** Final Enumeration
- **Data Insights:**
 - Notable **range expansion** beyond **Gir forest**.
 - Growing **habitat connectivity** and **stable sub-populations** outside protected areas.

About Asiatic Lions (*Panthera leo persica*):

- **IUCN Red List:** Vulnerable (**Recently it was reclassified** as Vulnerable from Endangered status)
- **CITES:** Appendix I
- **Wildlife Protection Act, 1972:** Schedule I
- **Habitat:**
 - **Current Range:** **Gir National Park** and surrounding areas in the **Saurashtra region** of Gujarat.
 - **Historical Range:** From **West Bengal** to **Madhya Pradesh** in central India, and parts of **West Asia**.
- **Biological & Physical Features:**
 - **Size:** Males: 160–190 kg; Females: 110–120 kg.
 - **Height:** Approx. 110 cm at shoulder; **length** up to 2.92 m (including tail).
 - **Distinct Feature:** A visible **belly fold**, less prominent mane compared to African lions.
 - **Coat Color:** Varies from sandy to buff-grey, sometimes with a silvery sheen.
 - **Social Structure:** Lives in small **prides**, lesser in size and complexity than African lion groups.

16TH ASIATIC LION CENSUS

Context:

Gujarat Chief Minister announced the completion of the 16th Asiatic Lion Population Census, reporting a population of 891 lions.

Syllabus: Defence, ISRO & Navy

INTER-SERVICES ORGANISATIONS (COMMAND, CONTROL AND DISCIPLINE) ACT, 2023

Context:

The Ministry of Defence notified subordinate rules under the Inter-Services Organisations (Command, Control and Discipline) Act, 2023, making the Act fully operational.



Summary of Newly Notified Rules:

- These rules, framed under **Section 11 of the Act**, provide a **structured operational framework** for ISOs.
- They empower ISO heads to exercise **full administrative and disciplinary authority** over service members from any branch.
- Rules establish **command succession** in case of the absence of the designated officer and prevent **overlapping disciplinary proceedings**.
- They ensure **operational synergy** across tri-service commands without altering individual service laws.

About Inter-Services Organisations (Command, Control and Discipline) Act, 2023:

- **Came into Force:** May 10, 2024, after receiving **Presidential assent on August 15, 2023**, and Parliament passage during the **2023 Monsoon Session**.
- **Objective:**
 - To **unify command** and promote **functional efficiency** across inter-services establishments such as **Andaman & Nicobar Command**, **National Defence Academy**, and **Defence Space Agency**.
- **Key Features of the Act:**
 - **Empowering ISO Leadership:**
 - Commanders-in-Chief and Officers-

in-Command can now exercise **disciplinary and administrative control** over all personnel under their ISO, regardless of whether they belong to the **Army, Navy, or Air Force**.

- Promotes **quick decision-making** and a **clear chain of command**.
- **Tri-Service Integration:**
 - Recognises existing ISOs and provides a legal framework for forming new **Joint Services Commands**.
 - Encourages **jointness** in planning and execution across forces.
- **No Change in Existing Service Laws:**
 - Does **not alter the Army, Navy, or Air Force Acts**.
 - Ensures that **unique service conditions** remain intact while enabling joint administrative mechanisms.
- **Command Clarity and Emergency Protocols:**
 - Provides clear succession procedures when commanding officers are on leave or unavailable.
 - Allows **higher formations** to deputize acting commanders during emergencies.
- **Administrative Efficiency:** Prevents duplication of disciplinary actions, promotes synergy in resource utilisation, and strengthens command accountability.

BRAHMOS SUPERSONIC CRUISE MISSILE

Context:

During **Operation Sindoor**, India reportedly deployed the BrahMos supersonic cruise missile in combat for the first time against Pakistani military installations.

About BrahMos Supersonic Cruise Missile:

- **What is BrahMos Missile?**
 - BrahMos is a **supersonic cruise missile** jointly developed by India and Russia. It is a precision strike weapon capable of being launched from land, air, sea, and underwater platforms.



- **Development Origin:** A product of a [1998 intergovernmental agreement](#), BrahMos Aerospace is a joint venture between India's DRDO (50.5%) and Russia's NPO Mashinostroyeniya (49.5%).
- **Name Origin:** The name is derived from **Brahmaputra (India)** and **Moskva (Russia)** rivers.
- **Anatomy of BrahMos Missile**
 - **Structure:** It is a **two-stage missile** with a solid-propellant booster and a **liquid-fueled ramjet engine**.
 - **Speed:** Reaches up to **Mach 3** (three times the speed of sound).
 - **Range:** Originally **290 km**, upgraded variants now exceed **350–400 km**, with future versions expected to reach **800+ km**.
 - **Stealth:** Low [radar cross-section \(RCS\)](#) and compact design enhance evasion from enemy radar.
 - **Guidance:** Equipped with a **'fire and forget'** system—requires no human input after launch.
- **Key Features:**
 - **Multi-platform Capability:** Deployable from **ships, submarines, mobile land launchers, and fighter aircraft**.
 - **Precision:** Known for high **accuracy**, deep-dive, terrain-hugging, and **mountain-warfare adaptability**.
 - **Speed & Kinetic Energy:** 3x speed and 9x kinetic energy compared to subsonic cruise missiles.
 - **Stand-off Range:** Enables operators to launch the missile without entering enemy airspace.
 - **Terminal Phase Altitude:** Can descend to **10 meters**, enabling precise target hits.
- **Variants of BrahMos Missile:**
 - **Ship-based Variant**
 - Fired from static and mobile warships.
 - Supports **vertical and inclined launch modes**.
 - Capable of salvo fire (up to 8 missiles).

- Inducted into the **Indian Navy** in 2005.
- **Land-based Variant**
 - Mobile autonomous launchers with 3 missiles each.
 - Deployed along **India's borders** with multiple blocks:
 1. **Block I:** Precision strike
 2. **Block II:** Deep-dive and target discrimination
 3. **Block III:** Mountain warfare adaptation
 - Range upgraded to **400 km**; future variant may cross **1,000 km**.
- **Air-launched Variant (ALCM)**
 - Integrated with **Sukhoi-30 MKI** aircraft.
 - First test: November 2017; validated for **land and sea targets**.
 - Offers **long-range deterrence** in the **Indian Ocean Region**.
- **Submarine-launched Variant**
 - Launched from **50 meters below** sea level.
 - First tested in **2013** off the coast of Visakhapatnam.
 - Designed for **canister-based vertical launch**.
- **BrahMos-NG (Next Generation) (under development)**
 - Will be **smaller, lighter**, and have **enhanced stealth**.
 - Designed for **aircraft and submarines**, including **torpedo-tube launch**.
 - Improved ECCM resistance and operational flexibility.

BRAHMOS-NG (NEXT GENERATION) MISSILE

Context:

The BrahMos-NG (Next Generation) missile is nearing flight testing, with the existing BrahMos missile's range extended to 800 km under development.

About BrahMos-NG (Next Generation):

- **What It Is?**
 - **BrahMos-NG** is a **smaller, lighter, and more versatile supersonic cruise missile** designed for deployment across a wider range of platforms, including fighter aircraft, ships, and submarines.

- **Developed By:** Jointly developed by India's [DRDO](#) and Russia's [NPO Mashinostroyeniya](#) under the BrahMos Aerospace partnership.

- **Objective:**



- To offer a **miniaturized, stealthier, and more agile missile** system capable of engaging land and sea-based targets with ultra-precision.
 - Designed to **equip multiple platforms**, including [LCA Tejas](#), [Su-30MKI](#), naval vessels, and submarines.
- **Key Features of BrahMos-NG:**
 - **Reduced Size & Weight:** Weighs approximately **1.5 tonnes** vs. the original's 2.5 tonnes, allowing integration on **more platforms** including light fighters.
 - **High Speed & Range:** Maintains **Mach 2.8** speed with a **400–450 km range**, with ongoing tests extending range **up to 800 km**.
 - **Stealth Capabilities:** Enhanced with [next-gen stealth technology](#) and low radar signature.
 - **Versatile Launch Options:** Can be launched from **air, land, ships, submarines** (via torpedo tubes and vertical launch systems).
 - **Advanced ECCM:** Improved Electronic Counter-Countermeasures (ECCM) for better resistance against jamming.
 - **Precision Targeting:** Suitable for **land-attack roles**, [anti-ship missions](#), and **underwater warfare** scenarios.
- **BrahMos-NG is Superior to BrahMos:**
 - **Miniaturization** enables compatibility with **more aircraft** including Tejas, Rafale, and MiG-29.
 - **Faster deployment and reload cycles** due to reduced logistics burden.
 - **Higher platform density:** Multiple missiles can be mounted on a single aircraft or ship.
 - **Future-proof design** aligned with modern stealth, mobility, and modularity requirements.

EXERCISE TEESTA PRAHAR

Context:

The [Indian Army](#) conducted Exercise Teesta Prahar in the riverine terrain of North Bengal, showcasing joint warfare capability and technological integration.

About Exercise Teesta Prahar:

- **What It Is:**
 - A **large-scale military field exercise** conducted at the **Teesta Field Firing Range**, West Bengal.
 - Aimed to simulate and validate combat operations in **challenging riverine and all-terrain environments**.



- **Organisations Involved:**
 - Conducted by the **Indian Army's Trishakti Corps** under the Eastern Command.
 - Involved integrated participation from: Infantry, Mechanised Infantry, Artillery, Armoured Corps, Para Special Forces, Army Aviation, and Engineers and Signals
- **Objectives:**
 - **Validate Jointness:** Promote seamless coordination between combat arms and support services.
 - **Enhance Operational Readiness:** Test rapid mobilisation and quick-response manoeuvres in real-time scenarios.
 - **Integrate Technology in Warfare:** Deploy next-gen weapon systems and modern military technologies.
 - **Simulate Future Combat Environments:** Practice tactical drills and battle rehearsals for hybrid and high-tech warfare.
- **Key Features:**
 - **Focus on jointness:** Multi-branch coordination for integrated battlefield synergy.
 - **Rapid mobility drills:** Quick deployment across complex riverine terrain.
 - **Tech-enabled warfare:** Incorporation of

- advanced surveillance, communication, and weapon systems.
- **All-terrain combat:** Training in geographically and environmentally diverse zones.
- **Post-Operation Sindoor Context:** Reinforces interoperability after India's successful joint Army-Air Force strike.

BHARGAVASTRA COUNTER-DRONE SYSTEM

Context:

India successfully conducted trials of 'Bhargavastra', a new low-cost counter-drone micro-missile system, developed by Solar Defence and Aerospace Ltd (SDAL).



About Bhargavastra Counter-Drone System:

What it is?

A **micro-missile-based counter-drone system** designed to detect and eliminate hostile drones, including drone swarms, using guided munitions.

Developed by: Solar Defence and Aerospace Ltd ([SDAL](#)) in partnership with Economic Explosives Ltd.

Objective: To provide a **cost-effective, rapid-response solution** for **neutralising drone threats**, especially in sensitive border and conflict zones.

Key Features of Bhargavastra:

- **Long Detection Range:** Can detect **small aerial drones beyond 6 km**.
- **Micro-Missile Arsenal:** Supports **simultaneous launch of 64 micro missiles**, enabling rapid engagement of multiple targets.
- **Salvo Launch Capability:** Successfully tested salvo mode firing of **two rockets within 2 seconds**.
- **Mobile Deployment:** Mounted on a **mobile platform**, ensuring flexible deployment across varied terrains including **high**

altitudes.

- **Extended Engagement Range:** Targets can be neutralised at **distances beyond 2.5 km**, ensuring stand-off protection.

Significance:

- **First of its Kind:** India's first micro-missile-based counter-drone system for Army Air Defence.
- **Bridges Capability Gap:** Addresses a critical void in India's anti-drone warfare preparedness.
- **Cost-Effective:** Offers an economical alternative to expensive air defence systems against low-cost drone threats.
- **Dual Interest:** [Indian Air Force](#) has shown interest, reflecting joint-service utility.
- **Global Relevance:** Few comparable systems exist globally, marking India's leap in indigenous defence innovation.

MADE IN INDIA FIFTH-GENERATION FIGHTER JET

Context:

The Defence Minister has officially approved the execution of the indigenous fifth-generation stealth fighter jet project, the Advanced Medium Combat Aircraft (AMCA).



About Made in India Fifth-Generation Fighter Jet:

- **What It Is?**
 - A next-generation **stealth-enabled fighter jet**, designed and built in India to enhance the Indian Air Force's (IAF) deep-strike and air superiority capabilities.
- **Organisations Involved:** Ministry of Defence, Defence Research and Development Organisation (DRDO), and Aeronautical Development Agency (ADA) in partnership with Hindustan Aeronautics Limited ([HAL](#)).
- **Key Features:**
 - **Stealth technology** with reduced radar cross-section.

- **Advanced avionics** with integrated sensors and data fusion.
- **Super cruise capability** (sustained supersonic flight without afterburners).
- **Network-centric warfare** and electronic warfare systems.
- **Multi-role capability** for air-to-air, air-to-ground, and surveillance missions.
- **Global Examples:** F-22 Raptor (USA), F-35 Lightning II (USA), Sukhoi Su-57 (Russia), and Chengdu J-20 (China)

About Advanced Medium Combat Aircraft (AMCA):

- **What is AMCA?**
 - A **fifth-generation stealth multirole fighter aircraft** being developed indigenously for the Indian Air Force.
 - Envisioned to **replace aging MiG and Jaguar fleets**, and operate alongside Tejas LCA and MRFA platforms.
- **Features:**
 - **Stealth Design:** Radar-absorbing materials, internal weapon bays.
 - **Advanced Avionics:** AESA radar, AI-enabled flight controls, sensor fusion.
 - **Twin-engine Configuration:** Capable of super cruise and high manoeuvrability.
 - **Multi-role Capability:** Air superiority, ground attack, reconnaissance.
 - **Digital Fly-by-Wire System** with advanced cockpit interface.

AIR DEFENCE SYSTEMS

Context:

In the early hours of **May 9, 2025**, Pakistan launched a **coordinated drone and missile swarm** targeting Indian military bases.

- India **successfully intercepted the attack** using its **air defence shield**, including **S-400 Triumf**, **Akash**, and **Barak-8 MRSAM**, in what was part of its integrated response under **Operation Sindoor**.



About Air Defence Systems:

What is an Air Defence System?

An **Air Defence System** refers to a **networked combination of sensors, weapons, and command systems** designed to detect, track, and neutralize **aerial threats** such as:

Missiles(ballistic/cruise)

Unmanned Aerial Vehicles (UAVs/drones)

Manned aircraft and helicopters

Components of Air Defence:

- **Surveillance Radars** – Detect incoming threats.
- **Command & Control Centres** – Prioritise and assign response.
- **Interceptor Weapons** – Surface-to-Air Missiles (SAMs), guns, or loitering munitions.
- **Electronic Warfare (EW) Systems** – Jam or spoof drones.

India's Multi-Layered Air Defence Framework:

System	Type & Origin	Range	Role in Operation
S-400 Triumf	Long-range Surface-to-Air (Russia)	Up to 400 km	Intercepted long-range missiles and aircraft
Barak-8 MRSAM	Medium-range SAM (India-Israel)	~70-100 km	Neutralized fast-moving drones and cruise missiles
Akash	Indigenous SAM (India)	Up to 25-30 km	Countered low-altitude aerial threats
S-125 Pechora	Legacy SAM system (Russian origin)	Short-range (35 km)	Supplemented older sectoral defences
Integrated Counter-UAS Grid	Multi-layered defence using jamming, spoofing, and guns	Varies	Intercepted UAVs and kamikaze drones across northern airspace

STRATOSPHERIC AIRSHIP PLATFORM

Context:

India successfully conducted the maiden flight trial of the Stratospheric Airship Platform developed by DRDO, reaching an altitude of 17 km.



About Stratospheric Airship Platform:

- **What is the Stratospheric Airship Platform?**
 - A lighter-than-air, high-altitude airship designed to operate in the **stratosphere (~17 km altitude)** for extended surveillance and observation missions.
- **Developed By:** Aerial Delivery Research and Development Establishment (ADRDE), Agra
 - Under the **Defence Research and Development Organisation (DRDO)**
- **Objectives of the Test:**
 - Validate **envelope pressure control system**.
 - Test **emergency deflation mechanisms**.
 - Collect real-time **sensor data** for future simulation models.
 - Demonstrate **system recovery** after mission.
- **Key Features:**
 - Operates at ~17 km altitude (stratosphere).
 - Carries **instrumental payloads** for ISR tasks.
 - **62-minute endurance flight** successfully completed.
 - Capable of **long-duration airborne operation**.
 - Deployable for **static surveillance and real-time observation**.
- **Applications & Strategic Significance:**
 - **ISR Capability Enhancement:** Improves India's **Intelligence, Surveillance, and Reconnaissance** operations for military and disaster response.
 - **Earth Observation:** Supports **border monitoring, coastal surveillance**, and high-resolution atmospheric sensing.
 - **Low-Cost Alternative to Satellites:** Offers **persistent coverage** without requiring costly satellite launches.
 - **Dual-Use Potential:** Can assist in **civilian use cases** like disaster management, communication relays, and environmental monitoring.
 - **Strategic Independence:** Places India among a few nations with **indigenous high-**

altitude airship technology, crucial amid rising border threats.

INS TAMAL

Context:

India is set to receive INS Tamal, its second advanced stealth frigate built by Russia under the Krivak-III class deal.



About INS Tamal:

- **What is INS Tamal?**
 - INS Tamal is a **3,900-tonne advanced stealth frigate** built in Russia as part of India's Krivak-III class deal signed in 2016. It is the sister ship of **INS Tushil**, commissioned in December 2024.
- **Developed by:**
 - Built at **Yantar Shipyard, Kaliningrad, Russia**
 - Joint project under **India-Russia defence collaboration**
 - Part of a four-frigate contract — 2 built in Russia, 2 under construction at **Goa Shipyard** with technology transfer
- **Key Features:**
 - **Stealth Technology:** Radio, infrared, and acoustic signature suppression for survivability
 - **Weapon Systems:**
 - BrahMos Supersonic Cruise Missiles (range: 450 km)
 - Shtil Surface-to-Air Missiles
 - Anti-submarine torpedoes and rockets
 - **Speed:** Over **30 knots**
 - **Helicopter Capability:** Can carry **Kamov-28** and **Kamov-31** for anti-submarine warfare and airborne early warning
 - **Automation:** High automation reduces crew workload and increases operational efficiency

- **Predecessor:** INS Tushil, first of the four frigates, arrived at [Karwar Naval Base](#) on February 2025.
- **Strategic Significance:**
 - Enhances India's **blue-water capabilities** for operations in air, surface, underwater, and electromagnetic domains
 - Crucial amid rising maritime tensions, especially in the Arabian Sea
 - Reinforces naval deterrence and force projection in the Indo-Pacific
 - Showcases successful **Make in India + global collaboration** with local production of Triput & Tavasya in Goa Shipyard

INSV KAUNDINYA - STITCHED SAIL SHIP

Context:

The Indian Navy formally inducted INSV Kaundinya, a stitched sail ship inspired by 5th-century Ajanta cave paintings, at [Karwar Naval Base](#).



- The ship will undertake a **transoceanic voyage from Gujarat to Oman** later this year, reviving India's ancient maritime heritage.

About INSV Kaundinya - Stitched Sail Ship:

- **What It Is?**
 - A **fully functional stitched sailing ship** built using ancient Indian shipbuilding techniques, inducted as an [Indian Naval Sailing Vessel](#) (INSV).
- **Inspiration:** Modeled on a **5th-century CE ship** depicted in **Ajanta Caves**, Maharashtra — showcasing India's maritime heritage through art.
- **Developed By:** Jointly developed under a **tripartite agreement** (July 2023) between:
 - Ministry of Culture (Funding Agency)
 - Indian Navy (Technical Validation &

Oversight)

- Hodi Innovations (Shipbuilder)

- **Objectives:**

- Revive and demonstrate **traditional Indian shipbuilding methods**.
- Celebrate India's [ancient maritime trade and navigation skills](#).
- Promote **cultural diplomacy and heritage awareness** globally.

- **Key Features:**

- **Construction Technique:** Built using **stitched plank technique**, where wooden planks are joined using coir rope, coconut fibre, and natural resin — no nails used.
- **Design Validation:** Reconstructed using **iconographic extrapolation** from Ajanta paintings, with hydrodynamic testing at IIT Madras.
- **Artistic Elements:** Sails feature [Gandabherunda](#) and **Sun** motifs, bow has a Simha Yali, deck holds a Harappan-style stone anchor.
- **Traditional Rigging:** Equipped with **square sails** and **steering oars**, replicating ancient sea-faring designs.
- **Naming Legacy:** Named after **Kaundinya**, the legendary Indian mariner who sailed to Southeast Asia, symbolizing historical Indo-Pacific ties.

CIVIL DEFENCE IN INDIA

Context:

Ahead of rising geopolitical tensions, the [Union Ministry of Home Affairs](#) has ordered a **nationwide Civil Defence Mock Drill** across 244 districts on **May 7, 2025**, to assess emergency preparedness against military and disaster threats.

WHAT TO DO DURING THE DRILL

CITIZENS MUST IDENTIFY 2 TYPES OF SIGNALS

WARNING: A long siren indicating a potential hostile air attack

ALL CLEAR: A short and steady siren indicating that the danger has passed

- In any emergency situation, immediately cease all outdoor activities and assist the elderly, children and disabled citizens



- Turn off or cover all lights in homes, offices, and vehicles during the blackout. Avoid using mobile phones or flashlights near windows

- Follow instructions of civil defence officers
- Do not spread rumours or false information

About Civil Defence in India:

What is Civil Defence?

Civil defence refers to **organized efforts to protect civilians, infrastructure, and essential services** during emergencies, especially in wartime or during natural or man-made disasters.

Globally, it functions across six pillars: **prevention, mitigation, preparedness, response, evacuation, and recovery.**

- **Legal Framework in India::**
 - **Civil Defence Act, 1968:** Enacted post-Indo-China and Indo-Pak conflicts to **institutionalize civil protection.**
 - **Amendment in 2009 (Act No. 3 of 2010):** Expanded the role to include **disaster management** along with war-related functions.
- **Structure and Functioning::**
 - Manned primarily by **volunteers from various professions**, trained to assist in emergency response.
 - Activated during **terror attacks, fires, floods, explosions, earthquakes, or other calamities** before official responders arrive.
 - Special focus on **critical initial minutes** of emergencies.
- **Application:**
 - Though the Act is pan-India, active **civil defence units are raised only in tactically vulnerable areas.**
 - These include **nuclear power plants, ports, military bases, dams, oil refineries**, and metropolitan cities.
- **About Civil Defence Districts:**
 - Civil Defence Districts are specially designated areas where civil defence programmes are actively implemented by the Government of India under the **Civil Defence Act, 1968.**
 - **The Ministry of Home Affairs** selects Civil Defence Districts based on strategic vulnerability:
 - **Proximity to International Borders:** E.g., Punjab, Rajasthan, Gujarat, Jammu & Kashmir
 - **Critical Infrastructure Presence:** Nuclear plants, military bases, ports, telecom hubs
 - **Urban Density & Civilian Risk:** Metro cities requiring evacuation planning
 - **Coastal Sensitivity:** Maritime security in states like Tamil Nadu, Kerala, West Bengal

ISRO PSLV-C61

Context:

ISRO's 101st launch using PSLV-C61 failed mid-flight, due to a chamber pressure drop during the third stage. The mission aimed to place EOS-09 in Sun Synchronous Polar Orbit.



About ISRO's PSLV-C61:

- **What it is:** The PSLV-C61 was the 63rd flight of the Polar Satellite Launch Vehicle (PSLV) and the 27th in the PSLV-XL configuration.
- **Developed by:** Indian Space Research Organisation (ISRO).
- **Mission Objective:** To launch EOS-09, an Earth Observation Satellite, into **Sun Synchronous Polar Orbit** (SSPO).
- **Vehicle Features:**
 - **Height:** 44.5 m, **Lift-off Mass:** 321 tonnes
 - **Four-stage** launch vehicle with **six solid strap-on boosters**
 - **Stages:** Alternating solid and liquid propulsion
 - **Stage 3 Failure:** Chamber pressure in solid motor dropped, leading to mission failure
- **Sustainability Effort:** Planned Orbit Change Thrusters (OCT) & passivation of PS4 to reduce orbital debris.

About EOS-09 Satellite:

- **What it is:** EOS-09 is a remote sensing satellite, a successor to EOS-04, developed to serve multi-sectoral imaging applications.
- **Objective:**
 - Provide high-resolution, all-weather Earth imagery using **Synthetic Aperture Radar** (SAR).
 - Support disaster monitoring, agriculture, forestry, and urban planning.
- **Key Features:**
 - **Launch Mass:** 1696.24 kg
 - SAR Payload for day/night and all-weather capabilities
 - **Mission Life:** 5 years

Equipped with deorbiting fuel for post-mission disposal compliance

Syllabus: Cyber Crimes & Digital Security

OPERATION HAWK

Context:

The CBI arrested two individuals from Mumbai and Delhi under Operation Hawk, targeting international cybercrime networks engaged in online child sexual exploitation.



About Operation Hawk:

- **What is Operation Hawk?**
 - **Operation Hawk** is a **special anti-cybercrime initiative** launched by the Central Bureau of Investigation (CBI) in 2025.
 - It aims to identify and prosecute individuals involved in **online child sexual exploitation** with **international digital footprints**.
- **Launched By:** CBI's International Operations Division.
- **Objectives:**
 - Dismantle **organized cyber networks** targeting minors online.
 - Strengthen **international cooperation** in combating cyber-pedophilia and child abuse.
 - Ensure **swift response** to foreign complaints involving Indian citizens.
 - Enhance **digital forensics and cross-border evidence collection**.
- **Key Features:**
 - **Cross-border Coordination:** Works with global agencies including the **FBI, Interpol**, and local cybersecurity units.
 - **Targeted Action:** Focuses on **CSAM trafficking**, sexual extortion (sextortion), and intimidation of minors.
 - **Robust Investigation:** Involves multi-

location raids, digital seizure, and legal action under **IPC, IT Act, and POCSO**.

- **Precedent-Based Expansion:** Builds on experience from earlier anti-CSAM operations.
- **Previous Similar Operations by CBI:**
 - **Operation CARBON (2021):** Targeted the dark web users sharing CSAM across global platforms.
 - **Operation MEGH CHAKRA (2022):** Conducted pan-India raids, based on Interpol inputs; resulted in large-scale digital seizures and arrests.

SAFE HARBOUR

Context:

The Ministry of Information and Broadcasting is reconsidering safe harbour protections under the IT Act, 2000, to tackle the surge in fake news and misinformation online.



About Safe Harbour:

- **What is Safe Harbour?**
 - Safe harbour is a legal protection that shields online platforms from being held liable for content posted by users.
 - **Legal Basis in India:** Section 79 of the **Information Technology Act, 2000** provides safe harbour for intermediaries, mirroring the US's Section 230 of the Communications Act.
 - **Key Features:**
 - Protects intermediaries from legal action for third-party content.
 - Conditional immunity—if they take prompt action upon receiving *actual knowledge* of illegal content (via court or government order).
 - Encourages innovation by not

overburdening platforms with liability.

- **What is Intermediary Liability?**

- It is the concept where intermediaries (like social media platforms, messaging apps, etc.) can be held responsible for content shared by users.
- **How It Is Regulated in India:**
 - Governed by **IT (Intermediary Guidelines and Digital Media Ethics Code) Rules, 2021.**
 - Platforms must appoint:
 - A **Grievance Officer** and **Nodal Contact Person** in India.
 - Publish monthly compliance reports.
 - The **2023 Amendment Rules** propose to revoke safe harbour for “fake news” identified by the **PIB’s fact-check unit** (challenged in court for overreach).
- **Features of Current Regime:**
 - Conditional immunity based on content moderation and user grievance mechanisms.
 - Restrictions apply if platforms do not comply with takedown requests, especially on misinformation, deepfakes, and cyberfrauds.
- Court rulings (e.g., Supreme Court interpretation of “actual knowledge”) influence enforcement.

- **Significance of Safe Harbour:**

- **Protects Innovation:** Prevents tech startups and platforms from being overwhelmed by content liability risks.
- **Upholds Free Speech:** Without it, platforms may engage in over-censorship to avoid legal trouble.
- **Enables Due Process:** Provides a structured, rule-based system for content takedowns instead of arbitrary removals.

mobilise the Territorial Army (TA) amid heightened tensions with Pakistan.



About Territorial Army:

- **Established:** Territorial Army Act, 1948; formally launched on **October 9, 1949**.
- **Controlling Ministry:** Ministry of Defence, Government of India.
- **Legal Provision:** Governed by **Territorial Army Act, 1948** – Rule 33 permits full mobilisation during national exigencies.
- **What is the Territorial Army?**
 - A **volunteer reserve force** comprising **part-time “citizen soldiers”** from civilian backgrounds (businessmen, professionals).
 - Aims to **relieve the regular Army** from non-combat duties and augment its manpower during conflict or crisis.
- **Historical Evolution:**
 - **Colonial Legacy:** Evolved from the Indian Territorial Force (1920), which saw action in global conflicts like WWI and the Boer War.
 - **Post-Independence Need:** Established to serve as the **second line of defence** and engage citizens in nation-building through defence service.
- **Objectives & Core Functions:**
 - **National Security Augmentation:** Support Army operations during war, terrorism, or border tension.
 - **Disaster Relief & Emergency Roles:** Assist civil administration during floods, earthquakes, and pandemics.
 - **Essential Services Maintenance:** Ensure continuity of key infrastructure like railways and telecom.
 - **Law & Order Support:** Aid in counter-insurgency and stability operations in conflict-prone areas.

Syllabus: Internal Security & its Challenges

TERRITORIAL ARMY

Context:

The Ministry of Defence has empowered the Army Chief under Rule 33 of the Territorial Army Act, 1948, to fully

- **Key Features:**
 - **Eligibility:** Indian citizens aged **18–42**, medically fit, with civilian occupations.
 - **Training Model:** Approximately **2 months of annual training**; no full-time military obligation in peace times.
 - **Current Strength:** Around **50,000 personnel**, organised into **65 units** across India.
- **Operational Participation:**
 - **1947–48, 1962, 1965, 1971 Wars:** Logistical support, rear area defence, and vital infrastructure protection.
 - **Operation Rakshak & Pawan:** Counter-insurgency in Punjab, J&K, and Sri Lanka support.
 - **Kargil Conflict (1999):** Guarded ammunition dumps, supply lines, and sensitive zones.

- **Key Cities & Sectors Covered:** Includes **Delhi NCR**, **western command sectors (Rajasthan, Punjab, J&K)**, **eastern borders**, and **southern commands**.
- **Key Features of IACCS**
 - **Multi-Sensor Integration:** Fuses inputs from **ground radar, Airborne Warning and Control System, Airborne Early Warning and Control**, civilian radar, and fighter jets into one cohesive command interface.
 - **Real-Time Threat Assessment:** Enables rapid detection, **target recognition**, and **interception** of aircraft, drones, and missiles using consolidated data streams.
 - **Battlefield Visualization:** Provides **live digital map and 360° airspace view** for military commanders to execute **central control and decentralised action**.
 - **Reduced Response Time:** Minimises lag between detection and interception, allowing **swift neutralisation** of threats using fighter aircraft and missile systems.
 - **Layered Defence Integration:** Integrates with Army's **Akashteer system**, creating a seamless **multi-layered air defence shield** across services.
 - **Future-Ready Architecture:** Ready for **AI-based threat analytics**, drone swarm handling, and integration with **next-gen missile systems** like LR-SAM and QR-SAM.

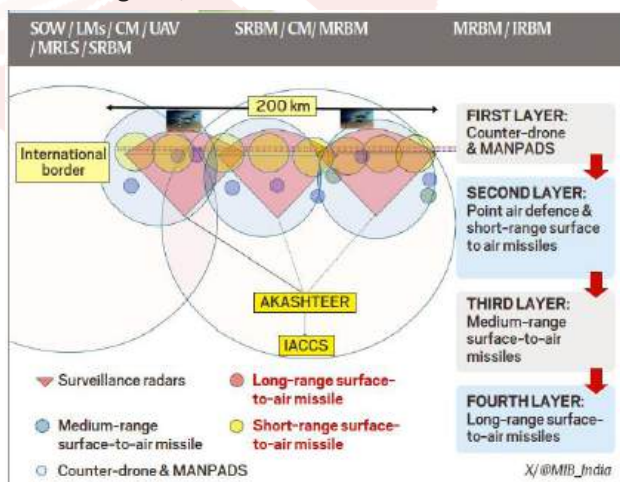
INTEGRATED AIR COMMAND AND CONTROL SYSTEM (IACCS)

Context:

The Indian Air Force showcased the Integrated Air Command and Control System (IACCS) as the backbone of India's aerial defence, effectively intercepting Pakistan's drone and missile attacks.

About Integrated Air Command and Control System (IACCS):

- **What it is:** IACCS is an **automated command and control network** developed to integrate all air defence assets for a **comprehensive and real-time air threat response**.
- **Developed by:** Bharat Electronics Limited (**BEL**), a public sector defence electronics firm.
- **Coverage Area:** Covers all **sensitive military bases**, **border regions**, and **air defence zones** across India.



India's Multilayered Air Defence Umbrella:

Layer	System Deployed
1st Layer	Counter-drone, MANPADS
2nd Layer	Point air defence systems
3rd Layer	Short and Medium-range SAMs
4th Layer	Long-range SAMs (e.g., S-400, Barak-8)

MISSION SANKALP

Context:

Mission Sankalp, a massive anti-Naxal operation along the Chhattisgarh–Telangana border, entered its third week, with confirmed Maoist casualties and strategic gains.

About Mission Sankalp:

- **Launched by:** Security forces under the joint command of Chhattisgarh Police, Telangana Police, CRPF, and CoBRA.



- **Area of Operation:** Karregutta hills, Bijapur district (Chhattisgarh) – Mulugu district (Telangana) border.
- **Objective:**
 - Flush out top Maoist leaders, especially Battalion 1 of the **People's Liberation Guerrilla Army** (armed wing of CPI-Maoist).
 - Dismantle fortified Maoist hideouts and destroy logistics bases and bunkers.
- **Key Features:**
 - **Troop Mobilisation:** 24,000+ personnel from DRG, STF, Bastar Fighters, CRPF, CoBRA, and Indian Air Force.
 - **Precision Strikes:** Use of air surveillance and intelligence-led operations in tough terrains.
 - **Recoveries:** Over 1,000 kg of explosives, ration stockpiles, detonators, medical kits, and electronic equipment from hideouts.
- **Strategic Significance:**
 - **Largest Inter-State Operation:** Reflects unprecedented joint coordination between central and state forces.
 - **Decapitates Leadership:** Aims to paralyse the Maoist chain of command in core forest zones.
 - **Boosts Civil Governance:** Paves way for infrastructure and welfare delivery in Maoist-hit tribal belts.
 - **National Security Impact:** Aligns with **Centre's zero-tolerance policy** on Left Wing Extremism.
 - **Morale Boost:** Signals state dominance in previously no-go areas; crucial in restoring civilian confidence.

About Operation Black Forest:

- **What It Is:** A 21-day high-intensity counterinsurgency mission targeting **Maoist** strongholds in forested hilly terrain.



- **Location:** Kurraguttalu Hills (KGH), spanning approx. 1,200 sq km along the Chhattisgarh–Telangana border.
- **Objective:**
 - Dismantle Naxal headquarters and operational infrastructure.
 - Neutralise top Maoist leadership and regain control over insurgent zones.
 - Realise India's target of eliminating Left Wing Extremism by **March 31, 2026**.
- **Forces Involved:** CRPF, including elite **CoBRA units**, Chhattisgarh Police, Special Task Force (STF), and District Reserve Guard (DRG).

About Karregutta Hills:

- **Location:** Karregutta Hills lie on the border of **Bhadradi Kothagudem district (Telangana)** and **Sukma district (Chhattisgarh)**.
- **Topography:** Spread over **25–50 km**, the terrain includes **steep hills, caves, waterfalls**, and dense forests — ideal for guerrilla warfare and concealment.
- **Elevation:** Hills rise to nearly **5,000 feet**, rendering them largely inaccessible even to locals.
- **Local Names:** Tribes refer to the hills as **Black Hills** or **Carregutta**.
- **Tribal Presence:** The region is inhabited by **Koya, Gond, and Chenchu tribes**, many of whom have been caught in the crossfire during decades of insurgency.
- **Other Active Maoist Zones:** Abujhmad (Chhattisgarh), Malkangiri (Odisha), Gadchiroli (Maharashtra) are other high-intensity Maoist strongholds.

OPERATION BLACK FOREST

Context:

In one of India's largest anti-Naxal operations, 31 Maoists were killed in Operation Black Forest, conducted in Kurraguttalu Hills on the Chhattisgarh–Telangana border.

INTERPOL ISSUE FIRST EVER SILVER NOTICE

Context:

Interpol has issued its first-ever Silver Notice at India's request to track illicit assets linked to former French Embassy official Shubham Shokeen, accused in a major visa fraud.



About Interpol Issue First Ever Silver Notice:

What is a Silver Notice?

- A colour-coded Interpol alert launched in **January 2025**.
- Aimed at **identifying, tracking, and recovering criminally acquired assets** worldwide.

How It Works?

Member countries can request a Silver Notice to locate **assets linked to crimes** such as:

- Fraud, corruption, money laundering, narcotics, and environmental crimes.
- It enables countries to **exchange asset-related intelligence** and initiate:
- **Freezing, seizure, or confiscation of these assets** under domestic laws.
- Information is first reviewed by **Interpol's General Secretariat** to prevent misuse or politically motivated targeting.
- **Authority and Issuance:**
 - In India, the **Central Bureau of Investigation (CBI)** acts as the **nodal agency** for all Interpol matters.
 - Only **member countries** can issue such notices, **subject to pilot phase limits** (9 notices per country till Nov 2025).
 - The notice is shared with 195 Interpol member countries for **real-time cooperation**.

Key Features of Silver Notice:

- **Asset-Focused Tool:** Unlike the Red Notice (for people), Silver Notice targets illicit assets.
- **Transnational Reach:** Aids asset tracking across borders using global police coordination.
- **Supports Financial Investigations:** Useful in [crypto scams](#), shell firms, real estate laundering, etc.
- **Strengthens Legal Cooperation:** Provides basis for bilateral asset recovery requests.

WORLD:: PLACES IN NEWS::

DR CONGO

Context:

Over 100 people, mostly children and the elderly, were killed in [Sud Kivu province](#), eastern DR Congo, as flash floods triggered by torrential rains swept through Kasaba village.



About DR Congo:

- **Location:**
 - Located in **Central Africa**, it is the **second largest country** in Africa after Algeria.
 - The DRC has a **short 40 km coastline** on the Atlantic Ocean but is largely **landlocked**.
- **Capital City:** Kinshasa.
- **Neighbouring Countries:** Central African Republic, South Sudan, Uganda, Rwanda, Burundi, Tanzania, Zambia, Angola, Republic of the Congo, Atlantic Ocean, and the Angolan exclave of Cabinda.
- **Geological and Physical Features:**
 - **Mountains:**
 - Ruwenzori Range (with [Margherita Peak](#) at 5,109 m – the highest point)
 - Virunga Mountains (volcanic range including Mount Nyiragongo)
 - Mitumba Mountains and Cristal Mountains
 - **Plateaus:**
 - Ubangi-Uele Plateau (North)
 - Katanga Plateau (Southeast,

includes Kundelungu and Hakansson highlands)

- Angola Plateau (Southwest)

Rivers:

- [Congo River](#) – the world's deepest river and second longest in Africa, forms the main drainage system
- **Major tributaries:** Kasai, Aruwimi, Lomami, Ubangi

Lakes:

- Lies along the **Western Rift Valley**, includes Lakes Tanganyika, Albert, Edward, Kivu, Mweru
- Lake Mai-Ndombe and Lake Tumba are significant in the western basin

Drainage Basin:

- Congo River Basin spans **3.46 million sq. km**, supports dense rainforest ecosystems
- Features rich [alluvial soils](#), vital for agriculture in valleys

LEBANON

Context:

A UN peacekeeping patrol in southern Lebanon was attacked by civilians with metal rods and axes; no casualties were reported, though vehicles were damaged.

About Lebanon:

- **Located in:** Western Asia, on the **eastern Mediterranean coast**.
- **Capital:** Beirut
- **Neighbouring Countries:** Bordered by Syria, Israel, and the Mediterranean Sea.



Geological Features:

- **Mountains:**
 - **Lebanon Mountains:** Dominant limestone-sandstone ridge; highest peak at **Qurnat al-Sawda' (3,088 m)**.
 - **Anti-Lebanon Range:** Runs parallel to the Lebanon Mountains; includes **Mount Hermon (2,814 m)**.
- **Plains and Valleys:**
 - **Bekaa Valley:** Fertile rift valley between the two mountain ranges; part of the **Great East African Rift System**.
- **Rivers:**
 - **Litani River:** Longest River within Lebanon; flows southward into the Mediterranean.
 - **Orontes River** and **Kabir River** also serve as significant drainage channels.

About UN Peacekeepers:

- **What It Is?**
 - **UN Peacekeeping** involves the deployment of **military personnel, police, and civilians** to conflict zones to maintain peace and security under UN mandates.
- **Established In:** Started in **1948**, when the UN deployed observers in West Asia following the **Arab-Israeli armistice**.
- **Key Features:**
 - **Mandated by:** UN Security Council through formal resolutions.
 - **Managed by:** UN Department of Peace Operations (DPO).
 - **Core Principles:**
 - Consent of the parties
 - Impartiality
 - Non-use of force, except in self-defence or defence of mandate
 - **Funding:** Approved by the **UN General Assembly** and contributed by member states.
 - **Objective:** Help countries **navigate the transition from conflict to peace**, ensure humanitarian aid, and support institution-building.



About South Africa Land Uplift:

- **What It Is?**
 - A **gradual uplift of land** observed in parts of South Africa due to reduced surface and groundwater pressure.
- **Reason Behind the Uplift:**
 - **Elastic rebound effect:** Removal of surface water (from drought or overuse) reduces weight on the Earth's crust, causing it to **rise upward**.
 - Confirmed via **GNSS-Trignet base stations** and satellite data (GRACE).
 - Unlike **subsidence** caused by aquifer collapse, this is a **loading-unloading effect**.
- **Key Features:**
 - **Uplift Rate:** About **2 mm/year**, totaling nearly 6 mm between 2012 and 2020.
 - **Cape Town Impact:** Severe drought years showed clear correlation between Total Water Storage (TWS) loss and land uplift.
 - **Measurement Tools:** **Global Navigation Satellite System** (GNSS), hydrological models, and gravity satellite data (GRACE).
 - **Distinction from Subsidence:**
 - **Uplift** = Loss of surface load (elastic rebound).
 - **Subsidence** = Collapse of pore structure due to **groundwater over-extraction** (poro-elastic effect).

About South Africa:

- **Location:** Southernmost country on the African continent.
- **Bordered by:** Namibia, Botswana, Zimbabwe, Mozambique, Eswatini
 - Encloses **Lesotho** as an independent country.
- **Capitals & Cities:**
 - Pretoria (Executive capital)

SOUTH AFRICA

Context:

Study published in Journal of Geophysical Research: Solid Earth reported that land in South Africa has been rising at 2 mm per year from 2012 to 2020.

- Cape Town (Legislative capital)
- Bloemfontein (Judicial capital)
- **Geological Features:**
 - **Mountains:**
 - **Great Escarpment** includes **Drakensberg Mountains** (Njesuthi: 3,408m)
 - **Other ranges:** Stormberg, Roggeveld, Table Mountain ranges
 - **Plateaus:**
 - Dominated by **Highveld Plateau** (1,200–1,800m elevation)
 - Formed from ancient **Karoo System rocks**
 - **Rivers:**
 - **Orange River** and tributaries (Caledon, Vaal) drain into Atlantic
 - **Limpopo System** drains north-east into Indian Ocean
 - **Other rivers:** Tugela, Mgeni, Great Kei, Gourits

gentle undulations and low hills.

- **Highest elevation:** Al-Shiqaya Peak at 290 metres.
- **Major Landforms:**
 - **Al-Zawr Escarpment** near Kuwait Bay (145 m high).
 - **Kuwait Bay:** A significant natural harbour and economic zone.
- **Water Resources:**
 - **No permanent rivers or lakes.**
 - Features intermittent **wadis** and **seasonal basins**.
 - Lacks natural freshwater sources and relies on **desalination**.
- **Ethnic Composition:**
 - Only **~30% of Kuwait's population are citizens**.
 - Large **expatriate community**, with **Bidoon (stateless residents)** numbering ~1 lakh.
 - Indigenous Kuwaiti identity is often defined **through paternal lineage**.

KUWAIT

Context:

Kuwaiti Emir Sheikh Meshal Al-Ahmad Al-Sabah revoked the citizenship of over 37,000 people, mostly women naturalised through marriage, citing a reformist agenda.



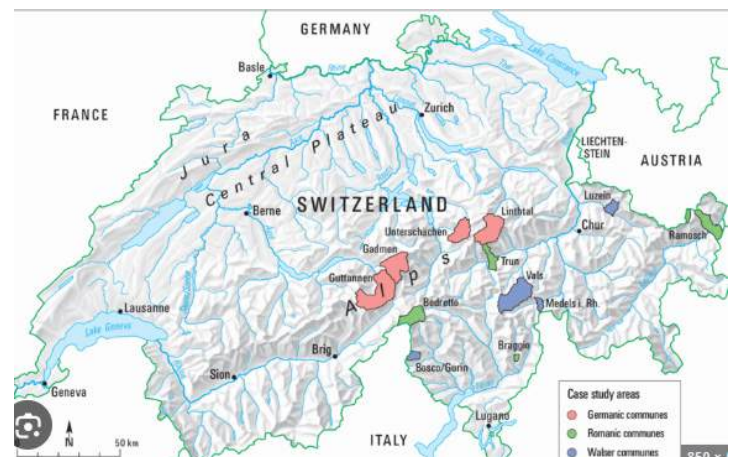
About Kuwait:

- **Located in:** Northwestern Persian Gulf, Kuwait is a small constitutional monarchy in **West Asia**.
- **Capital:** Kuwait City.
- **Neighbouring Nations:** Iraq, Saudi Arabia, and **Persian Gulf**.
- **Geological Features:**
 - **Topography:**
 - Mostly **flat desert terrain**, with

LONZA VALLEY

Context:

A massive glacier collapse in Switzerland's Loetschental valley on May 28, 2025, buried Blatten village under ice and rock debris, triggering flood fears as River Lonza's flow is blocked.



About Lonza Valley:

- **Location:** Loetschental (Lonza) Valley is located in the *canton of Valais*, in *southern Switzerland*, within the Alpine region.
- **Country Involved:** *Switzerland* is directly affected, with international attention on climate-induced glacial hazards.

• **Key Features:**

- River Lonza flows through the valley, fed by [Alpine glaciers](#).
- The valley is part of a fragile high-altitude ecosystem highly sensitive to global warming.
- It houses small Alpine settlements like Blatten, known for their proximity to glaciers and scenic landscapes.
- It is vulnerable to glacial retreat, permafrost thawing, and associated hazards like landslides and [flash floods](#).

TIBET

Context:

A 5.5-magnitude earthquake struck Shigatse in Tibet at a shallow depth of 10 km, as reported by the China Earthquake Administration.



About Tibet:

- Located in **Central Asia**, Tibet is officially known as the [Tibet Autonomous Region \(TAR\)](#) of China.
- **Capital:** Lhasa, situated at an elevation of 3,650 metres.
- **Neighbouring Regions and Countries:** China, India, Nepal, Bhutan, and Myanmar.
- **Physical Features of Tibet:**
 - **Topography:**
 - Known as the “**Roof of the World**”, Tibet lies on the **Tibetan Plateau**, averaging **4,500–5,000 metres** elevation.
 - **Major landforms:**
 - **Qiangtang Plateau** in the north – high-altitude, cold desert.
 - Deep **valleys and ravines** in the southeast.

- **Himalayas** in the south and [Kunlun Mountains](#) in the north.

○ **Mountains and Peaks:**

- [Mount Everest \(Qomolangma\)](#) – World’s tallest peak on the Tibet–Nepal border.
- **Mount Kailash** – Sacred to Hindus and Buddhists.
- **Other Ranges:** Gangdise, Himalayas, Kunlun, Tanglha.

○ **Major Rivers Originating in Tibet:**

- [Yarlung Tsangpo](#) (Upper Brahmaputra) – Cuts through the Himalayas into India.
- **Indus, Sutlej, Mekong, Salween, Yangtze** – All originate here.
- **Notable lakes:** Lake Nam, Lake Siling, Lake Mapam (Manasarovar).

• **Flora:**

- Dominant vegetation includes [grasslands](#), alpine shrubs, and sparse forests of bamboo, rhododendrons, oaks, and conifers.
- Medicinal and edible plants like **gro-ba**, **om-bu**, and **khres-pa** grow in river valleys and wet lowlands.

- **Fauna:** Tibet hosts over 100 mammals like wild yak, snow leopard, musk deer, and Tibetan antelope.

CHAGOS ISLANDS

Context:

The United Kingdom has officially agreed to transfer sovereignty of the Chagos Islands to [Mauritius](#), ending decades of British control.

About Chagos Islands:

• **Location:**

- The **Chagos Archipelago** consists of over **60 small islands** located in the central Indian Ocean, south of the Maldives, and east of Seychelles.



- The **largest island**, [Diego Garcia](#), hosts a key US-UK military base.
- **Previous Control:**
 - The islands were under **British rule since 1814**, ceded by France.
 - In **1965**, the UK separated Chagos from **Mauritius**, forming the **British Indian Ocean Territory (BIOT)** before Mauritius gained independence in 1968.
- **Strategic Significance:**
 - Diego Garcia has served as a critical logistics and intelligence base for **US military operations** in West Asia, South Asia, and East Africa.
 - It has hosted over **2,500 personnel**, nuclear-capable aircraft, and surveillance systems.

About UK–Mauritius Chagos Sovereignty Deal (2025):

- After a UK **High Court** ruling, England **Prime Minister** signed a treaty handing **sovereignty of the Chagos Islands to Mauritius**.
- The deal includes a **99-year lease** of **Diego Garcia** to the **UK and US** for continued military use.
- The UK will pay Mauritius approximately **£101 million/year**, totalling billions over the lease period.
- **Significance:**
 - Marks the completion of **Mauritius's decolonisation process**.
 - Balances **sovereignty claims** with strategic military requirements of Western allies.
 - Seen as a **“win-win”**—recognising Mauritian control while maintaining UK-US security presence.

India's Official Stance:

India has **consistently supported Mauritius's claim** over Chagos in line with its principles of territorial integrity, sovereignty, and international law.

NEW CALEDONIA

Context:

Talks over a new political status for [New Caledonia](#) broke down on May 8, 2025, after loyalist factions rejected France's proposal for “sovereignty in partnership”.



About New Caledonia:

- **Location:** Situated in the **Southwestern Pacific Ocean**, about 1,500 km east of Australia.
- **Capital city:** Nouméa.
- **Political Control:** It is a **French overseas collectively**, with administrative ties to France but enjoys a high degree of autonomy.
- **Geopolitical Neighbours:** Surrounded by **Australia** to the west, [Vanuatu](#) to the north, and **Fiji** to the northeast.
- **Historical Context:**
 - Colonised by France in **1853** as a penal colony.
 - Indigenous **Kanak people** resisted colonisation, leading to civil strife in the 1980s.
 - **1998 Nouméa Accord** granted significant autonomy and promised referendums on independence (held in 2018, 2020, and 2021 — all rejected).
 - Post-2021 unrest revived demands for full independence, especially after a disputed referendum boycott by the Kanak-led FLNKS.

Geographical & Ecological Features:

- **Topography:**
 - **Main island:** Grande Terre — 310 km long and 50 km wide.
 - Rugged terrain with **Mount Panié** (1,628 m) as the highest point.
 - Enclosed by one of the world's largest **coral reef lagoons** (New Caledonian Barrier Reef - [UNESCO World Heritage Site](#)).
- **Rivers & Climate**
 - **Longest river:** Diahot River (100 km).
 - **Subtropical climate:** East coast receives over 3,000 mm rainfall/year and west coast is drier (1,000 mm/year).

• **Biodiversity:**

- Home to **Amborella trichopoda**, a rare evolutionary link in plant taxonomy.
- Hosts endemic birds like the **kagu**, but lacks native mammals and frogs.

KILAUEA VOLCANO

Context:

Kilauea volcano in Hawaii erupted with lava fountains over 1,000 feet, marking the most intense activity since the Pu'u'ō'ō eruption of the 1980s.



About Kilauea volcano:

- Located on the **southeastern shore of Hawaii's Big Island**.
- Formed by the **Hawaiian hotspot** — not at plate boundaries but caused by a **mantle plume** under the **Pacific Plate**.
- **Key Features:**
 - **Type:** **Shield volcano** — broad, dome-shaped with gentle slopes.
 - **Crater:** Halema'uma'u, considered the mythological home of **Pele**, Hawaiian goddess of volcanoes.
 - **Eruption Style:** Frequent, fluid lava flows; episodic fountaining.
 - **Rift Zones:** Two major rift zones (east – 125 km, southwest – 35 km).
 - **Age:** Between 210,000 to 280,000 years; emerged above sea level ~100,000 years ago.
- **Volcanic Activity Timeline**
 - **1983–2018:** Longest recorded eruption — destroyed towns like Kalapana and Kaimū.
 - **2018:** Lava lake collapse and ash explosions up to 30,000 ft and 716 homes destroyed.

- **2024–25:** Renewed eruption cycles with episodic lava fountaining and toxic gas emissions.

• **Environmental & Ecological Significance:**

- Emits **sulphur dioxide**, leading to **volcanic smog (vog)** and acid rain.
- Impacts local **air quality** and **ecosystem growth** (e.g., Ka'ū Desert).
- Rich in **endemic species** due to isolation.
- Protected under **Hawai'i Volcanoes National Park**, a UNESCO World Heritage Site.

• **Cultural Relevance:**

- Studied extensively by the **Hawaiian Volcano Observatory (est. 1912)**.
- First described in detail by **William Ellis**, an English missionary.
- Holds deep **spiritual significance** in Hawaiian mythology.

SOUTH AUSTRALIA

Context:

Southern Australia, including South Australia, Victoria, and Tasmania, is facing one of the worst droughts in decades, raising alarm about the region's climate vulnerability and water security.



About South Australia:

- Located in **south-central Australia**.
- **Borders:** Western Australia (west), Northern Territory (north), Queensland (northeast), New South Wales & Victoria (east).
 - Southern coastline faces the **Great Australian Bight** (Southern Ocean).
- **Capital:** Adelaide.
- **Key Features of South Australia:**
- **Geographic Profile:**
 - Covers an area of 983,482 sq. km (approx. one-eighth of Australia).

- Mostly **flat plains and deserts**, with over 80% of land <300m above sea level.
- **Highest point:** Mount Woodroffe (1,435 m) in the Musgrave Ranges.
- **Water Resources:**
 - **Murray River** is the only major perennial river, vital for drinking and irrigation.
 - **Major water supply:** Pipelines from Murray River & Desalination Plants.
 - The **Great Artesian Basin** supports remote pastoral and mining operations.
- **Climate:**
 - **Driest state** in Australia.
 - Southern parts have a **Mediterranean climate** - wet winters, dry summers.
 - Prone to **droughts and bushfires**, particularly in summer months.
 - Temperature extremes due to contrasting air masses from inland and ocean.
- **Natural Resources:**
 - Features include **Lake Eyre** (below sea level), Mount Lofty Ranges, Kangaroo Island, and Flinders Ranges.
 - Rich in **minerals**, particularly uranium, copper, and gold — Olympic Dam is a major mining hub.

- **Located in:** Southeast **Flores Island**, Indonesia; part of the Lesser Sunda Islands volcanic arc.
- **Geological Features:**
 - **Twin peaks:** Laki-laki (more active) and Perempuan (less active).
 - Formed due to subduction of the Indo-Australian Plate beneath the Eurasian Plate.
 - Known for frequent eruptions, pyroclastic activity, and ash columns reaching over 5 km.

About Indonesia:

- **Location:** Archipelagic country in Southeast Asia; lies between the Indian Ocean and the Pacific Ocean.
- **Capital:** Jakarta (on the island of Java).
 - Indonesia is relocating its capital from Jakarta to a **new city called Nusantara**.
- **Borders:** Shares land borders with **Malaysia, Papua New Guinea, and Timor-Leste**.
- **Geological Features:**
 - **Islands:** Over 17,000 islands – major ones include Sumatra, Java, Borneo (Kalimantan), Sulawesi, New Guinea (Papua).
 - **Mountains/Volcanoes:** Over 100 active volcanoes including Merapi, Agung, Sinabung, and Krakatoa; part of the **Pacific Ring of Fire**.
 - **Rivers:**
 - **Longest:** Kapuas (1,140 km) in Kalimantan.
 - **Others:** Barito, Mahakam, Mamberamo.
 - **Tectonic Setting:** Junction of **Indo-Australian**, Eurasian, and Pacific plates—making it one of the most seismically active regions globally.

MOUNT LEWOTOB I LAKI-LAKI

Context:

Mount Lewotobi Laki-laki in Indonesia erupted multiple times over the weekend and again on Monday, prompting the government to raise the alert level to the highest tier.



About Mount Lewotobi Laki-laki:

- **What it is:** A stratovolcano forming part of a twin volcanic system with Lewotobi Perempuan, often symbolised as a “husband-wife” pair.

ANGOLA

Context:

Prime Minister of India held bilateral talks with Angolan President João Lourenço in New Delhi, offering a \$200 million defence credit line and expanding ties in infrastructure, defence, and space technology.

- The visit also marks the **40th anniversary of India-Angola diplomatic relations**.

About Angola:

- Angola is located in **southwestern Africa**, bordered by the **Atlantic Ocean** on the west.

- **Capital:** Luanda, a coastal port city.
- **Neighbouring Countries:** Republic of the Congo, Democratic Republic of the Congo, Zambia, Namibia, and Atlantic Ocean.

Note: It also includes an exclave, **Cabinda**, north of the main territory.

- **Geographical Features:**

- **Major Plateaus:** Bié Plateau (~2,600 m), Huíla Plateau (~2,300 m), and Malanje Highlands.

- **Highest Point:** Mount Moco (8,596 ft / 2,620 m) near Huambo.

- **Major Rivers:**

- **Cuanza (Kwanza):** Largest River within Angola.

- **Cunene River:** Border river with Namibia.

- **Cuango River:** Tributary of the Congo River.



- Other rivers drain into **Zambezi** and **Okavango systems**.

- **Desert Region:** Southwest Angola is part of the **Namib Desert**.

- **Climate:** Tropical climate with distinct rainy and dry seasons. Influenced by the **Benguela Current** (cold oceanic current).

- **Ethnic:** Angola is **ethnically diverse** with Bantu-speaking groups like Ovimbundu, Kimbundu, and Bakongo.

- **Economic Significance:**

- One of **Africa's top oil producers**; rich in **diamonds, iron ore, copper, and gold**.
- The **northeast** is known for **diamond deposits** in river gravels.

About Anak Krakatau Volcano:

- **Location:** **Anak Krakatau** ("Child of Krakatoa") is located in the **Sunda Strait**, between **Java and Sumatra** in Indonesia.

- **Volcano Type:** Stratovolcano



- **Tectonic Context:** Situated at the **convergent boundary** between the Indo-Australian and Eurasian plates.

- It is part of the **Pacific Ring of Fire**, a seismically active zone encircling the Pacific Ocean.

- **2018 Disaster:** In December 2018, its southwest flank collapsed into the sea during an eruption, generating a tsunami that killed over 400 people and injured thousands more.

- **New Research & Discovery:**

- **Technology used:**

1. **InSAR (Interferometric Synthetic Aperture Radar):** Satellite-based remote sensing that detects **surface deformation** within **centimetre to millimetre accuracy**.
2. Data was sourced from **ALOS-1, COSMO-SkyMED, and Sentinel-1** satellites over a **10+ year period**.

- **Findings**

1. The volcano's **flank slipped ~15 meters** between **2006 and 2018**.
2. **Acceleration of slip** observed **months before the 2018 collapse** — a key precursor to disaster.

- **Broader Implications:**

- Highlights the **risk of collapse in ocean volcanoes** and **potential for tsunami generation**.
- **Ground-based GPS** is often **impractical** in such regions due to cost, terrain, and safety issues.
- **Real-time InSAR processing** offers a promising solution for **early detection** in remote areas.

ANAK KRAKATAU VOLCANO

Context:

A new study reveals that **Indonesia's Anak Krakatau volcano**, which collapsed catastrophically in 2018 causing a deadly tsunami, showed **warning signs years in advance**.

MALDIVES

Context:

INS Sharda arrived at Maafilaafushi Atoll, Maldives to participate in a [Humanitarian Assistance and Disaster Relief \(HADR\) exercise](#).

About Maldives:

- South Asia, located in the **north-central Indian Ocean**, southwest of Sri Lanka and India.
- **Capital: Male** – also the most populous city.
- **Geography:**
 - An **archipelago of ~1,200 coral islands** grouped into **26 atolls**, of which ~200 are inhabited.



- **Low-lying terrain:** None of the islands rise above **1.8 metres (6 feet)**.
 - Protected by **barrier reefs** from monsoon damage.
- **Strategic Atoll: Maafilaafushi** – a northern atoll often used for **naval exercises and logistics support**.
- **Official Language: Dhivehi (Maldivian)**, an Indo-Aryan language.
- **Other spoken languages:** Arabic, Hindi, English.
- **Religion:** Islam is the **state religion**.
- **Ethnic Composition:**
 - Dominated by **Maldivian ethnic group**, with ancestry tracing to **Tamils, Sinhalese, Arabs**, and traders from Africa and Southeast Asia.
- **Strategic Importance:**
 - Lies on major **global shipping lanes** in the Indian Ocean.
 - Serves as a **critical maritime partner** for India's SAGAR (Security and Growth for All in the Region) and [MAHASAGAR doctrines](#).
 - Proximity to Lakshadweep (~400 km) enhances India's **naval surveillance** and regional outreach.

BALUCHISTAN

Context:

On May 9, 2025, Mir Yar Baloch declared [Balochistan's](#) independence from Pakistan, urging India to recognize it and host an embassy in New Delhi, the UN to deploy peacekeepers, and the Pakistani Army to withdraw.

About Balochistan:

- **Region:** Southwestern province of **Pakistan**, largest by area (~44% of Pakistan's territory), bordering **Iran and Afghanistan**, and facing the **Arabian Sea**.
- **Area:** ~347,190 sq km
- **Capital:** Quetta (near the Afghan border)
- **Borders:**
 - **East:** Sindh and Punjab provinces
 - **West:** Iran
 - **Northwest:** Afghanistan (Durand Line)
 - **South:** Arabian Sea (~770 km coastline)
- **Terrain and Climate:**
 - Mostly **arid, rugged terrain** with mountains (e.g., Sulaiman Range, Makran Range)
 - **Desert and dry steppe climate**
 - Sparse population, vast mineral resources
- **Ethnic and Demographic profile:**
 - **Dominant Group:** Baloch people (ethnic Iranian descent)
 - **Others:** Pashtuns (north), Brahuis
 - **Languages:** Balochi, Pashto, Brahui, Urdu
 - **Religion:** Predominantly Sunni Islam
- **Strategic and Geopolitical Importance:**
 - **Natural Resources:**
 - Rich in **natural gas, coal, copper, and gold** (Reko Diq mine)
 - Supplies **~40% of Pakistan's gas**, but remains underdeveloped
 - **CPEC & China's Interest:**



- Gwadar is the **southern node of China's BRI** in Pakistan

- Offers Beijing direct access to **Arabian Sea and West Asia**
- **India's Concerns:**
 - India has repeatedly raised human rights issues in Balochistan
 - Balochistan factors into India's **Indo-Pacific strategy** and **balancing CPEC-Chinese expansion**
- **Insurgency Movements:**
 - Several **Baloch nationalist groups** demand greater autonomy or independence
 - Regular attacks on **CPEC infrastructure**, Pakistani army convoys, and Chinese workers.

- **Flagship Species:** **Snow leopard** ("Ghost of the Mountains").
- **Other Wildlife:**
 - Tibetan wolf, **bharal (blue sheep)**, Himalayan ibex, **kiang (wild ass)**, Tibetan argali.
 - Rare birds: **Rose finch**, Tibetan raven, **yellow-billed chough**.
- **Ecosystem:** High-altitude **Trans-Himalayan biodiversity hotspot**.

Unique Features:

- **Community Involvement:** Managed by a **Conservation Reserve Management Committee** (includes local panchayats).
- **Livelihood Boost:** Promotes **eco-tourism**, trekking, wildlife research.
- **Climate Resilience:** Protects **snow leopard habitats** and alpine ecosystems.

INDIA:: PLACES IN NEWS::

TSARAP CHU CONSERVATION RESERVE

Context:

Himachal Pradesh notified Tsarap Chu Conservation Reserve, India's largest protected area (1,585 sq km), to safeguard high-altitude biodiversity, particularly snow leopards, and strengthen wildlife corridors.



About Tsarap Chu Conservation Reserve:

What is Tsarap Chu Conservation Reserve?

A protected area in Spiti Valley, Himachal Pradesh, notified under **Section 36A (1) of the Wildlife (Protection) Act, 1972**.

Aims to conserve **snow leopards**, rare Himalayan fauna, and critical wildlife corridors.

Location & Significance:

Area: 1,585 sq km (India's largest conservation reserve).

Borders: Ladakh (UT), Kibber Wildlife Sanctuary, Kabjima Nala, and **Chandratal Wildlife Sanctuary**.

Connects Kibber & Chandratal sanctuaries, acting as a **vital wildlife corridor**.

Key Flora & Fauna:

ARUNACHAL PRADESH

Context:

India has strongly rejected China's latest attempt to rename places in Arunachal Pradesh, calling it a "preposterous" move to justify false territorial claims.



- This is part of China's ongoing strategy to assert unilateral authority over areas it labels "Zangnan" or "**South Tibet**."

About Arunachal Pradesh:

- **China's Claim:**
 - China claims around **90,000 sq. km** of Arunachal Pradesh, referring to it as "**Zangnan**" (**South Tibet**).
 - It **rejects the McMahon Line**, agreed upon during the **1914 Simla Convention**, as the legal boundary.
 - Cites **historical religious and cultural ties**

between **Tawang Monastery and Lhasa** to reinforce its narrative.

- **India's Position:**
 - India asserts that **Arunachal Pradesh was, is, and will remain an integral part** of the country.
 - The **McMahon Line**, despite Chinese objections, is internationally recognized as the **de facto boundary**.
- **China's Renaming Tactic:**
 - Since **2017**, China has **repeatedly issued "standardised" Chinese names** for Indian locations in Arunachal.
 - These include **residential areas, rivers, mountains, and towns**—clearly within Indian territory.
 - The motive is to exert **psychological and diplomatic pressure** and reinforce territorial assertions.

About Arunachal Pradesh:

- Located in **Northeast India**, it became the **24th state of India in 1987**.
- Earlier known as the **North-East Frontier Agency (NEFA)**.
- **Capital:** Itanagar
- **State Borders:** Assam and Nagaland
- **International Borders:** China (1030 km), Myanmar (440 km), and Bhutan (160 km)
- **Ecological Importance:**
 - Known as the **"Orchid Paradise"** and **"Land of the Rising Sun"**.
 - Home to **dense forests, medicinal herbs, and rare wildlife species**.
 - Major **protected areas** include: **Namdapha National Park**, Pakke Tiger Reserve, and Dibang Wildlife Sanctuary.
- **Tribal Diversity:**
 - Inhabited by over **25 major tribes** including **Nyishi, Apatani, Mishmi, Wancho, Momba, Khamti, and Abor**.
 - Rich cultural heritage with unique **festivals** like **Losar, Solung, Dree, Nyokum, and Boori-Boot**.
- **Geological & River Features:**
 - **Rivers:** Siang (Tsangpo in Tibet), Kameng, Subansiri, **Lohit**, Tirap — mostly snow-fed and flowing from the Himalayas.
 - **Mountain Ranges:**
 - Dafla, Miri, Abor, Mishmi Hills
 - Part of the Eastern Himalayas with alpine and temperate climates.
 - **Passes:** Bum La, Bomdila, Tunga, and

Dihang Pass provide critical border access.

BUNDELKHAND

Context:

Bundelkhand's **water crisis** continues to deepen, placing a disproportionate burden on women and girls who travel long distances daily for water.



About Bundelkhand:

- Bundelkhand is a **historic plateau region** located in **central India**, now spread across **northern Madhya Pradesh and southern Uttar Pradesh**.
- It includes districts like Jhansi, Banda, Hamirpur (Uttar Pradesh), and Chhatarpur, Tikamgarh, Panna (Madhya Pradesh).

Geographical Features:

- Lies in the **Vindhyan hills** and ravine-cut plains with steep, isolated rocky outcrops ideal for fortifications.
- **Major rivers:** Betwa, Ken, Dhasan, and Tons — most flow through deep gorges, limiting irrigation potential.
- **Diamond deposits** are found near **Panna**, and major crops include wheat, cotton, and jowar.

Historical Background:

- Known as **Jejakabhukti** in ancient times; ruled by dynasties like **Gaharwars, Pratihars, and Chandelas**.
- Famous for **Khajuraho temples**, the region fell to Prithviraj Chauhan in 1182 CE.

- The **Bundela Rajputs**, from whom the region takes its name, resisted Mughal and [Delhi Sultanate](#) rule through guerrilla tactics.

BAKRA DAM

Context:

The [Bhakra Beas Management Board](#) (BBMB) ordered the release of 8,500 cusecs of water to Haryana, sparking strong opposition from the Punjab government, which cited an ongoing water crisis.

About Bhakra Dam:

- **Location:** Situated on the [Sutlej River](#) near **Bhakra village** in **Bilaspur district**, Himachal Pradesh, around **13 km upstream from Nangal (Punjab)**.
 - Bhakra dam is in Himachal, while Nangal is in Punjab.
- **States involved:** Jointly managed by **Punjab, Haryana, Rajasthan, Delhi, and Himachal Pradesh** via **BBMB**.
- **Key Features:**
 - Bhakra Dam is a concrete gravity dam.
 - **Asia's second tallest dam:** Height of **225.55 meters**.
 - **Gobind Sagar Reservoir:** Capacity of **9.34 billion cubic meters**, India's **second largest** after Indira Sagar.



- Provides **irrigation, hydroelectric power, flood control, and drinking water** to several states.
- It is known as the **“New Temple of Resurgent India”** by Jawaharlal Nehru.
- **Nangal dam** is another dam downstream of Bhakra dam. Sometimes both the dams together are called **Bhakra-Nangal dam** though they are two separate dams.

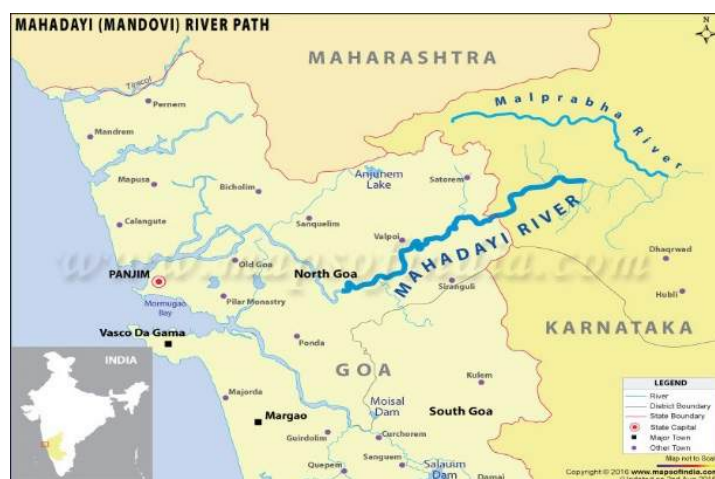
About Sutlej River:

- **Origin:**
 - Rises from **Lake Rakshastal**, near **Mount Kailash** in **southwestern Tibet**, at an elevation of over **15,000 feet (4,600 metres)**.
 - It is one of the **three trans-Himalayan rivers** that originate in Tibet and cut through the Himalayas, along with the **Indus** and **Brahmaputra**.
- **States it flows through:** Tibet (China), Himachal Pradesh (India), Punjab (India), and Pakistan.
 - Entry into India through the [Shipki La Pass](#) in Himachal Pradesh.
- **Tributaries of Sutlej:**
 - **Left-bank tributaries:** Spiti River, Baspa River, and Nogli Khad.
 - **Right-bank tributaries:** Soan River and Ghaggar-Hakra (historically connected)
- **Sutlej as a Tributary:**
 - Sutlej is the **longest of the five tributaries of the Indus River**.
 - After joining the **Beas River** in Punjab, it continues into Pakistan, meets the **Chenab**, and together they form the **Panjinad**, which ultimately merges into the Indus River.
- **Major Hydroelectric & Irrigation Projects:** Bhakra-Nangal Project, Nathpa Jhakri Hydroelectric Project (Himachal Pradesh), Karcham Wangtoo Hydroelectric Plant, [Sutlej Valley Project](#), and Sirhind Canal System.

MAHADAYI RIVER

Context:

A new scientific paper by CSIR-NIO and [INCOIS](#) claims that Karnataka's diversion of Mahadayi River will have limited ecological impact on Goa, sparking protests by local groups in Goa.



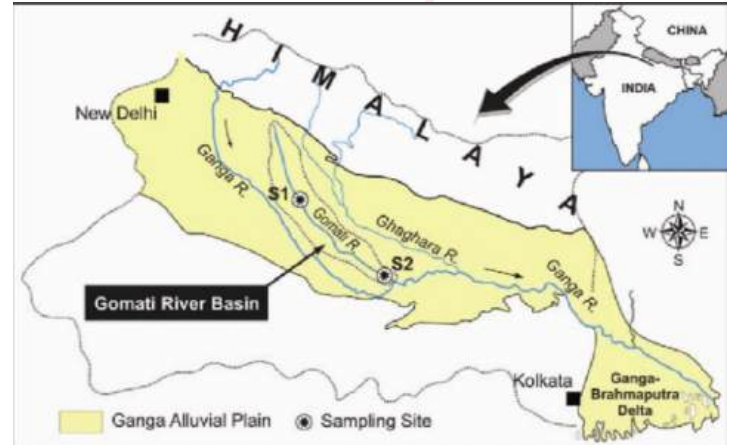
About Mahadayi River:

- **What it is?** Mahadayi (also called **Mandovi** or **Mhadei**) is a **rain-fed interstate river** known as Goa's **lifeline**, vital for drinking water, agriculture, biodiversity, and economy.
- **Origin:** Originates in the **Bhimgad Wildlife Sanctuary**, Belagavi district, Karnataka.
- **States it flows through:**
 - Flows through **Karnataka, Maharashtra, and Goa**.
 - **Total length:** 111 km — 35 km in Karnataka, 1 km in Maharashtra, 76 km in Goa.
- **Tributaries:**
 - **Major tributaries:** Kalasa, Banduri, Mapusa, Ragada, Nanuz, Valvoti, Nerul, St. Inez Creek, Dudhsagar, Kotrachi Nadi, Rio de Ourém.
 - The **Cumbarjua Canal** links Mahadayi and Zuari rivers.
- **Mouth:** Empties into the **Arabian Sea** at **Panaji**, Goa, near **Mormugao Harbour**.
- **Features of the River:**
 - Known for **Dudhsagar Falls**, **Salim Ali Bird Sanctuary** on Chorão Island.
 - Supports navigation, iron ore mining transport, and tourism (Mandovi cruises).
 - Hosts three parallel bridges including the **Atal Setu**, Goa's tallest bridge.
 - **Catchment area:** 2,032 km² (Goa – 1,580; Karnataka – 375; Maharashtra – 77).
- **What is the Dispute?**
 - **Karnataka** seeks to divert Mahadayi water for **drinking needs** in **drought-prone districts** (Belagavi, Dharwad, Bagalkot, Gadag).
 - **Goa** opposes it, citing **ecological harm** to its wildlife sanctuaries and dependence on the river.
 - The issue led to the formation of **Mahadayi Water Disputes Tribunal (MWDT)** under the **Inter-State River Water Disputes Act**.
- **About Kalasa-Banduri Project:**
 - A Karnataka-proposed project from the **1980s** to divert water from Mahadayi (Kalasa & Banduri tributaries) to the **Malaprabha basin** (Krishna River system).
 - Aims to meet drinking water demands in northern Karnataka.

GOMTI RIVER

Context:

The Gomti River in Lucknow is at risk of becoming ecologically dead due to rising untreated sewage, declining oxygen levels, and increasing **faecal coliform levels**.



About Gomti River:

- **Origin:**
 - Arises from **Gomat Taal (Fulhaar Jheel)** near **Madho Tanda**, Pilibhit district, Uttar Pradesh.
- **Course:**
 - Flows entirely through **Uttar Pradesh**, traversing districts like **Lucknow, Sitapur, Sultanpur, Jaunpur, Faizabad**, and others.
 - Joins the **Ganga River** at **Kaithi** in **Ghazipur** district.
- **Length & Basin:**
 - **Total Length:** ~960 km
 - **Drainage Area:** ~18,750 sq km (7,240 sq miles)
 - Perennial river with sluggish flow except during the **monsoon season**.
- **Major Tributaries:** Sai River, Chowka River, Kathina River, Saryu River, and Sarayan River.
- **Cultural and Religious Significance:**
 - Considered **sacred in Hinduism**, believed to be the daughter of **Rishi Vashishtha**.
 - Mentioned in the **Bhagavata Purana** as one of the **five transcendental rivers**.
 - The rare **Gomti Chakra** is found in its sands.

KALESHWARAM LIFT IRRIGATION PROJECT

Context:

The [National Dam Safety Authority](#) (NDSA) has found serious structural damage in Telangana's Kaleshwaram Lift Irrigation Project (KLIP) barrages, recommending urgent repairs and a complete safety review.



About Kaleshwaram Lift Irrigation Project:

- **What is KLIP?**
 - KLIP is the **world's largest multi-stage lift irrigation project**, aimed at diverting water from the [Godavari River](#) to drought-prone regions of **Telangana**.
- **Location:**
 - Situated at **Kaleshwaram**, Jayashankar Bhupalpally district, Telangana
 - It draws water from the **confluence of Pranahita and Godavari Rivers**
- **Lift Irrigation Technology:**
 - Uses **massive pumps** to lift water against gravity from lower elevations to higher regions
 - Includes **four major pump stations**, with Ramadugu being Asia's largest (powered by 7 x 140 MW pumps from BHEL)
- **Key Features of KLIP:**
 - **World's Largest Lift Irrigation Project:** Draws water from the Godavari-Pranahita confluence to irrigate over 18 lakh acres in Telangana.
 - **Massive Infrastructure:** Covers ~500 km across 13 districts with 1,800 km canal network and major barrages at Medigadda, Annaram, and Sundilla.

- **High Water Capacity:** Total 240 TMC – including 195 TMC from Medigadda Barrage and rest from Yellampalli & groundwater.
- **Multi-purpose Use:** Supplies water for agriculture (169 TMC), Hyderabad city (30 TMC), industry (16 TMC), and rural drinking needs (10 TMC).

About National Dam Safety Authority (NDSA):

- **What is NDSA?**
 - The **National Dam Safety Authority (NDSA)** is a **statutory regulatory body** established under **Section 8(1) of the [National Dam Safety Act, 2021](#)**.
 - It was created by the **Central Government** to institutionalize dam safety and oversee compliance with safety standards across India.
- **Headquarters:** New Delhi
- **Key Functions of NDSA:**
 - **Dam Regulation:** Formulates national policies for **design, construction, maintenance, and operation** of dams.
 - **Dispute Resolution:** Mediates conflicts between [State Dam Safety Organisations \(SDSOs\)](#) or between SDSOs and **dam owners**.
 - **Inspection & Oversight:** Conducts periodic **safety inspections**, especially for specified large dams.
 - **Disaster Preparedness:** Develops and monitors **emergency action plans** to respond to dam-related hazards.
 - **Public Awareness:** Leads **national campaigns** to build awareness on dam safety, flood risks, and community preparedness.
 - **Technical Support:** Provides **capacity building**, research, and guidelines for dam design and hydrological safety.

ARABIAN SEA

Context:

The IMD has forecast a low-pressure system forming over the east-central Arabian Sea, likely to intensify into a depression in the next 36 hours.

About Arabian Sea:

- **Location:** The Arabian Sea is a **northwestern extension of the Indian Ocean**, bordered by **India** to the east and the [Arabian Peninsula](#) to the west.



- **Neighbouring Nations:**
 - **Coastal countries:** India, Pakistan, Iran, Oman, Yemen, and Somalia.
 - **Key maritime links:** [Gulf of Oman](#) (to Persian Gulf) and Gulf of Aden (to Red Sea).
- **Indian Coastal States:** Indian states bordering the Arabian Sea include: Gujarat, Maharashtra, Goa, Karnataka, Kerala, and Lakshadweep UT.
- **Geographical Features:**
 - **Depth:** Average depth ~2,734 m and max depth at **Wheatley Deep** ~5,803 m
 - **Major Submarine Features:**
 - **Carlsberg Ridge** (seismic, mid-ocean ridge)
 - **Murray Ridge**, Somali and Arabian Basins
 - **Indus submarine canyon** and abyssal cone
 - **Key Islands:**
 - Socotra (Yemen), Kuria Muria Islands (Oman), Lakshadweep (India)
- **Role in Monsoon:**
 - **Monsoon Influence:**
 - Southwest monsoon winds (April–November) gather moisture from the Arabian Sea, triggering **heavy rains in India**.
 - **Upwelling near the Somali and Arabian coasts** aids in nutrient cycling and monsoon onset.
 - **Ocean Currents:**
 - Hosts the **Somali Current**, one of the fastest ocean currents (~13 km/hr), seasonally reversing with monsoons.
 - Drives **clockwise circulation** during summer and weakens during winter monsoon.
 - **Sediments & Marine Geology:**
 - High sedimentation from the [Indus](#)

River.

- Known for **ferromanganese nodules, hydrogen sulfide zones, and polymetallic sulfides.**

VIZHINJAM PORT

Context:

Prime Minister of India formally dedicated the Vizhinjam International Seaport to the nation, marking a strategic leap in India's maritime infrastructure.

About Vizhinjam Port:

- **What it is?**
 - **India's first deep-water, all-weather, automated transshipment port**, designed for handling next-gen ultra-large container vessels (ULCVs).
 - Functions under the **landlord port model**, integrating smart tech and scalable design.
- **Location:** Situated at **Vizhinjam near Thiruvananthapuram, Kerala**—just **10 nautical miles** from key global shipping routes (Suez–Far East & Far East–Middle East).



- **Developed & Operated By:** Owned by the Government of Kerala and **operated by Adani Ports & SEZ** under a 40-year concession.
- **Key Features:**
 - **Natural depth of 24 meters** – no capital dredging required; supports 24,000+ TEU vessels.
 - **AI-based Vessel Traffic Management System (VTMS)** & radar-powered tracking.
 - **World-class infrastructure:** Deepest breakwater (28m), tallest STS crane in India, cruise berth, and upcoming railway tunnel (India's 3rd longest).
 - Capable of handling **50% of India's**

transshipment cargo, reducing \$200+ million in annual foreign port dependency.

- **Strategic Importance:**

- **Transshipment Hub:** Directly competes with Colombo, Singapore, and Jebel Ali by offering lower-cost, high-efficiency cargo handling.
- Reduces **double handling costs**, transit delays, and boosts **Make in India** exports.

- **Trade Facilitation:**

- Facilitates **containerized export** of goods such as electronics, textiles, seafood, and perishables.
- Enhances port connectivity to both **east and west Indian coasts** and improves access to global markets.

Sikkimese belief.

- Surrounded by **four major glaciers**: [Zemu Glacier](#) (northeast), Talung Glacier (southeast), Yalung Glacier (southwest), and Kanchenjunga Glacier (northwest).
- Receives heavy summer snowfall due to monsoons, with **lighter winter snow**.

- **Cultural Importance:**

- Revered as a sacred mountain and **abode of guardian deity 'Dzoe-Nga'**.
- Considered inviolable by Sikkim's **Bhutia and Lepcha** communities.
- **Climbing is banned** from the Indian side under [Places of Worship \(Special Provisions\) Act, 1991](#) and **Article 371(F)**, which protects Sikkim's customs post-merger with India.

- **Historical Significance:**

- Believed to be the highest peak until [Mount Everest](#) was confirmed in 1856.
- **First climbed in 1955** by **Joe Brown and George Band** (British expedition).
- Climbers traditionally stop short of the summit to honour religious sentiments.
- Charles Evans also led an expedition on the southwest face in 1955.

MOUNT KANCHENJUNGA

Context:

Sikkim Chief Minister has urged the Centre to request a ban on scaling Mount Kanchenjunga from [Nepal](#), citing its deep spiritual significance to Sikkim's indigenous communities.



About Mount Kanchenjunga:

- **Location:**

- Lies in the **eastern Himalayas**, straddling the **India–Nepal border**, 74 km north-northwest of Darjeeling.
- Stands at an elevation of **8,586 metres (28,169 ft)**, making it the **third-highest mountain in the world** and the **highest peak in India**.

- **States Associated:**

- Located between [Sikkim \(India\)](#) and **Taplejung District (Nepal)**.
- The Indian side lies within the Khangchendzonga National Park in Sikkim.

- **Geographical Features:**

- Comprises **five prominent peaks**, referred to as the **"Five Treasures of the Snow"** in