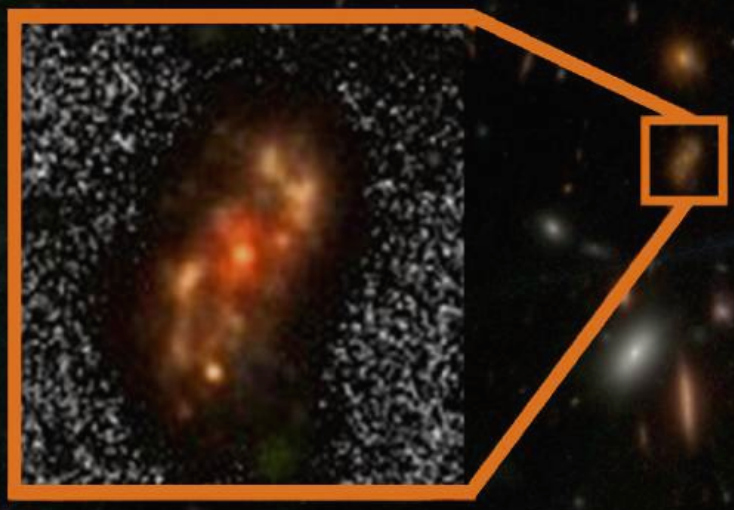
INSIGHTSIAS

SIMPLIFYING IAS EXAM PREPARATION

ALAKNANDA GALAXY

Indian astronomers have discovered Alaknanda, an implausibly old and well-formed spiral galaxy dating to just 1.5 billion years after the Big Bang, using JWST data.



INSIGHTS CURRENT AFFAIRS

DECEMBER 2025

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INSIDE

GENERAL STUDIES – 1

GENERAL STUDIES – 2

Topics: Government policies and interventions for development in various sectors and issues arising out of their design and implementation.

Topics: Welfare schemes for vulnerable sections of the population by the Centre and States and the performance of these schemes.

Topics: Issues relating to development and management of Social Sector/Services relating to Health, Education, Human Resources.

Topics: Important aspects of governance, transparency and accountability, e-governance applications, models, successes, limitations, and potential; citizens charters, transparency & accountability and institutional and other measures.

Topics: Bilateral, regional and global groupings and agreements involving India and/or affecting India's interests.

GENERAL STUDIES – 3

Topics: Indian Economy and issues relating to planning, mobilization of resources, growth, development and employment.

Topics: Issues related to direct and indirect farm subsidies and minimum support prices; Public Distribution System- objectives, functioning, limitations, revamping; issues of buffer stocks and food security; Technology missions; economics of animal-rearing.

Topics: Effects of liberalization on the economy, changes in industrial policy and their effects on industrial growth.

FACTS FOR PRELIMS; GENERAL STUDIES – 2

New bills and acts

Welfare schemes

Miscellaneous

International organisation

International Relations

FACTS FOR PRELIMS; GENERAL STUDIES – 3

ECONOMY; Basic Concepts and Macroeconomics (GDP, GNP, NI)

Banking and Money (Monetary Policy)

Financial Markets (Capital Market, Money Market)

Miscellaneous

Mapping

GENERAL STUDIES – 1

Topics: Indian culture will cover the salient aspects of Art Forms, Literature and Architecture from ancient to modern times.

DECLINE OF INDUS VALLEY CIVILISATION

Context:

A new multi-proxy paleoclimate study has claimed that the Indus Valley Civilisation (IVC) declined due to centuries-long recurring droughts, not a single catastrophic event.

About Decline of Indus Valley Civilisation:

What it is?

- The Indus Valley Civilisation (3300–1300 BCE), also called **Harappan Civilisation**, was one of the world's earliest urban cultures spread across present-day Pakistan and northwest India.
- It originated along the Indus and Ghaggar-Hakra (Sarasvati) river systems, evolving into a sophisticated Bronze Age civilisation known for cities like Harappa, Mohenjo-Daro, Rakhigarhi and Dholavira.

Features of Indus Valley Civilisation:

- **Art & Craft:**
  - Highly developed craftsmanship in bead-making, pottery, terracotta figurines, shell–copper–bronze artefacts, and the iconic "Dancing Girl" and "Priest-King" sculptures.
- **Architecture & Urban Planning:**
  - World-class urban design with grid-pattern streets, multi-storey brick houses, citadels, granaries, and advanced drainage with covered sewerage and soak pits.
- **Script & Literature:**
  - Used a still-undeciphered pictographic script found on seals, tablets and pottery; no surviving textual literature, but inscriptions show a complex symbolic system.
- **Economy:**
  - A diversified economy based on agriculture (wheat, barley, cotton), craft industries, internal trade, and long-distance trade with Mesopotamia, Oman and Iran (evident from seals, weights and boats).
- **Society & Governance:**
  - Urban society with standardised weights, uniform architecture, and planned layouts, implying an efficient civic authority; evidence suggests a largely peaceful, egalitarian society with little social stratification.

Decline of the Indus Valley Civilisation:

New Evidence from 2025 Study:

- **Decline was gradual, triggered by four major mega-droughts (2425–1400 BCE):**
  - The study identifies **four prolonged drought phases**, each lasting **over 85 years**, with the most severe one peaking around **1733 BCE for nearly 164 years**.
  - These droughts did not occur once but in cycles, creating **centuries of hydrological instability**, which progressively weakened agriculture, trade, and urban functioning.
- **Weakening monsoons due to warming of the tropical Pacific:**
  - Climate records show that the tropical Pacific shifted from a **cool, La Niña-like phase** (3000–2500 BCE) to a **warmer, El Niño-like phase**.
  - This directly **reduced monsoon rainfall by 10–20%**, drastically lowering water availability for fields, reservoirs, and rivers.
- **Hydrological changes: rivers shrank and soils dried up:**
  - The study combines lake cores, cave stalagmites, and climate models to show that rivers like the **Sutlej-Ghaggar system**, **Beas**, and many tributaries experienced **reduced flows**.

- Soil moisture declined, leading to **desiccation**, salinity build-up, and reduced crop yields — especially in areas away from the Indus River.

- **Impact on agriculture and food systems:**
  - Crop failures increased, forcing Harappans to **shift from water-intensive crops (wheat, barley)** to drought-resistant ones like **millets**.
  - Agricultural stress weakened the surplus system that supported large urban centres.
- **Breakdown of long-distance trade and economic networks:**
  - Lower river levels made river navigation difficult, reducing connectivity to Mesopotamia, the primary trade partner.
  - Reduced rainfall and shrinking lakes also made overland routes riskier.
  - This decline in external trade undermined urban jobs (bead makers, potters, metalworkers), destabilising the economic base.

Other Classical Theories:

- **Changes in River Systems (Indus & Ghaggar-Hakra shifts)**
  - Tectonic movement altered the courses of key rivers.
  - The **Ghaggar-Hakra (Sarasvati)** dried gradually, leading to the abandonment of major settlements like **Kalibangan** and **Banawali**.
  - The Indus River occasionally **flooded massively**, depositing silt and destroying fields, while later shifting away from some cities.
- **Collapse of Mesopotamian Trade Network:**
  - Around 2000 BCE, Mesopotamia faced internal political turmoil (Akkadian collapse, Ur III decline).
  - As Mesopotamian trade weakened, demand for **Harappan goods (beads, cotton textiles, metals)** fell sharply.
  - Reduced trade cut off a crucial economic pillar of urban Harappan life, contributing to industrial decline.
- **Urban Overcrowding and Declining Civic Maintenance:**
  - Archaeology shows that many cities became **densely crowded**, with houses built over older streets and structures.
  - The once-pristine drainage systems became **clogged and poorly maintained**, signalling administrative weakening.
  - Public buildings like the **Great Bath** were built over or lost importance.
- **No Evidence of Large-Scale Invasion or Warfare:**
  - Earlier theories proposed "Aryan invasion" based on Rig Veda references, but archaeology contradicts this:
    - No mass graves indicating war.
    - No burnt cities or weapons of destruction.
    - Harappan society overall shows **little militarisation**.
  - Most scholars now agree that invasion did **not** cause the collapse.

Significance of Indus Valley Civilisation:

- Gave India its first planned cities, sanitation systems and urban governance models.
- Demonstrated advanced hydrology, craft specialisation, maritime trade, and agricultural adaptation.
- Offers lessons for today on water management, climate resilience, and decentralised settlement planning.
- Its peaceful culture and standardised systems highlight early forms of civil administration, trade regulation and environmental adaptation.

Conclusion:

The new scientific findings show that the Indus collapse was not a mystery or a myth but a slow climatic tragedy worsened by fragile governance and economic stress. Yet the civilisation's adaptability for nearly two millennia underscores its resilience and sophistication. As today's world faces climate extremes, the Indus story serves as a powerful reminder that environmental shifts can reshape even the greatest urban cultures.

Topics: Modern Indian history from about the middle of the eighteenth century until the present- significant events, personalities, issues.

70TH DEATH ANNIVERSARY OF DR. B.R. AMBEDKAR

Context:

India observed the 70th death anniversary

(Mahaparinirvan Diwas) of Dr. B.R. Ambedkar, commemorating his lasting contributions to constitutional governance, social justice, and economic thought.

About 70th Death Anniversary of Dr. B.R. Ambedkar:

Who He Was?

- Dr. B.R. Ambedkar (1891–1956) was a jurist, economist, social reformer, and chief architect of the Indian Constitution. He led pioneering movements against caste discrimination and laid the foundations of India's modern democratic and economic institutions.

Early Life & Education:

- Born on **14 April 1891** in Mhow (MP) into a socially oppressed Mahar family; faced severe caste discrimination since childhood.
- Completed B.A. from Bombay University; supported by a Baroda State scholarship for higher studies abroad.
- Earned **PhD from Columbia University**, **D.Sc. from London School of Economics**, Bar-at-Law in London—becoming one of India's most accomplished scholars of his time.
- His early works—Castes in India, Evolution of Provincial Finance, Problem of the Rupee—established him as a global intellectual.

Contributions to India's Freedom Movement & Social Reform:

- **Led Mass Movements Against Untouchability:** Dr. Ambedkar transformed the social reform landscape by leading historic civil rights agitations, most notably the Mahad Satyagraha (1927) where Dalits asserted their right to drink water from a public tank. This marked the first organised anti-caste mass mobilisation challenging notions of purity–pollution.
- **Fought for Temple Entry and Religious Equality:** He spearheaded the Kalaram Temple Satyagraha (1930) in Nashik to demand Dalit entry into Hindu temples. This campaign directly confronted religious exclusion and became a symbol of the struggle for dignity and the right to worship.
- **Represented Depressed Classes at Round Table Conferences:** At the Round Table Conferences (1930–32) in London, Ambedkar was the foremost voice for Dalits. He articulated their political grievances, demanded separate electorates for adequate representation, and successfully internationalised the issue of caste discrimination.
- **Negotiated the Poona Pact (1932):** Ambedkar's negotiations with Mahatma Gandhi led to the Poona Pact, replacing separate electorates with reserved seats for Dalits in legislatures. This became the basis of modern affirmative action in India and ensured political empowerment within a joint electorate.
- **Championed Labour Rights and Social Justice During Colonial Rule:** As Labour Member in the Viceroy's Executive Council (1942–46), Ambedkar introduced 8-hour workdays, paid leave, maternity benefits, dispute resolution systems, and welfare funds—advancing both workers' rights and social justice during the freedom struggle.
- **Contribution to Drafting the Constitution:** Dr. B.R. Ambedkar ensured the Constitution embodied **justice, liberty, equality and fraternity** by designing a strong framework of fundamental rights, federalism and an independent judiciary. He introduced safeguards such as **abolition of untouchability, reservations, minority protections and social welfare principles.**

Contributions to India's Economic Thought:

- **Father of Monetary Economics in India:** His book The Problem of the Rupee (1923) shaped modern monetary policy and directly influenced the creation of the **Reserve Bank of India (RBI) in 1934**.
- **Fiscal Federalism Pioneer:** His 1921 thesis on provincial finance laid the intellectual foundation for **India's Finance Commission** and fiscal decentralisation.
- **Labour Reforms (as Labour Member, 1942–46):** Introduced **8-hour workday**, maternity benefits, labour welfare funds, and set up **Employment Exchanges** across India.
- **Water & Power Resource Planning:**

Spearheaded key institutions such as the **Central Water Commission**, Damodar Valley Project, and promoted multi-purpose river projects for national development.

- **Anti-inflation and welfare economics:** Emphasised monetary stability and warned that inflation disproportionately harms the poor—echoing principles in today's inflation-targeting framework.

Organisations Associated with Ambedkar:

- **Bahishkrit Hitkarini Sabha (1923):** Upliftment of oppressed communities.
- **Independent Labour Party (1936):** Advocated labour rights and social justice.
- **Scheduled Castes Federation (1942):** Political mobilisation of marginalized groups.
- **Republican Party of India (announced 1956):** Vision for an egalitarian polity (formed after his death).

Literary Contributions:

- Ambedkar's works span economics, sociology, politics, religion, and law. Key texts include:
  - Annihilation of Caste
  - The Problem of the Rupee
  - Who Were the Shudras?
  - Buddha and His Dhamma
  - Essays on Untouchables and Untouchability
  - Buddha or Karl Marx
- **Critical journals:** Mooknayak, Bahishkrit Bharat, Janata, Samata
- These writings shaped India's intellectual, social, and constitutional landscape.

Ambedkar's Last Days:

- **Declining Health (1954–56):** From 1954 onward, Ambedkar suffered from diabetes, weakened eyesight, and deteriorating physical health. Despite this, he continued his academic writing, parliamentary work, and Buddhist studies.
- **Completion of The Buddha and His Dhamma:** In the final months of his life, he worked intensely to complete his last and most profound book, "The Buddha and His Dhamma", laying the philosophical foundation of Navayana Buddhism. The book was published posthumously in 1957.
- **Historic Conversion to Buddhism (14 October 1956):** Ambedkar and over 5 lakh followers embraced Buddhism in Nagpur, marking a revolutionary social and spiritual movement. He saw conversion as the final step in rejecting caste oppression and reclaiming dignity.
- **Final Writings and Reflections:** In his last speeches and writings, Ambedkar expressed concern about rising casteism, economic inequality, and the gap between constitutional ideals and social reality. He warned that "**political democracy cannot last unless there lies at the base of it social democracy.**"
- **Mahaparinirvan (6 December 1956):** Ambedkar passed away peacefully in his sleep at his residence, 26 Alipur Road, Delhi, at the age of 65. His death anniversary is observed as Mahaparinirvan Diwas.
- **Cremation and Memorial at Chaitya Bhoomi:** His funeral drew lakhs of followers, and his ashes were enshrined at Chaitya Bhoomi, Mumbai, which has since become an iconic pilgrimage site for Ambedkarites.
- **Bharat Ratna (1990):** Ambedkar was posthumously awarded India's highest civilian honour, the Bharat Ratna, for his monumental contributions to nation-building, constitutional design, social justice, and economic thought.

Conclusion:

Dr. B.R. Ambedkar's legacy extends far beyond drafting the Constitution—he laid the moral, economic, and institutional foundation of modern India. His life remains a testament to the transformative power of knowledge, courage, and constitutionalism. Seven decades after his passing, Ambedkar's ideas continue to light the path towards a more just, equitable, and dignified society.

Topics: Women and women related issues.

CLIMATE STRESS ON WOMEN AND THE EVOLVING GLOBAL HEALTH RESPONSE

Context:

Women face growing health and safety risks from rising heat, a new MSSRF study shows. Meanwhile, WHO signals cautious approval for weight-loss drugs, India intensifies action on antibiotic resistance, and South Africa advances with a promising HIV prevention shot.

About Climate Stress on Women and the Evolving Global Health Response:

What is the issue?

- **Heat-linked morbidity among women** – Rising temperatures are directly correlating with specific reproductive and mental health crises in women, particularly in high-heat districts.

  E.g. A 2024 MSSRF study in **Beed (Maharashtra)** found that female sugarcane workers in high-heat zones reported a **2x higher rate of hysterectomies** and **70%** reported chronic dizziness and fatigue during summer months.
- **Workplace heat adaptation gaps** – Informal sectors lack basic "survival infrastructure" like cooling or hydration, turning workplaces into health hazards.

  E.g. In **Tamil Nadu's textile belts**, female workers reported avoiding water to skip bathroom breaks, leading to a spike in **Urinary Tract Infections (UTIs)** during heatwaves (MSSRF data).
- **Conditional WHO approval of GLP-1 weight-loss drugs** – The WHO has backed drugs like Semaglutide but with strict "last-resort" guardrails.

  E.g. The WHO guideline restricts **Wegovy (Semaglutide)** use to adults with **BMI ≥35** who have failed lifestyle interventions, rejecting it as a cosmetic "quick fix."
- **AMR plan progress with coordination deficit** – India's NAP-AMR 2.0 sets targets, but state-level enforcement remains the weak link.

  E.g. While **Kerala and Gujarat** successfully banned OTC antibiotic sales, other states lack similar enforcement, creating regulatory loopholes for drug resistance.
- **HIV prevention shift to long-acting injection** – A paradigm shift from daily pills to twice-yearly shots for HIV prevention.

  E.g. South Africa secured **400,000 doses** of **Lenacapavir** (a twice-yearly injection) via the Global Fund to target high-risk adolescent girls starting in **early 2026**.
- **Regulatory tightening and AI surveillance** – India is moving from reactive checks to predictive monitoring after global pharma trust deficits.

  E.g. Following the **Maiden Pharma** tragedy in Gambia, India's CDSCO audited **76 pharmaceutical firms**, cancelling 18 licenses for manufacturing violations in a single drive.

Implications:

- **Gendered climate health inequity deepens** – Heat is not just uncomfortable; it is becoming a driver of gender-based violence and economic loss.

  E.g. The MSSRF study noted a **38% increase in domestic violence** reports during peak summer months in surveyed households, linked to economic stress and water scarcity.
- **Therapeutic access divides widen** – Advanced drugs (GLP-1s, Lenacapavir) risk becoming elite-only products without price controls.

  E.g. WHO data projects that even with production scaling, GLP-1 drugs will reach **less than 10%** of the global population needing them by 2030 due to high costs (~$1000/month in US).
- **AMR containment remains structurally fragile** – Without federal-style accountability, national plans fail at the district level.

  E.g. The **"One Health"** approach is stalling because veterinary antibiotic use (regulated by States) remains largely unchecked compared to human health sectors.
- **Urban heat–cardiac vulnerability escalates** – Cities are becoming heat traps, triggering "silent" metabolic and cardiac collapses.

  E.g. Ahmedabad's Heat Action Plan found that all-cause mortality spiked by **43%** during heatwaves, prompting the integration of heat alerts with hospital admission data.
- **Regulatory legitimacy tests intensify** – Export safety is now directly linked to India's "Pharmacy of the World" reputation.

  E.g. In **October 2024**, samples of **Coldrif Syrup** (Sresan Pharmaceuticals) were found to contain **46% Diethylene Glycol** (a toxic solvent) after

causing deaths in Madhya Pradesh.

What can be done?

- **Legislate heat-protective labour conditions** – Mandate specific cooling amenities rather than general "welfare" norms.

  E.g. Kerala's Labour Department mandates a "noon break" (12 PM–3 PM) for outdoor workers between February and April to prevent heatstroke.

- **Convert AMR timelines into binding enforcement** – Move from voluntary state alignment to statutory mandates.

  E.g. Adopting **Kerala's "Operation Amrith"**, which empowers drug inspectors to conduct surprise raids and track antibiotic sales via a digital app, across all states.

- **Ensure equitable access to GLP-1 and Lenacapavir** – Use international licensing mechanisms to lower costs.

  E.g. The **Medicines Patent Pool (MPP)** signed voluntary licensing deals with Indian generic makers (like Cipla/Dr. Reddy's) to produce low-cost versions of Lenacapavir for 120 countries.

- **Embed AI-heat-AQI mapping into urban health plans** – Use technology to predict health risks before they peak.

  E.g. The **Nagpur Metropolitan Surveillance Unit** used AI media scanning to detect an outbreak of **Acute Encephalitis Syndrome (AES)** in Chhindwara days before official reports.

- **Modernise surveillance with unified audit layers** – Combine export checks with domestic safety monitoring.

  E.g. The Integrated Health Information Platform **(IHIP)** now aggregates real-time data from **33 disease conditions**, allowing districts to spot "fever clusters" instantly.

Conclusion:

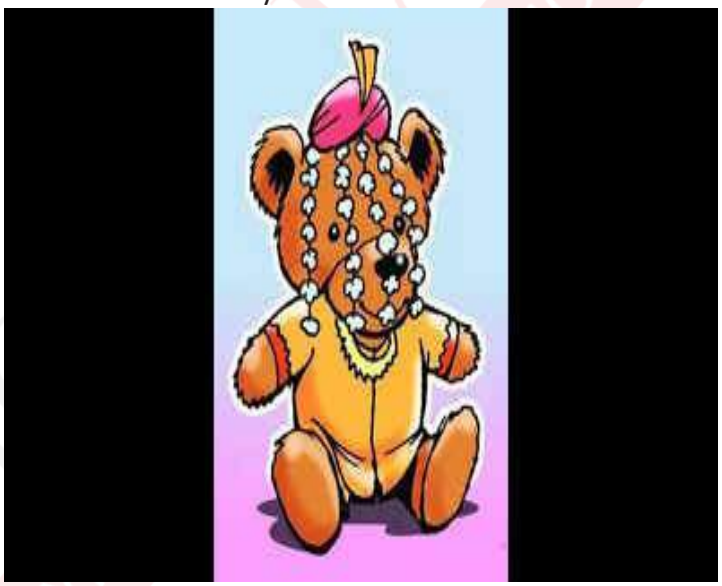
The convergence of heat-linked gender stressors, metabolic drug caution, AMR execution demands, and long-acting prevention signals a decisive turn in health governance. India's resilience now rests not on episodic drug breakthroughs but on climate-aware design (like Kerala's noon breaks), equity-proofing and strict institutional enforcement.

Topics: Population and associated issues, poverty and developmental issues.

CHILD MARRIAGES IN INDIA

Context:

Despite 18 years of the Prohibition of Child Marriage Act, 2006, Andhra Pradesh continues to report a high incidence of child marriage, highlighting gaps between law and social reality.



About Child Marriages in India:

What it is?

- Child marriage refers to the formal or informal union where one or both parties are below 18 years of age, violating children's rights to education, health, protection and choice.
- It disproportionately affects girls, exposing them to early pregnancy, domestic violence, school dropout and long-term economic dependence.

Historical evolution:

- **Colonial era:** Social reform movements (Raja Ram Mohan Roy, Ishwar Chandra Vidyasagar) highlighted early marriage as a social evil.
- **Legislative steps:**
  - Child Marriage Restraint Act, 1929 (Sarda Act) – minimum age fixed but weak enforcement.
  - Prohibition of Child Marriage Act, 2006 – declared child marriage voidable, introduced penalties and Child Marriage Prohibition Officers.
- **Recent push:** National campaigns like Bal Vivah-Mukt Bharat aim to eliminate child marriage by 2030 in line with SDG-5.

Trends of child marriage in India:

- About **16% of girls aged 15–19** are currently married, though prevalence declined from **47% (2005–06) to ~27% (2015–16)**.
- India still accounts for **~1.5 million child marriages annually**, the highest globally in absolute numbers.
- Higher prevalence persists in economically vulnerable regions such as Bihar, Andhra Pradesh, Rajasthan and parts of Madhya Pradesh.

Reasons for child marriage:

1. **Poverty and economic distress:** Poor households perceive early marriage as a way to reduce care costs and secure social protection for daughters.

   E.g. NFHS analysis shows child marriage is far higher among the poorest wealth quintile than the richest.
2. **Lack of awareness:** Limited understanding of the Prohibition of Child Marriage Act and adolescent health risks weakens legal deterrence.

   E.g. Surveys under Bal Vivah Mukt Bharat found low awareness of penalties and the legal marriage age.
3. **Entrenched gender norms:** Patriarchal beliefs treat girls as *paraya dhan*, prioritising marriage over education and autonomy.

   E.g. Social studies show norms change slowly even when female education improves.
4. **School dropouts:** Distance to schools, safety concerns and costs push girls out of secondary education, increasing vulnerability.

   E.g. UNICEF data shows completing secondary education sharply lowers the risk of early marriage.
5. **Social pressure and stigma:** Fear of elopement and loss of "family honour" drives families to arrange early marriages.

   E.g. Authorities report spikes in secret mass marriages on culturally auspicious days.

Challenges associated:

1. **Weak enforcement:** Low conviction rates dilute the deterrent effect of the law despite frequent prevention efforts.

   E.g. Judicial observations highlight severe pendency and slow disposal of child marriage cases.
2. **Family complicity:** Entire families often support early marriage, limiting scope for timely intervention.

   E.g. Courts have noted use of informal betrothals to bypass legal scrutiny.
3. **Institutional gaps:** Inadequate shelters, counselling services and trained officers weaken rescue and rehabilitation.

   E.g. Many Child Marriage Prohibition Officers hold additional charge without specialised capacity.
4. **Gendered health impacts:** Adolescent motherhood raises risks of anaemia, maternal mortality and low birth-weight infants.

   E.g. Nutrition audits link early marriage districts with poor maternal-child health outcomes.

Way ahead:

1. **Education-first strategy:** Retaining girls in secondary education delays marriage and expands life choices.

   E.g. Conditional cash transfers tied to schooling have significantly postponed marriage age.
2. **Economic support to families:** Cash-plus and skill-based interventions reduce poverty-driven marriage decisions.

   E.g. Upgraded Anganwadi centres now provide vocational and life-skills training for adolescents.
3. **Community engagement:** Shifting norms requires panchayats, faith leaders and youth ownership of prevention.

   E.g. Village-level "Child Marriage-Free" declarations have created positive social pressure.
4. **Stronger enforcement:** Dedicated units, digital reporting and swift FIRs improve accountability.

   E.g. Centralised online portals now enable real-time alerts and faster administrative response.
5. **Integrated adolescent empowerment:** Linking protection with health, nutrition and legal awareness ensures sustained impact.

   E.g. Nari Adalats combine community mediation with legal backing to prevent early unions.

Conclusion:

Child marriage is not merely a legal violation but a symptom of poverty, gender inequality and social neglect. While laws and campaigns exist, their success depends on education, economic security and community-level change. Ending child marriage is essential for safeguarding children's rights and breaking intergenerational cycles of deprivation.

THE CHANGING PATTERNS OF INDIA'S STUDENT MIGRATION

Context:

India is witnessing a sharp rise in self-financed student migration, with overseas enrolment projected to reach 13.8 lakh in 2025.

- Recent debates highlight rising debt, underemployment and "brain waste", questioning the developmental gains of this trend.

About The Changing Patterns of India's Student Migration:

What it is?

- Student migration now represents a **mass middle-class phenomenon**, driven less by elite scholarships and more by self-financed education loans and family savings.

Recent trends:

1. By December 2025, **18.82 lakh Indian students** were studying across **153 countries**, with Germany and France emerging as cost-effective alternatives, as Germany alone recorded **~49% growth** amid tighter rules in traditional hubs.
2. The **Kerala Migration Survey (2023–24)** shows student migration doubling from **1.29 lakh (2018) to 2.5 lakh (2023)**, now forming **11.3% of all emigrants**, while Gulf labour migration has stagnated.
3. In **2023–24**, Kerala's outward education remittances touched **₹43,378 crore**, nearly **20% of its inward labour remittances**, marking a measurable economic strain on households.
4. In **2024–25**, stricter norms in Canada, the US, UK and Australia saw Canada's study-visa approval rate fall to **~30%**, triggering a **23% YoY drop in education remittances** as families deferred overseas plans.

Factors Causing the Change in Migration Patterns:

- **Aspirational mobility and PR pathways:** Students increasingly choose destinations that offer post-study work and residency options, even at higher costs, viewing education as a migration ladder rather than a learning goal.

  Eg: In 2024–25, Australia and Germany saw higher Indian enrolments due to clearer PR pathways despite rising visa fees.
- **Gaps in domestic education–employment linkage:** Weak alignment between Indian degrees and labour-market needs pushes graduates to seek foreign credentials for employability.

  Eg: The India Skills Report 2024 found only **51% of Indian graduates employable**, fuelling the "degree-plus-visa" strategy.
- **Aggressive recruitment networks:** Unregulated agents prioritise commissions over student outcomes, steering aspirants to low-quality overseas institutions.

  Eg: In 2024, Punjab Police cracked down on hundreds of fake immigration firms after **700 students faced deportation threats from Canada.**
- **Normalisation of self-financed migration:** Middle-class families increasingly accept high debt as a legitimate investment in global mobility.

  Eg: RBI (2024) recorded a sharp rise in LRS remittances under "Education" and "Maintenance of Close Relatives".

Challenges Associated with Student Migration:

- **Deskilling and underemployment:** Highly educated students often end up in low-skill jobs due to restrictive visa regimes and weak placement support.

  Eg: UK's 2024 limits on skilled-visa switching pushed Indian STEM graduates into gig-economy work.
- **Reverse remittances and household debt:** Instead of earning abroad, students drain domestic savings and incur long-term family debt.

  Eg: Education loans averaged **₹35–40 lakh in 2024**, often mortgaging ancestral land in Punjab and Haryana.
- **Exploitation and informal labour:** Financial stress forces students into unsafe housing and undocumented work.

  Eg: Canada's 2024 housing crisis led to **"hot-**

bedding" and illegal warehouse jobs among Indian students.

- **Mental health and social stress:** Isolation, debt pressure and insecurity severely affect student well-being.

  Eg: Indian consulates in the US and Canada reported a surge in distress calls in 2024 after violent incidents.

- **Brain waste instead of brain gain:** Failure to secure skilled jobs results in debt-burdened returns rather than knowledge transfer.

  Eg: Many returnees face **"circular migration failure"**, coming back with loans instead of advanced skills.

Way Ahead:

- **Regulate education recruitment agents:** Mandatory registration and penalties can curb fraud and misinformation.

  Eg: Proposed amendments to the **Punjab Prevention of Human Smuggling Act** target unregistered study-abroad consultants.

- **Strengthen pre-departure counselling:** Transparent guidance can align expectations with ground realities.

  Eg: MEA's **"Surakshit Jaaye, Prashikshit Jaaye" (2024)** campaign educates aspirants on risks and rights.

- **Bilateral education accountability frameworks:** Structured mobility agreements reduce uncertainty and exploitation.

  Eg: India-Australia MATES programme provides regulated visa quotas for young professionals.

- **Improve domestic higher education outcomes:** Quality global education at home can reduce forced migration.

  Eg: Foreign university campuses at **GIFT City, Gujarat**, offer international degrees at lower cost.

- **Promote return and reintegration pathways:** Returning talent must be absorbed into India's innovation ecosystem.

  Eg: VAIBHAV Fellowship links diaspora and returnees with Indian R&D institutions.

Conclusion:

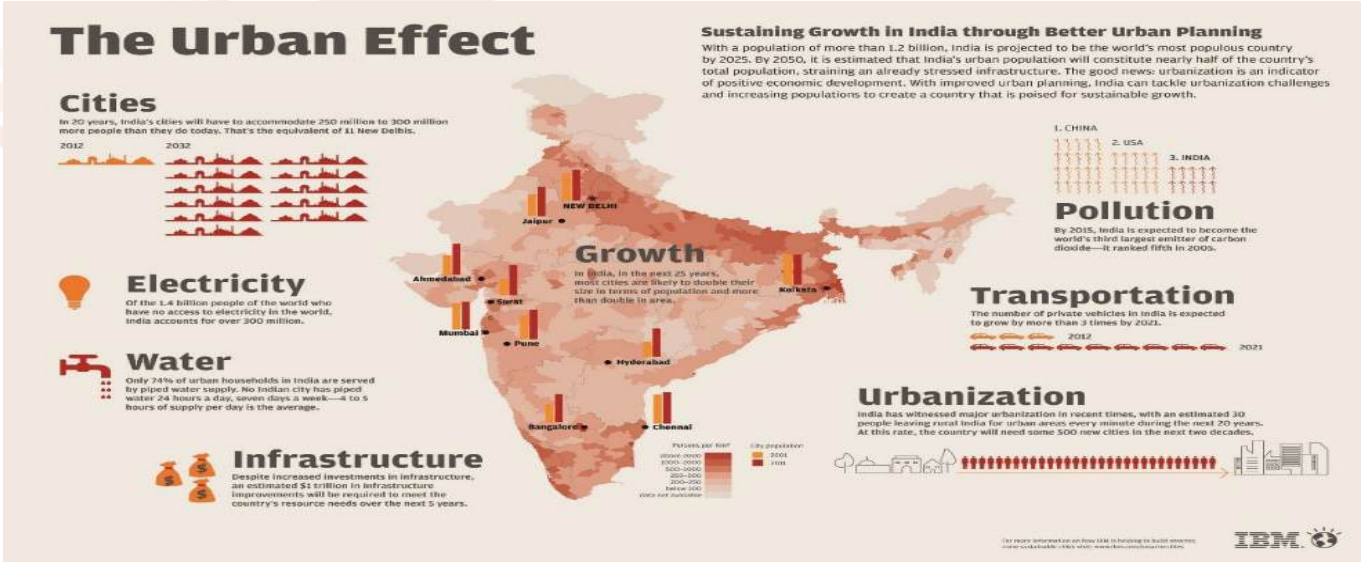
India's student migration reflects rising aspirations but also growing structural vulnerabilities. Without regulation and domestic reform, the promise of global education risks turning into debt-driven underemployment. A balanced approach is needed to convert student mobility into genuine human capital gain rather than brain waste.

Topics: Urbanization, their problems and their remedies.

THE URBAN FUTURE

Context:

Recent opinion pieces and policy debates have highlighted the need to reimagine India's urban future as inclusive, people-centric ecosystems, amid rapid urbanisation and mobility stress.



About The Urban Future:

What is urbanisation?

- Urbanisation is the process by which a growing share of the population shifts from rural to urban areas, leading to the expansion of cities in population, economic activity, and spatial footprint. It is driven by industrialisation, migration, better livelihoods, and access to services.

Data trends in India:

- **Urban population:** ~36% (2024), projected to exceed **50% by 2050–60s**.
- **Economic role:** Urban India contributes **~65–70% of GDP** despite housing a smaller population share.
- **Migration:** Increasing **inter-State and rural–urban migration**, especially to Tier-1 and Tier-2 cities.
- **Transport access:** Only **~37% of urban residents** have easy access to public transport (Economic Survey).
- **Infrastructure gap:** Need for **~2 lakh urban buses**; operational fleet **~35,000**.

Existing urbanisation pattern:

- **Concentration in metros:** Expansion of Tier-1 cities rather than balanced growth of new towns.
- **Peripheral sprawl:** Growth of informal settlements and urban fringes without commensurate services.
- **Sectoral hubs:** Cities specialising in IT, manufacturing, services, creating uneven regional development.
- **Smart city skew:** Infrastructure-centric planning, often neglecting social inclusion and lived experience.

Challenges Associated with Urbanisation:

- **Exclusion and inequality:** Migrants and informal workers face linguistic, cultural, and documentation barriers, limiting access to jobs, welfare, and civic participation, and pushing them to the urban margins.
  E.g. Gaps in implementing the Inter-State Migrant Workmen Act mean migrant workers in Surat often fail to access PDS benefits due to lack of local proof.
- **Housing deficit:** High land prices and weak rental markets force the urban poor into slums and insecure housing, perpetuating informality and eviction risks.
  E.g. The Dharavi Redevelopment Project reflects the challenge of formalising housing without disrupting livelihoods and social networks.
- **Urban mobility stress:** Inadequate public transport and over-reliance on private vehicles cause congestion, long commute times, and productivity losses.
  E.g. Bengaluru's Outer Ring Road (ORR) illustrates the mismatch between rapid IT-sector growth and lagging transport infrastructure.
- **Governance gaps:** Urban Local Bodies suffer from fragmented authority, overlapping agencies, and weak fiscal autonomy, reducing accountability and efficiency.
  E.g. Recurrent flooding in Chennai and Gurugram exposes poor coordination among municipal, drainage, and road agencies.
- **Environmental stress:** Unplanned expansion creates urban heat islands, air pollution, and water scarcity, threatening public health and sustainability.
  E.g. Delhi's winter smog (AQI 400+) is worsened by dense traffic, construction dust, and limited green cover.
- **Social cohesion:** Rapid urbanisation weakens community bonds and shared identity, leading to alienation and social fragmentation.
  E.g. The gated-community culture in Noida creates physical and social silos separating elites from service-providing populations.

Way Ahead: Transforming Indian Cities

- **People-centric planning:** Cities must be viewed as dynamic ecosystems, where infrastructure design prioritises human well-being over rigid master plans.
  E.g. Bhubaneswar's Child-Friendly City initiative integrates safe play spaces and walkable, inclusive urban design.
- **Inclusive governance:** Multilingual services and representation of migrants in decision-making improve access, trust, and civic participation.
  E.g. Kerala's 'Awas' health insurance scheme uses multilingual outreach to ensure migrant worker inclusion.
- **Sustainable mobility mix:** Strengthening buses, integrating alternative modes like trams, and improving last-mile connectivity reduces congestion and emissions.
  E.g. The Indore iBus (BRTS) boosted ridership through dedicated lanes and efficient feeder services.
- **Fiscal empowerment of ULBs:** Financial autonomy through municipal bonds and rational

user charges enables long-term infrastructure investment.
E.g. Pimpri-Chinchwad Municipal Corporation (PCMC) raised capital via municipal bonds for urban infrastructure.

- **Affordable housing:** Transit-oriented development and in-situ slum redevelopment integrate housing with jobs and services.
  E.g. PM Awas Yojana (Urban) and ARHCs target affordable housing for migrant workers post-pandemic.

Conclusion:

India's urban future will define its economic and social trajectory. Infrastructure alone cannot deliver success without inclusion, empathy, and efficient governance. Designing cities for people—present and future—is the cornerstone of a sustainable, resilient, and equitable urban India.

Topics: Salient features of world's physical geography.

LIGHTNING AN UNDERSTATED DISASTER IN INDIA

Context:

Experts at the 9th National Lightning Conference warned that lightning remains India's deadliest yet underestimated natural disaster, despite a sharp rise in strikes due to climate change.

About Lightning an understated disaster in India:

What it is?

- Lightning is a rapid electrostatic discharge between clouds or between cloud and ground, accompanied by thunderstorms, intense rainfall, winds and sometimes hail. It is sudden, highly localised and instantly lethal, making mitigation challenging compared to slow-onset disasters.

Trends in India:

- Lightning is the single largest killer natural hazard in India, causing over 2,000 deaths annually.
- India has witnessed a ~400% rise in lightning strikes (2019–2025), with a 7–14% annual increase linked to warming.
- New hotspots have emerged in Rajasthan, Gujarat, Haryana, Punjab and Delhi, alongside persistent vulnerability in Madhya Pradesh, Bihar and Odisha.

Why lightning remains ignored as a disaster?

- **Dispersed nature:** Lightning fatalities occur as scattered, single-event incidents across villages and fields, preventing media visibility and policy recognition that usually follows large, concentrated disasters.
- **Low visibility of damage:** Unlike floods or cyclones, lightning rarely leaves large-scale structural destruction, leading to underestimation of its cumulative human and economic toll.
- **Data and research gaps:** Inadequate ground-based sensors, electric-field meters and testing laboratories limit precise mapping, forecasting and scientific understanding of lightning behaviour.
- **Last-mile communication failures:** Although forecasts exist, warnings often fail to trigger timely behavioural change at the village level due to language, access and institutional gaps.
- **Perception bias:** Lightning is widely viewed as an unavoidable "act of nature" rather than a disaster that can be mitigated through science, planning and awareness.

Implications of rising lightning risk:

- **Human loss:** Farmers, labourers, fishermen and pastoral communities working outdoors face disproportionate mortality, making lightning a livelihood-linked hazard.
- **Economic damage:** Lightning damages crops, livestock, power lines, telecom towers and buildings, imposing recurring but underreported economic losses.
- Climate linkage: Rising atmospheric electricity correlates with cloudbursts, extreme rainfall and floods, amplifying compound climate risks.
- **Regional vulnerability:** Semi-arid, plateau and hilly regions with limited shelters and warning infrastructure face increasing exposure and fatalities.

NDMA guidelines and initiatives on lightning

- **Early warning systems:** IMD provides location-specific lightning forecasts up to 48 hours through Damini, Mausam and Sachet apps for timely alerts.
- **Public advisories:** NDMA has issued standardised do's and don'ts to reduce risky behaviour during thunderstorms and lightning events.
- **Community-centric approach:** Training programmes for disaster managers, volunteers and panchayats aim to convert warnings into early action.
- **Lightning Resilient India Campaign:** Focuses on nationwide awareness, education, capacity-building and local mitigation strategies.
- Mitigation Project on Lightning Safety (**MPLS):** Targets high-risk states and districts with risk mapping, electric-field meters, alert poles and lightning protection in schools and anganwadis.

Why lightning must be formally recognised as a disaster?

- **Highest mortality hazard:** Lightning kills more people annually than any other natural hazard in India, warranting priority disaster status.
- Climate change **amplifier:** Rising temperatures directly increase lightning frequency, making future risks systemic rather than episodic.
- **Preventable deaths:** Evidence shows that early warnings combined with behavioural change can sharply reduce fatalities.
- **Localised governance need:** Formal recognition enables funding, district-level action plans and Gram Panchayat integration.
- **Disaster risk reduction alignment:** Inclusion aligns India's policy framework with the Sendai Framework's emphasis on early warning and resilience.

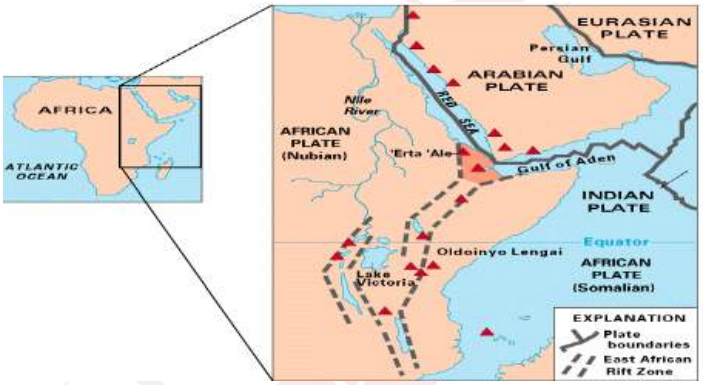
Conclusion:

Lightning is no longer a sporadic weather hazard but a climate-driven, nationwide disaster with severe human costs. Treating it as a mainstream disaster can unlock better science, funding and local preparedness. Integrating lightning risk into disaster management plans is essential to save lives in a warming India.

EAST AFRICAN RIFT VALLEY

Context:

A new study using resurrected 1960s magnetic data shows clear evidence of active seafloor spreading near the Afar triple junction, confirming that Africa is gradually splitting into two plates.



About East African Rift Valley:

- **What it is?**
  - World's largest active continental rift stretches ~3,500 km from the Red Sea to Mozambique, marked by elongate depressions and steep fault scarps produced by crustal extension.
- **Key Features:**
  - **Two distinct branches**: the volcanic-rich Eastern Rift (Ethiopia–Kenya) and the seismically active Western Rift (Uganda–Malawi), each showing advanced stages of crustal thinning.
  - **Tectonic & volcanic zone:** characterised by normal faults, fissures, active volcanoes like Erta Ale, and deep lakes such as Tanganyika formed by subsiding crust.
  - **Afar Triple Junction: a** meeting point of the Red Sea, Gulf of Aden and East African rifts, making it one of Earth's most dynamic tectonic regions.
  - **Divergent plate boundary:** separates the Somali and Nubian plates, with measurable spreading of 5–16 mm/year in the north.

Formation of the Rift Valley:

- **Mantle plume upwelling** increases heat flow and buoyancy, uplifting and thermally weakening the continental lithosphere beneath Ethiopia–Kenya.
- **Tensional plate forces** stretch the brittle crust, causing extensional stress that produces large,

steep **normal faults** on both sides of the rift.

- **Horst–graben structures** form as blocks of crust drop down (grabens) while adjacent blocks rise (horsts), creating deep trough-like rift valleys.
- **Magmatism & basaltic volcanism** accompany crustal thinning, as fissure eruptions and flood basalts fill the widening rift floor over millions of years.
- **Progressive divergence** may eventually rupture the continental crust entirely, allowing **seafloor spreading** to create a new ocean basin.

Factors Causing the African Rift:

- **Deep mantle superplume** beneath East Africa pushes the lithosphere upward, generating uplift, stretching, and widespread magmatic weakening.
- **Divergence between Somali & Nubian plates**, moving 5–16 mm/year, progressively widens the rift and increases extensional strain on the crust.
- **Afar triple-junction dynamics** intensify crustal breakup as three spreading centres mechanically pull the region apart in different directions.
- **High heat flow & magma intrusions** reduce crustal strength, accelerating normal faulting and basin subsidence.
- **Stress transfer from Red Sea & Gulf of Aden** spreading centres propagates southward, reinforcing rifting from the northeast to Mozambique.

Implications of the Rift:

- **Geological Implications:**
  - **Formation of a new ocean basin** is likely once continental rupture completes, separating the Somali plate from the African mainland.
  - **Higher volcanic and seismic activity** will persist along Ethiopia, Kenya, and Tanzania as crustal thinning continues and magma pathways open.
  - **Creation of deep linear lakes & drainage shifts**, altering hydrology and forming new basins such as expanded Lake Turkana or Malawi.
  - **Africa's long-term geographic reconfiguration**, producing two continents with newly emergent coastlines and submerged rift floors.
- **Socio-Economic Implications:**
  - **Frequent fissuring, fault scarps & earthquakes** threaten roads, farms, schools, and settlements across Rift Valley nations.
  - **Damage to public infrastructure**—as seen in Kenya and Ethiopia—will raise disaster-risk, requiring continuous monitoring and adaptation.
  - **Future coastline emergence** may give landlocked nations like Uganda and Zambia potential sea access, reshaping trade patterns.

Conclusion:

The East African Rift Valley represents one of Earth's most active continental breakup zones, gradually reshaping Africa's geography. Though unfolding over millions of years, its seismic and volcanic impacts are already visible today. Understanding this rifting is essential for managing future geological hazards and harnessing new resource opportunities.

Topics: Distribution of key natural resources across the world (including South Asia and the Indian subcontinent)

VIRTUAL WATER EXPORT CRISIS

Context:

India has emerged as the world's largest rice producer and exporter, accounting for nearly 40% of global rice trade, but this export dominance is intensifying groundwater depletion in water-stressed States like Punjab and Haryana.

- The debate has resurfaced around India's growing "virtual water export crisis", where scarce groundwater is effectively exported through water-intensive crops.

About Virtual Water Export Crisis:

What it is?

- The virtual water export crisis refers to the export of water embedded in agricultural commodities, especially water-intensive crops

like rice, from a water-stressed country.
- In India's case, large rice exports mean exporting billions of cubic metres of groundwater, even as domestic aquifers face depletion.

Key trends:
- India exports over **20 million metric tonnes of rice annually**, embedding massive quantities of irrigation water.
- Rice production alone accounts for **34–43% of global irrigation water use**.
- Around **24,000+ million cubic metres of virtual water** is exported annually through rice trade.
- Northern rice belts increasingly rely on **groundwater rather than surface irrigation**.

Reasons behind the virtual water export crisis:
- **Water-intensive rice cultivation model:** Rice requires **3,000–4,000 litres of water per kg**, far exceeding global averages, making it unsustainable in semi-arid regions.
- **Distortionary subsidies:** High MSPs for rice and free or cheap electricity incentivise excessive groundwater extraction and discourage crop diversification.
- **Policy legacy of food security:** Green Revolution-era policies prioritised rice and wheat to ensure food security, but were not recalibrated for water scarcity realities.
- **Weak groundwater regulation:** Groundwater remains poorly regulated, allowing unrestricted borewell drilling and over-extraction by farmers.
- **Global market dependence:** India's dominance in global rice trade makes policy shifts politically and economically sensitive due to price and export implications.

Impacts on India:
- **Rapid groundwater depletion:** In Punjab and Haryana, CGWB data shows most blocks classified as *over-exploited*, with borewell depths increasing from 30 feet to 80–200 feet, sharply raising irrigation costs.
- **Rising farm distress:** Small farmers in rice belts report mounting debt to finance deeper pumps and electricity, reflected in rising input costs despite MSP hikes, as highlighted in recent Reuters field surveys (2025).
- **Climate vulnerability:** Even with good monsoons in 2023–25, excessive extraction prevented aquifer recharge, exposing northern agriculture to severe risk during any future weak monsoon year.
- **Ecological imbalance:** Falling water tables have degraded wetlands and soil moisture regimes in Punjab–Haryana, reducing biodiversity and long-term land productivity, per PAU studies.
- **Inter-generational inequity:** India exports over 24,000 million cubic metres of virtual water annually through rice, effectively transferring future water security costs to coming generations.

Challenges associated:
- **Political resistance to reform:** The rollback of the **2020–21 farm laws** after nationwide protests shows the political sensitivity of reducing MSP dependence and procurement guarantees.
- **Farmer income insecurity:** One-season diversification incentives, such as **Haryana's ₹17,500/ha millet scheme (2024)**, failed to scale due to lack of income certainty.
- **Uneven State capacity:** As water is a **State subject**, groundwater regulation remains weak and fragmented, with enforcement varying widely across Punjab, Haryana and eastern States.
- **Short-term policy design:** Crop-switch schemes limited to a single season have not offset long-term risk, discouraging farmers from abandoning assured rice procurement.
- **Data and enforcement gaps:** Despite **NAQUIM mapping**, absence of real-time extraction monitoring allows unchecked borewell drilling in over-exploited blocks.

Initiatives taken to handle the water crisis:
1. **Jal Shakti Abhiyan (JSA):** Mission-mode water conservation and recharge campaign since 2019, with focus on over-exploited districts.
2. Atal Bhujal Yojana: Community-led groundwater management in water-stressed districts.
3. **Mission Amrit Sarovar:** Rejuvenation of local water bodies to enhance groundwater recharge.
4. **Per Drop More Crop:** Promotion of micro-irrigation to improve farm water-use efficiency.
5. **NAQUIM 2.0:** Scientific aquifer mapping for informed groundwater management decisions.

Way ahead:
- **Reorient MSP and procurement policy:** Expanding assured procurement for millets under International Year of Millets momentum can replicate rice-like income security with lower water use.

- **Price groundwater realistically:** Rationalising free power for agriculture and promoting solar pumps with usage caps can curb wasteful extraction, as piloted in parts of Gujarat.
- **Long-term diversification support:** Experts recommend 5–7 year income assurance, as short-term schemes have failed to induce durable crop shifts in Punjab–Haryana.
- **Promote climate-smart agriculture:** Techniques like Direct Seeded Rice (DSR) promoted by Punjab Agriculture Department reduce water use by 15–20% per hectare.
- **Integrate trade and water policy:** India's export strategy must internalise water footprint costs, shifting exports toward less water-intensive, higher-value crops to reduce virtual water loss.

Conclusion:

India's rice export success masks a silent crisis of groundwater depletion through virtual water exports. Continuing to subsidise water-intensive crops in stressed regions threatens long-term food and water security. Sustainable agriculture now demands aligning farm policy, water governance and trade strategy with ecological limits.

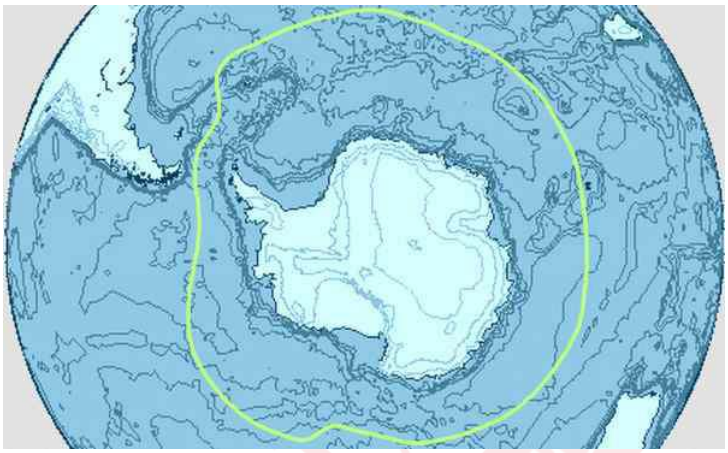
Topics: Important Geophysical phenomena such as earthquakes, Tsunami, Volcanic activity, cyclone etc., geographical features and their location- changes in critical geographical features (including water-bodies and ice-caps) and in flora and fauna and the effects of such changes.

SOUTHERN OCEAN CARBON ANOMALY

Context:

New research published in Nature Climate Change shows that the Southern Ocean has absorbed more carbon dioxide since the early 2000s, contrary to long-standing climate model predictions.

- This unexpected behaviour—termed a Southern Ocean carbon 'anomaly'—reveals key processes that climate models have so far underrepresented.



About Southern Ocean Carbon Anomaly:

What it is?

- The Southern Ocean carbon anomaly refers to the observed strengthening of the Southern Ocean as a carbon sink, even though climate models predicted it would weaken and start releasing carbon dioxide under global warming.
- Instead of emitting more CO_2 due to stronger winds and upwelling, the ocean has continued to absorb an increasing share of human-emitted carbon.

How it occurs?

- **Strengthened westerly winds drive upwelling:** Climate warming intensifies Southern Hemisphere westerlies, pulling carbon-rich deep waters upward toward the Southern Ocean surface.
- **Freshwater input lightens surface layers:** Increased Antarctic ice melt and rainfall add freshwater at the surface, making it less salty and more buoyant.
- **Stratification forms a surface "lid":** The buoyant freshwater layer strengthens vertical

stratification, separating surface waters from deeper, carbon-rich layers.

- **Blocked air–sea gas exchange:** Although deep waters rise, stratification prevents them from reaching the surface, stopping CO_2 from escaping to the atmosphere.
- **Carbon gets trapped below the surface:** Upwelled circumpolar deep waters remain **~100–200 m below the surface**, allowing continued **net carbon absorption**.
- **Small-scale processes amplify the effect:** Ocean eddies and ice-shelf cavity dynamics reinforce stratification but are poorly resolved in coarse climate models.

Factors causing the anomaly:

- **Freshening of surface waters:** Increased rainfall and meltwater from Antarctic glaciers have reduced surface salinity, making surface waters lighter and more buoyant.
- **Enhanced stratification:** Fresher, lighter surface layers sit atop warmer, saltier deep waters, limiting vertical mixing and air–sea gas exchange.
- **Trapping of carbon-rich waters below surface:** Upwelled circumpolar deep waters remain **100–200 metres below the surface**, preventing CO_2 release.
- **Incomplete model representation:** Climate models struggled to capture **small-scale processes** such as ocean eddies and ice-shelf cavity dynamics that govern stratification.
- **Data limitations:** Sparse, seasonal observations in the Southern Ocean reduced the ability to validate and refine model behaviour.

Implications of the anomaly:

- **Temporary climate buffer:** Continued carbon uptake has slowed the accumulation of atmospheric CO_2, buying the world limited time.
- **Risk of sudden reversal:** Observations suggest surface stratification is thinning; if it collapses, **stored deep carbon could rapidly outgas**.
- **Model refinement imperative:** Highlights the need to better integrate **ocean chemistry, freshwater inputs, and fine-scale physics** into climate models.
- **Policy relevance:** Reinforces that reliance on natural carbon sinks is risky and cannot substitute for emission reductions.
- **Importance of sustained observation:** Year-round monitoring of polar oceans is essential to anticipate abrupt climate feedbacks.

Conclusion:

The Southern Ocean carbon anomaly shows that nature can temporarily defy model expectations, but not indefinitely. Freshwater-driven stratification has masked deeper vulnerabilities in the climate system. As this protective layer weakens, the Southern Ocean could swiftly shift from carbon ally to climate amplifier, underscoring the urgency of emissions cuts and better observations.

GENERAL STUDIES – 2

Topics: parliament

PARLIAMENT DISRUPTIONS

Context:

The 2025 Winter Session opened amid protests over electoral roll revision and a sharply curtailed sitting schedule, again stalling both Houses in the first days.

PARLIAMENT OVER THE DECADES

- The number of sittings in the Lok Sabha has gone down from an average of 121 days a year between 1952-70 to 68 days since 2000.
- The 17th Lok Sabha between 2019 and 2024 had the fewest sittings (274) for a full-term house.
- The 17th Lok Sabha did not elect a Deputy Speaker for the entire term in what was a first for the lower house. The post remains vacant in the ongoing 18th Lok Sabha.

Worst washouts in the last two decades

Winter Session of 2010	Lok Sabha 5%	Rajya Sabha 2%
Winter Session of 2013	Lok Sabha 8%	Rajya Sabha 19%
Winter Session of 2016	Lok Sabha 15%	Rajya Sabha 18%
Budget Session of 2014	Lok Sabha 21%	Rajya Sabha 27%
Budget Session of 2018	Lok Sabha 21%	Rajya Sabha 27%

2004-2024 in a nutshell

14th Lok Sabha (2004-2009):	
Sittings	332 days
Time utilised	87%
Bills passed	248
Bills sent to committees	60%
15th Lok Sabha (2009-2014):	
Sittings	356 days
Time utilised	61%
Bills passed	179
Bills sent to committees	71%
16th Lok Sabha (2014-2019):	
Sittings	331 days
Time utilised	84%
Bills passed	133
Bills sent to committees	25%
17th Lok Sabha (2019-2024):	
Sittings	274 days
Time utilised	88%
Bills passed	179
Bills sent to committees	16%

About Parliament disruptions:

What is Parliament?

- Parliament is the supreme legislative body of India, consisting of the President, Rajya Sabha and Lok Sabha (Article 79).
- It performs four core functions: lawmaking, budget approval, executive accountability, and voicing people's concerns.

Key Constitutional Provisions:

- **Article 79–122**: Deal with composition, powers, privileges and procedures of Parliament.
- **Article 80**: Composition of Rajya Sabha (Council of States).
- **Article 81**: Composition of Lok Sabha (House of the People).

- **Article 107**: Procedure for passing of Bills and both Houses must "agree" to the Bill.
- **Article 118**: Each House may make rules of procedure.
- **Articles 120–121**: Language in Parliament and limits on discussion regarding conduct of judges.

Trends in Disruptions and Decline in Functioning:

- **Falling Number of Sittings:**
  - Early Lok Sabhas met for 120–130 days/ year; recent ones average 55–70 days/ year, with some years barely ~60 sittings.
  - The **17th Lok Sabha (2019–24)** became the shortest full-term House since 1952 in terms of days sat.
- **Frequent and Organised Disruptions:**
  - Disruption has become an **accepted "strategy"**: prolonged slogan-shouting, entering the Well, adjournments.
- **Bills Passed with Little or No Debate:**
  - A significant share of Bills are now passed within days of introduction, often in the midst of din.
  - In recent Lok Sabhas, many Bills were passed with less than an hour of discussion, and large parts of the Budget passed without debate.
- **Drop in Committee Scrutiny:**
  - Share of Bills referred to departmental standing committees has fallen from 60–70% earlier to well below 30% in recent terms.
- **Question Hour and Oversight Time Shrinking:** Question Hour often runs for only half or less of its scheduled time due to adjournments.

Reasons for Parliamentary Disruptions:

- **Government's Majoritarian Style:**
  - Limited pre-session consultation on legislative agenda and reluctance to allow structured debates on Opposition-raised issues.
  - Perception that the executive "bulldozes" Bills using its numbers, making Parliament a rubber stamp.
- **Opposition's Strategy of "Agitation Inside the House":** Opposition parties treat disruption as a legitimate democratic tactic to highlight issues when they feel ignored or denied time.
- **Erosion of Informal Conventions and Trust:**
  - Earlier, all-party meetings, back-channel consultations and floor management helped avoid deadlock.
  - Growing polarisation and personalised attacks have eroded mutual trust needed for compromise.
- **Media Incentives and Optics:** Disruptions provide high-impact visuals for TV and social media, creating perverse incentives for theatrics.
- **Weak Enforcement of Rules:** Presiding officers hesitate to use suspension/expulsion powers without all-party consensus.

Implications of Persistent Disruptions:

- **Weakening of Legislative Scrutiny:** Bills passed without adequate debate or committee review may contain drafting errors, rights concerns or federal issues, reducing quality of laws.
- **Erosion of Executive Accountability:** Loss of Question Hour and debates means fewer opportunities to question ministers, weakening checks and balances.
- **Undermining Federal and Plural Voices:** Smaller parties and regional interests lose speaking time when the House is in constant uproar, centralising discourse.
- **Loss of Public Trust in Institutions:** Citizens see Parliament as a "shouting arena", not a forum of reasoned deliberation, feeding cynicism about democracy.
- **Marginalisation of MPs' Representative Role:** MPs cannot effectively raise constituency grievances or policy concerns; Parliament's link between people and policy weakens.
- **Precedent of Tit-for-Tat Politics:** Each side justifies its behaviour by pointing to past disruptions by the other, trapping Parliament in a cycle of mutual vendetta.

Way Ahead:

- **All-Party Code of Conduct:**
  - Negotiate a formal, written, and publicly known code limiting entry into the Well, slogan-shouting, and repeated adjournment tactics.
  - Make graduated penalties (naming, suspension for specific days, loss of allowances) predictable and uniformly applied.
- **Guaranteed Space for Opposition:**
  - Reserve fixed days or time-slots each week or session (on the UK model of "Opposition Days") for issues chosen by the Opposition.

- In return, Opposition commits not to disrupt other listed business.

- **Minimum Sitting Days by Law:**
  - Enact a law or convention mandating at least 100–120 sitting days per year, with a pre-announced calendar.
  - This ensures enough time for Bills, Budget, Question Hour, and discussions.
- **Mandatory Committee Scrutiny for Key Bills:**
  - Make referral to standing/select committees the default for complex, rights-sensitive and economic Bills, with minimum time for review.
- **Stronger Floor Management and Pre-Legislative Consultation:**
  - Institutionalise pre-legislative consultation papers, stakeholder inputs and all-party briefings on major Bills.
  - This reduces surprises and mistrust, lowering the incentive to block proceedings.

Conclusion:

Parliamentary disruption has become systemic, weakening the core functions of India's legislature. Both government and Opposition are responsible—one for stifling debate, the other for replacing deliberation with obstruction. Restoring dignity requires more sittings, assured space for dissent, firm rule enforcement, and a culture where disagreements are settled by debate, not disorder.

Topics: Separation of powers between various organs dispute redressal mechanisms and institutions.

COURTS AS GUARDIANS, NOT REGULATORS: PRESERVING FREE SPEECH IN INDIA

Context:

Recent observations by the Supreme Court in Ranveer Allahbadia vs Union of India (2025), suggesting new regulatory mechanisms for online content, have triggered debate on whether courts should protect free speech or inadvertently regulate it.

About Courts as Guardians, Not Regulators: Preserving Free Speech in India

What is Free Speech?

- **Freedom of speech and expression** is the right to express opinions, ideas, beliefs, and information through speech, writing, art, or digital platforms without undue interference.
- It is foundational to **democracy,** enabling dissent, accountability, informed choice, and the free exchange of ideas.

Constitutional Provisions Backing Free Speech:

- **Article 19(1)(a):** Guarantees the right to freedom of speech and expression to all citizens.
- **Article 19(2):** Permits reasonable restrictions only on specific grounds—sovereignty and integrity of India, security of the State, public order, decency or morality, defamation, contempt of court, and incitement to an offence.
- The grounds under Article 19(2) are **exhaustive**, not illustrative.

Role of Courts in Handling Free Speech:

- **Constitutional umpire:** Courts are tasked with examining whether restrictions on speech are reasonable and constitutionally valid, not with crafting regulatory frameworks or prescribing policy solutions.
- **Guardian against prior restraint:** Judicial scrutiny must prevent pre-censorship or blanket controls, ensuring speech is restricted only after demonstrable harm and strict constitutional justification.
- **Doctrine of separation of powers:** Law-making and policy formulation belong to the legislature and executive, while courts must confine themselves to interpretation and review.
- **Rights-balancer within Article 19(2):** Courts may balance free speech with other rights only

within the expressly listed grounds under Article 19(2), avoiding expansion through judicial creativity.

Challenges from Regulation of Free Speech in India:

- **Risk of prior restraint:** Broad or preventive regulations can silence expression before any actual violation occurs, undermining democratic debate and dissent.
- **Vague and subjective standards:** Indeterminate terms like "morality" or "offensiveness" enable arbitrary enforcement, leading to inconsistent and biased restrictions.
- **Chilling effect on speech:** Fear of prosecution, takedowns, or sanctions discourages citizens and media from exercising legitimate criticism or unpopular opinions.
- **Judicial overreach:** When courts extend cases into policy-making domains, they risk weakening constitutional boundaries and democratic accountability.
- **Digital regulation complexity:** Online speech involves scale, speed, and technological nuances, requiring expertise beyond traditional judicial capacity.

Key Cases and Judgments:

- **Sahara India v. SEBI (2012):** The Court held that pre-censorship must be avoided and postponement of publication permitted only as a last resort under strict standards.
- **Kaushal Kishor v. State of UP (2023):** A Constitution Bench clarified that Article 19(2) grounds are exhaustive, and no new restrictions can be judicially added.
- **Common Cause v. Union of India (2008):** The Court cautioned against judicial attempts to solve policy problems beyond institutional competence.
- **Adarsh Cooperative Housing Society v. Union of India (2018):** The Court refused to mandate disclaimers, affirming that content regulation lies with statutory authorities after due process.
- **Shreya Singhal v. Union of India (2015):** Section 66A of the IT Act was struck down for vagueness and its chilling effect on free expression.

Way Ahead:

- **Judicial restraint:** Courts must limit themselves to constitutional review, preserving their role as protectors rather than regulators of speech.
- **Clear legislative standards:** Any restriction must be precise, narrowly tailored, and strictly aligned with Article 19(2).
- **Post-facto remedies over pre-censorship:** Democracies should prioritise content takedown and penalties after due process rather than preventive bans.
- **Comparative democratic practices:** India can adopt models from the EU, UK, and Australia that focus on removal mechanisms without surveillance-driven control.
- **Robust free speech jurisprudence:** Courts must consistently reaffirm that freedom is the rule and restriction the exception.

Conclusion:

Free speech is the **lifeblood of democracy**, protected by Article 19(1)(a) and constrained only by Article 19(2). Courts must act as **guardians, not regulators**, ensuring that fear of regulation does not replace freedom. Constitutional fidelity, judicial restraint, and precise law-making are essential to preserve liberty in the digital age.

Topics: Structure, organization and functioning of the Executive and the Judiciary; Ministries and Departments of the Government; pressure groups and formal/informal associations and their role in the Polity.

LAW ON SUSPENSION OF SENTENCE

Context:

The Supreme Court has stayed the Delhi High Court's order suspending the life sentence of former MLA Kuldeep Singh Sengar in the Unnao rape case, reviving debate on when courts can suspend sentences in heinous crimes.

About Law on Suspension of Sentence:

What is the issue?

- 'Suspension of sentence' refers to the **temporary halt on execution of punishment** awarded by a trial court during the pendency of an appeal.
- While it preserves the right to appeal, its misuse in **serious offences such as rape and**

life imprisonment cases raises concerns about victim safety, public confidence in justice, and dilution of deterrence.

Situations when suspension of sentence is granted

- **Fixed-term or short sentences:** Suspension is ordinarily granted because lengthy appellate delays may result in the convict serving the entire sentence, rendering the statutory right to appeal illusory and meaningless.
- **Life imprisonment or heinous offences:** Suspension is an exception and requires strict judicial scrutiny of the offence's gravity, manner of commission, societal impact, and the appellant's likelihood of securing acquittal.
- **Apparent legal or procedural infirmities:** Where the trial judgment reveals prima facie perversity, gross legal error, or misapplication of law, suspension may be justified to prevent irreversible miscarriage of justice.
- **Humanitarian and medical considerations:** Exceptional circumstances such as terminal illness, extreme age, or grave medical conditions may warrant suspension, provided public safety and justice are not compromised.
- **Prolonged incarceration with delayed appeal hearing:** In rare cases, exceptionally long imprisonment coupled with unlikely early disposal of appeal may be considered, though not as a standalone ground in life sentence cases.

Law governing suspension of sentence:

- **Statutory basis under criminal procedure law:** Section 389 of the CrPC, 1973 (now Section 430 of BNSS, 2023) empowers appellate courts to suspend execution of sentence during the pendency of appeal.
- **Suspension affects punishment, not conviction:** The provision merely stays the operation of the sentence; the finding of guilt remains intact unless reversed by the appellate court.
- **Discretionary and not a matter of right:** Suspension is a judicial discretion guided by reason, proportionality and public interest, rather than an automatic consequence of filing an appeal.
- **Higher threshold for serious offences:** In life imprisonment or heinous crimes, courts must apply a stricter standard to prevent erosion of deterrence and public confidence in justice.

Various court judgement:

1. **Bhagwan Rama Shinde Gosai v. State of Gujarat (1999):** The Supreme Court held that suspension of sentence is generally justified in **short-term convictions**, but must be exercised with restraint in serious offences.
2. **Shivani Tyagi v. State of Uttar Pradesh (2024):** The Court clarified that in **heinous crimes**, especially those involving sexual violence, long incarceration alone cannot justify suspension of sentence.
3. **Chhotelal Yadav v. State of Jharkhand (2025):** The Supreme Court ruled that in **life imprisonment cases**, suspension is permissible only where a **palpable legal error** suggests a real likelihood of acquittal on appeal.

Challenges associated:

- **Dilution of deterrence:** Frequent suspension in grave offences weakens the punitive signal of criminal law and undermines its role in discouraging serious crimes.
- **Threats to victim safety:** Release of powerful convicts can revive intimidation, retraumatise survivors, and compromise witness protection and trial integrity.
- **Inconsistent judicial application:** Divergent standards across courts create uncertainty, arbitrariness, and forum-dependent outcomes in suspension jurisprudence.
- **Legislative and definitional gaps:** Narrow statutory definitions, such as "**public servant**" under POCSO, may exclude politically influential offenders from aggravated liability.
- **Erosion of public trust:** Perceived leniency in high-profile cases fuels cynicism and weakens citizens' faith in the fairness of the justice delivery system.

Way ahead:

- **Stricter evidentiary threshold:** Suspension in life sentence cases should require a clear prima facie indication of likely acquittal or manifest legal error.
- **Victim-centric balancing:** Courts must weigh power asymmetry, prior intimidation, and survivor vulnerability alongside the rights of the convict.
- **Legislative clarification of special laws:** Parliament should amend statutes like POCSO to expressly include elected representatives where abuse of authority is evident.
- **Time-bound appellate adjudication:** Fast-tracking appeals in serious offences can reduce reliance on suspension due to prolonged

incarceration.

- **Uniform judicial guidelines:** The Supreme Court may frame binding norms to harmonise suspension standards in heinous and life-imprisonment cases.

Conclusion:

Suspension of sentence is an important appellate safeguard, but it must remain an exception in grave crimes. In life imprisonment and sexual offence cases, victim safety and societal interest must prevail over routine leniency. Clearer laws, cautious adjudication and faster appeals are essential to prevent dilution of justice.

Topics: Representation of people act

CORPORATE POLITICAL FUNDING IN INDIA

Context:

Post the Supreme Court's scrapping of the Electoral Bond Scheme (Feb 2024), corporate political funding has sharply concentrated in favour of the ruling party through electoral trusts.

About Corporate political funding in India:

What it is?

- Corporate political funding refers to **financial contributions made by companies to political parties** through legal channels such as direct donations, electoral trusts, or (earlier) electoral bonds, to support election campaigns and party activities.
- It plays a decisive role in shaping electoral competition, campaign outreach, media narratives and organisational strength.

Data and trends:

- In FY25, corporate and institutional funding became **highly concentrated**, with the ruling party receiving over **80% of total reported donations**, while major opposition parties received single-digit shares.
- Donations through **electoral trusts** **tripled** after the scrapping of electoral bonds, yet distribution remained skewed, reflecting donor risk-aversion and proximity to political power.

Evolution of corporate political funding in India:

- **Pre-2017 (Cash + limited transparency):** Parties relied heavily on cash donations below disclosure thresholds, fostering black money and opacity.
- **Electoral Trusts (2013 onwards):** Introduced to improve transparency, with named donors but pooled disbursements; usage remained limited.
- **Electoral Bonds (2018–2024):** Allowed anonymous, unlimited corporate donations via SBI bonds, increasing formalisation but eliminating voter transparency.
- **Post-2024 phase:** After the Supreme Court invalidated bonds, funding shifted back to **electoral trusts and direct donations**, but with heightened concentration and political pressure dynamics.

Challenges associated with corporate political funding:

- **Financial asymmetry and unfair elections:** Massive funding gaps distort electoral competition and discourage opposition participation.

  E.g. A ruling party candidate often outspends rivals several times over in the same constituency.
- **Quid pro quo risk:** Corporates prefer donating to parties in power to secure contracts, policy favours or regulatory protection.

  E.g. Funding patterns shift sharply after elections, aligning with the party controlling the executive.
- **Fear-driven compliance:** Investigative pressure and regulatory discretion can indirectly coerce businesses into one-sided donations.

  E.g. Corporates avoid opposition funding to reduce exposure to ED/CBI scrutiny.
- **Weak voter transparency:** Even electoral trusts provide only partial disclosure, preventing

voters from linking donors to beneficiaries.

E.g. Public filings show donor names but not donor-party pairing.

- **Erosion of democratic parity:** Money overwhelms ideology, leadership and grassroots mobilisation, hollowing democratic choice.

  E.g. Narrative dominance via paid media, influencers and digital campaigns correlates directly with spending power.

Way ahead:

- **Adopt a "blind pool" funding model:** Corporates donate to a central fund managed by an independent constitutional body, not directly to parties.

  E.g. Distribution based on objective criteria like seats contested or vote share, similar to IPL salary caps.

- **Ensure financial parity rules:** Impose caps or equalised disbursal limits so parties compete on ideas, not cash.

  E.g. Sports leagues globally enforce such parity to preserve competition.

- **Strengthen transparency with anonymity safeguards:** Protect donor identity from political retaliation while ensuring aggregate public disclosure.

  E.g. Anonymous pool with published allocation formula and audited accounts.

- **Empower Election Commission oversight:** Give ECI statutory authority to regulate, audit and penalise violations in political finance.

  E.g. Mandatory real-time reporting and independent audits.

- **Reduce campaign cost drivers:** Enforce spending ceilings, regulate digital advertising and curb paid political communication.

  E.g. Limits on social media political ads during election periods.

Conclusion:

India's electoral challenge is no longer lack of funding, but concentration of funding. Excessive corporate dependence risks turning elections free but unfair. Adopting transparent, parity-oriented funding reforms—learning from models like the IPL—can restore competitiveness, credibility and democratic balance.

Topics: Government policies and interventions for development in various sectors and issues arising out of their design and implementation.

SUPREME COURT STAY ON ARAVALLIS JUDGMENT

Context:

The Supreme Court has stayed its November 20 judgment that accepted a 100-metre elevation criterion for defining the Aravalli hills, amid nationwide protests by environmental groups.

About Supreme Court stay on Aravallis Judgment:

What it is?

- The stay pauses the Court's earlier acceptance of the Union government's height-based definition of the Aravalli hills (landforms ≥100 m above local relief) for regulating mining.
- The interim order restores status quo ante, preventing immediate regulatory dilution while the Court re-examines ecological and constitutional implications.

History of Supreme Court interventions on Aravallis:

1. Godavarman Thirumulpad v. Union of India **(1995–ongoing):** Expanded the definition of "forest" beyond records to **ecological characteristics**, bringing Aravalli forests under judicial protection and regulating mining and construction.
2. **M.C. Mehta v. Union of India (1985–ongoing):** Became the principal vehicle for **Aravalli protection** in Delhi–Haryana, leading to bans on illegal mining, construction controls, and demolition of unlawful real estate.
3. **Mining prohibitions (1996–2002):** The Court banned mining in parts of Faridabad and Haryana Aravallis based on expert reports (HPCB, NEERI), recognising irreversible ecological damage.
4. **2010 FSI scientific survey order:** Rejected

the **100-metre height rule** and directed FSI to map the entire Aravalli range using **scientific parameters**, leading to the **3-degree slope + buffer** criterion.

5. **2018 'vanished hills' intervention:** Acting on CEC findings that **31 of 128 hills had disappeared**, the Court ordered immediate stoppage of illegal mining, prioritising ecology over royalty revenue.
6. Delhi Ridge **protection (2023–2025):** Recognised the concept of **"morphological ridge"**, barred land allotment, halted tree felling, and ordered statutory backing for the **Delhi Ridge Management Board**.

Judgment conundrum:

- **Scientific reductionism:** A single elevation threshold ignores **low-relief hills, pediments and ridges** that perform vital ecological functions like groundwater recharge and climate moderation.
- **Departure from functional ecology:** Earlier jurisprudence assessed landscapes by **ecological function**, not numerical metrics—raising concerns of doctrinal inconsistency.
- Article 21 **implications:** As held in Subhash Kumar v. State of Bihar (1991), the right to life includes a right to a healthy environment; regulatory dilution directly implicates this right.
- **Precautionary principle conflict:** Vellore Citizens' Welfare Forum (1996) mandates caution where environmental harm is irreversible; the height-based test risks exposing fragile zones.
- **Public trust doctrine:** Under M.C. Mehta v. Kamal Nath (1997), the State is a trustee of natural resources—narrow definitions enabling exploitation may breach this fiduciary duty.

Implications of the stay:

- **Regulatory pause on mining expansion:** The stay halts immediate applicability of the 100-metre rule, preventing mining in lower Aravalli landforms until ecological and legal issues are finally adjudicated.
- **Restoration of ecological safeguards:** It temporarily revives earlier function-based protections evolved through Godavarman and M.C. Mehta orders that treated the Aravallis as an integrated ecological system.
- **Judicial reassertion of oversight:** The Court signals that environmental governance cannot be driven solely by executive convenience and remains subject to continuous judicial scrutiny.
- **Strengthening** constitutional scrutiny**:** The stay allows reassessment of the definition against Articles 14, 21, 48A and 51A(g), reinforcing the link between ecology, equality and the right to life.
- **Federal flexibility preserved:** States retain the space to apply stricter, region-specific safeguards, preventing a uniform definition from weakening local environmental protection.

Way ahead:

- **Adopt function-based ecological criteria:** Aravallis should be defined using slope, geomorphology, hydrology and biodiversity, reflecting ecological role rather than a single elevation threshold.
- **Codify scientific mapping:** The FSI–CEC scientific methodology should be given statutory backing under the Environment (Protection) Act, 1986 to ensure uniform, evidence-based regulation.
- **Embed the precautionary principle:** Any reclassification must follow cumulative impact assessments, recognising that ecological damage in fragile landscapes is often irreversible.
- **Strengthen single-window governance:** Bodies like the Delhi Ridge Management Board should be empowered with clear authority and NGT oversight to avoid regulatory fragmentation.
- **Align development with conservation:** Sustainable mining should be exception-based, allowing limited activity only where ecological integrity and long-term public interest are demonstrably protected.

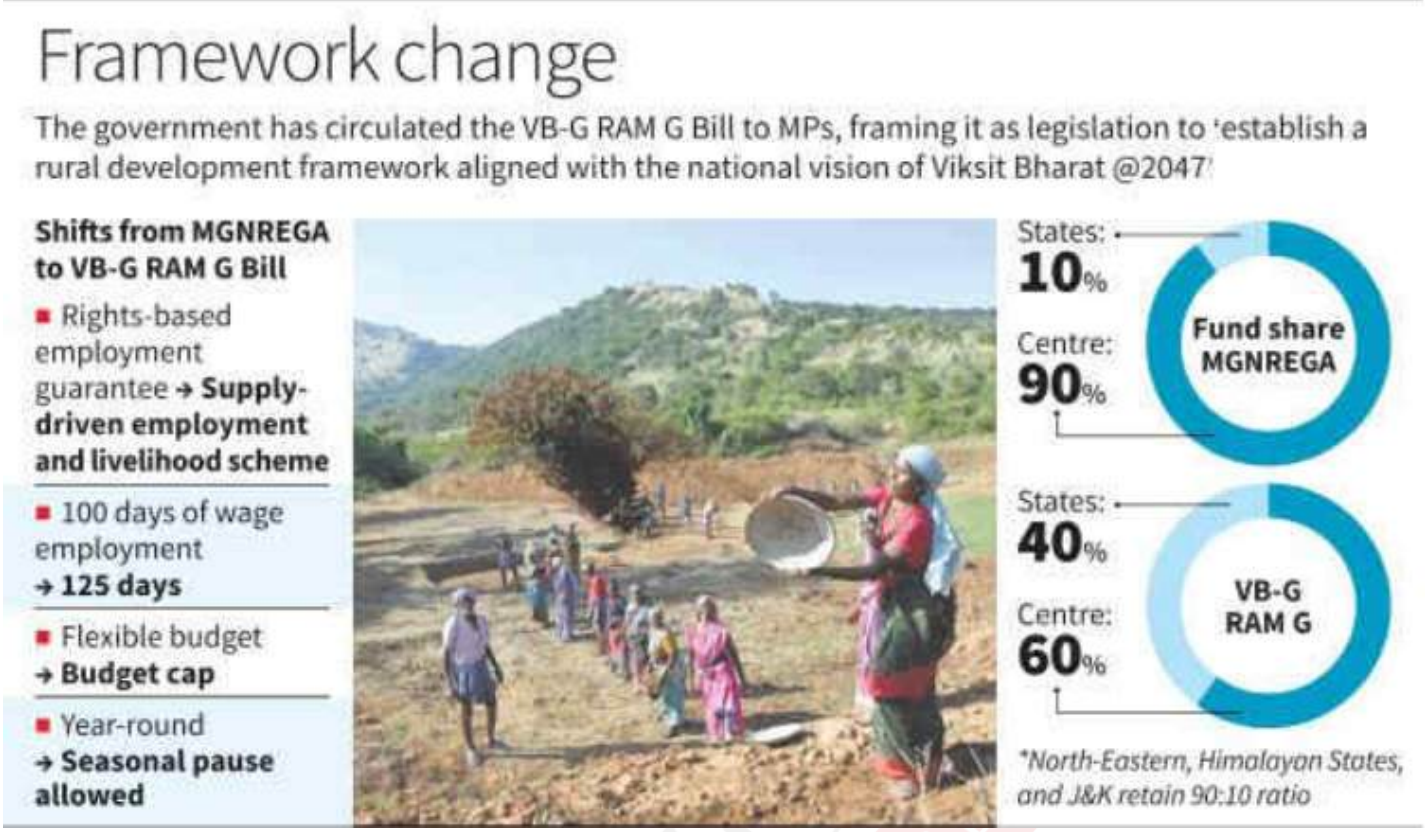
Conclusion:

The stay reflects the Supreme Court's enduring role as a guardian of constitutional environmentalism. Aravallis' value lies in their ecological function, not elevation. Lasting protection demands science-led definitions, precautionary governance, and fidelity to constitutional duties over administrative convenience.

VIKSIT BHARAT–GUARANTEE FOR ROZGAR AND AJEEVIKA MISSION (GRAMIN) BILL, 2025 (VB-G RAM G)

Context:

The Union government plans to table the Viksit Bharat–Guarantee for Rozgar and Ajeevika Mission (Gramin) Bill, 2025, proposing to replace the 20-year-old MGNREGA framework.



About Viksit Bharat–Guarantee for Rozgar and Ajeevika Mission (Gramin) Bill, 2025 (VB-G RaM G):

What it is?

- The VB-G RaM G Bill is a proposed legislation to replace **MGNREGA, 2005**, guaranteeing **125 days of wage employment** per rural household while aligning public works with long-term rural infrastructure, livelihoods, and climate resilience under the Viksit Bharat @2047 vision.

Key features of the Bill:

1. **Enhanced employment guarantee:** Raises assured workdays from **100 to 125 days**, increasing income security for rural households (≈25% higher earning potential).
2. **Four focused asset priorities:** Public works are limited to water security, core rural infrastructure, livelihood infrastructure, and climate-resilience works, ensuring durable assets rather than fragmented works.
3. **Normative funding framework:** State-wise allocations are pre-decided using objective parameters, improving predictability in budgeting while retaining unemployment allowance if work is denied.
4. **Revised cost-sharing pattern:** **60:40 Centre–State** for most states, **90:10** for NE/Himalayan states, and **100% Centre** for UTs without legislatures—enhancing state accountability.
5. **Digital governance and transparency:** Mandatory biometric attendance, Aadhaar-linked payments, GPS/geotagging, AI-based fraud detection, and real-time MIS dashboards to reduce leakages (e-payments already ~99.9%).
6. **Agricultural season safeguards:** Allows up to 60 days' pause during peak sowing/harvest to ensure labour availability for farms and prevent wage inflation.
7. **Stronger local planning:** Works planned through Viksit Gram Panchayat Plans and mapped to a National Rural Infrastructure Stack for coordinated development.

Need for the VB-G RaM G Bill:

1. **Changed rural socio-economic context:** Rural poverty fell from **25.7% (2011-12) to ~4.9% (2023-24)**, necessitating a shift from distress relief to productivity-linked employment.
2. **Asset quality concerns under MGNREGA:** Monitoring reports flagged **sub-standard works and misuse** (₹193.67 crore misappropriation in 2024-25), calling for tighter focus and oversight.
3. **Climate vulnerability of rural India:** Frequent floods, droughts, and heat stress demand **climate-adaptive assets** like water harvesting and soil conservation.
4. **Fiscal predictability:** Demand-driven budgeting caused volatility; normative funding enables

better Centre-State planning while retaining social protection.

How VB-G RaM G differs from MGNREGA?

Aspect	MGNREGA (2005)	VB-G RaM G Bill (2025)
Nature	Demand-driven legal right	Normative, budget-linked guarantee
Workdays	100 days	125 days
Funding	~90:10 Centre–State	60:40 (most states)
Work scope	Broad, fragmented	4 focused priority sectors
Technology	Supportive	Mandatory & codified
Implementation	Universal rural	Rural areas notified by Centre

Challenges associated with the Bill:

- **Dilution of demand-driven right:** Capped allocations may restrict employment if demand exceeds budgets, weakening the original rights-based ethos.
- **Higher state fiscal burden:** Poorer states may struggle to mobilise the **40% share**, risking uneven implementation.
- **Centralisation concerns:** Greater Centre control over notified areas and allocations may reduce state and Gram Sabha autonomy (73rd Amendment spirit).
- **Technology exclusion risks:** Biometric and app-based systems can fail in remote areas, affecting women, elderly, and tribal workers.
- **Seasonal pause impact:** The 60-day no-work window may affect landless and tribal households dependent on wage employment during lean periods.

Way ahead:

- **Hybrid funding safeguard:** Retain a contingency, demand-responsive window during distress years (pandemics, droughts) to protect the right to work.
- **Stronger state capacity support:** Provide fiscal handholding and flexibility for poorer states to meet cost-sharing requirements.
- **Technology with human fallback:** Ensure offline/manual alternatives where digital tools fail to avoid worker exclusion.
- **Deepened social audits:** Empower Gram Sabhas with binding audit outcomes and time-bound grievance redressal.
- **Phased rollout with review:** Pilot the scheme, assess impacts on employment days and asset quality, and course-correct before nationwide scaling.

Conclusion:

The VB-G RaM G Bill represents a significant shift from distress-centric wage relief to asset-led rural transformation. While higher guaranteed days and focused infrastructure are positives, concerns over rights dilution and state capacity remain. Balancing fiscal discipline with constitutional social protection will determine whether the reform strengthens or weakens rural livelihoods.

RIGHT TO DISCONNECT BILL, 2025: RE-DEFINING WORK–LIFE BOUNDARIES

Context:

The Right to Disconnect Bill, 2025, a Private Member's Bill introduced by NCP MP Supriya Sule, has reignited debate on work–life balance and employee well-being in India's digital work culture.

About Right to Disconnect Bill, 2025: Re-defining Work–Life Boundaries:

What it is?

- The Right to Disconnect Bill, 2025 seeks to grant employees a statutory right to disengage from work-related communications outside agreed working hours, protecting personal time in an era of constant digital connectivity and remote work.

Key Features of the Bill

1. **Legal right to disconnect:** Section 7 guarantees

every employee the right to ignore work-related calls, emails, or messages after contractual work hours without fear of disciplinary action.

2. **Defined 'out-of-work hours':** Clearly defines time beyond agreed work schedules, reducing ambiguity and employer overreach.
3. **Employees' Welfare Authority:** Establishes a central authority to oversee implementation, protect employee dignity, and promote work–life balance.
4. **Negotiation charter:** Mandates employer–employee charters specifying out-of-work communication protocols and mutually agreed exceptions.
5. **Overtime compensation:** Section 11 provides overtime pay at normal wage rates if employees voluntarily respond after hours.
6. **Digital well-being measures:** Requires awareness programmes, counselling services, and **Digital Detox Centres**, especially for remote work environments.
7. **Penalties for non-compliance:** Imposes a financial penalty of **1% of total employee remuneration** on violating organisations, acting as a strong deterrent.

Need for Such a Law in India:

- **Always-on work culture:** The spread of smartphones, remote work, and digital platforms has dissolved fixed work hours, making employees perpetually accessible and eroding clear boundaries between professional and personal life.
- **Mental health concerns:** Extended digital availability has led to rising cases of burnout, anxiety, and work-induced stress, particularly among young professionals and gig workers lacking institutional safeguards.
- **Power asymmetry at workplaces:** Employees often hesitate to ignore after-hours communication due to hierarchical pressures, performance appraisals, and job insecurity, resulting in involuntary overtime and silent exploitation.
- **Global legislative precedent:** Countries such as France, Belgium, Ireland, and Australia have legally recognised the right to disconnect, demonstrating its feasibility as a labour-rights protection in modern economies.
- **Productivity over presenteeism:** The law encourages a shift from measuring work by hours logged to outcomes delivered, improving efficiency, innovation, and long-term employee engagement.

Challenges Associated:

- **Diverse work models:** India's economy spans manufacturing, IT, gig work, and global services, making uniform regulation difficult for sectors requiring time-zone coordination or emergency responsiveness.
- **Enforcement difficulties:** Monitoring informal digital communications such as WhatsApp messages or late-night calls poses practical and evidentiary challenges for regulators.
- **SME compliance burden:** Small and medium enterprises may face difficulties in framing charters, maintaining compliance records, and absorbing potential financial penalties.
- **Risk of regulatory rigidity:** Overly strict provisions could limit operational flexibility during peak business cycles, emergencies, or client-driven deadlines.
- **Private Member's Bill limitation:** Without government sponsorship, private member's bills rarely become law, restricting immediate legislative impact despite policy relevance.

Way Ahead:

- **Phased and sector-specific adoption:** Introduce differentiated norms based on sectoral needs, allowing flexibility for global teams while protecting routine employees from digital overreach.
- **Tripartite dialogue mechanism:** Structured consultations among government, employers, and worker representatives can help create balanced, enforceable, and context-sensitive norms.
- **Soft-law approach initially:** Guidelines under existing labour codes can test feasibility and acceptance before formal statutory backing.
- **Behavioural and cultural change:** Awareness campaigns must promote responsible digital communication norms among managers and employees alike.
- **Integration with labour and health policies**: Link the right to disconnect with occupational health, mental well-being, and productivity frameworks for holistic workforce protection.

Conclusion:

The Right to Disconnect Bill, 2025 reflects the **evolving realities of India's digital workforce** and the growing need to protect mental well-being. While legislative and practical challenges remain, the Bill has sparked a vital conversation on **humane, sustainable work cultures.** Balancing flexibility with dignity at work

will be key to future labour governance in India.

GENERATIVE AI & COPYRIGHT – ONE NATION, ONE LICENSE, ONE PAYMENT

Context:

The Government released the Working Paper on Generative AI & Copyright – One Nation, One License, One Payment, proposing India's first structured model for regulating AI training on copyrighted works.

- It aims to balance **creator rights** and **AI innovation**, following rising disputes like **ANI vs OpenAI (Delhi HC, 2024–25)** over unauthorized training on Indian content.

About Generative AI & Copyright – One Nation, One License, One Payment:

What is the Issue?

- **Unlicensed use of Indian creative content for AI training:** GenAI models scrape Indian books, articles, films, music and news without permission, undermining creator rights and violating Section 14 protections.
  Eg: ANI alleged OpenAI used its news content for training ChatGPT without consent, triggering Delhi HC proceedings.
- **Lack of clarity on applicability of copyright law to GenAI training:** India's Copyright Act has no explicit Text & Data Mining (TDM) exception, creating ambiguity on whether large-scale scraping is permissible.
  Eg: Section 52 exceptions do not cover commercial AI training, leaving foreign AI developers operating in a legal grey zone.
- **No mechanism for creators to receive compensation from AI usage:** Indian writers, artists, musicians and journalists gain nothing even though their works significantly improve AI model accuracy and quality.
  Eg: India's informal music industry employing 1.4 crore people earns zero royalties despite models using their songs for training.
- **Risk of cultural dilution & decline of indigenous creative sectors:** AI outputs may replace or overshadow Indian folk art, local music and regional storytelling traditions, eroding cultural diversity.
- **Unequal bargaining power between big-tech AI firms and Indian creators:** Large foreign AI companies monetise Indian datasets while individual creators lack negotiation capacity or legal tools to protect rights.
  Eg: OpenAI itself stated India is its 2nd-largest market, yet no Indian creator currently receives any share of this revenue.

Key Concerns Identified by the Working Group:

- **Whether AI training constitutes reproduction and thus copyright infringement:** AI training requires copying, storing and transforming large volumes of works, which may trigger infringement under Section 14.
  Eg: Delhi High Court is examining if ChatGPT's use of ANI's content amounts to unauthorised reproduction.
- **Whether the 'fair dealing' exception can legally cover GenAI training:** Fair dealing is narrowly defined for private research, criticism, or reporting—not for commercial AI model training at industrial scale.
  Eg: Commercial LLM developers cannot invoke Section 52(1)(a), as training is revenue-driven and not "personal use".
- **Disadvantage & exploitation risk for small and independent creators:** Opt-out or negotiated licensing frameworks disproportionately favour big publishers, leaving small creators unprotected.
- **Heavy transparency burden on AI developers if disclosure is mandated:** Requiring detailed dataset disclosures could slow AI advancement, especially for start-ups lacking compliance capacity.
  Eg: IndiaAI-supported startups like Sarvam and Gan AI rely on flexible data access to compete with global players.
- **Threat of poor-quality or biased datasets if creators withhold works:** Excessive opt-outs may shrink datasets, increasing bias and hallucination risks in India-focused AI systems.

Need for India to Balance Copyright & AI Framework:

- **Protect India's rapidly growing creative and cultural economy:** Creative industries contribute billions to GDP and sustain livelihoods across entertainment, design, folk and digital media sectors.
  Eg: India's M&E sector is projected to reach $36B by 2027, making protection of creative rights economically essential.
- **Foster AI innovation aligned with IndiaAI Mission goals:** Balanced rules ensure that AI developers—especially Indian start-ups—have predictable, lawful access to high-quality datasets.
  Eg: IndiaAI Mission's rollout of 38,000 subsidised GPUs depends on a stable legal framework for training data.
- **Prevent decline of human creativity and preserve cultural diversity:** If AI freely mines creative works without reward, long-term incentives for creators weaken, risking cultural hollowing.
  Eg: PM Modi's 'Orange Economy' vision stresses India's unique storytelling heritage that must be preserved in the AI era.
- **Ensure fair revenue-sharing for Indian creators whose works train AI:** AI firms earn from Indian users; creators deserve statutory royalties to maintain creative ecosystems.
- **Eg:** OpenAI confirmed India is its 2nd-largest market—yet creators receive zero compensation today.
- **Support Indian startups & MSMEs with low-cost, low-friction AI licensing:** A predictable licensing regime reduces transaction costs and enables small players to innovate without legal uncertainty.

Recommendations of the Working Committee:

- **Introduce a Mandatory Blanket License for AI Training:** AI developers may train on all lawfully accessed copyrighted works without individual permissions, ensuring wide dataset access.
  Eg: Indian LLMs (Sarvam, Gan AI, Soket) can legally train on diverse Indian content across languages and formats.
- **Statutory Royalty Payments to Copyright Holders:** Creators will receive compensation proportional to AI revenues, ensuring long-term sustenance of the creative economy.
  Eg: India's 1.4 crore informal music workers would gain an organised income stream from AI-driven usage.
- **Establish the "Copyright Royalties Collective for AI Training (CRCAT)":** A central, government-designated body to collect licence fees and distribute royalties to members and non-members alike.
- **Create a Government-Appointed Royalty Rate-Setting Committee:** Ensures transparency, fairness, periodic review and judicial oversight of royalty rates to protect both creators and developers.
- **Provide a Single-Window, Low-Burden Licensing & Compliance System:** One licence → one payment → nationwide applicability to reduce friction, especially for smaller AI players.

Conclusion:

India stands at a critical intersection where AI growth and creative rights must advance together. The "One Nation, One License, One Payment" model proposes a fair, innovation-friendly, creator-protective solution. If adopted, it can make India a global leader by building an AI ecosystem rooted in fairness, cultural respect, and technological strength.

Topics: Welfare schemes for vulnerable sections of the population by the Centre and States and the performance of these schemes.

CHILD CARE IN INDIA

Context:

Two new national-level analyses highlight that childcare is no longer just a social welfare function but a critical economic growth lever for India.

About Child Care in India:

What it is?

- Childcare refers to the system of **early childhood care, learning, nutrition, safety, and developmental support** provided through institutional arrangements such as Anganwadi centres, crèches, preschools, and community-

based caregiving systems.

Key Trends:

- India has **1.4 million** Anganwadi centres, reaching 23 million children, yet coverage gaps persist—especially in urban and migrant-dense areas.
- Women spend **426 minutes/day** on unpaid care work versus 163 minutes for men, creating a massive gendered labour imbalance.
- Only **10% of Anganwadis operate fully in urban areas**, despite rising female workforce participation in cities.
- Care workers remain **underpaid and undervalued**, earning ₹8,000–₹15,000 per month with limited training or career pathways.

Need For Childcare in India:

- **Boost women's workforce participation:** Lack of reliable childcare forces millions of mothers to reduce hours or drop out of paid work altogether.
- **Human capital development:** 80% of brain development occurs in the first 1,000 days; quality childcare improves cognitive, language, and emotional outcomes.
- **Economic growth multiplier:** Childcare is a "soft infrastructure" essential for achieving **8–10% annual growth**, improving productivity and labour supply.
- **Support for migrant and low-income families:** Parents in informal labour markets depend heavily on childcare for livelihood stability.
- **Address demographic transition:** With fertility below replacement levels in many states, investments in early childhood are vital for future workforce quality.

Initiatives Taken:

- **ICDS (1975):** World's largest childcare programme providing nutrition, preschool education, and health services.
- **Poshan Tracker:** Digital guidance for parents on early childhood stimulation and nutrition.
- **Palna Scheme:** Crèche support for working mothers (though only 2,500 of 10,000 approved centres operational).
- **State innovations:**
  - **Tamil Nadu**: Half-time preschool educators doubled instructional hours.
  - **Telangana:** Increased honorarium for Anganwadi workers to extend centre hours.
  - **Meghalaya, Chandigarh:** Para-professionals & interns support Anganwadi services.
- **Civil society models:** Mobile Crèches and FORCES push for quality standards and worker recognition.

Challenges Associated:

- **Underpaid & undervalued care workers:** Low wages, absent career progression, weak training systems, and poor working conditions.
- **Urban childcare deficit:** Only 10% Anganwadis function fully in India's rapidly growing urban spaces.
- **Fragmented governance:** Childcare responsibilities lie across multiple ministries without a unified mission or strategy.
- **Poor infrastructure & quality gaps:** Overcrowded centres, limited hours, inadequate learning materials, and weak monitoring.
- **Gender inequality:** Heavy burden of unpaid care work limits women's economic agency and deepens workforce gender gaps.
- **Funding constraints:** India invests only **0.4% of GDP** in early childhood care—far below the **1–1.5%** levels seen in Scandinavian nations.

Way Ahead:

- **National Mission on Early Childhood Care:** Establish an integrated, multi-ministerial anchor for childcare reform and convergence.
- **Upgrade Anganwadis to full-day centres:** Extend working hours, improve infrastructure, and integrate trained para-professionals.
- **Invest in care workforce:** Professionalise roles, enhance remuneration, provide certification pathways, and ensure social security.
- **Hybrid service model:** Combine physical crèches with digital parent-support tools for early stimulation in the first 1,000 days.
- **Expand urban childcare:** Prioritise centres in industrial belts, service hubs, slums, and migrant-heavy localities.
- **Increase public investment:** Raise childcare spending to at least **1% of GDP** to achieve universal quality coverage.

Conclusion:

Childcare is not a welfare cost—it is foundational to India's productivity, gender equality, and long-term human capital. By valuing care work, investing in early childhood, and enabling women's economic participation, India can unlock a transformative growth

engine. A strong childcare ecosystem is essential for building a healthy, equitable, and future-ready nation.

CHILD MARRIAGES IN INDIA

Context: Despite 18 years of the Prohibition of Child Marriage Act, 2006, Andhra Pradesh continues to report a high incidence of child marriage, highlighting gaps between law and social reality.

About Child Marriages in India:

What it is?

- Child marriage refers to the formal or informal union where one or both parties are below 18 years of age, violating children's rights to education, health, protection and choice.
- It disproportionately affects girls, exposing them to early pregnancy, domestic violence, school dropout and long-term economic dependence.

Historical evolution:

- **Colonial era:** Social reform movements (Raja Ram Mohan Roy, Ishwar Chandra Vidyasagar) highlighted early marriage as a social evil.
- **Legislative steps:**
  - Child Marriage Restraint Act, 1929 (Sarda Act) – minimum age fixed but weak enforcement.
  - Prohibition of Child Marriage Act, 2006 – declared child marriage voidable, introduced penalties and Child Marriage Prohibition Officers.
- **Recent push:** National campaigns like Bal Vivah-Mukt Bharat aim to eliminate child marriage by 2030 in line with SDG-5.

Trends of child marriage in India:

- About **16% of girls aged 15–19** are currently married, though prevalence declined from **47% (2005–06) to ~27% (2015–16)**.
- India still accounts for **~1.5 million child marriages annually**, the highest globally in absolute numbers.
- Higher prevalence persists in economically vulnerable regions such as Bihar, Andhra Pradesh, Rajasthan and parts of Madhya Pradesh.

Reasons for child marriage:

1. **Poverty and economic distress:** Poor households perceive early marriage as a way to reduce care costs and secure social protection for daughters.
   E.g. NFHS analysis shows child marriage is far higher among the poorest wealth quintile than the richest.
2. **Lack of awareness:** Limited understanding of the Prohibition of Child Marriage Act and adolescent health risks weakens legal deterrence.
   E.g. Surveys under Bal Vivah Mukt Bharat found low awareness of penalties and the legal marriage age.
3. **Entrenched gender norms:** Patriarchal beliefs treat girls as *paraya dhan*, prioritising marriage over education and autonomy.
   E.g. Social studies show norms change slowly even when female education improves.
4. **School dropouts:** Distance to schools, safety concerns and costs push girls out of secondary education, increasing vulnerability.
   E.g. UNICEF data shows completing secondary education sharply lowers the risk of early marriage.
5. **Social pressure and stigma:** Fear of elopement and loss of "family honour" drives families to arrange early marriages.
   E.g. Authorities report spikes in secret mass marriages on culturally auspicious days.

Challenges associated:

1. **Weak enforcement:** Low conviction rates dilute the deterrent effect of the law despite frequent prevention efforts.

E.g. Judicial observations highlight severe pendency and slow disposal of child marriage cases.

2. **Family complicity:** Entire families often support early marriage, limiting scope for timely intervention.

   E.g. Courts have noted use of informal betrothals to bypass legal scrutiny.

3. **Institutional gaps:** Inadequate shelters, counselling services and trained officers weaken rescue and rehabilitation.

   E.g. Many Child Marriage Prohibition Officers hold additional charge without specialised capacity.

4. **Gendered health impacts:** Adolescent motherhood raises risks of anaemia, maternal mortality and low birth-weight infants.

   E.g. Nutrition audits link early marriage districts with poor maternal-child health outcomes.

Way ahead:

1. **Education-first strategy:** Retaining girls in secondary education delays marriage and expands life choices.

   E.g. Conditional cash transfers tied to schooling have significantly postponed marriage age.

2. **Economic support to families:** Cash-plus and skill-based interventions reduce poverty-driven marriage decisions.

   E.g. Upgraded Anganwadi centres now provide vocational and life-skills training for adolescents.

3. **Community engagement:** Shifting norms requires panchayats, faith leaders and youth ownership of prevention.

   E.g. Village-level "Child Marriage-Free" declarations have created positive social pressure.

4. **Stronger enforcement:** Dedicated units, digital reporting and swift FIRs improve accountability.

   E.g. Centralised online portals now enable real-time alerts and faster administrative response.

5. **Integrated adolescent empowerment:** Linking protection with health, nutrition and legal awareness ensures sustained impact.

   E.g. Nari Adalats combine community mediation with legal backing to prevent early unions.

Conclusion:

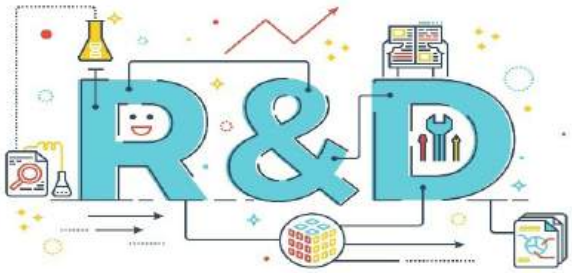
Child marriage is not merely a legal violation but a symptom of poverty, gender inequality and social neglect. While laws and campaigns exist, their success depends on education, economic security and community-level change. Ending child marriage is essential for safeguarding children's rights and breaking intergenerational cycles of deprivation.

Topics: Issues relating to development and management of Social Sector/Services relating to Health, Education, Human Resources.

INDIA'S RESEARCH DEFICIT

Context:

India's chronic research and development (R&D) deficit has returned to focus following renewed debate on India's global ambitions, low R&D spending (≈0.7% of GDP), and comparisons with countries—and even firms like Huawei—that far outspend India on innovation.



About India's Research Deficit:

What it is?

- India's research deficit refers to the systemic underinvestment, weak ecosystem linkages, and low output in scientific research, innovation, and high-end technology development, despite having one of the world's largest talent pools and economies.

Key trends:

- **R&D expenditure:** **~0.6–0.7% of GDP** (declining relative to GDP growth).
  - China: ~2.4% | USA: ~3.5% | Israel: ~5.4%
- **Global research output:** India has **~17.5% of world population** but produces only ~3% of global research output.
- **Patents (2023):**
  - Total filings: **64,480** (6th globally; fast growth from low base)
  - Share of global filings: **~1.8%**
  - Resident filings per million people: **47th rank**

- **Researchers density:** **~255 researchers per million people**
    - Global average: ~1,198 | USA: 4,452 | China: 1,307 | South Korea: 7,980
- **Private sector role:** Government contributes **~63.6%** of R&D spend; private sector only **~36.4%.**
- **Global Innovation Index 2024:** 39th rank.

Need for Strong Research in India:

1. **Economic competitiveness and value-chain upgradation:** R&D enables transition from assembly to design-led manufacturing and intellectual leadership.
    - Despite **₹1.6 lakh crore cleared under India Semiconductor Mission (2025)**, the absence of a **commercial sub-28 nm mega-fab** keeps India import-dependent for advanced logic chips.
2. **Strategic autonomy and technology sovereignty:** Indigenous research reduces exposure to external "technology vetoes" in critical sectors.
    - Although **65% defence equipment is domestically produced**, dependence on **GE-F404 engines for Tejas Mk-1A** reflects the long-standing aero-engine R&D deficit (Kaveri legacy).
3. **Conversion of demographic dividend into innovation capital:** High-quality research jobs prevent "brain waste" among India's STEM youth.
    - In **2024–25, 7.6 lakh students went abroad**, with a **35% surge in AI and renewable-energy PhDs**, driven by weak deep-tech lab infrastructure at home.
4. **Societal problem-solving and contextual innovation:** Indian challenges need India-specific scientific solutions beyond global models.
    - The **47°C Delhi heat events (2024–25)** exposed limits of global climate models, prompting **Mission Mausam (2024)** to develop indigenous, localised weather forecasting.

Initiatives taken:

- **₹1 lakh crore Research, Development and Innovation (RDI) Fund:**
    - ₹20,000 crore allocated initially; focus on **private-sector and deep-tech R&D**
- **Anusandhan National Research Foundation (ANRF):** Strengthens **academic research, labs, and basic science**
- **National missions:** **India Semiconductor Mission, National Quantum Mission, AI Mission, Green Energy & Hydrogen initiatives**

Challenges Associated:

1. **Private-sector risk aversion in R&D:** Indian industry underinvests in long-gestation "blue-sky" research. India's **GERD remains ~0.65% of GDP**, with private contribution at **36%**, compared to **70%+ in South Korea and the U.S.**
2. **Academia–industry disconnect:** Weak commercialization culture prevents lab-to-market transition. While IIT Madras scaled 5G RAN licensing (2024–25), over 80% patents from smaller colleges remain unlicensed due to absence of Technology Transfer Offices.
3. **Persistent brain drain due to ecosystem gaps:** Talent migrates to stable innovation clusters offering funding continuity. **GII 2025 ranks India 38th**, yet top **0.1% STEM talent exits** due to delays and uncertainty in grants like JC Bose Fellowship.
4. **Bureaucratic delays and funding liquidity crunch**: Slow disbursal disrupts experimental continuity in labs. Even after ANRF operationalisation (2024), SERB-SURE and DST funds took 8–12 months in 2025, causing project stagnation.
5. **Weak intellectual property quality and enforcement:** Filing growth is not translating into disruptive innovation. Though India became the **6th largest patent filer (2024–25)**, its **GII Business Sophistication rank (64)** shows dominance of incremental over frontier inventions.

Way Ahead

1. **Scale R&D investment decisively:** Raise R&D spending to **2% of GDP within 5–7 years**, ensuring **≥50% private-sector share** through tax credits, co-funding, and outcome-linked incentives.
2. **Adopt mission-mode research governance:** Focus on AI, semiconductors, quantum, green energy, advanced materials, with uninterrupted funding, strategic milestones, and national-security alignment.
3. **Reform universities into research engines:** Build research-centric universities, expand PhD fellowships, recruit global faculty, and establish world-class experimental infrastructure.
4. **Institutionalise industry–academia integration:**

Mandate industry-funded chairs, joint labs, incubators, and professional TTOs to bridge the "valley of death" between research and markets.

5. **Strengthen IP and innovation incentives:** Fast-track patents, improve enforcement, and ensure revenue-sharing models that reward inventors and institutions.
6. **Retain and attract top research talent:** Offer globally competitive pay, mobility grants, and flagship national labs, ensuring career stability and scientific autonomy.

Conclusion:

India's aspiration to become a global power cannot be sustained without a **robust, well-funded R&D ecosystem.** The current research deficit is not a talent problem but a **structural and investment failure**. Bridging this gap decisively in the next decade is essential for **Viksit Bharat,** technological sovereignty, and long-term economic leadership.

ARTIFICIAL INTELLIGENCE IN EDUCATION

Context:

The Vice President of India, at the National Conclave on AI Evolution (AI Mahakumbh), stressed that Artificial Intelligence must be integrated into school and higher-education curricula to build future-ready skills.

About Artificial Intelligence in Education:

What it is?

- Artificial Intelligence in education refers to the use of machine learning, data analytics, and intelligent systems to support teaching, learning, assessment, research, and educational governance while retaining human oversight.

Trends and data:

- **Rapid adoption:** Over **80% of higher-education students** in premier institutions reportedly use AI tools for learning and research support.
- **Policy push:** India's **AI for Science** and NEP-2020 encourage digital and AI-enabled pedagogy.
- **Global momentum:** UNESCO and OECD identify AI as a key accelerator for achieving **SDG-4 (Quality Education)**.

Why AI is critical for India's education system?

1. **Demographic scale challenge:** India's education system caters to over **250 million learners**, making uniform pedagogy ineffective across socio-economic, linguistic, and cognitive diversity.

   E.g. DIKSHA uses AI-driven recommendation engines to deliver customised learning paths across multiple State Boards.
2. **Teacher shortage:** Skewed teacher availability, especially in aspirational districts, weakens classroom outcomes and increases dropout risks.

   E.g. Uttar Pradesh's SwiftChat AI supports para-teachers in rural schools with lesson plans and doubt resolution.
3. Skill mismatch: The economy demands analytical, digital, and problem-solving skills, while curricula still over-emphasise rote memorisation.

   E.g. Atal Tinkering Labs integrate AI modules to develop computational thinking among secondary school students.
4. **Equity and access:** Linguistic, regional, and gender divides restrict access to quality learning resources.

   E.g. IIT Madras's AI4Bharat translates advanced STEM content into Indian languages like Tamil and Marathi.

Key transformations enabled by AI in education:

1. **Personalised learning:** AI dynamically adjusts content difficulty based on learner performance and pace.

   E.g. Embibe analyses test responses to generate targeted remedial practice for JEE/ NEET aspirants.
2. Teacher empowerment: Automation of grading and planning reduces clerical burden, enabling deeper student engagement.

   E.g. CBSE's AI-enabled portals auto-evaluate objective internal assessments at scale.
3. **Research acceleration:** AI compresses research timelines through rapid literature review and data synthesis.

   E.g. Bhashini enables multilingual academic collaboration, overcoming language barriers in research.
4. **Smart governance:** Data-driven dashboards improve decision-making across admissions, attendance, and retention.

   E.g. Gujarat's Vidya Samiksha Kendra uses predictive analytics to identify potential school dropouts early.

5. **Employability focus:** AI aligns curricula with emerging labour-market needs in real time.

   E.g. AICTE's NEAT platform maps student skills to internships in EV and semiconductor sectors.

Core principles emphasised by UNESCO

1. **Human-centred AI:** AI should assist teachers, not replace pedagogic judgement or moral authority.
2. **Equity and inclusion:** AI must actively bridge learning gaps for marginalised and differently-abled groups.
3. **Ethical use:** Transparency and safeguards are essential to prevent misinformation and algorithmic errors.
4. **Data privacy:** Learner data must be protected through consent-based, secure frameworks.
5. **Cultural sensitivity:** AI systems should reflect indigenous knowledge and local contexts.

Challenges associated with AI in education:

- Digital divide: Poor connectivity and device access persist in remote and Tier-3 regions.
- **E.g.** Himalayan villages remain unable to use bandwidth-intensive AI learning platforms.
- **Over-dependence risk:** Excessive reliance on AI outputs can weaken originality and reasoning.
- **E.g.** Students using ChatGPT for humanities essays without independent analysis.
- **Bias and inaccuracies:** Western-trained models often misinterpret Indian accents and contexts.
- **E.g.** Speech-recognition tools failing with regional linguistic variations.
- **Teacher readiness:** Limited digital literacy creates resistance to AI adoption.
- **E.g.** Pushback against AI-based attendance and assessment in state-run schools.
- **Privacy concerns:** Large-scale data collection of minors raises surveillance and misuse risks.
- **E.g.** Concerns over commercial exploitation of student data by private EdTech firms.

Way ahead:

- **Early curriculum integration:** AI literacy must be introduced from foundational schooling.
- **E.g.** CBSE has introduced AI as a skill subject from Grade 6.
- **Teacher upskilling:** Nationwide capacity-building in ethical and pedagogic AI use is essential.
- **E.g.** NISHTHA modules are being updated to include AI-assisted teaching methods.
- **Blended learning model:** Combine AI efficiency with human mentoring and ethical guidance.
- **E.g.** Phygital classrooms where AI delivers content and teachers guide reflection.
- **Robust regulation:** Clear legal oversight is needed for algorithmic transparency and accountability.
- **E.g.** Proposal for a National AI Regulatory Body for EdTech governance.
- **Indigenous AI development:** India must build sovereign, context-aware AI systems.
- **E.g.** Bhashini-led LLMs trained across all 22 Scheduled Indian languages.

Conclusion:

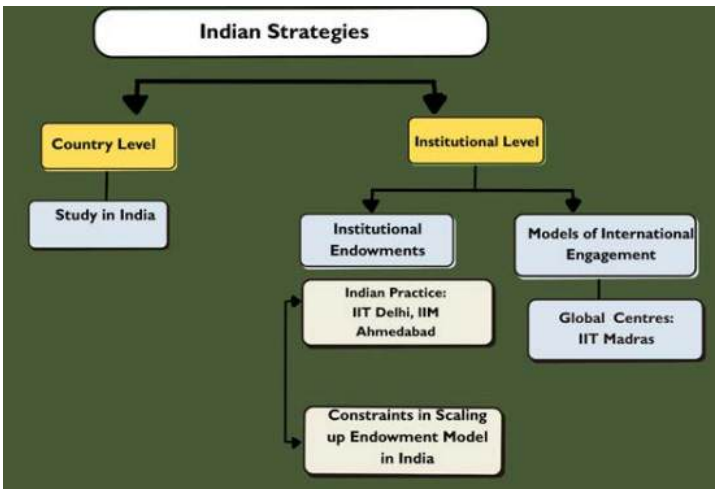
Artificial Intelligence can transform India's education system from rote-based to learner-centric. When guided by ethics, inclusion, and human oversight, AI becomes a force multiplier for equity and innovation. Responsible adoption of AI is vital for building a future-ready, knowledge-driven Viksit Bharat.

HIGHER EDUCATION IN INDIA

Context:

NITI Aayog has released a comprehensive policy report on "Internationalisation of Higher Education in India" to operationalise NEP-2020's vision of internationalisation at home.

- The report outlines a roadmap to make India a global hub for higher education and research by 2047, aligned with Viksit Bharat @2047.



About Higher Education in India:

What it is?

- Internationalisation of Higher Education refers

to the intentional integration of international, intercultural, and global dimensions into the purpose, curriculum, research, and governance of higher education institutions.

Core Features of Internationalisation of Higher Education (IoHE):

- **Internationalisation at Home:** Global curricula, foreign faculty, joint courses, and international research exposure are embedded within Indian campuses, benefitting nearly 97% students who remain in India.
- **Two-way Academic Mobility:** Promotes balanced inbound and outbound student–faculty exchanges, joint supervision of PhDs, and visiting professorships.
- **Cross-border Institutional Presence:** Enables foreign university campuses in India and offshore campuses of Indian HEIs abroad, expanding India's academic footprint.
- **Research-led Global Integration:** Focus on joint research, co-authored publications, shared laboratories, and participation in global research consortia.
- **Education as Soft Power:** Higher education is leveraged as an instrument of diplomacy, cultural influence, and long-term global engagement, especially with the Global South.

Potential of Higher Education in India:

- **Demographic Advantage:** With an **average age of 28.4 years**, India offers a vast, young talent pool for global education, innovation, and research.
- **Scale and System Capacity:** India hosts **1,200+ universities and 40 million students**, providing unmatched scale for international student absorption.
- **Cost-Quality Edge:** Quality education in engineering, medicine, and management is available at **30–40% lower cost** than in Western countries.
- **Knowledge Economy Strengths:** Success in IT, space, pharmaceuticals, and digital public infrastructure enhances India's credibility as a learning hub.
- **Global Ranking Presence:** 54 Indian institutions in QS World Rankings 2026 signal readiness to host 1 lakh international students by 2030.

Challenges to Internationalisation of Higher Education

- **Inbound–Outbound Imbalance:** Over **13 lakh Indian students study abroad**, while India hosts only **~50,000 foreign students**, reflecting weak inbound appeal.
- **High Forex Outflow:** Overseas education remittances reached **USD 3.4 billion in 2023–24**, straining national resources.
- **Regulatory Fragmentation:** Multiple regulators, slow approvals, and absence of a single degree-equivalence framework deter foreign participation.
- **Uneven Institutional Readiness:** Most state and rural universities lack international hostels, faculty support systems, and global academic offices.
- **Limited Global Branding:** India's universities suffer from **low international visibility**, weak alumni diplomacy, and inconsistent global outreach.

Three Global Strategies for Internationalisation of Higher Education:

1. **Transnational Education (TNE) hubs:** Countries like Australia, UAE, and Singapore attract global universities through branch campuses, joint degrees, and flexible regulation, positioning themselves as regional education hubs.
2. **Academic mobility & talent attraction:** Nations such as Germany and Canada use liberal visa regimes, post-study work options, and funded fellowships (e.g., DAAD) to attract international students, researchers, and faculty.
3. **Global research & ranking-driven collaboration:** Leading systems (US, UK, EU) prioritise joint research grants, co-authored publications, and global rankings, using international partnerships to boost innovation, funding, and academic prestige.

NITI Aayog's Recommended Strategy:

- **Inter-Ministerial Task Force:** Establish a high-level body anchored in the **Ministry of Education** to coordinate targets, funding, and global engagement.
- **National Equivalence Portal:** Create a **single-window digital platform** for recognition of professional and non-professional degrees to ease student mobility.
- **"Campus-within-a-Campus" model:** Allow foreign universities to operate co-located campuses within Indian HEIs using a brownfield approach with a 10-year sunset clause.
- **Country Centres of Excellence (CoEs):** Designate **Central Universities as nodal hubs** for specific partner nations (e.g., **54 CoEs for 54 countries**) to deepen bilateral research.

- **Vishwa Bandhu Fellowship:** Launch a flagship fellowship to attract **global researchers and diaspora faculty** from India's **3.5-crore overseas community**.
- **Expansion beyond GIFT City (IFSC):** Extend the GIFT model beyond finance into Law, Management, Public Policy, and Sports Science.
- **Revamped NIRF framework:** Integrate **internationalisation indicators**—international faculty ratios, inbound students, joint publications—into national rankings.
- **Tagore Academic Mobility Framework:** Establish multilateral credit-recognition and mobility arrangements for **ASEAN, BIMSTEC, BRICS**, and other regional groupings.

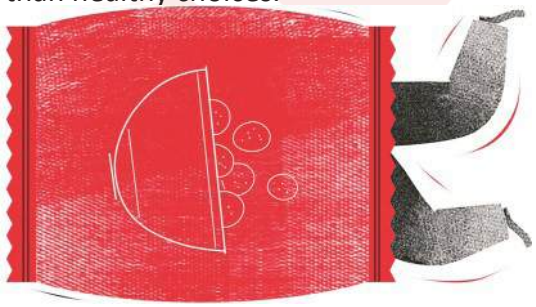
Conclusion:

The NITI Aayog roadmap marks a strategic shift from India being a "source" of global students to a "destination" for global talent. By prioritising Internationalisation at Home, India seeks to retain brain capital, reduce forex outflow, and reclaim its civilisational role as a Vishwa Guru. Achieving the target of 8 lakh international students by 2047 is central to realising the vision of a developed, knowledge-led Viksit Bharat.

INDIA'S DIET PARADOX: WHEN EASY FOOD BECOMES UNHEALTHY FOOD

Context: India's diets have shifted from home-cooked staples to ultra-processed, carbohydrate-heavy foods despite rising incomes and diversification.

- This transition now fuels high NCD burden, protein–vegetable gaps, and an ecosystem where unhealthy eating is cheaper and easier than healthy choices.



About India's Diet Paradox: When Easy Food Becomes Unhealthy Food

What Has Changed?

- **Carb dominance despite lower cereal spending** – Cereal expenditure has dropped, but dependence on refined carbohydrates remains the primary metabolic driver.

  E.g. ICMR-INDIAB (2024) reveals that **62%** of total energy intake in India still comes from low-quality carbohydrates like refined cereals and added sugars.
- **Animal foods and produce spending up** – There is a diversification toward dairy and perishables, but it hasn't displaced the carb-heavy base.

  E.g. NSSO HCES (2022-23) shows average monthly spending on milk/dairy increased to **₹503 (urban)** and **₹348 (rural)**, while fruit/vegetable spending nearly doubled since 2012.
- Ultra-processed foods **normalised** – Processed foods have shifted from "occasional treats" to "daily essentials" due to time poverty.

  E.g. Spending on processed foods surged by **353% in rural India** and **222% in urban India** since 1999 (NSSO), with a **90% decline in price elasticity**, signaling they are now treated as necessities.
- **Inequality in dietary quality** – Nutritional diversity is restricted to the wealthy, while the poor remain calorie-reliant.

  E.g. The top 5% of urban Indians spend **10 times more** on food (~₹20,310 MPCE) than the bottom 5% (~₹2,376), dictating access to diverse proteins vs. cheap carbs.

Health Consequences of Current Diets:

- **Diet drives majority of disease burden** – Poor nutrition is now the single largest risk factor for health in India.

  E.g. The **ICMR 2024 report** attributes **56.4%** of India's total disease burden directly to unhealthy diets, overtaking infectious diseases.
- Metabolic illnesses **rising steeply** – The carb-fat imbalances are fueling a non-communicable disease (NCD) crisis.

  E.g. Cancer deaths in India are projected to rise by **75% by 2050**, with diabetes already affecting **101 million** Indians (ICMR-INDIAB).
- Obesity–malnutrition **double burden** – Simultaneous prevalence of undernutrition and obesity due to calorie-dense, nutrient-poor foods.

  E.g. NFHS-5 indicates that while **35.5%** of children are stunted, urban obesity in women has risen to **24%**, driven by high-fat/sugar intake.
- **Persistent protein and vegetable gaps** – Rising incomes have not translated into adequate protein intake.

E.g. A 2024 study in *Frontiers* found **80% of rural households** consume less than the recommended protein, relying on cereals for **60–75%** of their intake.

- **Rising years of life lost** – Diet-induced chronic conditions are prematurely shortening lifespans.

  E.g. The WHO estimates that NCDs (driven by diet) now account for **66% of all deaths** in India, heavily impacting the productive age group (30–69 years).

Socio-Economic Drivers:

- **Cheap unhealthy food architecture** – Mass-produced processed foods benefit from economies of scale that fresh produce lacks.

  E.g. A packet of chips costs **₹5-10**, whereas a nutritionally equivalent serving of fruit often costs **3-4x more** in urban metros, incentivizing junk consumption.

- Consumption inequality **persists** – Food budgets scale with income, but nutritional quality does not improve linearly for the poor

  E.g. The **Gini coefficient** for consumption expenditure is **0.284 (urban)**, showing that despite rising incomes, the poor's food basket remains constrained to staples.

- **Processed as necessity, not indulgence** – High-sugar/salt foods are purchased for convenience and shelf-life, not just taste.

  E.g. The **90% drop in** price elasticity for processed foods means demand no longer drops significantly even when prices rise, proving they are now "essential goods."

Sustainability Link:

- **Healthier diets lower emissions** – Moving away from refined grains and excessive dairy can cool the planet.

  E.g. Adhering to **NIN 2024 dietary guidelines** could reduce India's agricultural methane emissions by **36%** and nitrous oxide by **35%** by 2050.

- **Balanced diets reduce consumer costs** – Contrary to perception, a balanced vegetarian diet can be economical if localized.

  E.g. The **EAT-Lancet commission** notes that shifting to a "planetary health diet" could reduce household food costs by **23%** by relying on cheaper plant proteins (pulses/legumes) over expensive processed foods.

- Reduced fertiliser and input **strain** – Legume-heavy diets fix soil nitrogen naturally, lowering chemical needs.

  E.g. Replacing 10% of cereal acreage with pulses can save **thousands of tonnes** of synthetic nitrogen fertilizer annually (ICAR).

What Needs to Change?

- **Strategic taxation on ultra-processed foods** – Use fiscal policy to curb consumption of high-sugar/salt products.

  E.g. A **20-30% "Sugar Tax"** (modeled after Mexico/UK) is recommended by public health experts to reduce obesity prevalence by **5-10%**.

- **Clear front-of-package labelling** – Warning labels are more effective than nutritional tables.

  E.g. The FSSAI's draft regulation **(2020)** on "High in Fat, Sugar, and Salt" (HFSS) warning labels is proven to alter consumer choice by **~20%** in pilot studies.

- **Cold chain and nutrient crop scaling** – Reduce spoilage to make perishables affordable.

  E.g. India wastes **16% of fruits and vegetables** annually; scaling PM-KISAN **SAMPADA** cold chains can recover this value to lower retail prices.

- **Redirection of subsidies** – Shift support from water-guzzling rice/wheat to nutri-cereals.

  E.g. Reallocating a portion of the **₹1.64 lakh crore fertilizer subsidy** to millet/pulse inputs could incentivize farmers to diversify 20 million hectares away from paddy.

- **Industry reform for culturally aligned healthy foods** – Reformulate mass-market products.

  E.g. FSSAI's **"**Eat Right India**"** initiative targets a **30% reduction** in salt/sugar content in packaged foods by 2025 through voluntary industry pledges.

Conclusion:

India's economic rise has not translated into nutritional security, as ultra processed dependence and carb-heavy diets drive metabolic and climate harm. Making healthy food structurally accessible, affordable and convenient is now central to reversing India's nutrition–disease spiral.

INDIA'S STEM FUTURE

Context: A national debate has emerged after concerns were raised about the government's proposal to restrict PhD research topics to "emerging national priorities," highlighting deeper structural issues in India's STEM ecosystem.

About India's STEM Future:

Trends in India's STEM Demography:

- **Massive Output:** India produces **25–30 lakh STEM graduates annually**, ranking second globally after China (AISHE 2021-22).
- **The "Leaky Pipeline" for Women:** While women comprise **43% of STEM graduates** (one of the highest globally), they hold only **14% of research positions** due to societal and structural barriers.
- **Low Researcher Density:** India has just **~260 researchers per million people**, significantly lower than China (~1,500), the USA (~4,500), and South Korea (~8,000).
- **Sectoral Imbalance:** The workforce is heavily skewed toward **IT services and software engineering**, with a severe shortage of talent in core research areas like biotechnology, material sciences, and physics.

Need for Strengthening STEM Education:

- **Strategic Autonomy:** Crucial for reducing import dependence in critical sectors like semiconductors, defense (DRDO), and space (ISRO).
- **Global Competitiveness:** Essential to transition from a "service-based economy" to an "innovation hub," targeting a $5 trillion economy.
- **Emerging Technologies:** Fundamental for success in national missions on Green Hydrogen, Artificial Intelligence (AI), and Quantum Computing.
- **Demographic Dividend:** With a median age of 28 years, skilling youth in high-end STEM fields prevents underemployment and boosts national productivity.

Initiatives Taken in India

- **Anusandhan National Research Foundation (ANRF) 2023:** Established with a corpus of ₹50,000 crore (over 5 years) to fund research in universities and colleges, not just elite institutions.
- **National Education Policy (NEP) 2020:** Introduces multidisciplinary education, allowing STEM students to take humanities courses to foster holistic thinking.
- **Targeted National Missions:**
    - **National Quantum Mission:** ₹6,000 crore allocated to scale intermediate-scale quantum computers.
    - **IndiaAI Mission:** ₹10,372 crore approved to build computing infrastructure and large multimodal models.
- **Innovation at School Level:** Atal Innovation Mission (AIM) has established over 10,000 Atal Tinkering Labs (ATLs) to foster curiosity in robotics and IoT among school children.
- **Fellowships & Scholarships:** Programs like PMRF (Prime Minister's Research Fellowship) offer attractive stipends (up to ₹80,000/month) to retain top talent in Indian PhD programs.

Challenges to STEM Education & Research:

- **Low R&D Expenditure:** India's Gross Expenditure on R&D (GERD) is stagnant at ~0.64% of GDP, compared to the global average of ~1.8% and China's 2.4%.
- **Private Sector Apathy:** The private sector contributes less than 40% of India's R&D spend, whereas in advanced economies (USA, Japan), it contributes over 70%.
- **Bureaucratic Red Tape:** Delays in fellowship disbursals (often 6–8 months) and rigid procurement rules for lab equipment demotivate scholars.
- **"Human Capital Flight":** Top-tier talent migrates to the US/Europe for better infrastructure; approx. 90% of AI researchers from elite Indian institutes move abroad for work.
- **Infrastructure Deficit:** 90% of state universities suffer from outdated laboratories and a lack of access to high-end journals.

Way Ahead:

- **Boost Funding to 2% GDP:** Government must commit to increasing R&D spending to at least 2% of GDP to match global standards.
- **Strengthen Industry-Academia Link:** Mandate industry funding for university research via **CSR norms** or tax incentives for R&D investments.
- **Ease of Doing Science:** Implement a "Single Window Clearance" for research grants and equipment procurement to reduce administrative burden.
- **Retain Talent:** Create "post-Doc" opportunities with competitive pay and strictly enforce monthly automated fellowship disbursals.
- **Democratize Access:** Expand the ANRF's reach to fund state universities and rural colleges, breaking the monopoly of IITs/IISc.

Conclusion:

India's STEM potential is massive but constrained by under-funding and bureaucratic inertia. Unlocking this potential requires a shift from "diploma production"

to "research creation," supported by robust funding and academic freedom. A self-reliant India (Atmanirbhar Bharat) can only be built on the foundation of a thriving, inclusive, and well-funded STEM ecosystem.

STUDENT SUICIDES INDIA

Context:

Student suicides have surged across India, with the recent death of 16-year-old Shourya Patil in Delhi highlighting systemic failures in school responses to bullying and distress.

- NCRB data shows a **65% rise in student suicides over a decade**, exposing deep institutional gaps in mental-health protection.

About Student Suicides India:

Rising Student Suicides in India:

- **Sharp rise in youth deaths:** Student suicides increased from **8,423 (2013) to 13,892 (2023)**, a 65% escalation, outpacing national suicide growth.
- **Younger children increasingly affected:** Cases now include ages **9–17**, indicating stress and institutional neglect is spreading across school stages.
- **Examination-linked distress:** Multiple States (e.g., Telangana, UP) report clusters of suicides around exam months, reflecting a marks-driven schooling culture.
- **Post-pandemic behavioural shifts:** Higher screen time, social withdrawal, and low emotional resilience intensify vulnerabilities among adolescents.

Systemic Gaps in Child & Adolescent Mental Health

- **Severe shortage of trained professionals:** UNICEF (2024) notes 23% of schoolchildren show psychiatric symptoms, but counsellor–student ratios remain dismal.
- **Weak recognition of early warning signs:** Mood changes, withdrawal, academic decline, and irritability are often dismissed as "normal teenage behaviour."
- **Inadequate regulatory enforcement:** Supreme Court's 2025 guidelines on helplines, trained counsellors, and staff sensitisation remain poorly implemented in schools.
- **Infrastructure deficits:** Most schools lack mental-health budgets, safe spaces for disclosure, and evidence-based emotional-literacy programmes.
- **Medication and therapy gaps:** Limited access to age-appropriate psychiatric services results in untreated anxiety, depression, and trauma.

Role of Schools and Families:

- **Punitive classroom culture:** Rigid academic expectations, public shaming, ranking, and comparisons erode students' dignity and sense of belonging.
- **Bullying normalisation:** Verbal taunts, exclusion, and physical teasing go unnoticed or trivialised, despite being severe adverse childhood experiences.
- **Teacher training deficits:** B.Ed programmes rarely include mental-health modules; teachers lack tools for psychological first aid or empathetic communication.
- **Family-level emotional vacuum:** Nuclearisation, work pressures, and digital distraction reduce parental engagement; children internalise distress in silence.
- **Digital overstimulation:** Social media's dopamine cycle distorts self-image and heightens impulsivity, creating fertile ground for self-harm tendencies.

Systemic Solutions

- **Build Mandatory Mental-Health Infrastructure:**
  - Appoint full-time counsellors in all schools with >100 students; ensure confidential reporting systems and crisis-intervention teams.
  - Integrate helplines and mandatory follow-ups for high-risk cases (as directed by SC, 2025).
- **Reform Academic and Evaluation Culture:**
  - Replace high-stakes exams with **phased assessments**, project-based learning, and multi-dimensional evaluation.
  - Limit homework, regulate coaching pressure, and create buffer days around

exam schedules.

- **Strengthen Teacher Capacity and Accountability:**
  - Introduce compulsory mental-health training in B.Ed and in-service teacher programmes.
  - Institutionalise guidelines against humiliation, intimidation, or punitive discipline.
- **Build Emotional Literacy from Early Years:**
  - Integrate **SEL (Social and Emotional Learning)** into curriculum: empathy, expression, stress management, conflict resolution.
  - Conduct structured "circle time" discussions and peer-support groups.
- **Regulate Bullying, Harassment, and Abuse:**
  - Set up school-level child protection committees under the JJ Act & POCSO norms.
  - Mandate periodic audits on safety, grievance handling, and teacher conduct.
- **Strengthen Family–School Partnership:**
  - Offer parent workshops on mental health, digital hygiene, and supportive communication.
  - Encourage collaborative response plans for at-risk students.

Conclusion:

Rising student suicides are not isolated events but indicators of a system that overwhelms children instead of nurturing them. Preventing the next tragedy requires transforming schools into safe, empathetic, and accountable spaces where emotional well-being is as important as academic success. India must move from reactive outrage to structural reform—before more young lives are lost.

INCLUSIVE GROWTH AND DISABILITY RIGHTS

Context: The International Day of Persons with Disabilities highlighted the WHO's call for inclusive and equitable health financing for persons with disabilities.

About Inclusive Growth and Disability Rights:

What It Means?

- Inclusive growth and disability rights aim to ensure persons with disabilities (PwDs) participate fully in society through accessible infrastructure, livelihoods, education and legal safeguards, eliminating structural barriers to equality and dignity.

Current Status in India:

1. **Population size:** India has **2.68 crore PwDs (2011 Census)** constituting **2.21%** of the population, requiring targeted rights-based frameworks for equal participation.
2. **Legal identity systems:** The UDID programme now enables nationwide disability certification, improving transparency and access to benefits.
3. **Expanding disability categories:** The RPwD Act 2016 recognises **21 disabilities**, expanding coverage beyond the earlier seven categories for more inclusive service delivery.

Need for Inclusive Growth in India:

- **Human capital utilisation:** PwDs can significantly contribute to the workforce if provided accessible education, skills and mobility, strengthening national productivity.
- **Equity and constitutional morality:** Inclusive growth fulfils the RPwD Act mandate of non-discrimination, dignity and equal opportunity for all citizens.
- **Breaking poverty–disability link:** Many disabilities push families into long-term poverty; inclusive systems reduce dependence and enhance economic independence.
- **International commitments:** As a UNCRPD signatory, India must build an accessible society aligned with rights-based development.

Challenges Faced by Persons with Disabilities (PwDs):

- **Accessibility gaps**: Public buildings, transport and digital systems often remain inaccessible despite the Accessible India Campaign's goals.
- **High financial burden:** Assistive devices, therapies and long-term care create major out-of-pocket costs, pushing families into economic stress.
- **Low awareness and outreach:** Many PwDs — especially women and marginalised castes — remain unaware of schemes, limiting utilisation.
- **Skill and employment barriers:** Limited training centres, low employer readiness and inadequate workplace adaptations hinder economic inclusion.
- **Justice system hurdles:** Legal aid remains inaccessible, with procedural delays and lack of disability-sensitive grievance redressal mechanisms.

Key Initiatives Taken:

1. **Legal & Policy Measures:**
    - **RPwD Act 2016**: Recognises 21 disabilities, mandates accessibility, 4% job reservation, inclusive education and strong anti-discrimination protections.
    - **National Trust Act 1999**: Supports persons with autism, cerebral palsy, intellectual and multiple disabilities through community-based care systems.
    - **RCI Act 1992**: Regulates training of rehabilitation professionals and maintains national registers for quality support services.
2. **Major Schemes & Programmes**
    - **Sugamya Bharat Abhiyan**: Advances accessibility across built spaces, transport and ICT; revamped app offers grievance reporting and accessibility mapping.
    - **UDID Project**: Creates a unified national database, enabling transparent delivery of benefits, renewals, and scheme integration.
    - **ADIP Scheme**: Provides modern assistive devices, cochlear implants, therapies and post-surgery support to enhance mobility and communication.

Way Ahead:

- **Strengthen last-mile delivery**: Expand local outreach, ensure multilingual accessibility, and improve district-level awareness for scheme utilisation.
- **Scale financing & insurance**: Integrate disability coverage in health financing and micro-insurance to prevent catastrophic expenditures.
- **Accelerate universal accessibility**: Enforce building codes, transport standards and digital accessibility norms across public and private sectors.
- **Boost skill-training ecosystem**: Expand NAP-SDP courses, industry partnerships, and inclusive workplaces for meaningful employment.
- **Enable justice access**: Link PM-DAKSH, UDID and legal aid institutions to create disability-friendly grievance and judicial systems.

Conclusion:

India is moving toward an inclusive, rights-based disability framework, combining legislation, digital tools and welfare schemes. Yet bridging awareness gaps, accessibility deficits and financial vulnerabilities remains essential. A coordinated, adequately funded and technology-enabled ecosystem is the path to ensuring dignity, equality and full participation for every person with a disability.

Topics: Important aspects of governance, transparency and accountability, e-governance applications, models, successes, limitations, and potential; citizens charters, transparency & accountability and institutional and other measures.

INDIA'S FIRE TRAGEDIES: A GOVERNANCE FAILURE MORE THAN AN ACCIDENT

Context: The Goa nightclub fire tragedy, which killed 25 people — most of them migrant workers — has exposed serious gaps in governance, unsafe working conditions, and weak enforcement of licensing and safety norms.

About India's Fire Tragedies: A Governance Failure More Than an Accident

Trends in Fire Tragedies in India:

- **High Incidence & Mortality:** India records approximately **1.6 lakh fire incidents annually**, resulting in over **27,000 deaths** (NCRB Accidental Deaths & Suicides in India Report).
- **Urban Commercial Shift:** While **57% of deaths occur in residential settings**, casualties in commercial hubs (hospitals, factories, markets) are rising due to mixed-land use violations.
- **Geographic Concentration:** Casualties are highest in industrialized, high-density states like **Maharashtra, Gujarat, Delhi, and Madhya Pradesh**, which account for over 50% of fire-related deaths.
- **Nighttime Vulnerability:** High-fatality incidents increasingly occur at night/early morning when occupants are asleep and reaction times are slow.

Causes of Fire Tragedies:

- **Regulatory Non-compliance:** Widespread operation without valid Fire NOCs.

  E.g. The **TRP Game Zone fire in Rajkot (2024)** occurred in a facility operating without a valid fire NOC or structural stability certificate.
- **Structural & Material Hazards:** Use of flammable cladding, temporary roofs, and illegal alterations.

  E.g. The **Kamla Mills fire (Mumbai, 2017)** spread rapidly due to highly combustible bamboo curtains and tarpaulin sheets on the rooftop.
- **Electrical Failures:** Short circuits remain the leading trigger (approx. 70% of fires) due to overloading and poor wiring.

  E.g. The **Mundka fire (Delhi, 2022)** was triggered by a generator explosion and electrical faults in a building with a single exit.
- **Blocked Egress & Ventilation:** Illegal basements and barred windows trap victims.

  E.g. In the **Takshashila Arcade fire (Surat, 2019)**, students were trapped on the top floor because the illegal dome structure blocked the only exit.
- **Urban Congestion:** Unplanned growth prevents fire tenders from reaching sites.

  E.g. In the **Delhi Anaj Mandi fire (2019)**, narrow lanes forced firemen to use small vehicles, delaying rescue for victims trapped in a "factory-cum-dormitory."

Implications of Recurrent Fire Accidents:

- **Disproportionate Impact on Poor:** Victims are often low-wage migrant laborers forced to live in unsafe workplaces.

  E.g. A significant portion 43 dead in Anaj Mandi were migrant workers sleeping inside the manufacturing of the unit.
- **Governance Deficit:** Reveals systemic corruption and lack of coordination between Municipal Corporations, Electricity Boards, and Fire Departments.
- **Healthcare Crisis:** Fires in hospitals undermine public trust in safety infrastructure.

  E.g. The Bhandara District Hospital fire (Maharashtra, 2021) killed 10 infants, highlighting gaps in safety audits for critical care units.
- **Economic Loss:** Beyond life, fires destroy capital and disrupt supply chains.

  E.g. FICCI estimates indicate fire-related losses cost the Indian economy over ₹1,000 crore annually.

Initiatives Taken So Far:

- **National Building Code (NBC) 2016 Part 4:** detailed provisions for Fire and Life Safety, including mandatory sprinklers, fire lifts, and occupancy restrictions.
- **Model Fire and Emergency Services Bill (2019):** Proposed to standardize fire services across states, which currently vary as "Fire Services" is a municipal function (12th Schedule).
- **Hospital Safety Guidelines (2020):** MoHFW mandated "No-Objection Certificates" and quarterly fire audits for all hospitals following the COVID-19 hospital fires.
- **Online Compliance Portals:** States like Gujarat (**Fire Safety COP**) and Maharashtra have digitized NOC applications to reduce bribery and track renewal dates.
- **Modernization Schemes:** The 15th Finance Commission recommended **₹5,000 crore** for strengthening fire services (expansion, modernization, and fleet augmentation).

Way Ahead:

- **Mandatory Third-Party Audits:** Shift from erratic government inspections to mandatory annual audits by certified independent agencies for all high-rise and commercial buildings.
- **GIS & Technology Integration:** Map all hydrants and high-risk zones using GIS; deploy **drones and firefighting robots** for narrow lanes (as seen in Delhi Fire Service trials).
- **Unified Command Centre:** Create a "One-Nation, One-License" dashboard integrating municipal building plans, electricity load sanctions, and fire NOCs to flag discrepancies automatically.
- **Liability Framework:** Amend laws to hold municipal officials and electrical inspectors criminally liable for negligence, not just building owners.
- **Workplace Safety for Migrants:** Strictly enforce the Occupational Safety, Health and Working Conditions Code, 2020, banning the practice of housing workers in factory basements or lofts.

Conclusion:

Fire tragedies in India are not mere accidents but the inevitable result of haphazard urbanization, regulatory apathy, and corruption. Addressing this requires a paradigm shift from reactive compensation to preventive audits, strict officer accountability, and technology-driven enforcement. A fire-safe India is non-negotiable for sustainable urban growth and the protection of its most vulnerable citizens.

Topics: Bilateral, regional and global groupings and agreements involving India and/or affecting India's interests.

INDIA–NEW ZEALAND FREE TRADE AGREEMENT

Context:

India and New Zealand have **concluded negotiations on a comprehensive Free Trade Agreement (FTA) in just nine months,** with formal signing expected in 2026.

About India–New Zealand Free Trade Agreement:

What is an FTA?

- A Free Trade Agreement (FTA) is a bilateral pact where countries reduce or eliminate tariffs and non-tariff barriers on goods and services to boost trade, investment, and economic cooperation.

Targets of the India–New Zealand FTA

- **Trade expansion:** Double bilateral trade from the current level to **USD 5 billion within five years**, deepening economic engagement.
- **Investment inflows:** Facilitate **USD 20 billion in New Zealand investments over 15 years**, aligned with Make in India.
- **Export diversification:** Provide Indian exporters alternative markets amid high tariffs in the US and global protectionism.
- **Services and mobility growth:** Strengthen services trade and skilled mobility through temporary employment visas and education linkages.

Existing Trade Between India and New Zealand:

- **Trade volume:** Bilateral trade reached USD 1.3 billion in FY25, registering a strong 49% year-on-year growth, yet remains modest relative to the economic size of both countries.
- **Indian exports:** India's exports are concentrated in pharmaceuticals, textiles, engineering goods, and IT/IT-enabled services, reflecting strengths in manufacturing and knowledge-based sectors.
- **Indian imports:** Imports from New Zealand largely consist of wool, fruits, forestry products, and dairy-related items, highlighting New Zealand's comparative advantage in agriculture.
- **Trade imbalance:** The trade structure is asymmetrical, with New Zealand exporting agri-products and India exporting manufactured goods and services, limiting value-chain integration.
- **Untapped potential:** Despite economic complementarities, trade remains below potential due to tariff barriers, regulatory constraints, and limited business awareness.

Key Features of the India–New Zealand FTA

- **Tariff liberalisation:** India will offer duty concessions on 95% of New Zealand exports, while New Zealand will provide duty-free access on 100% of India's tariff lines.
- **Protection of sensitive sectors:** India has excluded dairy, rice, wheat, sugar, onions, edible oils, and rubber, balancing trade liberalisation with farmer livelihood protection.
- **Boost to labour-intensive sectors:** Preferential access will support exports from textiles, apparel, leather, footwear, engineering goods, and pharmaceuticals, aiding employment generation.
- **Services and mobility provisions:** The FTA introduces 5,000 temporary employment visas annually, allowing Indian professionals to work in New Zealand for up to three years.
- **Trade facilitation rules:** Provisions on rules of origin, customs cooperation, SPS measures, and TBTs aim to reduce procedural delays and improve market predictability.

Challenges Associated with the FTA:

- **Agricultural sensitivities:** Concerns from farmer groups, especially in dairy and horticulture, restrict deeper liberalisation and require careful policy calibration.
- **Domestic political opposition in New Zealand:** Sections of New Zealand's ruling coalition oppose the pact, citing immigration pressures and dairy-sector disadvantages.
- **Low trade base:** Given the relatively small existing trade volume, economic gains may accrue gradually rather than immediately.
- Non-tariff barriers: Divergent regulatory standards, certification norms, and SPS requirements may continue to constrain exports.
- **Implementation capacity:** The agreement's success depends on how effectively MSMEs and service providers utilise its provisions.

Way Ahead:

- **Strengthen supply chains:** Beyond tariff cuts, both countries should build integrated manufacturing and agri-processing value chains to deepen trade.
- **Deepen services cooperation:** Expanding collaboration in IT, education, healthcare, tourism, and professional services can unlock high-value growth.
- **Leverage diaspora and skills:** Mobility provisions should be used to enhance people-to-people ties, skill transfer, and innovation linkages.
- **Support MSMEs:** Targeted trade facilitation, standards support, and export credit will help MSMEs access New Zealand markets.
- **Continuous review mechanism:** Regular monitoring through joint trade committees can address sectoral concerns and fine-tune implementation.

Conclusion:

The India–New Zealand FTA represents a new-generation trade agreement balancing market access with domestic sensitivities. By expanding trade, investment, and skilled mobility, it strengthens India's Indo-Pacific economic strategy. Effective implementation can transform the pact into a durable platform for diversified and resilient bilateral ties.

INDIA–OMAN CEPA

Context: India and Oman signed a Comprehensive Economic Partnership Agreement (CEPA) marking India's second major trade pact in West Asia after the UAE.

About India–Oman CEPA:

What it is?

- A Comprehensive Economic Partnership Agreement (CEPA) aimed at deepening trade, services, investment and mobility between India and Oman.
- It is Oman's first bilateral trade agreement since the US FTA (2006).

Key features of India–Oman CEPA:

1. **Zero-duty market access:** Oman has eliminated customs duties on **98.08% of its tariff lines**, covering **99.38% of India's exports**, making Indian goods significantly more price-competitive.
2. **Boost to labour-intensive sectors:** Sectors like **textiles, leather, gems & jewellery, engineering goods, pharmaceuticals and automobiles** gain from full tariff elimination, supporting jobs, MSMEs and export-led growth.
3. **Wide services liberalisation:** Oman has opened **127 services sub-sectors**, including **IT, professional services, R&D, education and healthcare**, creating high-value opportunities for Indian service providers.
4. **Enhanced mobility for professionals (Mode 4):** The quota for **intra-corporate transferees rises from 20% to 50%**, while **contractual service suppliers can stay up to two years**, extendable further, improving workforce mobility.
5. **100% FDI in services:** Indian companies are allowed **full foreign ownership** in major services sectors in Oman, enabling long-term commercial presence and regional expansion.
6. **AYUSH and traditional medicine access:** For the first time globally, a country has committed to **traditional medicine across all modes**, opening the Gulf market for India's AYUSH and wellness sectors.
7. **Faster pharmaceutical approvals:** Acceptance of approvals by **USFDA, EMA and UKMHRA** reduces regulatory delays and costs, speeding up Indian pharma exports to Oman.

Oman deal and India's West Asia trade strategy:

- **Market diversification beyond the West:** The Oman CEPA helps India reduce overdependence on the US and EU, where exports face higher tariffs and carbon-linked barriers like CBAM.
  E.g. EU's carbon tax has raised compliance costs for Indian steel and cement exporters, making West Asia a safer alternative market.
- **Oman as a gateway economy:** Oman's location near the Strait of Hormuz allows Indian goods to access West Asia, East Africa and trans-shipment hubs efficiently.
  E.g. Ports like Duqm and Sohar can serve as re-export bases for Indian engineering and consumer goods.
- **Strategic foothold within GCC:** With FTAs with UAE (2022) and Oman (2025), India gains leverage despite stalled India–GCC negotiations.
  E.g. Two bilateral pacts help India avoid tariff disadvantages in Gulf markets dominated by EU and East Asian exporters.
- **Services-led trade expansion:** The deal strengthens India's core strength in IT, healthcare, education and professional services, sectors less affected by tariff barriers.
  E.g. Oman's services imports are USD 12.5 billion, while India's share is only 5.3%, indicating untapped potential.
- **Energy-security complementarity:** India secures stable access to crude oil, LNG, fertilisers and petrochemical inputs, vital for domestic energy and agriculture.
  E.g. Oman remains a reliable LNG supplier amid global energy volatility after the Ukraine conflict.

Challenges associated with the Oman CEPA:

- **Limited market size:** Oman's domestic market is small, which may restrict large-scale export growth beyond niche and re-export segments.
  E.g. Oman's annual imports are around USD 40 billion, far smaller than UAE or Saudi Arabia.
- **Competitiveness and quality gaps:** Indian exporters must upgrade quality, packaging and

branding to sustain long-term market presence.
E.g. Gulf consumers increasingly prefer premium and certified products.

- **Implementation and NTB risks:** Actual gains depend on smooth implementation of services mobility and non-tariff barrier removal.
  E.g. Delays in professional visa processing can dilute Mode 4 benefits.
- **Regional geopolitical volatility:** West Asia remains exposed to conflicts, energy shocks and shipping disruptions.
  E.g. Red Sea tensions have recently raised freight and insurance costs.
- **Fragmentation of GCC trade policy:** Multiple bilateral FTAs may complicate the path to a comprehensive India–GCC trade agreement.
  E.g. Different rules of origin can increase compliance burden for exporters.

Way ahead:

- **Develop Oman as a re-export hub:** Position Oman as a logistics and redistribution centre for Indian goods entering Africa and the Middle East.
  E.g. Leveraging Duqm port under India–Oman industrial cooperation.
- **Move up the value chain:** Shift focus from raw exports to value-added manufacturing and brand-led exports.
  E.g. Engineering goods and finished jewellery instead of raw materials.
- **Deepen services and skills integration:** Fast-track mutual recognition agreements and professional mobility frameworks.
  E.g. Easier entry for Indian doctors, architects and IT professionals.
- **Align with domestic growth schemes:** Integrate CEPA benefits with PLI schemes, MSME clusters and skilling initiatives.
  E.g. PLI-supported auto and electronics exports to Gulf markets.
- **Use bilateral success to revive GCC talks:** Leverage Oman and UAE pacts to rebuild momentum for an India–GCC FTA.
  E.g. Demonstrating mutual gains to other GCC members.

Conclusion:

The India–Oman CEPA strengthens India's West Asia trade pivot at a time of rising protectionism in the West. By combining tariff-free goods access, deep services commitments and professional mobility, the deal enhances India's export resilience. If effectively implemented, it can transform Oman into a **strategic economic bridge** linking India to the wider Gulf and Africa.

INDIA–OMAN BILATERAL RELATIONS

Context: PM Narendra Modi's Oman visit during his West Asia–Africa tour coincides with 70 years of India–Oman diplomatic ties and rising regional churn.

About India–Oman Bilateral Relations:

History and evolution:

- **Civilisational maritime bridge:** India–Oman ties run through the **Indian Ocean trading system**, where the Arabian Sea acted as a connector for commerce, culture and navigation traditions.
- **People-to-people and diaspora depth:** Long-standing movement of traders, seafarers and workers created trust that outlasted modern geopolitics.
- **Early strategic comfort in a sensitive region:** When parts of the region were ambivalent about India, Oman maintained steady engagement based on moderation and neutrality.
- **Institutionalisation of partnership (2005–2008 onwards):** Defence MoU (2005) and **Strategic Partnership (2008)** gave the relationship a formal security and political spine.
- **2018–2025 phase: Strategic + digital + connectivity:** The relationship expanded into **Duqm access**, fintech linkages and corridor conversations (IMEC).
  Eg: RuPay launch in Oman (2022) shows India's DPI diplomacy moving beyond rhetoric.

Sectors of cooperation:

- **Defence and maritime security:**

- **Duqm as a strategic enabler:** Duqm logistics access supports Indian naval turnaround, replenishment and operational flexibility in the western IOR.
- **Joint exercises and interoperability:** Regular tri-service engagement builds habits of cooperation for contingencies and HADR missions.
- **Overflight and transit support:** Operational access enhances India's reach for evacuation, disaster response and crisis-time movement.

- **Trade, investment and business:**
  - **Growing trade and JV ecosystem:** Beyond trade value, the relationship has a JV backbone that anchors continuity even during political shocks.

    Eg: Over **6,000 India–Oman joint ventures** in Oman with estimated investment **~$776 mn**.
  - **Manufacturing and logistics linkages:** Free zones and port-led projects can integrate Indian firms into Gulf–Africa supply chains.

    Eg: Indian companies are major investors in **Sohar and Salalah Free Zones**.
- **Fintech and digital public infrastructure:**
  - **Payment connectivity:** Linked payment systems reduce transaction friction for diaspora remittances, tourism and SMEs.

    Eg: Central Bank of Oman–NPCI MoU (Oct 2022) and **RuPay in Oman** created a visible DPI milestone.
- **Energy transition and future fuels:**
  - **Beyond oil: green energy convergence:** Both sides can align on green hydrogen, renewables, and critical minerals to future-proof energy security.
- **Education and health:**
  - **Knowledge corridor potential**: Offshore campuses and skill partnerships can create long-term influence and workforce linkages.

Challenges associated:

- **Regional volatility risk:** West Asia's conflict cycles can disrupt trade routes, investor confidence, and diaspora safety planning.
- **Trade concentration and limited diversification:** High dependence on a few commodities reduces resilience and limits CEPA's early "headline gains".
- **Eg:** Without value-chain expansion, trade growth can remain price-driven instead of productivity-driven.
- **Great power competition in the IOR:** Strategic space is contested, and every logistics/port arrangement attracts geopolitical signalling.

  Eg: Oman's location enables monitoring of **PLA Navy activity**, but also raises competitive sensitivities.
- **Implementation gap in agreements:** Announcements can outpace execution due to standards, customs processes, and regulatory alignment issues.
- **Diaspora welfare and labour market shifts:** Economic slowdowns or policy changes can affect Indian workers, remittances and community stability.

Way ahead:

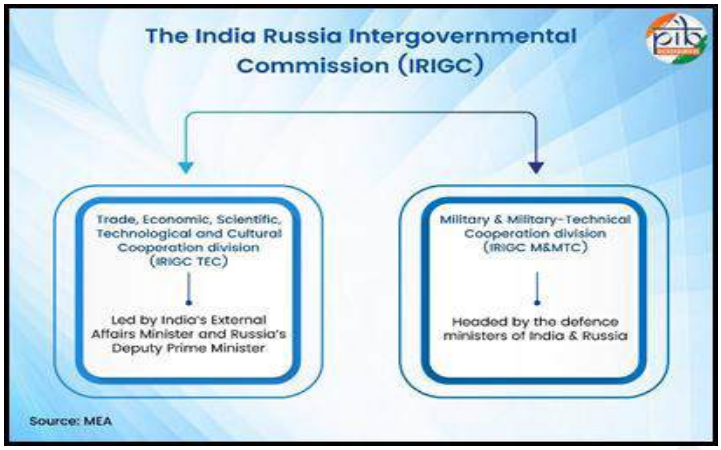
- **Fast-track CEPA with sectoral "early harvest" wins:** Prioritise services, MSME market access, standards harmonisation, and logistics facilitation for quick impact.
- **Deepen Duqm-centric maritime cooperation:** Expand joint patrol coordination, HADR drills, and anti-piracy information sharing in the Gulf of Oman.
- **Build a green energy partnership roadmap:** Create joint pilots on green hydrogen value chains and renewable-linked industrial clusters.
- **Scale fintech interoperability beyond RuPay:** Move from card presence to wider acceptance, cross-border UPI-like rails, and SME payment solutions.
- **People-first cooperation: skills, healthcare, and mobility:** Use education/health partnerships to build trust that survives geopolitical swings.

Conclusion:

India–Oman ties combine civilisational depth with modern strategic utility—from Duqm and maritime security to fintech and the energy transition. The proposed CEPA can turn a strong relationship into a more productive economic engine. Sustained delivery, diversification and people-centric outcomes will decide how far this partnership scales in a volatile region.

INDIA–RUSSIA BILATERAL RELATIONS

Context: Russian President Vladimir Putin is on a state visit to India for the 23rd India–Russia Annual Summit in New Delhi, where he received a ceremonial welcome at Rashtrapati Bhavan and held talks with Prime Minister of India.



About India–Russia Bilateral Relations:

- **Nature of ties**: India–Russia enjoys a "Special and Privileged Strategic Partnership" since 2010, upgraded from a Strategic Partnership in 2000, marked by high trust, defence dependence, and political convergence on multipolarity.
- **Institutional structure**: Relations are anchored in annual summits, the India–Russia Inter-Governmental Commission (IRIGC) with its TEC and M&MTC segments, the 2+2 dialogue, NSA-level talks, parliamentary exchanges and sectoral working groups.
- **Strategic convergence**: Both countries support a multipolar world, reform of global governance (UNSC expansion including India), and coordination in BRICS, SCO, G20, UN.

Key Areas of Cooperation:

1. **Defence & Strategic Security:**
   - **Legacy & current platforms**: Russia remains India's major defence partner – Su-30MKI, T-90 tanks, INS Vikramaditya, most submarines, and S-400 air defence system are of Russian origin or co-produced.
   - **Joint R&D / production**: Flagship projects include BrahMos cruise missile, licensed production of Su-30MKI and T-90, AK-203 assault rifles under "Make in India", long-term military-technical cooperation programme 2021–31.
   - **Exercises & operational cooperation:** Regular joint exercises like INDRA (tri-services + naval), participation in large Russian drills (e.g., ZAPAD-2025), and Garuda-type engagements strengthen interoperability and strategic signalling.
   - **Nuclear & space cooperation:** Russia is India's only foreign civil nuclear partner on the ground (e.g., Kudankulam Nuclear Power Plant), and a key collaborator for Gaganyaan astronaut training and space-tech sharing.
2. **Energy & Natural Resources:**
   - **Hydrocarbons**: Russia is a major supplier of discounted crude oil, gas and coking coal, pivotal during post-Ukraine sanctions turbulence. Indian companies have upstream stakes in Russian projects (e.g., Sakhalin).
   - **Civil nuclear energy:** Ongoing units and plans at Kudankulam underpin long-term baseload power and technology transfer.
   - **New frontiers:** Dialogue on LNG, critical minerals, Arctic energy, hydrogen and nuclear fuel cycle cooperation is expanding.
3. **Trade, Connectivity & Economic Ties:**
   - **Trade profile**: Bilateral trade reached USD 68.7 billion in FY 2024–25, dominated by India's imports of energy, fertilizers, and defence items; India exports pharmaceuticals, agri-products, chemicals and marine products.
   - **Trade targets:** Leaders have set a goal of USD 100 billion trade by 2030 and USD 50 billion mutual investments (energy, petrochemicals, banking, infrastructure, pharma).
   - **Connectivity corridors:** Joint work on International North–South Transport Corridor (INSTC), Chennai–Vladivostok Eastern Maritime Corridor, and interest in the Northern Sea Route to shorten transit times and bypass chokepoints.
4. **Science, Technology & Space:**
   - **S&T cooperation**: Joint projects in basic

sciences, nanotech, materials science, IT, AI, guided by an STI Roadmap (2021) aiming at commercialization and innovation ecosystems.

- **Space collaboration**: Long-standing partnership including Gaganyaan astronaut training, satellite cooperation and potential joint missions; legacy goes back to early ISRO–Soviet launches.

4. **Education, Culture & People-to-People Ties:**
   - **Education:** Over 20,000 Indian students study in Russia (especially medicine); multiple MoUs under EEP, RIN, SPARC, GIAN and growing scholarship exchanges (ITEC).
   - **Cultural links:** Indian films, Yoga, classical arts and festivals (e.g., Bharat Utsav, Indian Film Festival) remain popular in Russia, while Russian literature, art and academic exchanges are prominent in India.

Key Challenges in the Bilateral Relationship:

- **Geopolitical Pressures & Ukraine War:** Western sanctions, US/EU scrutiny and the ongoing Russia–Ukraine conflict complicate India's balancing between Russia and the West, raising reputational and financial risks (payment channels, secondary sanctions).
- **Trade Imbalance & Payment Issues:** Trade is heavily skewed in Russia's favour (large current account deficit for India); rupee–rouble settlement, frozen funds and banking connectivity remain unresolved.
- **Over-Dependence on Russian Defence Supplies:** Despite diversification, a significant share of Indian military platforms and spares is Russian; delays, sanctions, and Russia's own wartime needs risk **supply disruptions** and slow modernization.
- **Technological Transitions & Competition:** India seeks cutting-edge defence and high-tech from Western/Japanese partners, sometimes beyond what Russia can offer, creating relative decline in Russia's share of India's procurement pipeline.
- **Connectivity & Logistics Bottlenecks:** INSTC, Chennai–Vladivostok corridor and Northern Sea Route face infrastructure, regulatory and financing constraints, and regional instability in West Asia/Caucasus can affect routes.

Way Ahead:

- **Rebalance Economic Ties & Diversify Trade Basket:** Push Indian exports in pharma, agri, textiles, machinery, IT services, resolve payment mechanisms, and set up dedicated India–Russia trade facilitation corridors and logistics parks.
- **Deepen Co-production & Technology Sharing in Defence:** Move from buyer–seller to joint design, IP sharing and export-oriented co-production (next-gen air defence, armour, naval platforms, engines, space and cyber).
- **Fast-Track Connectivity Projects:** Operationalise INSTC and Chennai–Vladivostok EMC with regular shipping services, digital documentation, customs harmonisation and PPP investments; explore Arctic shipping cooperation carefully.
- **Cooperate on New-Age Technologies & Energy Transition:** Launch joint missions in nuclear fuel cycle, small modular reactors (SMRs), green hydrogen, critical minerals, AI, quantum and cybersecurity to keep the partnership future-oriented.
- **Strengthen People-to-People and Educational Links:** Ease student mobility, mutual degree recognition, joint campuses, and expand cultural festivals, tourism, and academic chairs in each other's universities.
- **Institutionalise Strategic Dialogue Amid Global Flux:** Use Annual Summits, 2+2, NSA dialogue and track-2 channels to manage differences on Ukraine, China, Indo-Pacific and sanctions while preserving strategic autonomy for both.

Conclusion:

India–Russia relations remain one of New Delhi's most enduring strategic partnerships, built on defence, energy and political trust. The current summit amid global churn is an opportunity to rebalance ties beyond hydrocarbons and Soviet-era defence platforms towards technology, trade and connectivity. Managing external pressures while modernising and diversifying cooperation will decide whether the partnership stays "special and privileged" in substance, not just in name.

GENERAL STUDIES – 3

Topics: Indian Economy and issues relating to planning, mobilization of resources, growth, development and employment.

TREND AND PROGRESS OF BANKING IN INDIA 2024-25 REPORT

Context: RBI's latest "Trend and Progress of Banking in India" report flags a resilient banking system with multi-decadal low NPAs, strong balance-sheet expansion and policy push for safer, more inclusive finance.

About Trend and Progress of Banking in India 2024-25 Report:

What it is?

- An annual RBI flagship assessment of banking & NBFC performance, risks, regulation/supervision priorities, payments, technology adoption, financial inclusion and consumer protection, culminating in an overall systemic soundness assessment.

Key trends:

- **Balance sheets expanding:** Scheduled commercial banks (SCBs) grew at a double-digit pace in deposits and credit (with some moderation).
- **Asset quality stronger:** SCBs' GNPA ratio fell to a multi-decadal low.
- **Capital & liquidity buffers:** Banks are well-capitalised with leverage and liquidity ratios above regulatory minimum.
- **Digital inclusion scale-up:** 514 districts became fully digitally-enabled (at least one digital payment mode for every eligible individual).
- **Financial Inclusion Index up:** RBI's FI Index improved to **67.0** (from **43.4** earlier), indicating deeper inclusion.
- **ULI expanding credit access:** 64 lenders (41 banks, 23 NBFCs) onboarded; using 136+ data services across 12 loan journeys.
- **Deposit insurance reform:** Shift approved to risk-based deposit insurance premium, moving beyond the flat premium (ceiling noted as 12 paise/₹100 assessable deposits).

Positive growth of the Indian banking sector in India

- **Asset quality at multi-decade best:** Gross Non-Performing Assets (GNPA) ratio declined to ~2.1% of total advances, the lowest level seen in several decades, indicating strong recovery and prudent lending.
- **Sustained credit expansion:** Bank credit has been growing at double-digit rates (~14–16%), reflecting healthy demand from industry, MSMEs, housing and services sectors.
- **Robust capital adequacy:** Scheduled Commercial Banks maintain Capital to Risk Weighted Assets Ratio (CRAR) well above 16%, significantly higher than the Basel III requirement of 11.5%, ensuring shock absorption capacity.
- **Strong deposit mobilisation:** Bank deposits have also grown at ~12–13%, showing rising public trust in the formal banking system despite alternative investment avenues.
- **Deepening financial inclusion:** RBI's Financial Inclusion Index improved to about 67, up sharply from earlier levels, reflecting wider access to accounts, credit, insurance and digital payments.

Key initiatives taken:

- **PRAVAAH portal:** Centralised digital portal for regulatory submissions; wider service coverage to improve transparency and turnaround.
- **Digital payments push:** Inclusion-focused measures (district-level digital enablement; accessibility for PwD).
- **Unified Lending Interface (ULI):** Plug-and-play data architecture to speed up safer lending decisions and widen formal credit.
- **FREE-AI framework:** Principles + governance rails for responsible AI adoption (fairness, accountability, safety, transparency).
- **Risk-based deposit insurance:** Incentivises sound risk management and strengthens trust

in the banking system.

Key challenges in banking:

- **Customer grievances rising:** Complaints in loans, cards and digital channels are increasing, exposing weak service delivery, slow resolution and inconsistent customer communication.
- **Digital fraud and cyber risk:** UPI/online banking growth expands the attack surface, and weak cybersecurity hygiene plus social engineering can quickly erode trust and trigger losses.
- **AI and model-risk concerns:** Greater use of AI in credit and fraud systems brings opacity, bias and privacy risks; poor governance can cause systemic mis-scoring and unfair outcomes.
- **Retail-credit stress pockets:** Even with overall better asset quality, certain unsecured/small-ticket segments can show strain, especially when underwriting and collection discipline weaken.
- Inclusion-quality gap**:** Access to accounts is not equal to meaningful inclusion; low financial literacy, language barriers and digital discomfort can lead to exclusion or mis-selling.

Way ahead:

- **Quality-first credit expansion:** Strengthen underwriting with verified data, tighter affordability checks and risk-based pricing so growth remains sustainable, not consumption-bubble driven.
- **Stronger consumer protection stack:** Upgrade internal ombudsman processes, faster turnarounds and transparent escalation so grievances reduce and trust becomes a competitive advantage.
- **Tech governance and audits:** Build board-level oversight for AI and IT systems, mandate explainability, periodic audits, bias testing and strong data protection across lifecycle.
- Cybersecurity**-by-design:** Shift from reactive controls to continuous monitoring, secure authentication, staff training and coordinated fraud intelligence sharing across banks and agencies.
- **Deepen** financial literacy**:** Scale targeted literacy for rural users, seniors and first-time digital users, focusing on safe payments, fraud awareness and informed borrowing decisions.

Conclusion:

The report underlines that India's banks are entering a stronger phase with low NPAs, solid buffers and expanding balance sheets. Next gains will come from responsible tech adoption (ULI/AI) and faster, fairer customer protection. A stability-first approach that still enables innovation is the key to sustaining credit-led growth and inclusion.

THE INDIAN OCEAN AS THE CRADLE OF A NEW BLUE ECONOMY

Context: The Indian Ocean is emerging as a focal point of global climate, economic and geopolitical shifts, prompting calls for a new Blue Economy framework.

About The Indian Ocean as the Cradle of a New Blue Economy:

India's Historical Leadership in Ocean Governance:

- **Championing "Common Heritage of Mankind":** India aligned with Small Island Developing States (SIDS) during UNCLOS, advocating that seabed resources beyond national jurisdiction be treated as a global common, strengthening its moral leadership.
- **Early Vision of Maritime Centrality:** Nehru asserted that India's future prosperity and security are tied to ocean freedom and resources, embedding oceans into India's strategic imagination from the 1950s.
- **Environmental Justice at Global Forums:** Indira Gandhi's Stockholm (1972) stance on balancing poverty eradication with environmental protection positioned India as a credible advocate of equitable ocean governance.
- **Consistent Support for Multilateral Ocean Regimes:** India's engagement in IORA, IONS, and Indian Ocean Commission reflects a long-standing commitment to cooperative maritime governance instead of great-power rivalry.
- **Leadership in Sustainable Use Norms:** India has consistently supported biodiversity protection, including readiness to ratify the **BBNJ Agreement**, reinforcing its reputation as a responsible ocean steward.

Emerging Challenges in the Indian Ocean:

- **Intensifying Climate Vulnerability:** The Indian Ocean is warming faster than the global average, driving thermal expansion, sea-level rise, and more frequent extreme cyclones impacting coastal populations.

- **Ocean Acidification & Coral Collapse:** Rising CO_2 levels are degrading coral reefs such as the Lakshadweep and Chagos systems, undermining biodiversity, fisheries productivity, and tourism incomes.
- **Illegal, Unreported & Unregulated (IUU) Fishing:** IUU fleets deplete fish stocks, harm artisanal livelihoods, and fuel regional tensions, particularly near East Africa and the Bay of Bengal.
- **Declining Marine Productivity:** Overfishing and altered monsoon patterns reduce nutrient upwelling, weakening the marine food chain and posing food-security risks for littoral nations.
- **Socio-Economic Instability:** Ecosystem decline triggers migration, loss of coastal employment, and community vulnerability, creating a security challenge beyond traditional naval threats.

Rationale for a Blue Ocean Strategy for India:

Stewardship of the Commons:

- **Promote Cooperative Ocean Governance:** Position the Indian Ocean as a shared space through rules-based management, biodiversity protection, and joint marine scientific research.
- **Restore Degraded Ecosystems:** Lead regional coral-restoration, mangrove recovery, and sustainable fisheries initiatives to rebuild ecological resilience.
- **Strengthen Marine Protected Areas (MPAs):** Support expansion of MPAs—including high-seas areas under BBNJ—to safeguard critical habitats and spawning grounds.

Climate and Disaster Resilience:

- **Regional Resilience & Innovation Hub:** India can host a hub integrating ocean observation, modelling, and technology transfer for SIDS and African nations to strengthen early-warning capacities.
- **Enhance Ocean Observation Infrastructure:** Scale up INCOIS, MoES, and satellite systems for better cyclone prediction, monsoon modelling, and tsunami risk tracking.
- **Build Climate-Ready Coastal Infrastructure:** Support nature-based solutions—mangrove belts, dune restoration, artificial reefs—to protect vulnerable coasts from storm surges.

Inclusive Blue Growth:

- **Green Shipping Corridors:** Develop low-emission maritime routes with major ports, reducing freight emissions and aligning with IMO decarbonisation goals.
- **Offshore Renewable Energy Expansion:** Leverage India's vast EEZ for offshore wind, wave, and tidal energy projects, enabling clean growth for coastal states.
- **Sustainable Aquaculture Systems:** Promote mariculture, seaweed farming, and hatchery upgrades to boost rural incomes while reducing pressure on wild stocks.

Global Momentum for Ocean Finance:

1. **Rising Global Commitments for Ocean Action:** New international pledges indicate a rapid shift in global priorities, with countries and institutions recognising oceans as critical to climate resilience, biodiversity protection, and sustainable development.
2. **€25 Billion Existing Ocean Investments + €8.7 Billion New Pledges (BEFF 2025):** At the Blue Economy & Finance Forum 2025, governments, development banks, and private investors showcased a €25 billion pipeline of ongoing ocean projects and announced €8.7 billion fresh commitments, signalling confidence in blue-economy returns.
3. **$20 Billion Ocean Finance Target Under the One Ocean Partnership (COP30, Belém):** COP30 launched the One Ocean Partnership committing to mobilise $20 billion by 2030, integrating oceans into mainstream climate finance and supporting conservation, resilience, and sustainable blue-economy pathways.

Way Ahead:

- **Establish an Indian Ocean Blue Fund:** Create a financing mechanism seeded by India and open to global partners to convert pledges into implementable regional projects.
- **Operationalise "Security Through Sustainability":** Integrate anti-IUU patrols, coral monitoring, and pollution tracking with maritime domain awareness to align ecology with security.
- **Lead Ocean Norm-Setting Platforms:** Use IORA, IOC-UNESCO, and G20 forums to standardise practices on green shipping, blue bonds, and responsible marine resource extraction.
- **Accelerate BBNJ Ratification & Implementation:** Demonstrate leadership in high-seas biodiversity governance by championing MPAs, ABS mechanisms, and marine technology sharing.
- **Promote Science-Diplomacy Networks:** Strengthen collaboration among INCOIS, CSIR-NIO, WHOI, and regional institutes to jointly advance ocean science, modelling, and innovation.

Conclusion:

The Indian Ocean—home to ancient civilizations and modern vulnerabilities—can become the **cradle of a new blue economy** that blends prosperity with sustainability. By aligning vision with finance and stewardship, India can show that cooperation, not rivalry, must define the future of ocean governance, living up to the principle: **"From the Indian Ocean, for the World."**

CURRENCY DEPRECIATION

Context: The Indian Rupee recently slipped past the ₹90 per US dollar mark, making it one of Asia's worst-performing currencies in 2025, even as GDP growth remains robust.

About Currency Depreciation:

What it is?

- Currency depreciation is a **fall in the value of a domestic currency** against a foreign currency under a **market-determined (floating) exchange rate system**. It is the opposite of appreciation and reflects excess supply or weak demand for the domestic currency in forex markets.

Key Features:

- It alters **relative prices**: exports become cheaper in foreign currency, imports costlier in domestic currency.
- It can be **gradual or sudden**, driven by trade, capital flows, expectations, or policy choices.
- It affects **inflation, external debt, capital flows, and growth** simultaneously, not just exports.

Causes of Rupee Depreciation:

- **Capital Outflows & FPI Selling:** Foreign investors have shifted funds from Indian markets to **higher-return AI and tech stocks abroad**, reducing demand for the rupee and raising demand for dollars.
- **Trade Tensions & Tariffs:** Higher **US tariffs on Indian exports**, uncertainty over trade deals, and global protectionism have weakened export prospects, lowering forex earnings.
- **Widening Current & Capital Account Pressures:** Costlier crude oil (especially after **curbs on cheap Russian oil**) and high gold prices have **widened the trade deficit**, raising India's external financing needs.
- **Relative Interest Rate & Dollar Strength:** Tight US monetary policy and strong dollar assets attract global capital, making emerging market currencies like the rupee relatively unattractive.
- **Risk Sentiment & Geopolitics:** Ongoing wars, sanctions, and global uncertainty push investors into **"safe havens"** like the US dollar and gold, adding pressure on the rupee.

Implications of Currency Depreciation:

- **Potential Benefits:**
  - **Improved Export Price Competitiveness:** A weaker rupee can make Indian goods cheaper in dollar/euro terms, supporting sectors like textiles, IT-enabled services, and generic pharma—**if** export capacity and demand conditions are favourable.
  - **Substitution Away from Imports:** Costlier imports may push firms and consumers towards domestically produced alternatives, supporting "Make in India" and local value chains in the medium term.
- **Risks and Costs:**
  - **Imported Inflation:** Higher rupee cost of **oil, gas, fertilisers, electronics, edible oils and gold** can feed into CPI and WPI, forcing RBI to tighten monetary policy and potentially slowing growth.
  - **Worsening CAD & External Vulnerability:** India remains a net importer of energy and capital goods; if import volumes don't fall, the current account deficit (CAD) can widen despite depreciation.
  - **Burden on External Debt & Corporate Balance Sheets:** Firms and government entities with **dollar-denominated loans** face higher repayment costs in rupees, pressuring corporate balance sheets and public finance.
  - **Market Volatility & Investor Confidence:** A persistently falling rupee can create a perception of **macroeconomic weakness**, discouraging long-term FDI and raising the risk premium on India.

Methods to Counter Rupee Depreciation:

- **Prudent RBI Intervention:** Use forex reserves to smooth volatility (not defend a fixed level), intervene in spot and forward markets, and deploy swap lines with other central banks.
- **Interest Rate and Liquidity Management:** Calibrated rate hikes and tighter liquidity can make rupee assets more attractive, but must balance inflation control with growth concerns.
- **Incentivising Forex Inflows:**
  - Offer attractive terms on **NRI deposits**, sovereign or quasi-sovereign **dollar bonds**, and special FCNR schemes.
  - Provide **interest subvention or tax incentives** to exporters who repatriate earnings early and hold forex in India.
- **Deepening Local Currency Use in Trade:** Encourage INR invoicing in bilateral trade, especially with key partners, and promote currency swap arrangements to reduce dollar dependence.
- **Structural: Boost Productivity & Export Capacity:** Invest in R&D, logistics, ports, power, skilling, and digital infrastructure so that export competitiveness comes from productivity, not a chronically weak rupee.

Significance of a Stable Rupee:

- **Macroeconomic Credibility:** A relatively stable rupee signals sound fundamentals, disciplined macro policy, and low inflation expectations, reassuring investors and rating agencies.
- **Planning & Investment Certainty:** Exchange rate stability lowers hedging costs and gives firms clarity for pricing, contracting, and long-term investment decisions.
- **Social and Distributional Stability:** Stable currency protects the poor from imported inflation (fuel, food, fertiliser) and shields savings from sudden erosion in purchasing power.

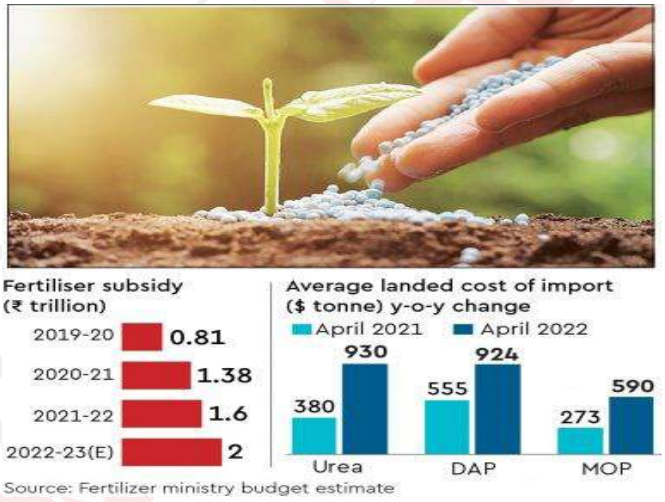
Conclusion:

Currency depreciation may briefly boost export competitiveness, but prolonged weakness fuels inflation, heightens external risks, and strains the economy. India's trade strength must ultimately come from higher productivity, diversified exports, and strong institutions—not a falling rupee. Depreciation should remain a short-term measure, while policy prioritises a stable and credible currency.

Topics: Issues related to direct and indirect farm subsidies and minimum support prices; Public Distribution System- objectives, functioning, limitations, revamping; issues of buffer stocks and food security; Technology missions; economics of animal-rearing.

REFORMING THE FERTILISER SUBSIDY IN INDIA

Context: Amid wide-ranging economic reforms led by present government, economists have called for urgent restructuring of India's fertiliser subsidy regime.



About Reforming the Fertiliser Subsidy in India:

What it is?

- The fertiliser subsidy is a government support mechanism that keeps fertiliser prices—especially urea—artificially low for farmers by compensating manufacturers for the gap between cost of production/import and retail price.
- It aims to ensure affordable inputs and food security but has evolved into one of India's largest and most distortionary subsidies.

India's current status and trends:

- **Second-largest subsidy** in the Union Budget, next only to food subsidy.
- Expected to reach **~₹2 lakh crore in FY26**, exceeding the budget of the Ministry of Agriculture & Farmers' Welfare.
- **Urea dominates the subsidy**: nearly two-thirds of total outgo, sold at a fixed price of **₹242 per 45-kg bag**, among the cheapest globally.
- **High import dependence:** ~78% natural gas (urea), ~90% phosphatic fertilisers, and nearly 100% potash.
- **Resultant nutrient imbalance:** India's N:P:K ratio has worsened to **10.9:4.4:1**, far from the

recommended **4:2:1**.

Why subsidy is needed in India?

1. **Food security imperative:** Fertiliser subsidy enabled widespread adoption of modern inputs during the Green Revolution, sharply raising cereal output and avoiding mass hunger.
   E.g. In the 1970s, the fertiliser–grain response ratio was around **1:10**, underpinning India's food self-sufficiency.
2. **Protection of small and marginal farmers:** With over **85% farmers cultivating small holdings**, subsidies cushion them against volatile global fertiliser and energy prices.
   E.g. Sudden deregulation would spike input costs and reduce fertiliser use, especially among cash-constrained farmers.
3. **Ensuring affordability of cultivation:** Fertiliser subsidy lowers the cost of cultivation and stabilises farm profitability in rain-fed and low-productivity regions.
   E.g. Cheap urea keeps per-acre input costs manageable for cereal farmers.
4. **Price stability and inflation control:** Input subsidies indirectly moderate food prices by containing cost-push inflation in agriculture.
   E.g. Low fertiliser prices help stabilise cereal prices in the short run.
5. **Risk mitigation in a climate-vulnerable sector:** Agriculture faces monsoon variability and yield uncertainty; subsidies act as a buffer against income shocks.
   E.g. Subsidised inputs reduce downside risk during poor rainfall years.

Challenges associated with the current regime:

1. **Low nutrient use efficiency (NUE):** Only **35–40% of nitrogen** applied is absorbed by crops, reflecting inefficient and excessive urea use.
   E.g. The rest volatilises or leaches, raising costs without proportional yield gains.
2. **Environmental degradation:** Excess nitrogen pollutes groundwater and depletes soil organic carbon, harming long-term soil fertility.
   E.g. Nitrate contamination has made groundwater non-potable in several agrarian belts.
3. **Productivity stagnation:** Rising fertiliser consumption has not translated into commensurate yield growth.
   E.g. Fertiliser–grain response ratio declined to **~1:2.7** by 2015 in irrigated areas.
4. **Leakages and diversion:** Price-controlled urea incentivises diversion to non-farm uses and cross-border smuggling.
   E.g. 20–25% of subsidised urea reportedly leaks into plywood, glass industries or illegal trade.
5. **Fiscal and geopolitical vulnerability:** Heavy import dependence exposes subsidy outgo to global energy and commodity shocks.
   E.g. A spike in natural gas prices immediately inflates the subsidy bill.

Way ahead:

1. **Gradual price decontrol with income support:** Shift from price subsidy to **direct income transfers**, protecting farmers while restoring market signals.
   E.g. Redirect savings through PM-KISAN–type support while allowing fertiliser prices to reflect nutrients.
2. **Bring urea under Nutrient-Based Subsidy (NBS):** Align urea pricing with phosphorus and potassium to correct nutrient imbalance.
   E.g. Reduce nitrogen subsidy and rebalance support towards P and K without increasing total outlay.
3. **Leverage digital agriculture (Agri Stack):** Use land records, PM-KISAN data, crop maps, and satellite imagery for precise targeting.
   E.g. Cap fertiliser quantity based on land size and crop sown to curb overuse.
4. **Promote balanced and precision farming:** Encourage complex fertilisers, micronutrients, fertigation, and customised blends to raise NUE.
   E.g. China uses **~60% complex fertilisers** compared to **~17% in India**.
5. **E-vouchers and PoS-based delivery:** Digitise fertiliser distribution to eliminate diversion and improve accountability.
   E.g. e-RUPI–style vouchers redeemable only at authorised agri-input dealers.

Conclusion:

Reforming fertiliser subsidy is not about withdrawing support but making it smarter, greener, and fairer. Correcting price signals can save ~₹40,000 crore annually, improve soil health, and raise farm productivity. With high growth and manageable inflation, this is the right moment to align farm subsidies with sustainability and income security.

Topics: Effects of liberalization on the economy, changes in industrial policy and their effects on industrial growth.

INDIA AND A STRONG DEFENCE INDUSTRIAL BASE

Context: The debate on building a strong defence industrial base has intensified as India targets ₹3 lakh crore defence production and ₹50,000 crore defence exports by 2029, alongside rising geopolitical instability and supply-chain risks.

About India and A Strong Defence Industrial Base:

What it is?

- A defence industrial base is the ecosystem of public + private firms, MSMEs, R&D labs, testing infrastructure, and supply chains that can design, develop, manufacture, maintain, and export defence platforms, spares, and technologies.

Key trends in India:

- **Highest-ever defence production:** **₹1.54 lakh crore** in **FY 2024–25**.
- **Indigenous defence production: ₹1,27,434 crore** in **FY 2023–24** (up **174%** from 2014–15).
- **Defence exports:** Record **₹23,622 crore** in **FY 2024–25**, to **80+ countries / over 100 nations**.
- **Ecosystem depth: 16,000 MSMEs**, **788 industrial licences** to **462 companies**.
- **Private sector role rising:** About **23%** share in total production (FY 2024–25).

Necessity of an Indigenous Defence Industrial Base (IDIB):

- **Strategic autonomy in crises:** An indigenous defence base insulates national security from foreign sanctions, export controls, and geopolitical pressure during conflicts.
  E.g. The BrahMos Missile System, co-developed and manufactured in India, ensures India retains full operational control without the risk of a foreign "push-button veto" in crisis situations.
- **Operational readiness:** Domestic manufacturing enables faster repairs, upgrades, and contextual modifications essential for sustained military operations.
  E.g. During the Ladakh standoff, indigenous platforms like LCA Tejas and ALH Dhruv were rapidly adapted for high-altitude and extreme weather conditions by HAL, avoiding delays from foreign dependence.
- **Economic multiplier:** Defence production catalyses high-skill employment and innovation across aerospace, electronics, metallurgy, and advanced materials.
  E.g. The Tamil Nadu and Uttar Pradesh Defence Industrial Corridors have attracted firms like Tata Advanced Systems and L&T, building end-to-end domestic supply chains from components to complex systems.
- **Geopolitical leverage:** Defence exports deepen strategic partnerships, enhance interoperability, and translate industrial capability into diplomatic influence.
  E.g. India's BrahMos export to the Philippines (2024) marked a shift from importer to security provider in the Indo-Pacific, adding a credible hard-power dimension to India's foreign policy.

Initiatives taken so far:

1. **Policy reforms for indigenous procurement:** DAP 2020 emphasising **Buy (Indian-IDDM)** and faster approvals.
2. **Ordnance Factory reforms:** Corporatisation to improve efficiency and accountability.
3. **FDI liberalisation:** Up to 74% automatic route, up to 100% via government route (as per your notes).
4. **Innovation push:** iDEX, Technology Development Fund, and **RDI ecosystem** linking startups/ MSMEs with defence needs.
5. **Defence Industrial Corridors:** UP and Tamil Nadu corridors as manufacturing clusters and supply-chain hubs.
6. **Export facilitation digitisation:** Online export authorisations, OGEL, simplified SOPs to ease exports.

Challenges Associated with Defence Indigenisation:

- **Regulatory complexity:** Multiple approvals for joint ventures, technology transfer, and export licensing slow project execution and reduce private-sector confidence.
  E.g. The Single Engine Fighter Jet project faced years of delay under the Strategic Partnership

model, as firms like Tata–Lockheed and Adani awaited clarity on technology ownership and transfer terms.

- **Testing and certification bottlenecks:** Lengthy trials, limited test infrastructure, and frequently changing GSQRs delay induction of indigenous systems.
  E.g. The ATAGS artillery system underwent nearly six years of multi-terrain trials; while ensuring quality, such timelines slowed induction compared to off-the-shelf imports.

- **Financing constraints:** Defence MSMEs face high working-capital needs and long order cycles, making access to affordable credit difficult.
  E.g. Drone startups in Bengaluru and Pune often exhaust early-stage funding while waiting for RFPs and long-term MoD contracts required by banks for lending.
- **R&D to production gap:** Translating successful prototypes into reliable, mass-produced systems remains a key weakness.
  E.g. Despite DRDO's R&D success, the Nishant UAV struggled during scale-up due to production and quality issues, limiting its operational adoption.
- **Demand uncertainty:** Frequent cancellations and re-tendering discourage private investment in capacity and specialised infrastructure.
  E.g. Repeated halting and revival of the Navy's LPD project created uncertainty for private shipyards like L&T (Kattupalli), affecting long-term planning and investment.

Way ahead for Defence Indigenisation:

- **Single-window export facilitation agency:** Fragmented approvals across ministries delay exports and weaken credibility; a single-window, professionally run agency can fast-track licensing, coordination, and after-sales support, improving India's reliability as a defence supplier.
- **Predictable long-term procurement pipelines:** Unclear demand projections discourage private investment in capital-intensive defence manufacturing; 10–15 year procurement roadmaps with assured indigenous orders can reduce risk and enable capacity expansion.
- **Re-orient DRDO's role:** Combining R&D with production slows induction timelines; limiting DRDO to frontier research while industry handles manufacturing will speed up commercialisation and operational deployment.
- **Strengthen the defence finance ecosystem:** Long gestation cycles and weak access to credit constrain MSMEs; specialised export finance, credit guarantees, and sovereign lines of credit can de-risk investment and sustain production.
- **World-class testing and certification:** Limited testing capacity and India-specific standards delay induction and exports; integrated test facilities and alignment with global norms will shorten trials and boost acceptance.
- **Ease of doing business for MSMEs and startups:** Complex compliance and delayed payments strain cash flows; faster clearances, simplified rules, and time-bound payments will help startups survive procurement delays and scale up.

Conclusion:

A strong defence industrial base is India's shield and springboard—it protects sovereignty while powering innovation-led growth. The recent rise in production and exports shows the direction is right, but reforms must now deepen into finance, testing, demand certainty, and faster clearances. If sustained, defence Atmanirbharta can become a defining pillar of Viksit Bharat 2047 and India's global strategic credibility.

MANUFACTURING IN INDIA

Context: India's manufacturing slowdown has resurfaced in public debate following economist Arvind Subramanian's analysis linking weak industrialisation to wage structures, technology stagnation, and the Dutch Disease framework.

About Manufacturing in India:

What it is?

- **Manufacturing** refers to the transformation of raw materials into finished goods using labour, capital, technology, and energy, forming the backbone of **employment-led structural transformation**.
- Historically, manufacturing has enabled countries to move from agrarian economies to high-productivity, export-driven growth.

Trends and data:

- Manufacturing contributes **~13% of** India's GDP, while services account for about **64%**, indicating premature deindustrialisation.
- Between **2011–2023**, India's manufacturing GDP share declined by **3.2 percentage points**, though less than China (6 pp) and South Korea (4 pp).
- Industrial growth remains uneven, with recent PMI expansion but limited long-term wage and productivity gains.

Successes of India's manufacturing sector:

- **Electronics manufacturing boom:** Targeted incentives under the PLI scheme reduced cost disadvantages, encouraged scale economies, and integrated India into global electronics value chains.

  E.g. Mobile exports surged from USD 0.18 bn (2014) to USD 15+ bn (2024), reflecting rapid capacity creation.
- **Improved FDI inflows:** Geopolitical diversification under the China+1 strategy positioned India as a preferred manufacturing destination for global firms.

  E.g. Apple's contract manufacturers crossed 20% domestic value addition in India by FY25.
- **Import substitution achieved:** Domestic production reduced dependence on critical electronic imports, strengthening trade balance and supply-chain resilience.

  E.g. Mobile phone imports fell from USD 5.7 bn (2014-15) to below USD 1 bn (2023-24).
- **Defence and aerospace gains:** Strategic indigenisation reduced import reliance and built domestic technological capabilities in high-value manufacturing.
- **Renewables manufacturing growth:** Policy push aligned manufacturing with climate goals, creating green industrial capacity and export opportunities.

Challenges associated with manufacturing in India:

- **Dutch disease-like wage distortion:** High public-sector wages raised economy-wide wage expectations without parallel productivity growth in manufacturing.

  E.g. Manufacturing firms struggled to compete with government salaries, discouraging factory employment expansion.
- **Low technological upgrading:** Easy access to cheap labour reduced incentives for automation, capital deepening, and productivity enhancement.

  E.g. Many apparel units continue manual stitching instead of adopting automated cutting and sewing technologies.
- **Weak skill ecosystem:** Mismatch between formal education and shop-floor skills constrains industrial efficiency and scale.

  E.g. MSMEs report shortages of CNC machine operators despite high youth unemployment.
- **MSME fragility:** Limited access to finance, technology, and standards prevents MSMEs from integrating into global value chains.

  E.g. Numerous Indian MSMEs could not meet Apple's supplier quality benchmarks.
- **Rising inequality:** Capital-intensive growth concentrated gains at the top, weakening wage growth and mass consumption demand.

  E.g. IT unicorn valuations soared while entry-level software salaries stagnated for over a decade.

Way ahead:

- **Technology-driven industrialisation:** Manufacturing must shift from labour dependence to innovation-led productivity growth.

  E.g. Germany's Industry 4.0 demonstrates how automation sustains competitiveness despite high wages.
- **Labour-intensive manufacturing push:** Sectors with high employment elasticity should anchor India's industrial strategy.

  E.g. Bangladesh's garment exports crossed USD 45 bn, generating large-scale female employment.
- **Skill–industry integration:** Vocational education must be aligned with real-time industry requirements.

  E.g. Japan's dual training model integrates classroom learning with factory apprenticeships.
- **MSME value-chain integration:** Cluster-based support, standardisation, and export credit can unlock MSME scale.

  E.g. Vietnam linked MSMEs to global electronics chains, boosting exports and productivity.
- **Stable trade and policy regime:** Long-term policy certainty is essential to crowd in private manufacturing investment.

  E.g. South Korea's consistent industrial policy produced globally competitive manufacturing champions.

Conclusion:

India's manufacturing lag is rooted not only in policy choices but also in insufficient technological upgrading and labour absorption. Recent gains show promise, yet employment-centric industrialisation remains incomplete. A technology-enabled, MSME-driven, labour-absorbing manufacturing strategy is essential for inclusive growth.

Topics: Infrastructure: Energy, Ports, Roads, Airports, Railways etc.

NUCLEAR ENERGY AND THE SHANTI BILL: PROMISE, PERIL AND POLICY CHOICES

Context: Parliament has passed the Sustainable Harnessing and Advancement of Nuclear Energy for Transforming India (SHANTI) Bill, 2025**,** marking a major overhaul of India's nuclear governance framework.

About Nuclear Energy and the SHANTI Bill: Promise, Peril and Policy Choices

What is the SHANTI Bill?

- The SHANTI Bill, 2025 replaces the Atomic Energy Act, 1962 and the Civil Liability for Nuclear Damage Act, 2010.
- It provides a new legal framework to expand nuclear power, permit private participation, and restructure liability and regulation in the nuclear sector.

Key features of the Bill:

1. **Opening nuclear sector to non-government entities:** The Bill allows licences for building, owning and operating nuclear plants to **private companies, joint ventures and other permitted persons**, under government licensing and regulatory oversight.
2. **Tiered liability framework:** It introduces **graded operator liability caps** ranging from **₹100 crore to ₹3,000 crore** based on reactor capacity, with excess liability borne by the central government.
3. **Removal of supplier liability for defects:** The operator's right of recourse against suppliers for **defective equipment or materials** is removed, retaining recourse only for contractual or deliberate acts.
4. **Statutory status to AERB:** The **Atomic Energy Regulatory Board (AERB)** is granted statutory recognition, tasked with ensuring nuclear and radiation safety.
5. **Expanded territorial coverage of claims:** Compensation claims may now extend to **nuclear damage in foreign territories**, subject to specified conditions.
6. **New appellate mechanism:** The Bill establishes an **Atomic Energy Redressal Advisory Council**, with further appeals lying before the **Appellate Tribunal for Electricity**.

Need for the SHANTI Bill:

- **Rising energy demand and decarbonisation goals:** India's growing economy and digitalisation require massive energy expansion, while net-zero commitments demand low-carbon baseload sources like nuclear.
- **Limitations of renewables alone:** Solar and wind are intermittent, land-intensive and storage-dependent; nuclear provides reliable baseload power for a decarbonised grid.
- **Public sector capacity constraints:** NPCIL and DAE face financial and execution limits in scaling up nuclear capacity to 100 GW without private capital and expertise.
- **Global best practices and investment flows:** Opening the sector aligns India with global nuclear markets and enables access to technology, finance and supply chains.

Issues associated with the SHANTI Bill:

- **Dilution of liability and public safety concerns:** Low liability caps and removal of supplier liability risk **socialising catastrophic costs**, contrary to the *polluter pays* principle.
- **Lessons from Bhopal and Fukushima ignored:** Past industrial disasters underline the need for **strong accountability**, which critics argue the Bill weakens.
- **Regulatory independence questioned**: Despite statutory status, AERB remains executive-controlled, raising concerns of regulatory

capture.

- **Radioactive waste and decommissioning gaps:** The Bill lacks a clear funding and responsibility framework for long-term waste management and decommissioning.
- **Labour and environmental justice risks:** Private participation may increase reliance on **contract labour**, heightening occupational and environmental risks.
- **Energy sovereignty concerns:** Higher foreign participation could deepen technology dependence, weakening India's indigenous nuclear trajectory.

Way ahead:

- **Strengthen liability and accountability mechanisms:** Revisit liability caps, restore meaningful supplier accountability, and introduce explicit criminal negligence provisions.
- **Ensure truly independent regulation:** Reform appointment processes and empower AERB with autonomy, transparency and parliamentary oversight.
- **Create a nuclear waste and decommissioning fund:** Mandate fully funded, ring-fenced mechanisms to manage intergenerational radioactive waste burdens.
- **Balance nuclear expansion with renewables:** Adopt a diversified energy strategy, prioritising grid modernisation, storage and energy efficiency alongside nuclear.
- **Enhance public consultation and trust:** Institutionalise community participation, environmental safeguards and transparency in nuclear siting and operations.

Conclusion:

The SHANTI Bill, 2025 represents a transformative shift in India's nuclear energy governance, driven by decarbonisation and development goals. While it can unlock investment and accelerate capacity expansion, weakened liability, regulatory risks and safety concerns remain significant. A balanced approach—combining nuclear growth with strong accountability, public trust and renewable integration—is essential for sustainable energy security.

Topics: Science and Technology- developments and their applications and effects in everyday life Achievements of Indians in science & technology; indigenization of technology and developing new technology.

TRANSFORMING INDIA INTO A LEADING QUANTUM-POWERED ECONOMY

Context: NITI Aayog's Frontier Tech Hub has released a comprehensive roadmap titled "Transforming India into a Leading Quantum-Powered Economy."

About Transforming India into a Leading Quantum-Powered Economy:

What It Is?

- It is a national strategic roadmap prepared by NITI Aayog (with IBM as knowledge partner) that lays out India's 2035 vision for quantum computing, communication, sensing and materials, and details actions needed to build a globally competitive quantum ecosystem.

Key Highlights of the Report:

1. **Vision for 2035: India Among Top 3 Quantum Economies:** India aims to become a global leader with 10+ quantum startups achieving USD 100M+ revenue and capturing over 50% of the global quantum software market.
2. **Deployment Across Strategic Sectors:** Quantum tech should be deployed at scale across defence, healthcare, finance, mining, energy and national infrastructure by 2035.
3. **Full Quantum Supply-Chain Participation:** India must achieve "quantum Atmanirbharta" by contributing to quantum hardware, materials, processors, cryogenic systems, and software stacks, while becoming a net exporter.
4. **Two-Phase Milestone Plan (2025–30 & 2030–35):** Milestones include setting up testbeds, 50+ funded startups, sectoral pilots, PQC deployment, and later global leadership, export corridors and supply-chain dominance.
5. **Workforce Expansion & Talent Readiness:** The plan calls for a 10× expansion of quantum-skilled professionals within 2–3 years and making India a top-three global destination for quantum talent.

6. **Focus on Standards, IP and Global Quantum Diplomacy:** India will lead international standard-setting, secure market access through global partnerships, and establish quantum benchmarking consortia.
7. **Large-Scale Adoption of Quantum-Resilient Cryptography:** Mandatory planning for quantum-safe encryption in government systems, deployment of PQC testbeds, and integration into national cybersecurity architecture.
8. **Strong Emphasis on Industry Participation & Innovation-to-Market Pipeline:** The roadmap highlights quantum–HPC integration, sectoral pilots, cloud-based quantum services, accelerators and venture funding to build a strong private-sector ecosystem.

Opportunities for India:

- **Leapfrog Advantage:** Quantum is still nascent globally, giving India a rare chance to lead rather than catch up (greenfield trillion-dollar opportunity).
- **High-Value Job Creation:** Specialized jobs in algorithms, hardware, cryogenics, sensors, and quantum materials.
- **Sectoral Productivity Boost:** Logistics, finance, aviation, energy, pharma, and manufacturing can achieve massive optimization and cost savings through quantum advantage.
- **Strategic Autonomy:** Indigenous quantum communications, PQC and sensing will strengthen defence and national security.
- **Export Leadership:** Software, PQC libraries, cloud platforms, sensors and components for the Global South market.

Initiatives Already Taken:

- **National Quantum Mission (2023–2031)** with ₹6000+ crore to build quantum hubs, testbeds, and technologies.
- **Start-up support via iDEX and NQM**, early industry pilots, and India's participation in international collaborations.
- **Quantum communication trials**, QKD networks, and sensing prototypes in strategic sectors.

Challenges Identified in the Report:

- **Hardware Gaps & Import Dependence:** India lacks domestic capability in quantum processors, cryogenic systems, quantum materials, and peripherals.
- **Weak Basic Science & Low R&D Investment:** India invests only ~0.65% of GDP in R&D; research quality and IP ownership remain low.
- **Severe Skill Shortages:** Shortage of experts in cryogenics, optics, microwave engineering, hardware–software co-design and techno-business skills.
- **Risk-Averse Capital & Limited Industry Adoption:** Deep-tech capital is scarce; industry awareness is low; procurement and audit processes hinder innovation.
- **Global Geopolitical Risks:** China's dominance in materials, export controls by advanced economies, and global talent competition.

NITI Aayog Roadmap Recommendations:

- **Build domestic quantum hardware & materials ecosystem**: manufacturing for cryo-electronics, detectors, photonics, and processors.
- **Set up quantum-specific standards, testbeds, and certification systems** to ensure global interoperability.
- **Massively scale quantum skilling** through universities, online platforms, and national quantum education programmes.
- **Accelerate industry pilots** in logistics, aviation, energy, pharma, finance, and defence.
- **Strengthen international quantum diplomacy** for market access, supply-chain security and standards leadership.
- **Ensure early transition to PQC** across government and critical infrastructure.
- **Create a national quantum venture fund** and innovation-to-market accelerators.

Conclusion:

Quantum technology offers India a once-in-a-century opportunity to shape a frontier industry rather than chase it. With coordinated investment, strong R&D, global partnerships and aggressive industry adoption, India can rise as a top-three quantum economy by 2035. The roadmap provides a blueprint to secure technological leadership, economic competitiveness and national security in the coming quantum era.

INDIA'S RESEARCH DEFICIT

Context: India's chronic research and development (R&D) deficit has returned to focus following renewed debate on India's global ambitions, low R&D spending (≈0.7% of GDP), and comparisons with countries—and even firms like Huawei—that far outspend India on innovation.

About India's Research Deficit:

What it is?

- India's research deficit refers to the systemic underinvestment, weak ecosystem linkages, and low output in scientific research, innovation, and high-end technology development, despite having one of the world's largest talent pools and economies.

Key trends:

- **R&D expenditure: ~0.6–0.7% of GDP** (declining relative to GDP growth).
  - China: ~2.4% | USA: ~3.5% | Israel: ~5.4%
- **Global research output:** India has **~17.5% of world population** but produces only ~3% of global research output.
- **Patents (2023):**
  - Total filings: **64,480** (6th globally; fast growth from low base)
  - Share of global filings: **~1.8%**
  - Resident filings per million people: **47th rank**
- **Researchers density: ~255 researchers per million people**
  - Global average: ~1,198 | USA: 4,452 | China: 1,307 | South Korea: 7,980
- **Private sector role:** Government contributes **~63.6%** of R&D spend; private sector only **~36.4%.**
- **Global Innovation Index 2024:** 39th rank.

Need for Strong Research in India:

1. **Economic competitiveness and value-chain upgradation:** R&D enables transition from assembly to design-led manufacturing and intellectual leadership.
   - Despite **₹1.6 lakh crore cleared under India Semiconductor Mission (2025)**, the absence of a **commercial sub-28 nm mega-fab** keeps India import-dependent for advanced logic chips.
2. **Strategic autonomy and technology sovereignty:** Indigenous research reduces exposure to external "technology vetoes" in critical sectors.
   - Although **65% defence equipment is domestically produced**, dependence on **GE-F404 engines for Tejas Mk-1A** reflects the long-standing aero-engine R&D deficit (Kaveri legacy).
3. **Conversion of demographic dividend into innovation capital:** High-quality research jobs prevent "brain waste" among India's STEM youth.
   - In **2024–25, 7.6 lakh students went abroad**, with a **35% surge in AI and renewable-energy PhDs**, driven by weak deep-tech lab infrastructure at home.
4. **Societal problem-solving and contextual innovation:** Indian challenges need India-specific scientific solutions beyond global models.
   - The **47°C Delhi heat events (2024–25)** exposed limits of global climate models, prompting **Mission Mausam (2024)** to develop indigenous, localised weather forecasting.

Initiatives taken:

- **₹1 lakh crore Research, Development and Innovation (RDI) Fund:**
  - ₹20,000 crore allocated initially; focus on **private-sector and deep-tech R&D**
- **Anusandhan National Research Foundation (ANRF):** Strengthens **academic research, labs,**

and basic science

- **National missions: India Semiconductor Mission, National Quantum Mission, AI Mission, Green Energy & Hydrogen initiatives**

Challenges Associated:

1. **Private-sector risk aversion in R&D:** Indian industry underinvests in long-gestation "blue-sky" research. India's **GERD remains ~0.65% of GDP**, with private contribution at **36%**, compared to **70%+ in South Korea and the U.S.**
2. **Academia–industry disconnect:** Weak commercialization culture prevents lab-to-market transition. While IIT Madras scaled 5G RAN licensing (2024–25), over 80% patents from smaller colleges remain unlicensed due to absence of Technology Transfer Offices.
3. **Persistent brain drain due to ecosystem gaps:** Talent migrates to stable innovation clusters offering funding continuity. **GII 2025 ranks India 38th**, yet top **0.1% STEM talent exits** due to delays and uncertainty in grants like JC Bose Fellowship.
4. **Bureaucratic delays and funding liquidity crunch**: Slow disbursal disrupts experimental continuity in labs. Even after ANRF operationalisation (2024), SERB-SURE and DST funds took 8–12 months in 2025, causing project stagnation.
5. **Weak intellectual property quality and enforcement:** Filing growth is not translating into disruptive innovation. Though India became the **6th largest patent filer (2024–25)**, its **GII Business Sophistication rank (64)** shows dominance of incremental over frontier inventions.

Way Ahead

1. **Scale R&D investment decisively:** Raise R&D spending to **2% of GDP within 5–7 years**, ensuring **≥50% private-sector share** through tax credits, co-funding, and outcome-linked incentives.
2. **Adopt mission-mode research governance:** Focus on AI, semiconductors, quantum, green energy, advanced materials, with uninterrupted funding, strategic milestones, and national-security alignment.
3. **Reform universities into research engines:** Build research-centric universities, expand PhD fellowships, recruit global faculty, and establish world-class experimental infrastructure.
4. **Institutionalise industry–academia integration:** Mandate industry-funded chairs, joint labs, incubators, and professional TTOs to bridge the "valley of death" between research and markets.
5. **Strengthen IP and innovation incentives:** Fast-track patents, improve enforcement, and ensure revenue-sharing models that reward inventors and institutions.
6. **Retain and attract top research talent:** Offer globally competitive pay, mobility grants, and flagship national labs, ensuring career stability and scientific autonomy.

Conclusion:

India's aspiration to become a global power cannot be sustained without a **robust, well-funded R&D ecosystem.** The current research deficit is not a talent problem but a **structural and investment failure**. Bridging this gap decisively in the next decade is essential for **Viksit Bharat,** technological sovereignty, and long-term economic leadership.

ACHIEVEMENTS OF THE DEPARTMENT OF BIOTECHNOLOGY (DBT) IN 2025

Context: The Department of Biotechnology (DBT) released its Year-Ender 2025, showcasing major milestones that strengthened biotechnology as a key pillar of India's economic, health, agricultural and scientific growth.

- With the bio-economy crossing $165.7 billion and new initiatives in genomics, biomanufacturing, health and agriculture, 2025 marked a decisive expansion.

About Achievements of the Department of Biotechnology (DBT) in 2025:

What is DBT

- The Department of Biotechnology, under the Ministry of Science & Technology, is the

nodal body for policy, funding, regulation and ecosystem-building in biotechnology, spanning health, agriculture, industry, environment and frontier sciences, aligned with missions like Atmanirbhar Bharat, Make in India and Viksit Bharat.

Key achievements in 2025:

1. **Bio-economy expansion:**
   - India's bio-economy grew **16-fold in a decade**, from **$10 billion (2014) to $165.7 billion (2024)**, with a clear pathway to **$300 billion by 2030**.
   - India ranks **12th globally in biotech**, **3rd in Asia-Pacific**, and hosts the world's largest vaccine manufacturing capacity.
2. **National Biofoundry Network & BioE3 Policy:**
   - **India's first National Biofoundry Network** launched with six biofoundries and a high-performance biomanufacturing platform.
   - Implemented under the **BioE3 Policy**, focusing on APIs, smart proteins, precision biotherapeutics, climate-resilient agriculture, carbon capture and space-marine biotechnology.
3. **GenomeIndia Project milestone:**
   - Launch of the **Indian Genomic Data Set** with **10,000 whole genome sequences** made globally accessible.
   - Operationalisation of **FeED** and **Indian Biological Data Centre (IBDC)** portals strengthened data-driven research and global collaboration.
4. **Strengthening biomedical research talent:**
   - **Biomedical Research Career Programme (BRCP) Phase-III** approved with an outlay of **₹1,500 crore**, ensuring long-term fellowships and grants.
   - Reinforced India's pipeline of high-quality biomedical researchers and clinician-scientists.
5. **Breakthroughs in space biotechnology:**
   - **India's first human muscle stem-cell experiment on the ISS (Axiom-4)** conducted.
   - Validation of **microalgae and cyanobacteria growth in microgravity**, supporting future long-duration space missions and closed-loop life-support systems.
6. **Health and biopharma innovations:**
   - **National Biopharma Mission** delivered **ZyCoV-D and Corbevax vaccines**, indigenous MRI scanner, biosimilars, diagnostics, ventilators and bioreactors.
   - Advanced **AI-enabled TB drug-resistance mapping**, with **18,000 MTB isolates sequenced**, strengthening the **TB-Mukt Bharat** mission.
7. **Agricultural biotechnology advances:**
   - **Gene-edited rice** with **20% higher yield** (DEP1 gene).
   - **Drought-resistant rice 'Arun'**, climate-resilient chickpea cultivars and **transgene-free CRISPR-edited mustard** with high glucoraphanin content.
   - Strengthened food security under climate stress.
8. **Startup, innovation and IP ecosystem:**
   - Expansion to **75 BioNEST Centres and 19 E-YUVA Centres**.
   - Support to **3,000+ startups**, **1,300+ IP filings**, and **800+ products** nearing commercialisation, spreading biotech innovation beyond metros.
9. **World-class research infrastructure:**
   - Commissioning of **Animal BSL-3 Facility for Non-Human Primates**, advanced **Cryo-EM, stem-cell and imaging facilities**.
   - Nationwide access enabled through **DBT-SAHAJ** shared research platforms.

Major initiatives taken in 2025:

- Launch of **D.E.S.I.G.N for BioE3 Challenge** to empower youth innovators.
- **DBT–IndiaAI MoU** to integrate **biotechnology with artificial intelligence**.
- Regulatory reforms including **Guidelines on Genetically Engineered Plants (Stacked Events), 2025**.
- Centre-State partnerships through **BioE3 Cells** to align local strengths with national biomanufacturing goals.

Significance:

- Positions **biotechnology as a strategic growth engine** for India's economy, health security and climate resilience.
- Strengthens **technological sovereignty** through indigenous vaccines, genomics, biomanufacturing and agri-biotech.
- Enhances India's **global leadership** in affordable innovation, South-South cooperation and frontier science.

Conclusion:

The year 2025 marked a turning point for India's biotechnology ecosystem, with DBT driving scale, depth and global relevance. From genomics to space biotech and from startups to sovereign health technologies, DBT anchored innovation to national priorities. Together, these achievements firmly position biotechnology as a pillar of India's journey toward a Viksit Bharat by 2047.

NUCLEAR POWER IN SPACE

Context: The U.S. has announced plans to deploy a small nuclear reactor on the Moon by the early 2030s, marking the first attempt to establish permanent nuclear power beyond Earth.

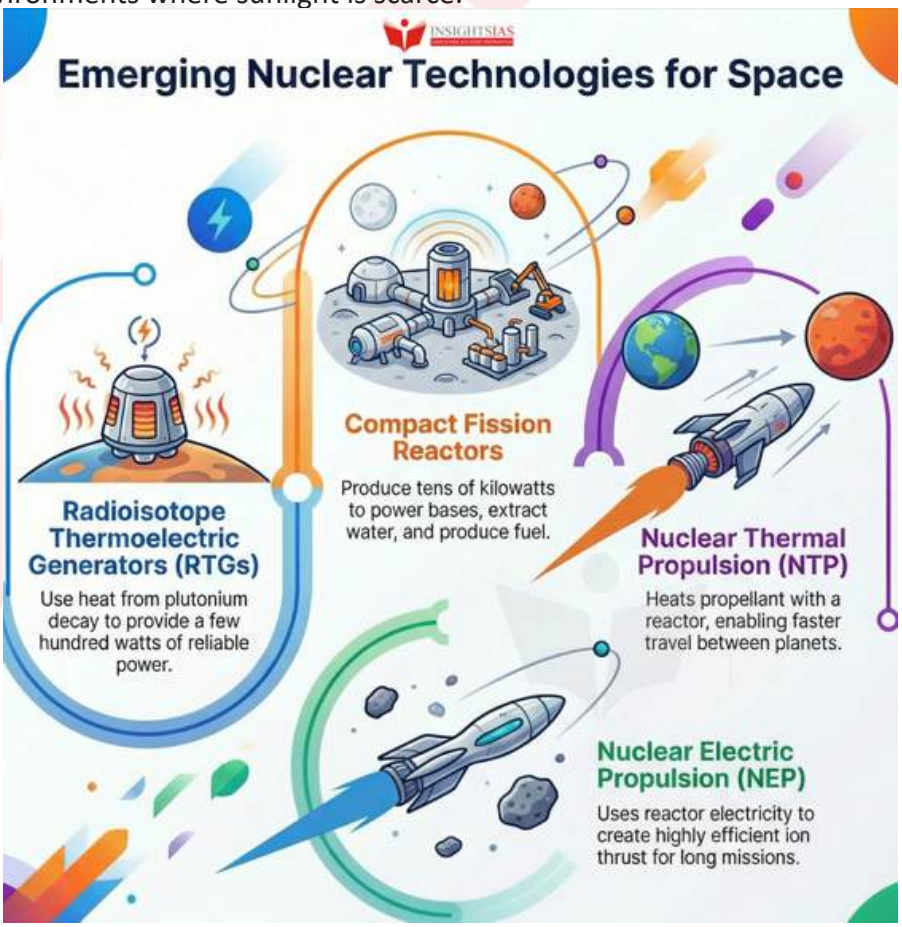
About Nuclear Power in Space:

Need for Nuclear Power in Space:

- **Solar unreliability on Moon/Mars:** Long lunar nights, dust storms and weak polar sunlight make solar energy inconsistent, limiting continuous operations.
- **Need for continuous high-density power:** Human habitats, life-support, labs and manufacturing require stable, uninterrupted energy far beyond what solar arrays can supply.
- **ISRU requires megawatt-scale energy:** Extracting ice, producing water, oxygen and rocket fuel needs large, steady power that solar cannot reliably generate.
- **Nuclear reactors provide compact stability:** They generate dense, weather-independent energy in small footprints, enabling long-term missions and remote operations.

Applications of Nuclear Power in Space:

- **Habitats on Moon and Mars:** Reactors power life-support, thermal control, communications and scientific equipment essential for human survival.
- **ISRU for water and fuel production:** Nuclear power enables continuous extraction and processing of ice into water, oxygen and propellants for return missions.
- **Mobility and robotics support:** Supports recharging rovers, powering drilling units and enabling long-range autonomous surface exploration.
- **Deep-space propulsion – NTP:** Nuclear thermal systems heat propellant for faster Mars transit, reducing astronaut exposure to cosmic radiation.
- **Deep-space propulsion – NEP:** Reactor-generated electricity drives ion engines, offering long-duration thrust for probes and cargo missions.
- **Scientific missions in harsh regions:** Provides reliable energy to explore shadowed craters, polar regions or deep-space environments where sunlight is scarce.



Existing International Laws Governing Space Nuclear Power:

1. **UN Principles (1992) – procedural safeguards:** Mandate safe design, pre-launch risk analysis and emergency reporting, but focus mainly on power-generation reactors.
2. **Outer Space Treaty (1967):** Bans nuclear weapons in orbit but allows peaceful nuclear reactors, creating ambiguity in propulsion applications.
3. **Liability Convention (1972):** Covers damage caused by space objects but offers unclear guidance on accidents involving reactors beyond Earth orbit.
4. **NPT – nuclear material control:** Restricts weaponisation but leaves gaps in oversight for space reactors or nuclear propulsion systems.

Challenges:

- **Safety risks during launch/operation:** Accidents during launch or re-entry could disperse radioactive material, posing transboundary hazards.
- **Regulatory vacuum:** Lack of enforceable international standards leaves reactor safety and disposal practices largely unregulated.
- **Environmental contamination risks:** Nuclear fallout could irreversibly alter pristine lunar or Martian environments before scientific study is complete.
- **Geopolitical tensions:** Deploying nuclear systems may spark suspicion, competition or militarisation among major spacefaring nations.
- **Planetary protection concerns:** Undefined "safety zones" around reactors risk becoming de facto territorial claims, conflicting with space law.

Way Ahead:

Update UN Principles to include propulsion reactors: Introduce binding standards for NTP/NEP design, safety limits and radiation containment for modern missions.

- **Create binding environmental protocols:** Set global rules for safe launches, contamination prevention, waste disposal and handling of reactor end-of-life.
- **Establish an IAEA-like oversight mechanism:** A multilateral body should certify reactor designs, verify safety compliance and enhance transparency among nations.
- **Promote international transparency and cooperation:** Joint missions, open data-sharing and multinational governance can reduce mistrust and ensure safe innovation.
- **Foster responsible innovation:** Balance ambition with strict ethics, biosafety and planetary protection to prevent conflict and protect ecosystems.

Conclusion:

Nuclear power is becoming essential for long-term human presence and industrial activity beyond Earth. However, the absence of strong global governance mechanisms poses significant safety and legal risks. A modern, comprehensive regulatory framework is critical to ensure that nuclear technologies enable peaceful exploration rather than trigger conflict or contamination.

Topics: Conservation related issues, environmental pollution and degradation, environmental impact assessment.

VIRTUAL WATER EXPORT CRISIS

Context: India has emerged as the world's largest rice producer and exporter, accounting for nearly 40% of global rice trade, but this export dominance is intensifying groundwater depletion in water-stressed States like Punjab and Haryana.

- The debate has resurfaced around India's growing "virtual water export crisis", where scarce groundwater is effectively exported through water-intensive crops.

About Virtual Water Export Crisis:

What it is?

- The virtual water export crisis refers to the export of water embedded in agricultural commodities, especially water-intensive crops like rice, from a water-stressed country.
- In India's case, large rice exports mean exporting billions of cubic metres of groundwater, even as domestic aquifers face depletion.

Key trends:

- India exports over **20 million metric tonnes of rice annually**, embedding massive quantities of irrigation water.
- Rice production alone accounts for **34–43% of global irrigation water use**.
- Around **24,000+ million cubic metres of virtual water** is exported annually through rice trade.
- Northern rice belts increasingly rely on **groundwater rather than surface irrigation**.

Reasons behind the virtual water export crisis:

- **Water-intensive rice cultivation model:** Rice requires **3,000–4,000 litres of water per kg**, far exceeding global averages, making it unsustainable in semi-arid regions.
- **Distortionary subsidies:** High MSPs for rice and free or cheap electricity incentivise excessive groundwater extraction and discourage crop diversification.
- **Policy legacy of food security:** Green Revolution-era policies prioritised rice and wheat to ensure food security, but were not recalibrated for water scarcity realities.
- **Weak groundwater regulation:** Groundwater remains poorly regulated, allowing unrestricted borewell drilling and over-extraction by farmers.
- **Global market dependence:** India's dominance in global rice trade makes policy shifts politically and economically sensitive due to price and export implications.

Impacts on India:

- **Rapid groundwater depletion:** In Punjab and Haryana, CGWB data shows most blocks classified as *over-exploited*, with borewell depths increasing from 30 feet to 80–200 feet, sharply raising irrigation costs.
- **Rising farm distress:** Small farmers in rice belts report mounting debt to finance deeper pumps and electricity, reflected in rising input costs despite MSP hikes, as highlighted in recent Reuters field surveys (2025).
- **Climate vulnerability:** Even with good monsoons in 2023–25, excessive extraction prevented aquifer recharge, exposing northern agriculture to severe risk during any future weak monsoon year.
- **Ecological imbalance:** Falling water tables have degraded wetlands and soil moisture regimes in Punjab–Haryana, reducing biodiversity and long-term land productivity, per PAU studies.
- **Inter-generational inequity:** India exports over 24,000 million cubic metres of virtual water annually through rice, effectively transferring future water security costs to coming generations.

Challenges associated:

- **Political resistance to reform:** The rollback of the **2020–21 farm laws** after nationwide protests shows the political sensitivity of reducing MSP dependence and procurement guarantees.
- **Farmer income insecurity:** One-season diversification incentives, such as **Haryana's ₹17,500/ha millet scheme (2024)**, failed to scale due to lack of income certainty.
- **Uneven State capacity:** As water is a **State subject**, groundwater regulation remains weak and fragmented, with enforcement varying widely across Punjab, Haryana and eastern States.
- **Short-term policy design:** Crop-switch schemes limited to a single season have not offset long-term risk, discouraging farmers from abandoning assured rice procurement.
- **Data and enforcement gaps:** Despite **NAQUIM mapping**, absence of real-time extraction monitoring allows unchecked borewell drilling in over-exploited blocks.

Initiatives taken to handle the water crisis:

1. **Jal Shakti Abhiyan (JSA):** Mission-mode water conservation and recharge campaign since 2019, with focus on over-exploited districts.
2. Atal Bhujal Yojana: Community-led groundwater management in water-stressed districts.
3. **Mission Amrit Sarovar:** Rejuvenation of local water bodies to enhance groundwater recharge.
4. **Per Drop More Crop:** Promotion of micro-irrigation to improve farm water-use efficiency.
5. **NAQUIM 2.0:** Scientific aquifer mapping for informed groundwater management decisions.

Way ahead:

- **Reorient MSP and procurement policy:** Expanding assured procurement for millets under International Year of Millets momentum can replicate rice-like income security with lower water use.
- **Price groundwater realistically:** Rationalising free power for agriculture and promoting solar pumps with usage caps can curb wasteful extraction, as piloted in parts of Gujarat.
- **Long-term diversification support:** Experts recommend 5–7 year income assurance, as

short-term schemes have failed to induce durable crop shifts in Punjab–Haryana.

- **Promote climate-smart agriculture:** Techniques like Direct Seeded Rice (DSR) promoted by Punjab Agriculture Department reduce water use by 15–20% per hectare.
- **Integrate trade and water policy:** India's export strategy must internalise water footprint costs, shifting exports toward less water-intensive, higher-value crops to reduce virtual water loss.

Conclusion:

India's rice export success masks a silent crisis of groundwater depletion through virtual water exports. Continuing to subsidise water-intensive crops in stressed regions threatens long-term food and water security. Sustainable agriculture now demands aligning farm policy, water governance and trade strategy with ecological limits.

ARAVALLI HILLS CONTROVERSY

Context: The Supreme Court has approved a new height-based definition of the Aravalli Hills, triggering nationwide concern as environmentalists warn it may deregulate large ecologically sensitive areas beyond mining.

- The move has sparked protests under the "Save Aravalli" campaign, citing long-term ecological risks.

About Aravalli Hills Controversy:

What are the Aravalli Hills?

- The Aravalli range is one of the oldest mountain systems in the world (≈3.2 billion years old), stretching ~650–700 km from Delhi to Gujarat.
- It acts as the ecological backbone of north-west India, preventing desertification, aiding groundwater recharge, moderating climate, and supporting rich biodiversity.

Key features of the Aravallis:

- **Natural climatic barrier:** Acts as a shield preventing the eastward expansion of the Thar Desert, reducing desertification in Haryana, Rajasthan and Delhi-NCR.
- **Hydrological significance:** Serves as the source and recharge zone for rivers such as Chambal, Sabarmati and Luni, sustaining agriculture and drinking water security.
- Wildlife corridors: Forms ecological linkages between protected areas like Sariska and Ranthambhore, crucial for tiger and wildlife movement.
- **Pollution buffer:** Acts as the green lungs of North India, moderating heat, trapping dust, and reducing air pollution in Delhi-NCR.

What is the issue?

- **New height-based definition:** The Centre has defined Aravalli Hills as landforms rising ≥100 metres above local relief, narrowing their legal recognition.
- **Shift from scientific mapping:** This replaces the FSI's 3-degree slope method, which recognised low-height but ecologically continuous hill systems.
- **Large-scale exclusion risk:** Many low-elevation Aravalli tracts, especially in Delhi-NCR and Rajasthan, may lose protection.
- **Beyond mining concerns:** Even if mining is restricted, derecognition can allow construction, urbanisation and real estate expansion.
- **Long-term ecological impact:** Experts warn of increased water stress, heat waves, dust storms and biodiversity loss due to fragmented protection.

Supreme Court judgment on Aravalli Hills:

- In its **November 20, 2025 judgment**, the Supreme Court accepted the Centre-led committee's definition.
- It held that:
  - Only hills **≥100 m above local relief** are Aravalli Hills.
  - Two such hills within **500 m** constitute an Aravalli range.
  - Fresh mining leases are temporarily barred pending detailed studies.
- The Court prioritised **administrative uniformity and "sustainable mining"**, over landscape-level ecological continuity.

Challenges associated:

- **Massive ecological exclusion:** By relying on a narrow height-based benchmark, the new definition risks removing legal protection from vast stretches of low-lying Aravalli systems that function as one continuous ecological landscape.
- **Threat beyond mining:** Even if mining is restricted, derecognised Aravalli tracts become vulnerable to construction, highways and real estate expansion, especially in the rapidly urbanising Delhi–NCR region.
- **Weak precautionary principle:** Prioritising avoidance of "over-inclusion" underestimates cumulative environmental harm, ignoring how small, fragmented interventions can irreversibly damage fragile hill ecosystems.
- **Limited public participation:** The redefinition process lacked meaningful consultation with local communities, scientists and environmental groups, reducing democratic legitimacy and ecological accountability.
- **Climate vulnerability:** Degradation of the Aravallis can intensify heat waves, dust storms, flooding and groundwater depletion, worsening climate stress across North India.

Way ahead:

- **Adopt landscape-based protection:** Conservation must include not only hilltops but also slopes, valleys and ecological corridors that sustain hydrology, biodiversity and climate regulation.
- **Restore scientific benchmarks:** Revisiting FSI's slope-based and geological criteria can ensure demarcation reflects ecological function rather than narrow physical thresholds.
- **Strengthen legal safeguards:** Expanding eco-sensitive zones and rigorously enforcing the Environment (Protection) Act can provide layered and durable protection to vulnerable areas.
- **Institutionalise public consultation:** Transparent decision-making with stakeholder participation can balance development needs with ecological and social concerns.
- **Integrate climate resilience:** Recognising the Aravallis as critical natural infrastructure can anchor policies in long-term climate adaptation and disaster risk reduction.

Conclusion:

The Aravalli Hills are not defined by height, but by their ecological function and continuity. A narrow, technical definition risks dismantling one of India's most vital natural shields. Revisiting the judgment through a science-based, precautionary, and participatory approach is essential to safeguard long-term environmental security.

AIR POLLUTION

Context: A new assessment shows that air pollution is now India's largest health threat, cutting life expectancy, worsening disease burdens, and affecting vulnerable groups nationwide.

About Invisible Epidemic: Air Pollution in India

Trends in India's Air Pollution:

- Air pollution is no longer a **seasonal winter issue**, but a **perennial national health crisis** affecting rural and urban regions alike.
- Of **256 cities monitored in 2025**, **150 exceeded PM2.5 limits**, indicating widespread non-compliance.
- Delhi's seasonal PM2.5 levels reached **107–130 µg/m³**, far above India's limit (60 µg/m³) and WHO guideline (15 µg/m³).
- India's AQI system still caps readings at **500**, masking extreme pollution that often crosses **600–1,000**.
- Long-term exposure now reduces life expectancy by **3.5–8 years** across northern India.

Causes of Air Pollution in India:

Structural issues:

- **Vehicular emissions:** Rapid motorisation, old diesel fleets, traffic congestion, and poor public transport lead to continuous NOx, PM2.5 and ozone formation, especially in metros.
- **Industrial pollution:** Coal-based power plants, refineries, brick kilns, and chemical units release sulphur dioxide, nitrogen oxides, heavy metals and particulate matter throughout the year.

- **Construction and demolition dust:** Unregulated digging, material loading, concrete mixing, and demolition generate large amounts of PM10/ PM2.5, worsening air quality in expanding urban corridors.
- **Household biomass use:** Firewood, dung cakes and crop residues burned in rural and peri-urban kitchens produce indoor and outdoor smoke, contributing heavily to PM2.5 levels.

Seasonal Amplifiers:

- **Stubble burning:** post-harvest crop burning in Punjab-Haryana adds massive but short-term particulate spikes, worsening air quality in Delhi and the Indo-Gangetic Plains.
- **Winter inversion layers:** Cold, stagnant air traps pollutants near the surface, preventing dispersion and causing PM2.5 to accumulate for days or weeks in northern India.
- **Fireworks and festival combustion:** Diwali and New Year fireworks, combined with low wind speeds, create sudden surges in toxic gases and particulates, amplifying existing pollution loads.

Impacts of Air Pollution on the Human Body:

- **Cardiovascular System:**
  - PM2.5 enters bloodstream, causing **inflammation, hypertension, heart attacks, strokes**.
  - Every **10 µg/m³ increase** leads to **8% rise in annual mortality**.
- **Respiratory System:**
  - Rising cases of **asthma (6% of Indian children)**, COPD, chronic bronchitis.
  - PM2.5 increases paediatric emergency visits by **20–40%**; lung capacity drops **10–15%** in exposed children.
- **Neurological System:**
  - PM2.5 crosses the blood–brain barrier → **neuroinflammation, cognitive decline, dementia risk (+35–49%)**.
  - Linked to reduced academic performance in polluted Indian cities.
- **Maternal & Child Health:**
  - Higher risks of **preterm birth, low birth weight, stillbirths**, and neonatal mortality.
  - Worsens intergenerational health inequities.
- **Social & Economic Inequalities:** The poor live closest to **roads, industrial belts, landfills**, suffering disproportionate exposure and healthcare burdens.

Initiatives Taken by India:

- **National Clean Air Programme (NCAP):**
  - Targets **40% reduction in PM10** in 131 non-attainment cities.
  - Expanded monitoring networks, city action plans, and clean mobility pilots.
- **Policy & Regulatory Measures:**
  - GRAP in Delhi-NCR, BS-VI fuel norms, EV push, smog towers, anti-smog guns.
  - Industrial emission norms, construction dust rules, waste management guidelines.
- **Judicial Interventions:** Supreme Court and NGT directives on stubble burning, fireworks, and industrial emissions.
- **Technological Steps:** Real-time monitoring, satellite-based assessments, low-emission zones (pilot), and EV incentives.

Way Ahead:

- **Modernise Air Quality Governance:** Reform the AQI system by removing the 500 cap, aligning thresholds with WHO norms, and making PM2.5 the central regulatory metric for all clean-air planning.
- **Strengthen Environmental Institutions:** Increase staffing, funding, and technical capacity of pollution control boards, ensure independent oversight, and enforce real-time, science-based compliance monitoring.
- **Transform Transport and Industry:** Accelerate electrification of buses, autos and two-wheelers; shift freight to rail; and mandate strict industrial emission standards while phasing down coal-heavy processes.
- **Regulate Construction and Waste Burning:** Implement compulsory dust suppression, enclosure norms and mechanised sweeping, while reforming municipal waste systems to end open burning in all urban clusters.
- **Integrate Health & Community Action:** Embed AQI advisories in healthcare, expand lung-function testing and COPD screening, and promote citizen-led air monitoring and localised clean-air interventions.

Conclusion:

India's air pollution is **an invisible epidemic**—silent, chronic, and the largest threat to public health. The evidence is unequivocal: it shortens lives, harms the unborn, weakens the brain, and deepens inequity. Clean air must now be recognised as a fundamental right **and national priority**, anchored in science, backed by political will, and implemented with urgency to secure a healthier, equitable future.

INDIA'S CLIMATE AMBITIONS

Context: India is preparing to submit its next round of climate commitments (NDCs) for the 2035 horizon even as experts call for a clearer, economy-wide transition plan.

About India's Climate Ambitions:

What are NDCs?

- Nationally Determined Contributions (NDCs) are each country's self-defined climate commitments under the Paris Agreement, updated every five years (Article 4).
- They include targets for emissions reduction, renewable energy, adaptation, climate finance and technology deployment.

India's Current NDC Targets:

- **Reduce Emissions Intensity by 45% (2005–2030):** India commits to lowering CO_2 emissions per unit of GDP by almost half, signalling a shift toward cleaner production while sustaining economic growth.
- **50% Non-Fossil Installed Capacity by 2030:** India aims to ensure half of its total power capacity comes from solar, wind, hydro, nuclear and biomass, contingent on affordable global finance and technology transfer.
- **Additional 2.5–3 Bt CO_2 Carbon Sink:** Through large-scale afforestation and agroforestry, India plans to expand forest/tree cover to naturally sequester emissions by 2030.
- **Promote LIFE Movement:** India pledges to mainstream sustainable lifestyles through behavioural change campaigns encouraging low-carbon consumption and resource-efficient habits.
- **Strengthen Adaptation in Vulnerable Sectors:** Investments will be scaled in agriculture, water, coastal systems, Himalayan ecology, health and disaster management to reduce climate risks.
- **Mobilise Climate Finance & Technology:** India seeks both domestic funds and international support to expand renewable energy, adaptation systems, and indigenous research in climate technologies.

Performance of India's Climate Ambitions:

- Non-Fossil Capacity **Crossed 50% (June 2025):** India achieved its 2030 target ahead of time, indicating rapid renewable expansion and strong policy momentum.
- **Renewables Hit 51.5% Daily Share (July 2025):** For the first time, more than half of India's electricity demand was met from renewables in a single day, marking a milestone in grid integration.
- **Emission Intensity Reduced by 36%:** Steady efficiency gains and renewable uptake have sharply lowered carbon intensity, placing India ahead of its projected 2030 trajectory.
- **Global Renewable Ranking:** India now ranks 4th globally in total renewables, 3rd in solar, and 4th in wind, reflecting its emergence as a clean-energy powerhouse.
- **Rapid Electrification Trends:** Railways and urban mobility are shifting to electric systems, reducing oil dependence and creating structural emission reductions.

Challenges Associated with Climate Ambition:

- Absolute Emissions **Still Rising:** Despite efficiency gains, rapid GDP growth means total emissions will peak only around 2035, delaying net-emission decline.
- **Persistent Coal Dependence:** Coal remains critical for grid stability, making rapid phase-down difficult without viable alternatives or CCS solutions.
- **$62 Billion Annual Investment Need:** India requires sustained high-level investment through 2035 for renewables, storage, and grid upgrades, straining fiscal space.
- **Technology & Storage Gaps:** India lacks commercially scalable long-duration storage, green hydrogen systems, and CCS needed for deep decarbonisation.
- **Inadequate Climate Finance:** Global commitments fall short, forcing developing countries like India to self-finance major parts of the transition.
- **Just Transition Pressures:** Coal-heavy states must retrain workers, diversify economies, and ensure welfare as fossil fuel employment declines post-2040.

- **Adaptation Lag vs. Climate Risks:** Heatwaves, urban pollution and extreme weather are rising faster than India's health, water and urban adaptation capacities.

Way Ahead:

- **Announce a Peak-Emission Year (~2035):** Formally identifying the emissions peak will bolster India's credibility and align national planning with the 2070 net-zero roadmap.
- **Target 80% Non-Fossil Capacity by 2035:** Scaling solar, wind and storage to ~170 GW will allow clean electricity to dominate supply and meet rising demand reliably.
- **Phase Down Unabated Coal Post-2030:** Stopping new coal plants after 2030 and retiring older units gradually aligns emissions with India's long-term climate objectives.
- **Accelerate Electrification of Transport:** Electrifying railways, buses and three-wheelers will cut oil imports and urban pollution while supporting clean mobility ecosystems.
- **Strengthen Carbon Credit Trading Scheme:** CCTS must evolve with tighter norms and wider sector coverage to become a credible market tool for emission reductions.
- **Reform Electricity Pricing:** Time-of-day tariffs and market-based trading will allow flexible pricing, supporting variability in renewable-dominated grids.
- **Revive PM's Council on Climate Change:** A centralised apex body can coordinate federal action, monitor progress, and dynamically refine the national transition strategy.

Conclusion:

India has made early gains in renewables and efficiency, but the next phase needs deeper reforms and sharper targets. A credible, well-financed 2035 transition plan is essential to sustain global trust amid a warming climate. Clear timelines, strong investment and coordinated institutions will decide whether India can achieve a just and ambitious path to net-zero.

INSTITUTIONALISING ANIMAL REPRESENTATION

Context: A nationwide letter-petition movement urged the Supreme Court to strengthen animal protection laws and institutional representation.

About Institutionalising Animal Representation:

Status of the Human–Animal Divide:

- Modern democracy is built on an anthropocentric divide where only humans are political subjects, leaving animals reduced to property without any voice or representation.
- Democratic institutions view animals as non-rational and non-political beings, creating a structural vacuum where their welfare is ignored in policy and legal decisions.
- The PCA Act 1960 imposes fines as low as ten to fifty rupees for cruelty, revealing how the law treats animals as economic objects rather than sentient beings.
- Courts have recognised animal personhood in cases like Animal Welfare Board vs A Nagaraja (2014), yet statutory systems still categorise animals as "property" under IPC Sections 428 and 429.

Need for Democratic Representation of Animals

- **Correcting the Human–Animal Power Imbalance:** Animals have no electoral, economic or lobbying power, making their interests structurally invisible; representation ensures land use, food and infrastructure decisions do not default to human-only priorities.
- **Addressing Legal Erasure and Weak Protections:** Despite Art. 51A(g) and the SC's Nagaraja (2014) judgment, animals remain "property" under IPC 428–429 and PCA fines of ₹10–50 remain non-deterrent, requiring formal representation to fill this legal vacuum.
- **Preventing Systemic Harm by Economic Sectors:** Industrial farming, transport and urban projects routinely override welfare for profit; fiduciary bodies conducting ex-ante assessments can prevent institutionalised cruelty before harm occurs.
- **Ensuring Independent, Science-Based Decisions:** AWBI, SAWBs and SPCAs lack autonomy, budgets and enforcement; specialised institutions with veterinarians and

welfare scientists ensure unbiased, evidence-led policy-making.

Key Challenges to Institutional Animal Representation:

- **Outdated Welfare Laws:** Fines for cruelty under Section 11 remain ₹10–₹50 (unchanged since 1960), allowing abuse to persist despite Supreme Court affirmations of animal dignity in Nagaraja vs Union of India (2014).
- **Exploitation in Farming Systems:** India's 535.78 million livestock (20th Livestock Census) are governed by productivity norms, with 70–80% of hens confined in battery cages despite Law Commission Report 269 urging prohibition.
- **Infrastructure and Urban Planning Gaps:** Highways, rail lines and power projects rarely integrate wildlife corridors; between 2018–21, 330 elephants died from electrocution/train hits, fuelling conflict that caused 1,500+ human deaths (2019–22).
- **Weak and Non-Independent Institution:** AWBI functions under the same ministry promoting animal husbandry, causing conflict of interest, while many State Boards and District SPCAs exist only on paper with negligible funding or enforcement authority.
- **Constitutional and Legal Contradictions:** Though the Constitution mandates compassion (Art. 51A(g)), legal frameworks still treat animals as replaceable assets, undermining their welfare and enabling systemic exploitation across sectors.

Way Ahead:

- **Create Independent Fiduciary Institutions:** Establish constitutionally protected guardians for animals with fixed terms, multi-disciplinary expertise, power to review policies, and freedom from political or industrial capture.
- **Mandate Animal-Impact Assessments (AIA):** Integrate AIA into environmental clearances for roads, railways, mining and urban planning to protect corridors and reduce preventable deaths of elephants, leopards and urban animals.
- **Amend and Modernise the PCA Act:** Increase penalties to meaningful levels, redefine cruelty based on contemporary science, and recognise sentience to align with global welfare standards.
- **Strengthen AWBI, SAWBs and SPCAs:** Provide statutory independence, dedicated budgets, transparent appointments, and accountability systems including annual public audits and performance benchmarks
- **Institutionalise Parliamentary and Executive Oversight:** Create standing committees on animal protection to review legislation, scrutinise welfare impacts and ensure cross-sector alignment across agriculture, infrastructure and environment.
- **Public Education and Participatory Accountability:** Launch national campaigns on co-existence, responsible ownership, and humane practices, enabling citizens to monitor violations and demand institutional responsiveness.

Conclusion:

India's democracy cannot be complete while millions of sentient beings remain unrepresented and structurally invisible. Institutionalising animal representation is essential to bridge constitutional morality with governance practice. A rights-based, expert-driven framework is the only way to ensure justice and dignity for those who cannot speak for themselves.

BIOREMEDIATION

Context: India's growing pollution burden and recent expert discussions highlight the urgent need for bioremediation as a sustainable method to clean contaminated soil, water and waste sites.

About Bioremediation:

What it is?

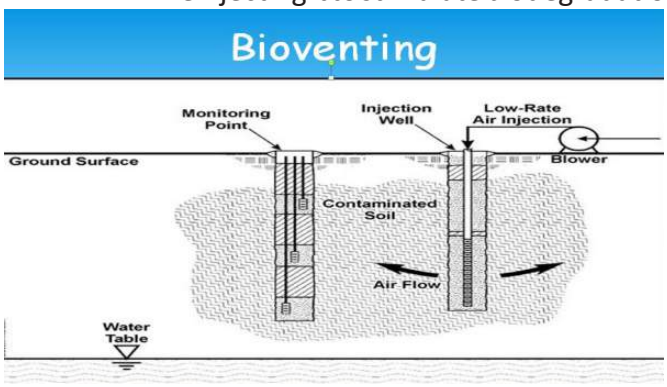
- Bioremediation means using living organisms—bacteria, fungi, algae, or plants—to break down, transform or detoxify environmental pollutants such as oil, pesticides, heavy metals, plastics and industrial chemicals.
- Microbes metabolise contaminants as food, converting them into harmless by-products like water, carbon dioxide, organic acids, or non-leachable metal forms.

Types of Bioremediations:

1. **In-situ Bioremediation (on-site)**
   Pollutants are treated directly at the contaminated location.
   - **Bioventing:** Injecting air + nutrients to stimulate indigenous microbes in unsaturated soil.
   - **Air Sparging:** Pumping air into groundwater to oxygenate microbes and strip volatile pollutants.
   - **Biobarriers/Biowalls:** Permeable trenches where microbes degrade

contaminants as groundwater flows through.

- **Water Recirculation Systems:** Extracting contaminated water, treating it and reinjecting it to stimulate biodegradation.



2. **Ex-situ Bioremediation (off-site)**
   - Contaminated soil or water is removed, treated in controlled reactors, and returned after cleaning—used when pollutant levels are **very high** or conditions cannot be controlled on-site.

Need for Bioremediation in India:

- **Growing Pollution Burden:** Rivers such as Ganga, Yamuna and Cauvery receive massive loads of untreated sewage and industrial effluents.
- **Industrial Contamination:** Urban and industrial sites show oil spills, heavy metals, pesticides, plastics, hydrocarbons, and hazardous waste.
- **High Cost of Conventional Clean-up:** Mechanical and chemical remediation are expensive, energy-intensive and generate secondary pollution.
- **India's Biodiversity Advantage:** India hosts diverse indigenous microbes adapted to heat, salinity and pollutants, making bioremediation more effective than imported technologies.
- **Sustainable, Scalable Solution:** Bioremediation is cheaper, eco-friendly, minimally invasive and suitable for large polluted landscapes.

Current Status in India:

Government & Institutional Efforts:

- **Department of Biotechnology (DBT):** Supports R&D under its Clean Technology Programme.
- **CSIR–NEERI:** Nodal agency for bioremediation pilot projects across contaminated sites.
- **IITs:** Research on oil-absorbing nanocomposites, pollutant-eating bacteria, and water-purifying microbial consortia.

Technological Advances:

- Use of **genetically modified (GM) microbes** to degrade persistent pollutants (plastics, hydrocarbons).

Best Practice:

- **Japan:** Integrates plant–microbe systems for urban waste cleanup.
- **EU:** Funds multi-country bioremediation research for oil spills and mining sites.

Challenges in Adoption:

- **Lack of Site-specific Data:** Pollutants vary by region; microbial solutions must be customised.
- **No Unified National Standards:** India lacks universal bioremediation protocols and certification systems.
- **Complex Pollutant Mixtures:** Mixed contaminants require microbial consortia, not single strains.
- **Regulatory Gaps for GM Microbes:** Use of engineered organisms risks ecological imbalance without strict biosafety oversight.
- **Slow Process & Unpredictability:** Bioremediation takes time and depends on environmental conditions—temperature, pH, oxygen, nutrients.

Way Forward:

- **Create National Standards:** Develop protocols, guidelines and certification for microbial formulations and site assessment.
- **Establish Regional Bioremediation Hubs:** Link universities with industries and local governments to tailor solutions for polluted sites.
- **Invest in Biosafety & Monitoring:** Strengthen regulation of GM microbes and ensure long-term ecological monitoring.
- **Integrate with National Missions:**
  - Swachh Bharat Mission
  - Namami Gange
  - Urban waste management and Smart Cities
- **Promote Public Awareness:** Educate communities on the safety and benefits of microbial technologies.

Conclusion:

Bioremediation offers India a **low-cost, sustainable and scientifically robust** pathway to restore polluted ecosystems. With rising industrialisation and complex waste streams, microbial solutions are not optional but essential. A coordinated national strategy—grounded in standards, biosafety and innovation—can transform India's environmental future.

Topics: Disaster and management.

LIGHTNING AN UNDERSTATED DISASTER IN INDIA

Context: Experts at the 9th National Lightning Conference warned that lightning remains India's deadliest yet underestimated natural disaster, despite a sharp rise in strikes due to climate change.

About Lightning an understated disaster in India:

What it is?

- Lightning is a rapid electrostatic discharge between clouds or between cloud and ground, accompanied by thunderstorms, intense rainfall, winds and sometimes hail. It is sudden, highly localised and instantly lethal, making mitigation challenging compared to slow-onset disasters.

Trends in India:

- Lightning is the single largest killer natural hazard in India, causing over 2,000 deaths annually.
- India has witnessed a ~400% rise in lightning strikes (2019–2025), with a 7–14% annual increase linked to warming.
- New hotspots have emerged in Rajasthan, Gujarat, Haryana, Punjab and Delhi, alongside persistent vulnerability in Madhya Pradesh, Bihar and Odisha.

Why lightning remains ignored as a disaster?

- **Dispersed nature:** Lightning fatalities occur as scattered, single-event incidents across villages and fields, preventing media visibility and policy recognition that usually follows large, concentrated disasters.
- **Low visibility of damage:** Unlike floods or cyclones, lightning rarely leaves large-scale structural destruction, leading to underestimation of its cumulative human and economic toll.
- **Data and research gaps:** Inadequate ground-based sensors, electric-field meters and testing laboratories limit precise mapping, forecasting and scientific understanding of lightning behaviour.
- **Last-mile communication failures:** Although forecasts exist, warnings often fail to trigger timely behavioural change at the village level due to language, access and institutional gaps.
- **Perception bias:** Lightning is widely viewed as an unavoidable "act of nature" rather than a disaster that can be mitigated through science, planning and awareness.

Implications of rising lightning risk:

- **Human loss:** Farmers, labourers, fishermen and pastoral communities working outdoors face disproportionate mortality, making lightning a livelihood-linked hazard.
- **Economic damage:** Lightning damages crops, livestock, power lines, telecom towers and buildings, imposing recurring but underreported economic losses.
- Climate linkage**:** Rising atmospheric electricity correlates with cloudbursts, extreme rainfall and floods, amplifying compound climate risks.
- **Regional vulnerability:** Semi-arid, plateau and hilly regions with limited shelters and warning infrastructure face increasing exposure and fatalities.

NDMA guidelines and initiatives on lightning

- **Early warning systems:** IMD provides location-specific lightning forecasts up to 48 hours through Damini, Mausam and Sachet apps for timely alerts.

- **Public advisories:** NDMA has issued standardised do's and don'ts to reduce risky behaviour during thunderstorms and lightning events.
- **Community-centric approach:** Training programmes for disaster managers, volunteers and panchayats aim to convert warnings into early action.
- **Lightning Resilient India Campaign:** Focuses on nationwide awareness, education, capacity-building and local mitigation strategies.
- **Mitigation Project on Lightning Safety (MPLS):** Targets high-risk states and districts with risk mapping, electric-field meters, alert poles and lightning protection in schools and anganwadis.

Why lightning must be formally recognised as a disaster?

- **Highest mortality hazard:** Lightning kills more people annually than any other natural hazard in India, warranting priority disaster status.
- **Climate change amplifier:** Rising temperatures directly increase lightning frequency, making future risks systemic rather than episodic.
- **Preventable deaths:** Evidence shows that early warnings combined with behavioural change can sharply reduce fatalities.
- **Localised governance need:** Formal recognition enables funding, district-level action plans and Gram Panchayat integration.
- **Disaster risk reduction alignment:** Inclusion aligns India's policy framework with the Sendai Framework's emphasis on early warning and resilience.

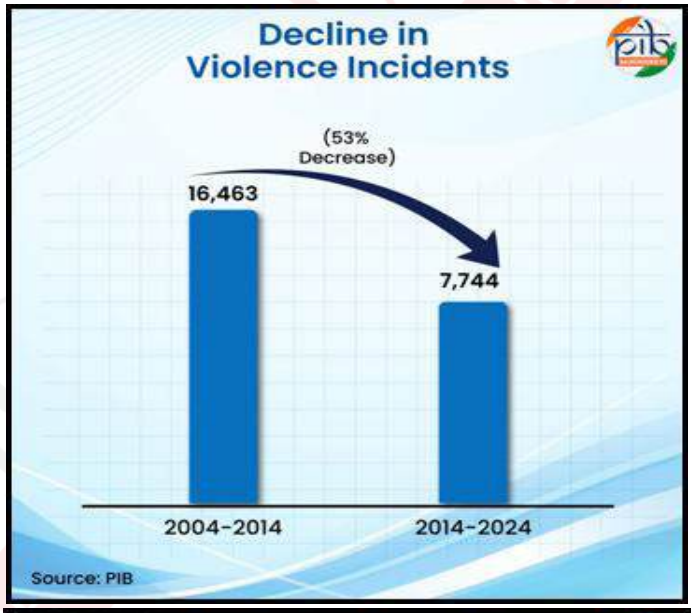
Conclusion:

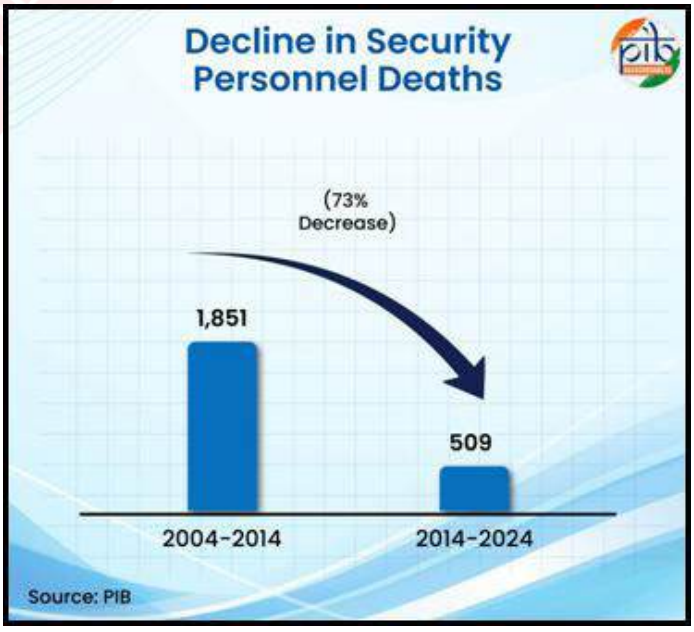
Lightning is no longer a sporadic weather hazard but a climate-driven, nationwide disaster with severe human costs. Treating it as a mainstream disaster can unlock better science, funding and local preparedness. Integrating lightning risk into disaster management plans is essential to save lives in a warming India.

Topics: Security challenges and their management in border areas; linkages of organized crime with terrorism.

FROM RED CORRIDOR TO NAXAL-FREE BHARAT

Context: India is close to achieving a Naxal-free Bharat, with Left-Wing Extremism (LWE) districts reduced from 126 (2014) to 11 (2025) and only 3 most-affected districts remaining.





About From Red Corridor to Naxal-Free Bharat:

Trends in Naxalism in India (2014–2025):

1. **Sharp territorial contraction:** Maoist influence shrank from **126 to 11 districts**, with core Red Corridor areas dismantled.

Eg: Most-affected districts reduced from **36 to 3** by 2025.

2. **Steep fall in violence and casualties:** Sustained decline in incidents and deaths.

   Eg: Violent incidents down **53%**, civilian deaths down **70%**, and security force deaths down **73%** compared to 2004–14.

3. **High cadre attrition:** Arrests, surrenders and neutralisation peaked.

   Eg: 2025 alone saw **317 neutralised, 800+ arrested, ~2,000 surrendered**.

4. **Collapse of Maoist parallel governance:** Roads, telecom and policing broke jungle sanctuaries.

History of Naxalism in India:

1. **Origin (1967):** The Naxalbari uprising in West Bengal emerged from landlessness and exploitative agrarian relations, turning class conflict into armed mobilisation.

   Eg: Charu Mazumdar's line popularised "land to the tiller" through Maoist-inspired revolutionary politics.

2. **Expansion (1980s–2000s):** The movement spread into tribal Fifth Schedule belts where weak administration, land alienation and forest control created deep state-society distrust.

   Eg: The 2004 formation of **CPI (Maoist)** unified factions and intensified LWE across central India.

3. **Peak and decline (2005–2014):** Maoists built "liberated zones" and parallel systems, but coordinated state action gradually increased pressure through policing and development.

   Eg: The **Red Corridor** expanded from AP to Jharkhand, yet large operations began shrinking safe havens.

4. **Decisive rollback (2014 onwards):** A unified security-development approach with permanent camps, roads and telecom broke Maoist mobility and recruitment networks in core areas.

   Eg: Strongholds like **Bastar** and **Dandakaranya** saw sustained clearance and governance footprint expansion.

Initiatives taken to counter Naxalism:

1. **Constitutional & governance measures:**
   - **Fifth Schedule framework:** It provides special governance for Scheduled Areas via Governor powers and Tribal Advisory Councils, aiming to prevent exploitation and land alienation.
   - **PESA Act, 1996:** It empowers Gram Sabhas to control local resources and consent processes, intended to deepen self-rule and reduce outsider domination.
   - **Forest Rights Act, 2006:** FRA recognises individual and community forest rights, correcting historical injustice and strengthening livelihood security for forest dwellers.
2. **Development & welfare schemes:**
   - **Infrastructure saturation:** Roads, electricity and telecom reduce isolation, expand service delivery, and allow faster security response in remote interiors.
   - **Financial inclusion:** Banking access cuts cash dependence, enables DBT delivery, and reduces extortion and shadow-economy influence in affected blocks.
   - **Skill and education push:** Training and local employability reduce the recruitment pool by giving youth credible alternatives to insurgent networks.
3. **Security & enforcement:**
   - **Fortified policing:** Permanent forward presence prevents Maoist re-occupation, improves area domination, and protects

development works from disruption.

- **Financial choking:** Seizures and attachments disrupt extortion channels, arms procurement and urban networks that sustain the insurgency ecosystem.
- **Surrender-cum-rehabilitation policy:** Incentives, security guarantees and livelihoods convert cadres into stakeholders of peace and weaken local Maoist manpower.

Challenges to complete eradication:

1. **Governance deficits persist:** Courts, policing, health and schools remain thin in interiors, making the state visible mainly through coercion, not services.

   Eg: Low tribal representation in permanent bureaucracy sustains "outsider rule" perceptions.

2. **Weak implementation of rights laws:** If FRA/PESA protections look negotiable, new displacement and distrust can re-create conditions for mobilisation.

   Eg: Gram Sabha consent bypass in mining belts becomes a recurring grievance trigger.

3. **Socio-economic vulnerability:** Poverty, land disputes and insecure livelihoods keep communities susceptible to coercion, promises of justice, or rent-seeking networks.

   Eg: Displacement around mineral corridors fuels long-term anger and instability.

4. **Ideological residue and urban support:** Even with territorial losses, propaganda, recruitment narratives and digital influence can persist and re-organise.

   Eg: Online information warfare can revive legitimacy even when armed capability declines.

Way ahead

1. **Governance-led consolidation:** After security gains, the state must win trust through justice delivery, primary health, schools and grievance redress, not only patrols.

   Eg: Fast-track courts and tribal health cadres can reduce everyday exploitation.

2. **Deepen local self-rule:** Real devolution of funds/ functions to Gram Sabhas makes democracy meaningful and blocks the space for parallel "people's courts."

   Eg: Adopt selective features of **Sixth Schedule** autonomy where contextually suitable.

3. **Administrative indigenisation:** Recruiting locals into police, revenue and frontline services improves legitimacy, language access and cultural sensitivity in governance.

   Eg: Scaling the **Bastariya Battalion** model strengthens ownership of peace.

4. **Protect rights-based laws:** Enforceable consent, CFR recognition and transparent land processes prevent fresh alienation and pre-empt insurgent narratives.

   Eg: Make Gram Sabha consent **mandatory, time-bound, and auditable** for projects.

Conclusion:

India has decisively broken the territorial and military backbone of Naxalism through a calibrated mix of security, development and rehabilitation. The next phase demands **governance reform, justice delivery and tribal empowerment** to prevent relapse. A post-Maoist India will succeed only when **constitutional promises translate into lived realities** in Fifth Schedule areas.

GENERAL STUDIES – 4

Attitude

ATTITUDE BEATS APTITUDE IN THE MODERN WORKPLACE

Context: An article highlights why **attitude increasingly determines early-career success,** even when skills are comparable. The discussion gains relevance amid AI-driven workplaces where adaptability, ownership and coachability matter as much as technical ability.

About Attitude beats aptitude in the modern workplace:

What it is?

- Attitude beating aptitude refers to the growing reality that **mindsets and behaviours**—such as openness to learning, accountability, resilience and collaboration—often determine professional growth more than raw technical skills, especially in the early years of a career.

Importance of attitude over aptitude in the workplace:

- **Learnability over static knowledge:** In fast-changing roles, openness to learning and experimenting enables employees to stay relevant, whereas fixed skill sets quickly become outdated.
- **Ownership and accountability:** Employees who take responsibility for outcomes rather than merely completing tasks build trust and are seen as reliable contributors.
- **Ability to handle ambiguity:** Work environments often lack perfect clarity, and those who remain calm, adaptive and solution-oriented perform better under uncertainty.
- **Collaboration and interpersonal maturity:** A positive attitude enables effective teamwork, respectful communication and conflict resolution, which are essential in interdependent workplaces.
- **Coachability and growth mindset:** Willingness to accept feedback and improve continuously signals maturity and long-term leadership potential.

Importance of aptitude in the workplace:

- **Foundation of professional competence:** Technical and cognitive aptitude ensures minimum standards of quality, accuracy and safety in professional work.
- **Efficiency and problem-solving ability:** Strong aptitude allows faster understanding of tasks and logical resolution of complex challenges.
- **Credibility in specialised roles:** In technical or regulated domains, aptitude builds confidence among peers, supervisors and stakeholders.
- **Innovation and analytical depth:** High aptitude supports structured thinking, experimentation and the creation of scalable solutions.
- **Reduced training dependency:** Employees with sound aptitude require less hand-holding, saving organisational time and resources.

Challenges to developing the right attitude in workplaces:

- **Fear of making mistakes:** Over-emphasis on perfection discourages questioning and experimentation, limiting behavioural growth.
- **Rigid hierarchies:** Power distance often prevents young professionals from seeking clarity or expressing ideas openly.
- **Digital and remote disengagement:** Limited human interaction reduces informal learning and emotional alignment with teams.
- **Credential-based entitlement:** Excessive focus on degrees and ranks can weaken humility and willingness to learn.
- **Low feedback literacy:** Many struggle to separate feedback on work from personal worth, leading to defensiveness.

Methods to instil attitude and aptitude in modern adults:

- **Continuous learning culture:** Integrating behavioural and technical learning encourages adaptability rather than one-time skill acquisition.
- **Regular, structured feedback:** Frequent feedback helps individuals reflect, correct

course and build accountability.

- **Experiential learning at work:** Learning through real tasks strengthens both competence and confidence simultaneously.
- **Ethics-based training:** Emphasising integrity, responsibility and fairness shapes attitudes that sustain trust.
- **Mentorship and role modelling:** Observing senior professionals demonstrates how skills and attitude operate together in practice.

Conclusion:

Aptitude enables entry into the workplace, but **attitude** governs growth**, trust and leadership**. Ethical behaviour, accountability and openness to learning convert skills into sustained excellence. In the long run, **character becomes the true multiplier of competence.**

Applied Ethics

BEYOND ALGORITHMS: WHY THOUGHT STILL DEFINES BEING

Context: Rapid advances in artificial intelligence and automation are challenging long-held ideas about thought, consciousness, and human uniqueness, reviving debates once central to philosophy.

- At the same time, the decline of philosophy in public discourse has raised concerns about society's ethical and intellectual preparedness for technological change.

About Beyond Algorithms: Why Thought Still Defines Being

What it is?

- Technology and philosophy together examine how tools, machines, and algorithms reshape human values, knowledge, ethics, and identity. While technology expands capability, philosophy interrogates meaning, purpose, responsibility, and limits of such expansion.

Thought as the Basis of Existence:

- **Cartesian Rationalism and Epistemic Certainty:** Descartes' *cogito* establishes **self-conscious rational thought** as the indubitable foundation of existence, privileging epistemic certainty over sensory or empirical doubt.
- **Intentionality as Moral Distinction:** Unlike AI's computational outputs, human thought possesses **intentionality**—the directedness of consciousness—central to moral responsibility and ethical accountability.
- **Self-awareness and Reflexive Agency:** Human cognition is **reflexive**, capable of evaluating its own beliefs and actions, a prerequisite for **moral agency** absent in algorithmic systems.
- **Normative Reasoning vs Instrumental Rationality:** Human thought engages in normative reasoning (what ought to be), whereas AI operates within **instrumental rationality**, optimising means without moral ends.
- **Personhood and Moral Status:** Ethical traditions (Kantian ethics) ground **personhood** in autonomy and dignity, not mere information processing—distinguishing humans from synthetically intelligent entities.

Decline of Philosophy in Public Life:

- **Erosion of Practical Wisdom (Phronesis):** Public discourse increasingly values technical expertise over **phronesis**—ethical judgment rooted in lived human experience.
- **Utilitarian Education Paradigm:** Market-driven systems prioritise economic utility over critical reflection, marginalising philosophy as "non-productive" despite its civic value.
- **Fragmentation of Moral Discourse:** The loss of philosophical frameworks has led to moral relativism and polarized debates lacking shared

ethical reasoning.

- **Technocratic Governance Bias:** Policy-making increasingly relies on technocratic rationality, sidelining ethical deliberation on justice, rights, and social consequences.
- **Displacement by Ideology and Dogma:** In the absence of philosophical skepticism, ideological absolutism fills the vacuum, reducing nuanced ethical inquiry to binary moral postures.

Misconceptions Behind Philosophy's Perceived Decline:

- **Scientific reductionism replacing normative inquiry:** Science explains causal mechanisms (*how things work*), but cannot address **normative questions** of value, purpose, and moral obligation, which remain philosophical.
- **Ideology masquerading as philosophy:** Dogmatic ideologies offer closed answers and moral certainty, unlike philosophy's commitment to critical skepticism, fallibilism, and open-ended inquiry.
- **Hyper-specialisation and temporal acceleration:** Academic fragmentation and fast-paced economies devalue **slow reasoning**, reflection, and conceptual synthesis essential for philosophical insight.
- **Materialist bias in measuring relevance:** Philosophy's non-quantifiable outcomes—ethical clarity, moral imagination, and civic reasoning—are obscured in productivity-driven evaluative frameworks.

Why Philosophy Remains Indispensable?

- **Ethical navigation under uncertainty:** When empirical data is inconclusive, philosophy provides **ethical frameworks**—utilitarian, deontological, virtue-based—to guide responsible decision-making.
- **Epistemic resilience against manipulation:** Philosophical training cultivates critical rationality, enabling individuals to resist misinformation, propaganda, and algorithmic persuasion.
- **Foundations of justice and rights:** Concepts like dignity, equality, and moral worth are philosophical constructs that underpin legal and political institutions.
- **Meaning beyond optimisation:** Philosophy addresses existential questions of purpose and flourishing, which lie beyond computational efficiency or economic optimisation.

Technology as the Moment of Philosophy's Return:

- **AI and the problem of moral agency:** Autonomous systems raise questions about responsibility, accountability, and intent, requiring philosophical—not technical—resolution.
- **Algorithmic power and epistemic justice:** Bias, opacity, and surveillance demand philosophical scrutiny of fairness, consent, and distributive justice in digital systems.
- **Language, truth, and digital distortion:** Echo chambers and misinformation revive Wittgensteinian concerns about language, meaning, and truth in public discourse.
- **Human relevance in an automated age:** As machines outperform humans instrumentally, philosophy reasserts human dignity, creativity, and moral uniqueness as non-replaceable values.

Conclusion:

As technology accelerates, philosophy is not fading—it is quietly becoming essential again. In an age of intelligent machines, philosophy ensures that progress remains human-centred, ethical, and meaningful. The future demands not less philosophy, but deeper reflection on what it means to think, to choose, and to be human.

FACTS FOR PRELIMS

1. GENERAL STUDIES – 1

ART AND CULTURE

Architecture

NATIONAL MARITIME HERITAGE COMPLEX (NMHC) AT LOTHAL

Context:

India and the Netherlands have signed an MoU to cooperate on the development of the National Maritime Heritage Complex (NMHC) at Lothal, Gujarat.

About National Maritime Heritage Complex (NMHC) at Lothal:

What it is?

- The National Maritime Heritage Complex (NMHC) is a flagship cultural and heritage project of the Ministry of Ports, Shipping and Waterways (MoPSW) aimed at showcasing India's 4,500–5,000-year-old maritime legacy through a world-class museum and cultural complex.

Location:

Lothal, near Ahmedabad, **Gujarat**

Nodal Ministry:

Ministry of Ports, Shipping and Waterways

- Developed as India's first comprehensive national institution dedicated exclusively to maritime heritage.

Key features:

- **World-class maritime museum** with galleries on ancient navigation, shipbuilding, trade routes, naval history, and coastal cultures
- **International collaboration**, including partnership with the National Maritime Museum, Amsterdam, for design, curation, and conservation
- **Maritime research and training centre** for scholars and professionals
- **Venue for global maritime fairs, exhibitions, and cultural events**
- **Inclusive public outreach** with affordable access for students, local communities, and underprivileged groups
- Integration of **modern technology and immersive visitor experiences**

About Lothal:

- **Located in:**
  - **Lothal**, near Ahmedabad, Gujarat
  - Part of the **Indus Valley (Harappan) Civilization** cultural landscape
- **Excavation:**
  - Excavated in **1957** by the Archaeological Survey of India
  - Dates back to around **2400 BCE**
  - Recognised for the discovery of the **world's earliest known man-made dockyard**
- **Key features and significance:**
  - The Lothal dockyard connected the settlement to ancient maritime trade routes linking Sindh, Saurashtra, Mesopotamia, Egypt, and beyond.
  - Evidence of advanced town planning, tidal regulation, and maritime engineering.
  - A major port town that facilitated not only trade in goods but also the exchange of cultures, ideas, and technologies.
  - Demonstrates India's continuous maritime tradition spanning over 4,500–5,000 years.

ELLORA CAVES

Context:

Scottish historian urged the Maharashtra government to spotlight the neglected yet significant heritage sites

around the Ellora Caves, such as Malik Ambar's tomb, the first Peshwa's tomb, and the empty tomb of the last Ottoman Caliph.

About Ellora Caves:

What it is?

- Ellora Caves are a UNESCO World Heritage Site comprising 34 monumental rock-cut temples and monasteries representing Buddhist, Hindu, and Jain traditions. They form one of the largest rock-cut cave complexes in the world.

Location:

Situated in Chhatrapati Sambhajinagar (Aurangabad), Maharashtra.

History:

- Constructed between **600 CE to 1000 CE**.
- **12 Buddhist caves (caves 1–12): ~200 BCE to 600 CE:** Early monastic caves with viharas, meditation cells and chaitya halls, marking the shift from simple rock shelters to more structured prayer and learning spaces.
- **17 Hindu caves (caves 13–29): ~500 CE to 900 CE:** Rashtrakuta-era caves with bold iconography, massive pillars and grand sculptures, culminating in the Kailasa temple—the finest example of Indian rock-cut engineering.
- **5 Jain caves (caves 30–34): ~800 CE to 1000 CE:** Later additions marked by intricate carvings, ornate pillars and themes of asceticism, showcasing Ellora's spirit of multi-religious coexistence and artistic refinement.
- Designated UNESCO World Heritage Site in **1983**.

Key Features:

- **Kailasa Temple (Cave 16):**
  - Largest **single monolithic rock excavation** in the world.
  - Carved from top to bottom, removing **1,50,000–2,00,000 tonnes** of rock.
  - Chariot-shaped monument dedicated to **Lord Shiva**.
- **Notable carvings:** Nandi Mandapa, Life-size elephants, Ravana shaking Mount Kailasa, and Narasimha slaying the demon.
- **Multi-Religious Harmony:**
  - Rare archaeological site exhibiting **Hindu–Buddhist–Jain coexistence** across centuries.
- **Architectural Excellence:**
  - **Complex includes:** Elaborate facades, multi-story halls, Sculptures, pillars, windows and stairways carved from solid basalt.
  - **Nearby Heritage Cluster:**
  - **Khultabad:** Naga veneration sites, Sufi shrines.
  - Malik Ambar's tomb, First Peshwa's tomb, Empty tomb of the last Ottoman Caliph.

Paintings

BOREENDO

Context:

UNESCO has inscribed Pakistan's Boreendo, a rare clay vessel-flute linked to the Indus Valley musical tradition, on the Intangible Cultural Heritage in Need of Urgent Safeguarding list.

About Boreendo:

- **What it is?**
  - The Boreendo is a **spherical clay vessel-flute**, producing mellow, breathy tones used in folk melodies, pastoral songs and winter gatherings in Sindh.
- **Origin:** It originates from **Keti Mir Muhammad Lund in Sindh**, with roots tracing back to Mohenjo-daro artefacts, indicating a long sonic lineage from the Indus Valley Civilization.

- **Characteristics:**
  - **Terracotta Craft:** Handmade from sun-dried and kiln-fired clay, keeping the instrument fully eco-friendly.
  - **Spherical Vessel Design:** Egg-shaped hollow body with 1 inlet and 3–5 holes enables simple melodic variation.
  - **Tilt-Based Sound Control:** Pitch and tone shift by tilting the mouthpiece rather than complex fingering.
  - **Community Decoration:** Women paint natural motifs, embedding local aesthetics into each instrument.
  - **Haunting Acoustic Tone:** Produces soft, breathy notes traditionally played at bonfires, weddings, and festivals.
  - **Size-Linked Sound Range:** Larger Boreendos give deeper resonance; smaller ones create sharper tones.
  - **Oral Transmission of Skills:** Craft and playing techniques taught in artisan families, now also via schools and festivals.
  - Cultural Symbolism**:** Represents Thari pastoral identity and strengthens community-nature bonds.
- **Cultural Significance:** It survives through only a **single maestro (Zulfikar Loond)** and one potter, making safeguarding essential to preserve both music and craft heritage.

About the Indus Valley Flute Tradition:

- **What it is?**
  - Archaeological excavations at **Mohenjo-daro and Harappa** have revealed terracotta and bone flutes, some nearly identical to the modern Boreendo.
- **Discovered in?**
  - Flute fragments were found at **Mohenjo-daro**, Harappa, and adjoining sites of the Indus Valley Civilization (3300–1300 BCE).
- **Key Characteristics:**
  - Made from clay, bone, or shell.
  - Carefully drilled finger holes; sometimes uneven spacing (microtonal scales).
  - Cylindrical or spherical forms similar to today's vessel flutes.
  - Evidence suggests both solo and group musical performances.

Religion and Festivals

DANDAMI MARIA TRIBE

Context:

The Bison Horn Maria dance of the Dandami Madia (Maria) tribe of Bastar, Chhattisgarh, has drawn attention for its enduring cultural vitality despite modern influences.

About Dandami Maria Tribe:

Who they are?

- The Dandami Maria, also known as Bison Horn Maria or Khalpati Maria, are a tribal community belonging to the broader Gond (Koytorias) ethnic group.
- They are recognised for their distinctive ceremonial dance and headgear resembling bison horns, which has become a cultural marker of their identity.

Origin:

- The Dandami Maria trace their lineage to the **ancient Gondwana region**, once spread across central India.
- They identify as part of the **Gond tribal tradition**, one of the oldest indigenous groups of the Deccan plateau.
- Linguistically, they speak **Dandami Maria**, with many also using **Gondi dialects**, an oral language of **Dravidian origin**.

Habitat and Distribution:

- Predominantly inhabit the **Bastar region of southern Chhattisgarh**, especially in **Darbha, Tokapal, Lohandiguda, Dantewada**, and surrounding forested tracts.
- Their settlements are closely integrated with **dense forests**, shaping their subsistence patterns, rituals, and worldview.
- They practice **agriculture**, supplemented by **hunting and fishing**.

Key Cultural Characteristics:

- **Bison Horn Maria Dance:**
  - Performed by both men and women during festivals, rituals, and communal gatherings.
  - Men wear **horn-shaped bamboo headgear** decorated with bison or cattle horns, feathers, cowries, and cloth strips, along with bead necklaces and ankle bells.
  - Women wear **handwoven saris**, heavy **silver and brass jewellery**, coin ornaments, and ceremonial crowns.
- **Social and Cultural Life:**
  - The **ghotul (youth dormitory)** plays a vital role in socialisation, cultural transmission, and community cohesion.
  - Distinct hairstyles, traditional ornaments, and ceremonial objects such as tobacco boxes and combs are culturally significant.
  - They permit **divorce and widow remarriage**, reflecting flexible social norms.

Significance:

- Represents a living tribal heritage that preserves Gond identity and pre-Aryan cultural traditions.
- Embodies a nature-centric worldview, celebrating hunting traditions, seasonal cycles, and forest deities like Budhadev and Danteshwari Mai.

HORNBILL FESTIVAL

Context:

The 26th Hornbill Festival (2025) in Nagaland is underway, with day three showcasing vibrant cultural performances by 18 Naga tribal troupes at Kisama Heritage Village.

About Hornbill Festival:

What it is?

- A premier cultural festival of Nagaland, known as the **"Festival of Festivals,"** celebrating the heritage, traditions, and artistic expressions of all major Naga tribes.

Celebrated in:

- Held annually from December 1–10 at Kisama Heritage Village, near Kohima in Nagaland.

History:

- Started in **2000** by the Government of Nagaland to promote inter-tribal unity, preserve indigenous culture, and boost tourism.
- Named after the **Hornbill**, a revered bird in Naga folklore symbolising valour, beauty, and tradition.

Key Features:

- Daily cultural shows featuring traditional dances, folk songs, war cries, and indigenous sports.
- **Display of Naga arts:** wood carving, textiles, crafts, paintings, sculptures.
- Food festivals, herbal medicine stalls, flower shows, and traditional archery & wrestling.
- **Major events:** Hornbill International Rock Festival, Morung exhibitions, fashion shows, and craft bazaars.
- Participation from international partner countries and neighbouring states.

Significance:

- Revives, preserves, and promotes the diverse cultural identity of Nagaland's 17 major tribes.
- Acts as a platform for cultural assimilation, where village elders and youth interact and exchange traditions.
- Enhances tourism, economic activity, and global cultural ties.

Textiles

NARSAPURAM LACE CRAFT

Context: The Prime Minister highlighted Narsapuram Lace Craft in *Man Ki Baat* as a model of women-led economic empowerment and cultural continuity.

- The craft's Geographical Indication (GI) tag has renewed national attention on this traditional livelihood of the Godavari region.

About Narsapuram Lace Craft:

What it is?

- Narsapuram Lace Craft is a handmade crochet lace tradition, where fine threads are transformed into intricate lace products using a single crochet hook, reflecting high skill and patience.

Region:

West Godavari and Dr. B.R. Ambedkar Konaseema districts of Andhra Pradesh

- **Key centres:** Narsapur, Palacole, Razole and Amalapuram

History:

- Introduced in **1844** when lace-making techniques were taught to local women by European missionaries.
- The craft survived major historical shocks such as **famines and economic depressions**, sustaining women's livelihoods across generations.
- Over time, it evolved into a globally recognised hand-crafted textile tradition.

Key characteristics:

- **Raw materials:** Uses fine cotton threads, along with silk, rayon or synthetic yarns for decorative and export-quality products.
- **Tools:** Crafted using crochet hooks of varying sizes to produce different textures and lace densities.
- **Technique:** Involves looping and interlocking stitches manually to form delicate lace structures without machinery.
- **Design motifs:** Features floral, paisley and geometric patterns inspired by nature and traditional aesthetics.
- **Product range:** Includes garments, home furnishings and accessories such as doilies, bedspreads, table linen, cushion covers, stoles and wall hangings.

Significance:

- The craft provides regular income to thousands of women, making them primary contributors to household economies.
- It safeguards an indigenous textile tradition passed down through generations.

Dance

HAKA DANCE

Context:

The Māori haka recently drew global attention after being performed as a protest gesture in New Zealand—both during a counter-protest against a Sikh Nagar Kirtan in Auckland.

About Haka Dance:

What it is?

- Haka is a traditional Māori posture dance involving vigorous rhythmic movements—stamping feet, slapping thighs and chest, chanting (waiata), and intense facial expressions. It conveys strength, unity, pride, challenge, or protest.

Origin:

- Originates from the **Māori**, the indigenous Polynesian people of **Aotearoa (New Zealand)**.
- Rooted in Māori mythology: the dance is associated with **Tāne-rore**, son of the sun god Tama-nui-te-rā and summer goddess Hine-raumati.
- The shimmering air on hot days is believed to be Tāne-rore dancing—symbolised by trembling hand movements in haka.

Key characters / contributors:

- **Te Rauparaha** (Ngāti Toa chief): Composer of the most famous haka **"Ka Mate"** (c. 1820).
- **Māori iwi (tribes)**: Custodians and performers

of diverse haka traditions.

Types of Haka:

- **Ka Mate:** Celebrates survival and resilience.
- **Peruperu:** War haka performed before battle.
- **Ngeri:** Short, informal haka to energise participants.
- **Pōwhiri:** Welcoming haka during formal greetings.
- **Manawa wera:** Performed at funerals or memorials to express grief.

Significance:

- Cultural identity**:** Symbol of Māori heritage, ancestry, and collective memory.
- **Social function:** Used in welcomes, protests, celebrations, mourning, and storytelling.
- **Political expression:** A non-violent, culturally rooted form of dissent and assertion of indigenous rights.

NATYASHASTRA

Context:

During the 20th Session of UNESCO's Intergovernmental Committee for Safeguarding Intangible Cultural Heritage (ICH) in New Delhi, IGNCA organised an academic programme on Natyashastra.

About Natyashastra:

What it is?

- The Natyashastra is the foundational Sanskrit treatise on drama (natya), dance (nritya and nritta), music (sangita), aesthetics, and stagecraft in the Indian tradition.
- It is regarded as the Natya Veda (Fifth Veda)—intended to communicate ethical, aesthetic, and social values to all sections of society through performance.

Authored by:

Traditionally attributed to **Bharata Muni**.

Language: Composed in **Classical Sanskrit**, primarily in **śloka (verse) form**, with a few prose explanations in later recensions.

History and Composition:

- Broadly dated to **c. 200 BCE – 200 CE** (scholarly consensus range).
- The text evolved from an **oral performance tradition** before being codified.
- The most influential classical commentary is **Abhinavagupta's Abhinavabharati (c. 10th–11th century CE)**.

Key features of the text:

- Consists of **36 chapters** (some traditions count 37).
- Covers the entire lifecycle of theatrical production.
- **Rasa theory (core contribution):** Explains aesthetic experience through Rasa–Bhava framework; classical rasas include Shringara, Hasya, Karuna, Raudra, Veera, Bhayanaka, Bibhatsa, Adbhuta (later tradition adds Shanta).
- **Four-fold acting tools (Abhinaya):** Describes Angika (body), Vachika (speech), Aharya (costume/props), Sattvika (inner emotion) as essential to performance.
- **Dramaturgy & stagecraft:** Details plot construction, roles, performance styles, theatre space, costumes, make-up, and direction—making it a complete production manual.
- **Dance & gesture codification:** Elaborates mudras/hastas, body positions, facial/eye movements, and units like karanas, enabling standardised training.
- **Integration of arts:** Treats performance as a synthesis of music + rhythm + movement + expression, making "theory and praxis" inseparable.

Significance:

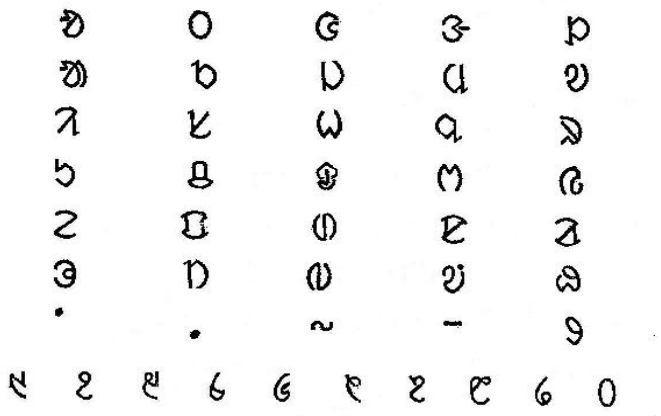
- **Civilisational foundation:** Provides the theoretical base for India's classical performing arts ecosystem—dance, theatre, music pedagogy and aesthetics.
- **Cultural continuity:** Helps reinterpret classical forms for contemporary theatre and performance training without breaking tradition.

Miscellaneous

THE SANTHALI LANGUAGE

Context:

President of India highlighted the role of language and literature in binding communities during the centenary celebrations of the Ol Chiki script and Santali Language Day.



About The Santhali Language:

What it is?

- Santhali is one of India's most ancient living tribal languages, primarily spoken by the Santhal community and recognised in the Eighth Schedule of the Constitution.

Origin:

- Belongs to the **Munda branch of the** Austroasiatic language family, distinct from Indo-European languages.
- Traditionally transmitted through **oral literature, songs, folklore and rituals**.
- Acquired its own script, **Ol Chiki**, in **1925**, developed by **Pandit Raghunath Murmu**, giving the language a written identity.

Current status:

- Included in the Eighth Schedule through the **92nd Constitutional Amendment Act, 2003**.
- Spoken by about **7 million people in India**, mainly across Jharkhand, Odisha, West Bengal and Bihar, and also in Nepal and Bangladesh.

Key features:

- **Distinct script – Ol Chiki:** A phonetic and scientific script designed to accurately represent Santhali sounds, unlike earlier borrowed scripts.
- **Austroasiatic linguistic traits:** Agglutinative structure, tonal elements, and word formation through suffixes, shared with related Munda languages like Ho and Mundari.
- **Strong oral tradition:** Rich corpus of folk songs, myths and storytelling that preserves Santhal history, ecology and social values.
- Cultural identity **marker:** Language and script function as symbols of tribal self-respect, cohesion and continuity.

ARCHAEOLOGISTS FIND 2,000-YEAR-OLD LABYRINTH REVEALING INDIA'S ROLE IN ANCIENT GLOBAL TRADE

Context:

Archaeologists have uncovered a 2,000-year-old circular stone labyrinth in Maharashtra's Solapur district, the largest of its kind in India.

About Archaeologists find 2,000-year-old labyrinth revealing India's role in ancient global trade:

What it is?

- The find is a massive circular stone labyrinth constructed using carefully laid concentric stone circuits.
- It is dated to nearly 2,000 years ago and linked to the Satavahana dynasty (1st–3rd century CE).

Discovered at:

- Located in the Boramani grasslands, Solapur district, **Maharashtra**.
- The semi-arid grassland ecosystem limited excavation, aiding long-term preservation of the structure.

Key features:

- **Size:** Approximately **50 feet × 50 feet**, making it

the **largest circular labyrinth in India**.

- **Design:** Comprises **15 concentric stone circuits**, the highest number recorded so far in Indian circular labyrinths.
- **Form:** Circular layout, distinct from the larger but square labyrinth found at **Gedimedu, Tamil Nadu**.
- **Setting:** Situated in open grasslands, not within settlements, temples, or forts.

Connections within India:

- Similar, smaller labyrinths have been found in **Sangli, Satara, and Kolhapur**, indicating a **regional network** across western Maharashtra.
- Their alignment suggests links between **inland Deccan routes and** western coastal ports such as those used in Roman trade.
- Maharashtra's location made it a **trade conduit** between interior production centres and Arabian Sea ports.

Significance:

- The circular motif resembles labyrinth designs on ancient Roman coins from Crete, many of which have been found in Indian trade hubs.
- Likely served as navigational or symbolic signposts for merchants transporting spices, textiles, and precious stones.
- Reinforces Maharashtra's role as a key crossroads in ancient global commerce.

PARAM VIR CHAKRA (PVC)

Context:

On Vijay Diwas 2025, President Droupadi Murmu inaugurated the 'Param Vir Dirgha' at Rashtrapati Bhavan, where portraits of all 21 Param Vir Chakra awardees were displayed.

- This replaced portraits of British Aide-de-Camps, symbolising India's continued effort to shed colonial legacies.

About Param Vir Chakra (PVC):

- **What it is?**
  - The Param Vir Chakra is **India's highest military gallantry award**, conferred for the most conspicuous bravery, valour, and supreme sacrifice in the presence of the enemy during wartime.
- **Instituted in:** 26 January 1950, coinciding with the enforcement of the Constitution of India.
- **Key features:**
  - Open to **personnel of all ranks** of the Army, Navy, Air Force, Territorial Army and other lawfully constituted armed forces.
  - Can be awarded **posthumously**; the majority of recipients have received it after martyrdom.
  - Comes with a **monthly honorarium of ₹3,000**, with an additional ₹3,000 for each bar awarded.
- **Criteria for award:**
  - Awarded only in wartime.
  - Recognises exceptional courage, indomitable spirit, and self-sacrifice in the face of the enemy.
- **Winners so far:**
  - **21 awardees** till date.
  - **14 awarded posthumously**.
  - Conferred across **four major wars** fought by India.

About Aide-de-Camps (ADCs):

- An Aide-de-Camp is a personal military officer attached to high constitutional authorities such as the President, Governors, or Chiefs of Services.
- **Rank and background:**
  - Typically, a Major (Army), Lieutenant Commander (Navy), or Squadron Leader (Air Force).
- **Key functions:**
  - Managing the daily schedule and official engagements of the dignitary.
  - Coordinating ceremonial duties, state visits, and protocol events.
  - Acting as a liaison between Rashtrapati Bhavan and civil or military authorities.
  - Assisting in protocol, coordination, and security arrangements.

EMPEROR PERUMBIDUGU MUTHARAIYAR II

Context:

Prime Minister of India has welcomed the release of a commemorative postage-stamp honouring Emperor Perumbidugu Mutharaiyar II (Suvaran Maran), recognising his administrative excellence and patronage of Tamil culture.

About Emperor Perumbidugu Mutharaiyar II:

Who he was?

- Perumbidugu Mutharaiyar II, also known as Suvaran Maran or Shatrubhayankar, was a prominent ruler of the Mutharaiyar lineage who ruled during c. 705–745 CE.

Kingdom Associated With:

- Belonged to the **Mutharaiyar dynasty**, a powerful Tamil ruling lineage.
- Functioned as **feudatories of the Pallavas**, particularly under **Pallava king Nandivarman II**.
- Controlled the central Cauvery region, including Thanjavur, Tiruchirappalli, Pudukkottai, Perambalur, and surrounding areas.
- Ruled primarily from Tiruchirappalli, exercising authority for nearly four decades.

Key Contributions:

Administrative & Military Achievements:

- Known as a **formidable administrator** with strategic foresight and governance stability.
- Fought several battles alongside Pallava forces, helping maintain regional order during Pallava decline.

Temple Building & Architecture:

- The Mutharaiyars were among the **early temple builders of Tamil Nadu**, contributing to rock-cut and structural temples.
- Their architectural innovations influenced the **early Chola temple tradition**, even before the rise of Vijayalaya Chola.

Cultural & Religious Patronage:

- Patronised **Shaivism**, while also hosting philosophical debates involving **Jain scholars** such as **Acharya Vimalachandra**, reflecting religious pluralism.
- Supported Tamil language, literature, and religious institutions, as evidenced by inscriptions.

Public Works:

- Inscriptions attest to his contributions to temple endowments, irrigation systems, and agrarian infrastructure, strengthening the Cauvery delta economy.

Significance:

- **Historical significance:** Represents the rise of powerful regional chieftains during the weakening of imperial Pallava authority.
- **Cultural legacy:** Acts as a bridge between Pallava and Chola traditions, especially in temple architecture and governance.
- **Social relevance:** Revered as an icon by the Mutharaiyar community, classified among Most Backward Classes (MBCs) in Tamil Nadu.

POLYGAMY IN INDIA

Context:

Assam has passed the Assam Prohibition of Polygamy Bill, 2025, becoming the second state after Uttarakhand to ban polygamy.

About Polygamy in India:

What it is?

- Polygamy refers to a marital system where one person has more than one spouse at the same time. In India, it is regulated differently across religions, states, and tribal customs.

Historical Context:

- Traditionally practiced in several communities, polygamy was restricted over time through religion-specific reforms — e.g., the Hindu Marriage Act (1955) outlawed bigamy for Hindus.
- Muslim personal law historically permitted up to four wives; tribal groups followed customary practices recognized by the Constitution.

Laws Governing:

- **Hindus, Buddhists, Jains, Sikhs** – Bigamy prohibited under the Hindu Marriage Act, 1955; second marriages deemed void.
- **Parsis** – Prohibited under Parsi Marriage & Divorce Act, 1936.
- **Christians** – Prohibited under the Indian Christian Marriage Act, 1872.
- **Muslims** – Muslim Personal Law (Shariat) Act, 1937 allows Muslim men to have up to four wives; hence not criminal under BNS Section 82.
- **Goa** – Under the Portuguese Civil Code, monogamy is the rule for all; a unique historical clause allows a Hindu man a second marriage under rare conditions (unused since 1910).
- **Tribal Groups** – Exempt under the Constitution (Fifth & Sixth Schedule); customary laws prevail.

Recent State-Level Bans:

- **Uttarakhand UCC (2024):** Outlaws bigamy for all residents except Scheduled Tribes.
- **Assam Bill (2025):** Makes polygamy a cognisable, non-bailable offence; penalties up to 7–10 years; bars convicts from government jobs and elections; tribal areas exempt.

Significance:

- Reflects push toward gender justice and uniform legal standards in marriage.
- Tests the legal boundary between personal law autonomy and legislative reform.
- Raises questions on minority rights, state powers, and the future trajectory of UCC in India.

MODERN HISTORY

Socio–Religious Reform Movements

MAHAD SATYAGRAHA

Context:

The Mahad Satyagraha has returned to public discourse as scholars revisit its profound role in shaping constitutional morality and human rights ethics in India.

About Mahad Satyagraha:

What it is?

- A historic non-violent movement led by **Dr. B. R. Ambedkar** asserting Dalit rights to access public water and reject caste-based exclusion—one of India's earliest human rights struggles.

Launched in:

March 19–20, 1927 (Mahad 1.0) and December 25–26, 1927 (Mahad 2.0) at Mahad, Bombay Presidency (now Raigad, Maharashtra).

Causes:

- **Denial of access to public water sources** such as the Chavdar Tank due to caste-based untouchability.
- **1923 Bole Resolution** legally allowed Dalits to use public facilities, but local caste elites resisted implementation.
- Rising caste violence in villages like Goregaon and Dasgaon reinforcing the need for collective assertion of rights.

Key Features of Mahad Satyagraha:

- **Assertion of Civil Rights:** Ambedkar and thousands of followers marched to Chavdar

Lake and drank water to affirm equality as a human right.

- **Challenge to Brahmanical Hegemony:** Upper castes performed "purification rituals," prompting Ambedkar's stronger mobilisation in Mahad 2.0.
- **Burning of Manusmriti:** On December 25, 1927, Ambedkar symbolically rejected the scriptural basis of caste oppression.
- **Birth of Constitutional Morality:** Ideas of liberty, equality, fraternity—later embedded in the Constitution—were explicitly articulated at Mahad.
- **Participation of Women:** Ambedkar addressed women directly, making gender equality central to the anti-caste struggle.
- **Non-violent Democratic Protest:** Inspired by the French Revolution's ideals, but rooted in Buddhist ethics of dignity and maitri (compassion).

Outcome:

- **Legal victory (1937):** Courts held no valid custom existed to bar Dalits from public tanks, affirming equal civic rights.
- **Strengthened Dalit political consciousness:** Mahad became the birthplace of a new rights-based movement.
- **Foundation for later struggles:** Directly influenced Ambedkar's arguments in Annihilation of Caste and shaped the moral core of India's Constitution.
- **December 25 recognised as Indian Women's Liberation Day**, reflecting the gendered nature of Ambedkar's social revolution.

Freedom Movement

140TH FOUNDATION DAY OF INDIAN NATIONAL CONGRESS (INC)

Context:

The Indian National Congress (INC) marked its 140th Foundation Day on December 28, 2025, prompting renewed reflection on its historical role in India's freedom struggle and post-Independence politics.

About 140th Foundation Day of Indian National Congress (INC):

What it is?

- The Indian National Congress is one of India's oldest and most influential political parties, which spearheaded the national movement against British colonial rule and later dominated India's post-Independence political landscape.

Founded in: 28 December 1885

- **First session:** Gokuldas Tejpal Sanskrit College, **Bombay (Mumbai)**
- **First President:** W. C. Bonnerjee

Origin:

- Founded by **Allan Octavian Hume**, a British civil servant, along with Indian leaders such as Dadabhai Naoroji, Surendranath Banerjee, Pherozeshah Mehta, and Gopal Krishna Gokhale
- Initially conceived as a **platform to voice Indian grievances** and influence British policy through petitions and constitutional methods
- Gradually evolved into a **mass nationalist movement**, especially under **Mahatma Gandhi**

Key features:

- **Broad-based nationalist platform:** Brought together Indians across regions, religions, and linguistic groups
- **Ideological evolution:** From moderate constitutionalism → mass civil disobedience → democratic socialism
- **Mass mobilisation:** Led movements like **Non-Cooperation**, **Civil Disobedience**, **Quit India**, and **Purna Swaraj (1929)**
- **Post-Independence role:** Advocated **secularism, parliamentary democracy, planned economy, and non-alignment**
- **Organisational depth:** Longest-running nationwide political organisation in India

Significance:

- Central force in ending nearly 200 years of colonial rule.
- Provided leadership in framing the **Constitution**, establishing democratic institutions, and shaping early economic and foreign policy.

Post-Independence

VIJAY DIWAS MARKS INDIA'S VICTORY IN 1971 WAR

Context:

India is observing Vijay Diwas on 16 December 2025 to commemorate the 1971 victory and honour the armed forces' sacrifice and valour.

- The day marks the surrender of Pakistan's Eastern Command in Dhaka (16 Dec 1971) and the birth of Bangladesh.

About Vijay Diwas Marks India's Victory in 1971 War:

Background of the war:

- **Electoral mandate denied (1970):** The **Awami League** won a decisive majority in Pakistan's 1970 elections, but transfer of power was blocked, triggering mass agitation in East Pakistan.
- **Military crackdown (25 March 1971):** Pakistan Army launched **Operation Searchlight** in Dhaka and elsewhere, intensifying violence and driving the liberation movement.
- **Refugee crisis in India:** Around **~10 million refugees** crossed into India creating major humanitarian and fiscal pressure.
- **Rise of Mukti Bahini + Govt-in-exile:** Bengali resistance consolidated as **Mukti Bahini**; India provided training, logistics and sanctuary while preparing for escalation.

Key events during the war (3–16 Dec 1971):

- **Trigger — 3 Dec 1971:** Pakistan launched pre-emptive air strikes (**Operation Chengiz Khan**) on multiple Indian airfields, after which India formally entered full-scale war.
- **Air superiority in the East:** Indian Air Force quickly neutralised East Pakistan's limited air capability, enabling unhindered close air support and interdiction.
- **Naval blockade in Bay of Bengal:** Indian Navy isolated East Pakistan; **INS Vikrant** supported strikes on ports/coastal targets, choking reinforcement and resupply.
- **Karachi strikes:** Indian Navy hit Karachi in **Operation Trident (4/5 Dec)** and **Operation Python (8/9 Dec)**—major blows to fuel storage/ shipping capacity.
- **Surrender — 16 Dec:** With Dhaka encircled and East Pakistan strategically isolated, **Eastern Command surrendered**, ending the war decisively in **13 days**.

Outcomes:

- **Bangladesh created:** East Pakistan became the sovereign state of **Bangladesh**, fundamentally altering South Asian geopolitics.
- **Mass surrender/POWs:** **~93,000** Pakistani troops/personnel surrendered—one of the biggest capitulations since WWII.
- **Strategic realignment:** Pakistan lost its eastern wing; India emerged as the dominant conventional military power in the region, with strengthened deterrence credibility.
- **Post-war settlement:** The 1971 outcome directly shaped subsequent diplomacy, including **Simla Agreement (1972)** framework and long-term India–Bangladesh relations.

Significance:

- **National remembrance:** Symbol of armed forces' bravery, jointness (Army-Navy-Air Force) and decisive leadership in warfighting.
- **Doctrine & deterrence:** Demonstrates the value of clear political objectives, rapid manoeuvre, air superiority, and maritime choke-point control.

Important Movements

THE COMMUNIST PARTY OF INDIA (CPI)

Context:

The Communist Party of India (CPI) has **completed 100 years** since its founding, marking a century of organised Communist politics in India.

About The Communist Party of India (CPI):

What it is?

- The Communist Party of India (CPI) is one of India's oldest political parties, rooted in Marxist ideology, committed to representing the interests of workers, peasants, and marginalised classes through both mass movements and parliamentary politics.

Established in:

December 26, 1925, at Kanpur (then Cawnpore)

- Founded through a national conference of Indian Communist groups active within India

  Note: An earlier émigré CPI was formed in **Tashkent in 1920**, a point of historical debate

Aim:

- Liberation of India from British imperialism (pre-1947).
- Socialisation of means of production and distribution.
- Creation of a socially just, egalitarian society free from exploitation.

Evolution:

- **1920s–30s:** Influenced by the **Russian Revolution (1917)**; faced repression through conspiracy cases (Kanpur, Meerut).
- **1930s–40s:** Participation in trade unionism, peasant struggles, and United Fronts with socialist forces.
- **1940s:** Led major agrarian movements like **Tebhaga (Bengal)** and **Telangana**.
- **Post-Independence:** Shifted largely to **parliamentary democracy**, forming elected governments in **Kerala, West Bengal, and Tripura**.
- **1964:** Major ideological split leading to the formation of **CPI (Marxist)** amid debates over constitutionalism and the Sino-Soviet split.

Leaders associated:

- **M. N. Roy:** International Marxist theorist; linked to Comintern and Tashkent phase
- **S. A. Dange:** Key organiser of Indian Communism; associated with Kanpur foundation
- **Muzaffar Ahmad:** Pioneer of Communist movement in Bengal
- **P. C. Joshi:** Early General Secretary; emphasised united front politics
- **A. K. Gopalan, E. M. S. Namboodiripad:** Post-Independence parliamentary leaders

Key features:

- **Marxist ideological foundation:** Class struggle, anti-imperialism, and social equality
- **Mass-based politics:** Strong links with **trade unions (AITUC)** and peasant movements
- **Dual strategy:** Combination of extra-parliamentary movements and electoral participation
- **Internationalist influence:** Inspired by global Communist movements, yet adapted to Indian conditions
- **Federal presence:** Regional strength varies, with influence concentrated in specific States

Important Personalities

115 YEARS OF SAVARKAR'S POEM 'SAGARA PRAN TALAMALALA'

Context:

Union Home Minister and Minister of Cooperation addressed a cultural programme in Sri Vijayapuram to mark 115 years of Swatantryaveer Vinayak Damodar Savarkar's poem Sagara Pran Talamalala.

About 115 Years of Savarkar's Poem 'Sagara Pran Talamalala':

What it is?

- 'Sagara Pran Talamalala' (often rendered as Sagara Pran Talmalala / Ne Majasi Ne…) is a **Marathi patriotic poem** expressing an exiled revolutionary's torment, homesickness and yearning for the motherland, with the sea personified as a messenger between the patriot and India.

Written by:

Swatantryaveer **Vinayak Damodar Savarkar** (1883–1966), revolutionary, social reformer, writer and Hindutva ideologue.

- The poem was later immortalised in song form by **Lata Mangeshkar**, with music by Hridaynath Mangeshkar.

Circumstances of Composition:

- Composed around **1909** on the shores of **Brighton**, England, when Savarkar was a young revolutionary at **India House, London**.
- Savarkar was under surveillance and facing imminent repression after the arrest of his elder brother and the revolutionary assassination of **Curzon Wyllie** by **Madan Lal Dhingra**, whom he had influenced at India House.
- The poem captures his **inner conflict**—torn between commitment to armed struggle in foreign land and a desperate desire to return to **"Matru-bhoomi"** (motherland).
- The opening invocation to the sea—urging it to carry him back to India—has since come to symbolise the anguish of countless exiles and political prisoners in the freedom movement.

Other Literary Works of Savarkar:

- **The Indian War of Independence 1857:** A landmark reinterpretation of the 1857 uprising as a national war of independence, countering British narratives of a "mutiny".
- **Hindutva: Who is a Hindu?**
  - Lays out his idea of Hindutva as a cultural–civilisational identity based on common nation (rashtra), heritage and geography, encompassing Hindus, Buddhists, Jains and Sikhs.
- **My Transportation for Life (Mazi Janmathep)**: Autobiographical account of his incarceration in Cellular Jail, Andamans, describing brutal conditions, psychological suffering, and resolve.
- **Six Glorious Epochs of Indian History:** A civilisational narrative highlighting periods of Hindu resistance and resurgence, written from a distinctly nationalist–militant lens.
- **Hindu Pad-Padshahi & Other Historical Works**: On the Maratha empire and Hindu political power.
- **Poetry & Plays:**
  - Patriotic poems (including 'Sagara Pran Talamalala', 'Jayostute', 'Ne Majasi Ne…') and plays such as Sanyast Khadga, Uttarkriya, combining themes of liberty, duty, sacrifice, and rationalism.

C. RAJAGOPALACHARI (RAJAJI)

Context:

Prime Minister of India paid tribute to C. Rajagopalachari (Rajaji) on his birth anniversary, recalling his role as a freedom fighter, thinker, statesman, and India's last Governor-General.

About C. Rajagopalachari (Rajaji):

Who he was?

- C. Rajagopalachari (1878–1972), popularly known as **Rajaji**, was a freedom fighter, jurist, writer, statesman, and **the first and only** Indian Governor-General of India. Gandhi famously called him *"the keeper of my conscience."*

Early Life:

- Born on **10 December 1878** in Thorapalli, Tamil Nadu; educated in Hosur, Bangalore, and Presidency College, Madras.
- Began his career as a successful criminal lawyer in Salem before joining public life in 1917 as Chairman of Salem Municipality.

Key Contributions to India's Freedom Movement:

- **Rowlatt Satyagraha (1919):** Led major protests in Madras Presidency; addressed mass meetings on Marina Beach.
- **Non-Cooperation Movement:** Among the first to give up a thriving law practice; mobilised Tamil Nadu against British rule.
- **Khilafat Movement:** Earned the esteem of Muslims by actively supporting Khilafat committees and provincial agitations.
- **Vedaranyam Salt March (1930):** Led the Tamil equivalent of Gandhi's Dandi March, inspiring thousands across the region.
- **Civil Disobedience & Quit India:** Imprisoned multiple times; remained a close strategist of Gandhi throughout.

Post-Independence Roles:

- **Governor of West Bengal (1947–48)** during the turbulent post-partition phase.
- **Governor-General of India (1948–50):** Last person to hold the office, abolishing it upon India becoming a republic.
- **Home Minister of India (1950):** Succeeded Sardar Patel.
- **Chief Minister of Madras State (1952–54):** Implemented administrative reforms, dealt firmly with police strikes, and introduced contentious education policies.

Unique Facts:

- Only Indian to serve as **Governor-General of India**.
- Founder of the Swatantra Party **(1959)** — India's first major liberal-conservative, pro-market political party.
- Gandhi's closest ideological counsellor, described as his "moral compass."
- Coined the slogan: **"English ever, Hindi never"** in later years, advocating linguistic choice.
- Known for his sharp intellect, minimalism, wit, and uncompromising integrity.

200TH ANNIVERSARY OF DADABHAI NAOROJI

Context:

India celebrated the 200th birth anniversary of Dadabhai Naoroji in 2025, honouring his legacy as a nationalist leader, economic thinker and early architect of the freedom movement.

About 200th anniversary of Dadabhai Naoroji:

Who he was?

- Dadabhai Naoroji (1825–1917) was an Indian nationalist leader, economic theorist, social reformer, scholar, and the first Indian Member of British Parliament.

Early Life & Education:

- Born on **4 September 1825** in Bombay (some sources say Navsari), in a middle-class Parsi family.
- Educated at **Elphinstone Institute**, where he excelled in mathematics and English.
- Became the **first Indian Professor** at Elphinstone College, symbolising modern Indian intellectual awakening.

Contributions to the Indian Freedom Movement:

- **Economic Contributions:**
  - **Drain of Wealth Theory:** Systematically demonstrated how British rule drained India's resources through salaries,

pensions, remittances, and unequal trade.
    - **Authored major works:**
        - Poverty and Un-British Rule in India
        - Poverty of India
    - His advocacy led to the creation of the **Welby Commission (1895)** on Indian expenditure, where he served as a member.
    - Popularised economic nationalism and laid foundations for **Swadeshi and fiscal self-reliance**.
- **Political Contributions:**
    - Founding member of **Indian National Congress (INC)** and its President in **1886, 1893, and 1906**.
    - Elected **first Indian MP in British Parliament (1892)** from Central Finsbury on a Liberal Party ticket.
    - Advocated **self-government**, constitutional methods, and parliamentary democracy.
    - Played a unifying role between **Moderates and Extremists**, presiding over the 1906 Calcutta Session that adopted the demand for **Swaraj**.
    - Mentored future leaders including **Tilak, Gokhale, and Mahatma Gandhi**.
- **Social Reform:**
    - Champion of **women's education**—helped run special classes at Elphinstone and supported girls' schooling.
    - Founded **Rast Goftar**, a Gujarati newspaper promoting social reform.
    - Co-founded **Rahnumai Mazdayasan Sabha (1851)** to reform Parsi society.
    - Led efforts for **compulsory primary education**, submitting recommendations (with Jyotiba Phule) to the **Hunter Commission (1882)**.
- **Organisational Building:**
    - Founded or co-founded key institutions to internationalise India's cause:
        - **London Indian Society (1865)**
        - **East India Association (1866)**
    - These groups later merged with the INC and served as platforms for India's political diplomacy.

Unique Facts:

- Known worldwide as the **"Grand Old Man of India."**
- Called the **"Unofficial Ambassador of India"** for championing India's cause in Britain.
- Taught **Gujarati at University College London**, breaking academic barriers.
- Among the first to scientifically analyse poverty in India using data-based methods.
- His 1906 INC presidential address was the **first to adopt "Swaraj" as the national goal**.

GEOGRAPHY

Origin and Evolution of Universe

BRAZIL HAVE IDENTIFIED THE YOUNGEST RHYNCHOSAUR

Context:

Palaeontologists in Brazil have identified the youngest rhynchosaur ever recorded, based on a hatchling fossil of Macrocephalosaurus mariensis.

About Brazil have identified the youngest rhynchosaur:

What it is Macrocephalosaurus mariensis?

- *Macrocephalosaurus mariensis* is a species of rhynchosaur—beaked, herbivorous, archosaur-like reptiles belonging to the clade Rhynchosauridae.
- It lived during the Late Triassic period (Carnian stage) and is known exclusively from southern Brazil.

Habitat:

- Fossils are found in the Santa Maria Formation, Rio Grande do Sul, Brazil.
- Rhynchosaurs were among the dominant land herbivores in Gondwana during the Triassic.

Key characteristics:

- **Beaked skull** adapted for plant-based diet.
- **Highly specialised dentition** with multiple tooth rows; adults show extreme tooth wear due to herbivory.
- Diagnostic features include a **single maxillary sulcus**, **two rows of dentary teeth**, and an **open infraorbital foramen**.
- Adult individuals could reach **over 2 metres in length**, whereas the newly found hatchling skull measures **less than 2.5 cm**.
- Juvenile specimen shows **unworn teeth**, indicating death shortly after hatching.

Significance:

- Represents the first perinate (newborn) fossil of Hyperodapedontinae, the most diverse rhynchosaur sub-clade.
- One of the oldest archosauromorph hatchlings recorded from continental settings.
- Provides insights into early reptile development, growth patterns, and life history during the Triassic.

Climatology

FOG

Context:

The India Meteorological Department has issued a Red Alert for dense to very dense fog over Uttar Pradesh, with similar conditions forecast across north and eastern India.

About Fog:

What it is?

- Fog is a meteorological phenomenon in which **tiny water droplets or ice crystals** remain suspended near the Earth's surface, **reducing visibility to below 1 km** due to scattering of light.

Types of Fog:

- **Radiation fog:** Forms during clear, calm nights when the Earth rapidly loses heat by radiation, cooling the air near the surface to the dew point. It is common in winter over plains and usually dissipates after sunrise.
- **Valley fog:** A special type of radiation fog where cold, dense air flows downslope and accumulates in valleys. The trapped air cools further, making valley fog denser and longer-lasting than fog over flat terrain.
- **Advection fog:** Occurs when warm, moist air moves horizontally over a colder surface such as snow, land, or cold ocean currents. Cooling from below causes condensation, and the fog can persist even during daytime.
- **Freezing fog:** Composed of supercooled liquid droplets that freeze instantly upon contact with surfaces. It creates a thin ice coating on roads, trees, and power lines, making travel extremely hazardous.
- **Evaporation (mixing) fog:** Forms when water vapour added by evaporation mixes with cooler, drier air until saturation is reached. Common examples include steam fog over warm water bodies and frontal fog during rainfall.
- **Upslope fog:** Develops when moist air is forced to rise along hills or mountain slopes. As the air ascends, it cools adiabatically, condenses, and forms fog, often covering large elevated areas.
- **Hail fog:** A rare fog that forms after heavy hailstorms when melting hail cools the warm, moist air near the ground to its dew point. It is usually shallow, patchy, and short-lived.

How fog is formed?

- Fog forms when **air temperature falls to the dew point** or when **moisture content increases** enough for saturation.
- Key mechanisms include radiational cooling, horizontal movement of moist air, evaporation, or orographic uplift.
- Calm winds, high humidity, long winter nights, and temperature inversions favour fog formation.

Impacts on local weather and society:

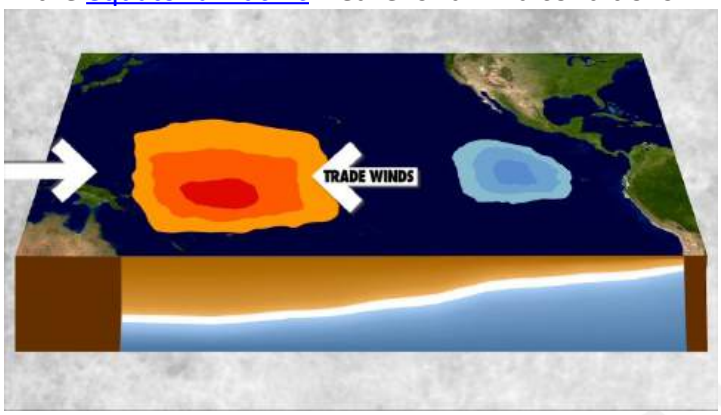
- **Visibility reduction:** Near-zero visibility disrupts road, rail, and air transport, increasing accident risk.

- **Temperature moderation:** Fog can suppress daytime heating, prolonging cold conditions.
- **Air quality deterioration:** Fog traps pollutants near the surface, worsening smog and respiratory issues.

EL NIÑO

Context:

Climate models and ocean observations show early signals of a possible El Niño return in 2026**,** as warming in the equatorial Pacific weakens La Niña conditions.



About El Niño:

- **What it is?**
  - El Niño is the warm phase of the El Niño–Southern Oscillation (ENSO), marked by abnormal warming of surface waters in the eastern and central equatorial Pacific Ocean.
  - It occurs irregularly every 2–7 years and tends to raise global average temperatures.
- **How it forms?**
  - **Trade winds weaken** along the equator, allowing warm surface waters to shift **eastward from the western Pacific** toward South America.
  - The **thermocline deepens** in the eastern Pacific, **suppressing upwelling** of cold, nutrient-rich water.
  - This alters atmospheric circulation, linking oceanic warming with pressure changes known as the **Southern Oscillation**.
- **Indicators:**
  - **Sea Surface Temperature (SST) anomalies** in the Niño regions.
  - **Subsurface ocean heat build-up** (warm water pools at 100–250 m depth).
  - **Oceanic Niño Index (ONI):** SST anomalies of **≥ +0.5°C (or +0.9°F)** for at least five consecutive three-month periods.
  - Weakening or reversal of **Walker Circulation** and trade winds.
- **Factors affecting El Niño:**
  - Strength and persistence of **trade winds**.
  - **Subsurface heat content** of the Pacific Ocean.
  - Interaction between ocean temperatures and atmospheric pressure systems.
  - Natural climate variability and long-term **global warming**, which can amplify impacts.
- **Implications:**
  - **Global warming boost**, often making El Niño years among the **hottest on record**.
  - **India:** Increased risk of **weaker monsoons and droughts**.
  - **South America:** Heavy rainfall, floods and coastal erosion.
  - **Australia & Southeast Asia:** Droughts, heatwaves and wildfires.

World Geography of India

GANDIKOTA CANYON

Context:

Gandikota Canyon has drawn renewed attention as a spectacular yet underdeveloped natural–heritage site, despite recent state plans to boost tourism infrastructure.

About Gandikota Canyon:

What it is?

- Gandikota Canyon is a dramatic river gorge carved by the Penna (Pennar) River, often called the "Grand Canyon of India" for its sheer cliffs and striking geological formations.

Located in:

- **Kadapa district, Andhra Pradesh.**
- About **77 km from Kadapa town** and ~300–380 km from Bengaluru, Hyderabad, and Chennai.
- Lies within the **Erramala Hills** on the banks of the Penna River.

Historical origin:

- The canyon overlooks the **Gandikota Fort**, dating back to **1123 CE.**
- The fort rose to prominence under the **Pemmasani Nayaks**, feudatories of the **Kakatiya dynasty.**
- Later ruled by the Vijayanagara Empire, Qutb Shahis of Golconda, Mughals, Nawabs of Kadapa, Kingdom of Mysore, and finally the British.
- Mentioned in historical records like the **Mackenzie Kaifiyat** and travelogues of **Jean-Baptiste Tavernier.**

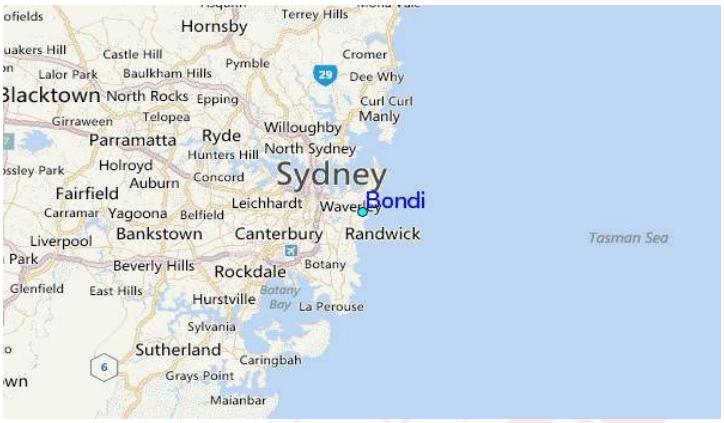
Key features:

- **Spectacular geomorphology:** Steep red sandstone and quartzite cliffs forming a ~200-metre-wide gorge.
- **Riverine landscape:** Penna River flowing sinuously through the canyon, offering dramatic sunrise and sunset views.
- **Architectural heritage:** Gandikota Fort complex with Madhavaraya Temple, Ranganatha Temple, Jama Masjid, granary, jail, step wells, and gun foundry.
- **Cultural significance:** Linked to Vijayanagara art, Indo-Islamic architecture, and local folklore; associated with **poet Yogi Vemana.**
- **Tourism potential:** Panoramic viewpoints, heritage trails, and proximity to Tirupati make it ideal for integrated cultural–eco tourism.

BONDI BEACH

Context:

Australia was shaken by a deadly terror-linked mass shooting at Sydney's Bondi Beach during a Jewish festival, prompting the government to consider tougher gun laws.



About Bondi Beach:

What it is?

- Bondi Beach is a world-famous ocean beach and adjoining suburb in Sydney, known for its surf culture, tourism, and public recreation. It is among the most visited beaches in Australia and a major symbol of the country's coastal lifestyle.

Location:

- Situated **7 km east of Sydney's Central Business District (CBD)**.
- Lies in the **Eastern Suburbs** of Sydney within the **Waverley Council** local government area.
- Neighbouring suburbs include North Bondi, Bondi Junction, Rose Bay, and Bellevue Hill.

Key features:

- **Natural setting:** Crescent-shaped sandy beach facing the Tasman Sea, popular for surfing and swimming.
- **Cultural prominence:** Featured in global TV series such as Bondi Rescue and Bondi Vet.
- **Demographics:** Historically multicultural, with a strong **Jewish community** and migrant heritage.
- **Indigenous heritage:** Traditionally inhabited by **Bidjigal, Birrabirragal, and Gadigal Aboriginal peoples**.
- **Name origin:** Derived from the **Dharawal word "Bondi"**, meaning a loud thud, like waves crashing on rocks.

Significance:

- **Tourism & economy:** A key contributor to Sydney's tourism-driven economy and international image.
- **Cultural history:** Site of major social movements, including early 20th-century debates on public decency and beach culture.
- **Public safety relevance:** The recent attack highlights challenges of urban security, counter-terrorism, and public space safety.

FACTS FOR PRELIMS

GENERAL STUDIES – 2

POLITY

Salient Features, Schedules and Preamble

CONSTITUENT ASSEMBLY OF INDIA

Context: India marks 79 years since the Constituent Assembly held its first meeting on December 9, 1946, beginning the monumental task of drafting the Constitution.

About Constituent Assembly of India:

What It Is?

- The **Constituent Assembly** was the supreme representative body tasked with drafting the Constitution of India, acting as both a constitution-making body and a provisional legislature.

Origin:

- Rooted in the **1934** M.N. Roy proposal and later adopted by the Indian National Congress (1935).
- Formally created under the Cabinet Mission Plan **(1946)** through an **indirect election** by Provincial Legislative Assemblies.
- First session held on **December 9, 1946**, chaired temporarily by **Dr. Sachchidananda Sinha**.

Historical Evolution:

- Initially 389 members (292 Provincial, 93 Princely States, 4 Chief Commissioners' Provinces).
- After Partition (Mountbatten Plan, June 1947), Pakistan formed its own Assembly; Indian membership reduced to **299**.
- Drafting completed in **2 years, 11 months, 17 days**; Constitution adopted on **November 26, 1949** and enforced on **January 26, 1950**.

Key Facts & Milestones:

- **11 sessions**, **165 total meeting days**, **114 days** spent debating the draft Constitution.
- Major committees included:
  - Drafting Committee – B.R. Ambedkar
  - **Union Powers Committee** – Jawaharlal Nehru
  - **Provincial Constitution Committee** – Sardar Patel
  - **Rules Committee** – Rajendra Prasad
- Members represented diverse ideological, regional, and social backgrounds.

Significance:

- Created one of the world's largest and most detailed written constitutions.
- Balanced India's unity with federalism, liberty with social justice, and rights with duties.
- Embedded democratic values, separation of powers, fundamental rights, directive principles, and independent institutions.
- Set the tone for constitutional morality, deliberative democracy, and accommodation of diversity.

Bodies (Constitutional, Statutory, Regulatory Bodies)

QUALITY COUNCIL OF INDIA

Context: The Quality Council of India (QCI) announced next-generation quality reforms on the eve of Sushasan Divas 2025 to strengthen India's quality ecosystem.

About Quality Council of India (QCI):

What it is?

- The Quality Council of India (QCI) is an autonomous, non-profit national accreditation body that promotes, adopts, and institutionalises quality standards across sectors in India.
- It operates as a public–private partnership (PPP) model, independent of direct government control, while supporting national quality objectives.

Established in:

- **1996**, following Cabinet approval, under the **Societies Registration Act, 1860**.
- Set up on the recommendations of a multi-stakeholder committee coordinated by the then **Department of Industrial Policy and Promotion (now DPIIT)**.

Aim:

- To build a robust national quality infrastructure aligned with international standards.
- To enhance global competitiveness of Indian goods and services, protect consumer interests, and improve quality of life.

Key functions:

- **National accreditation programmes:** Accredits laboratories, certification bodies, inspection agencies, medical labs, and testing facilities as per global norms.
- **Service-sector quality assurance:** Develops accreditation frameworks for education, healthcare, governance, environment, infrastructure, and vocational training.
- **Trade facilitation:** Helps overcome **TBT/SPS barriers** under WTO by ensuring internationally acceptable conformity assessment.
- **Capacity building:** Strengthens quality systems in governments, institutions, MSMEs, and enterprises through training and benchmarking.
- **International engagement:** Maintains linkages with **ILAC, IAF, OECD, ISQua, APLAC, PAC**, enabling mutual recognition and global acceptance.
- **Quality awareness:** Leads the **National Quality Campaign** to empower citizens to demand quality goods and services.

Significance:

- Recent initiatives like Q Mark – Desh ka Haq and Quality Setu shift the system from inspection-heavy regulation to trust-based governance.
- Improves export credibility, especially for MSMEs, by aligning Indian standards with global benchmarks.

NATIONAL INTELLIGENCE GRID (NATGRID)

Context:

The National Intelligence Grid (NATGRID) is receiving around 45,000 data requests per month, as Central agencies and State police increasingly use the platform for real-time intelligence access.

About National Intelligence Grid (NATGRID):

- **What it is?**
  - NATGRID is a **real-time integrated intelligence platform** under the Ministry of Home Affairs that links multiple government and private databases for **secure access by authorised security and law-enforcement agencies** to counter terrorism and organised crime.
- **Conceptualised:** 2009 (after the 26/11 Mumbai attacks)
- **Operationalised:** 2023 (platform became functional and opened to wider agencies)
- **Aim:**
  - To provide **seamless, real-time intelligence** by integrating diverse datasets for faster investigations.
  - To eliminate delays caused by agencies separately requesting data from multiple sources.
- **Functions:**
  - **Data Integration Across Databases:** Connects datasets such as Aadhaar, driving licences, bank records, telecom data, airline PNRs, immigration logs, and social media activity.
  - **Secure Access for Investigative Agencies:** Provides authorised officers (now including **SP-rank officials**) access to sensitive information while

maintaining user confidentiality.

- **Supports Intelligence & Investigation:** Helps agencies **"join the dots"** without an FIR, enabling predictive intelligence, tracking suspicious behaviour, and analysing crime patterns.
- **Inter-Agency Coordination:** Facilitates cooperation between IB, RAW, NIA, ED, FIU, DRI, NCB and State police by offering a single unified information platform.
- **Data Security & Cyber Protection:** Uses advanced cybersecurity protocols to protect sensitive information amid rising cyberattacks on critical infrastructure.

- **Significance:**
  - **Counter-Terror Backbone:** Created after 26/11 to prevent intelligence gaps by providing faster, deeper, and integrated data access.
  - **Reduces Investigation Time:** Eliminates bureaucratic delays; accelerates terrorism, narcotics, financial fraud, and cybercrime probes.
  - **Strengthens Federal Policing:** Empowers State police forces by giving them the same intelligence access previously limited to central agencies.

DIRECTORATE GENERAL OF CIVIL AVIATION (DGCA)

Context: IndiGo's mass flight cancellations forced the DGCA to grant a one-time exemption from the new Flight Duty Time Limitations (FDTL) rules, raising questions about the regulator's authority and decision-making process.

About Directorate General of Civil Aviation (DGCA):

What it is?

- The DGCA is India's statutory civil aviation regulator responsible for ensuring aviation safety, airworthiness, and compliance with global standards.

Established in:

- Originally created in **1927** (as a government organization)
- Became a **statutory body in 2020** under the Aircraft (Amendment) Act.

Ministry:

- Functions under the **Ministry of Civil Aviation (MoCA)**.

Aim: To promote **safe, efficient and reliable air transportation** through proactive safety oversight, effective regulation, and alignment with ICAO international standards.

Key Functions of DGCA:

- **Safety Oversight & Regulations:**
  - Frames and enforces Civil Aviation Requirements (CARs).
  - Conducts surveillance, audits and spot checks of airlines, airports, MROs and training organisations.
- **Aircraft & Airport Certification:**
  - Registers civil aircraft.
  - Issues Certificates of Airworthiness.
  - Certifies and inspects aerodromes for safety compliance.
- **Licensing:**
  - Issues licences to **pilots, AMEs, ATCOs, cabin crew, flight dispatchers** etc.
  - Conducts examinations and skill checks.
- **Accident & Incident Investigation:**
  - Investigates incidents and serious incidents (up to 2250 kg AUW).
  - Implements safety management and prevention programmes.
- **Air Transport Regulation:**
  - Grants Air Operator Certificates (AOC).
  - Regulates domestic and international scheduled and non-scheduled flights.
- **ICAO Coordination:**
  - Ensures Indian aviation rules comply with ICAO standards.
  - Participates in USOAP audits and

harmonisation of global norms.

- **Training Oversight:** Approves flying schools, AME schools, simulator centres and aviation training institutes.
- **Dangerous Goods & ANS Oversight:**
  - Certifies operators handling dangerous goods.
  - Regulates air navigation services and coordinates civil–military airspace use.

Significance of DGCA:

- **Ensures Passenger Safety:** Through strict oversight of aircraft, crew rest, maintenance and airport standards.
- **Maintains Operational Discipline:** Keeps airlines compliant with safety rules, training norms and technical requirements.
- **Balances Safety and Capacity:** Recent FDTL rollback highlights its role in negotiating between safety norms and operational feasibility.

NATIONAL COMMISSION FOR BACKWARD CLASSES (NCBC)

Context: The NCBC has recommended excluding 35 communities—mostly Muslim—from West Bengal's Central OBC list, following its scrutiny of OBC inclusions made in 2014.

About National Commission for Backward Classes (NCBC):

What it is?

- A constitutional body under Article 338B, mandated to safeguard the rights and ensure the welfare of Socially and Educationally Backward Classes (SEBCs).

Established in:

- Originally created under the **NCBC Act, 1993**, it gained **constitutional status in 2018** through the **102nd Constitutional Amendment,** which inserted **Articles 338B and 342A**.

Aim: To advise, monitor, investigate, and recommend matters related to SEBC inclusion/exclusion, welfare safeguards, socio-economic advancement, and violations of rights.

Composition:

- **5 members:** Chairperson, Vice-Chairperson, and three Members.
- Appointed by the **President of India** by warrant under his hand and seal.
- Members hold rank and pay equivalent to **Secretary, Government of India**.

Functions:

- Investigate and monitor implementation of Constitutional safeguards for SEBCs.
- Inquire into complaints of rights violations or misuse of reservation benefits.
- Evaluate socio-economic development programs for backward classes and advise governments.
- Ensure mandatory consultation by Union & States on policy matters affecting SEBCs.
- Submit annual and special reports to the President, which are tabled in Parliament and State Legislatures.

Powers:

- Has **civil court powers**: summoning witnesses, examining on oath, demanding documents, receiving evidence.
- Advises Union Government on **inclusion/ exclusion** in the Central OBC List and final amendments must be enacted by **Parliament** under Article 342A.

New bills and acts

VIKSIT BHARAT–GUARANTEE FOR ROZGAR AND AJEEVIKA MISSION (GRAMIN) ACT, 2025

Context: President of India has granted assent to the Viksit Bharat–Guarantee for Rozgar and Ajeevika Mission (Gramin) Act, 2025**,** passed in the Winter Session of Parliament.

About Viksit Bharat–G RAM G Act, 2025:

What it is?

- The Viksit Bharat–Guarantee for Rozgar and Ajeevika Mission (Gramin) Act, 2025 is a revamped statutory framework for rural employment that replaces the Mahatma Gandhi National Rural Employment Guarantee Act, 2005. It repositions rural employment as an integrated tool for livelihood security, asset creation, and climate resilience in line with the Viksit Bharat @2047 vision.

Aim:

- Enhance income security of rural households through expanded employment guarantee
- Transform wage employment into rural development via durable asset creation

Key features:

1. **Increased guaranteed employment**
    - Statutory guarantee raised to **not less than 125 days** of unskilled manual work per rural household per financial year.
    - Unemployment allowance retained if work is not provided within 15 days of demand.
2. **Centrally sponsored scheme with revised funding pattern**
    - Implemented as a **centrally sponsored scheme (CSS)**.
    - **60:40 Centre–State sharing** for most states; **90:10** for North-Eastern and Himalayan states; **100% central funding** for UTs without legislatures.
    - States continue to bear unemployment allowance and delay compensation.
3. **Normative allocations with state responsibility for excess expenditure**
    - Centre will notify state-wise normative allocations annually based on prescribed parameters.
    - Excess expenditure beyond allocation to be borne by states, without diluting the statutory right to work.
4. **Pause during peak agricultural seasons**
    - States may notify an **aggregated pause of up to 60 days** in a year during sowing and harvesting seasons.
    - Does **not reduce the 125-day entitlement**, ensuring labour availability for agriculture.
5. **Decentralised and integrated planning framework**
    - **Gram Sabhas and Panchayats** remain the core planning authorities.
    - Works to originate from Viksit Gram Panchayat Plans prepared through participatory processes.
    - Plans integrated with PM Gati Shakti National Master Plan and aggregated upward for convergence.
6. **Focus on priority development domains**
    - Works limited to four thematic areas:
        - Water security
        - Core rural infrastructure
        - Livelihood-related infrastructure
        - Climate resilience and extreme weather mitigation
    - Assets mapped into a national rural infrastructure stack to prevent duplication.
7. **Strengthened implementation and monitoring**
    - Retains central and state councils; composition to be notified through Rules.
    - Establishes a **National Level Steering Committee** and **State Steering Committees** for oversight, convergence, and plan aggregation.
8. **Technology-driven transparency with social accountability**
    - Use of biometric authentication, geo-tagging, real-time dashboards, and weekly public disclosure.
    - Social audits by Gram Sabhas strengthened to ensure inclusion and accountability.

CORPORATE SOCIAL RESPONSIBILITY (CSR)

Context: The Supreme Court of India has ruled that Corporate Social Responsibility (CSR) must inherently include environment and ecology, holding that CSR spending on environmental protection is not charity but a constitutional obligation under Article 51A(g).

About Corporate Social Responsibility (CSR):

What it is?

- Corporate Social Responsibility (CSR) refers to the responsibility of companies to contribute to social welfare and sustainable development, by integrating social, environmental, and ethical concerns into business operations and stakeholder interactions.

Launched in: CSR was made mandatory in India through the Companies Act, 2013, making India the first country in the world to legislate CSR spending.

Eligibility criteria (Section 135, Companies Act, 2013):

- CSR provisions apply to companies that meet **any one** of the following in the preceding financial year:
  - **Net worth:** ₹500 crore or more
  - **Turnover:** ₹1,000 crore or more
  - **Net profit:** ₹5 crore or more
- Such companies must spend **at least 2% of the average net profits of the last three years** on CSR activities.

Key features of CSR in India:

- **Mandatory spending:** Minimum 2% of average net profits.
- **CSR Committee:** Board-level committee to plan and monitor CSR policy.
- **Schedule VII activities:** CSR spending must align with approved areas such as education, health, environment, rural development, etc.
- **Disclosure norms:** Details of CSR policy, spending, and unspent amounts must be disclosed in the Board's Report.
- **Environmental inclusion (as per SC):** Protection of ecology, biodiversity, and wildlife is an **intrinsic CSR duty**, not optional.

Significance of CSR:

- **Promotes sustainable development:** Aligns corporate growth with environmental protection and social justice.
- **Corporate accountability:** Reinforces the idea that profits are partly owed to society that enables their generation.
- **Constitutional alignment:** Operationalises Fundamental Duties, especially environmental protection.

SUSTAINABLE HARNESSING OF ADVANCEMENT OF NUCLEAR ENERGY FOR TRANSFORMING INDIA (SHANTI BILL)

Context:

The Union Cabinet has approved the Atomic Energy Bill, 2025, branded as the SHANTI Bill, marking the biggest reform in India's nuclear sector since 1962.

About Sustainable Harnessing of Advancement of Nuclear Energy for Transforming India (Shanti Bill):

- **What it is?**
  - A comprehensive nuclear-sector reform bill replacing fragmented laws and modernising India's nuclear governance, safety, liability, and industry participation framework.
- **Ministry:** Introduced by the **Department of Atomic Energy (DAE)** under the Prime Minister; regulatory reforms involve creating an **independent nuclear safety authority**.
- **Law Governing Nuclear Energy Currently:**
  India's nuclear sector is presently overseen primarily by:
  - **Atomic Energy Act, 1962**
  - **Civil Liability for Nuclear Damage Act, 2010 (CLND Act)**

  These laws restrict private participation and

impose ambiguous liability burdens.

- **Aim:** To enable large-scale nuclear expansion, attract private and global investment, modernise regulatory oversight, reform liability rules, and accelerate India's path to 100 GW of nuclear power by 2047.
- **Key Features:**
  - **Opening the Nuclear Value Chain to Private Players:** Allows private sector entry in exploration, fuel fabrication, equipment manufacturing, and potentially plant operations.
  - **Unified Legal Framework:** Consolidates outdated laws into a streamlined licensing, safety, compliance, and operations structure.
  - **Reformed Nuclear Liability Architecture:** Clear delineation of operator–supplier responsibilities, insurance-backed caps, and government backstopping—aligned with global norms.
  - **Independent Nuclear Safety Authority:** New regulator ensuring transparent, professional, globally benchmarked safety oversight.
  - **Dedicated Nuclear Tribunal**: Specialised mechanism to settle liability and contractual disputes efficiently.
  - **Boost to Small Modular Reactors (SMRs):** Supports R&D and deployment of SMRs for industrial and grid-scale decarbonisation.
- **Significance:**
  - Breaks 60+ years of state monopoly, enabling private innovation and investment.
  - Critical for achieving 100 GW nuclear capacity and India's net-zero by 2070 target.

Strengthens energy security, reducing dependence on coal and imported fuels

Welfare schemes

CONSUMER PROTECTION ACT, 2019

Context: The Central Consumer Protection Authority (CCPA) has imposed an ₹11 lakh penalty on coaching institute for publishing misleading advertisements related to UPSC CSE results.

- The action was taken under the **Consumer Protection Act, 2019**, highlighting strict enforcement against deceptive coaching claims.

About Consumer Protection Act, 2019:

What is it?

- The Consumer Protection Act, 2019 is a comprehensive law enacted to protect consumer rights, curb unfair trade practices, and provide speedy grievance redressal in an increasingly digital and service-driven economy. It replaced the Consumer Protection Act, 1986.

Aim:

- To safeguard consumers from misleading advertisements, unfair trade practices, and defective goods/services.
- To establish strong enforcement mechanisms and ensure accountability of manufacturers, service providers, and advertisers.

Key features

- **Central Consumer Protection Authority (CCPA):** Empowers the government to **investigate, penalise, and order discontinuation** of misleading advertisements and unfair trade practices.
- **Definition of misleading advertisement (Section 2(28)):** Covers **false claims, concealment of material facts, and exaggerated promises** likely to mislead consumers.
- **Product liability provisions:** Fixes liability on **manufacturers, service providers, and sellers** for harm caused by defective goods or deficient services.
- **Enhanced consumer rights:** Explicitly recognises **six consumer rights** including the right to information, choice, redressal, and consumer

awareness.

- **E-commerce regulation:** Brings **online platforms and digital advertisements** under the consumer protection framework.
- **Simplified dispute redressal:** Introduces **e-filing of complaints**, mediation cells, and clearer jurisdiction of consumer commissions.

Significance:

- Protects aspirants and parents from exploitative practices in high-stakes sectors like education and coaching.
- Promotes truthful advertising and transparency, especially in the digital space.

25TH ANNIVERSARY OF PRADHAN MANTRI GRAM SADAK YOJANA (PMGSY)

Context: Pradhan Mantri Gram Sadak Yojana (PMGSY) completed 25 years in December 2025, marking a major milestone in India's rural infrastructure journey.

About 25th Anniversary of Pradhan Mantri Gram Sadak Yojana (PMGSY):

What it is?

- Pradhan Mantri Gram Sadak Yojana (PMGSY) is a **centrally sponsored scheme** aimed at providing **all-weather road connectivity** to eligible, previously unconnected rural habitations, thereby integrating villages with markets, schools, and healthcare facilities.

Launched in:

- **Year:** 25 December 2000
- **Occasion:** Birth anniversary of former Prime Minister **Atal Bihari Vajpayee**

Implementing ministry: Ministry of Rural Development (MoRD), Government of India

Key features:

- **Phased implementation:**
  - **PMGSY-I:** Universal rural connectivity to unconnected habitations.
  - **PMGSY-II:** Upgradation and consolidation of existing rural road networks.
  - **PMGSY-III:** Strengthening through routes and major rural links connecting markets, schools, and health facilities.
  - **PMGSY-IV (2024–29):** Connectivity to 25,000 habitations via 62,500 km of roads.
- **Large-scale coverage:** Over 8.25 lakh km of roads sanctioned, with nearly 95% completed by December 2025.
- **Technology-driven monitoring:** Use of OMMAS, e-MARG, GPS-based tracking, and geo-tagged inspections for real-time monitoring and transparency.
- **Quality assurance:** Institutionalised three-tier quality monitoring system involving executing agencies, State Quality Monitors, and National Quality Monitors.
- **Sustainability focus:** Adoption of eco-friendly materials like waste plastic, fly ash, bio-bitumen, and climate-resilient construction techniques.

Significance:

- Improves market access, farm-to-market linkages, and price realisation for farmers.
- Enhances access to education, healthcare, and welfare services in remote areas.

SHAKTI SCHOLARS – NCW YOUNG RESEARCH FELLOWSHIP

Context:

The National Commission for Women (NCW) has launched 'SHAKTI Scholars' – NCW Young Research Fellowship to promote policy-oriented research on women-centric issues.

About SHAKTI Scholars – NCW Young Research Fellowship:

What it is?

- SHAKTI Scholars is a six-month, grant-based research fellowship designed to support young scholars and independent researchers in undertaking policy-relevant, multidisciplinary research on issues affecting women in India.

Launched by: National Commission for Women (NCW)

Aim:

- Encourage evidence-based research on women-centric challenges.
- Build a pipeline of young researchers contributing to gender-responsive governance.
- Support research that can inform laws, schemes, and institutional reforms.

Eligibility criteria:

- **Nationality:** Indian citizens only
- **Age:** 21 to 30 years
- **Minimum qualification:** Graduation from a recognised institution
- **Preference:**
  - Candidates pursuing or having completed post-graduation, M.Phil., or PhD
  - Disciplines such as Gender Studies, Law, Social Sciences, Public Policy, Economics, Health, Technology, Development Studies, etc.

Key features:

1. Research grant – **₹1 lakh:** The fellowship provides financial support to cover data collection, fieldwork, analysis, and documentation costs.
2. **Duration – 6 months:** A six-month timeframe balances rigorous research with timely policy relevance and feasibility.
3. **Phased fund release:** Grants are disbursed in stages, ensuring accountability and progress-linked research execution.
4. **Research themes include:**
   - Women's safety and dignity
   - Gender-based violence and POSH implementation
   - Legal rights and access to justice
   - Cyber safety
   - Health, nutrition, education, and skill development
   - Economic empowerment and labour force participation
   - Women's leadership, political participation, and work-life balance

PROPOSAL TO RENAME MNREGA

Context:

The Centre is set to amend the MGNREGA Act to rename the flagship rural employment scheme as "Pujya Bapu Gramin Rozgar Yojana" and may raise the guaranteed work limit from 100 to 125 days.

About Proposal to rename MNREGA:

What it is?

- MGNREGA is a **demand-driven, rights-based rural wage employment programme** guaranteeing unskilled manual work to rural households, aimed at livelihood security and creation of durable assets.

Launched in:

- **2005**, brought into force through the **MGNREGA Act, 2005**
- Came into effect in phases from **2006** across India

Historical Background:

- Recommended by **Narsimha Rao's Employment**

Assurance Scheme (1993) and **Food for Work Programme (2004)**.

- Envisioned as a legal right to work, inspired by Gandhian ideals of **self-reliant rural livelihoods**.
- Became the **largest social security programme** in the world.

Aim of MGNREGA:

- Guarantee 100 days of wage employment (now proposed 125 days).
- Enhance livelihood security, reduce distress migration.
- Strengthen Panchayati Raj Institutions through decentralized planning.

Key Features of the Scheme:

- **Rights-based entitlement:**
  - Every adult rural household member can demand unskilled manual work.
  - **Right to unemployment allowance** if work not provided within 15 days.
- **Wage & Material Ratio:** 60:40 ratio at Gram Panchayat level.
- **Women-Centric Approach:** At least **1/3rd beneficiaries must be women**; actual participation > **58% (2024–25)**.
- **Transparent Payment Systems:** Payment via **Aadhaar-Based Payment System (ABPS)**; 99%+ wage payments through e-FMS.
- **Strengthening Natural Resource Base:** Focus on **water conservation, afforestation, land development**, and soil moisture restoration.
- **Social Audit:** Mandatory audits by Gram Sabha to ensure transparency and accountability.

Recent Amendments:

- **Renaming and Expansion of Employment (2025 Proposal):**
  - Rename MGNREGA as **"Pujya Bapu Gramin Rozgar Yojana"**.
  - Increase employment from **100 to 125 days**.
  - Introduce **exclusion clauses** based on a State's economic indicators.
  - Tweaks in **funding pattern**.
- **Priority for Water Conservation (Sept 2025 Amendment)**
  - MGNREGA's Schedule-I amended to earmark:
  - **65% funds** in Over-exploited & Critical blocks
  - **40% funds** in Semi-critical blocks
  - **30% funds** in Safe blocks
- **Project UNNATI (Skill Upgradation):**
  - Launched in **2019** to skill MGNREGA workers.
  - Target 2 lakh workers however 90,894 trained till March 2025.

SHILP DIDI PROGRAMME

Context:

The Union Textiles Secretary announced that the Shilp Didi Programme has significantly boosted women artisans' income, with some earning over ₹5 lakh.

About Shilp Didi Programme:

- **What it is?**
  - A government initiative to **economically empower women artisans** ("Shilp Didis") by providing training, digital skills, and market access, including e-commerce platforms and physical exhibitions.
- **Launched In: 2024** (100-day pilot phase began in June 2024).
- **Implemented By:** Ministry of Textiles, through the Office of the Development Commissioner (Handicrafts).
- **Aim:** To make women artisans **financially independent**, improve design and business skills, and help them leverage modern marketing and entrepreneurship tools.
- **Key Features:**
  - **E-training modules** (entrepreneurship, regulatory compliance, social media, e-commerce onboarding).
  - **Marketing opportunities** via Dilli Haat, craft fairs, and curated events.
  - **E-commerce integration** for nationwide and global visibility.
  - **Baseline inclusion of 100 women artisans** from 72 districts across 23 states.
  - Covers **30 diverse handicrafts** (textiles, pottery, metal crafts, embroidery, etc.).

- Capacity-building through **National Handicrafts Development Programme (NHDP)** clusters.

- **Significance:**
  - Provides sustainable livelihoods and boosts rural/non-farm incomes.
  - Strengthens micro-entrepreneurship among women in the handicrafts sector.
  - Enhances digital inclusion—artisans use social media & e-commerce to expand markets.

Miscellaneous

PASSENGER ASSISTANCE CONTROL ROOM (PACR)

Context: The Ministry of Civil Aviation (MoCA) has established a 24×7 Passenger Assistance Control Room (PACR) to fast-track aviation-related passenger grievance redressal.

About Passenger Assistance Control Room (PACR):

What it is?

- The Passenger Assistance Control Room (PACR) is a permanent, round-the-clock integrated control centre set up to monitor aviation operations and ensure real-time resolution of passenger grievances related to flights, airports and airlines.

Ministry: Ministry of Civil Aviation (MoCA)

Aim:

- To place passengers at the centre of India's civil aviation ecosystem.
- To ensure fast, transparent and accountable grievance redressal.
- To institutionalise a coordinated crisis-response mechanism during operational disruptions.

Key features:

- **24×7 real-time operations:** Continuous monitoring of aviation operations, passenger calls and disruptions to enable immediate intervention.
- **Integrated stakeholder hub:** Officials from MoCA, DGCA, AAI and airlines work **under one roof**, enabling on-the-spot coordination and resolution.
- **AirSewa integration:** Complete integration with the **AirSewa grievance platform** for seamless handling of online complaints.
- **Omni-channel grievance intake:** Passenger inputs via calls, digital platforms and AirSewa are converted into actionable cases.
- **Data-driven dashboards:** Live dashboards track grievance type, response time and stakeholder action for transparency and accountability.
- **Passenger Charter compliance:** Grievances on delays, cancellations, refunds and baggage are handled strictly as per the **Passenger Charter**.

Significance:

- Over **13,000 grievances** resolved and **500+ call-based interventions** since December 2025.
- Enhances confidence in India's rapidly expanding aviation sector.

GOVT. TO INCREASE RESERVATION FOR AGNIVEERS IN CAPFS TO 50%

Context: The Union Home Ministry has notified an increase in reservation for ex-Agniveers in Group-C posts of Central Armed Police Forces (CAPFs) from **10% to 50%**, starting with the Border Security Force (BSF).

About Govt. to increase reservation for Agniveers in CAPFs to 50%:

What it is?

- The Ministry of Home Affairs has amended

recruitment rules to reserve 50% of constable (Group-C) vacancies in CAPFs for ex-Agniveers, beginning with the Border Security Force.

Earlier policy:

- In 2022, the government announced **10% reservation** for ex-Agniveers in CAPFs.
- Additional relaxations included **5 years age relaxation** for the first batch and **3 years** for subsequent batches.
- Ex-Agniveers were required to compete through regular recruitment processes.

New proposal / changes:

- **50% reservation** for ex-Agniveers in **every recruitment year** for constable posts.
- Ex-Agniveers are **exempted from PST/PET**, but must **clear the written examination** like other candidates.
- Recruitment will be done in **two phases**:
  - Phase-1: Nodal CAPF recruits ex-Agniveers for 50% vacancies.
  - Phase-2: SSC recruits remaining candidates (including 10% ex-servicemen).
- Age limit for absorption of BSF Combatised Constable (Tradesmen) relaxed from **30 to 35 years**.
- Recruitment rules of other CAPFs (CRPF, CISF, ITBP, SSB, Assam Rifles) to be amended gradually.

About Agnipath Scheme:

What it is?

- A short-term military recruitment scheme under which selected youth are enrolled as **Agniveers** for a **four-year service period** in the Armed Forces.

Launched in: June 2022

Key features:

- **Tenure:** 4 years (including training).
- **No pension or gratuity** for Agniveers after exit.
- **Seva Nidhi package:** ~₹10.04 lakh (tax-free) on exit after 4 years.
- **Pay:** Starts at ₹30,000/month (Year 1) and rises to ₹40,000/month (Year 4).
- **Regular cadre intake:** Up to **25%** of each batch may be absorbed into the permanent cadre based on performance.
- **Insurance:** ₹48 lakh non-contributory life cover during service.
- **Skill & education benefits:** Skill certificate and Class-12 equivalent certification (for those enrolled after Class 10).

THE INTERNATIONAL INSTITUTE FOR DEMOCRACY AND ELECTORAL ASSISTANCE (INTERNATIONAL IDEA)

Context: India's Chief Election Commissioner Gyanesh Kumar will assume the Chair ship of the International Institute for Democracy and Electoral Assistance (International IDEA) on December 3, 2025, in Stockholm.

About The International Institute for Democracy and Electoral Assistance (International IDEA):

What it is?

- An intergovernmental organisation dedicated exclusively to supporting and strengthening democratic institutions, processes and norms worldwide.

Establishment: Founded in **1995** as a global platform for democracy support, with its headquarters in **Stockholm, Sweden**.

Membership:

- Started with 14 founding members including India, Norway, Spain, Australia and South Africa.
- Today has **35 member countries**, with the **US and Japan as observers**.
- Holds **UN General Assembly Observer Status since 2003**.

Aim: To advance and safeguard sustainable democracy by generating comparative knowledge, strengthening electoral institutions, supporting reforms, and promoting rule of law, participation, and inclusion.

Core Functions:

- **Knowledge Production:** Research on elections, political parties, constitutions, governance and democratic innovations.
- **Capacity Building:** Training Election Management Bodies (EMBs), political parties and democratic institutions.
- **Advocacy:** Promoting global democratic standards and electoral integrity.
- **Dialogue Convening:** Facilitating international exchanges among policymakers, civil society and regional bodies.
- **Technical Assistance:** Advising countries on electoral reforms, institutional design and

democratic resilience.

Significance:

- Only global intergovernmental organisation with a *sole mandate* to support democracy.
- Provides a "virtuous cycle" of research → capacity building → advocacy → policy reform.
- India's chair ship enhances its global leadership in election management, sharing expertise from administering elections to 90+ crore voters.

WORLDSKILLS ASIA COMPETITION 2025

Context: India secured 8th rank in its first-ever participation at the WorldSkills Asia Competition (WSAC) 2025, winning 1 Silver, 2 Bronze, and 3 Medallions for Excellence.

About WorldSkills Asia Competition 2025:

- **What is WorldSkills Asia Competition (WSAC)?**
  - A premier continental skill competition under the WorldSkills movement, promoting excellence in technical and vocational education (TVET) across Asia. It brings together youth to compete in diverse trades—traditional, digital, and emerging.
- **History:**
  - WorldSkills Asia (WSA) was established to organize regional contests within Asia.
  - **First WSAC:** 2018, Kuala Lumpur (Malaysia).
  - **India debuted** in 2025 at Chinese Taipei.
- **Key Features of WSAC 2025:**
  - Asia's largest regional TVET competition under the WorldSkills framework.
  - Competitions held across **44 high-demand skills** including robotics, industrial design, web tech, software development, electrical installations.
  - Focus on:
    - Future-ready skills (AI, automation, web tech, robotics).
    - Traditional trades (painting, electrical, design).
    - Youth employment, TVET reforms, industry-global partnerships.
  - Facilitates trainer development, international cooperation, and bridging the education–employment gap.
- **India's Performance:**
  - **Rank:** 8th overall among 29 nations.
  - **Team:** 23 competitors in 21 skills, supported by 21 experts
    - Led by MSDE & NSDC.
  - **Medals:**
    - Silver – Painting & Decorating: Muskan
    - Bronze – Industrial Design Tech: Komal Panda
    - Bronze – Robot System Integration: Shivam Singh & Dinesh R

International organisation

2ND WHO GLOBAL SUMMIT ON TRADITIONAL MEDICINE

Context: India has officially begun preparations for the 2nd WHO Global Summit on Traditional Medicine, which will be held at Bharat Mandapam, New Delhi.

About 2nd WHO Global Summit on Traditional Medicine:

- **What It Is?**
  - A high-level **global health summit** convened by the WHO to advance

traditional, complementary, and integrative medicine through scientific validation and policy collaboration.

- **Host:**
  - **Co-hosted by WHO and the Ministry of Ayush, Government of India**.
  - Supported by the **WHO Global Traditional Medicine Centre (GTMC), Jamnagar**, established in partnership with India.
- **Theme (2025):** "Restoring balance: The science and practice of health and well-being."
  - **Key Features of the 2025 Summit:**
  - **Evidence-Based Integration:** Pushes scientific validation of traditional medicine through research, clinical trials, regulatory frameworks, and quality benchmarks.
  - **Global Participation:** Delegations from 100+ countries, including Ministers, policymakers, industry leaders, scientists, and Indigenous medicine practitioners.
  - **Digital Health & Innovation:** Showcases digital repositories, AI-driven pharmacopeias, and biodiversity mapping for medicinal plants.
  - **Biodiversity & Sustainability:** Examines sustainable sourcing of medicinal plants and conservation of knowledge systems, including Ayurveda, Siddha, Unani, Sowa-Rigpa, and Homeopathy.
  - **Policy Harmonisation:** Aims to create a **decade-long roadmap** for integrating safe, equitable, evidence-based traditional medicine into national healthcare systems
- **Significance of the Summit:**
  - **Bolsters India's Soft Power:** Positions India as the global leader in traditional medicine, building on Yoga's international success and Ayurveda's rising credibility.
  - **Strengthens WHO–India Collaboration:** Enhances the role of the WHO-GTMC in Jamnagar, reflecting global trust in India's knowledge systems.
  - **Drives Health System Integration:** Helps countries incorporate traditional medicine into universal health coverage, primary healthcare, and public health programs.

THE BLUE LINE

Context: A UNIFIL peacekeeper was injured by gunfire near the Blue Line in southern Lebanon, allegedly following fire from Israeli Defence Forces positions.

About The Blue Line:

What it is?

- The Blue Line is a United Nations–identified withdrawal line, not an international border, used to verify Israel's withdrawal from southern Lebanon as mandated by UN Security Council resolutions.

Located in:

- Along **southern Lebanon**, adjoining **northern Israel**
- Extends for about **120 kilometres** from the Mediterranean coast to the tri-border area near the Golan Heights

Neighbouring nations: Lebanon, Israel, and Israeli-occupied Golan Heights (bordering Syria)

Origin of the Blue Line:

- Established in **2000** by the **United Nations**
- Created to confirm Israel's compliance with **UN Security Council Resolution 425 (1978)** after its withdrawal from Lebanon
- Reinforced under **UN Security Council Resolution 1701 (2006)** following the Israel–Hezbollah conflict

Key features:

- **Unofficial boundary:** Serves as a line of withdrawal, not a legally recognised international border.
- **UN monitoring:** Patrolled by the **UN Interim**

Force in Lebanon (UNIFIL) to prevent escalation.

- **Weapons-free buffer:** Resolution 1701 calls for a zone **free of armed groups** between the Blue Line and the Litani River (except Lebanese armed forces and UNIFIL).
- **Frequent flashpoint:** Subject to violations, construction disputes, and cross-border firing, making it one of the most sensitive frontiers in West Asia.

UN PEACEKEEPERS

Context: The UN Security Council has strongly condemned drone attacks on UN peacekeepers in Sudan's South Kordofan, which killed six Bangladeshi personnel serving with UN Interim Security Force for Abyei.

About UN Peacekeepers:

What it is?

- UN Peacekeeping is a mechanism deployed by the **United Nations** to help countries transition from conflict to peace by stabilising volatile situations and supporting political processes.

Evolution of UN Peacekeeping:

- **1948: Observer missions** UN peacekeeping began with unarmed observer missions like UNTSO, focused on monitoring ceasefires and reporting violations without enforcement powers.
- **Cold War era:** Geopolitical rivalry between major powers restricted mandates, limiting peacekeeping largely to monitoring roles and consent-based deployments.
- **Post-1990s expansion:** After civil wars increased, missions became multidimensional, combining military presence with political mediation and humanitarian support.
- **Reforms (Brahimi Report, 2000):** The report called for clearer mandates, adequate resources, rapid deployment, and prioritising civilian protection.

Functions of UN Peacekeepers:

- **Ceasefire monitoring:** Peacekeepers observe buffer zones and report violations to prevent renewed hostilities.
- **Protection of civilians:** They are authorised to use force when necessary to protect civilians facing imminent threats.
- **Disarmament, Demobilisation and Reintegration (DDR):** They assist ex-combatants in laying down arms and reintegrating into civilian life.
- **Support to elections and governance:** Peacekeepers help organise elections and strengthen local administrative institutions.
- **Human rights and rule of law:** They monitor abuses, support judicial reforms, and promote accountability.
- **Humanitarian assistance:** They facilitate relief delivery and support early recovery in post-conflict areas.

India and UN Peacekeeping:

- **Major troop contributor:** India remains one of the largest contributors of uniformed personnel to UN peacekeeping operations.
- **Scale of participation:** Over 2,90,000 Indian peacekeepers have served in more than 50 missions worldwide.
- **Current deployments:** Around 5,000 Indian personnel are deployed across **nine active** UN missions.
- **Sacrifice and commitment:** Nearly 180 Indian peacekeepers have sacrificed their lives in service of global peace.

INDIA'S BRICS PRESIDENCY 2026

Context: Brazil has formally handed over the BRICS (18th) presidency to India for 2026, amid global trade frictions and geopolitical tensions.

About India's BRICS presidency 2026:

What it is?

- India will serve as the rotating (pro tempore) Chair of BRICS in 2026. As Chair, India will set priorities, convene meetings, and host the annual summit for the year.

Established in:

- **Origins (BRIC):** Political dialogue began with the BRIC Foreign Ministers' meeting in 2006 (UNGA sidelines).
- **Leaders' summit start:** The first summit of heads of state/government took place in 2009 (Yekaterinburg).
- **BRICS formed:** South Africa joined in **2011**, turning BRIC into **BRICS**.

Headquarters: No permanent HQ and it works as an informal coordination platform with a rotating presidency.

- The New Development Bank (NDB) is headquartered in Shanghai, China.

Members: Brazil, Russia, India, China, South Africa, Egypt, Ethiopia, Iran, United Arab Emirates, Saudi Arabia, Indonesia.

How is the BRICS Presidency decided?

- Not elected by voting. The BRICS presidency is rotational, not chosen through an election.
- **Rotation principle:** The chairmanship rotates annually among member countries, traditionally following the alphabetical order of the acronym "BRICS".
- **Tenure:** Each presidency runs from 1 January to 31 December of the year.
- **Role of the President country:**
  - Sets the annual agenda and priorities
  - Chairs meetings at all levels (Sherpas, Ministers, Leaders)
  - Hosts the BRICS Summit

Official language of BRICS: No single official language is prescribed in the BRICS Charter.

Key functions of BRICS:

- **Political coordination:** Builds common positions on major global issues and pushes for a fairer world order.
- **Economic and financial cooperation:** Promotes trade, investment coordination, and reform of global financial governance.
- **Development finance:** Uses institutions like the **NDB** to fund infrastructure and sustainable development in EMDCs.
- **People-to-people pillar:** Expands cultural, academic, youth and civil society engagement across members.
- **Bridge-building for Global South:** Provides a platform where developing countries amplify shared priorities.

Significance of India's BRICS presidency:

- India can steer agendas on development finance, health, and technology equity.
- India can strengthen calls for reform of institutions like UN, IMF, World Bank, WTO.

GLOBAL DECLARATION ON NONCOMMUNICABLE DISEASES (NCDS) AND MENTAL HEALTH

Context: World leaders at the 80th United Nations General Assembly (UNGA) adopted a historic global political declaration that jointly addresses noncommunicable diseases (NCDs) and mental health for the first time.

About Global Declaration on Noncommunicable Diseases (NCDs) and Mental Health:

What it is?

- The Global Declaration on NCDs and Mental Health is a political declaration adopted by UN Member States to accelerate prevention, control and care of NCDs and mental health conditions through an integrated approach.

- It represents the first UN declaration to treat NCDs and mental health together, recognising their shared risk factors and societal impact.

Published by:

- United Nations General Assembly (UNGA)
- Adopted during the Fourth UN High-Level Meeting on NCDs and Mental Health (2025)

Targets (to be achieved by 2030):

The declaration introduces first-ever global "fast-track" outcome targets:

1. 150 million fewer tobacco users
2. 150 million more people with hypertension under control
3. 150 million more people with access to mental health care

Key features:

- **Integrated health approach:** Treats NCDs and mental health as interconnected challenges driven by common risk factors such as unhealthy diets, tobacco, alcohol, physical inactivity and air pollution.
- **Expanded scope of NCDs:** Covers new areas including oral health, lung health, childhood cancer, kidney and liver diseases, and rare diseases.
- **Focus on emerging risks:** Addresses environmental determinants (air pollution, clean cooking, lead exposure) and digital harms (excessive screen time, harmful online content, misinformation).
- **Stronger regulation:** Emphasises regulation of e-cigarettes, novel tobacco products, unhealthy food marketing to children, front-of-pack labelling, and elimination of industrial trans fats.
- **System-level national targets:** Calls for strong primary healthcare, affordable essential medicines, financial protection, multisectoral national plans, and robust surveillance systems.
- **Whole-of-government and whole-of-society approach:** Encourages engagement of civil society, youth, persons with disabilities, and people with lived experience.

Significance:

- Addresses the world's leading causes of premature death and disability, affecting people across all countries and income groups.
- Prioritises vulnerable groups such as climate-affected populations, Small Island Developing States (SIDS), and humanitarian settings.

THE TIANJIN DECLARATION

Context: At the 2025 Shanghai Cooperation Organisation (SCO) Summit in Tianjin, India joined other SCO members in endorsing the Tianjin Declaration, committing to deepen cooperation in Artificial Intelligence (AI) governance and capacity building.

About The Tianjin Declaration:

- **What it is?**
  - The Tianjin Declaration is the outcome document adopted by the SCO Council of Heads of States at the 2025 Tianjin Summit, outlining collective positions on security, development, technology, and institutional reforms.
- **Key outcomes:**
  - **AI cooperation framework:** Emphasised that all countries have equal rights to develop and use AI, aligning with the UN General Assembly resolution on AI capacity building.
  - **Risk mitigation in AI:** SCO members committed to improving security, accountability, transparency, inclusiveness, trustworthiness and fairness of AI systems.
  - **Roadmap adoption:** Supported implementation of the SCO AI Cooperation Roadmap to guide joint research, standards and capacity building.
  - **Regional AI centre:** Welcomed the UNGA resolution proposing a **Regional AI Centre in Dushanbe**, strengthening Central Asia's digital ecosystem.

About Shanghai Cooperation Organisation (SCO):

- **What it is?**
  - The SCO is a **permanent intergovernmental organisation** focused on regional security, economic

cooperation and people-to-people ties across Eurasia.

- **Established in:** 15 June 2001, Shanghai (evolved from the Shanghai Five mechanism).
- **Headquarters:**
  - **Secretariat:** Beijing, China
  - **RATS (Regional Anti-Terrorist Structure):** Tashkent, Uzbekistan
- **Members:**
  - **10 Member States:** India, China, Russia, Kazakhstan, Kyrgyzstan, Tajikistan, Uzbekistan, Pakistan, Iran, Belarus
  - **2 Observer States:** Afghanistan, Mongolia
- **Aims:**
  - Strengthen mutual trust, friendship and good-neighbourliness.
  - Promote cooperation in politics, security, economy, science & technology, energy, transport, culture and education.
- **Key functions and mechanisms:**
  - **Security cooperation:** Counter-terrorism, separatism and extremism through **RATS**.
  - **Economic cooperation:** Trade, connectivity, energy and infrastructure initiatives.
  - **Technology & innovation:** Growing focus on **digital economy, cybersecurity and AI**.
  - **Decision-making bodies:**
    - Council of Heads of States (CHS): supreme body
    - Council of Heads of Government (CHG): economic and budgetary matters
    - Council of National Coordinators: coordination mechanism
  - **Official languages:** Russian and Chinese.

INDIA–ADB $2.2 BILLION LOAN AGREEMENTS

Context: India and the Asian Development Bank (ADB) have signed loan agreements worth over $2.2 billion to finance five major development projects.

About India–ADB $2.2 billion loan agreements:

What it is?

- A multi-sector financing package from ADB to India aimed at accelerating human capital development, clean energy transition, urban mobility, healthcare capacity and sustainable livelihoods across several states.

Key features:

- **Skilling & employability ($846 million):** Modernisation of 650 ITIs in 12 states and upgradation of 5 National Skill Training Institutes; targets employability of 1.3 million youth in high-growth sectors like renewable energy and electric mobility.
- **Rooftop solar expansion ($650 million):** Supports PM Surya Ghar: Muft Bijli Yojana to scale rooftop solar for 10 million households by 2027, focusing on sectoral reforms and affordable, collateral-free loans.
- **Healthcare augmentation ($398.8 million):** Strengthens tertiary healthcare by upgrading medical colleges in Guwahati, Dibrugarh and Silchar as centres of excellence.
- **Urban transport ($240 million):** Chennai Metro Rail Project: Tranche 2 for new corridors and stations with climate-resilient and universal access features.
- **Sustainable livelihoods ($77 million):** Meghalaya ecotourism and climate-smart agriculture project to improve incomes and conservation outcomes for local and indigenous communities.

About Asian Development Bank (ADB):

- **What it is?**
  - ADB is a multilateral development bank that supports inclusive, resilient and sustainable growth in Asia and the Pacific through finance, policy support and partnerships.
- **Established:** 19 December **1966**
- **Headquarters:** Manila, Philippines

- **Members:** **69** countries (50 regional, 19 non-regional); **India is a founding member (1966)**
- **India's position:** Largest recipient, accounting for about 14% of ADB's financial commitments
- **Aims:** Eradicate extreme poverty and promote prosperous, inclusive, resilient and sustainable development aligned with the SDGs.
- **Functions:**
    - Provides loans, grants, technical assistance and equity investments to governments, private sector and PPPs.
    - Supports policy reforms, capacity building and co-financing with official and private sources.
    - Focuses on education, health, transport, energy, finance and climate action.

UNITED NATIONS ALLIANCE OF CIVILIZATIONS (UNAOC)

Context: India reaffirmed its civilisational ethos of Vasudhaiva Kutumbakam and Sarva Dharma Samabhav at the 11th United Nations Alliance of Civilizations (UNAOC) held in Riyadh, Saudi Arabia.

About United Nations Alliance of Civilizations (UNAOC):

- **What it is?**
    - UNAOC is a United Nations initiative that seeks to improve understanding and cooperation among nations and peoples across cultures and religions, and to counter extremism through dialogue and partnership.
- **Established in:** 2005, as a political initiative of former UN Secretary-General Kofi Annan, co-sponsored by Spain and Türkiye.
- **Headquarters:** New York, United States.
- **Aim:** To reduce polarization between societies and cultures, strengthen intercultural dialogue, and promote peaceful coexistence and inclusive societies.
- **Functions / Priority areas:**
    - **Education:** Promoting intercultural learning and curricula.
    - **Youth:** Empowering youth as agents of peace.
    - **Migration:** Advancing inclusion and social cohesion.
    - **Media:** Countering stereotypes and hate speech.
    - **Women as peace mediators:** Strengthening women's role in peacebuilding.
    - Building partnerships with states, civil society, faith leaders, academia, media, arts, sports, and the private sector.

About UNAOC 2025 (11th Edition)

- **Host:** Saudi Arabia, **Riyadh**.
- **Theme:** "UNAOC: Two Decades of Dialogue for Humanity—Advancing a New Era of Mutual Respect and Understanding in a Multipolar World".
- **Outcomes / Highlights:**
    - Renewed global commitment to dialogue, mutual respect, and religious harmony amid conflicts and trust deficits in multilateralism.
    - Marked **20 years of UNAOC**, setting the course for its third decade.
    - Broad participation of political leaders, international organizations, religious and faith actors, youth, civil society, media, arts and sports to advance peacebuilding through dialogue.

DEEPAVALI ON UNESCO'S INTANGIBLE CULTURAL HERITAGE LIST

Context: Deepavali has been officially inscribed on UNESCO's Representative List of the Intangible Cultural Heritage of Humanity during the 20th Session of the Intergovernmental Committee in New Delhi.

About Deepavali on UNESCO's Intangible Cultural Heritage List:

- **What it is?**
  - Deepavali is a multi-regional, multi-faith festival symbolising light over darkness, hope, renewal and community harmony, celebrated across India and the global diaspora.
- **Historical Roots:**
  - With references in **Itihasas, Puranas and regional traditions**, Deepavali commemorates diverse legends—return of Rama to Ayodhya, Krishna's victory over Narakasura, worship of Lakshmi, and harvest rituals—reflecting India's cultural pluralism.
- **Key Features of Deepavali as Living Heritage:**
  - **Social practice:** Lighting diyas, rangoli, community feasts, rituals and intergenerational transmission of customs.
  - **People-centric festival:** Sustained by potters, artisans, farmers, sweet-makers, florists and priests, forming a vast cultural-livelihood ecosystem.
  - **Diaspora celebrations:** Celebrated across Southeast Asia, Africa, Europe, the Gulf and the Caribbean, strengthening India's cultural diplomacy.
  - **Values embodied:** Inclusivity, unity, generosity, wellbeing and the moral ideal of *Tamso Ma Jyotirgamaya*.

About Intangible Cultural Heritage (ICH):

- **What it is?**
  - ICH refers to living traditions, expressions, rituals, performing arts, craftsmanship and knowledge systems that communities recognise as part of their cultural identity.
- **Origin:**
  - UNESCO adopted the **Convention for the Safeguarding of the Intangible Cultural Heritage (2003)**, which came into force in 2006; India ratified it in 2005.
- **Aim:** To safeguard living heritage, support practitioners, promote cultural diversity, transmission, community participation and intercultural dialogue.
- **Features of the ICH Framework:**
  - **Community-based:** Heritage must be recognised by the communities who practise it.
  - **Dynamic & living:** Includes traditional and contemporary expressions adapting across time.
  - **Five domains:** Oral traditions, performing arts, social practices & rituals, knowledge concerning nature, and craftsmanship.
  - **Representative List:** Highlights practices that contribute to humanity's cultural diversity.
  - **Safeguarding Measures:** States must inventory, conserve, support practitioners and report periodically.

THE UNIT - A PILOT GOLD-BACKED DIGITAL TRADE CURRENCY

Context: Several reports and expert circles are speculating that BRICS may unveil a pilot gold-backed digital trade currency called "The Unit", though no official announcement has been made yet.

About The Unit - a Pilot Gold-Backed Digital Trade Currency:

What it is?

- A **digital,** blockchain-based settlement currency designed for cross-border trade within BRICS, backed by physical gold and BRICS national currencies.

Launched by:

- Developed as a **pilot** by the International Research Institute for Advanced Systems (IRIAS), supported informally by BRICS members.

Aim:

- Reduce reliance on the US dollar for international trade.
- Provide a **stable, neutral settlement instrument** anchored in gold.
- Build an alternative financial architecture for the Global South.

How It Works?

- **40% gold + 60% BRICS currency basket:** The Unit's value is anchored in physical gold while balancing currency exposure, ensuring stability and diversified risk across the five BRICS economies.
- **Daily value recalibration:** Its price updates every day based on gold rates and currency fluctuations, keeping the Unit aligned with real-world macroeconomic movements.
- **Blockchain-based settlement (Cardano):** Transactions run on a permissioned Cardano blockchain, enabling secure, traceable, tamper-proof settlement across countries.
- **Not a national currency replacement:** The Unit serves only as a cross-border settlement tool, reducing dollar dependence while leaving domestic monetary policy untouched.

Key Features:

- **Gold-anchored stability:** Pegging to physical gold protects the Unit from extreme volatility and fiat currency shocks, making it a reliable trade-settlement medium.
- **Transparency through blockchain:** Blockchain ensures all transactions are auditable and immutable, reducing manipulation risks and increasing trust among BRICS members.
- AI-led governance**:** The AI-governed Unit Foundation minimizes political bias in decision-making, providing consistent oversight and automated, rules-based management.
- **Reserve sovereignty:** Member countries keep gold reserves domestically while still backing the Unit, avoiding the geopolitical risks of pooling gold offshore.
- **Improves gold liquidity:** By using gold in active trade settlement rather than storage, the Unit increases gold's transactional role and deepens global gold-market liquidity.

Significance:

- Major step toward de-dollarisation by offering a non-Western settlement option.
- Strengthens BRICS' role in global monetary reform and south-south cooperation.
- Potential to become the first large-scale gold-backed digital settlement system if scaled.

INDIA HOSTS 20TH UNESCO'S INTER-GOVERNMENTAL COMMITTEE

Context:

India is hosting the 20th Session of UNESCO's Intergovernmental Committee for the Safeguarding of Intangible Cultural Heritage at the Red Fort, New Delhi.

About India Hosts 20th UNESCO's Inter-Governmental Committee:

What is this Committee?

- The Intergovernmental Committee for the Safeguarding of Intangible Cultural Heritage (ICH) is a 24-member UNESCO body created under the 2003 ICH Convention to promote, supervise and operationalize safeguarding of intangible heritage globally.

Host Venue: Red Fort (Lal Qila), New Delhi

Structure of the Committee:

Composition:

- **24 Member States**, elected by the General Assembly of States Parties.
- Seats allocated by **equitable geographical representation** across six UNESCO regional groups.
- Each State must nominate **experts qualified in ICH fields**.

Term:

- **Members serve four-year terms:** Each elected State Party remains on the Committee for a fixed four-year period to ensure continuity in safeguarding work.
- **Every two years, half the members are replaced:** A staggered renewal system maintains institutional memory while introducing fresh perspectives regularly.
- **No consecutive terms allowed:** States cannot be re-elected immediately, preventing monopolisation and promoting broader global participation.

Functions of the Committee:

- **Promote the objectives of the** 2003 Convention**:** Ensures global commitment to preserving living heritage and strengthening community-based safeguarding.
- **Provide guidance on best safeguarding practices:** Offers States technical advice and models to improve preservation of traditions and cultural expressions.
- **Prepare operational directives and ICH Fund**

plans: Drafts rules, procedures and financial guidelines for effective implementation of the Convention.

- **Examine nominations for the Representative List:** Evaluates cultural elements proposed by States to highlight global diversity and awareness.
- **Evaluate elements for the Urgent Safeguarding List:** Identifies traditions at risk and determines their eligibility for immediate safeguarding measures.

About Intangible Cultural Heritage (ICH):

What is ICH?

- Intangible Cultural Heritage refers to **living traditions**, expressions, skills and knowledge transmitted across generations — including performing arts, rituals, festivals, crafts, oral expressions and social practices.

Origin:

- Concept institutionalised in the **2003 UNESCO Convention for Safeguarding of Intangible Cultural Heritage** (entered into force in 2008).
- Created global **ICH Lists** to protect living traditions and encourage community participation.
- **Lists include:**
  - Representative List
  - Urgent Safeguarding List
  - Register of Good Safeguarding Practices
- India currently has **15 elements** on UNESCO's Representative List.

WHO'S GLOBAL GUIDELINE ON GLP-1 MEDICINES

Context: The World Health Organization (WHO) has released its first-ever global guideline on the use of GLP-1 receptor agonist medicines for the long-term treatment of obesity.

About WHO's Global Guideline on GLP-1 Medicines:

What it is?

- A new WHO policy framework offering evidence-based recommendations for using GLP-1 therapies to treat obesity as a **chronic, relapsing disease** requiring lifelong management.

Key Guidelines Issued:

- **Conditional recommendation for long-term use in adults:** GLP-1 medicines (semaglutide, tirzepatide, liraglutide) may be used for sustained obesity management—except in pregnant women.
- **Must be combined with behavioural interventions:** WHO emphasizes that GLP-1 therapy should be paired with structured diet plans, physical activity, and counselling for best outcomes.
- **Equity and system readiness:** WHO warns that rapid adoption without affordability and access policies could widen health disparities, as <10% of those who need GLP-1 are expected to access them by 2030.

About GLP-1 Medicines:

What they are?

- GLP-1 receptor agonists are a class of drugs originally developed for **type-2 diabetes** that mimic a natural hormone called **Glucagon-Like Peptide-1** involved in appetite regulation and insulin control.

How They Work?

- Reduce appetite and slow stomach emptying → lower calorie intake.
- Increase insulin secretion and reduce blood sugar.
- Improve metabolic health, reducing cardiovascular and kidney complications.
- Lead to **significant and sustained weight loss** when used long-term.

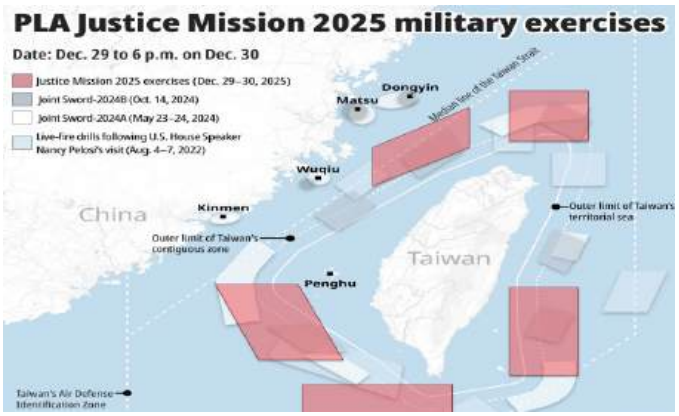
Key Features:

- Highly effective for weight loss (10–20% body weight reduction in many studies).
- Improve multiple obesity-related comorbidities.
- Administered as weekly/ daily injections depending on formulation.
- Included in WHO Essential Medicines List for diabetes management.

International Relations

JUSTICE MISSION 2025

Context: China conducted large-scale live-fire military drills named "Justice Mission 2025" around Taiwan, including missile launches, fighter jet sorties, and naval deployments.



About Justice Mission 2025:

What it is?

- Justice Mission 2025 is a high-intensity, two-day PLA (People's Liberation Army) military exercise involving live-fire missile launches, air and naval manoeuvres.
- It is designed to simulate blockade operations and precision strikes against Taiwan's ports and maritime targets.

Location:

- Conducted **around Taiwan**, including waters to the **north and south of the island**.
- Missile launches observed from Pingtan Island, the closest Chinese territory to Taiwan.

Nations involved:

- **China:** People's Liberation Army (ground forces, navy, air force, missile units).
- **Taiwan:** Target of the drills; responded with heightened military readiness.

Aim:

- To send a deterrent signal against Taiwan's independence assertions.
- To warn the US and its allies against military support and arms sales to Taiwan.
- To demonstrate China's capability to blockade and isolate Taiwan during a conflict.

Key features:

- **Live-fire missile launches** targeting surrounding waters.
- **Naval deployments** simulating maritime blockades and anti-submarine warfare.
- **Joint operations** integrating air, sea, missile, and ground forces.
- One of the **largest drills near Taiwan in recent years**, indicating escalation.

Implications:

- **Heightened regional tension:** Raises the risk of miscalculation in the Taiwan Strait.
- **US-China rivalry:** Reinforces strategic competition over Taiwan's security.
- **East Asian security impact:** Concerns for Japan, ASEAN, and global trade routes.

ELECTIONS IN BANGLADESH

Context:

Bangladesh has announced its 13th general election and a national referendum on the July National Charter to be held on February 12, 2026.

About July National Charter:

What it is?

- A political declaration and reform blueprint formulated after the July 2024 mass uprising in Bangladesh, proposing changes to the 1972 Constitution and governance structure.

Nation Involved: Prepared through national consensus in Bangladesh, involving the interim government under Muhammad Yunus and 30 political parties.

Aim of the Charter:

- To institutionalise democratic reforms after the July Revolution (2024).
- To introduce constitutional, electoral, administrative, and judicial reforms.

- To protect the gains of the pro-democracy movement within the constitutional framework.

Features of the July National Charter:

- **28-point reform document** produced through multi-party consultations.
- Commitment to:
  - Implement reforms aligned with **public aspirations and sacrifices**.
  - Enact changes via **constitutional amendments, legal revisions, or new laws**.
  - Establish **legal and constitutional safeguards** to ensure uninterrupted implementation.
  - Complete reforms **within two years** of the elected government taking office.
  - Ensure **full protection** for Charter provisions in the Constitution.
  - **Formally recognise the July 2024 pro-democracy uprising** as a historic event.
- Backed by the **National Consensus Commission**.
- Supported by **25–30 political parties**, reflecting broad societal acceptance.

Significance:

- Represents the foundation of Bangladesh's new democratic trajectory after Hasina's fall.
- Attempts to restore public trust, strengthen electoral integrity, and rebuild state institutions.
- Could reshape Bangladesh's political architecture, judicial independence, and anti-corruption mechanisms.
- Seen as a milestone in post-crisis nation-building, signalling a transition from authoritarian tendencies to participatory governance.

INDIA RE-ELECTED TO UNESCO EXECUTIVE BOARD FOR 2025–29

Context: India has been re-elected to the UNESCO Executive Board for the 2025–29 term, reaffirming global confidence in its leadership in multilateral governance.

About India Re-Elected to UNESCO Executive Board for 2025–29:

- **What the UNESCO Executive Board Is?**
  - The Executive Board is one of UNESCO's three constitutional organs responsible for supervising programme implementation and providing strategic direction to the organisation.
- **Established In:** UNESCO was created in **1945**, and the Executive Board became its core governing body soon after the Constitution came into force in **1946**.
- **Headquarters:** UNESCO and its Executive Board operate from **Paris, France**.
- **Composition and Membership:**
  - The Board consists of **58 Member States** each elected for a **four-year** term by the General Conference.
  - Members are selected through **regional electoral groups** to ensure equitable representation.
- **Mandate and Functions:**
  - Examines UNESCO's programme of work and the corresponding budget submitted by the Director-General.
  - Prepares and submits recommendations for the agenda of the General Conference.
  - Makes recommendations regarding admission of new Member States.
  - Advises on the appointment of the Director-General.
  - Supervises execution of programmes adopted by the General Conference.
  - Convenes international conferences related to education, science, culture and knowledge dissemination.

- **Significance of India's Re-Election:**
  - Reinforces India's global standing as a champion of inclusive, human-centric development.
  - Enables India to shape UNESCO priorities in areas such as education reform, digital inclusion, cultural heritage protection, climate-science cooperation and media literacy.

50TH ANNIVERSARY OF THE BIOLOGICAL WEAPONS CONVENTION

Context:

India hosted the international conference "50 Years of BWC: Strengthening Biosecurity for the Global South" in New Delhi to mark the 50th anniversary of the Biological Weapons Convention's entry into force.

About 50th anniversary of the Biological Weapons Convention:

What the BWC is?

- The **Biological Weapons Convention (BWC)** is the world's first multilateral disarmament treaty banning an entire category of weapons of mass destruction.
- It prohibits the development, production, stockpiling, acquisition, transfer and use of biological and toxin weapons.

Established In:

- **Opened for signature**: 10 April 1972 (London, Moscow, Washington)
- **Entered into force:** 26 March 1975
- India is a **founding State Party** and one of the **189 signatories** committed to full compliance.

Key Features of the Biological Weapons Convention:

- **Core Prohibitions (Articles I–III):**
  - No development, stockpiling, or use of biological and toxin weapons.
  - Obligation to destroy existing stockpiles.
- **No Verification Mechanism:**
  - A major limitation: BWC lacks a **formal verification regime** to check compliance.
  - Past violations include **Soviet Union** and **Iraq**.
- **Review Conferences:** Held roughly every five years to update norms, address technological advances and strengthen global governance.
- **International Cooperation (Article X):** Promotes peaceful use of biological science, especially capacity building for developing countries.
- **Global Norm Against Bioweapons:** Today no state openly acknowledges possessing or seeking biological weapons, reflecting strong normative acceptance.
- **Political, Not Legal, Enforcement Mechanisms:** Complaints mechanism exists (Article VI) but rarely used.

Significance:

- The BWC remains the primary global bulwark against biological weapons.
- Rapid advances in AI, synthetic biology, gene editing, gain-of-function research pose new risks requiring updated oversight.
- The Global South faces greater vulnerabilities—weak infrastructure, disease burden, limited biosafety systems—making BWC reforms crucial.

INDIA RE-ELECTED TO IMO COUNCIL

Context:

India has been re-elected to the IMO Council in Category B with the highest votes (154/169) for the 2026–27 term. This marks India's second consecutive highest vote tally, reinforcing its rising maritime influence.

About India Re-elected to IMO Council:

- **What is the IMO Council?**
  - The Council is the **executive body** of the International Maritime Organization, responsible for supervising its work between Assembly sessions and making policy decisions on maritime governance.
- **Formation & Role:**
  - The Council is constituted under the IMO Convention (1958) and elected every two years by the Assembly.
  - **Category B** includes 10 nations with the **largest interest in international seaborne trade**.
- **India's Position:**
  - India secured 154/169 votes, highest in Category B.
- **Category B Member States:** Australia, Brazil, Canada, France, Germany, India, Netherlands, Spain, Sweden and the United Arab Emirates (UAE).
- **Functions of the IMO Council:**
  - Coordinates IMO's administrative & financial functioning.
  - Prepares agenda, work programmes, and strategic plans.
  - Supervises implementation of maritime conventions.
  - Facilitates cooperation on **maritime safety, environmental regulation, digitalisation, security**, etc.

About the International Maritime Organization (IMO):

- **History:**
  - Established by a **UN Convention in 1948**, came into force in **1958**.
  - First session held in **1959**, marking the beginning of global maritime regulatory cooperation.
- **Headquarters:** London, UK.
- **Aim:** To ensure safe, secure, efficient and environmentally responsible shipping, while maintaining uniform global maritime standards to prevent unfair advantage.
- **Major Functions:**
  - Formulates & updates global maritime conventions: SOLAS, MARPOL, STCW, etc.
  - Regulates ship design, construction, operation & disposal.
  - Develops rules to prevent marine and air pollution from ships.
  - Oversees global norms on seafarer training and certification.
  - Promotes sustainable maritime transport aligned with SDG-14 (Life Below Water).

FACTS FOR PRELIMS GENERAL STUDIES – 3

ECONOMY

Basic Concepts and Macroeconomics (GDP, GNP, NI)

HINDU RATE OF GROWTH

Context: Prime minister criticised the phrase "Hindu rate of growth" as a colonial and communalising label that unfairly tied India's past economic stagnation to Hindu culture and identity.

About Hindu Rate of Growth:

- **What is meant by 'Hindu rate of growth'?**
  - The "Hindu rate of growth" is an **economic term for India's persistently low GDP growth (about 3.5–4% per year)** from the 1950s to the 1980s, **before the 1991 reforms**.
  - It refers specifically to **long-run real GDP growth**, not to religion-based economic behaviour in any technical macro model.
- **Coined by:**
  - The term was **coined by economist Raj Krishna** (Delhi School of Economics) in the late 1970s (commonly dated to 1978).
- **Features:**
  - **Low and Persistent GDP Growth:** India's GDP stayed stuck around 3.5–4% annually from the 1950s to 1980s, and per capita income rose even slower due to high population growth, reflecting long-term structural stagnation.
  - **Stability Across Shocks and Regimes:** The growth rate barely changed despite wars, droughts, famines, political shifts, and policy variations, making economists view it as a deeply entrenched, system-wide equilibrium.
  - **Licence–Permit–Quota Raj:** A heavily controlled economy with industrial licensing, import substitution, high tariffs, and a dominant public sector restricted private enterprise and kept productivity low.
  - **Mixed but State-Led Economic System:** India pursued a mixed economy with the state controlling core industries, credit, trade, and planning, limiting market competition and foreign participation in growth sectors.
  - **Contrast with East Asian "Miracle" Economies:** While India grew at ~3.5%, East Asian economies like South Korea and Taiwan achieved 7–10%, underscoring India's relative underperformance among post-colonial peers.
  - **Turnaround Before 1991:** Studies show growth accelerated to ~5.6–5.8% in the 1980s, indicating India had already moved beyond the old growth trap due to gradual deregulation and internal reforms pre-1991.

Banking and Money (Monetary Policy)

NEW LOGO FOR REGIONAL RURAL BANKS (RRBS)

Context: The Government of India and NABARD have unveiled a common logo for all Regional Rural Banks (RRBs) under the **"One RRB, One Logo"** initiative.

About New Logo for Regional Rural Banks (RRBs):

What it is?

- A single, common logo adopted by all 28 RRBs across India.
- Aims to create a unified, modern, and easily recognisable brand identity for RRBs after consolidation.

Key features and symbolism:

- **Upward arrow (Progress):** Represents growth, development, and advancement of rural economies.
- **Hands (Nurturing):** Symbolise care, support, and assistance to rural communities.
- **Flame (Enlightenment):** Denotes knowledge, empowerment, and financial awareness.
- **Colours:**
  - **Dark blue:** Trust, stability, and finance
  - **Green:** Life, agriculture, and growth
- Reflects the core values of financial inclusion, rural development, and empowerment.

About Regional Rural Banks (RRBs):

What they are?

- Specialised banking institutions created to provide credit and banking services in rural and semi-urban areas.
- Designed as a **hybrid model**, combining the local familiarity of cooperatives with the professional banking expertise of commercial banks.

Established in:

- **1975** through an **Ordinance**, later enacted as the **Regional Rural Banks Act, 1976**.
- **Ownership structure:** Central Government (50%), State Government (15%), Sponsor Bank (35%).
- Regulated by **RBI** and supervised by **NABARD**.

Evolution and consolidation:

- **Initial setup:** 5 RRBs in 1975.
- Progressive amalgamation under **"One State, One RRB"** policy:
  - 196 RRBs → **28 RRBs** (by 2025).
- **Recent phase (2025):** 26 RRBs merged across 11 States/UTs to improve scale, efficiency, and viability.

Key functions:

- Provide **institutional credit** to:
  - Small and marginal farmers
  - Agricultural labourers
  - Artisans
  - SHGs and small entrepreneurs
- Support **agriculture, allied activities, MSMEs, and rural livelihoods**.
- Act as a key instrument for **financial inclusion**, DBT delivery, and rural development schemes.

CABINET APPROVE 100% FDI IN INSURANCE

Context: The Union Cabinet has approved a proposal to raise the FDI limit in insurance companies from 74% to 100%, to be implemented through the Insurance Laws (Amendment) Bill, 2025.

About Cabinet Approve 100% FDI In Insurance:

What is FDI?

- Foreign Direct Investment (FDI) is when a non-resident investor acquires an equity stake (≥10%) in an Indian company, with a lasting interest and some degree of control/management influence.

How FDI works in India?

- Foreign investor brings capital into an Indian company through:
  - Subscription to shares (MoA, preferential allotment, rights/bonus issue, private placement)
  - Mergers, demergers, amalgamations
  - Share purchase from existing residents
  - Conversion of convertible instruments / notes, swap of instruments etc.
- FDI is regulated under **FEMA**, sectoral caps, pricing guidelines, entry routes and conditions laid down by the **Government / RBI**.
- In insurance, 100% FDI means a foreign insurer can now hold **full ownership (subject to Indian regulatory conditions)** in an Indian insurance company.

Two FDI Routes in India:

a) **Automatic Route**
   - No prior Government or RBI approval required.
   - Investment must comply with sectoral caps, FEMA rules, SEBI/RBI norms etc.
   - Investor only needs to report and file prescribed forms.

b) **Government Route**
   - Prior **Government approval** is mandatory.
   - Application is made through the **Foreign Investment Facilitation Portal (FIFP)**.
   - Approval may carry specific conditions (lock-in, reporting, security conditions, etc.).

Prohibited Sectors under FDI:

FDI is **not allowed** in, among others:

- Lottery business, online lotteries
- Gambling and betting, including casinos
- Chit funds (except some NRI/OCI non-repatriation cases)
- Nidhi companies
- Trading in Transferable Development Rights (TDRs)
- Real estate business and construction of farmhouses
- Manufacturing of **cigarettes, cigars, cigarillos** of tobacco / substitutes
- Sectors not open to private investment (e.g. **atomic energy, certain railway operations**)
- Technology collaboration (brand/franchise/ management) is also prohibited in lottery and gambling/betting.

Progressive FDI Liberalisation in Insurance:

- **2015** – FDI cap raised from **26% to 49%**.
- **2021** – FDI cap raised from **49% to 74%**, with safeguards on Indian management and control.
- **2025 (proposed)** – FDI cap to be raised to 100%, subject to conditions in the Insurance Laws (Amendment) Bill, 2025 and changes in:
   - LIC Act, 1956
   - IRDA Act, 1999
   - Insurance Act, 1938

IMF LISTS UPI AS WORLD'S LARGEST REAL-TIME PAYMENT SYSTEM

The IMF has officially recognised India's Unified Payments Interface (UPI) as the world's largest real-time retail payment system by transaction volume.

- UPI accounts for 49% of all global real-time digital payments, far ahead of Brazil, Thailand and China.

UPI's status against other leading international real-time payment platforms

Countries	Transaction Volume (in Billions)	% Share of Global real-time payment platform
India	129.3	49%
Brazil	37.4	14%
Thailand	20.4	8%
China	17.2	6%
South Korea	9.1	3%

About IMF Lists UPI as World's Largest Real-Time Payment System:

What UPI Is?

- UPI (Unified Payments Interface) is India's instant, real-time, interoperable payments system that enables bank-to-bank transfers using a mobile phone.
- It is operated by NPCI (National Payments Corporation of India) and regulated by the Reserve Bank of India (RBI).

Origin of UPI:

- Conceptualised by NPCI to unify fragmented payment systems under one interoperable platform.
- Launched as a pilot in **April 2016** by then RBI Governor **Raghuram Rajan**.

Key Features of UPI:

- **Real-time payments**: Money transfers in under 5 seconds, 24×7.
- **Interoperability**: Works across banks, apps, QR codes and merchants.
- **Low-cost / Zero MDR**: Ensures mass adoption among small businesses and consumers.
- **Scalable architecture**: Handles billions of transactions per month.
- **Versatility**: Supports P2P, P2M, autopay, credit line on UPI, RuPay linkage, and international acceptance.

Global Share & IMF Recognition:

- IMF's report "Growing Retail Digital Payments – The Value of Interoperability" lists UPI as the **world's largest retail fast-payment system**.
- As per ACI Worldwide (Prime Time for Real-Time 2024):
  - **UPI share: 49% of global real-time transactions**
  - **Volume: 129.3 billion transactions**
- UPI outperforms:
  - **Brazil (14%)** – Pix
  - **Thailand (8%)** – PromptPay
  - **China (6%)** – UnionPay/WeChat/Alipay
- This makes India the **undisputed global leader** in fast payments.

Financial Markets (Capital Market, Money Market)

INITIAL PUBLIC OFFERING (IPO)

Context: India's IPO market has touched record highs, raising about ₹3.8 lakh crore through 701 IPOs in the last two years (2024–25), surpassing the previous four-year total.

About Initial Public Offering (IPO):

What it is?

- An Initial Public Offering (IPO) is the process through which a private company offers its shares to the public for the first time to raise equity capital, thereby becoming a publicly listed company on stock exchanges like NSE and BSE.

Types of IPO:

1. **Fixed price issue:** The company sets a **single, pre-determined price** for its shares in consultation with merchant bankers, giving investors certainty about the issue price.
2. **Book building issue:** Shares are offered within a **price band (floor price to cap price)**, and the final price is discovered based on **investor demand during bidding**. This is the **most common method in India**.

Stages of IPO allotment:

- **Preparation and due diligence:** Company appoints investment banks; financial, legal, and regulatory checks are conducted.
- **DRHP filing:** Draft Red Herring Prospectus is filed with **SEBI**, disclosing business, risks, and financials.
- **Pricing and bidding:** Price or price band is announced; investors place bids during the subscription period.
- **Basis of allotment:** Registrar finalises allocation based on demand and SEBI norms.
- **Listing:** Shares are listed on stock exchanges and trading begins in the secondary market.

How IPO allotment works?

- IPO shares are allotted category-wise to Qualified Institutional Buyers (QIBs), Non-Institutional Investors (NIIs), and Retail Individual Investors (RIIs) as per SEBI regulations.
- If the issue is undersubscribed, all valid applicants receive shares.
- If oversubscribed, allotment is done proportionately or through a lottery system (especially for retail investors).
- Allotted shares are credited to Demat accounts, while unallotted funds are refunded.

OPEN MARKET OPERATION (OMO) PURCHASE

Context: The RBI announced a ₹1 trillion OMO purchase along with a $5 billion dollar–rupee swap to inject durable liquidity into the banking system as the rupee weakened past 90/$ amid foreign outflows.

About Open Market Operation (OMO) Purchase:

What is an OMO Purchase?

- An Open Market Operation (OMO) purchase is when the **RBI buys government securities** from banks and financial institutions to inject durable liquidity into the financial system.
- It increases bank reserves, lowers short-term interest rates, and supports smooth monetary transmission.

Purpose of OMO Purchases:

- Inject durable and long-term liquidity into the banking system.
- Smoothen monetary transmission so lending rates fall in line with policy cuts.
- Stabilise money-market rates such as the Weighted Average Call Rate (WACR).

Types of Open Market Operations:

1. **Expansionary OMO (Liquidity Injection):**
    - RBI **buys** government securities.
    - Increases in bank reserves lead to lower interest rates, which will stimulate lending/investment.
2. **Contractionary OMO (Liquidity Absorption):**
    - RBI **sells** government securities.
    - The reduction in money supply leads to a rise in interest rates, which in turn cools inflation.
3. **Special OMOs / Operation Twist:**
    - RBI buys long-term bonds and sells short-term ones simultaneously.
    - Used to shape the yield curve without changing overall liquidity.

How OMO Purchases Work?

- **Assessing Liquidity Conditions:** RBI monitors currency pressure, capital flows, call money rates, and banking liquidity.
- **Announcing OMO Auctions:** RBI notifies the quantity (e.g., ₹1 trillion) and maturity of securities it will purchase.
- **Buying Government Securities:** Banks sell bonds to the RBI in the auction.
- **Settlement:** RBI pays banks → their reserves increase → system liquidity expands.
- **Market Impact:**
    - More liquidity lowers overnight rates.
    - Bond yields soften.
    - Rupee money-markets stabilise even during dollar demand shocks.
    - Transmission improves across banks

Significance of OMO Purchases:

- **Strengthens Rupee Liquidity During Currency Stress:** Foreign outflows reduce rupee liquidity; OMO purchases replenish it.
- **Supports Monetary Transmission:** Ensures lending rates move in line with repo rate decisions.
- **Stabilises Bond Markets:** Prevents disorderly spikes in yields that raise government borrowing costs.
- **Enhances Banking System Liquidity:** Banks get durable funds, enabling more lending to businesses and households.

MASALA BOND

Context: The Enforcement Directorate has issued show-cause notices to Kerala CM, former Finance Ministry and KIIFB officials over alleged FEMA and RBI violations linked to KIIFB's 2019 Masala Bond issuance.

About Masala Bond:

What is a Masala Bond?

Masala Bonds are rupee-denominated bonds issued overseas by Indian entities to raise funds, where the currency risk is borne by the investor, not the issuer.

Introduced in: First issued globally by **IFC in 2014** (₹1,000 crore) and officially allowed by **RBI in 2015** under its rupee-denominated bond framework.

Objective:

- To allow Indian corporates, NBFCs and infrastructure trusts to raise global capital in rupees.
- To reduce reliance on Foreign Currency borrowings (ECBs) and shift exchange rate risk to investors.
- To deepen offshore rupee markets and promote internationalisation of the Indian rupee.

Key Features:

- **Rupee-denominated:** Bonds priced in INR but subscribed overseas; redemption also paid in

INR.

- **Investor bears currency risk**, unlike ECBs where Indian borrowers carry forex risk.
- **Eligible issuers:** Indian corporates, NBFCs, REITs, InvITs.
- **Listing:** Can be listed on global exchanges (e.g., London, Singapore).
- **Use restrictions:** Cannot be used for capital market investment, real estate (except affordable housing), land purchase, or FDI-prohibited sectors.
- **Minimum maturity:** Initially 5 years, later reduced to **3 years**.
- **Tax incentives:** 5% withholding tax on interest; capital gains from rupee appreciation exempt.

Benefits of Masala Bonds:

- Reduced currency risk for Indian issuers and improved cost of borrowing versus domestic bonds.
- Diversifies funding sources and attracts a wider pool of global investors.
- Boosts infrastructure financing, especially for states and large PSUs.
- Strengthens global confidence in the Indian rupee and supports its internationalisation.

Industry and Infrastructure

COPPER

Context: Copper prices touched a record high of over USD 12,000 per tonne in 2025, driven by US tariff uncertainty, global supply disruptions and surging demand from AI, clean energy and EVs.

About Copper:

What it is?

- Copper (Cu) is a naturally occurring metallic element (Atomic number: 29) known for its excellent electrical and thermal conductivity.
- It is among the oldest metals used by humans and is central to modern industrial, digital and green economies.

Characteristics of Copper:

- **Chemical characteristics:**
  - **Symbol:** Cu and **Atomic weight:** 63.546 amu
  - High resistance to corrosion and oxidation
  - Forms important alloys such as **brass (Cu+Zn)** and **bronze (Cu+Sn)**
- **Physical characteristics:**
  - Excellent **electrical and thermal conductivity** (second only to silver)
  - Ductile and malleable, enabling easy wiring and shaping
  - Naturally reddish-brown; one of the few coloured metals
- **Unique properties:**
  - **100% recyclable** without loss of quality
  - **Antimicrobial** in nature, useful in healthcare settings
  - Enhances **energy efficiency**, reducing CO_2 emissions over product life cycles

Applications of Copper:

- **Energy and power sector:** Used extensively in power grids, transformers, renewable energy systems, and battery storage.
- **Electric vehicles (EVs):** EVs use over twice the copper of conventional vehicles due to motors, batteries and wiring.
- **Digital and AI infrastructure:** Data centres, especially hyperscale AI facilities, require massive copper volumes for cooling and power transmission.
- **Construction and manufacturing:** Plumbing, roofing, industrial machinery and electronics rely heavily on copper.
- **Defence and healthcare:** Used in defence electronics, ammunition and antimicrobial medical surfaces.

India and Copper: Current Status

- India is recognised copper as a **critical mineral** under its resource strategy.
- Over **90% dependence on imported copper concentrate**

Major producers across globe: Chile, Peru, DR Congo, China, USA

BUREAU OF PORT SECURITY (BOPS)

Context: The Union government has constituted the Bureau of Port Security (BoPS) as a statutory body under the Merchant Shipping Act, 2025 to strengthen port and maritime security.

About Bureau of Port Security (BoPS):

What it is?

- The Bureau of Port Security (BoPS) is a statutory regulatory authority responsible for the security oversight of ports, port facilities, and ships in India.
- It is modelled on the Bureau of Civil Aviation Security (BCAS), providing a unified institutional framework for port security.

Established by:

- Constituted under Section 13 of the Merchant Shipping Act, 2025.
- Functions under the Ministry of Ports, Shipping and Waterways (MoPSW).

Aim:

- To create a single, legally empowered authority for port security regulation, coordination, and compliance.
- To ensure safe, secure, and resilient ports in line with Maritime India Vision 2030 and global security standards.

Key functions:

- **Regulatory oversight:** Enforce compliance with international frameworks such as the International Ship and Port Facility Security (ISPS) Code.
- **Coordination role:** Act as a nodal body coordinating among **Coast Guard, CISF, Navy, State maritime police, and port authorities** to avoid security gaps.
- **Threat prevention:** Address risks like maritime terrorism, arms and drug smuggling, human trafficking, piracy, illegal migration, and poaching.
- **Cybersecurity:** Establish a dedicated division to protect **port IT systems and digital infrastructure**, coordinating with national cyber agencies.
- **Standardisation & training:** Designate CISF **as a recognised security organisation** to prepare security plans, conduct audits, and train port security personnel.
- **Graded security implementation:** Ensure risk-based, phased security measures across **major and non-major ports**.

Significance:

- Reduces fragmentation caused by multiple agencies handling coastal security.
- Enhances security credibility amid rising cargo volumes, port capacity expansion, and inland waterway usage.

INDIA'S FIRST PPP-MODEL MEDICAL COLLEGES

Context: India has announced its first-ever PPP-model medical colleges in the tribal districts of Dhar and Betul (Madhya Pradesh).

About India's first PPP-model medical colleges:

What it is?

- India's first medical colleges under the Public–Private Partnership (PPP) model are being set up in tribal-dominated districts of Madhya Pradesh.
- Four such colleges are planned (Dhar, Betul, Katni, Panna), linked with **existing district hospitals** to strengthen both medical education

and public healthcare delivery.

What is the PPP model?

- Public–Private Partnership (PPP) is an arrangement where the government and private sector jointly provide public infrastructure or services.
- The private partner invests in construction, management or operations, while risks and responsibilities are clearly shared, and payments are linked to performance standards.

Types of PPP models:

1. **BOT / DBFOT (Build–Operate–Transfer / Design–Build–Finance–Operate–Transfer):** Private entity designs, builds, finances and operates the asset for a fixed period before transferring it to the government.
2. **Operations & Maintenance (O&M):** Private player manages and maintains public assets for a shorter contractual duration.
3. **Lease–Develop–Operate–Maintain:** Existing public assets are leased to private entities for development and operation during the concession period.

Government incentives for PPP:

- Viability Gap Funding **(VGF):** Capital grant of up to **40% of project cost** to improve financial viability.
- **India Infrastructure Project Development Fund (IIPDF):** Financial support for feasibility studies and project structuring.
- **IIFCL financing:** Long-term debt support for infrastructure projects with long gestation periods.
- **FDI support:** Up to **100%** FDI permitted in most PPP sectors through the automatic route.

POLICY FOR AUCTION OF COAL LINKAGE FOR SEAMLESS, EFFICIENT & TRANSPARENT UTILISATION (COALSETU)

Context: The Union Cabinet has approved creation of a new CoalSETU window under the NRS Linkage Policy, enabling long-term coal linkages for any industrial use and exports.

About Policy for Auction of Coal Linkage for Seamless, Efficient & Transparent Utilisation (CoalSETU):

What it is?

- CoalSETU is a **new auction-based coal linkage window** under the Non-Regulated Sector (NRS) Linkage Policy, allowing **any domestic industrial buyer** to secure long-term coal linkages for own use or export (up to 50%), except resale within India.

Ministry: Ministry of Coal, Government of India

Aim of the Policy:

- To ensure transparent, seamless and efficient utilisation of domestic coal resources.
- To promote ease of doing business and reduce dependence on coal imports.
- To boost availability of washed coal and support export opportunities.

Key Features:

- **New CoalSETU Window in NRS Policy (2016):**
  - Allows **any industrial consumer** to participate in coal linkage auctions.
  - Existing NRS auctions for cement, sponge iron, steel, aluminium, CPPs will continue.
  - These users may also bid in the CoalSETU window.
- **No End-Use Restrictions:**
  - Coal can be used for **own consumption**, washing, or **export (up to 50%)**.
  - **Coking coal excluded** from this window.
  - **Traders barred** from bidding to prevent speculative hoarding.
- **Export Flexibility:**
  - Companies may export up to **50% of allotted coal**.
  - Washed coal allowed for export.
  - Coal can be shared across **group companies** as per operational needs.
- **Boost to Washery Operators:**
  - Encourages growth of private washeries.
  - Improves domestic supply of **washed,**

cleaner coal.
    - o May reduce import dependence and improve export viability.
- **Alignment with Coal Sector Reforms:**
    - o Complements the 2020 reform allowing **commercial mining without end-use restrictions**.
    - o Strengthens fair, market-driven allocation of mineral resources.

Significance of the Policy:

- **Promotes Transparent & Competitive Allocation:** Auction-based linkages ensure fair market access and remove closed-door allocations.
- **Reduces Import Dependence:** By expanding domestic access and improving washed coal availability, industries can reduce reliance on costly imports.
- **Supports Industrial Growth:** Provides long-term assured coal supply to small, medium and new industries previously excluded.

INDIA'S FIRST INDIGENOUS HYDROGEN FUEL CELL PASSENGER VESSEL

Context: India launched its first fully indigenous hydrogen fuel cell-powered passenger vessel into commercial service in Varanasi, marking a breakthrough in green inland water transport.

About India's First Indigenous Hydrogen Fuel Cell Passenger Vessel:

- **What it is?**
    - o A 24-metre hydrogen fuel cell-powered AC catamaran crafted for zero-emission passenger movement, ensuring clean mobility on inland waterways.
- **Location:** Namo Ghat, Varanasi — the vessel's maiden commercial run began here along the Ganga.
- **Developed by:** Cochin Shipyard Ltd (CSL), showcasing indigenous excellence in clean marine engineering.
- **Key Features:**
    - o **Capacity:** Carries 50 passengers comfortably with full air-conditioning for urban river mobility.
    - o **Propulsion:** Uses Low-Temperature PEM fuel cell technology enabling silent, vibration-free cruising.
    - o **Emission:** Emits only water, ensuring completely pollution-free navigation on the Ganga.
    - o **Endurance:** Can operate for around 8 hours on a single hydrogen refill, supporting daily commercial runs.
    - o **Hybrid System:** Integrates hydrogen fuel cells, batteries and solar panels to optimise efficiency.
    - o **Speed:** Cruises at ~6.5 knots, balancing energy efficiency with safe riverine operations.
    - o **Hull Type:** Catamaran design provides high stability, better deck space and superior seakeeping.

About Hydrogen Fuel Cell:

- **What it is?**
    - o An electrochemical device that converts hydrogen and oxygen into electricity, yielding only water and heat for clean, efficient power generation.
- **How It Works?**
    - o Hydrogen enters the anode, supplying the fuel for electrochemical splitting.
    - o A catalyst splits H_2 into protons (H^+) and electrons (e^-), initiating the energy conversion.
    - o Protons move through the PEM membrane to the cathode, maintaining the reaction flow.
    - o Electrons, unable to cross the membrane, travel via an external circuit to generate electricity.
    - o At the cathode, oxygen, protons and electrons combine to form water and release heat.
- **Features:**
    - o Produces zero emissions, releasing only water as the harmless byproduct.
    - o Offers higher efficiency than combustion engines by avoiding thermal losses.
    - o Provides quiet, vibration-free operation

ideal for sensitive environments.
    - Adaptable across mobility, stationary and portable clean-power applications.
- **Applications:**
    - Used in transportation including cars, buses, trucks, ships, drones and forklifts.
    - Deployed in stationary systems for buildings, data centres and remote-grid power.
    - Used in portable supply systems for defence, small devices and emergency backup.

DUMPING

Context: The U.S. is considering new tariffs on Indian rice after American farmers accused India of dumping subsidised rice into the U.S. market, lowering domestic prices.

About Dumping:

What is Dumping?

- Dumping occurs when a firm sells a product in a foreign market at a price lower than its domestic price or below its average cost of production, often to capture market share.
- It is a form of **international price discrimination**, enabled when goods cannot freely move back from low-price to high-price markets due to tariffs or transport costs.

Criteria to Determine Dumping:

A product is considered dumped if:

- **Export price < domestic market price** of the exporting country; or
- **Domestic price unavailable**, then compare export price with:
    - Price in a third-country market, or
    - Exporter's average production cost.
- If any of these tests confirm under-pricing, the importing country can initiate anti-dumping action.

Implications of Dumping:

- **Hurts domestic producers** by undercutting prices and eroding market share, leading to losses and job reductions.
- **Short-term benefit** to consumers through cheaper imports but **long-term harm** when domestic industry becomes uncompetitive.
- **Market distortion** occurs when firms rely on subsidies to artificially lower prices, creating trade tensions.

WTO and Dumping Rules:

- The WTO does **not ban dumping**, but allows countries to act only if they prove:
    - Dumping has occurred,
    - Domestic industry suffered material injury, and
    - Dumping caused this injury.
- Countries may impose **anti-dumping duties** equal to the margin of dumping (difference between dumped price and normal price). WTO's Anti-Dumping Agreement governs procedures, investigations, and review mechanisms.

Measures to Counter Dumping:

- **Anti-dumping duties:** Additional tariffs matching the price difference (as the U.S. is considering against Indian rice).
- **Countervailing duties:** Tariffs to offset foreign government subsidies.
- **Import quotas:** Limits to prevent market flooding.
- **Price undertakings:** Exporter voluntarily raises prices to avoid penalties.
- **Strengthening domestic industry:** Support for productivity, tech upgrades, and diversification to withstand imported competition.

External Sector and International Institutions (BOP, FDI, FII, Capital Account, Currency Devaluation, Depreciation, IMF, WB)

CHINA FILES WTO COMPLAINT AGAINST INDIA

Context: China has filed a fresh complaint against India at the World Trade Organization (WTO) challenging India's solar subsidies and tariff measures.

About China files WTO complaint against India:

What is the issue?

- China has sought **formal consultations** with India under the WTO framework regarding **subsidies for India's photovoltaic (solar) sector**.
- It claims that India's policies:
  - Violate **bound tariff commitments** and **national treatment obligations**.
  - Constitute **prohibited** import-substitution **subsidies**, favouring domestic producers over foreign firms.
- This follows an earlier Chinese complaint (October 2025) against India's EV **and battery subsidies**, signalling rising trade frictions over **green industrial policies**.

About WTO Dispute Settlement System:

What it is?

- The WTO Dispute Settlement System (DSS) is a rules-based, compulsory and multilateral mechanism to resolve trade disputes between WTO Members.
- It operates under the Dispute Settlement Understanding (DSU), which is an integral part of the WTO Agreement.

Aim:

- Ensure security, predictability and stability in international trade.
- Uphold WTO rights and obligations while preventing unilateral trade retaliation.

Key stages of WTO dispute settlement:

- **Consultations:** The disputing members first hold formal consultations to resolve the issue amicably without litigation, reflecting the WTO's preference for negotiated and mutually agreed solutions.
- **Panel stage:** If consultations fail, an independent panel of experts examines factual evidence and legal arguments to determine whether WTO rules have been violated.
- **Appellate review:** Parties may appeal panel findings on points of law before the Appellate Body, though this stage is currently stalled due to non-functioning of the body.
- **Adoption of reports:** Panel or Appellate Body reports are adopted by the Dispute Settlement Body (DSB), making the rulings legally binding on the parties.
- **Implementation:** The losing member must bring its measures into compliance within a "reasonable period of time," monitored by the DSB.
- **Retaliation (if needed):** If compliance is not achieved, the complainant may seek DSB authorisation to impose proportionate trade countermeasures.

Key features:

- **Compulsory jurisdiction:** All WTO Members are bound once they join the WTO.
- **Time-bound process:** Normally ~12 months (or ~16 months with appeal).
- **Ban on unilateral action:** Members cannot impose trade sanctions without WTO authorisation.
- **Exclusive forum:** WTO disputes cannot be taken to parallel international bodies.

THE RAPID FINANCING INSTRUMENT (RFI)

Context: The International Monetary Fund (IMF) has approved USD 206 million in emergency funding for Sri Lanka under the Rapid Financing Instrument (RFI) following the devastation caused by Cyclone Ditwah.

About The Rapid Financing Instrument (RFI):

What it is?

- The Rapid Financing Instrument (RFI) is an IMF emergency lending facility that provides quick, low-access financial assistance to member countries facing urgent balance-of-payments (BoP) needs, especially during crises such as natural disasters, external shocks, or domestic instability.

Organisation: International Monetary Fund (IMF)

Aim:

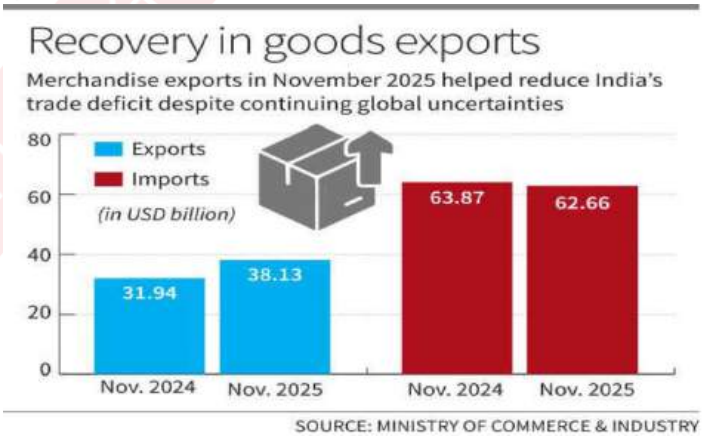
- Provide immediate liquidity to countries facing sudden BoP pressures.
- Prevent severe economic disruption when full-fledged IMF programmes are unnecessary or not feasible.
- Support macroeconomic stability during short-term crises.

Key features:

1. **Nature of assistance:**
   - Single, rapid disbursement of funds.
   - Designed for urgent and temporary BoP needs.
   - No requirement for a comprehensive economic reform programme.
2. **Windows under RFI**
   - **Regular window:**
     - For BoP stress due to domestic instability, exogenous shocks, or fragility
     - Access up to **50% of IMF quota per year** and **100% cumulatively**
   - **Large Natural Disaster window:**
     - Applicable when disaster damage equals or exceeds **20% of GDP**
     - **Higher access:** up to 80% of quota per year and 133.33% cumulatively
3. **Conditionality framework**
   - **No ex-post conditionality** or programme reviews
   - Limited **prior actions** may be required
   - Borrowing country expected to pursue policies addressing underlying BoP problems
4. **Terms of lending**
   - **Repayment period:** 3¼ to 5 years
   - **Interest rate:** Same as IMF's standard non-concessional facilities (FCL, PLL, SBA)
   - **Access:** Generally one-off, with scope for repeated use in exceptional circumstances
5. **Review and monitoring:**
   - No formal programme reviews
   - IMF monitoring remains light and focused on macroeconomic stability

TRADE DEFICIT

Context: India's trade deficit fell sharply to $6.6 billion in November 2025, driven by a strong rise in merchandise exports and a decline in merchandise imports (notably lower gold imports).



About Trade deficit:

What it is?

- A trade deficit occurs when the value of a country's imports exceeds the value of its exports over a given period, resulting in a negative balance of trade (BoT).

Formula:

- Trade balance (BoT) = Total exports − Total imports
  - If BoT is negative → Trade deficit.
  - If BoT is positive → Trade surplus.

Types:

1. **Merchandise (goods) trade deficit**: Gap between goods exports and goods imports.

2. **Services trade deficit/surplus**: Gap between services exports and imports.
3. **Bilateral trade deficit**: Deficit with a specific country.

Key features:

- **Indicator of net external demand:** Shows whether a country is a net buyer or net seller in global markets.
- **Highly cyclical**: Moves with growth, commodity prices (oil/gold), exchange rate, and domestic demand.
- **Composition matters**: Deficit driven by capital goods/intermediates can aid future productivity; deficit driven by non-essential imports may be less desirable.
- **Linked to current account**: Trade deficit is a major component of the Current Account Deficit (CAD), though services/remittances can offset it.

Implications:

- **Currency pressure**: Persistent deficits can raise demand for foreign currency, contributing to rupee depreciation and imported inflation.
- **External vulnerability**: Larger deficits may widen **CAD**, increasing reliance on **capital inflows** (FDI/ FPI/borrowings).
- **Inflation transmission**: Higher import bills (especially oil) can feed into fuel, transport, and food inflation.
- **Industrial competitiveness signal**: Can reflect gaps in **manufacturing capability**, logistics costs, technology intensity, or export diversification.
- **Not always "bad"**: If financed sustainably and linked to productive investment (machinery, technology), it can support growth and upgrading.

Schemes

FLIGHT DUTY TIME LIMITATIONS RULES

Context: India's aviation sector is facing major disruptions as the newly implemented Flight Duty Time Limitations (FDTL) rules have triggered large-scale flight cancellations and delays, especially at IndiGo, due to crew shortages and tighter fatigue norms.

About Flight Duty Time Limitations Rules:

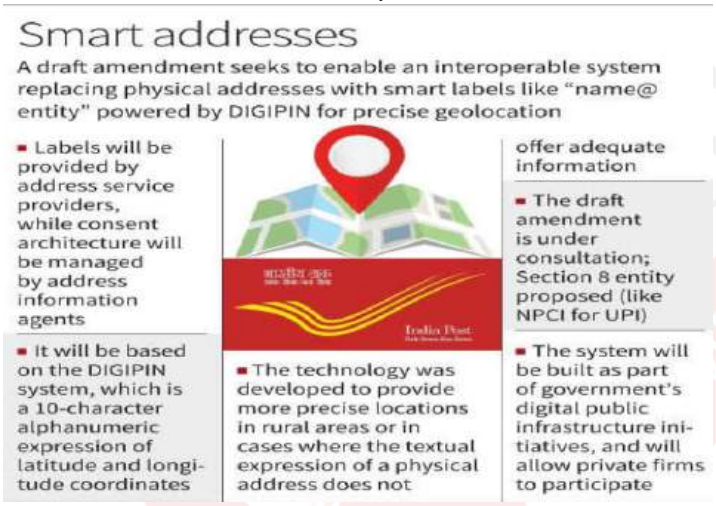
- **What it is?**
  - FDTL refers to regulatory limits on how long pilots can be on duty, how many hours they may fly, the number of night operations they can perform, and the minimum rest required to prevent fatigue.
- **Published by:** Issued and enforced by the **Directorate General of Civil Aviation (DGCA)** under a revised framework notified in January 2024.
- **Aim:** To reduce fatigue-related safety risks, align Indian aviation with global norms, and ensure safer flight operations by regulating duty hours, night operations, and rest requirements.
- **Features:**
  - **48 hours of continuous** weekly rest ensures pilots get sufficient uninterrupted recovery time, reducing cumulative fatigue that builds up over busy rosters and frequent night operations.
  - **Night period extended to 00:00–06:00** increases protected rest hours for early-morning and late-night flights, which are biologically high-fatigue windows, strengthening safety margins.
  - **Limit of two-night landings and two consecutive night duties** reduce exposure to the most fatiguing tasks, preventing performance degradation during critical phases of flight.
  - **Mandatory roster adjustments and fatigue** reporting require airlines to redesign schedules and allow pilots to formally flag fatigue risks, making crew management more transparent and safety-driven.
  - **Phased implementation by November 1, 2025** pushed airlines to overhaul

long-standing scheduling practices and expand crew capacity to comply with the stricter fatigue-control framework.

- **Significance:**
  - Enhances flight safety by scientifically addressing circadian fatigue.
  - Aligns India with ICAO and international best practices.
  - Improves pilot well-being and operational discipline.

DIGITAL HUB FOR REFERENCE AND UNIQUE VIRTUAL ADDRESS (DHRUVA)

Context: The Department of Posts has released a draft amendment to introduce DHRUVA, a UPI-like digital addressing system enabling users to share address "labels" such as name@entity.



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

What it is?

- DHRUVA is a national Digital Address Digital Public Infrastructure (DPI) that standardises, digitises and virtualises physical addresses through secure, consent-driven sharing using UPI-like address labels.
- It builds on the DIGIPIN system to offer geocoded precision and interoperability across platforms.

Launched by: Draft policy introduced by the Department of Posts in **2025** for public consultation.

Aim:

- To create a unified, interoperable, secure, and user-controlled digital address ecosystem.
- To treat address-data management as a core public infrastructure similar to Aadhaar, UPI, and DigiLocker.
- To enable Address-as-a-Service (AaaS) for government, businesses, and citizens.

Key Features:

- **UPI-like Address Labels:** Users get a virtual address such as **"name@entity"**, which acts as a proxy for their physical address—reducing the need to fill address forms repeatedly.
- **Consent-Based Access:** Companies can access the user's geocoded or textual address only with **time-bound authorisation**, ensuring strong privacy protection.
- **DIGIPIN Backbone:**
  - DIGIPIN = a **10-character alphanumeric geocode** representing **latitude–longitude**.
  - Maps every **14 sq m patch** of Indian territory (~228 billion unique pins).
  - Open-sourced and precise, especially for rural and hard-to-map areas.
- **Address-as-a-Service (AaaS) Framework:** Provides secure APIs for integrating address data across government agencies, logistics firms, fintech, e-commerce, etc.
- **Institutional Architecture:**
  - A Section 8 not-for-profit entity (NPCI-like) will administer the ecosystem.
  - Address Service Providers (ASPs) issue labels; Address Information Agents (AIAs) manage consent workflows.
- **Interoperability & Private-Sector Participation:** The system is voluntary—designed to attract e-commerce, gig platforms, financial services, and logistics companies.

PM-WANI SCHEME

Context: The government has updated Parliament on the rapid expansion of the PM-WANI network, with over 3.9 lakh Wi-Fi hotspots deployed across India as of November 2025.

About PM-WANI Scheme:

What it is?

- PM-WANI (Prime Minister's Wi-Fi Access Network Interface) is a national public Wi-Fi framework enabling affordable, widespread broadband access through decentralized Wi-Fi hotspots operated by small entrepreneurs.

Ministry: Implemented by the Department of Telecommunications (DoT) under the Ministry of Communications.

Launched in: Approved by the Union Cabinet on **9 December 2020**.

Aim:

- To democratize internet access, promote digital inclusion, and create a nationwide network of public Wi-Fi hotspots—supporting the goals of the National Digital Communications Policy (NDCP) 2018.

Key Features of PM-WANI:

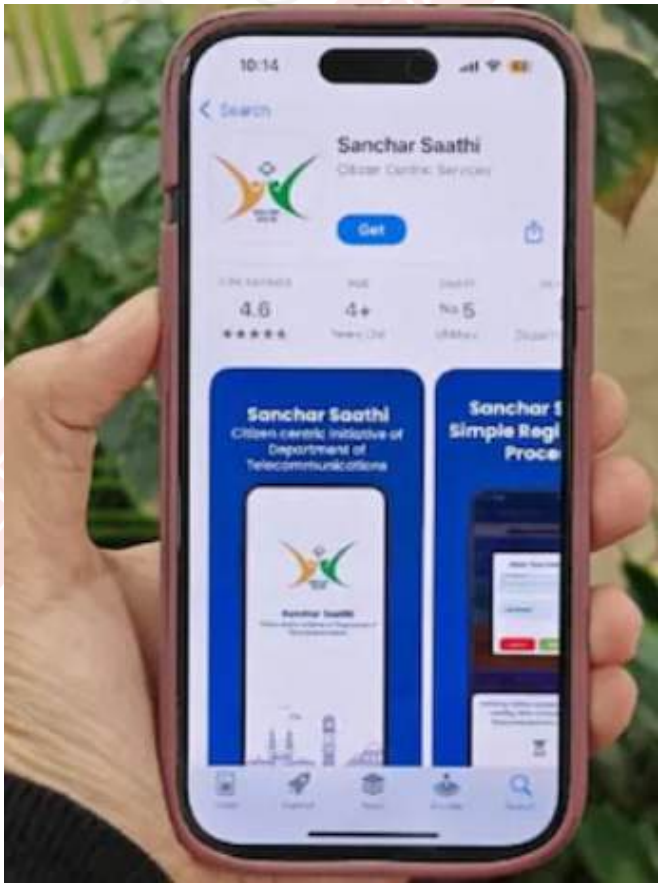
- **No License Required:** PM-WANI allows small shops and local businesses to operate Wi-Fi hotspots without needing any licence, fee, or formal registration, making broadband delivery easy and low-cost.
- **Four-tier Architecture:** The system works through four components—PDOs providing Wi-Fi, PDOAs handling authentication and accounting, App Providers enabling user access, and a Central Registry (C-DoT) that records all entities.
- **FTTH Support:** PDOs are now permitted to use regular fibre-to-the-home broadband connections, reducing their operational costs and making hotspot deployment more viable.
- **Roaming Between PDOAs:** Users can seamlessly switch between hotspots operated by different PDO Aggregators, ensuring continuous connectivity similar to mobile network roaming.
- **Mobile Data Offload:** PDOs can partner with telecom operators to divert mobile data traffic onto Wi-Fi networks, improving network quality and reducing mobile congestion.
- **User-Based Promotions:** App Providers and PDOAs may send promotional messages or content to users, but only after obtaining explicit user consent to ensure privacy protection.
- **Affordable Bandwidth (TRAI Rule):** TRAI requires that all retail fibre broadband plans up to 200 Mbps be sold to PDOs at no more than twice the consumer tariff, ensuring that public Wi-Fi remains affordable.

Significance:

- Bridges the digital divide by providing low-cost internet in rural and underserved regions.
- Generates local entrepreneurship, creating lakhs of micro-Wi-Fi operators.
- Enhances digital payments, e-learning, telemedicine, and e-governance reach.

SANCHAR SAATHI APP

Context: The Department of Telecommunications (DoT) has mandated that all smartphones sold from March 2026 must come with the Sanchar Saathi app pre-installed.



About Sanchar Saathi App:

- **What it is?**
  - Sanchar Saathi is a telecom security and citizen-protection platform offering tools to report fraud, check SIM misuse, and block stolen devices.
- **Developed by:** Department of Telecommunications (DoT), Government of India.
- **Aim:** To safeguard mobile users by enabling identity management, fraud reporting, device verification, and enhancing awareness on telecom and cyber risks.

- **Key Features:**
  - **Fraud & Scam Reporting:** Chakshu tool enables reporting of fake KYC alerts, impersonation scams, phishing links and suspicious WhatsApp/SMS messages.
  - **SIM & Identity Protection:** Users can check **all SIMs/ mobile connections** linked to their identity to detect unauthorised usage.
  - **Lost/Stolen Phone Blocking:** Allows **IMEI blocking** of lost or stolen devices; more than **7 lakh devices** recovered since launch.
  - **Device Authenticity Verification:** Helps confirm whether a handset's **IMEI is genuine or blacklisted**, crucial for India's large second-hand phone market.
  - **Reporting Illegally Masked International Calls:** Users can report cases where foreign calls appear as **+91 numbers**, aiding anti-fraud investigations.
  - **Reporting Spam & Malicious Links:** Enables reporting of telemarketing spam, unsafe APKs, phishing websites and fraudulent apps.
  - **Additional Utilities:** Local ISP locator, trusted helpline directory, updated awareness material on telecom security.
- **Significance:**
  - Strengthens India's defence against digital fraud, impersonation scams and mobile theft, which affect millions yearly.
  - Helps curb circulation of tampered or cloned IMEIs, a major security threat cited by DoT.
  - Protects buyers in the second-hand mobile market by verifying stolen/ blacklisted devices.

AGRICULTURE

MAKHANA

Context: Parliament was informed that India produces nearly 80% of the world's makhana, reinforcing its global dominance in this niche agri-sector.

- The government has also set up the National Makhana Board and approved a ₹476.03 crore central scheme (2025–31) to boost value addition and exports.

About Makhana:

What it is?

- Makhana, also known as fox nut or gorgon nut, is the edible seed of Euryale ferox, an aquatic plant grown in ponds and wetlands. It is the only surviving species of the genus Euryale, valued for both nutrition and livelihood potential.

Regions where it is grown:

- Makhana is cultivated mainly in **India, China and Japan**, with **India being the world's largest producer**.
- Bihar contributes ~85% of India's output, with Darbhanga as a major cultivation and processing hub.

Key features:

- **Aquatic crop:** Grown in shallow ponds and wetlands, often integrated with fisheries.
- **Labour-intensive:** Provides employment to farmers and fisher communities.
- **Versatile food item:** Roasted or fried, used as snacks and in traditional dishes.

Significance:

- **Economic livelihood:** Enhances incomes of small farmers and fishermen, especially in eastern India.
- **Nutrition security:** Rich in protein, fibre and antioxidants, low glycaemic index, and heart-friendly.
- **Export potential:** Rising global demand for healthy snacks positions makhana as a niche export crop.
- **Policy focus:** The National Makhana Board and the ₹476.03 crore development scheme aim to improve productivity, processing, branding and global market access.

ENVIRONMENT

Biodiversity

50 YEARS OF CITES

Context: CITES marked its 50th anniversary at CoP20 in Samarkand, Uzbekistan, where member nations adopted major species protection decisions and debated livelihoods, sustainable use, and wildlife trade governance.

About 50 Years of CITES:

- **What Is CITES?**
  - CITES (Convention on International Trade in Endangered Species of Wild Fauna and Flora) is a **legally binding multilateral treaty** regulating international trade in wild animals and plants to ensure it does not threaten species survival.
- **History:**
  - Conceived by IUCN (1963) and text finalized in **1973 (Washington D.C.)**.
  - Entered into force on **1 July 1975**.
  - Membership: **185 Parties** (as of 2025), making it one of the world's largest conservation agreements.
  - Operates through three Appendices (I, II, III) providing graded trade restrictions.
- **Key Functions of CITES:**
  - Regulates international wildlife trade via **permits and certificates**.
  - Maintains Appendices that assign protection levels based on extinction risk.
  - Coordinates enforcement against illegal wildlife trade.
  - Promotes sustainable use, scientific assessment, and global cooperation.

About 2025 CITES Summit (CoP20):

- **What It Is?**
  - The **20th Conference of the Parties (CoP20)** is the decision-making summit held every 2–3 years, shaping global wildlife trade policy.
- **Host:**
  - Hosted by Uzbekistan (Samarkand) — first CoP in Central Asia.
  - Marked the 50th anniversary of CITES.
- **Major Outcomes**
  - **Species Additions & Uplistings**
    - **77 species added** to CITES Appendices.
    - Sharks & rays (oceanic whitetip, whale shark; all manta & devil rays) added to **Appendix I**.
    - **Galápagos land iguanas (3 species)** and marine iguana added to **Appendix I**.
    - African reptiles such as **Home's** hinge-back tortoise added to Appendix I.
  - **Downlistings due to Conservation Success:**
    - **Saiga antelope (Kazakhstan)** removed from Appendix II with export flexibility.
    - **Guadalupe fur seal (Mexico)** downlisted from Appendix I added to II.
  - **India's Role:**
    - India **successfully opposed** EU proposal to list **guggul (Commiphora wightii)** in Appendix II, citing lack of scientific assessment.

Species In News

GREAT INDIAN BUSTARD

Context: The Supreme Court, has strengthened safeguards for the critically endangered Great Indian Bustard (GIB) while revising transmission alignments under the Green Energy Corridor (GEC) in Rajasthan and Gujarat.

About Great Indian Bustard (GIB):

What it is?

- The Great Indian Bustard (*Ardeotis nigriceps*) is one of the heaviest flying birds in the world and the state bird of Rajasthan.
- It is a flagship grassland species and a key indicator of ecosystem health in India's arid and semi-arid landscapes.

Conservation status:

- **IUCN Red List:** *Critically Endangered*
- **Indian Wildlife (Protection) Act, 1972:** Schedule I
- **CITES:** Appendix I
- **CMS (Bonn Convention):** Listed species
- **Estimated population:** ~200 individuals worldwide

Habitat and distribution:

- Prefers **open, flat grasslands and scrub landscapes** with minimal disturbance.
- Historically spread across **11 Indian states and parts of Pakistan**; now largely confined to **Rajasthan and Gujarat**, with small pockets in Maharashtra, Karnataka and Andhra Pradesh.
- Key habitats include **Desert National Park** and surrounding agro-grassland mosaics.

Key characteristics:

- Tall bird (~1 metre), brownish body with **black crown** (more prominent in males).
- **Wingspan:** 210–250 cm; **weight:** 15–18 kg.
- Ground-nesting species; females lay **a single egg** during monsoon.
- Highly vulnerable to **overhead power lines**, habitat fragmentation, vehicular collisions and free-ranging dogs.

About Green Energy Corridor (GEC):

- **What it is?**
  - The Green Energy Corridor is a national transmission programme to evacuate large-scale renewable energy from resource-rich regions to state and national grids.
  - It is critical for integrating solar and wind power into India's electricity system.
- **Located in:** Focused on renewable-rich states such as **Rajasthan and Gujarat**, especially desert and coastal wind–solar zones.

RHINOCEROS (RHINO)

Context: A recent international study shows that rhino dehorning has reduced poaching by nearly 75–78% in African reserves, offering a cost-effective conservation tool.

About Rhinoceros (Rhino):

- **What it is?**
  - The rhinoceros is a large, herbivorous mammal belonging to the family *Rhinocerotidae*.
  - It is one of the oldest surviving megafauna, dating back millions of years.
- **Habitat:**
  - Rhinos occupy diverse ecosystems depending on species:
  - Grasslands and savannahs
  - Tropical and subtropical forests
  - Swamps, riverine areas, and shrublands

- **Types of rhinos (5 species):**
  - **White rhino (*Ceratotherium simum*):** Africa
  - **Black rhino (*Diceros bicornis*):** Africa
  - **Greater one-horned (Indian) rhino (*Rhinoceros unicornis*):** India & Nepal
  - **Javan rhino (*Rhinoceros sondaicus*):** Indonesia
  - **Sumatran rhino (*Dicerorhinus sumatrensis*):** Indonesia
- **Key characteristics:**
  - Horn made of keratin, not bone (same protein as hair and nails)
  - Herbivorous, feeding on grasses, leaves, shoots, and roots
  - Poor eyesight but strong hearing and smell
  - Semi-aquatic behaviour in some species (Indian rhino)
  - Slow reproduction, making recovery difficult after population loss
- **Conservation status:**
  - **Critically Endangered:** Javan, Sumatran, Black rhino
  - **Vulnerable:** Greater one-horned rhino
  - **Near Threatened:** White rhino
- **Significance:**
  - **Biodiversity value:** Rhinos are keystone species, shaping grassland and forest ecosystems through grazing and seed dispersal.
  - **Ecological balance:** Their feeding behaviour maintains habitat heterogeneity, supporting smaller species.
  - **Cultural and heritage value:** The Indian rhino features in Assam's natural heritage, especially Kaziranga National Park.
  - **Indicator of governance:** Rhino conservation reflects state capacity, anti-poaching enforcement, and community participation.
  - **Global conservation symbol:** Rhino protection is central to global efforts against illegal wildlife trade, alongside elephants and tigers.

TAPANULI ORANGUTANS

Context: Scientists have warned that Cyclone Senyar–triggered floods and landslides in Sumatra's **Batang Toru region** may have killed 6–11% of the remaining Tapanuli orangutans.

About Tapanuli orangutans:

What it is?

- The Tapanuli orangutan is a critically endangered species of great ape, formally described as a distinct species in 2017, and considered the rarest great ape on Earth with fewer than ~800 individuals in the wild.

Habitat:

- Found **only** in the **Batang Toru Ecosystem** in the three Tapanuli districts of **North Sumatra, Indonesia**.
- Restricted to fragmented upland / submontane rainforests south of Lake Toba, likely occupying <3% of their historical range.
- Evidence suggests they were better adapted to **lower-altitude habitats**.

IUCN Red List Status: Critically Endangered (CR).

Characteristics:

- **Physical Traits:**
  - Similar body size to other orangutans.
- **Distinguishing features:**
  - Smaller, differently shaped skulls, flatter faces than other orangutan species.
  - Thicker, frizzier orange fur.
  - Flanged males have beard and moustache, flatter cheek pads with a thin layer of blonde fuzz.
- **Social & Behavioural Traits:**
  - **Arboreal and largely solitary**, spending almost all their time in the forest canopy.
  - Highly **intelligent, tool-using** primates: use branches as hooks, scratchers,

umbrellas, and for extracting insects.
    - Show **cultural variation** and strong **imitation / learning** capacity—behaviours spread socially within groups.
- **Reproductive & Social Structure:**
    - **Slowest life history** among mammals after humans:
    - Strong, long **mother–offspring bond** (7–11 years).
    - **Sexual dimorphism & bimaturism** in males:
    - Unflanged males (smaller, no cheek pads) vs **flanged dominant males** (large cheek pads, throat sacs).
- **Unique Traits of Tapanuli Orangutans:**
    - **Most ancient orangutan lineage**, even though the last to be described.
    - **Dietary specializations:** only known orangutan species to eat certain **caterpillars and pinecones**, alongside a wide variety of fruits, leaves, buds and insects.

WESTERN TRAGOPAN

Context: A captive-breeding programme at Sarahan Pheasantry, Himachal Pradesh, has successfully stabilised the Western Tragopan population, giving conservationists fresh hope.

About Western Tragopan:

- **What it is?**
    - The Western Tragopan (Tragopan melanocephalus) — also called *Jujurana* or "king of birds" — is one of the world's rarest pheasants and the state bird of Himachal Pradesh. It is a flagship species of the Western Himalayas, known for its striking plumage and ecological sensitivity.
- **Habitat:**
    - Found between **2,400–3,600 m** in moist temperate Himalayan forests.
    - Prefers dense undergrowth, ringal bamboo, rhododendron thickets, and conifer forests.
    - Key strongholds include **Great Himalayan National Park (GHNP)**, Kazinag, Limber (J&K), and pockets in Uttarakhand and northern Pakistan.
- **IUCN Status:**
    - Listed as **Vulnerable** on the IUCN Red List.
    - Only **3,000–9,500 mature individuals** remain, all forming a **single fragile sub-population**.
- **Key Characteristics:**
    - **Male:** Velvet-black head, crimson breast, white spotting, and colourful blue–orange facial wattles used in elaborate mating displays.
    - **Female:** Brown, camouflaged, smaller; immature males resemble females.
    - Ground-dwelling, shy, active at dawn/dusk; feeds on berries, seeds, buds, shoots, and insects.
    - Breeds during **May–June**, laying **3–5 eggs** in concealed nests.
- **Significance:**
    - An **indicator species** of high-altitude forest health.
    - Cultural symbol of Himachal Pradesh.
    - Captive breeding at **Sarahan Pheasantry** has produced over **40+ individuals**, offering insurance against extinction.

SENNA SPECTABILIS

Context: Tamil Nadu has launched one of India's largest invasive-species eradication drives to completely remove Senna spectabilis from all forest divisions by March 2026.

About Senna spectabilis:

What It Is?

- Senna spectabilis is a fast-growing, yellow-flowering tree belonging to the legume family (Fabaceae), widely planted as an ornamental and shade tree but now recognised as a **highly invasive alien species** in India, Africa, and parts of Asia.

Origin:

- **Native to:** South & Central America (Brazil, Argentina, Paraguay, Bolivia, Peru, Venezuela).
- In India, it has aggressively invaded **Nilgiris, Mudumalai, Sathyamangalam, Anaikatty** and other Western Ghats ecosystems.

Habitat:

- Thrives in **dry to moist deciduous forests**, disturbed woodland, savannahs, and well-drained soils.
- Prefers **full sunlight**, adapts to poor soils, and spreads easily through prolific seeds.

Key Characteristics:

- Grows **7–18 m tall**, with dense, spreading crown forming thick canopies.
- Bright **yellow flowers** and long **dehiscent pods** (15–30 cm) containing numerous hard-coated seeds.
- Leaves exhibit **nyctinasty** (close at night, open at dawn).
- Used traditionally for **fuelwood, ornamental planting, shade**, and small implements.

IUCN Status: Classified as **Least Concern**.

Ecological Implications:

- **Suppresses native vegetation** by forming dense monocultures, reducing forest biodiversity.
- **Limits fodder availability** for elephants, deer, and other herbivores, altering wildlife movement patterns.
- **Raises forest fire risk** due to dry biomass accumulation.
- **Delays natural forest regeneration**, threatening long-term ecosystem resilience.

BNHS TO RELEASE CRITICALLY ENDANGERED VULTURES

Context: BNHS will release six critically endangered vultures—slender-billed and white-rumped—into the wild in Assam in January 2026 as part of India's long-term vulture recovery programme.

About BNHS to Release Critically Endangered Vultures:

About Slender-billed Vulture *(Gyps tenuirostris)*

- **What it is?**
  - A critically endangered Old World vulture species native to South Asia, once widespread but now reduced to fragmented pockets.
- **Habitat:** Found in the Gangetic plains, Assam, northern Bangladesh, southern Nepal, Myanmar, and Cambodia.
  - Nests **on tall trees** in open areas near human settlements, slaughterhouses, and riverine landscapes.
- **IUCN Status:** Critically Endangered (since 2002) with fewer than **~870 mature individuals** remaining.
- **Key Characteristics:**
  - Length **80–95 cm**, wingspan **196–258 cm**.
  - Darker head with a **distinctively slender, narrow bill**, long bare neck.
  - Grey plumage with pale rump; juveniles have white neck down.
  - No sexual dimorphism; solitary nesters; slow breeders (1 egg per clutch).
  - Feeds mainly on carrion, often alongside other vulture species.

About White-rumped Vulture *(Gyps bengalensis)*

- **What it is?**
  - A medium-sized Asian vulture once commonly found across India; among the fastest-declining bird species in the world.
- **Habitat:** Occurs in **cities, villages, plains, and open fields**, nesting mainly on **large trees** or

cliffs; often roosts near human habitation.

- **IUCN Status:** Critically Endangered due to catastrophic declines caused primarily by diclofenac poisoning in livestock carcasses.
- **Key Characteristics:**
  - Length **75–85 cm**, wingspan **180–210 cm**, weight **3.5–7.5 kg**.
  - Dark plumage, **white neck ruff**, and **distinct white patch on rump**.
  - Highly visible **white underwing coverts** during flight.
  - Sexes similar; breeds from **October to March**, laying one thick-shelled egg.
  - Scavenges on carcasses, often feeding in mixed-species groups.

GREAT NICOBAR CRAKE

Context: A newly photographed Great Nicobar Crake, possibly a new species of the Rallina genus, has been reported from Great Nicobar Island—only the third photographic record in over a decade.

About Great Nicobar Crake:

What it is?

- The Great Nicobar Crake is a medium-sized, potentially new Water Crake species (Genus: Rallina) found only in Great Nicobar Island. It may be endemic to the Andaman & Nicobar region and shows several morphological features not seen in known Rallina species.

Habitat:

- Lives in dense tropical rainforest undergrowth, including bamboo, vines, and cane thickets.
- Usually found near wetlands, streams, and forest-floor vegetation.
- Exhibits shy, elusive behaviour, making sightings extremely rare.

IUCN Status: Not yet officially assessed, but scientists suggest it may qualify as Data Deficient or Endemic–Near Threatened, following patterns seen in other Rallina crakes.

Characteristics:

- **Physical Features:**
  - **Plumage:** Rich reddish-brown (rufescent), browner back.
  - **Underparts:** Bold **black-and-white barring** on belly and wing-coverts.
  - **Bill:** Stout, pale green, uniformly deep, reddish tip.
- **Social & Behavioural Traits:**
  - Shy, ground-dwelling and fast-running; rarely flies.
  - Moves silently through undergrowth; forages on insects and small invertebrates.

Significance:

- Indicates exceptionally rich biodiversity and high endemism of Great Nicobar Island (24% endemism in some faunal groups).
- Highlights ecological sensitivity of the area facing mega infrastructure development.
- Emphasises the need for strict conservation, long-term monitoring, and careful environmental assessments.

ENVIRONMENTAL POLLUTION COMMISSION FOR AIR QUALITY MANAGEMENT (CAQM)

Context: The Commission for Air Quality Management (CAQM) has issued show cause notices to six thermal power plants within 300 km of Delhi for violating biomass co-firing norms aimed at reducing air pollution in the NCR.

About Commission for Air Quality Management (CAQM):

What it is?

- CAQM is a statutory body mandated to coordinate, plan, and implement measures for prevention and control of air pollution in the National Capital Region (NCR) and adjoining areas.

Established in:

- 2021, under the Commission for Air Quality Management in NCR and Adjoining Areas Ordinance, 2021.
- Replaced the Environment Pollution (Prevention and Control) Authority (EPCA).

Headquarters (HQ): New Delhi

Composition:

- Chairperson
- Member-Secretary (rank of Joint Secretary; also Chief Coordinating Officer)
- One full-time central government member (serving or former Joint Secretary)
- Three independent technical experts in air pollution
- Three members from non-government organisations (NGOs)

Tenure: 3 years or till 70 years of age (whichever is earlier)

Coverage: National Capital Region (NCR)

- Adjoining areas in Haryana, Punjab, Rajasthan, and Uttar Pradesh where pollution sources impact NCR air quality

Functions:

- Coordinate air pollution control actions of Centre and State governments.
- Plan and execute air quality management strategies for NCR.
- Frame a framework for identification of air pollutants.
- Conduct research and capacity building with technical institutions.
- Prepare and implement action plans (e.g., plantation drives, stubble-burning control).
- Monitor compliance with pollution control norms (including biomass co-firing).

ERIVAN ANOMALOUS BLUE

Context: Armenia has unveiled the official logo of **COP17 of** the Convention on Biological Diversity **(CBD)**, featuring the **Erivan Anomalous Blue (Polyommatus eriwanensis)**, a rare endemic butterfly.

About Erivan Anomalous Blue (Polyommatus eriwanensis):

- **What it is?**
  - Polyommatus eriwanensis, commonly known as the Erivan Anomalous Blue, is a blue butterfly species endemic to Armenia.
  - It is named after Yerevan (Erivan) and is found only in southern Transcaucasia.
- **Habitat:**
  - Inhabits calcareous grasslands in Armenia.
  - Found at elevations of 1,200–2,200 metres above sea level.
  - One generation per year; adults are active from mid-June to mid-July.
  - The larval host plant is still unknown, limiting ecological assessment.
- **IUCN status:**
  - Not listed in the Global or European IUCN Red Lists.
  - Listed as Endangered in the Red Book of Animals of Armenia (2010).
  - Distribution partly overlaps with Khosrov Forest State Reserve and Gnishik Protected Landscape.
- **Key characteristics:**
  - **Endemic and range-restricted**, making it highly sensitive to environmental change.
  - Butterflies act as **indicator species**, reflecting ecosystem health.
  - Population trends and density remain uncertain due to **identification challenges** and unknown host plant.

About COP17 of the Convention on Biological Diversity (CBD):

- **What it is?**

- The 17th Conference of the Parties (COP17) under the Convention on Biological Diversity, a UN treaty adopted in 1992.
- Serves as the supreme decision-making body for global biodiversity governance.

- **Host:** Yerevan, Armenia
  - Scheduled for **October 2026**
- **Theme:** "Taking action for nature"
- **Logo significance:**
  - Features the Erivan Anomalous Blue butterfly, symbolising local biodiversity linked to global goals.
  - Uses 23 blended colours, representing the interdependence of the 23 biodiversity targets.

Climate Change

HARD CORALS (STONY CORALS)

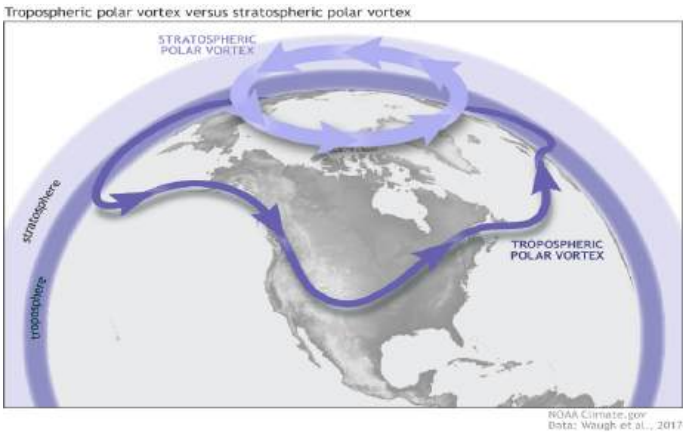
Context: A new Global Coral Reef Monitoring Network (GCRMN) assessment shows Caribbean hard coral cover has declined by 48% between 1980 and 2024 due to extreme heat and bleaching events.

About Hard Corals (Stony Corals):

- **What they are?**
  - Hard corals (stony corals) are **marine animals** that secrete **calcium carbonate skeletons**, forming the rigid structures that make up **coral reefs**, which support one-third of marine biodiversity.
- **Types of Corals:**
  - **Hard Corals (Reef-Building):** Species like **elkhorn** and **staghorn** corals; they grow in colonies, produce limestone skeletons, and construct reef frameworks.
  - **Soft Corals (Non-Reef-Building):** Include **Sea fingers**, **sea whips**; flexible, plant-like, without stony skeletons, and do not form reefs.
- **Key Features of Hard Corals:**
  - Build **calcium carbonate skeletons** that become reef rock over centuries.
  - Live in colonies of tiny polyps, each hosting **zooxanthellae algae** that provide food through photosynthesis.
  - Form the **foundation of coral reef ecosystems**, enabling fish nurseries, coastal protection, and high biodiversity.
  - Thrive in warm, clear, shallow waters with stable conditions.
- **Threats to Hard Corals:**
  - **Mass Bleaching Events:** Driven by extreme heat waves (1998, 2005, 2023–24), causing coral starvation and mortality.
  - **Stony Coral Tissue Loss Disease (SCTLD):** A fast-spreading disease affecting >30 species, now across 30 Caribbean countries; considered the most devastating coral disease recorded.
  - **Herbivore Declines:** Collapse of sea urchins (**Diadema antillarum**) and declining parrotfish populations → uncontrolled macroalgae growth (up 85%).

SUDDEN STRATOSPHERIC WARMING (SSW) EVENT

Context: Meteorologists have warned that another Sudden Stratospheric Warming (SSW) event may occur in December 2025, potentially disrupting the polar vortex and sending unusually cold Arctic air into parts of the United States.



About Sudden Stratospheric Warming (SSW) Event:

- **What is SSW?**
  - Sudden Stratospheric Warming is a **rapid**

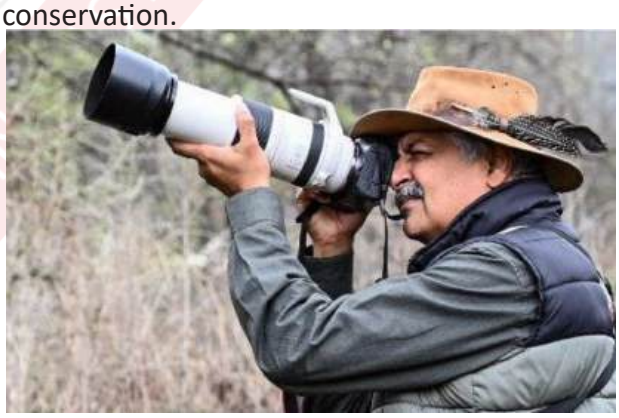
temperature rise (up to 50°C) in the stratosphere, about 10–50 km above Earth's surface.
    - It disrupts the **polar vortex**, the circulation of strong westerly winds around the Arctic, often causing major weather anomalies at the surface.
- **How Does SSW Occur?**
    - **Polar Vortex Formation:** In winter, strong westerly winds tighten around the Arctic forming the **stratospheric polar vortex**, a cold, circular wind belt that traps frigid air high above the pole.
    - **Upward Rossby Waves:** Large atmospheric disturbances called **Rossby waves** rise from the troposphere into the stratosphere, carrying energy that disrupts the vortex's stable circulation.
    - **Wave Breaking:** When these waves "break," much like ocean waves, they **weaken or even reverse** the vortex's westerly winds, destabilising the entire polar wind system.
    - **Rapid Descending Air:** As the weakened system collapses, cold stratospheric air **descends rapidly**, compresses, and warms sharply—creating the sudden stratospheric temperature spike.
    - **Vortex Split or Shift:** The disrupted vortex can **split or drift south**, releasing Arctic air into mid-latitudes and triggering cold outbreaks across North America, Europe, or Asia.
- **Key Features of an SSW:**
    - **Rapid stratospheric warming:** Up to a 50°C increase within days.
    - **Vortex weakening or reversal:** Westerly winds turn easterly.
    - **Jet stream disruption:** The jet stream becomes wavier or blocked.
    - **Surface impacts lag:** Weather effects appear **1–3 weeks later**.
    - **Irregular occurrence:** Not every winter sees an SSW, and not all events affect surface weather.
- **Implications of SSW Events:**
    - **Weather Impacts:**
        - Can cause **sudden cold waves**, snowstorms, and extended freezing conditions across North America and Europe.
        - May shift storm tracks and create high-pressure blocks over the North Atlantic.
    - **Forecast Challenges:**
        - Hard to predict more than 7–10 days in advance.
        - Models struggle to pinpoint **where the displaced Arctic air will descend**.
        - Surface weather may influence the stratosphere, creating complex feedback loops.

International Policies/Efforts

IUCN SPECIES SURVIVAL COMMISSION (SSC)

Context: Indian wildlife conservationist Vivek Menon has been elected as the Chair of the IUCN Species Survival Commission (SSC) for 2025–2029.

- He is the **first Asian** to head the Commission in its 75-year history, marking a major milestone for Global South leadership in biodiversity conservation.



About IUCN Species Survival Commission (SSC):

What it is?

- The Species Survival Commission (SSC) is the largest and most influential scientific network of the International Union for Conservation of Nature (IUCN), dedicated to conserving species and halting biodiversity loss worldwide.

Established in: 1949, alongside the formation of IUCN

Organisation:

- Functions as one of the **six expert Commissions of IUCN**
- Works closely with the **IUCN Secretariat** and national governments, NGOs, and research institutions

Aim:

- Prevent species extinctions and support recovery of threatened species.

- Ensure that use of biodiversity is equitable and sustainable.
- Integrate science, policy, and on-ground action for global conservation.

Functions:

- **IUCN Red List of Threatened Species:** Provides scientific assessments categorising species as *Critically Endangered, Endangered, Vulnerable*, etc.
- **Knowledge generation:** Tracks **status and trends of species** across taxa and regions
- **Policy and guidelines:** Develops global conservation standards and best-practice frameworks
- **Conservation planning:** Supports species recovery plans, reintroductions, and habitat management
- **Action-oriented partnerships:** Catalyses **on-ground conservation** through collaboration with governments, NGOs, and local communities
- **Species Conservation Cycle:** Assessment → Planning → Action, supported by communication and monitoring

Significance:

- Forms the scientific backbone of global biodiversity governance.
- Guides national laws, protected area policies, and international conventions such as CBD and CITES.
- Serves as the global gold standard for extinction risk assessment.

SEVENTH UN ENVIRONMENT ASSEMBLY (UNEA-7)

Context: A deep divide has emerged among member states over UNEP's Medium-Term Strategy (2026–2030), triggering tense negotiations as UNEA-7 opens in Nairobi.

About Seventh UN Environment Assembly (UNEA-7):

- **What is UNEA-7?**
  - UNEA-7 is the world's highest environmental decision-making forum, convened under the UN Environment Programme (UNEP). It brings together all UN member states to negotiate resolutions and chart global environmental policy.
- **Venue:** UNEP Headquarters, Nairobi, Kenya
- **Historical Background:**
  - UNEA was created in **2012** after the Rio+20 Conference to elevate environmental diplomacy to the same status as UN bodies on peace and development.
  - Since **2014**, six assemblies have adopted **105 resolutions** on issues ranging from plastics to illegal wildlife trade.
- **Theme of UNEA-7 (2025):** "Advancing sustainable solutions for a resilient planet."
- **Aim:**
  - To secure a coherent global environmental agenda for 2026–2030.
  - To approve UNEP's Medium-Term Strategy (MTS) and align it with global treaties.
- **Key Features of UNEA-7:**
  - **Intense Negotiations on UNEP's Medium-Term Strategy (2026–2030):** Countries are split on whether the MTS should be reopened, renegotiated, or adopted as drafted.
  - **Funding Crisis within UNEP:**
    - UNEP's regular UN budget share dropped by 20% due to the US halting payments.
    - Contributions to the Environment Fund have declined by **11–12%**.
  - **Slimmer Set of Resolutions:** Of 19 proposed resolutions, only **15 survive**, many "on life support."
  - **Importance of UNEA in Global Green Diplomacy:** UNEA is the only forum addressing climate, biodiversity, and pollution together.
- **Key features of UNEP Medium-Term Strategy 2026–2030:**
  - **Climate Stability:** Scale mitigation and adaptation measures; strengthen science-policy interfaces.
  - **Thriving Biodiversity:** Support implementation of nature-positive

restoration and conservation frameworks.
- **Zero Pollution:** Tackle waste, plastics, chemicals, and air pollution with life-cycle solutions.
- **Resilient Land & Ecosystems:** Address land degradation and desertification.
- **Sustainable Resources & Consumption:** Shift economies toward circularity and efficiency.
- **Strengthened Environmental Governance:** Enhance compliance systems, data platforms and transparent monitoring.

WORLD SUMMIT ON DISASTER MANAGEMENT (WSDM) 2025

Context: At the World Summit on Disaster Management (WSDM) 2025 in Dehradun, Dr. Jitendra Singh announced major upgrades to Uttarakhand's early-warning systems, including six weather radars, 33 observatories, and 142 AWS stations.

About World Summit on Disaster Management (WSDM) 2025:

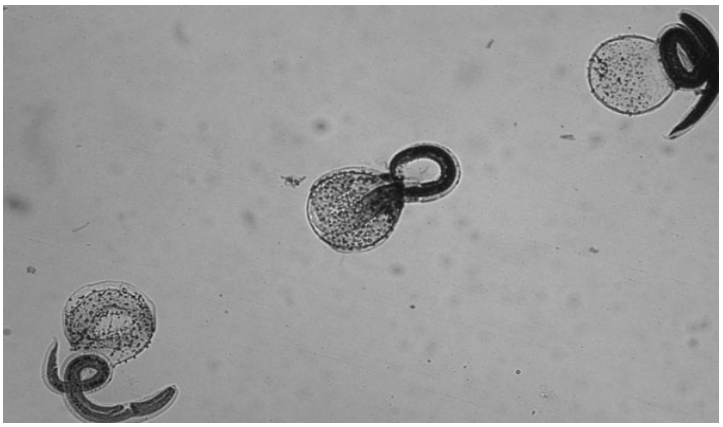
- **What it is?**
  - WSDM 2025 is a **global platform on disaster resilience**, bringing together scientists, policymakers, practitioners, and industry leaders to discuss future-ready strategies for disaster risk reduction in a changing climate.
- **Held in:** Dehradun, Uttarakhand
- **Theme:** "Strengthening International Cooperation for Building Resilient Communities."
- **Aim:**
  - To enhance global disaster collaboration, share scientific insights, strengthen early-warning infrastructure, and promote resilient development, especially in fragile ecosystems like the Himalayas.
- **Key Features:**
  - Announcement of **expanded radar networks**, early-warning systems, and Himalayan climate studies.
  - Focus on hydrometeorological hazards, climate change impacts, glacier monitoring, landslide risk, and forest fire prediction.
  - Emphasis on "Nowcast" systems providing 3-hour forecasts to vulnerable districts.
  - Discussions on using **agri-startups, CSIR value-addition models**, and technological innovation for resilient Himalayan livelihoods.
- **Significance:**
  - Reinforces India's emergence as a regional hub for disaster science, forecasting, and climate resilience.
  - Strengthens Uttarakhand's capacity to manage cloudbursts, GLOFs, landslides, and flash floods.
  - Helps align India's climate adaptation efforts with global commitments like Net Zero 2070.

SCIENCE AND TECHNOLOGY

Biology

RACCOON ROUNDWORM

Context: A new European study has found widespread spread of raccoon roundworm (Baylisascaris procyonis) in wild raccoon populations across nine European countries, with very high infection rates.



About Raccoon roundworm:

What it is?

- Raccoon roundworm is a zoonotic parasitic infection caused by the nematode Baylisascaris procyonis, which primarily infects raccoons but can accidentally infect humans and other animals, causing severe neurological and ocular damage.

Origin:

- **Native to** North America, where raccoons are natural hosts.
- Spread to Europe through **import of raccoons for pets and fur farms** in the early 20th century.
- Escaped raccoons established wild populations, carrying the parasite with them

Found in:

- **Primary host:** Raccoons (Procyon lotor).
- **Other animals:** Dogs, birds, rodents, and small mammals (as accidental hosts).
- **Geographic spread:**
  - North America (endemic).
  - Europe (now established in at least **nine countries**, Germany as epicentre).
- **India:** Not established due to absence of wild raccoon populations.

Symptoms in humans:

Human infection is rare but often severe due to larval migration:

- **Early symptoms:** Nausea, fatigue, liver enlargement.
- **Neurological signs:** Loss of coordination, reduced attention, muscle weakness.
- **Severe outcomes:**
  - **Ocular larva migrans:** Blindness.
  - **Neural larva migrans:** Brain damage, coma, death.
- **High-risk group:** Children (soil contact, poor hand hygiene)

Key features:

- **Extremely hardy eggs:**
  - Eggs become infectious after **2–4 weeks in soil.**
  - Can survive **for years** in the environment.
- **High reproductive output:** Adult worms release **millions of eggs** in raccoon faeces.
- **Difficult diagnosis:** No widely available definitive tests in humans.
- **High severity, low frequency:** Rare infections, but disproportionately serious outcomes.

Physics

PLASSER'S QUICK RELAYING SYSTEM (PQRS)

Context: The Northeast Frontier Railway (NFR) has set a record single-day mechanised track renewal of 1,033 track metres using Plasser's Quick Relaying System (PQRS).

About Plasser's Quick Relaying System (PQRS):

What it is?

- Plasser's Quick Relaying System (PQRS) is a semi-mechanised track renewal technology used by Indian Railways to remove old track panels and replace them with new prefabricated rail panels efficiently within short traffic blocks.

Developed by: Plasser & Theurer, an Austria-based global leader in railway track maintenance and construction machinery

Aim:

- To speed up track renewal while minimising traffic disruption.
- To enhance track safety, reliability, and maintenance efficiency.
- To reduce manual labour and lifecycle maintenance costs.

How it works?

- PQRS uses **self-propelled portal cranes** that move on an **auxiliary track (3,400 mm gauge)** aligned with the existing track.
- Old rail panels (rails + sleepers) are **lifted and removed**, and **new prefabricated panels** are placed using Track Laying Equipment (TLE).
- Retrieved old panels are directly transferred to **BFRs (Bogie Flat Wagons)**, eliminating extra freight handling.

Key features:

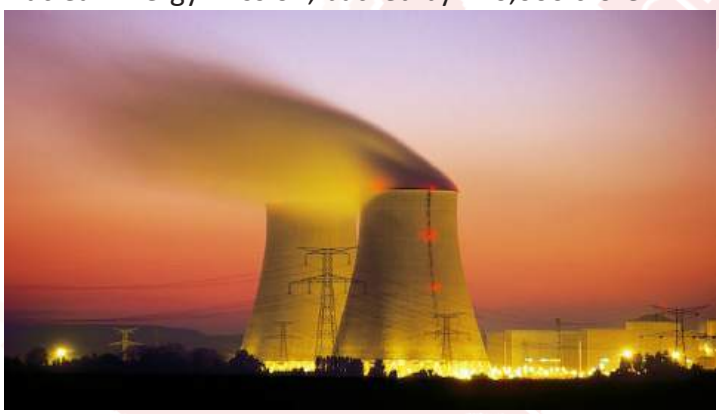
- **Portal cranes:** Self-loading, self-unloading cranes capable of lifting complete rail panels.
- **High lifting capacity:**
  - Older models: ~5 tonnes (9 m panels)
  - Newer models (PQRS-201): up to **9 tonnes**, lifting **13 m PRC sleeper panels**
- **Integrated gripping system:** Sleeper grippers and rail clamps securely hold panels during lifting and placement.
- **Turntable mechanism:** Enables cranes to be turned and placed on/off BFRs even in mid-sections.
- **Compact and modular design:** Reduces maintenance cost and improves operational flexibility.

Significance:

- **Faster renewals:** Allows renewal of **longer track lengths in shorter traffic blocks**.
- **Improved safety:** Ensures uniform track geometry and reduces human error.

NUCLEAR ENERGY MISSION

Context: Government informed Parliament that India will operationalise at least 5 indigenously designed Small Modular Reactors (SMRs) by 2033 under the Nuclear Energy Mission, backed by ₹20,000 crore.



About Nuclear Energy Mission:

What it is?

- A national mission framework to scale up nuclear power through advanced and indigenous technologies, with a strong thrust on SMR R&D and deployment alongside large reactors.

Announced in: Union Budget 2025–26 as a dedicated push for R&D and deployment of SMRs, with a clear 2033 milestone.

Aim:

- **Scale-up target:** Reach about 100 GW nuclear power capacity by 2047 to support India's long-term energy transition.
- **SMR target:** At least 5 indigenous SMRs by 2033 for clean, reliable, decentralised nuclear power.

Key features:

- **Big R&D push:** ₹20,000 crore for research, design, development and deployment of SMRs (FY 2025–26).
- **Indigenous SMR pipeline:** BARC has initiated design work on BSMR-200 (200 MWe), SMR-55 (55 MWe), and a high-temperature gas-cooled reactor (~5 MW) for hydrogen generation.
- **Industrial decarbonisation focus:** SMRs are positioned for captive power, repowering retiring fossil units, and remote/off-grid applications.
- **Capacity roadmap with roles:** Public sector expected to contribute ~58–60 GW, with the remainder envisaged via public/private participation under the evolving policy framework.
- **NPCIL-led rollout + partnerships:** NPCIL's roadmap includes indigenous PHWRs and foreign cooperation; and the NTPC–NPCIL JV is part of enabling nuclear expansion.

Significance:

- **Clean baseload power:** Nuclear provides 24×7 firm electricity, supporting grid stability as renewables scale up.
- **Net Zero pathway:** Helps India progress toward Net Zero 2070 by cutting lifecycle emissions compared to fossil generation.

SOLAR FLARES

Context: NASA reported a strong X1.9-class solar flare erupting from the Sun causing a major radio blackout over Australia and raising concerns about further space-weather disturbances.

- The flare coincides with the emergence of a massive sunspot (**AR 4294–96**) over 10 times the size of Earth.

About Solar Flares:

What it is?

- A solar flare is a **sudden, intense explosion of energy** on the Sun caused by the rapid release of magnetic energy stored in twisted magnetic field lines near sunspots.
- It emits radiation across the electromagnetic spectrum—from radio waves to X-rays and gamma rays.

How It Forms?

- **Twisted magnetic fields:** Strong magnetic fields around sunspots become twisted and stressed by solar rotation and plasma flows, building up large amounts of magnetic tension and stored energy.
- **Magnetic reconnection:** When these stressed magnetic field lines suddenly snap and reconnect, the stored magnetic energy is explosively released, creating an intense flare.
- **Heating and particle ejection:** This energy release heats solar plasma to several million degrees and accelerates photons and charged particles outward at high speeds.
- **Link with CMEs:** A flare may erupt alone or alongside a coronal mass ejection (CME), which ejects massive clouds of solar plasma capable of disturbing Earth's magnetic field.

Key Features:

- **X-ray classification:** Solar flares are ranked from A to X based on peak X-ray brightness, with each letter step representing a tenfold increase in intensity measured by space-based detectors.
- **X-class events:** X-class flares are the strongest type and can cause global radio blackouts, disrupt navigation systems, and expose satellites to damaging levels of radiation.
- Multi-wavelength radiation: Flares emit radiation across radio, ultraviolet, X-ray and gamma-ray bands, heating solar material almost instantly and affecting space weather conditions.
- **Sunspot connection:** They commonly arise in large, magnetically complex sunspots where interacting magnetic fields make eruptions more frequent and more powerful.
- **Rapid and energetic:** Flares unfold within minutes, releasing immense energy unpredictably, which makes forecasting difficult and raises concerns for satellites and communication networks.

Implications:

- **Communication disruptions:** Affect high-frequency radio signals, aviation communication, maritime navigation, and military systems.
- **Satellite and spacecraft risk:** Can damage electronics, sensors and expose astronauts to radiation.
- **Geomagnetic storms:** If accompanied by a CME directed at Earth, can deform Earth's magnetic field and cause power grid failures.

Biotechnology

INDIAN PHARMACOPOEIA COMMISSION (IPC)

Context: The Union Health Minister reviewed the progress of the Indian Pharmacopoeia Commission (IPC) and announced that the 10th edition of the Indian Pharmacopoeia (IP) 2026 will be launched in January 2026.

About Indian Pharmacopoeia Commission (IPC):

What it is?

- The Indian Pharmacopoeia Commission (IPC) is an autonomous national body responsible for publishing the Indian Pharmacopoeia, the official book of standards for drugs in India,

ensuring their identity, purity, strength, quality, and safety under the Drugs and Cosmetics Act, 1940.

Established in:

- **Operational since 1 January 2009**
- Constituted as an **autonomous institution** fully funded by the **Government of India**
- Under the administrative control of the Ministry of Health and Family Welfare (MoHFW)

Headquarters: Ghaziabad, Uttar Pradesh

Aim:

- To promote public and animal health by setting authoritative, scientifically robust drug standards
- To support Atmanirbhar Bharat and Viksit Bharat through self-reliant pharmaceutical regulation and global harmonisation

Key functions

- **Publication and revision of Indian Pharmacopoeia:** Regular revision of drug monographs covering APIs, excipients, dosage forms, medical devices, and herbal drugs.
- **National Formulary of India (NFI):** Publishes NFI to guide rational prescribing practices for healthcare professionals.
- **Pharmacovigilance Programme of India (PvPI):** Acts as the National Coordination Centre, monitoring adverse drug reactions to ensure patient safety.
- **IP Reference Substances:** Preparation, certification, and distribution of **IP Reference Standards** for quality testing.
- **Global harmonisation:** Collaborates with international pharmacopoeias such as USP, BP, Ph. Eur., JP, ChP, and WHO-IP.
- **Capacity building & training:** Conducts training, research, and awareness programmes on pharmacopoeial and regulatory standards.

Significance:

- Ensures uniform quality, safety, and efficacy of medicines across India.
- Recognition of IP in **19 countries** strengthens India's regulatory standing.
- Supports India's leadership in global pharmaceutical supply chains.

Health

THE DRUG-RESISTANT FUNGAL SPECIES *CANDIDA AURIS*

Context: An Indian-led study has warned that Candida auris, a drug-resistant fungal pathogen, is becoming more virulent and spreading globally, with high mortality even after treatment.

About The drug-resistant fungal species Candida auris:

What it is?

- *Candida auris* is a **multidrug-resistant fungal pathogen** that causes severe invasive infections, especially in hospitalised and immunocompromised patients.
- First identified in 2009, it is now classified as an **emerging global health threat** due to high fatality rates and treatment failure.

Vector / Reservoir:

- Primarily **healthcare settings** such as hospitals and long-term care facilities.
- Persists on **human skin**, medical devices, and inanimate surfaces for prolonged periods.

Symptoms:

- Symptoms vary by site of infection and often resemble bacterial sepsis, making detection difficult.
- Common signs include **fever, chills, low blood pressure, tachycardia**, and in severe cases, bloodstream infections (candidemia).

Key features:

- **Multidrug resistance:** Resistant to multiple antifungal classes, limiting treatment options.
- **High virulence:** Mortality often exceeds **50%**, even with therapy.
- **Morphological flexibility:** Can switch from yeast

form to filamentous growth, aiding invasion.

- **Immune evasion:** Adapts rapidly to host immune responses and environmental stress.

Transmission:

- Spreads through direct contact with infected or colonised individuals (even asymptomatic).
- Transmitted via contaminated surfaces, medical equipment, and invasive devices like catheters or ventilators.

ANOPHELES STEPHENSI

Context: India's push to eliminate malaria by 2030 faces a new challenge with the rapid spread of the invasive urban mosquito Anopheles stephensi, especially in cities like Delhi.

About Anopheles stephensi:

What it is?

- Anopheles stephensi is a malaria-transmitting mosquito species capable of spreading both Plasmodium falciparum and Plasmodium vivax, now recognised globally as an invasive vector threatening malaria elimination efforts.

Origin:

- Native to **South Asia and the Arabian Peninsula**
- Recently detected in multiple African countries, indicating rapid transcontinental spread

Habitat:

- Thrives in **urban and peri-urban environments.**
- Breeds in **artificial water containers** such as overhead tanks, tyres, construction sites, and water storage vessels.
- Unlike traditional malaria vectors, it adapts easily to **high-density cities.**

Key features:

- **Urban adaptability:** Efficiently survives in man-made habitats.
- **Efficient vector:** Transmits both major human malaria parasites.
- **Container breeder:** Similar breeding behaviour to dengue mosquitoes, complicating control strategies.
- **Resilient spread:** Capable of establishing itself rapidly in new regions.

Implications:

- **Threat to malaria elimination goals:** Undermines India's target of zero indigenous cases by 2027 and elimination by 2030.
- **Urban malaria resurgence:** Shifts malaria from rural/tribal zones to metropolitan settings.
- **Control challenges:** Requires city-specific surveillance, vector control, and inter-sectoral coordination.

AFMS LAUNCHES INDIA'S FIRST AI-DRIVEN COMMUNITY SCREENING PROGRAMME FOR DIABETIC RETINOPATHY

Context: The Armed Forces Medical Services (AFMS) launched India's first AI-driven community screening programme for Diabetic Retinopathy (DR).

- The initiative uses **MadhuNetrAI**, an AI platform, to enable early detection and referral of diabetic eye disease at the community level.

About AFMS launches India's first AI-driven community screening programme for Diabetic Retinopathy:

What it is?

- A nation-first, AI-enabled community screening programme for Diabetic Retinopathy, rolled out by AFMS in collaboration with Dr. Rajendra Prasad Centre for Ophthalmic Sciences (RPC), AIIMS, and the eHealth AI Unit, MoHFW.

Aim:

- Early detection and timely referral of Diabetic Retinopathy.
- Build real-time national health intelligence on

DR prevalence and geography.
- Reduce preventable diabetes-related blindness through scalable screening.

Key features:
- **AI-based screening & grading** of retinal images captured via **handheld fundus cameras**.
- **Community-level deployment** by trained Medical Officers, nurses and health assistants.
- **Automated triaging** with referrals for vision-threatening DR to vitreo-retina specialists.
- **Real-time dashboards** for prevalence and geographic mapping to aid policy planning.
- **Pilot across 7 diverse locations**: Pune, Mumbai, Bengaluru, Dharamshala, Gaya, Jorhat, Kochi.
- **Integration with NCD programmes** via district health administrations for continuity of care.

Significance:
- **Public health impact**: Tackles a major complication of diabetes with early, accessible screening.
- **AI in healthcare**: Demonstrates safe, practical integration of AI into routine public health systems.
- **Equity & reach**: Enables screening in rural, hilly, coastal and remote regions.

FSSAI LAUNCHES EGG SAFETY DRIVE AFTER 'NITROFURANS PRESENCE'

Context: The Food Safety and Standards Authority of India (FSSAI) has launched a nationwide egg safety drive after a viral video alleged the presence of nitrofurans—a banned antibiotic—in eggs of a popular brand.

About FSSAI launches egg safety drive after 'nitrofurans presence':

What it is?
- The egg safety drive is a regulatory surveillance and testing initiative by FSSAI to detect residues of banned veterinary drugs, particularly nitrofurans, in eggs to ensure consumer safety and food law compliance.

Scientific name and classification:
- **Nitrofurans** are a group of **synthetic nitrofuran-based antimicrobial agents**.
- Common compounds include **nitrofurantoin, furazolidone, nitrofurazone, and furaltadone**.
- They are classified as **chemotherapeutic antibacterial agents**, not naturally occurring antibiotics.

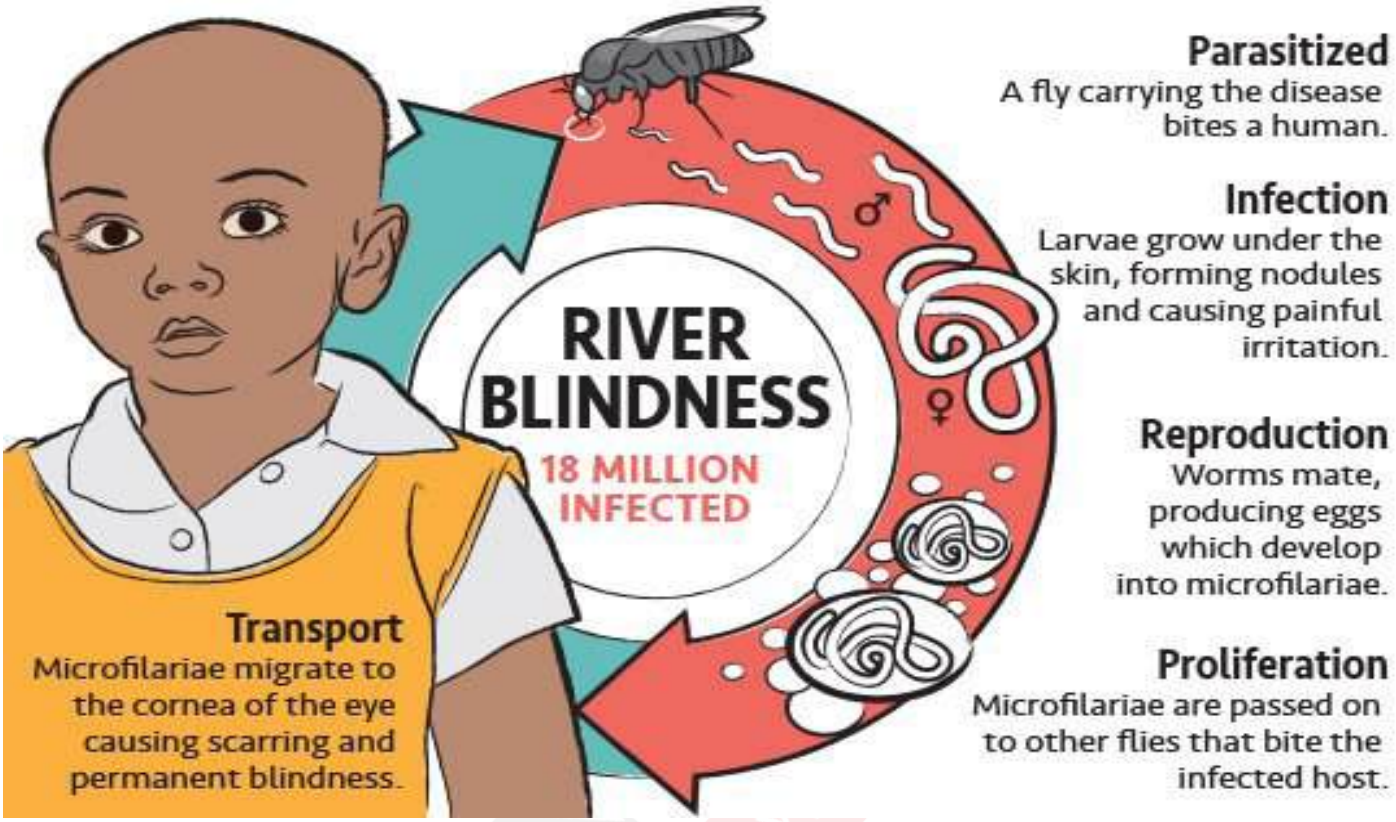
Origin and use:
- Nitrofurans were historically used in **veterinary medicine** to treat bacterial and protozoal infections.
- Due to their **carcinogenic potential**, they are **banned in food-producing animals** in India, the EU, and several other countries.

Key features of nitrofurans:
- **Broad-spectrum activity** against gram-positive and gram-negative bacteria, including Salmonella and Giardia.
- Primarily **bacteriostatic**, becoming bactericidal at higher doses.
- More active in **acidic environments**.
- Known for **slow development of microbial resistance**, but show complete cross-resistance within the group.

Implications on human health:
- **Carcinogenic risk:** Some nitrofurans are linked to cancer, prompting global bans.
- **Toxicity:** Excess exposure can cause neurological symptoms, gastrointestinal distress, and hypersensitivity reactions.
- **Food safety concern:** Presence of residues in eggs undermines consumer trust and violates food safety standards.
- **Public health risk:** Long-term exposure, even at low levels, may pose cumulative health hazards.

NIGER BECOMES 1ST AFRICAN COUNTRY TO ELIMINATE ONCHOCERCIASIS

Context: Niger has officially become the first African country to eliminate onchocerciasis (river blindness), as declared by the government and verified by the World Health Organization (WHO).



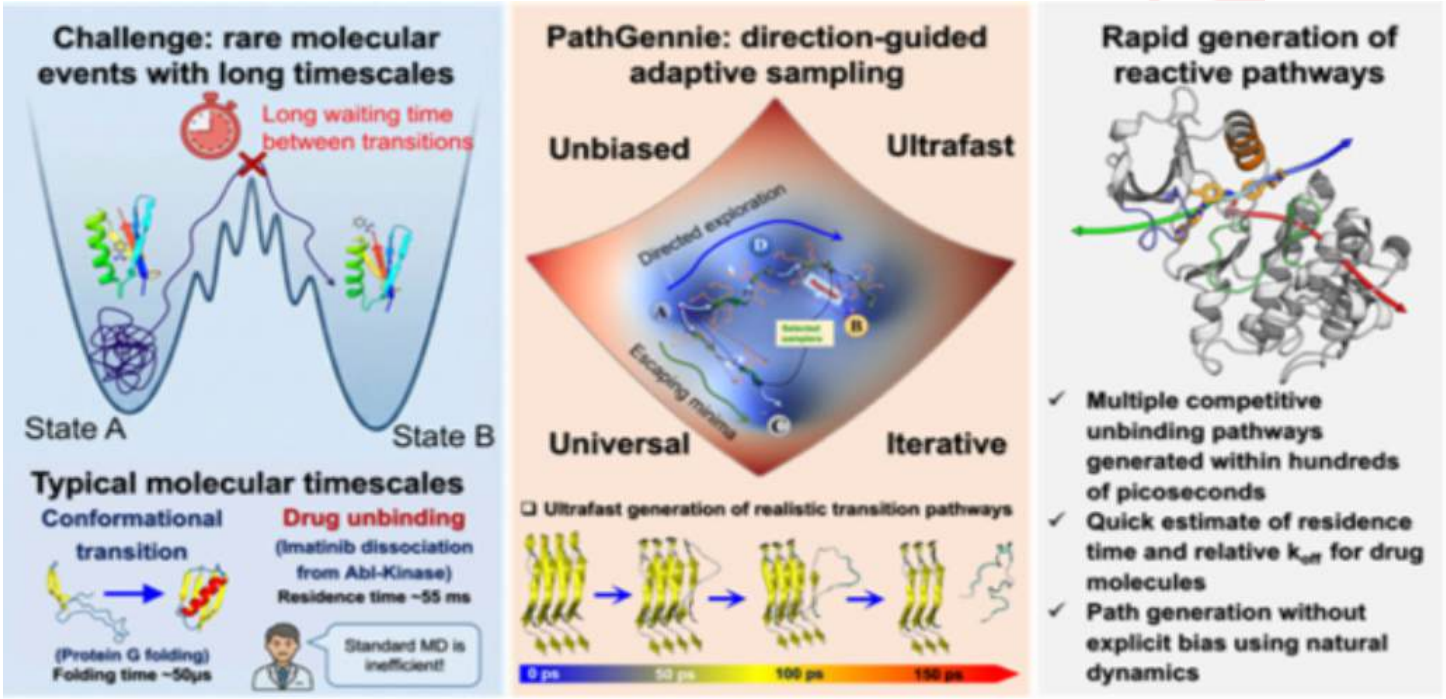
About Niger becomes 1st African country to eliminate onchocerciasis:

- **What is Onchocerciasis?**
  - Onchocerciasis, or **river blindness**, is a neglected tropical parasitic disease caused by the filarial worm **Onchocerca volvulus**, transmitted by infected blackflies breeding near fast-flowing rivers.
- **Vector:** *Simulium* blackflies found near rapidly flowing rivers and streams.
- **Origin:**
  - Over **99% of global cases** occur in **sub-Saharan Africa and Yemen**.
  - Smaller endemic pockets exist on the Brazil–Venezuela border.
  - Onchocerciasis is the **second leading infectious cause of blindness**, after trachoma.
- **Key Features:**
  - Caused by chronic microfilarial infection producing **intense inflammation**.
  - Leads to severe itching, disfiguring skin changes ("leopard skin"), and progressive eye damage.
  - Adult worms live **10–15 years**, making long-term treatment essential.
  - Community-level morbidity includes blindness, reduced productivity, and increased poverty risk.
- **Symptoms:**
  - **Skin:** severe itching, rashes, skin thickening, depigmentation.
  - **Eyes:** lesions leading to impaired vision and eventual permanent blindness.
  - **Nodules:** firm subcutaneous lumps containing adult worms.
  - Early infection in children is linked to **epilepsy** in certain regions.
- **Treatment:** The primary treatment is Ivermectin (Mectizan), given once or twice yearly for 10–15 years.

Emerging Technologies

PATHGENNIE SOFTWARE FOR FAST-TRACKING DRUG DISCOVERY

Context: The Ministry of Science and Technology has developed PathGennie, a new open-source computational software that significantly accelerates drug discovery by accurately simulating drug–protein unbinding.



About PathGennie Software for Fast-Tracking Drug Discovery:

What it is?

- PathGennie is an open-source computational framework designed to efficiently simulate rare molecular events, especially drug unbinding from protein targets, without introducing artificial distortions.
- It helps predict drug residence time, a key factor in drug efficacy and safety.

Developed by: Scientists at S. N. Bose National Centre for Basic Sciences, Kolkata

Aim:

- To overcome limitations of traditional molecular dynamics simulations in capturing slow, rare molecular transitions.
- To provide physically accurate pathways for drug–protein interactions while reducing computational cost and time.

How it works?

- Instead of forcing molecules to move, the software **lets them move naturally**.
- It runs **many tiny, short simulations** at the same time to see which ones head in the right direction.
- Only the **useful paths are continued**, while the rest are stopped, saving time and computing power.
- This works like **natural selection** — the best paths survive without artificial pressure or heat.
- It can handle **complex patterns**, even those identified using artificial intelligence, making it very adaptable.

Applications:

- Predicts accurate drug unbinding pathways and residence times (e.g., imatinib–Abl kinase).
- Understanding protein–ligand kinetics for better drug design.
- Applicable to chemical reactions, catalysis, phase transitions and self-assembly processes.

RARE-EARTH ELEMENTS (REES)

Context: Rare-earth elements are drawing global attention as essential inputs for green technologies, electronics, and defence systems, amid supply-chain vulnerabilities.

About Rare-earth elements (REEs):

What they are?

- Rare-earth elements are a group of 17 metallic elements comprising the 15 lanthanides (lanthanum to lutetium) plus scandium and yttrium, known for their unique magnetic, optical, and electronic properties.

Key characteristics:

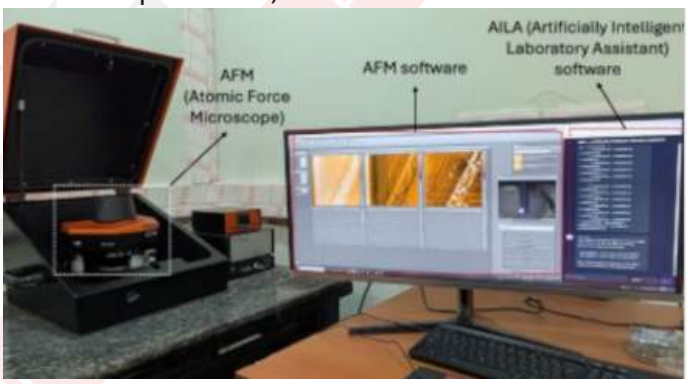
- **Physical features:**
  - Mostly **silvery, soft metals** with high density
  - High melting points and good thermal stability
  - Often used in oxide form due to reactivity
- **Chemical features:**
  - Predominantly exhibit a **+3 oxidation state**
  - Possess **4f electrons** that are highly localised, giving rise to:
    - Strong **magnetism** (high magnetic moments)
    - Sharp, stable **optical emissions** (phosphors, lasers)
  - Chemically very similar to each other, making separation complex and energy-intensive.

Distribution in the world:

- REEs are **not evenly distributed** and occur in minerals like **bastnäsite, monazite**, and ion-adsorption clays.
- Major global reserves (approximate):
  - **China:** ~44 million tonnes (dominant in refining)
  - **Brazil:** ~21 million tonnes
  - **India:** ~6.9 million tonnes
  - **Australia:** ~5.7 million tonnes
  - **Russia, Vietnam, USA, Greenland** – smaller but strategic reserves
- **China controls ~90%+ of global refining and magnet production**, making midstream processing the real strategic bottleneck.

AILA (ARTIFICIALLY INTELLIGENT LAB ASSISTANT)

Context: Researchers at IIT Delhi have developed AILA, an AI system capable of autonomously conducting real scientific experiments, a first of its kind in India.



About AILA (Artificially Intelligent Lab Assistant):

What it is?

- AILA is an autonomous AI-powered laboratory assistant that can design, run, and interpret real-world scientific experiments without continuous human intervention.
- Unlike conventional AI tools that only analyse data, AILA directly controls laboratory instruments and adapts decisions in real time.

Developed by: Indian Institute of Technology (IIT) Delhi, in collaboration with research teams from Denmark and Germany.

Aim:

- To automate complex laboratory experiments, reduce human effort and time, and accelerate discoveries in materials science and experimental physics.
- To enable AI to move beyond analysis into active scientific reasoning and experimentation.

Key features:

- **Autonomous experiment execution:** Independently operates the Atomic Force

Microscope **(AFM)**, a critical tool in nanoscale materials research.

- **Real-time decision-making:** Adjusts experimental parameters dynamically based on ongoing observations.
- **End-to-end workflow:** Designs experiments, controls instruments, analyses data, and generates results without manual intervention.
- **Time efficiency:** Reduces tasks that took an entire day to **7–10 minutes**, significantly boosting research productivity.
- Adaptive intelligence: Learns from experimental outcomes to refine subsequent actions.

Significance:

- Marks a transition from AI as a support tool to AI as an **active scientific agent**.
- Enables wider access to advanced instruments by lowering skill and time barriers.
- Aligns with India's **AI for Science initiative** and ANRF-backed research funding.

AGENTIC AI

Context: Agentic AI is rapidly gaining traction in the market as businesses adopt autonomous, goal-driven AI agents to automate complex workflows with minimal human oversight.

About Agentic AI:

What it is?

- Agentic AI refers to autonomous, goal-oriented AI systems capable of completing tasks independently with limited human oversight.
- It consists of AI agents—often powered by large language models (LLMs)—that can reason, make decisions and take actions in dynamic environments.
- In multi-agent systems, different agents handle specialised subtasks coordinated through AI orchestration.

How Agentic AI works?

- **Perceives the environment:** The system gathers real-time information from users, sensors, databases, APIs or the internet to understand the current situation.
- **Understands and reasons:** It analyses the collected data using language, vision or pattern recognition to interpret context and identify what needs to be done.
- **Sets goals and plans:** Based on user instructions or predefined objectives, the AI decides clear goals and plans a sequence of steps to achieve them.
- **Decides and acts:** The AI evaluates different possible actions, selects the best option and executes it by using tools, software, APIs or connected systems.
- **Learns and coordinates:** It reviews outcomes, learns from feedback and coordinates with other AI agents to improve future performance and complete tasks efficiently.

Key features

- **Autonomy:** Performs multi-step tasks without continuous human intervention.
- **Proactivity:** Can initiate actions, monitor systems and respond to changing conditions.
- **Tool-use capability:** Interacts with external tools, databases and applications.
- **Specialisation:** Agents can be task-specific or organised hierarchically or horizontally.
- **Adaptability:** Learns from experience and improves performance over time.
- **Natural interaction:** Operates through **natural language**, reducing dependence on complex user interfaces.

Significance:

- Enables end-to-end automation of complex workflows beyond simple content generation.
- Boosts productivity and efficiency by reducing human cognitive and operational load.
- Supports advanced applications in enterprise operations, software development, robotics, healthcare, finance and logistics.

DHRUV64 MICROPROCESSOR

Context: India launched DHRUV64, its first indigenously designed 1.0 GHz, 64-bit dual-core microprocessor, marking a major milestone in the country's semiconductor self-reliance journey.

- The launch strengthens India's efforts under the Digital India **RISC-V (DIR-V) Programme** to reduce dependence on imported processors.

About DHRUV64 Microprocessor:

What it is?

- **DHRUV64** is India's **first 64-bit, 1.0 GHz dual-core microprocessor**, fully designed domestically and based on the **RISC-V open-source architecture**.
- It is suitable for both **strategic and commercial applications**.

Developed by:

- Designed by the **Centre for Development of Advanced Computing (C-DAC)**.
- Developed under the **Microprocessor Development Programme (MDP)**, guided by **MeitY**.

Aim:

- To build a trusted, indigenous processor ecosystem.
- To support Atmanirbhar Bharat in semiconductors and reduce reliance on foreign chips.
- To enable low-cost prototyping, research, and startup innovation within India.

Key features:

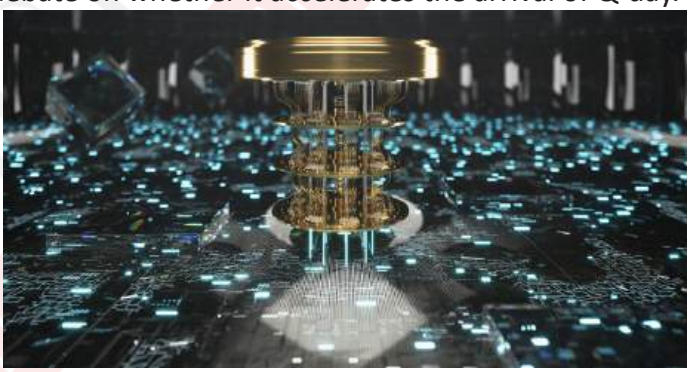
- **GHz clock speed** with **64-bit dual-core architecture**.
- Enhanced efficiency, multitasking, and reliability.
- **High compatibility** with external hardware systems.
- Designed for applications in 5G, automotive electronics, industrial automation, IoT, and consumer electronics.
- Fabricated as the **third chip under DIR-V**, after THEJAS32 and **THEJAS64**.

Significance:

- Strengthens national security and technological sovereignty in critical electronics.
- Provides a domestic platform for startups, academia, and industry to design and test products.
- Accelerates future indigenous processors like **DHANUSH64 and DHANUSH64+ SoCs**.

Q-DAY

Context: Google's new Quantum Echoes experiment using the 65-qubit Willow processor has sparked global debate on whether it accelerates the arrival of Q-day.



About Q-day:

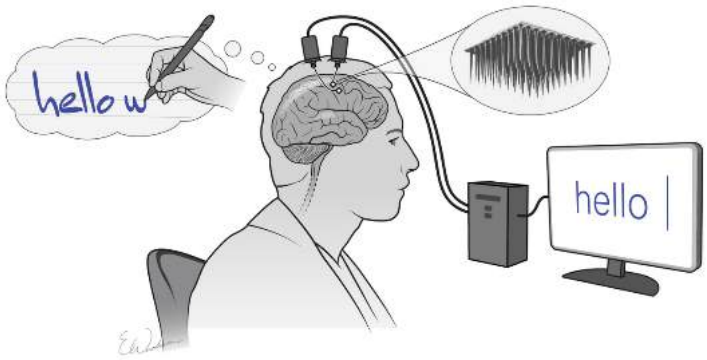
- **What it is?**
  - Q-day refers to the moment when a **cryptographically relevant quantum computer** becomes powerful enough to break widely used encryption systems such as **RSA-2048**, threatening global digital security.
- **Background:**
  - The fear stems from **Shor's algorithm (1994)**, which showed that a sufficiently large quantum computer could factor large numbers exponentially faster, breaking the mathematics behind today's public-key cryptography.
- **Key Features of Q-Day Risk:**
  - **Breaks RSA & ECC:** Quantum computers could factor keys and compromise global internet security.
  - **Harvest Now, Decrypt Later:** Hackers/ governments may store encrypted data today and decrypt it later.

- **Requires millions of logical qubits:** Current machines have only hundreds of *noisy* qubits — far from attack capability.
- **Triggers Post-Quantum Cryptography (PQC):** Push for quantum-safe algorithms like CRYSTALS-Kyber & Dilithium (standardised by NIST).

- **Significance:**
  - **Global cybersecurity transition:** Banks, governments, military networks and cloud systems must shift to PQC before the end of this decade.
  - **Strategic & geopolitical implications:** Nations see PQC as the next digital infrastructure race.
  - **Long-term digital safety:** Prevents future mass data breaches, identity theft, and compromise of national security communications.

BRAIN–COMPUTER INTERFACE (BCI)

Context: India is exploring neurotechnology and Brain–Computer Interfaces (BCIs) as strategic tools for healthcare, economic growth, and technological leadership amid global advances led by the U.S., China, and Europe.



About Brain–Computer Interface (BCI):

What It Is?

- A **Brain–Computer Interface (BCI)** is a system that interprets brain signals and converts them into digital commands to control external devices such as computers, robotic limbs, or wheelchairs.
- BCIs form a two-way communication channel between the **brain and machines**, aiding restoration of lost functions or enabling new capabilities.

How It Works?

- **Signal Capture:** Electrodes (invasive or non-invasive) record electrical activity from neurons.
- **Neural Decoding:** Machine learning algorithms translate these patterns into intentions (e.g., move arm, select letter).
- **Device Control:** The decoded signals activate an external device—robotic limbs, speech synthesizers, drones, or smart-home systems.
- **Feedback Loop:** Continuous decoding improves accuracy and enables real-time brain-machine interaction.

Key Features:

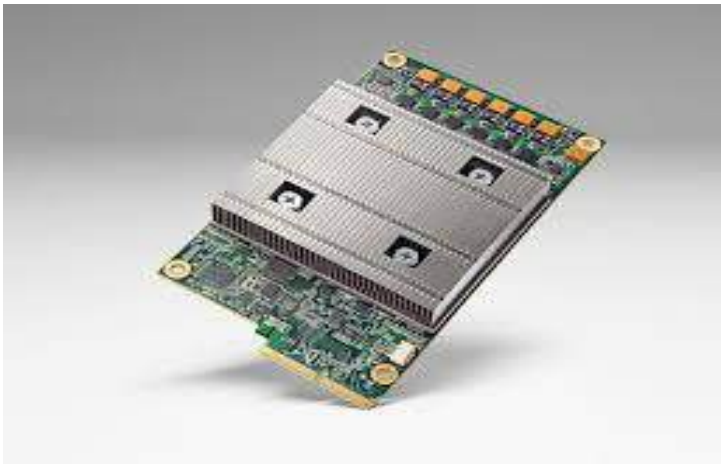
- **Direct brain–machine link:** Bypasses nerve or muscle pathways, crucial for paralysed patients.
- **Invasive & non-invasive options:** Implantable electrodes give high precision; wearable EEG devices enable safer, everyday use.
- **Real-time response:** AI speeds up decoding, allowing fast, naturalistic control.
- **Bidirectional capability (emerging):** Some BCIs can stimulate the brain to restore function or treat disorders.

Applications of BCIs:

- **Medical Rehabilitation:** BCIs restore mobility in paralysed patients through robotic limbs or wheelchairs and enable "locked-in" patients to communicate via neural spellers or gaze-based typing.
- **Treatment of Neurological Disorders:** Used for stroke, Parkinson's, depression and spinal injuries by stimulating targeted brain regions, reducing long-term reliance on conventional psychiatric or neuro drugs.
- **Assistive Technologies:** Allow users to operate smartphones, computers and smart-home devices through thought-driven commands, significantly boosting independence for motor-impaired individuals.
- **Defence & Security:** BCIs can enable soldiers to control drone swarms or communication systems mentally, offering tactical advantages but creating serious ethical, legal and security risks.

TENSOR PROCESSING UNIT (TPU)

Context: Google's release of the Ironwood TPU comes at a pivotal moment as the global AI boom accelerates demand for faster, specialised compute.



About Tensor Processing Unit (TPU):

What it is?

- A Tensor Processing Unit (TPU) is a custom application-specific integrated circuit (ASIC) designed by Google specifically to accelerate machine learning—especially deep neural networks and matrix-heavy computations.

Developed in:

- TPUs were first deployed internally by Google in **2015** to run TensorFlow workloads and were released for external use via Google Cloud in **2018**.

How it Works?

- TPUs use large **matrix-multiply units (MXUs)** capable of performing tens of thousands of multiply-accumulate operations per clock cycle.
- They process data in matrix form, breaking inputs into vectors, running them in parallel, and feeding results back to AI models.
- High-bandwidth memory and optimized interconnects enable extremely fast data movement for training large neural networks.

Key Features:

- **Matrix Multiplication at Scale:** 128×128 ALU arrays delivering massive parallelism.
- **High Throughput:** Designed for large batch sizes and weeks-long training runs.
- **SparseCores:** Specialized units for embedding-heavy models like recommendation engines.
    - **Optimized for TensorFlow, JAX, PyTorch** through Google Cloud's AI stack.
- **Low Power, High Efficiency:** Purpose-built hardware avoids unnecessary general-purpose circuitry.

Superiority Over GPUs and CPUs:

Compared to CPUs:

- CPUs are flexible but slow for ML—processing one instruction at a time with limited parallelism.
- TPUs far outperform CPUs on ML tasks due to specialized matrix math hardware and lower power consumption.

Compared to GPUs:

- GPUs offer parallelism but still carry general-purpose overhead and less efficient matrix specialization.
- TPUs provide **even higher throughput**, dedicated MXUs, and tighter integration with ML frameworks—ideal for LLMs, vision models, and deep learning pipelines.

SIM BINDING

Context: The Union Government has directed messaging apps like WhatsApp, Telegram, Signal and others to mandatorily link their services to the SIM card used during registration.

About SIM Binding:

What is SIM Binding?

- SIM binding is a security mechanism that permanently links a user's messaging or authentication service to the physical SIM card used during registration. The app stops working if the original SIM is not present in the device, acting as a hardware token for identity verification.

Ministry:

- Department of Telecommunications (DoT)
- Under the **Telecommunication Cybersecurity Amendment Rules, 2025**.
- Introduced the concept of **Telecommunication Identifier User Entity (TIUE)** to regulate digital

communications more securely.

New Government Order Mandates:

- Messaging apps must ensure their services remain **continuously linked to the SIM** used during sign-up.
- App must **block access** if the registered SIM is not physically present in the device.
- Web versions (like WhatsApp Web) must **auto-logout every six hours**.
- Platforms have **90 days to comply**.

SIM Binding Works:

- SIM binding is a security process that links a user's digital identity to the unique identifiers stored inside a physical SIM card. Every SIM contains hardware-level data such as:
  - IMSI (International Mobile Subscriber Identity)
  - ICCID (Integrated Circuit Card Identifier)
  - Ki (authentication key stored in SIM hardware)
- When an app implements SIM binding, it continuously checks these SIM identifiers inside the device.
- If the app does not detect the same IMSI/ ICCID/Ki that were present during registration, it concludes the identity mismatch and automatically blocks access.

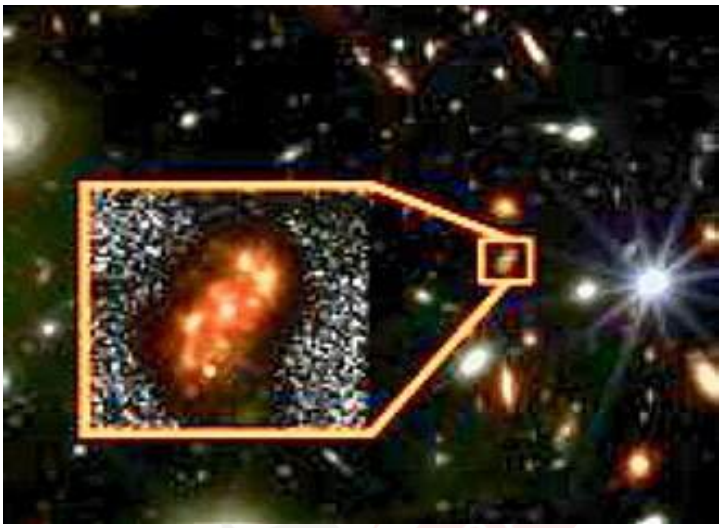
Need for SIM Binding Rules:

- Several fraudsters use messaging apps without the original SIM, especially from outside India.
- Prevents impersonation, spoofing, OTP bypass attacks and cross-border cyber fraud.
- Ensures device–SIM–account linkage, making account misuse harder.
- Enhances national cyber security by reducing anonymity on messaging platforms.

Space

ALAKNANDA GALAXY

Context: Indian astronomers have discovered Alaknanda, an implausibly old and well-formed spiral galaxy dating to just 1.5 billion years after the Big Bang, using JWST data.



About Alaknanda Galaxy:

What it is?

- Alaknanda is a distant, fully developed spiral galaxy with a rotating disk, two symmetric spiral arms, and a central bulge—features thought to take billions of years to assemble.

Discovered in: James Webb Space Telescope (JWST) public data.

- Identified during the UNCOVER survey.

Origin:

- Formed when the universe was only **~1.5 billion years old.**
- Observed at **redshift z ≈ 4**, placing it among the **earliest known spiral galaxies.**
- Name inspired by the **Alaknanda river**; paired symbolically with the Milky Way (Mandakini).

Key features:

- **Clear spiral morphology:** Two well-defined arms persist after disk/bulge subtraction
- **Active star formation: ~60 solar masses per year** along the arms
- **Stable rotating disk:** Indicates early dynamical settling
- **Photometrically robust:** Multiple independent redshift estimates agree

Significance:

- Current simulations rarely produce such structured spirals so early.
- Suggests accelerated disk formation via cold gas accretion or early interactions/mergers.

MICROMETEOROIDS AND ORBITAL DEBRIS (MMOD)

Context: Concerns over space debris safety resurfaced after **orbital debris damaged a window of China's** Shenzhou-20 crewed spacecraft**.** The incident has renewed global attention on **protecting astronauts and spacecraft from Micrometeoroids and Orbital Debris (MMOD).**

About Micrometeoroids and Orbital Debris (MMOD):

What it is?

- Micrometeoroids and Orbital Debris (MMOD) refers to a combined threat from naturally occurring space particles and human-made debris orbiting Earth, capable of damaging or destroying spacecraft due to their extremely high velocities.

Located in:

- **Orbital debris:** Concentrated mainly in Low Earth Orbit (LEO) between 200 km and 2,000 km altitude.
- **Micrometeoroids:** Present throughout interplanetary space, with slightly higher density near Earth due to gravitational pull.

Formation:

- **Micrometeoroids:** Formed mainly from asteroid collisions in the asteroid belt and debris from comets, travelling at very high speeds.
- **Orbital debris:** Generated from defunct satellites, exploded rocket stages, accidental collisions, and anti-satellite (ASAT) weapon tests.
- **Cascade effect (Kessler Syndrome):** Collisions between debris create more fragments, potentially triggering a self-sustaining chain reaction of debris generation.

Key features:

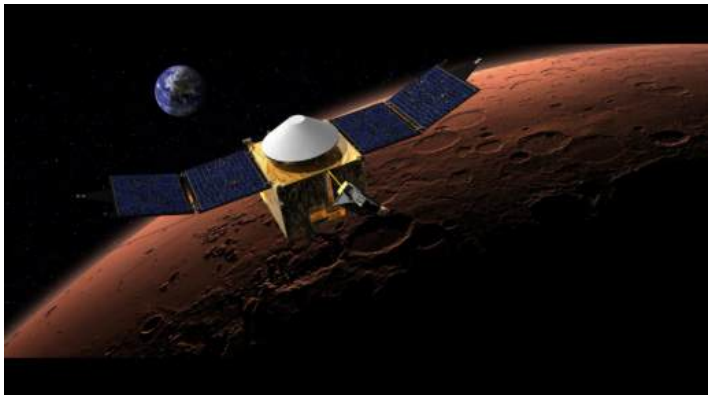
- **Extremely high velocity:** Micrometeoroids travel at **11–72 km/s**, while orbital debris moves at around **10 km/s**, making even tiny fragments lethal.
- **Huge population:** Over 34,000 objects larger than 10 cm are tracked, while hundreds of millions of smaller fragments remain untrackable.
- **Highly directional risk:** Spacecraft face maximum danger on the **forward-facing surface**, where relative collision speeds are highest.
- **Difficult to detect:** Most MMOD particles are **too small to be tracked**, requiring probabilistic risk modelling rather than real-time avoidance.
- **Long persistence:** Debris can remain in orbit for **decades or centuries**, especially in higher LEO and beyond.

Implications:

- **Threat to astronaut safety:** Even millimetre-sized debris can cause **catastrophic damage** to crewed spacecraft and space stations.
- **Risk to satellites and missions:** MMOD impacts can disable satellites, disrupt communication, navigation, and Earth observation systems.
- **Rising collision avoidance costs:** Frequent **debris-**avoidance manoeuvres increase fuel use and reduce mission lifetimes.
- **Barrier to future space exploration:** Unchecked debris growth could make certain orbits **unsafe or unusable**, limiting human expansion in space.
- **Need for global governance:** Existing UN space debris guidelines are **non-binding**, highlighting gaps in enforceable international space law.

MARS ATMOSPHERE AND VOLATILE EVOLUTION (MAVEN) SPACECRAFT

Context: NASA has lost contact with the Mars Atmosphere and Volatile Evolution (MAVEN) spacecraft after it went silent in early December 2025 following a routine communication blackout.



About Mars Atmosphere and Volatile Evolution (MAVEN) Spacecraft:

What it is?

- MAVEN is a NASA Mars orbiter mission dedicated to studying the upper atmosphere, ionosphere, and atmospheric escape processes of Mars to understand how the planet transformed from a warm, wet world to a cold, dry one.

Launched in: November 18, 2013

Aim:

- Determine how and how fast Mars lost its atmosphere to space.
- Understand the role of the Sun and solar wind in driving atmospheric escape.
- Support surface missions through data relay services.

Key features of MAVEN:

- **Orbiter mission:** MAVEN follows an elliptical orbit that samples **multiple altitudes**, allowing scientists to observe daily, seasonal, and solar-driven atmospheric changes.
- **Upper-atmosphere focus:** The mission studies neutral gases, charged ions, solar wind, and magnetic fields, directly targeting the region where atmospheric escape occurs.
- **Eight scientific instruments:** MAVEN carries **eight specialised payloads**, including mass spectrometers and plasma sensors, designed for detailed atmospheric diagnostics.
- **Imaging Ultraviolet Spectrograph (IUVS):** Though MAVEN lacks a conventional camera, IUVS maps the global structure and composition of Mars' upper atmosphere in ultraviolet light.
- **Communications relay role:** MAVEN functions as an interplanetary relay satellite, transmitting data from rovers like Curiosity and Perseverance back to Earth.
- **Highly elliptical orbit:** Its orbit allows **close passes through the upper atmosphere** and distant observations, enabling vertical profiling of atmospheric processes.

Major discoveries and contributions:

- **Atmospheric loss quantified:** MAVEN confirmed that solar wind stripping has been a dominant mechanism removing Mars' atmosphere over billions of years.
- **Water loss pathways identified:** The mission showed how water vapour breaks into hydrogen and oxygen, with lightweight hydrogen escaping irreversibly to space.
- **Impact of solar storms:** MAVEN observed that solar flares and coronal mass ejections sharply increase atmospheric escape rates during extreme space-weather events.

THE RESPOND BASKET 2025

Context: ISRO has released the RESPOND Basket 2025, inviting research proposals from academia aligned with its current and future mission needs.

About The RESPOND Basket 2025:

What it is?

- The RESPOND Basket is a curated set of mission-oriented research problem statements identified by ISRO and Department of Space (DoS) centres.
- It guides academia towards targeted research that directly supports ISRO's upcoming space missions and R&D priorities.

Published by:

- Indian Space Research Organisation (ISRO)
- Under the aegis of the Department of Space (DoS), Government of India

Aim:

- To bridge academia and national space missions through focused, collaborative research.
- To leverage academic innovation, advanced research and human capital for solving complex space-technology challenges.

Key features:

- **Mission-aligned problem statements:** Derived from ISRO's immediate and future programmatic requirements.
- **Open to premier institutions:** Universities and recognised academic and R&D institutions across India can apply.
- **Technical orientation:** ISRO scientists provide detailed technical briefings on expectations and outcomes.
- **Digital submission**: Proposals to be submitted through the I-GRASP portal.
- **Interactive engagement**: Enables two-way exchange between ISRO scientists and academic researchers.

Significance:

- Strengthens ISRO–academia partnership, a critical pillar of India's space ecosystem.
- Ensures problem-driven research, reducing the gap between theory and mission deployment.
- Builds a future-ready talent pipeline for India's expanding space programme.

GEMINID METEOR

Context: The Geminid meteor shower is set to peak over India between December 13–15, 2025, offering up to 100–120 meteors per hour under dark skies.

About Geminid Meteor:

What it is?

- The Geminids are an annual meteor shower observed every December, known for their high meteor rates, bright fireballs, and slow-moving streaks, making them among the most spectacular celestial events visible from Earth.

Origin:

- Unlike most meteor showers that originate from comets, the Geminids arise from the **asteroid 3200 Phaethon**, a rocky body with a highly elliptical orbit around the Sun.
- Extreme solar heating causes Phaethon to shed debris, which Earth encounters each year, producing the meteor shower.

Why it occurs?

- The shower appears to radiate from the **constellation Gemini**, which rises higher in the sky after midnight, increasing meteor visibility.
- Earth passes through the **dense debris stream** of 3200 Phaethon between **mid-November and late December**, with peak activity in mid-December.
- The phenomenon is visible **globally**, with better rates in the **Northern Hemisphere**, including India.

Key Characteristics:

- **Peak rate:** Up to **120 meteors per hour** under dark, clear skies
- **Colour:** Often **yellow or white**, sometimes producing bright fireballs
- **Speed:** Moderately fast (~35 km/s), slower than Perseids
- **Observation:** Best seen **from midnight to pre-dawn**, without telescopes

Significance:

- **Scientific importance:** Helps astronomers study asteroid-origin meteoroid streams and near-Earth objects.

- **Public engagement:** One of the most accessible astronomical events, promoting scientific curiosity and citizen science.
- **Planetary defence insight:** Understanding Phaethon improves tracking of potentially hazardous asteroids.

ISRO TO LAUNCH ITS HEAVIEST US COMMERCIAL SATELLITE: BLUEBIRD-6

Context: ISRO will launch BlueBird-6, the heaviest American commercial communication satellite (6.5 tonnes) ever to be launched by India, on December 15 aboard the LVM3 rocket.

About ISRO To Launch Its Heaviest Us Commercial Satellite: Bluebird-6:

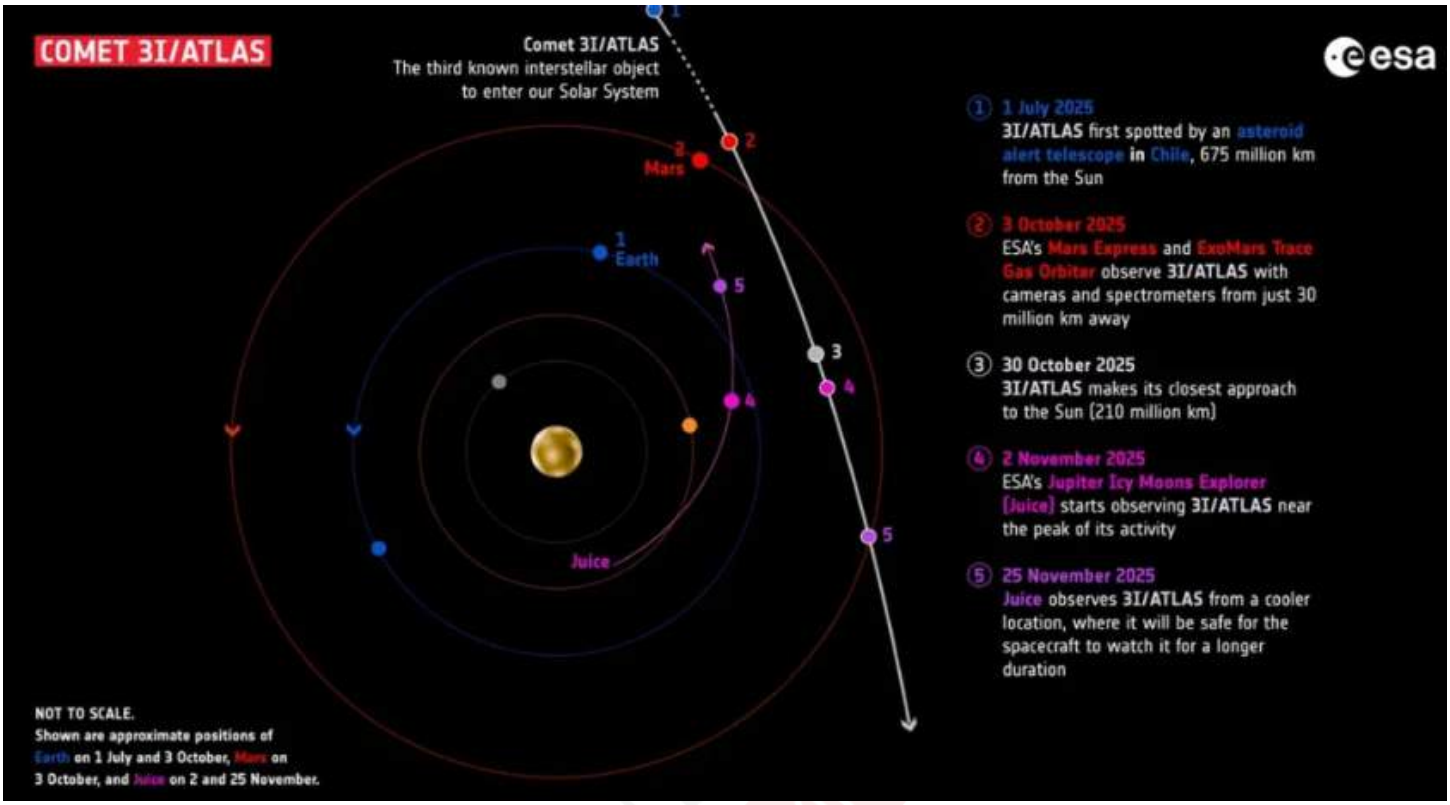
- **What it is?**
  - A 6.5-tonne Low-Earth Orbit (LEO) communication satellite, part of AST SpaceMobile's next-generation constellation designed for direct-to-device mobile broadband globally.
- **Key Features:**
  - **Largest commercial phased array antenna in LEO:** ~2,400 sq ft once deployed
  - **Block-2 series:** 3.5× larger than BlueBirds 1–5 and **10× higher data capacity**
  - Provides up to **10,000 MHz bandwidth** per satellite
  - Enables **non-continuous direct-to-device connectivity** in areas without terrestrial networks

About Launch Vehicle LVM3 (Bahubali Rocket)

- **What it is?**
  - India's heaviest-lift launch vehicle, capable of placing 8,000 kg into LEO and 4,000 kg into GTO, and the designated launcher for Gaganyaan human spaceflight missions.
- **Features:**
  - **Three-stage configuration:**
    - **S200 solid strap-on boosters** (204 tonnes propellant; among the world's largest).
    - **L110 liquid core stage** with twin engines.
    - **C25 cryogenic upper stage** powered by indigenous **CE-20 engine** (28-ton propellant load).
  - **Dimensions:** 43.5 m height, 640-ton lift-off mass, 5-m payload fairing.
  - **Precision staging sequence:**
    - S200 ignition, separation at ~137 seconds.
    - L110 ignition at ~113 seconds, separation at ~313 seconds.
    - C25 ignition thereafter.
  - Injects spacecraft into **GTO (180 × 36,000 km)** in ~974 seconds.
  - Recently launched **CMS-3 (4.4 tonnes)** successfully.
  - Human-rated LVM3 variant to fly astronauts under **Gaganyaan in 2027.**

PLANETARY-DEFENSE EXERCISE ON 3I/ATLAS

Context: Europe has launched the world's largest planetary-defence drill, centred on tracking the fast-approaching object 3I/ATLAS.



About Planetary-Defense Exercise on 3I/ATLAS:

- **What it is?**
  - The 3I/ATLAS planetary-defense drill is the **largest global simulation ever conducted** to test how nations detect, track and respond to near-Earth threats.
- **Launched By:** Led jointly by **ESA, NASA, UN-IAWN** (International Asteroid Warning Network).
- **Aim:**
  - To evaluate Earth's readiness for high-velocity objects by **testing early-warning systems, tracking networks, emergency coordination and citizen communication**.
  - Also aims to identify gaps in international cooperation, data-sharing and psychological preparedness.
- **How It Works?**
  - **Tracking 3I/ATLAS:** Agencies use ground telescopes and space-based sensors to continuously monitor the comet's position, speed and brightness, refining its orbital path in real time.
  - **Analysing Trajectory Shifts:** Scientists test for small deviations caused by gravity or solar forces, updating orbital models to identify any change that could alter its distance from Earth.
  - **Calculating Impact Probabilities:** Thousands of simulations are run with different uncertainty ranges to determine whether the object could intersect Earth's orbit or remain safely distant.
  - **Running Global Response Scenarios:** Teams simulate options such as deflection missions, civil-defence mobilisation or evacuation modelling to test operational readiness under pressure.
  - **Testing International Coordination:** The drill evaluates how quickly NASA, ESA, ISRO, CNSA, JAXA and UN-IAWN exchange data, issue alerts and take joint decisions during high-uncertainty events.
- **Key Features:**
  - **Real object (3I/ATLAS)** travelling at ~60 km/s provides real-world complexity.
  - Involves **planetary-defense modelling**, orbital prediction drills and anomaly-response protocols.
  - Includes **public-communication modules**, addressing misinformation and psychological

preparedness.
    - Uses **multi-agency coordination**, including defense space commands.
    - Parallel geopolitical coordination amid ESA's record budget and U.S.–China–India moves in space security.
- **Significance:**
    - Strengthens global readiness for future asteroid threats — a rising planetary-security concern.
    - Exposes systemic weaknesses like absence of a global public-guidance system during space anomalies.

ASTROSAT

Context: IIA celebrated 10 years of the UltraViolet Imaging Telescope (UVIT) aboard AstroSat, marking a decade of major scientific discoveries.

About AstroSat:

- **What it is?**
    - AstroSat is India's first dedicated astronomy satellite enabling simultaneous observations in UV, optical, soft X-ray and hard X-ray bands.
- **Launched in:** **2015** by **PSLV-C30** into a 650 km orbit.
- **Aim:** To study cosmic sources across multiple wavelengths, track high-energy processes, and provide global-access astronomical data.
- **Key Features:**
    - Five scientific payloads covering **0.3–100 keV** + UV bands.
    - Enables **simultaneous multi-wavelength imaging**, unique among space observatories.
    - High pointing stability and long-duration exposure capabilities.
    - Data processed and archived by **ISSDC**, Bylalu; mission operated by **ISTRAC**, Bengaluru.
    - **Minimum designed life:** 5 years, extended far beyond.

About Ultra-Violet Imaging Telescope (UVIT):

- **What it is?**
    - A twin-telescope UV imager aboard AstroSat capable of near-UV, visible, and far-UV observations.
- **Features:**
    - Spatial resolution **better than 1.5 arcseconds** (among the world's best in UV imaging).
    - Two telescopes: **NUV+Visible** and **FUV** channels.
    - Developed by a national consortium led by **IIA**, with ISRO centres.
- **Significance:**
    - India's **first UV space telescope**, second globally in FUV capability after Hubble.
    - Enabled major discoveries: hot companions of Be stars, blue stragglers, UV disks in dwarf galaxies, novae in Andromeda, AGN UV–X-ray correlations.

Defence and Security

DEFENCE ACQUISITION COUNCIL (DAC)

Context: The Defence Acquisition Council (DAC) has accorded Acceptance of Necessity (AoN) for capital acquisition proposals worth about ₹79,000 crore to strengthen the operational capabilities of the Armed Forces.

About Defence Acquisition Council (DAC):

What it is?

- The Defence Acquisition Council (DAC) is the highest decision-making body for capital defence procurements in India, responsible for granting in-principle approvals and Acceptance of Necessity for major acquisitions.

Established in:

- Set up following the recommendations of the Group of Ministers on Reforming the National Security System.

Members:

- **Chairman:** Raksha Mantri
- **Members:** Raksha Rajya Mantris, Chief of Defence Staff, Chiefs of Army, Navy and Air Force
- **Other members:** Defence Secretary, Secretaries of Defence Production, Defence R&D, Defence Finance
- **Member Secretary:** Deputy Chief of Defence Staff (PP&FD)

Functions:

- **Approval of Long-Term Perspective Plan:** Provides in-principle approval to capital acquisitions in the **15-year Long Term Perspective Plan**, identifying projects with long gestation periods.
- **Acceptance of Necessity (AoN):** Grants AoN for capital acquisition projects proposed for inclusion in Five Year Plans, forming the first formal step in procurement.
- **Categorisation of projects:** Decides whether acquisitions will be **Buy, Buy and Make, or Make**, promoting indigenisation and domestic capability.
- **Monitoring major projects:** Reviews progress of key acquisition programmes based on feedback from the Defence Procurement Board.
- **Policy coordination:** Ensures coordination between operational requirements, financial prudence and indigenous defence production goals.

Significance:

- Enables timely acquisition of critical platforms and systems across the three services.
- Streamlines decision-making and reduces delays in defence acquisitions.
- Encourages indigenous development and production under the Atmanirbhar defence framework.

PINAKA LONG RANGE GUIDED ROCKET (LRGR-120)

Context: DRDO has successfully conducted the maiden flight test of the Pinaka Long Range Guided Rocket (LRGR-120) at ITR Chandipur.

About Pinaka Long Range Guided Rocket (LRGR-120):

What it is?

- The Pinaka LRGR-120 is an indigenously developed, precision-guided rocket variant of the Pinaka multi-barrel rocket system, designed for long-range, high-accuracy strikes.

Developed by: Armament Research and Development Establishment (ARDE), DRDO in association with High Energy Materials Research Laboratory (HEMRL).

Aim:

- To extend the strike range of the Pinaka system
- To provide precision-guided firepower with minimal collateral damage
- To enhance operational flexibility using existing Pinaka launchers

Key features:

- **Extended range:** Capable of striking targets up to **120 km**, significantly increasing battlefield reach.
- **Precision guidance:** Guided rocket with advanced navigation and control ensuring **textbook accuracy** on targets.
- In-flight manoeuvrability: Demonstrated planned manoeuvres throughout the flight trajectory.
- **Launcher compatibility:** Can be fired from the **in-service Pinaka launcher**, enabling multiple variants from the same platform.
- **Indigenous design:** Entirely designed and developed within India using domestic technologies.

Significance:

- **Force multiplier:** Enhances the Indian Army's long-range precision strike capability.
- **Operational versatility:** Allows seamless deployment of different Pinaka variants without new launch infrastructure.
- **Reduced collateral damage:** Precision guidance improves target discrimination.

INSV KAUNDINYA

Context: The Prime Minister has lauded INSV Kaundinya as it embarks on its maiden voyage from Porbandar to Muscat, symbolically retracing India's ancient maritime routes.

- Built using the ancient Indian stitched-ship technique, the vessel showcases India's rich seafaring heritage.

About INSV Kaundinya:

What it is?

- INSV Kaundinya is an Indian Naval Sailing Vessel recreated on the basis of a 5th-century CE ship depicted in the Ajanta Cave paintings, representing India's ancient ocean-going traditions.

Built by: Indian Navy, in collaboration with the Ministry of Culture

Key features of the ship:

- **Stitched wooden hull:** Wooden planks are stitched together instead of being nailed, reflecting ancient shipbuilding wisdom.
- **Traditional materials:** Uses coconut coir rope, natural resin and wooden planks, avoiding modern metal fastenings.
- **Cultural symbolism:** Sails carry Gandabherunda **and Sun motifs**, bow features a **Simha Yali**, and deck holds a Harappan-style stone anchor.
- **Ocean-going capability:** Designed and tested to be fully seaworthy for long-distance navigation across the Indian Ocean.
- **Historic identity:** Named after **Kaundinya**, the legendary Indian mariner associated with early maritime links to Southeast Asia.

About Ancient Indian stitched-ship technique:

What it is?

- The stitched-ship technique is an indigenous Indian method of shipbuilding in which wooden planks are stitched together using natural fibres, a practice once common along India's coastline and the Indian Ocean world.

Features:

- **Stitching instead of nails:** Planks are tied with coir rope, allowing flexibility and strength in rough seas.
- **Use of organic materials:** Natural resins and fibres improve durability while remaining environmentally sustainable.
- **Shock absorption:** Flexible joints reduce damage from waves, making ships suitable for long ocean voyages.
- **Ancient maritime reach:** Enabled Indian sailors to trade with West Asia**, Africa and Southeast Asia** centuries ago.
- **Living heritage revival:** The technique represents the revival of India's indigenous knowledge systems in shipbuilding.

REGIONAL LEVEL POLLUTION RESPONSE EXERCISE (RPREX-2025)

Context: The Indian Coast Guard (ICG) conducted RPREX-2025, a Regional Level Pollution Response Exercise off the Mumbai coast, to test preparedness against major oil spill incidents.

About Regional Level Pollution Response Exercise (RPREX-2025):

What it is?

- RPREX-2025 is a large-scale maritime pollution response exercise conducted to simulate

and manage oil spill emergencies at sea, in accordance with India's National Oil Spill Disaster Contingency Plan (NOSDCP).

Host: Conducted off the Mumbai coast.

Organisations involved: Indian Coast Guard and ONGC.

Aim:

- To ensure a swift, coordinated, and effective response to oil spills at sea.
- To test inter-agency coordination, equipment readiness, and communication.
- To validate the National Oil Spill Disaster Contingency Plan (NOSDCP).

Key features:

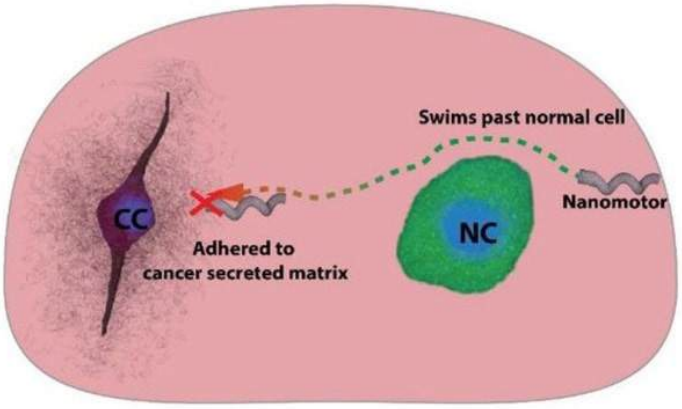
- **Realistic spill simulation:** Scenario involved a tanker–fishing boat collision, causing crude oil spillage in the Arabian Sea.
- **Two-phase approach:**
  - **Phase I:** Planning conference, technical lectures, tabletop exercise
  - **Phase II:** Full-scale **live sea exercise** testing ships, skimmers, and containment gear
- **Specialised assets deployed:** Use of Pollution Control Vessels (PCVs) with skimming and containment equipment.
- **Multi-agency participation:** Integration of port authorities, oil companies, coastal police, and state agencies.
- **Sea-to-shore coordination:** Mangrove protection, coastal livelihood security, and port contingency plans tested.

Significance:

- **Environmental protection:** Prevents oil spills from reaching sensitive coastlines and mangroves.
- **Maritime safety:** Enhances India's capacity to respond to large-scale marine pollution disasters.
- **Economic resilience:** Protects fisheries, ports, and coastal livelihoods.

NANOBOTS

Context: An IISc Bengaluru–led breakthrough on magnetic nanobots for targeted cancer therapy has gained global attention after Dr Ambarish Ghosh won the 2025 New York Academy of Sciences–Tata Sons Transformation Prize.



About Nanobots:

What they are?

- Nanobots (nanorobots) are microscopic machines at the nanometre scale designed to operate inside the human body for targeted drug delivery, diagnosis, imaging, and therapy, especially in hard-to-reach tissues like deep tumours.

How they work?

- IISc's nanobots are **helical, bacteria-inspired nanoswimmers** that move like a **corkscrew or propeller**.
- A **magnetic component (iron)** allows external magnetic fields to **guide and steer** them precisely through blood, dense tissue, and even cells.
- Drugs are **coated on the surface or tip**, enabling **direct delivery to cancer cells** while sparing healthy tissue.
- They can also generate **localized heat (>42°C)** under magnetic fields to destroy cancer cells (magnetic hyperthermia).

Key features:

- **Targeted precision:** Preferentially bind to **cancer cells**, reducing collateral damage to healthy tissues.
- **Deep tissue penetration:** Can access dense and poorly vascularised tumours invisible to conventional scans.
- **Multifunctionality:** Act as drug carriers, therapeutic agents, and imaging beacons (visible under MRI).
- **Biocompatible materials:** Made of silica and iron, materials already used safely in medical applications.
- **Broad applicability:** Proven effective against ovarian and breast cancer cells, bacteria, and dental infections; potential use in dentistry and regenerative medicine.

Limitations:

- Currently validated mainly on cell cultures and animal models; human clinical trials pending.
- Requires extensive safety validation and approvals.
- Market adoption depends on mass production, affordability, and clinician acceptance.

AKASH-NG MISSILE SYSTEM

Context: DRDO has successfully completed User Evaluation Trials (UET) of the Next Generation Akash (Akash-NG) missile system, meeting all PSQR requirements.

About Akash-NG Missile System:

What it is?

- Akash-NG (Next Generation Akash) is an indigenously developed surface-to-air missile (SAM) system designed to intercept a wide range of aerial threats, including aircraft, drones, cruise missiles, and other high-speed targets.

Developed by: Defence Research and Development Organisation (DRDO)

Aim:

- To replace and upgrade earlier Akash variants with longer range, higher accuracy, and faster response time
- To strengthen self-reliance (Atmanirbhar Bharat) in critical missile technologies

Key features:

- **Indigenous** Radio Frequency **(RF) seeker** for high accuracy and resistance to electronic countermeasures.
- **Dual-pulse solid rocket motor** enabling engagement at varied ranges and altitudes.
- **Capability to intercept**:
  - High-speed aerial threats
  - Low-altitude targets (near-boundary scenarios)
  - Long-range, high-altitude targets
- Fully indigenous radars and C2 (Command & Control) system.
- High precision demonstrated across **multiple operational scenarios.**

Significance:

- Major upgrade over legacy Akash systems in range, lethality, and survivability.
- Enhances India's ability to counter drones, cruise missiles, and modern aerial threats.
- Strengthens air defence architecture of the IAF and Army.

EXERCISE DESERT CYCLONE–II 2025

Context: An Indian Army contingent has departed for the India–UAE Joint Military Exercise DESERT CYCLONE–II (2025) to be held in Abu Dhabi.

About Exercise DESERT CYCLONE–II 2025:

What it is?

- DESERT CYCLONE–II is the **second edition of the bilateral joint military exercise** between the Indian Army and the UAE Land Forces, aimed at enhancing operational cooperation.

Host country: United Arab Emirates (Abu Dhabi)

Participating nations:

- **India:** 45 personnel from a battalion of **The Mechanised Infantry Regiment**
- **UAE:** Personnel from **53 Mechanised Infantry Battalion**, UAE Land Forces

Aim:

- To train jointly for sub-conventional operations under a UN mandate.
- To prepare forces for peacekeeping, counter-terrorism and stability operations in urban environments.

Key features:

- Training in fighting in built-up areas (FIBUA).
- Heliborne operations and detailed joint mission planning.
- Integration of Unmanned Aerial Systems (UAS) and Counter-UAS techniques.
- Focus on urban warfare scenarios and joint tactical drills.

Significance:

- Strengthens bilateral defence ties and military diplomacy between India and the UAE.
- Enhances mutual understanding of tactics, techniques and procedures (TTPs).

HAMMER PRECISION-GUIDED WEAPON (AASM)

Context: India has signed a pact with France's Safran to jointly manufacture, customise, supply and maintain the HAMMER (AASM) precision-guided air-to-ground weapon in India through a 50–50 JV with BEL.

About HAMMER precision-guided weapon (AASM):

What it is?

- HAMMER (Highly Agile Modular Munition Extended Range), also known as AASM, is a stand-off, precision-guided air-to-ground weapon that converts conventional bombs into high-accuracy strike systems through modular guidance and propulsion kits.

Developed by:

- Developed by Safran Electronics & Defense (France).
- In India, it will be jointly manufactured by Bharat Electronics Limited (BEL) and Safran through a 50:50 joint venture.

Aim:

- To provide the air force with accurate, flexible and survivable precision strike capability from stand-off ranges, enabling controlled escalation while minimising collateral damage and aircraft risk.

Key features:

- **Modular design:** Consists of a nose-mounted guidance kit and a tail-mounted range-extension kit, fitted onto standard bomb bodies (125 kg to 1,000 kg, including Mk-80 series).
- **Multiple guidance options:** INS-GPS (all-weather), INS-GPS-IR (high-precision fixed targets), and **laser guidance** (moving targets).
- **Stand-off range & off-axis launch:** Rocket booster and winglets allow launch from outside hostile air-defence zones and even at large off-axis angles.
- **High precision:** Circular Error Probability ranges from ~10 m (INS-GPS) to ~1 m (IR-guided).
- **Platform flexibility:** Integrated on **Rafale** and planned for **Tejas**, enabling a common precision-strike capability across imported and indigenous aircraft.

Significance:

- **Operational edge:** Bridges the gap between unguided bombs and expensive cruise missiles, offering missile-like precision at lower cost.
- **Strategic autonomy:** Domestic manufacturing reduces import dependence and ensures availability during crises.
- **Technology absorption:** Builds Indian expertise in guidance systems, propulsion integration and precision-strike workflows.

DIVING SUPPORT CRAFT (DSC) A20

Context: The Indian Navy will commission DSC A20, its first indigenously designed Diving Support Craft, at Kochi.

About Diving Support Craft (DSC) A20:

What it is?

- A purpose-built Diving Support Craft designed for underwater operations such as diving missions, inspection, repair, and salvage in coastal waters.

Developed by: Titagarh Rail Systems Limited (TRSL), Kolkata

Aim:

- To enhance the Navy's diving, underwater inspection, salvage, and coastal operational support.
- To strengthen indigenous maritime capability under Aatmanirbhar Bharat.

Key Features:

- **Catamaran hull form:** superior stability, larger deck area, improved seakeeping.
- **Approx. displacement:** 390 tons.
- **Advanced state-of-the-art diving systems** meeting top safety and operational standards.
- Designed and built as per **Naval Rules & Regulations of IRS**.
- Underwent comprehensive **hydrodynamic analysis and model testing** at NSTL, Visakhapatnam.
- Lead ship in a series of **five Diving Support Craft**.

Significance:

- Strengthens India's underwater operations, salvage, and coastal mission capabilities.
- Enhances operational readiness of the Southern Naval Command (based at Kochi).
- Represents a milestone in indigenisation and defence manufacturing, showcasing synergy between industry, research bodies, and the Navy.

BORDER ROADS ORGANISATION (BRO)

Context: Defence Minister of India inaugurated 125 BRO infrastructure projects worth ₹5,000 crore, the largest single-day launch in the organisation's history.

About Border Roads Organisation (BRO):

What is BRO?

- BRO is a premier **road construction executive force under the Ministry of Defence** responsible for developing and maintaining strategic infrastructure in India's border areas and in friendly foreign countries.

- **Established:** 7 May 1960
- **Parent Body:** Border Roads Development Board (BRDB)
- **Headquarters:** New Delhi
- **Aim:**
  - To meet the strategic needs of the Armed Forces through efficient, time-bound and high-quality infrastructure development.
  - To support socio-economic development of remote border regions.
- **Key Functions:**
  - **Peace-time Role:**
    - Develop and maintain **operational road infrastructure** in border areas.
    - Support socio-economic development in remote terrains.
    - Execute projects in friendly countries (Afghanistan, Bhutan, Myanmar, Tajikistan, Sri Lanka).
  - **War-time Role:**
    - Construct and maintain roads required for **troop mobility and logistics**.
    - Keep supply routes open by

clearing snow, landslides and avalanches.
- Execute additional tasks assigned by the Government during conflict.

- **Other Functions:**
  - Construction of roads, bridges, airfields in **extreme climatic and high-altitude environments**.
  - Use of indigenous technologies (e.g., **Class-70 modular bridges**).
  - Employing **local labour** (over 2 lakh workers), aiding rural livelihoods.
  - Disaster response support (tsunamis, earthquakes, floods, landslides).

- **Significance:**
  - **Strategic:** Enhances military mobility along critical borders with China, Pakistan and in high-altitude regions.
  - **Economic:** Boosts trade, tourism, connectivity and local development in remote areas.
  - **Geopolitical:** Strengthens India's neighbourhood outreach via infrastructure diplomacy.
  - **Humanitarian:** Plays a key role in rescue operations during natural disasters.

EXERCISE HARIMAU SHAKTI

Context: India and Malaysia have begun the 5th edition of Exercise Harimau Shakti 2025 at Mahajan Field Firing Range, Rajasthan.

About Exercise Harimau Shakti:

- **What It Is?**
  - Exercise Harimau Shakti is a bilateral military training exercise conducted between the Indian Army and the Royal Malaysian Army to strengthen coordination in counter-insurgency and peacekeeping operations.
- **Nations Involved:**
  - **India:** Represented mainly by troops from the **DOGRA Regiment**.
  - **Malaysia:** Represented by the **25th Battalion, Royal Malaysian Army**.
- **Host location:** Mahajan Field Firing Range, Rajasthan (India).
- **Key Features:**
  - Focus on **Sub-Conventional Operations under UN Chapter VII mandates**.
  - Joint drills on **cordon and search, heliborne operations, search and destroy missions**, and securing helipads.
  - Practice of **casualty evacuation**, counter-terrorist tactical responses, and coordinated small-team operations.
  - Inclusion of **Army Martial Arts Routine (AMAR)**, combat reflex shooting, and yoga for physical conditioning.
  - Exchange of best practices to improve tactical proficiency and operational synergy.
- **Significance:**
  - Enhances interoperability between Indian and Malaysian forces in peacekeeping and counter-terror scenarios.
  - Strengthens bilateral defence cooperation and military diplomacy.
  - Improves readiness for UN peacekeeping roles, ensuring safer and more coordinated ground operations.

MILITARY EXERCISES IN NEWS

Context: Two major military exercises were in focus: Exercise Garuda 25 between India and France concluded in France, while Exercise Garuda Shakti 2025 between India and Indonesia commenced in Himachal Pradesh.

About Military Exercises in News:

About Exercise Garuda 25:

- **Host:** Air Base 118, Mont-de-Marsan, France
- **Nations Involved:** India (IAF) and France (French Air & Space Force – FASF)
- **Key Features:**
  - IAF deployed **Su-30MKI**, **IL-78** air-to-air refuellers, and **C-17 Globemaster III**.
  - Conducted complex missions including **strike**, **escort**, **air refuelling**, and coordinated operations.
  - Included joint mission planning, tactical execution, and exposure to each other's SOPs.
  - Ensured high aircraft serviceability through IAF maintenance teams.
  - Reinforced Indo–French strategic partnership and improved interoperability in high-end air combat.

About Exercise Garuda Shakti 2025:

- **Host:** Special Forces Training School, Bakloh, Himachal Pradesh
  Nations Involved: India (PARA SF) and Indonesia (Indonesian Special Forces)
- **Key Features:**
  - Focus on counter-terrorism tactics, unarmed combat, combat shooting, sniping, and heliborne ops.
  - Training on drone warfare, counter-UAS, and loiter-munition planning in semi-mountainous terrain.
  - Includes sharing expertise on weapons, equipment, and operational procedures.
  - Culminates in a validation exercise simulating real-operation scenarios for testing readiness.

INS ARIDAMAN

Context: India is set to commission INS Aridaman, its third indigenous nuclear-powered ballistic missile submarine (SSBN), with Navy Chief Admiral Dinesh K.

About INS Aridaman:

What it is?

- INS Aridaman is India's third indigenously built SSBN, part of the Arihant-class nuclear submarines under the Strategic Forces Command, designed to provide assured retaliatory capability under India's no-first-use nuclear doctrine.

Built By: Constructed under the Advanced Technology Vessel (ATV) Project, led by:

- Ship Building Centre, Visakhapatnam
- It integrates over **90% indigenous components**, including its nuclear reactor.

History of India's Nuclear Submarine Programme:

- Initiated under the **ATV programme** in the late 1980s to achieve a credible underwater nuclear deterrent.
- **INS Arihant** (launched 2009, commissioned 2016) made India the **6th nation** with operational SSBN capability.
- **INS Arighat** followed in 2024.
- **INS Aridaman** will be the **third operational SSBN**, marking the first time India will have a minimum rotation fleet for continuous at-sea deterrence.

Key Features of INS Aridaman:

- **Displacement:** ~6,000 tonnes (surface), ~7,000 tonnes (submerged)
- **Reactor:** 83 MW pressurised water reactor (BARC) enabling **near-unlimited endurance**
- **Armament:**
  - Four vertical launch tubes
  - Up to **24 K-15 Sagarika SLBMs** (750 km range) or
  - **K-4 missiles** with 3,500 km range
- **Stealth Enhancements:** Anechoic tiles, advanced sonar suite (bow, flank, towed array)

Significance:

- **Strengthens Nuclear Triad:** Provides survivable, assured second-strike capability essential under

India's no-first-use posture.

- **Enhances Maritime Security:** Expands Navy's deterrence reach across the Indo-Pacific amid rising regional tensions.
- **Boost to Aatmanirbhar Bharat:** High indigenous content reflects mastery over complex nuclear naval propulsion.

INS TARAGIRI

Context: The Indian Navy has received 'Taragiri', the fourth Nilgiri-class advanced stealth frigate under Project 17A, delivered by Mazagon Dock Shipbuilders Ltd.

About INS Taragiri:

What it is?

- INS Taragiri is a Project 17A Nilgiri-class advanced stealth frigate, designed as a multi-mission combat platform with enhanced stealth, firepower, automation and survivability.

Built By: Mazagon Dock Shipbuilders Ltd (MDL), Mumbai

Full List Ships Under Project 17A:

- INS Nilgiri
- INS Himgiri
- INS Udaygiri
- INS Taragiri
- INS Dunagiri (Upcoming)

Key Features:

- **Advanced Stealth Design:** Reduced radar, acoustic and infrared signatures.
- **Propulsion:** Combined Diesel or Gas (CODOG) system with diesel engines + gas turbines; CPP on each shaft.
- **Sensors & Weapons:**
  - **BrahMos** supersonic cruise missiles
  - **MF-STAR** multifunction radar
  - **MRSAM** air defence missile complex
  - **76 mm SRGM**, 30 mm and 12.7 mm CIWS
  - Torpedoes and rockets for anti-submarine warfare
- **Integrated Platform Management System (IPMS)** for automation and machinery control
- **Indigenisation Level:** ~75% with contributions from over 200 MSMEs

Significance:

- Strengthens India's naval deterrence with a modern, multi-mission stealth combat platform.
- Demonstrates India's capability to design, construct and deliver sophisticated warships under compressed timelines.
- Supports Aatmanirbhar Bharat through indigenous technologies and large MSME participation.

AIRCRAFT HANSA-3 NG

Context: The Union Minister for Science & Technology launched India's first indigenous production-version pilot trainer aircraft Hansa-3 NG at CSIR-NAL, Bengaluru.

About Aircraft Hansa-3 NG:

What it is?

- Hansa-3 NG is a two-seater, next-generation, all-composite trainer aircraft designed for Private Pilot Licence (PPL) and Commercial Pilot Licence (CPL) training.
- It is the first fully indigenous trainer aircraft ready for serial production in India's civil aviation ecosystem.

Developed by: Designed and developed by CSIR–National Aerospace Laboratories (NAL), Bengaluru.

Key Features of Hansa-3 NG:

- **Aircraft Design & Performance:**

- Built with a lightweight composite airframe, making the aircraft durable, fuel-efficient and easier to maintain.
- Features a bubble canopy and wide cockpit, giving excellent visibility and comfortable seating for trainee pilots.
- Designed for stable low-speed handling, making take-offs, landings and training manoeuvres safer for beginners.

- **Avionics:**
  - Comes with a modern glass cockpit that displays all flight information digitally for better situational awareness.
  - Integrated navigation, communication and safety systems (GPS, ILS-ready, transponder, radio).
  - Equipped with Emergency Locator Transmitter (ELT) for safety compliance.
- **Powerplant:**
  - Powered by a fuel-efficient Rotax engine, widely used worldwide for flight-training aircraft.
  - Easy-to-maintain engine setup with quick-access panels, helping reduce servicing time and cost.
- **Safety & Durability:**
  - Airframe treated with lightning protection for safe all-weather flying.
  - Strong landing gear designed to handle frequent training landings on different types of runways.

Significance:

- Critical to India's requirement of 30,000 pilots over the next 15–20 years.
- Reduces dependence on foreign trainer aircraft and saves foreign exchange.
- Enables Atmanirbhar Bharat in aviation manufacturing and boosts MSME participation.

Miscellaneous

INDUSTRIAL HEMP

Context: Himachal Pradesh has legalised and initiated regulated cultivation of industrial hemp under the 'Green to Gold' initiative to promote a bio-economy–led growth model.

About Industrial hemp:

What it is?

- Industrial hemp is a non-intoxicating variety of *Cannabis sativa* cultivated for fibre, seed, and biomass, with tetrahydrocannabinol (THC) content below 0.3%, making it unsuitable for drug use.

Origin:

- Native to **Central and South Asia**, with millennia-old use in **textiles, ropes, paper, and medicine**
- Now legally cultivated across parts of Europe, North America, and Asia under regulated THC thresholds

Key characteristics:

- **Low THC (<0.3%)** and high fibre/seed yield
- **Climate-resilient:** Requires ~**50% less water than cotton** and grows in marginal soils
- **Fast-growing:** Harvest cycle of **70–140 days**
- **Soil-friendly:** Suppresses weeds and improves soil structure via deep roots
- **High biomass yield:** Suitable for fibre, oilseed, and dual-purpose use

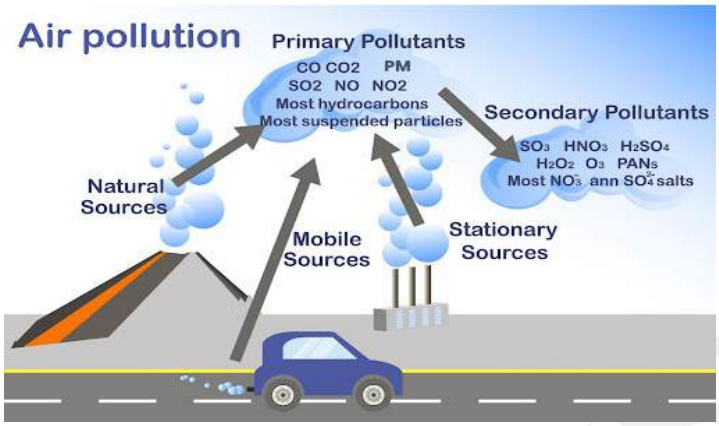
Applications:

- **Construction:** *Hempcrete* is a lightweight, insulating material that absorbs more carbon than it emits, offering a carbon-negative alternative for sustainable building.
- **Paper & packaging:** Hemp provides a low-impact pulp source, requiring fewer chemicals and enabling recyclable, biodegradable packaging solutions.
- **Pharmaceuticals & wellness:** Hemp-derived oils and extracts are used in nutraceuticals and medicines for pain relief and anti-inflammatory applications without psychoactive effects.
- **Cosmetics & personal care:** Hemp seed oil is rich in essential fatty acids, making it valuable for skin-friendly creams, lotions, and hair products.

- **Bio-energy & bioplastics:** Hemp biomass can be converted into renewable fuels and biodegradable plastics, supporting a circular and low-carbon economy.

SECONDARY POLLUTANTS

Context: Recent analysis by the Centre for Research on Energy and Clean Air (CREA) shows that secondary pollutants now account for nearly one-third of Delhi's annual PM2.5 load.



About Secondary Pollutants:

What are secondary pollutants?

- Secondary pollutants are not emitted directly from a source; instead, they are formed in the atmosphere when primary pollutants (gases) undergo chemical reactions influenced by sunlight, humidity, temperature and stagnation.
- Unlike visible local emissions, they often build up downwind and over time, making control more complex.

Major secondary pollutants:

- **Secondary particulate matter (PM2.5):** Ammonium sulfate, ammonium nitrate.
- **Ozone (O_3):** Formed from nitrogen oxides (NOx) and volatile organic compounds (VOCs) under sunlight.
- **Acids:** Sulfuric acid and nitric acid (contributors to acid rain).
- **Photochemical smog components:** Peroxyacetyl nitrates (PANs), nitrogen dioxide (NO_2).

How are secondary pollutants formed?

- **Emission of precursor gases:** SO_2 (coal-fired power plants, refineries), NOx (vehicles, power plants), ammonia (fertiliser use, livestock, sewage).
- **Atmospheric transformation:**
  1. SO_2 oxidises to sulfate → reacts with ammonia → ammonium sulfate.
  2. NOx oxidises to nitric acid → combines with ammonia → ammonium nitrate.
- **Favourable weather conditions:** High humidity, fog, low temperatures and low wind speeds accelerate these reactions, especially in winter, allowing particles to form within hours and remain airborne for days.

Implications:

- **Regional and transboundary impact:** Secondary aerosols can travel **hundreds of kilometres**, meaning Delhi's air quality is affected by emissions from coal-dominated states beyond NCR.
- **Severe winter smog:** Moist, stagnant winter conditions sharply increase secondary PM2.5, explaining sudden pollution spikes even when local sources are restricted.
- **Policy blind spots:** Focus on visible PM10 or local sources alone is insufficient; control of precursor gases (SO_2, NOx, NH_3) is crucial.
- **Health risks:** Fine secondary particles penetrate deep into lungs, increasing risks of respiratory and cardiovascular diseases.

POLLUTION CONTROL VESSEL 'SAMUDRA PRATAP'

Context: The Indian Coast Guard (ICG) has inducted its first indigenously designed and built Pollution Control Vessel (PCV), Samudra Pratap, marking a major milestone in maritime environmental protection.

About Pollution Control Vessel 'Samudra Pratap':

What it is?

- Samudra Pratap is a specialised Pollution Control

Vessel (PCV) commissioned into the Indian Coast Guard for marine environmental protection, oil-spill response, and firefighting operations.

- It is the largest vessel in the ICG fleet and the first PCV to be indigenously designed and constructed in India.

Built by: Goa Shipyard Limited (GSL) under the two-ship Pollution Control Vessel project for the Indian Coast Guard.

Key features:

- **Size & capacity:** 114.5 m length, 16.5 m breadth, displacement of **4,170 tonnes**, enabling long endurance and high-seas operations.
- **Advanced navigation & control:** First ICG ship with **Dynamic Positioning (DP-1)** capability for precise station-keeping during pollution response.
- **Pollution response systems:** Equipped with oil fingerprinting machine, oil spill detection systems, viscous oil recovery equipment, and onboard pollution control laboratory.
- Firefighting capability: Holds **FiFi-2/FFV-2 notation** with a high-capacity **external firefighting system** for ship and offshore fire emergencies.
- **Combat & support systems:** Armed with **30 mm CRN-91 gun** and **two 12.7 mm remote-controlled guns**, integrated with modern fire-control systems.
- **Indigenous systems:** Features Integrated Bridge System, Integrated Platform Management System, and Automated Power Management System.

Significance:

- Enhances India's capability to respond to oil spills, chemical pollution, and maritime accidents within the EEZ and beyond.
- Demonstrates India's ability to design and build complex, mission-specific vessels domestically.
- Strengthens preparedness for maritime ecological disasters and offshore industrial accidents.

NATIONAL ENERGY CONSERVATION AWARDS

Context: The President of India felicitated the winners of the National Energy Conservation Awards (NECA) 2025 on National Energy Conservation Day at Vigyan Bhawan, New Delhi.

About National Energy Conservation Awards:

What it is?

- The National Energy Conservation Awards (NECA) are annual national-level awards that recognise industries, institutions, establishments, and innovators for outstanding achievements in energy efficiency and reduction of energy consumption while maintaining or improving productivity.

Launched in:

- Instituted in **1991** (under the Energy Conservation framework)
- Presented annually on **14 December**, observed as **National Energy Conservation Day**

Nodal Ministry: Ministry of Power

Implementing Agency: Bureau of Energy Efficiency (BEE)

- BEE was established under the **Energy Conservation Act, 2001**

Aim:

- Promote energy conservation and efficiency across sectors of the economy.
- Encourage adoption of energy-efficient technologies and practices.

Key Features of NECA 2025:

- **Wide sectoral coverage:** Industry, Buildings, Transport, Institutions, Appliances, Innovation, and Professionals
- **High participation:** 558 applications received across categories
- **New category introduced:** Social Media

Influencers & Digital Content Creators to promote behavioural change through digital outreach

- **Transparent selection process:**
  - Technical Committee (headed by Member–Thermal, CEA)
  - Award Committee chaired by **Secretary (Power)**

Significance of NECA:

- **Energy security:** Promotes "energy saved = energy produced" approach without resource depletion.
- **Climate action:** Supports India's decoupling of GDP growth from GHG emissions.
- **Policy alignment:** Complements schemes like PAT, Standards & Labelling, RCO, and ADEETIE.

ITALY BECOMES FIRST COUNTRY TO WIN UNESCO RECOGNITION FOR ITS NATIONAL CUISINE

Context: UNESCO has inscribed "Italian cooking" on its Intangible Cultural Heritage List, making Italy the first country in the world to receive recognition for its national cuisine as a whole.

About Italy Becomes First Country to Win UNESCO Recognition for Its National Cuisine:

- **What it is?**
  - A historic UNESCO recognition that declares **Italian cooking**—not a single dish, but the entire national culinary tradition—as an element of humanity's **intangible cultural heritage**.
- **Awarded by:**
  - UNESCO's Intergovernmental Committee for the Safeguarding of Intangible Cultural Heritage, during the 20th session held in Delhi.
  - Recognition titled: "Italian cooking: Between sustainability and biocultural diversity."
- **Key Characteristics:**
  - Described as a **cultural and social blend of culinary traditions**, rooted in artisanal techniques and high respect for ingredients.
  - Emphasises **conviviality**, shared meals, intimacy with food, and intergenerational transmission of skills.
  - Strong **anti-waste philosophy**, use of seasonal/local produce, and community cooking practices.
  - Passed informally within families—especially **grandparents to grandchildren**—and formally through schools, universities and culinary institutes.
- **Significance:**
  - Makes Italy the first nation globally to receive UNESCO recognition for an entire cuisine.
  - Reinforces Italy's cultural identity and its political use of cuisine as a symbol of national pride.
  - Supports preservation of biocultural diversity, sustainable food practices and artisanal traditions.

UNEP CHAMPIONS OF THE EARTH AWARD - 2025

Context: Supriya Sahu, Additional Chief Secretary of Tamil Nadu, has won the UNEP Champions of the Earth 2025 Award for her leadership in climate mitigation, adaptation, and heat resilience.

About UNEP Champions of the Earth Award – 2025:

- **What It Is?**
  - The **Champions of the Earth** award is the **UN's highest environmental honour**, conferred annually by UNEP to individuals and organisations exhibiting exceptional environmental leadership.
- **Established in:**
  - Created in **2005**, the award has honoured **127 laureates** so far, including heads of state, scientists, activists, youth groups, and grassroots innovators.
- **Key Features:**
  - **Four Award Categories:** Policy Leadership, Inspiration & Action, Entrepreneurial Vision, Science & Innovation.
  - Focuses on **climate justice, resilient buildings, methane reduction, sustainable cooling, and forest protection** (2025 theme).
  - Recognises **innovative, community-led and scalable** environmental solutions.
  - Aims to motivate global ambitions aligned with the Paris Agreement and SDGs.
- **2025 Winners & Their Contributions:**
  - **Pacific Islands Students Fighting Climate Change – Policy Leadership**
    - Youth-led NGO that secured a historic ICJ advisory opinion affirming states' legal duties to prevent climate harm and protect human rights.
  - **Supriya Sahu (India) – Inspiration & Action**
    - Led Tamil Nadu's pioneering work in **heat adaptation**, **nature-based solutions**, **ecosystem restoration**, and **sustainable cooling**.
    - Her initiatives created **2.5 million green jobs**, expanded forest cover, and benefited **12 million people**, making Tamil Nadu a global climate leader.
  - **Mariam Issoufou (Niger/France) – Entrepreneurial Vision**
    - Architect transforming Sahelian architecture with passive cooling designs that reduce indoor temperatures by up to 10°C without AC.
  - **Imazon (Brazil) – Science & Innovation**
    - Research institute using AI-driven geospatial tools to expose illegal deforestation and strengthen Amazon governance.
  - **Manfredi Caltagirone (Posthumous) – Lifetime Achievement**
    - Former head of UNEP's International Methane Emissions Observatory; championed global methane transparency.

NATIONAL TECHNOLOGY READINESS ASSESSMENT FRAMEWORK (NTRAF)

Context: The Principal Scientific Adviser to the Government of India has unveiled the National Technology Readiness Assessment Framework (NTRAF) to create a uniform, evidence-based system for assessing technology maturity across India's R&D ecosystem.

About National Technology Readiness Assessment Framework (NTRAF):

What it is?

- The National Technology Readiness Assessment Framework (NTRAF) is a standardised, objective framework to assess the maturity of technologies from early laboratory research to full commercial deployment using 9 Technology Readiness Levels (TRLs).

Ministry / Department:

- Office of the Principal Scientific Adviser (OPSA) to the Government of India
- Developed in collaboration with the Confederation of Indian Industry (CII)

Aim:

- Establish a common language between researchers, investors and policymakers
- Enable evidence-based funding decisions under national R&D and mission-mode programmes
- Reduce the "Valley of Death" between TRL 4

and TRL 7 by de-risking promising deep-tech innovations

Key features:

- **TRL-based assessment:** Covers the full innovation cycle from Proof of Concept (TRL 1–3) to Prototype Development (TRL 4–6) and Operational Deployment (TRL 7–9).
- **Objectivity over subjectivity:** Uses structured, measurable checklists instead of narrative claims of readiness.
- **Global best practices, Indian context:** Adapted from international models (e.g., NASA TRLs) and customised for India's research and industrial ecosystem.
- **Sector-specific annexures:** Tailored assessment pathways for domains such as **Healthcare & Pharmaceuticals** and **Software**, recognising sectoral differences.
- **Self-assessment tool:** Enables researchers and startups to identify technical gaps before applying for funding.

Significance:

- Improves efficiency of public R&D spending by aligning funding with actual technology maturity.
- Boosts private sector confidence by providing validated, investment-ready readiness benchmarks.

VILLAGE DEFENCE GUARDS (VDGS)

Context: The Indian Army's Sabre Brigade conducted an intensive training programme for Village Defence Guards (VDGs) in Jammu to enhance their operational readiness and coordination with security forces.

About Village Defence Guards (VDGs):

What it is?

- Village Defence Guards (VDGs) are armed civilian defence groups constituted in vulnerable areas of Jammu & Kashmir to assist security forces in counter-terrorism, village protection, and intelligence gathering.

Launched in:

- **March 2022**, approved by the **Union Ministry of Home Affairs (MHA).**
- Replaced and restructured the earlier **Village Defence Committees (VDCs)** (1995).

Aim:

- To provide localised, immediate defence against militant threats.
- To act as a force multiplier for police and armed forces in remote and border villages.
- To enhance community participation in internal security.

Key features:

- **Composition:** Mainly ex-servicemen and trained civilians, identified at the panchayat level; group strength up to 15 members.
- **Training & weapons:** Trained by CRPF/Army; equipped with Self-Loading Rifles (SLRs) instead of older .303 rifles.
- **Operational control:** Function under the District SSP/SP, ensuring integration with the formal security grid.
- **Remuneration:** Group heads receive ₹4,500/ month; members receive ₹4,000/month, unlike earlier VDCs where only SPOs were paid.
- **Roles:** Conduct day-night patrols, protect villages, religious places, and public infrastructure, and assist in search and cordon operations.

Significance:

- Acts as a second line of defence in areas with delayed security-force access.
- Residents' familiarity with terrain improves early warning and intelligence inputs.

GHOST PAIRING

Context: The **Ministry of Electronics and Information Technology (MeitY)** has issued an advisory warning users about **WhatsApp "ghost pairing",** a new cyber fraud technique.

About Ghost Pairing:

What it is?

- Ghost pairing is a social-engineering–based cyberattack in which fraudsters secretly link (pair) a victim's WhatsApp account to the attacker's device, gaining real-time access to chats, media, and contacts without hacking the phone itself.

Aim:

- Gain unauthorised access to WhatsApp conversations
- Steal sensitive information (photos, OTP hints, documents)
- Extort money, commit identity fraud, or empty bank accounts through follow-up scams

How it works?

- **Impersonation:** Attacker messages the victim using a familiar name, or poses as a bank, tax, or government official.
- **Bait message:** Victim receives a message like "Hi, check this photo" or "Your account will be blocked" with a **malicious link**.
- **Urgency and panic:** Social pressure is applied using threats such as bank account freeze or number deactivation.
- **Verification trap:** Victim is tricked into approving a WhatsApp device-linking request or entering a pairing/verification code.
- **Silent takeover:** Attacker's device gets linked as a companion device, giving them **full WhatsApp access** without alerting the victim.

Key features:

- No SIM swap required.
- No password cracking involved.
- Exploits human trust, urgency, and fear.
- Works across WhatsApp, Telegram, and similar messaging apps.
- Enables real-time spying and data extraction.

Limitations of the attack:

- **Requires user action:** The scam succeeds only if the victim clicks a link or approves pairing.
- **Traceable transactions:** Financial fraud leaves digital trails; quick reporting can freeze accounts.
- **Linked-device visibility:** Users can detect and remove unknown devices from WhatsApp → Linked Devices.

OPIUM POPPY CULTIVATION

Context: A new UNODC report shows that Myanmar's opium poppy cultivation has surged 17%, reaching the highest level in a decade at 53,100 hectares, driven by conflict, economic distress, and rising opium prices.

About Opium Poppy Cultivation:

What it is?

- Opium poppy (*Papaver somniferum*) is a flowering plant cultivated for the latex-rich capsules that produce opium and its derivatives.
- It is the world's primary natural source for morphine, codeine, thebaine, and other alkaloids used in medical and illicit drug markets.

History:

- In India, opium production became a **government-controlled monopoly** under the East India Company and later the British, with major factories at **Ghazipur and Patna**.
- After Independence, cultivation and

manufacturing came under the Central Government (1950).

- India regulates all activities through the **NDPS Act, 1985**, and is the only country producing licit opium gum for pharmaceuticals.

Characteristics:

- **Climate Needs:** Opium poppy thrives in cool, dry regions with low humidity and well-drained soils, conditions that help the plant develop resin-rich capsules for alkaloid extraction.
- **Latex Production:** When the green capsule is lanced, a milky latex emerges that naturally contains morphine, codeine and other alkaloids used in medicinal and illicit drug manufacturing.
- **Harvest Process:** Farmers manually score the pods, collect the dried latex the next day and submit it to authorised government centres for weighing, grading and processing.
- **Crop Cycle:** The poppy is an annual winter crop that matures in about 120 days, enabling systematic monitoring and controlled harvesting by regulatory authorities.

Uses of Opium:

- **Medical Uses:**
  - **Morphine:** analgesic for severe pain.
  - **Codeine:** cough suppressant and mild analgesic.
  - **Thebaine derivatives:** used to manufacture synthetic opioids.
    - Also used in **Ayurveda, Unani, and Homoeopathy**.
- **Non-medical Uses:** Raw opium is processed into **heroin** and other narcotics, driving illegal trafficking.
- **Other Uses:** Poppy seeds for food and edible oil.

Issues and Concerns:

- **Illicit cultivation** fuels organised crime, insurgency, and cross-border smuggling.
- Myanmar's spike in production threatens regional security, including India's Northeast, due to proximity to Sagaing and Chin.
- India strictly licenses cultivation only in MP, Rajasthan and UP with **annual yield criteria** and tight monitoring.

PFRDA (EXITS AND WITHDRAWALS UNDER THE NATIONAL PENSION SYSTEM) (AMENDMENT) REGULATIONS, 2025

Context: The Pension Fund Regulatory and Development Authority has notified the NPS Exit & Withdrawal (Amendment) Regulations, 2025, increasing lump sum withdrawal to 80% for non-government subscribers and allowing exit deferment up to 85 years, significantly enhancing flexibility and liquidity in NPS.

About PFRDA (Exits and Withdrawals under the National Pension System) (Amendment) Regulations, 2025:

What it is?

- A set of amended regulations governing withdrawal, exit, deferment, annuity requirements, loans, and death-related settlements under the National Pension System (NPS).

Key features:

- **Higher lump sum withdrawal:**
  - **Non-government subscribers:** Up to **80% lump sum**, mandatory annuity reduced to **20%** (earlier 40%).
  - **Government subscribers:** Existing **60:40** (lump sum : annuity) continues.
- **Enhanced exit deferment:**
  - Subscribers can defer lump sum withdrawal or annuity purchase **up to age 85** (earlier 75).
- **Corpus-based flexibility (non-govt):**
  - Accumulated Pension Wealth ≤ ₹8 lakh: **100% lump sum allowed**.
  - ₹8–12 lakh: Options of ₹6 lakh lump sum or **80:20** split.
  - ₹12 lakh: **Up to 80% lump sum**, 20%

annuity mandatory.

- **Voluntary exit norms:**
  - Accumulated Pension Wealth ≤ ₹5 lakh: **100% lump sum** permitted; otherwise **20:80** applies.
- **Death cases:**
  - **100% lump sum or 100% annuity** allowed for non-govt subscribers irrespective of corpus.
- **Loans against NPS:**
  - Permits loans from regulated institutions **up to 25% of own contributions**.
- **Partial withdrawals clarified:**
  - House construction allowed as **one-time withdrawal**.
  - Medical withdrawals broadened to **any medical treatment/hospitalisation** of self/family.
- **No fixed 5-year lock-in:**
  - Exits governed by eligibility and annuity rules, improving liquidity.
- **Missing subscriber provision:**
  - **20% interim relief** to nominees; balance settled after legal presumption of death (as per Bharatiya Sakshya Adhiniyam, 2023).

About National Pension System (NPS):

- **What it is?**
  - A market-linked, defined contribution pension scheme aimed at providing retirement income through systematic savings.
- **Launched in:** 2004 (initially for government employees; later expanded)
- **Regulatory authority:**
  - Regulated and administered by Pension Fund Regulatory and Development Authority under the PFRDA Act, 2013.
- **Key features:**
  - **Voluntary, portable, flexible** retirement savings scheme.
  - **Eligible subscribers:**
    - Central & State Government employees (as opted), corporate employees, and **all citizens (18–70 years)** including NRIs.
  - **Account structure:**
    - **Tier I:** Mandatory retirement account (restricted withdrawals).
    - **Tier II:** Voluntary savings account (free withdrawals; requires active Tier I).
  - **Tax efficiency:**
    - Contributions eligible for tax benefits; **Seva Nidhi / withdrawals subject to prevailing tax rules**.

INDIAN STATISTICAL INSTITUTE (ISI)

Context: The draft Indian Statistical Institute (ISI) Bill, 2025 has triggered strong protests by students, faculty, and staff at ISI Kolkata over proposed changes to the institute's governance structure and autonomy.

About Indian Statistical Institute (ISI):

What it is?

- A premier national institution for research, education, and applied work in statistics, mathematics, computer science, quantitative economics, and related fields; recognised as an Institution of National Importance.

Established in: Founded in **1931** by eminent statistician **Prasanta Chandra Mahalanobis**; declared an Institution of National Importance through an Act of Parliament in **1959**.

Headquarters: Kolkata, with centres in **Delhi, Bengaluru, Chennai, and Tezpur**.

Aim:

- To advance statistical research, provide academic training, support national planning through data-driven approaches, and apply statistical science across sectors such as agriculture, economics, demography, and public policy.

Current System Governance:

- Registered as a **society** under the Societies Registration Act.
- Highest body: **33-member Council** with elected members, government representatives, UGC nominee, and senior academic leaders.
- Director appointed by the Council and ISI has substantial **autonomy in academics, appointments, and administration**.
- Publishes the renowned journal **Sankhyā** and offers degree programs in statistics and related sciences.

Features of Indian Statistical Institute Bill, 2025:

- **Converts ISI into a Statutory Body Corporate:** Replaces the 1959 Act and transforms ISI from a registered society into a **statutory body**, similar to IITs/IIMs.
- **Governance Shift to a New Board of Governance (BoG)**
    - President of India becomes the **Visitor**.
    - BoG chaired by a Visitor-nominated chairperson based on Centre's recommendation.
    - Majority representation from the Union government and its nominees.
    - Powers to make regulations, grant degrees, oversee administration, and control appointments.
- **New Academic Council Structure:**
    - Led by the Director, comprising division and centre heads.
    - Acts as an advisory body making academic recommendations to the BoG.
- **Director Appointment Under Central Oversight:**
    - Search-cum-selection committee constituted by the Union government.
    - Director appointed by the BoG chairperson.
    - Visitor empowered to remove Director and order inquiries and reviews.
- **Replaces the ISI Act, 1959:** The new Bill supersedes the earlier Act that conferred ISI's national importance status.

MAPPING

KAIMUR WILDLIFE SANCTUARY

Context: The Bihar government has approved a revised proposal to notify Kaimur Wildlife Sanctuary as a Tiger Reserve, which will now be sent to the National Tiger Conservation Authority (NTCA) for final clearance.

About Kaimur Wildlife Sanctuary:

What it is?

- Kaimur Wildlife Sanctuary is the **largest wildlife sanctuary in Bihar**, known for its rich biodiversity, forested plateaus and historical–archaeological heritage.

Located in: Kaimur and Rohtas districts of Bihar

- Situated in the Kaimur Range, covering parts of the **Kaimur Plateau and Rohtas Plateau.**

History:

- Established in 1979 as a wildlife sanctuary.
- Historically significant region with prehistoric cave paintings, megaliths, fossil sites, and forts such as Rohtasgarh Fort and Shergarh Fort.
- Long recognised for its ecological potential, with recent evidence of tiger movement prompting the tiger reserve proposal.

Key geological and physical features:

- **Plateaued landscape** of the Kaimur hills with steep escarpments and forested valleys
- **Numerous waterfalls:** Karkat, Telhar, Dhua Kund, Tutla Bhawani, Manjhar Kund, Kashish
- **Lakes and water bodies:** Anupam Lake, Karamchat Dam, Kohira Dam.
- **Forest types:** Tropical Dry Mixed Deciduous forests, Dry Sal forests, Boswellia forests, Dry Bamboo brakes

Significance:

- **Biodiversity hotspot**: Home to Bengal tiger, leopard, sloth bear, pangolin, sambar, chital, four-horned antelope, nilgai and over 70 resident bird species, with migratory birds from Central Asia in winter
- **Tiger conservation potential**: Large, contiguous forest landscape suitable for a viable tiger population and ecological corridors in eastern India
- **Ecological balance**: Helps maintain forest–river–plateau ecosystems of southwestern Bihar

KOLLERU LAKE

Context: Kolleru Lake has gained renewed attention as its traditional black dried fish has emerged as a high-value product in domestic and international markets, supporting hundreds of local families.

About Kolleru Lake:

What it is?

- Kolleru Lake is one of the largest freshwater lakes in India, renowned for its rich biodiversity, fisheries, and role as a critical wetland ecosystem.

Located in: Andhra Pradesh

- **Districts:** Krishna and West Godavari

Rivers associated:

- Situated in the **inter-deltaic plain of the Krishna and Godavari rivers**
- Fed by seasonal streams, irrigation canals, and drainage systems connected to both rivers
- Acts as a **natural flood-balancing reservoir** for Krishna and Godavari

Key geological and physical features:

- **Inter-deltaic freshwater basin:** Lies between two major river deltas, enabling seasonal water storage and groundwater recharge.
- **Shallow wetland system:** Characterised by

low depth and wide spread, making it ideal for fisheries and bird habitats.

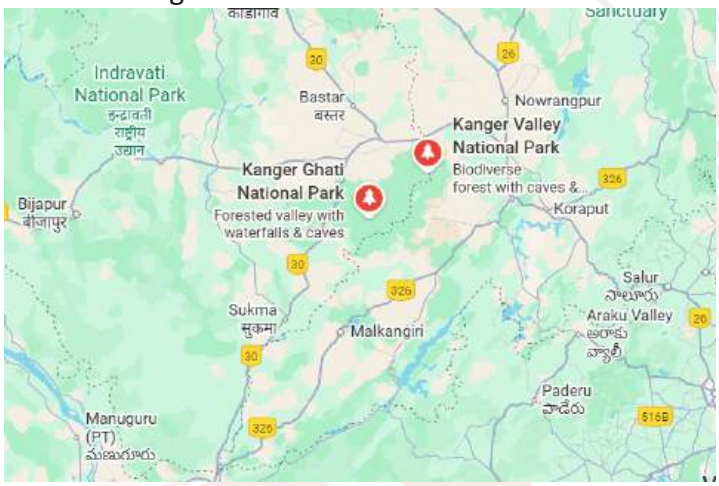
- **Flood moderation role:** Absorbs excess monsoon flows, reducing downstream flood intensity in coastal Andhra Pradesh.
- **Nutrient-rich sediments:** Supports high fish productivity and aquatic vegetation due to fertile alluvial deposits.

Significance:

- **Ecological importance:** Declared a Wildlife Sanctuary (1999) and a Ramsar Wetland (2002), hosting nearly 20 million resident and migratory birds including pelicans, storks and ibises.
- **Biodiversity hotspot:** Home to around 90 varieties of fish and diverse aquatic flora and fauna.

KANGER VALLEY NATIONAL PARK

Context: Kanger Valley National Park has come into focus as the Chhattisgarh government, with support from the Wildlife Institute of India (WII), has initiated biodiversity surveys to seek its recognition as a UNESCO World Heritage Site.



About Kanger Valley National Park:

What it is?

- Kanger Valley National Park is a biodiversity-rich protected area known for its dense forests, limestone caves, waterfalls, and diverse ecosystems, making it one of the most ecologically significant national parks in Central India.

Located in:

- **Bastar district, Chhattisgarh**
- About **24 km southeast of Jagdalpur** on the Jagdalpur–Darbha Road
- Lies within the **Deccan biogeographical zone**
- Named after the **Kanger River**, which flows through the park

Key characteristics:

- **Area:** ~200 sq km
- **Terrain:** Highly heterogeneous, ranging from flat plains to steep slopes, plateaus, valleys, and stream courses
- **Hydrology:** Network of seasonal and perennial streams joining the Kanger River
- **Geomorphology:** Famous for **subterranean limestone caves** such as Kotumsar and Kailash caves, among the most biologically diverse cave systems in India and South Asia
- **Flora & fauna:** Dense sal and mixed forests; habitat of the **Bastar Hill Myna** (state bird of Chhattisgarh), along with rich mammalian, avian, reptilian, and insect diversity
- **Scenic features:** Tirathgarh waterfalls, valleys, and undulating forest landscapes

Current status:

- Declared a **National Park in 1982** (then Madhya Pradesh Gazette).
- Managed under **Jagdalpur Wildlife Circle**, comprising Kotumsar and Koleng ranges.
- Included in UNESCO's Tentative List of World Heritage Sites.

SOMALILAND

Context: Israel has become the first country to formally recognise Somaliland as an independent sovereign state, triggering sharp opposition from Somalia, the African Union, and key regional powers.

About Somaliland:

What it is?

- Somaliland is a self-declared independent state in the Horn of Africa that separated unilaterally from Somalia in 1991 after the collapse of the Somali central government.
- Though it has its own government, currency, security forces, and institutions, it lacked international recognition until Israel's announcement in 2025.

Located in:

- **Horn of Africa**, along the Gulf of Aden
- Corresponds largely to the territory of **former British Somaliland**

Bordering nations: Djibouti, Ethiopia, Somalia (including Puntland), and Gulf of Aden.

Historical origin:

- **1888:** Became a **British protectorate** (British Somaliland)
- **1960:** Gained independence and voluntarily merged with **Italian Somaliland** to form the Somali Republic
- **1991:** Following civil war and the overthrow of **Siad Barre**, Somaliland declared independence, citing the failure of the 1960 union
- **2001:** Referendum endorsed independence with **over 97% support**

Present status:

- Functions as a **de facto state** with relative peace and stability compared to Somalia.
- **Not recognised** by the UN, AU, or most countries; Somalia considers it an **integral part of its territory.**
- Maintains **working political institutions**, holds elections, issues its own currency (Somaliland shilling), and controls internal security.
- Israel's recognition (2025) marks the **first formal bilateral recognition**, potentially encouraging others but also risking regional instability.

MOUNT KILIMANJARO

Context: A helicopter crash near Barafu Camp on Mount Kilimanjaro killed five people, including a pilot, doctor, guide, and two foreign tourists, reportedly during a medical rescue mission.

About Mount Kilimanjaro:

What it is?

- Mount Kilimanjaro is Africa's highest mountain and the world's tallest free-standing volcanic massif, rising to 5,895 metres above sea level. It is a major tourism, ecological, and geographical landmark.

Located in:

- **Northeastern Tanzania**, close to the **Kenya border**
- About 160 km east of the East African Rift System and 225 km south of Nairobi
- Administered under Mount Kilimanjaro National Park, a UNESCO World Heritage Site (1987)

Origin:

- Kilimanjaro is of volcanic origin, formed through **tectonic activity associated with the East African Rift**
- It developed through successive volcanic eruptions over **millions of years**, followed by erosion and glaciation

Key geological features:

- **Three extinct volcanic cones:**
  - **Kibo (5,895 m):** Highest and youngest cone; retains a **caldera and residual volcanic activity**
  - **Mawenzi (5,149 m):** Older, highly eroded, jagged peak
  - **Shira (3,962 m):** Remnant of an ancient collapsed crater
- **Permanent ice cap (shrinking):** Only Kibo retains a permanent ice cap, which is rapidly retreating due to climate change.
- **Distinct ecological zones:** From base to summit—savannah scrub, cultivated slopes, montane forest, moorland, alpine desert, and summit ice fields.
- **Isolated volcanic massif:** Unlike folded mountain

ranges, Kilimanjaro rises independently from surrounding plains, making it a classic example of a stratovolcanic mountain.

TAIWAN

Context: A magnitude 6.1 earthquake struck Taiwan shaking buildings in Taipei and other cities, though no major damage was reported.

About Taiwan:

What it is?

- Taiwan is an island in the western Pacific Ocean, officially governed as the Republic of China (ROC), with its own elected government, economy, and armed forces.
- It functions as a self-administered polity, though its sovereignty status remains contested internationally.

Location:

- Situated about **160 km off the southeastern coast of China**, separated by the **Taiwan (Formosa) Strait**.
- Lies between the **East China Sea (north)** and the **South China Sea (south)**, facing the **Pacific Ocean** to the east.

Capital: Taipei.

Neighbouring countries:

- **China** to the west (across the Taiwan Strait).
- **Japan** (Ryukyu Islands) to the northeast.
- **Philippines** to the south, across the Bashi Channel.
- Surrounded by strategically contested waters in the East and South China Seas.

Brief history:

- Prior to the 17th century, Taiwan had indigenous self-governing communities with no central authority.
- Colonised by the **Dutch (17th century)**, later ruled by **Qing China** for nearly two centuries.
- Became a **Japanese colony (1895–1945)** after the First Sino-Japanese War.
- In **1949**, after the Chinese Civil War, the **Nationalist government (Kuomintang)** retreated to Taiwan following defeat by the Communists on the mainland.
- Since then, Taiwan has remained politically separate from the **People's Republic of China**, which claims it under the **One-China policy**.

Geological features:

- Lies at the **convergence of the Philippine Sea Plate and Eurasian Plate**, making it one of the world's most **earthquake-prone regions**.
- Part of the Pacific Ring of Fire, the most seismically active zone globally.
- Dominated by the Central Mountain Range, with over two-thirds of the island being mountainous.
- Home to **Yu (Jade) Mountain**, the highest peak in East Asia (3,997 m).

SUBANSIRI LOWER HYDROELECTRIC PROJECT (SLHEP)

Context: India's largest hydropower project, the 2,000 MW Subansiri Lower Hydroelectric Project, has become operational after nearly 20 years, with the commissioning of its first 250 MW unit.

About Subansiri Lower Hydroelectric Project (SLHEP):

What it is?

- The Subansiri Lower Hydroelectric Project is a run-of-the-river hydropower project with an installed capacity of 2,000 MW, making it India's largest hydropower project once fully commissioned.

Located in: Gerukamukh, on the Assam–Arunachal

Pradesh border

- Implemented by NHPC Limited (National Hydroelectric Power Corporation)

River flow through: Built on the Subansiri River, the largest tributary of the Brahmaputra River

Project History:

- **Approved:** 2003
- **Challenges (2011–2019):** Progress was delayed by environmental impact studies, seismic safety reviews, and public protests in downstream Assam.
- **Operational Launch:** The first 250 MW unit began operation in December 2025.
- **Completion Schedule:** The remaining seven units (250 MW each) are scheduled for commissioning between 2026 and 2027.

Key Specifications:

- **Type:** Concrete Gravity Dam
- **Height:** 116 m (from riverbed) / 210 m (from deepest foundation)
- **Length:** 284 m
- **Engineering Highlights:** The dam features several landmark achievements for India's hydroelectric sector, including:
  - The country's heaviest hydro generator rotors.
  - Its largest stators and inlet valves.
  - The first use of the Rotec Tower Belt system for dam concreting.
- **Strategic Benefits:** Beyond power generation, the project will provide:
  - **Flood Control:** Moderation of downstream flooding in Assam.
  - **Grid Stability:** Enhanced resilience and reliability of the national power grid.
  - **Clean Energy Goals:** Direct support for national Net Zero and renewable energy targets.

YELLOWSTONE NATIONAL PARK

Context: The US Geological Survey (USGS) shared footage showing mud erupting from the Black Diamond Pool in Yellowstone National Park, highlighting renewed hydrothermal activity.

About Yellowstone National Park:

What it is?

- Yellowstone National Park is the world's first national park, globally renowned for its geothermal activity, volcanic landscape, wildlife, and intact ecosystems. It hosts about half of the world's known hydrothermal features, including geysers, hot springs, and mud pools.

Located in: Northwestern United States.

- Covers about 8,992 sq km (3,472 sq miles).

History:

- Established on March 1, 1872 by the U.S. Congress
- Recognised as the first national park in the world
- Designated a UNESCO Biosphere Reserve (1976) and World Heritage Site (1978).

Key features:

- **Geothermal dominance:** Home to over 10,000 hydrothermal features and more than 300 geysers, including Old Faithful and Steamboat Geyser (world's tallest).
- **Volcanic hotspot:** Lies above a mantle hotspot, with magma chambers driving geysers, hot springs, fumaroles, and mud pots.
- **Seismic activity:** Experiences hundreds of minor earthquakes annually, reflecting active tectonics beneath the park.
- **Distinct physical landscape:** Features volcanic plateaus, mountain ranges (Absaroka, Gallatin, Teton), deep canyons, obsidian cliffs, and lava flows.
- **Hydrology:** Contains **Yellowstone Lake**, the largest high-altitude lake in North America, and the **Grand Canyon of the Yellowstone River**.
- **Rich biodiversity:** Supports iconic wildlife such as bison, grizzly bears, wolves, elk (wapiti) in a largely intact ecosystem.

Significance:

- **Global geothermal laboratory:** Serves as a natural site for studying volcanism, hydrothermal systems, and seismic processes.
- **Conservation milestone:** Set the global precedent for the national park conservation model.
- **Climate and ecological research:** Provides insights into ecosystem resilience, climate change, and wildlife dynamics.

BHIMA RIVER

Context: Karnataka has urged the Centre/Central Water Commission (CWC) to intervene, alleging excess and unauthorised use of Bhima river water by Maharashtra, contrary to agreed allocations.

About Bhima River:

- **What it is?**
  - The Bhima River is a major perennial river of western and southern India and a key tributary of the Krishna River.
  - It is also locally known as the Chandrabhaga River, especially near Pandharpur.
- **Origin:**
  - Originates near the **Bhimashankar hills** in the **Western Ghats (Sahyadris)**, close to the Bhimashankar Temple in Pune district, Maharashtra.
- **States it flows through:**
  - Flows southeast for about 861 km through Maharashtra, Karnataka and Telangana before joining the Krishna River.
- **Bhima as a tributary of:**
  - Krishna River, at the Karnataka–Telangana border, about 24 km north of Raichur.
  - Notably, at the confluence, Bhima is longer than the Krishna.
- **Major tributaries of Bhima:**
  - **Left bank:** Sina, Nira, Ghod, Vel
  - **Right bank:** Indrayani, Mula–Mutha, Pavana, Man, Bhogavati
  - Important tributaries also include **Kagna (Karnataka)** and **Bori** rivers.
- **Other key features:**
  - **Drainage basin:** ~70,614 sq km; about 75% lies in Maharashtra.
  - **Hydrology:** Highly monsoon-dependent—flood-prone during rains and near-stagnant in summer.
  - **Agriculture:** Supports irrigated crops like sugarcane, and rainfed crops such as **jowar, bajra and oilseeds**.
  - **Socio-cultural significance:** Hosts major religious sites including Pandharpur (Vitthal Temple) and Bhimashankar Jyotirlinga.

ARCTIC REGION

Context: A recent assessment by the **US National Oceanic and Atmospheric Administration (NOAA)** reported that the Arctic **experienced its warmest and wettest year on record** temperatures rising more than **twice the global average.**

About Arctic Region:

What it is?

- The **Arctic** is Earth's **northernmost polar region**, characterised by extreme cold, vast ice cover, permafrost, and unique marine and terrestrial ecosystems. It plays a critical role in **regulating** global climate through its high albedo (ice reflectivity).

Located in:

- Lies **north of the Arctic Circle (≈66.5° North**

latitude)

- Centred around the **Arctic Ocean Basin**

Bordering states:

The Arctic region spans parts of **eight countries**:

- Russia, Canada, United States (Alaska), Denmark (Greenland), Norway, Sweden, Finland, Iceland

Major rivers draining into the Arctic Ocean:

Large rivers bring freshwater and sediments into the Arctic, influencing salinity and sea ice:

- **Ob, Yenisei, Lena** (Russia)
- **Mackenzie** (Canada)
- **Yukon** (USA–Canada)

Geological features:

- **Arctic Ocean Basin:** Shallowest and coldest of the world's ocean basins
- **Continental shelves:** Extensive shelves rich in hydrocarbons and minerals
- Lomonosov Ridge**:** Submarine mountain chain claimed by multiple Arctic states
- **Permafrost:** Permanently frozen ground storing vast amounts of carbon and methane

Unique facts:

- Holds about 20% of Earth's freshwater in the form of glaciers and ice caps.
- Sea ice reflects ~80% of solar radiation, acting as Earth's "refrigerator".
- Experiences polar night and midnight sun due to Earth's axial tilt.
- Warming has led to phenomena like "rusting rivers" from metal release due to permafrost thaw.

ANDHRA'S RARE EARTH CORRIDOR

Context: Andhra Pradesh has emerged as a strategic focus due to its **rich rare earth element (REE) reserves** along its coastline, crucial for clean energy, defence and semiconductor sectors.

About Andhra's Rare Earth Corridor:

What it is?

- A continuous belt of rare earth–rich beach sand deposits containing monazite and other heavy minerals.
- Considered one of India's most valuable underutilised critical mineral zones.

Located in:

- Along Andhra Pradesh's **974 km coastline**, from **Srikakulam to Nellore**.
- Key sites include **Bhimunipatnam, Kalingapatnam, Kakinada, Narsapur, Machilipatnam, Chirala, Vodarevu, Ramayapatnam and Dugarajapatnam**.

Key features:

- Rich in **monazite**, containing **55–60% rare earth oxides** and **8–10% thorium**.
- Holds a **complete suite of light rare earth elements** such as neodymium, praseodymium, lanthanum and cerium.
- Andhra Pradesh is estimated to possess **30–35% of India's monazite reserves**.
- Supported by expanding infrastructure such as IREL's monazite processing plant at Gudur (Nellore) and beach sand separation units.
- Backed by policy support through PLI schemes, National Critical Mineral Mission (NCMM) and mining waste recovery initiatives.

Applications:

- **Clean energy:** Permanent magnets for electric vehicles, wind turbines and solar technologies.
- **Defence and space:** Missile guidance systems, satellites and advanced optics.
- **Electronics and semiconductors:** Chips, fibre optics and superconductors.
- **Nuclear energy:** Thorium for **next-generation nuclear reactors**.
- **Medical technologies:** Imaging systems and diagnostic equipment.

KUNAR RIVER

Context: Afghanistan's Taliban authorities have approved plans to divert water from the Kunar (Chitral) River toward the **Darunta Dam**, raising fears of reduced downstream flows into Pakistan.

About Kunar River:

What it is?

- The Kunar River, known as the Chitral River in Pakistan, is a major transboundary Himalayan River flowing through Pakistan and Afghanistan.
- It is a key component of the Indus Basin system, supporting irrigation, drinking water, and hydropower.

Origin:

- **Source:** Chiantar Glacier in the Hindu Kush Mountains
- **Location:** Northern Chitral region, Pakistan

Course and flow:

- Rises in **Chitral (Pakistan)** as the Chitral/Mastuj River
- Enters **Afghanistan at Arandu**, where it is called the **Kunar River**
- Flows through **Kunar and Nangarhar provinces**
- Merges with the **Kabul River** near **Jalalabad**
- The Kabul River then flows back into **Pakistan** and joins the **Indus River near Attock**

Countries it flows through: Pakistan → Afghanistan → Pakistan (via Kabul–Indus system)

Tributaries of the Kunar River:

- Pech River (major tributary)
- Lotkoh River

Kunar River is a tributary of: Kabul River, which is itself a tributary of the Indus River

Key features:

- **Transboundary river:** Shared by Pakistan and Afghanistan, with strategic and geopolitical importance.
- **Glacial-fed system:** Around 60–70% of its discharge originates in Pakistan, making upstream changes critical for downstream users.
- **Economic significance:** Vital for irrigation, drinking water, and hydropower in Pakistan's Khyber Pakhtunkhwa and eastern Afghanistan.
- **Security sensitivity:** The basin lies in a conflict-prone border region, linking water stress with security risks.
- **No legal framework:** Unlike the Indus Waters Treaty, no bilateral treaty governs Kunar waters, increasing the risk of water disputes.

TIGRIS RIVER

Context: Iraq's Tigris River is facing an acute crisis due to shrinking flows, heavy pollution and upstream water controls, raising fears that parts of the river may dry up.

About Tigris River:

What it is?

- The Tigris River is one of the two great rivers of ancient Mesopotamia, along with the Euphrates, forming the heart of the historic Fertile Crescent, where early civilisation emerged.

Origin of the river:

- Originates from **Lake Hazar** in the **Taurus Mountains of southeastern Türkiye**.
- Flows generally southeast, parallel to the Euphrates.

Nations it flows through: Türkiye (upper reaches), Iraq, Forms part of the Shatt al-Arab after joining the Euphrates, which flows into the Persian Gulf.

Major tributaries of the Tigris: Greater Zab, Lesser Zab, Al-Adhaim, Diyala, and Karkheh (from Iran).

Key features:

- Second-largest River in **Western Asia**.
- Supports irrigation in an otherwise **arid and semi-arid climate**.
- Used for drinking water, agriculture, transport, industry and hydropower.
- Hosts several dams for electricity generation and water storage.

Significance:

- **Cradle of civilisation:** Enabled the rise of early cities, agriculture, writing and technology in Mesopotamia.
- **Economic lifeline:** Backbone of Iraqi agriculture and food security.
- **Cultural and religious importance:** Sacred to communities like the Mandaeans, whose rituals require flowing river water.
- **Geopolitical relevance:** A transboundary river affected by upstream dams, climate change and regional water politics.

ETHIOPIA

Context: Prime Minister of India visit to Ethiopia has highlighted India's growing strategic engagement with Africa, especially the Horn of Africa region.

About Ethiopia:

- **What it is?**
  - Ethiopia is a sovereign African nation and one of the oldest continuously existing states in the world, with a long civilisational history linked to Aksumite civilisation and Pan-African movements.
- **Located in:** It is a landlocked country in the Horn of Africa, lying entirely within tropical latitudes and occupying a central position in East Africa.
- **Capital:** Addis Ababa, which also hosts the headquarters of the African Union (AU) and the UN Economic Commission for Africa (UNECA).
- **Neighbouring nations:** Eritrea, Djibouti, Somalia, Kenya, South Sudan and Sudan.
- **Geological features:**
  - **Ethiopian Highlands:** Among the most rugged in Africa, often called the "Roof of Africa," with **Mount Ras Dejen** as the highest peak.
  - **Great Rift Valley:** Part of the East African Rift System, running north–south through the country, marked by tectonic activity, volcanoes and lakes.
  - **Volcanic plateau:** Large parts of Ethiopia are covered by **basaltic lava flows** from Cenozoic volcanic activity.
  - **Major river systems:** Origin of the **Blue Nile (Abay)**, along with Tekeze and Baro rivers flowing westward; Awash and Omo rivers form internal drainage.
  - **Denakil Depression:** One of the **hottest and lowest places on Earth**, featuring active volcanoes like **Erta Ale**.

JORDAN

Context: Prime Minister of India has embarked on a three-nation tour (Jordan–Ethiopia–Oman) beginning with Jordan, marking 75 years of India–Jordan diplomatic relations.

About Jordan:

What it is?

- Jordan is a constitutional monarchy in Southwest Asia (West Asia), ruled by King Abdullah II ibn Al Hussein. Despite being a relatively young state (independent since 1946), it occupies an ancient land with deep biblical, classical, and Islamic civilisational history.

Capital: Amman is the capital and largest city.

- Historically known as Philadelphia during the Roman period and earlier associated with the Ammonites (13th century BCE).

Neighbouring Nations: Syria, Iraq, Saudi Arabia, Israel and the West Bank.

- It also has a 26 km coastline on the Gulf of Aqaba, providing maritime access via Al-ʿAqabah, its only port.

Geological Features:

Jordan has three major physiographic regions:

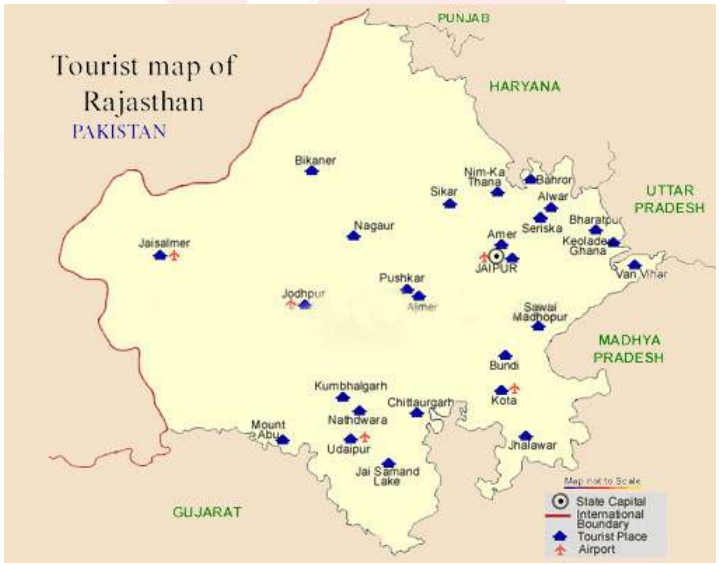
- **Eastern Desert:** Part of the Syrian–Arabian Desert, covering over four-fifths of the country, dominated by basalt, sandstone, and granite.
- **Uplands east of the Jordan River:** Elevated plateau rising to Mount Ramm (1,754 m), the country's highest point.
- **Jordan Valley:** Part of the Great Rift Valley, descending to the Dead Sea (≈430 m below sea level), the lowest natural point on Earth.
- The **Jordan River** drains into the Dead Sea, shaping regional hydrology and agriculture.

Significance:

- **Geopolitical importance:** Located at the crossroads of West Asia, bordering conflict-prone regions yet known for relative political stability.
- **Cultural heritage:** Home to globally significant sites such as Petra (Nabataean capital) and Qasr Amrah (UNESCO World Heritage Sites).
- **India–Jordan relations:** Strong civilisational, cultural, and people-to-people ties; cooperation spans trade, defence, education, culture, and diaspora engagement.

SILISERH LAKE AND KOPRA JALASHAY ADDED TO THE RAMSAR LIST

Context: Siliserh Lake in Alwar district, Rajasthan, and Kopra Jalashay near Bilaspur, Chhattisgarh, have been added to the List of Wetlands of International Importance (Ramsar List), taking India's tally of Ramsar sites to 96.



About Siliserh Lake and Kopra Jalashay Added to the Ramsar List:

About Siliserh Lake, Rajasthan:

- **What it is?**
  - A human-made / artificial lake and wetland, now recognised as a Ramsar site (Site no. 2581).
  - Important waterbody in a semi-arid zone, vital as a water source and biodiversity-rich habitat.
- **Located in:**
  - **Alwar district, Rajasthan**, about **8 miles southwest of Alwar city**.
  - Lies within the buffer zone of the Sariska Tiger Reserve, enhancing its eco-tourism and conservation value.
- **History:**
  - Built in 1845 by Maharaja Vinay Singh, ruler of Alwar, by constructing an embankment on a tributary of the Ruparel River.
  - Created primarily to supply drinking water to Alwar, as evidenced by old aqueducts still visible around the lake.
- **Key Features:**
  - Area of about 7 km², flanked by dense woodland and cenotaphs on its embankment.
  - Supports **149 bird species** and **17 mammal species**, including:
    i. **Vulnerable** river tern (*Sterna aurantia*),
    ii. **Endangered** tiger (*Panthera tigris*),
    iii. **1% of the biogeographic population** of **black stork** (*Ciconia nigra*).
  - Popular for **birdwatching**, with sightings of cranes, colourful kingfishers and many more species.
  - Provides drinking water, recreation and tourism, but faces threats from intensive agriculture and expanding human settlements; a restoration plan is underway.

About Kopra Jalashay, Chhattisgarh:

- **What it is?**
  - A reservoir-type wetland now designated as a Ramsar site (Site no. 2583).
  - Originally constructed mainly for irrigation, now recognised for its hydrological and ecological importance.

- **Located in:**
  - In Chhattisgarh, in the upper catchments of the River Mahanadi, near Bilaspur.
  - Mainly surrounded by farmland and a few villages.
- **Key Features:**
  - Has an extensive open water area with shallow, nutrient-rich backwaters.
  - Strong hydrological and ecological connectivity, creating a mosaic of habitats.
  - Supports more than 60 migratory bird species that use it for nesting, feeding and as a stop-over site.
  - Notable species include:
    i. **Vulnerable** greater spotted eagle (*Aquila clanga*),
    ii. **Endangered** Egyptian vulture (*Neophron percnopterus*).
  - Valued by local communities and tourists for its **natural beauty and birdwatching opportunities**.
  - Faces threats from **siltation**, invasive non-native species, and intensive agriculture; conservation measures are proposed, but a formal management plan is yet to be prepared.

ADICHANALLUR HISTORICAL SITE

Context: The Madras High Court has ordered that no sand mining be permitted anywhere near the Adichanallur archaeological site, citing the need to protect its heritage value.

About Adichanallur Historical Site:

- **What it is?**
  - One of India's oldest Iron Age archaeological sites, known for extensive urn burials, skeletal remains, metal artefacts, and early cultural evidence of South India.
- **Located in:**
  - **Thoothukudi district, Tamil Nadu**, on the **banks of the Thamirabarani river**, near Srivaikuntam.
  - About **24 km from Tirunelveli**, and close to **ancient port town Korkai**, indicating maritime connectivity.
- **Major Discoveries:**
  - Large **urn burials**, skeletal remains of mixed ethnic origins, pottery, iron and bronze artefacts.
  - **169 burial urns** unearthed in the 2004–05 ASI excavations.
  - Early excavations uncovered **gold diadems, pottery, weapons**, and **over 4,000 antiquities**.
  - American and Indian analyses reveal **multiracial skeletal composition**—Negroid, Australoid, Caucasoid, Mongoloid, and Dravidian traits—suggesting a **cosmopolitan settlement**.
  - **Carbon dating (2019):** artefacts between **905 BCE and 696 BCE**, older than Keezhadi.
- **Historical Background:**
  - Excavations began with **German explorer Dr. Jagor (1876)** and were expanded by **Alexander Rea (1899–1904)**.
  - The site likely thrived due to proximity to **Korkai**, a major maritime trade centre in Sangam literature.
- **Key Features:**
  - Represents a **major Iron Age urn burial culture**, with evidence of long-distance contacts via the Thamirabarani–Korkai maritime route.
  - Only **4–5%** of the site excavated and full potential remains untapped.

SEA OF JAPAN

Context: Two U.S. B-52 nuclear-capable bombers conducted joint drills with Japanese F-35 and F-15 jets over the Sea of Japan, marking Washington's first show of force after China–Russia bomber and naval exercises near Japan and South Korea.

About Sea of Japan:

- **What it is?**
  - The **Sea of Japan** is a major marginal sea of the western Pacific Ocean, characterised by a deep, semi-enclosed basin with restricted water exchange through narrow straits.
- **Location:** It lies between Japan and Sakhalin Island to the east, and Russia and the Korean Peninsula to the west, covering about 978,000 sq. km with a mean depth of 1,752 m.
- **Neighbouring Nations:**
  - **Japan** (to the east)
  - **Russia** (to the north & northwest)
  - **North Korea** & **South Korea** (to the west/southwest)
- **Physiographic Features:**
  - Almost **elliptical**, oriented southwest–northeast.
  - Connected to adjacent seas via the **Korea Strait**, **Tsushima Strait**, **Tsugaru Strait**, **La Perouse Strait**, and **Kanmon Strait**.
  - Divided into **Japan Basin (north)**, **Yamato Basin (southeast)**, and **Tsushima Basin (southwest)**.
  - Japanese side has wider **continental shelves**, ridges and banks (e.g., **Sado Ridge**, **Oki Ridge**, **Hakusan Banks**).

Japan Border Issues with China and Russia:

- **China – East China Sea Disputes:**
  - The core flashpoint is the **Senkaku/ Diaoyu Islands**, controlled by Japan but claimed by China.
- **Russia – Northern Territories/Kuril Islands Issue:**
  - Japan claims the **Southern Kurils** (Iturup, Kunashir, Shikotan, Habomai), calling them the Northern Territories.

THAILAND–CAMBODIA BORDER TENSION

Context: Renewed fighting has erupted along the Thailand–Cambodia border, with artillery, rockets, drones and airstrikes used by both sides, causing rising civilian and military casualties.

About Thailand–Cambodia Border Tension:

What the conflict is?

- A long-running border dispute along their 817 km undemarcated frontier, rooted in colonial-era mapping.
- Both sides claim sovereignty over specific stretches near ancient temple complexes and forested highlands.

Historical Background:

1. **Colonial-Era Mapping (1907):**
   - The border was first mapped by **France** (colonial ruler of Cambodia) in 1907; Thailand (then Siam) later contested parts of this map, especially around ancient temples and high ground.
2. **Preah Vihear Temple Dispute:**
   - In **1962**, the **International Court of**

Justice (ICJ) awarded the Preah Vihear temple to Cambodia, but Thailand disputes parts of the surrounding territory.
    - In **2013**, the ICJ reaffirmed Cambodia's sovereignty over land around the temple and asked Thailand to withdraw forces, but Bangkok has questioned the ruling's scope.

3. **Periodic Armed Flare-Ups:**
    - Major clashes occurred in **2008–2011**, including a deadly artillery exchange in 2011 around Preah Vihear and nearby temples, killing soldiers and civilians and displacing thousands.
4. **Recent Escalations in 2025:**
    - Tensions rose after **May 2025** skirmishes and a Thai soldier's death, followed by stricter border measures and trade bans.

Places and Areas Under Tension:

- **Preah Vihear Region:**
    - Hilltop **UNESCO World Heritage** temple and surrounding high ground remain symbolic and strategic flashpoints.
    - **Mekong River** is the major waterway in Preah Vihear Province, featuring significant spots like the Preah Nimith Waterfall
- **Border Provinces (Thailand):**
    - **Surin, Buri Ram, Sa Kaeo, Sisaket, Trat** – reports of shelling, cross-border fire, and large-scale evacuations into temporary shelters.
- **Border Provinces (Cambodia):**
    - Adjacent districts in **Oddar Meanchey, Preah Vihear, Banteay Meanchey, Battambang, Pailin, Koh Kong** seeing civilian casualties, infrastructure damage, and internal displacement.
    -

SAUDI UNESCO GLOBAL NETWORK OF LEARNING CITIES (GNLC)

Context: UNESCO has added three more Saudi cities — Riyadh, AlUla, and Riyadh Al-Khabra — to the Global Network of Learning Cities (GNLC) in its 2025 update.

About Saudi UNESCO Global Network of Learning Cities (GNLC):

What is GNLC?

- The GNLC is a UNESCO-led international network that recognises cities promoting lifelong learning across all age groups through inclusive, accessible, and sustainable learning ecosystems.

History:

- Established in **2013**, GNLC has grown rapidly and today includes **425 cities from 91 countries**, supporting lifelong learning opportunities for nearly **500 million people**.
- It forms part of UNESCO's Education 2030 agenda and the SDG-4 mandate.

Key Features of a UNESCO Learning City:

Learning cities must demonstrate:

- **Lifelong learning systems:** Education integrated across formal, non-formal, workplace, and community settings.
- **Digital and AI readiness:** Preparing citizens for future labour markets and technological shifts.
- **Literacy & skills development:** Targeted programmes for youth, adults, and marginalised groups.
- **Innovation & entrepreneurship:** Platforms for creativity, startup culture, and workforce reskilling.
- **Sustainability & inclusion:** Learning linked to SDGs, environmental responsibility, and social equity.

Saudi Arabia's Recent Addition:

- UNESCO recognised **Riyadh, AlUla, and Riyadh Al-Khabra** for meeting rigorous global benchmarks of community-wide learning.
    - Saudi's total GNLC membership: 8 cities.
    - The expansion aligns with **Saudi Vision 2030** and the Human Capability

Development Program.

India and the Global Learning Cities Network:

- India has **three GNLC cities** (2022 cohort):
  - **Warangal (Telangana)**
  - **Thrissur (Kerala)**
  - **Nilambur (Kerala)**
- These cities were recognised for integrating learning in public spaces, literacy programmes, and community participation.

ETURNAGARAM WILDLIFE SANCTUARY

Context: Telangana's Mulugu forest officials are set to launch safari services for the first time inside the Eturnagaram Wildlife Sanctuary, creating new eco-tourism opportunities.

About Eturnagaram Wildlife Sanctuary:

- **What It Is?**
  - Eturnagaram Wildlife Sanctuary is one of **Telangana's oldest protected areas**, known for its rich Deccan Plateau ecosystem, diverse wildlife, and unique cultural–ecological heritage.
- **Located In:** Mulugu District, Telangana
  - Situated along the **Godavari River**
  - Lies close to the **Telangana–Maharashtra–Chhattisgarh** tri-border region
- **History:**
  - **Established:** 30 January 1952 (one of the earliest sanctuaries in the state)
  - **Notified:** 7 July 1999 under wildlife protection rules
  - The region has evidence of **ancient human dwellings**, stone-age remains, and sites like **Rakshasa Gullu**.
  - Hosts Asia's largest tribal congregation, **Medaram Jatara**, celebrated every two years at Tadvai within the sanctuary.
- **Key Features:**
  - **Biodiversity:**
    - **Fauna:** Tigers, leopards, gaurs, sambar, chital, blackbuck, nilgai, wolves, pythons, antelopes.
    - **Flora:** Dominated by **Teak (Tectona grandis)** and mixed dry deciduous vegetation.
  - **Landscape & Ecology:**
    - Located in **Deccan dry deciduous forest** zone.
    - Dense forest patches, riverine tracks, and undulating terrain support high wildlife diversity.
- **Significance:**
  - **Ecological Importance:** A critical habitat linking forested regions across three states, supporting predator–prey balance.
  - **Cultural Heritage:** Home to the Medaram Jatara, enriching tribal identity and traditional conservation practices.
  - **Tourism Potential:** Safari services and accommodation facilities can generate livelihoods for local communities and enhance conservation awareness.

BARCELONA CONVENTION

Context: At COP24 of the Barcelona Convention in Cairo, EU countries and Mediterranean partners adopted strengthened commitments to protect the Mediterranean Sea.

About Barcelona Convention:

- **What it is?**
  - The Barcelona Convention is a legally binding UNEP-led regional environmental agreement for protecting the Mediterranean Sea against pollution and promoting sustainable coastal and marine management.
- **Adopted in:** 16 February 1976 (Convention for the Protection of the Mediterranean Sea Against Pollution)
- **Entered into force:** 1978
- **Amended & renamed:** 1995 as the Convention for the Protection of the Marine Environment and Coastal Region of the Mediterranean
- **Aim:**
  - Prevent, reduce, combat and eliminate pollution from land-based, marine and atmospheric sources.
  - Promote sustainable development through coordinated regional action.
  - Support Mediterranean states in implementing protocols dealing with dumping, emergencies, land-based sources, protected areas, offshore pollution, hazardous waste, and coastal zone management.

About Mediterranean Sea:

What it is?

- A **semi-enclosed, intercontinental sea** between Europe, Asia, and Africa, covering ~2.5 million km² and accounting for ~0.7% of global ocean area; a biodiversity hotspot and cradle of ancient civilizations.

Neighbouring Nations:

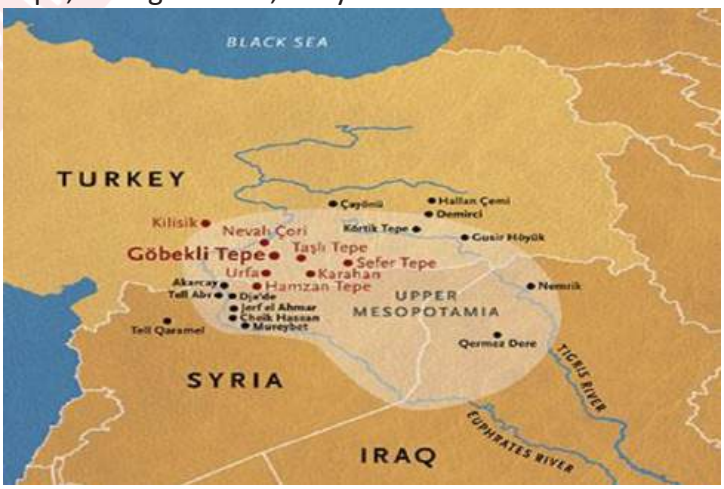
- **The Mediterranean is bordered by:**
  - **Europe:** Spain, France, Monaco, Italy, Slovenia, Croatia, Montenegro, Albania, Greece
  - **Asia:** Turkey, Cyprus, Syria, Lebanon, Israel
  - **Africa:** Egypt, Libya, Tunisia, Algeria, Morocco
- **Connected to major water bodies via:**
  - **Atlantic Ocean** through Strait of Gibraltar
  - **Black Sea** through Dardanelles–Marmara–Bosporus system
  - **Red Sea** through Suez Canal

Geological Features:

- Formed by tectonic convergence of the African and Eurasian plates.
- Divided by the Sicily submarine ridge into **western** and **eastern** basins.
- Contains major basins: Alborán, Algerian, Tyrrhenian (west); Ionian, Levantine (east).
- Deepest point: **Calypso Deep (5,267 m)** in the Ionian Sea.
- Hosts major islands including Sicily, Sardinia, Corsica, Crete, Cyprus, Lesbos, and Mallorca.

KARAHAN TEPE

Context: Archaeologists in Türkiye have unearthed new carved human faces, including the first-ever human-faced T-shaped pillar, at the Neolithic site of Karahan Tepe, dating back 11,000 years.



About Karahan Tepe:

- **What it is?**
  - Karahan Tepe is a major **Pre-Pottery Neolithic** archaeological site and one of the 12 settlements in Türkiye's **Taş Tepeler (Stone Hills)** project, believed to be among the world's earliest ritual-residential complexes.
- **Located in:** Sanliurfa Province, southeastern Türkiye, near the Syrian border—close to the

globally renowned Göbekli Tepe.

- **Features:**
  - Dates from **~9400 to 8000 BCE**; inhabited for ~1,500 years.
  - Built on a limestone plateau between the **Tigris and Euphrates rivers**.
  - Consists of residential structures, ritual enclosures, and T-shaped monoliths.
  - Represents one of the earliest known **symbolic and communal societies**, predating widespread agriculture.
- **Major Discoveries:**
  - **First human face carved on a T-shaped pillar**, with deep-set eyes and angular features.
  - Stone figurines including **stitched-lip sculptures**, expressive stone faces, and symbolic serpentinite beads.
  - Anthropomorphic pillars with carved **arms, hands, belts, fur garments**.
  - A **2.3-m tall male statue** and multiple mythic-animal-human hybrid carvings.
  - Evidence of a **highly organised society** with distinct symbolic and ritualistic practices.

THAILAND

Context: Thailand has formally expressed its intention to join BRICS, seeking India's support ahead of New Delhi's BRICS chairmanship in 2026.

About Thailand:

- **Location:** Thailand is a Southeast Asian country located in the centre of mainland Southeast Asia, entirely within the tropical zone.
- **Capital:** Bangkok is the capital and the largest urban and economic centre.
- **Neighbouring Nations:** Myanmar, Laos, Cambodia, and Malaysia.
- **Geographical Features:**
  - **Northern & Western Mountains:** Granitic ridges, highest peak: Mount Inthanon (2,585 m).
  - **Khorat Plateau (Northeast):** Tilted tableland with rolling terrain drained by Mekong tributaries.
  - **Chao Phraya River Basin (Central):** Fertile alluvial plains forming the agricultural heartland.
  - **Southern Peninsula:** Narrow peninsula with a mountainous spine and major islands like **Phuket**.

About BRICS:

- **What it is?**
  - BRICS is a major geopolitical grouping of **eleven countries**: Brazil, Russia, India, China, South Africa, Saudi Arabia, Egypt, UAE, Ethiopia, Indonesia, and Iran.
- **Established in:**
  - Concept coined in **2001,** first ministerial meeting held in **2006**, first leaders' summit in **2009** and became **BRICS** with South Africa's entry in 2011.
  - Second major expansion occurred in **2024–25** with six new members.
- **2026 BRICS Summit Host:** India will host the 18th BRICS Summit in 2026, taking over the presidency from Brazil.
- **Key Features of BRICS:**
  - Promotes reform of global governance institutions (UNSC, IMF, World Bank).
  - Focuses on economic resilience, financial cooperation, counterterrorism, energy security, and technology governance.
  - Includes the New Development Bank (NDB) as its financial institution.
  - Allows flexible participation modes such as Members, Partner Countries, BRICS Outreach and BRICS Plus.

BLACK SEA

Context: Ukraine struck two Russian civilian oil tankers — Kairos and Virat — in the Black Sea using sea drones, causing major damage to vessels believed to be transporting sanctioned Russian oil.

About Black Sea:

What it is?

- The Black Sea is a large inland sea connected to the Mediterranean through a chain of straits. It is known for its unique stratified water system, where deep layers lack oxygen and are filled with hydrogen sulfide, creating a biologically "dead zone."

Location: Situated at the southeastern extremity of Europe, the Black Sea lies between Eastern Europe, the South Caucasus, and Anatolia.

Neighbouring Nations: It is bordered by Ukraine, Russia, Georgia, Turkey, Bulgaria and Romania.

Key Features:

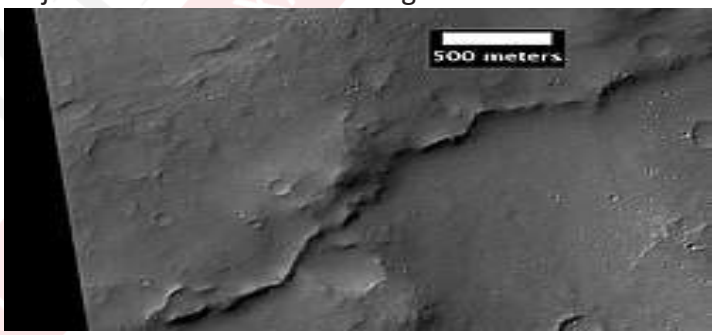
- **Shape & Size:** Roughly oval-shaped basin; area ~163,000 sq. miles (422,000 sq. km).
- **Connection:** Linked to the Mediterranean via the Bosporus to Sea of Marmara to Dardanelles to Aegean Sea.
- **Depth:** Maximum depth exceeds **7,250 feet (2,210 m)**.
- **Stratified waters:**
  - Upper layers: oxygenated, biologically productive.
  - **Below ~150–200 m:** anoxic (no oxygen), filled with hydrogen sulfide, supporting only anaerobic bacteria.
- **Geology:** Remnant of the ancient **Tethys Sea**, transformed over millions of years by tectonic uplift.
- **Climate:** Northern parts experience cold steppe climate; southern coasts more humid and subtropical.

Significance:

- Key geopolitical flashpoint involving NATO, Russia, Ukraine, and Turkey; crucial maritime route for oil, grain, and military logistics.
- Supports commercial fisheries, shipping lanes, tourism, and provides access to global trade routes.
- Hosts rich biodiversity in upper layers, while deep anoxic layers preserve ancient shipwrecks in near-perfect condition.

PARANÁ VALLES

Context: Scientists have, for the first time, mapped large river drainage systems on Mars, identifying 16 major ancient basins—including Paraná Valles.



About Paraná Valles:

What it is?

- Paraná Valles is one of Mars' major ancient fluvial drainage systems, formed by networks of valleys, streams and sedimentary channels carved by flowing water billions of years ago.
- It is considered one of the strongest geological indicators that Mars once had rainfall and sustained surface runoff.

Located In:

- Situated in the **southern hemisphere** of Mars.
- Lies within the region of **Margaritifer Terra**, an area rich in valley networks and past water-related landforms.
- The drainage system covers a **large-scale watershed**, comparable to large river basins on Earth.

Formation:

- Formed by **flowing liquid water**, likely during Mars' early warm and wetter climate.

- Created through **rainfall-fed runoff**, erosion and sediment transport over long periods.
- Water likely flowed through interconnected valleys, lakes and channels, eventually draining into larger canyon systems or possibly an ancient Martian Ocean.

Key Features:

- **Branching valley network** indicating dendritic (tree-like) river patterns similar to terrestrial rivers.
- Contains streams, lakes, canyons and sediment deposits that confirm long-term fluvial activity.
- Represents a **large drainage basin** exceeding 100,000 sq km—the threshold for large river systems on Earth.
- Shows evidence of erosion, nutrient transport, and prolonged water–rock interaction.

Significance:

- One of the best-preserved Martian landscapes showing past hydrology.
- High potential site for finding biosignatures, because large drainage systems transport nutrients—key for microbial life.
- Helps scientists reconstruct Mars' ancient climate, supporting theories that the planet once had rainfall and stable water bodies.

BITRA ISLAND

Context: India is set to increase military presence in Lakshadweep, with a new naval detachment on Bitra Island becoming fully operational next year, alongside expanding Air Force facilities on Agatti and Minicoy.

About Bitra Island:

What it is?

- Bitra is the smallest inhabited island of Lakshadweep, forming part of the Amindivi subgroup. It is a tiny coral atoll known for its ecological fragility, lagoon system, and cultural significance.

Location:

- Situated in the **Arabian Sea**, **483 km west of Kochi**.
- Lies north of Perumal Par and southeast of Byramgore Reef within the Lakshadweep archipelago.

Formation:

- Bitra is a **coral atoll**, formed from the upward growth of coral reefs on submerged volcanic bases.
- Over time, biological accretion and reef-building created a **ring-shaped lagoon system**, with small sandy islands emerging on the reef surface.

Geological Features:

- **Two islands:** Main Bitra Island (≈0.177 sq km) + a small southern cay (≈0.009 sq km).
- **Lagoon area:** ~45–54 sq km, protected by a surrounding coral reef.
- Reef barrier ensures **calm lagoon waters** even during monsoon storms.

Significance:

- **Strategic:** Now hosts a new Indian naval detachment, boosting surveillance across critical shipping lanes near the Arabian Sea.
- **Cultural:** Home to the shrine of Malik Mulla, an Arab saint, making it a pilgrimage site for islanders.
- **Ecological:** Historically a major seabird breeding ground; part of Lakshadweep's fragile coral ecosystem.
- **Human history:** Permanently settled only in 1945, making it one of India's newest inhabited regions.