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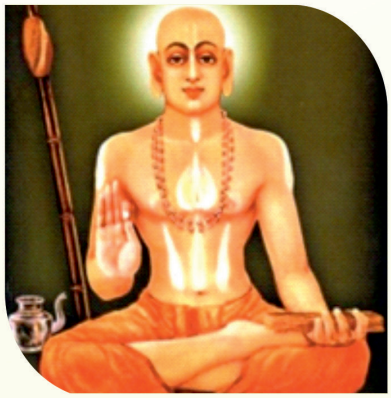

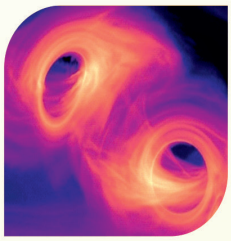

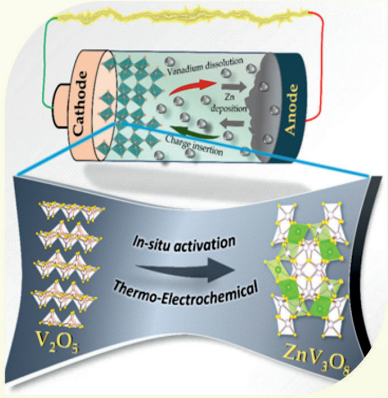

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December-2025

Current Affairs

Contents

Chapter-
1

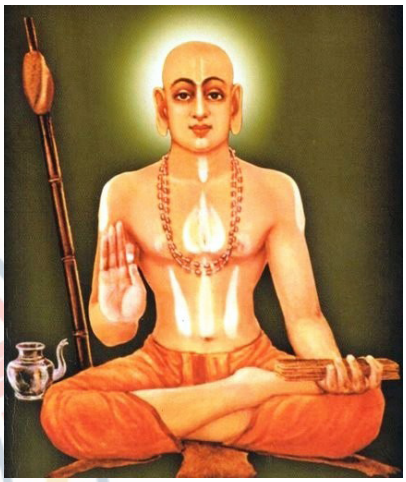
HISTORY & CULTURE

1. Madhvacharya

Context: Prime Minister Narendra Modi unveiled a 77-feet bronze statue of Lord Rama at the Shree Samsthan Gokarn Partagali Jeevottam Math in Goa.

- He also visited Udupi evoked the legacy of Jagadguru Madhvacharya, linking Udupi's spiritual heritage to India's cultural unity.

About Madhvacharya:



Who He Was?

- Madhvacharya (13th century CE) was a renowned Indian philosopher, theologian and founder of the Dvaita (dualism) school of Vedanta. He is revered as a major Vaishnava acharya and is traditionally regarded as an incarnation of Vayu, the Wind God.

Birth and Early Life:

- Born as Vāsudeva in Pajaka village near Udupi, Karnataka (1199–1278 CE or 1238–1317 CE, dates debated).
- Exceptional physical strength and intellect—nicknamed Bhima.
- Took Sannyasa as a teenager, initiated by Achyutapreksha, receiving the names Purna Prajna and later Ananda Tirtha.

His Philosophy (Dvaita Vedanta):

- Madhvacharya's school, Tattvavāda, is based on realist dualism. Key principles:
- Pancha-Bheda (Five Eternal Distinctions):
  - God – Soul
  - God – Matter
  - Soul – Matter
  - Soul – Soul
  - Matter – Matter

These differences are natural, eternal and real, rejecting monism.

- God:
  - Vishnu/Narayana is the supreme independent reality (Svatantra Tattva).
  - All souls and matter are dependent realities.
  - Liberation (moksha) is possible only through Vishnu's grace.
- Pramānas (Sources of Knowledge):
  - Accepted three:
  - Pratyaksha (perception)
  - Anumāna (inference)
  - Śabda (scriptural testimony)
- Bhakti over Jnana

Liberation comes through devotion (bhakti), not mere intellectual knowledge.

Contribution to Bhakti Movement:

- Reinforced personal devotion to Vishnu and daily remembrance of God (Smarana).
- Rejected Advaita's non-dualism; debated Shankara and Ramanuja traditions.
- Authored 37 Sanskrit works, including commentaries on:

- Bhagavad Gita
- Brahma Sutras (Madhva-bhashya & Anuvyakhyana)
- Principal Upanishads
- Bhagavata Purana (Tatparya-nirnaya)

- Founded the Udupi Krishna Mutt, establishing the famous Ashta Mathas tradition.
- Inspired later Dvaita scholars: Jayatirtha, Vyasatirtha, Raghavendra Tirtha.

2. Sri Guru Tegh Bahadur

Context: President of India attended the 350th anniversary commemoration of Sri Guru Tegh Bahadur at the Red Fort, New Delhi.

About Sri Guru Tegh Bahadur:

Who He Was?

Sri Guru Tegh Bahadur (1621–1675) was the ninth Guru of Sikhism, known for his fearlessness, spiritual depth, and ultimate sacrifice to defend the freedom of conscience.

- Born as Tyag Mal in Amritsar, he was the youngest son of Guru Hargobind Sahib, the sixth Guru.

Early Life:

- Born on 1 April 1621 at Amritsar; trained in martial skills, scriptures, archery, horsemanship, and classical texts like the Vedas/Upanishads.
- Displayed exceptional bravery in the Battle of Kartarpur (1634); earned the title "Tegh Bahadur" (Brave of the Sword).
- Married Mata Gujri (1632); lived at Bakala for over 20 years, meditating in seclusion.

Installation as the Ninth Guru:

- Before his death, Guru Har Krishan uttered "Baba Bakale", pointing to his successor in Bakala.
- Over 22 claimants tried to occupy the gurushipp until Makhan Shah Labana identified Tegh Bahadur as the true Guru by testing his divine knowledge of a secret offering vow.
- In August 1664, a Sikh congregation led by Diwan Dargha Mal formally installed him as the ninth Guru.

Major Works & Contributions:

- Extensive Preaching Journeys:
  - Travelled across Punjab, UP, Bengal, Bihar, Assam, and Dhaka, spreading Guru Nanak's message.
  - Established centres of Sikh teaching; dug wells, started langars, and supported poor communities.
- Founding of Anandpur Sahib:
  - Purchased land from Rani Champa of Bilaspur; founded Chakk Nanaki (later Anandpur Sahib) in 1665–72, which became a major Sikh centre.
- Social-Reformist Role:
  - Condemned casteism, fanaticism, ritualism, and tyranny.
  - Strengthened Sikh identity through a philosophy rooted in fearlessness (nirbhau) and freedom from enmity (nirvair).
- Spiritual & Literary Contributions:

- Composed 59 Shabads and 57 Shaloks across 15 Raagas.
- His hymns form an integral part of Guru Granth Sahib, added by Guru Gobind Singh.

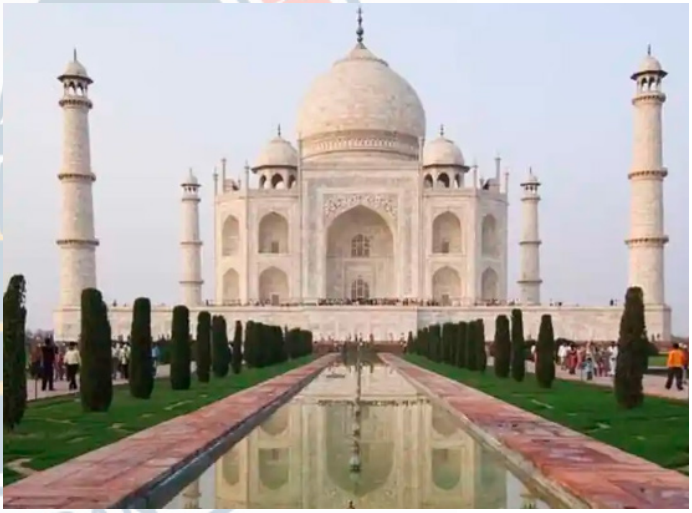
Conflict with Aurangzeb & Execution:

- Under Aurangzeb's rule, forcible conversions and religious persecutions increased.
- Kashmiri Pandits, led by Pandit Kirpa Ram, sought Guru Tegh Bahadur's protection.
- Guru decided to sacrifice himself to uphold religious freedom—a stand unique in world history.
- Arrest & Torture:
  - Arrested at Ropar; imprisoned at Sirhind and later Delhi.
  - His companions—Bhai Mati Das, Bhai Sati Das, Bhai Dayala—were brutally executed in his presence.
- Martyrdom (11 November 1675):
  - He refused to:
    - Convert to Islam
    - Perform miracles
  - Was publicly beheaded at Chandni Chowk (now Gurdwara Sis Ganj Sahib).
  - His body was cremated secretly at the site of Gurdwara Rakab Ganj Sahib.

3. The Taj Mahal

Context: The upcoming Hindi film "The Taj Story", starring Paresh Rawal, has triggered nationwide controversy for reviving the discredited "Tejo Mahalaya" theory, which claims the Taj Mahal was originally a Shiva temple.

About the Taj Mahal:



What it is?

- The Taj Mahal is a 17th-century white marble mausoleum on the right bank of the Yamuna River in Agra, Uttar Pradesh. It is one of the Seven Wonders of the World and a UNESCO World Heritage Site (1983), celebrated as the pinnacle of Indo-Islamic architecture.

Built during:

- Commissioned in 1632 CE by Mughal Emperor Shah Jahan in memory of his wife Mumtaz Mahal, it was completed in 1648 CE, with additional structures and landscaping finished by 1653 CE under the supervision of architect Ustad Ahmad Lahori.

History:

- Constructed by artisans, calligraphers, inlayers, and masons from across India, Central Asia, and Persia, the Taj represents the zenith of Mughal craftsmanship.
- Inscriptions in Arabic, Persian, and Quranic verses document its chronology and spiritual symbolism.

Key Features:

- The central white marble tomb stands on a raised square platform with four minarets at each corner, symbolizing symmetry and spatial balance.
- The double-dome chamber houses the cenotaphs of Mumtaz Mahal (center) and Shah Jahan (west); the real graves lie in the lower crypt.
- The pietra dura (inlay) work, with precious stones depicting intricate floral motifs, exemplifies Persian and Indian artistic fusion.
- The Charbagh garden follows the Timurid-Persian quadripartite design, divided by water channels symbolizing the rivers of paradise.

- The main gateway (Darwaza-i-Rauza) and flanking mosque and guest house of red sandstone contrast with the central marble mausoleum, emphasizing visual harmony.

Significance:

- Represents the culmination of Mughal architecture, uniting Persian, Ottoman, and Indian aesthetics into a symbol of eternal love and divine harmony.
- Serves as a testament to 17th-century engineering and design, blending artistic precision with spiritual allegory—reflecting paradise and resurrection.
- Continues to be a global icon of India's cultural heritage, drawing over 6 million visitors annually and inspiring art, literature, and architecture worldwide.

4. Gold coins from the Vijayanagara-era unearthed

Context: Over 100 gold coins from the Vijayanagara era were unearthed inside an earthen pot during restoration works at a Later Chola-period Shiva temple in Kovilur, Tiruvannamalai district, Tamil Nadu.

About Gold coins from the Vijayanagara-era unearthed:

What it is?

- A total of 103 punch-marked gold coins of varying sizes and shapes were discovered during excavation near the sanctum sanctorum of the Kovilur Shiva temple atop the Jawadhu Hills.

Discovery:

- Officials from the Tamil Nadu State Archaeology Department (TNSAD) and Revenue Department secured the site and transferred the coins to the district treasury under the provisions of the Indian Treasure Trove Act, 1878.
- The coins carry the boar emblem, a symbol of Vijayanagara royal authority, and are believed to be devotional offerings minted during the reigns of rulers such as Harihara II or Krishnadevaraya (14th–16th centuries CE).
- Archaeologists estimate the coins to be approximately 5 mm in size, made of pure gold, and possibly issued as temple endowments or donations.

About Numismatics of the Vijayanagara Empire:

Origin:

- The Vijayanagara Empire (1336–1646 CE) was founded by Harihara I and Bukka I, inspired by the sage Vidyaranya, to defend Hindu kingdoms in South India.
- Its capital at Hampi became a major political, economic, and religious hub. The empire issued one of the most sophisticated monetary systems in medieval India.

Key Features of Vijayanagara Coinage:

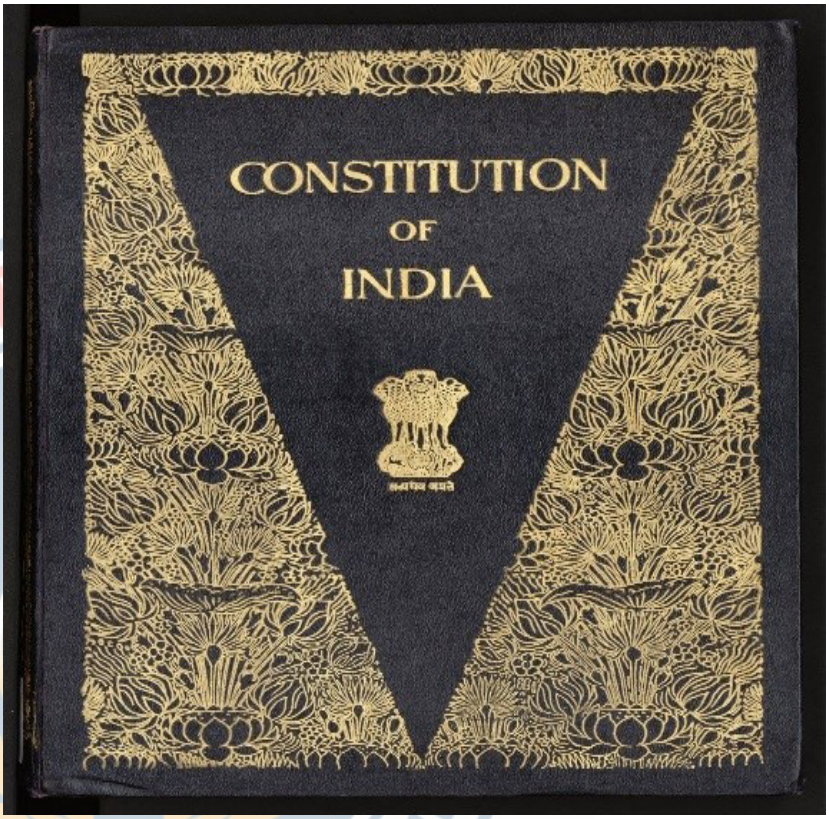
- Metal Composition: Predominantly gold pagodas (gadyanas), half and quarter pagodas, along with silver taras and copper jitals. Gold was reserved for religious offerings and royal use.

Eg: Krishnadevaraya's gold Balakrishna pagoda (3.3 gm) with Devanagari legend "Sri Pratapa Krishna Raya."

- Artistic Imagery: Coins bore images of Hindu deities—Siva-Parvati (Uma-Maheshwara), Vishnu-Lakshmi, Balakrishna, or Gandaberunda (double-headed eagle)—reflecting royal devotion and temple culture.
- Legends and Language: Inscribed in Devanagari, Kannada, or Tamil, often featuring the ruler's name and honorifics such as "Sri Pratapa" (valiant).
- Symbolism: The boar emblem (Varaha)—an avatar of Vishnu—was used as the state symbol on royal coins and seals, representing divine sanction to rule.
- Economic Role: Vijayanagara coinage served both as temple wealth and trade currency, circulating widely across South India, Sri Lanka, and the Indian Ocean trade routes.

1. Indian Constitution at 76: Why It Still Outpaces Western Models

Context: India marks the 76th anniversary of the adoption of the Constitution, prompting renewed reflection on its evolution and contemporary relevance.



About Indian Constitution at 76: Why It Still Outpaces Western Models

Indian Constitution Ahead of Its Time:

- India adopted universal adult franchise in 1950 when countries like the US and Australia still denied voting rights to many communities.
- It confronted caste hierarchy from the outset through Articles 15(2), 17 and 23 which targeted discrimination, untouchability and bonded labour in both state and private domains.
- The Constitution institutionalised affirmative action in 1950 for Scheduled Castes and Scheduled Tribes which was decades earlier than affirmative action frameworks in the US or South Africa.
- It recognised that social power in India did not lie only with the state but also with communities, caste groups and local hierarchies which required constitutional checks.

Indian Constitution vs Western Constitutional Models:

- Western constitutions mainly restrict state power while India expanded constitutional rights to shield citizens from societal oppression, especially caste-based exclusion.
- Western models rarely included group-differentiated protections at the founding stage while India guaranteed minority cultural and educational rights through Articles 29 and 30.
- Many Western democracies incorporated anti-discrimination protections later in the 1960s and 1970s while India embedded them in the original text through Articles 14 to 17.
- Unlike rigid liberal constitutions, India combined liberal rights with a transformative agenda of social reform through Directive Principles, affirmative action and state-led socio-economic restructuring.

Evolution of the Constitution Since 1950:

- The Supreme Court expanded the meaning of Article 21 into a cluster of rights including privacy (Puttaswamy), environment (Subhash Kumar), education (Mohini Jain) and legal aid (Hussainara Khatoon).
- The Basic Structure Doctrine created in 1973 through Kesavananda Bharati protected democracy, secularism, judicial review and federalism from arbitrary amendment.
- Social justice provisions evolved through the Mandal reforms, 77th and 103rd Constitutional Amendments and ongoing debates on sub-categorisation of OBCs.

- Expansion of minority rights, disability rights, transgender rights and privacy rights emerged through progressive judicial interpretation.
- Federalism strengthened through GST Council jurisprudence, Sarkaria and Punchhi Commission inputs and cooperative-federal mechanisms after economic liberalisation.

Key Challenges to the Indian Constitution Today:

- Caste discrimination, manual scavenging and residential segregation remain prevalent despite constitutional abolitions and anti-atrocity laws.
- Consolidation of executive power risks weakening independent institutions such as the Election Commission, CVC, CBI and regulatory bodies.
- Emergency-era provisions and broad preventive detention powers still allow the state significant coercive authority.
- Balancing religious freedom with gender justice remains difficult as seen in debates around personal laws, Sabarimala and triple talaq.
- Growing digital surveillance, algorithmic decision-making and weak data protection frameworks create new threats to privacy and civil liberties.
- Rising majoritarian narratives challenge the plural ethos that Articles 25 to 30 were designed to uphold.

Way Ahead:

- Strengthen autonomy of constitutional institutions through transparent appointments, fixed tenures and independent funding norms.
- Expand constitutional literacy movements through NCERT revisions, university modules, digital platforms and Constitution Clubs in schools.
- Update privacy, data protection and algorithmic accountability laws in alignment with evolving interpretations of Article 21.
- Implement stronger anti-discrimination laws covering housing, employment and algorithmic bias along with targeted caste-equity audits.
- Promote participatory federalism in which States play a central role in digital governance, climate policy and welfare delivery.
- Expand minority-rights jurisprudence and reinforce linguistic and cultural protections in the face of homogenising pressures.

Conclusion:

India's Constitution was a transformative project that imagined equality in a deeply unequal society. Its endurance reflects both its visionary design and the institutions that constantly reinterpret it. As India moves toward 2047, constitutional morality, pluralism and social justice must remain the compass for national progress.

2. Structural Gaps Between UPSC and State PSCs

Context: The 2025 National Conference of Chairpersons of State Public Service Commissions (PSCs) is being hosted by the Telangana PSC on December 19–20 to address recurring issues in recruitment.

About Structural Gaps Between UPSC and State PSCs:

Historical Background of PSCs:

1. Montagu–Chelmsford Reforms (1918): Proposed an independent, merit-based, politically insulated recruitment authority to counter colonial bias and ensure fair entry of Indians into civil services.
2. First Public Service Commission (1926): Established to regulate recruitment for the Union; marked the beginning of a permanent and professionalised service commission framework.

3. Government of India Act, 1935: Mandated separate PSCs for each province, institutionalising a federal recruitment mechanism that formed the foundation for present UPSC–State PSC structure.
4. Continuation in the Constitution (1950): Constituent Assembly retained PSCs under Articles 315–323, recognising their role in ensuring neutrality, fairness, and depoliticised recruitment.

Structural Difference: UPSC vs State PSCs:

Aspect	UPSC	State PSCs
Appointment Process	Merit-Based Appointments — Members selected for experience, seniority, and neutrality, ensuring professionalism and reduced political interference.	Politicised Appointments — Often influenced by ruling parties, compromising independence, credibility, and expertise standards.
Representation Norms	Representation Across Zones — Mandatory zonal distribution ensures pan-India perspectives and minimises regional bias.	Lack of Representation Norms — No fixed criteria on age, qualifications, or experience; appointments may lack administrative depth.
Administrative Framework	Dedicated Personnel Ministry (DoPT) — Ensures systematic manpower planning, timely vacancy notifications, and consistency in exam cycles.	No Dedicated Personnel Ministry — Poor workforce planning leads to irregular notifications, backlog of vacancies, and delays.
Resource Availability	Financial & Administrative Stability — Central resources support reliable recruitment, strong exam systems, and quick grievance redressal.	Fiscal Constraints — States face funding shortages, extend retirement ages, and defer recruitments, resulting in erratic exam schedules.

Issues / Problems in State PSCs:

- Irregular Revision of Syllabus: Syllabi remain outdated as PSCs rarely form expert committees, weakening alignment with current affairs, modern academics, and UPSC standards.
- Limited Academic Pool: Dependence on in-state experts restricts diversity, impacting quality of question papers and moderation processes.
- Evaluation & Moderation Weaknesses: Lack of strong inter-se moderation leads to uneven scoring and subjective evaluation, prompting frequent judicial intervention.
- Reservation & Zonal Complexity: Incorporating vertical, horizontal, and regional quotas requires complex calculations, often resulting in errors and litigation.
- Poor Translation Mechanisms: Weak English-to-regional language translations distort meanings, causing ambiguity, unfair advantage, and paper cancellations.
- Transparency vs Confidentiality Imbalance: Frequent leaks, mismanagement, and slow grievance responses fuel loss of trust and repeated exam cancellations.

Recommendations for Reform:

- Create a Dedicated State Personnel Ministry: A DoPT-like body should publish a 5-year recruitment calendar, ensuring predictable vacancies and annual exam cycles.
- Constitutional Amendment on PSC Membership: Fix minimum age at 55 years and maximum at 65, with defined qualifications to ensure experienced, apolitical, and competent members.
- Panel-Based Appointment System: States should maintain a vetted panel of eminent administrators and professionals, selected for integrity, domain expertise, and neutrality.
- Periodic Syllabus Revision: Revise syllabi every 3–5 years, place drafts in public domain, and align with UPSC trends to enhance objectivity and clarity.
- Mixed Exam Pattern: Retain objective prelims, but use objective + descriptive mains to balance analytical testing with fair evaluation and reduced subjectivity.
- Improve Translation & Question Setting: Use tech-enabled secure translation plus human review to ensure accuracy; vary patterns regularly to reduce AI-driven formulaic answers.

- Strengthen PSC Secretariat Leadership: Secretary must be an officer with experience in school/board exam systems, ensuring rigorous supervision and procedural integrity.

Conclusion:

State PSCs require urgent structural and procedural reforms to match the credibility and efficiency of the UPSC. Instituting transparent appointments, modernised syllabi, and predictable exam cycles can restore aspirants' trust. A professionally managed, depoliticised system will ensure merit-based recruitment and strengthen administrative capacity at the State level.

3. Constitution 131st Amendment Bill 2025

Context: The proposed Constitution (131st Amendment) Bill, 2025 sparked a major political row after it sought to bring Chandigarh under Article 240, altering its administrative structure.

About Constitution (131st Amendment) Bill, 2025:

What it is?

- A draft amendment proposing to include Chandigarh under Article 240, placing it in the same category as UTs where the President can directly frame regulations.
- Aim: To "simplify the Central Government's law-making process for the UT of Chandigarh" and bring uniformity with other UTs lacking legislatures.

Key Features:

- Brings Chandigarh under Article 240: Enables the President to make regulations equivalent to Acts of Parliament, similar to A&N Islands, Lakshadweep, DNHDD and Puducherry (when Assembly is dissolved).
- Allows appointment of an independent Administrator: Opens the possibility of replacing the current system where Punjab's Governor serves as Chandigarh's Administrator.
- Reduces Punjab's administrative role: Would mark a structural shift from the historical arrangement given during the 1966 Punjab Reorganisation, triggering political concerns.

About Chandigarh:

History:

- Planned vision of Jawaharlal Nehru: Conceived as a symbol of modern India's aspirations after Partition— "a new town, unfettered by the traditions of the past."
- Designed by Le Corbusier: The famous French architect developed the master plan, making it one of the world's earliest and finest experiments in modernist urban planning.

- Post-Partition Background:
  - Replacement for Lahore: After 1947, Punjab lost Lahore to Pakistan; Chandigarh was envisioned as the capital of Indian Punjab.
  - Refugee rehabilitation: The city was partly designed to resettle thousands displaced from West Punjab.
- Site Selection and City Construction:
  - Chosen in 1948: Foothills of the Shivalik's—then part of Ambala district—were selected jointly by the Centre and Punjab Government.
  - Foundation stone laid in 1952: Marking the beginning of India's foremost modern city project.
- Role after the 1966 Punjab Reorganisation:
  - Joint capital of Punjab and Haryana: After Haryana was carved out, Chandigarh was designated as the shared capital of both states under the Punjab Reorganisation Act, 1966.
  - Declared a Union Territory: The city came directly under Central Government administration while hosting the secretariats and legislatures of both states.

Existing Governance Structure:

- Administrator of Chandigarh:
  - Presently, Governor of Punjab holds additional charge as the Administrator of the UT.
  - Earlier (1966–1984), the city had its own independent Chief Commissioner/Chief Secretary, before administration shifted to Punjab's Governor.
- Administrative Control:
  - Chandigarh UT functions directly under the Ministry of Home Affairs (MHA).
  - The city has no legislative assembly, and governance is carried out through UT administration officials (Adviser to Administrator, Home Secretary, Finance Secretary, etc.).

4. Bharat NCAP 2.0

Context: Bharat NCAP 2.0 draft has been released by the Ministry of Road Transport & Highways (MoRTH), expanding India's crash-safety rating system with new test categories and higher safety benchmarks.

About Draft Bharat NCAP 2.0:

What it is?

- A revised vehicle safety rating programme that evaluates crashworthiness and safety technologies of cars sold in India. It updates the 2023 Bharat NCAP guidelines and introduces new crash tests and assessment verticals.

Launched by: the Ministry of Road Transport and Highways (MoRTH).

- Testing and certification are handled by the Central Institute of Road Transport (CIRT), Pune.

Aim:

- To upgrade India's vehicle safety framework to global standards.
- To protect not just occupants but also pedestrians and vulnerable road users.
- To encourage manufacturers to adopt advanced safety technologies.

Key Features of Bharat NCAP 2.0:

- Five Assessment Verticals: Safe Driving, Accident Avoidance, Crash Protection, Vulnerable Road User Protection (new), Post-Crash Safety (new)
- Expanded Crash Tests: Frontal impact, side impact, oblique pole test, full-width frontal test (new), rear impact test (new).
- Injury Evaluation: Uses advanced test dummies (ATDs) to measure injury levels in different crash scenarios.
- Vulnerable Road User Safety: Includes pedestrian legform tests, adult/child head impact tests; optional checks for autonomous braking in pedestrian and motorcyclist situations.
- Accident-Avoidance Tech: Mandatory Electronic Stability Control (ESC); optional Autonomous Emergency Braking (AEBS) earns extra points.
- Post-Crash Safety: Checks for fire/electrical safety and ease of occupant escape (doors and seat-belt buckles).
- Revised Star Ratings: Higher point thresholds; no 5-star rating if any category scores zero or shows severe injury risk

Significance:

- Brings India closer to global NCAP standards.
- Improves protection for pedestrians, who form over 20% of road-accident deaths.
- Boosts India's aim of reducing road fatalities by 50% by 2030.

5. 53rd Chief Justice of India

Context: Justice Surya Kant is set to take oath as the 53rd Chief Justice of India (CJI) on 24 November 2025 following the retirement of CJI B. R. Gavai.

- His tenure will extend until 9 February 2027, making it one of the longer CJI tenures in recent years.

About 53rd Chief Justice of India:

- What is the Office of the CJI?
  - The Chief Justice of India (CJI) is the head of the Indian judiciary and presiding judge of the Supreme Court of India.
  - The office flows from Article 124(1), which establishes a Supreme Court consisting of a CJI and other judges.
- Constitutional Associated:
  - Article 124(1): Establishes the Supreme Court of India (CJI + other judges).
  - Article 124(2): Judges (including CJI) appointed by the President by warrant under his hand and seal, after consultation.
  - Article 126: Appointment of an Acting CJI when needed.
  - Article 127: Appointment of ad hoc judges of the Supreme Court.
  - Article 128: Retired SC judges can sit and act as judges of the Supreme Court.
- Procedure for Appointment of the CJI:
  - Seniority Principle: By convention, the senior-most judge of the Supreme Court (by tenure in SC) is considered for appointment as CJI, if found fit.
  - Initiation by Outgoing CJI: About one month before retirement, the outgoing CJI recommends the name of the next CJI to the Union Minister of Law & Justice.
  - Executive Processing: Law Minister → places file before the Prime Minister → PM advises the President.
  - Presidential Appointment & Oath:
    - The President issues the warrant of appointment under Article 124(2).
    - The CJI then takes oath of office before the President of India.
  - Memorandum of Procedure (MoP): The MoP (1999) codifies this practice: "Appointment to the office of the CJI should be of the seniormost Judge of the Supreme Court considered fit to hold the office."

Key Features of the CJI Appointment System:

- Seniority-based & Convention-driven: Reduces arbitrariness and strengthens judicial independence by limiting political discretion.
- Consultative but Executive-formalised: Though the President/Executive formally appoints, the recommendation flows from the judiciary, especially the outgoing CJI.
- Linked to Collegium System: As CJI heads the collegium, his appointment affects the entire higher judiciary appointments ecosystem.
- Significance of the CJI's Role:
  - Judicial Head & Master of Roster: Allocates benches, lists cases, and shapes which issues get priority.
  - Head of Collegium: Crucial role in appointment and transfer of High Court and Supreme Court judges.
  - Constitutional Sentinel: Leads benches deciding on federal disputes, fundamental rights, electoral issues, separation of powers.

6. The Higher Education Commission of India (HECI) Bill 2025

Context: The Centre is set to table the Higher Education Commission of India (HECI) Bill 2025 in the upcoming Winter Session of Parliament, five years after the NEP 2020 recommended a single higher-education regulator.

About The Higher Education Commission of India (HECI) Bill 2025:

What it is?

- A draft law proposing the creation of a single regulatory authority for all higher education (except medical and legal education) by merging the roles of the University Grants Commission (UGC), All India Council for Technical Education (AICTE), and National Council for Teacher Education (NCTE).

Aim of the Bill:

- To streamline India's higher education regulation by eliminating the existing fragmented structure.
- To implement the vision of NEP 2020, which calls for an integrated, transparent, and less intrusive regulatory framework.

Key Features of the HECI Bill 2025:

- Single Regulator for All Higher Education:
  - HECI will subsume UGC (general education), AICTE (technical education), and NCTE (teacher education).
  - Medical and legal education will remain outside its purview.
- Four Vertical Structure (as per NEP 2020):
  - National Higher Education Regulatory Council (NHERC): Regulation and compliance for all institutions (except medical & legal).
  - National Accreditation Council (NAC): Accreditation and quality benchmarking.
  - General Education Council (GEC): Learning outcomes, curricular frameworks, academic standards.
  - Higher Education Grants Council (HEGC): Funding — though funding powers likely remain with the Ministry, not HECI.
- Independent, Expert-Based Governance:
  - Each vertical will function as an autonomous professional body with experts known for integrity and experience.
  - HECI itself will be a small, independent commission overseeing coordination among the verticals.
- Reduction of Red Tape:
  - Addresses complaints of the current system being "mechanistic, heavy-handed, and disempowering."
  - Aims to eliminate conflict of interest, overlapping jurisdictions, and inconsistent regulation across UGC–AICTE–NCTE.
- Autonomy for Higher Education Institutions:
  - Bill seeks to help institutions become independent, self-governing, and academically free.
  - Promotes a transparent, robust accreditation system linked to academic autonomy.
- Alignment with NEP 2020:
  - Follows NEP's prescription for functional separation of:

■ Regulation
■ Accreditation
■ Funding
■ Academic Standard-Setting

Significance of the HECI Bill 2025:

- Structural Reform in Higher Education Governance: Creates a single-window regulatory system,

resolving decades-long fragmentation between UGC, AICTE, and NCTE.

- Enhances Quality and Accountability: Improves institutional performance through clear standards, outcome-based learning, and professional accreditation mechanisms.
- Reduces Bureaucratic Overload: Minimises duplication, delays, conflicting notifications, and overlapping approvals.

7. Supreme Court struck down key provisions of the Tribunal Reforms Act, 2021

Context: The Supreme Court struck down key provisions of the Tribunal Reforms Act, 2021 as unconstitutional for violating judicial independence and the doctrine of separation of powers.

- The Court also directed the Union Government to establish a National Tribunal Commission within four months and restore the earlier safeguards laid down in the Madras Bar Association (MBA) IV & V judgments.

About Supreme Court struck down key provisions of the Tribunal Reforms Act, 2021:

What is the Tribunal Reforms Act, 2021?

- Enacted on 13 August 2021, it sought to restructure and rationalise the tribunal system by abolishing several appellate tribunals and consolidating provisions on appointments, tenure and service conditions of tribunal members.
- It replaced the Tribunal Reforms Ordinance, 2021 and became the primary statute governing many central tribunals.

Aims of the Act:

- To reduce delay by shifting many appellate functions from tribunals to High Courts.
- To standardise appointments and service conditions across tribunals.
- To enhance administrative efficiency and accountability by giving the Centre a more central role in managing tribunals.

Key Features:

- Abolition of Tribunals: Dissolved bodies like the Film Certification Appellate Tribunal, Intellectual Property Appellate Board, Airport Appellate Tribunal, etc., transferring their jurisdiction to High Courts / other courts.
- Centralised Appointments: Chairpersons and Members to be appointed by the Central Government on recommendation of a Search-cum-Selection Committee chaired by the CJI or nominee.
- Tenure & Age:
  - Chairperson – 4-year term or till 70 years (whichever earlier).
  - Members – 4-year term or till 67 years.
  - Minimum age for appointment is fixed at 50 years, excluding younger practitioners.
- Executive Rule-Making Power: Centre empowered to frame rules on salaries, allowances and service conditions and to amend the Schedule (list of tribunals) by notification.
- Transitional Provisions: On abolition, members ceased office; pending cases shifted to High Courts/ other courts.

Supreme Court Judgment On The Act (2025):

- The Court held that the Act violates constitutional principles of separation of powers and judicial independence and amounts to an impermissible "legislative override" of binding Supreme Court decisions (especially MBA IV & V).

- It struck down the impugned provisions that:
  - Re-introduced a 4-year tenure,
  - Imposed minimum age 50 years,
  - Allowed a panel of two names per vacancy for the government to choose from,
  - Tied service conditions to equivalent civil servants.

Key Reasoning:

- Parliament cannot re-enact, in slightly altered form, provisions already struck down, without curing the underlying constitutional defects.
- Judicial directions on minimum tenure, eligibility of advocates with 10 years' practice, composition and role of selection committees are not "abstract principles" but constitutional requirements flowing from Articles 323A–323B, Article 14 and the basic structure (judicial independence).
- The Act tried to restore executive dominance over tribunals where the Union is often the largest litigant, undermining institutional autonomy.

Directions Issued:

- National Tribunal Commission to be constituted within 4 months as an "essential structural safeguard" for tribunal independence, appointments, administration and oversight.
- Till a new law consistent with earlier judgments is enacted, directions in Madras Bar Association (MBA IV & V) on tenure, eligibility, age limits, and composition of selection committees will continue to govern.
- Appointments already made pursuant to selections completed before the Act came into force are protected and governed by the parent statutes and MBA IV & V, not by the truncated tenure in the Act.

Arguments In Favour of the Tribunal Reforms Act:

1. Streamlining & Rationalisation: Supporters argued that abolishing small, under-utilised tribunals and shifting work to High Courts would reduce fragmentation and improve consistency of judicial review.
2. Uniformity & Administrative Clarity: A single law with common rules on appointments and service conditions was projected as bringing predictability and uniform standards across multiple tribunals.
3. Executive Efficiency in Appointments: Greater Central control was justified on grounds of speed and coordination—a single nodal authority supposedly prevents delays caused by multiple ministries and bodies.
4. Experience-Based Age Threshold: The 50-year minimum age was defended as ensuring that only mature, experienced candidates (often retired judges/bureaucrats) preside over complex technical disputes.
5. Shorter, Fixed Tenure: A 4-year tenure was portrayed as enabling performance review and rotation, preventing tribunals from becoming a "permanent sinecure" for select individuals.

Arguments Against the Tribunal Reforms Act:

1. Violation of Judicial Independence: Short 4-year tenures and heavy executive control over re-appointments were seen as creating dependence on the government, especially when the Union is a key litigant before these bodies.
2. Re-Enactment of Struck-Down Provisions: The Act brought back, in tweaked language, the same tenure and age rules already invalidated in MBA IV & V, amounting to a direct challenge to the Court's authority.
3. Exclusion of Younger Talent: The 50-year age bar blocks capable lawyers and domain experts in their 40s, weakening diversity and dynamism in tribunal composition.
4. Executive Dominance in Appointments & Service Conditions: Giving the Centre a decisive say in appointments, service rules, salaries and allowances undermines the arm's-length distance required for neutral adjudication.
5. Burdening High Courts, Weakening Specialisation: Abolishing specialised tribunals and offloading

cases to already overburdened High Courts was criticised as hurting access to justice and diluting technical expertise.

Way Ahead:

1. Enact a Fresh, Constitution-Compliant Tribunal Law: Parliament should legislate in line with MBA IV & V and the 2025 judgment—ensuring minimum 5-year tenure, reasonable age limits, and security of service.
2. Establish and Empower National Tribunal Commission: The proposed Commission must handle appointments, evaluation, infrastructure and administration of all tribunals, insulating them from day-to-day ministerial control.
3. Balance Between Specialisation and Court Oversight: Maintain core specialised tribunals where technical expertise is crucial, while ensuring High Courts retain judicial supervision through appeals/ judicial review.
4. Transparent, Merit-Based Appointments: Clear criteria, public notifications, short-lists, and reasoned decisions by selection committees can enhance legitimacy and public trust.
5. Strengthen Infrastructure & Digital Systems: Better staffing, digital case management, and timelines will make tribunals genuinely effective forums for speedy and specialised justice.

Conclusion:

The Supreme Court's verdict re-asserts that tribunal reform cannot be used as a backdoor to expand executive control over adjudication. By striking down the 2021 Act, the Court has reaffirmed constitutional supremacy and the centrality of judicial independence in our institutional design. Going forward, a robust National Tribunal Commission and a fresh, constitutionally aligned statute can turn tribunals into genuine instruments of speedy, specialised and impartial justice.

8. First Jal Sanchay Jan Bhagidari (JSJB) Awards

Context: The Hon'ble President of India, will confer the First Jal Sanchay Jan Bhagidari (JSJB) Awards and the 6th National Water Awards 2025 on 18th November 2025 at Vigyan Bhawan.

About 6th National Water Awards:

What it is?

- A flagship initiative of the Department of Water Resources, River Development & Ganga Rejuvenation (DoWR, RD & GR) under the Ministry of Jal Shakti, instituted in 2018 to recognize outstanding efforts in water conservation and management.
- Aim: To promote community participation, awareness, and innovation in water resource management, aligning with the vision of "Jal Samridh Bharat."
- Features:
  - Awards across 10 categories, including Best State, District, Village Panchayat, Industry, NGO, and Institution.
  - Evaluation based on field verification by CWC and CGWB.
  - 46 winners selected out of 751 applications received via the Rashtriya Puraskar Portal.
- Rankings (Top Performers):
  - Best State: Maharashtra (1st), Gujarat (2nd), Haryana (3rd)
  - Best Districts: Rajnandgaon (Chhattisgarh), Khargone (Madhya Pradesh), Mirzapur (Uttar Pradesh), Tirunelveli (Tamil Nadu), Sepahijala (Tripura)

- Best Urban Local Body: Navi Mumbai, Maharashtra

About First Jal Sanchay Jan Bhagidari (JSJB) Awards:

What it is?

- A community-driven initiative under the Jal Shakti Abhiyan: Catch the Rain (JSA: CTR) campaign, launched on 6th September 2024 at Surat, Gujarat, promoting grassroots water stewardship.

- Aim: To encourage Jan Bhagidari (public participation) and CSR involvement in constructing, rejuvenating, and maintaining artificial recharge and storage structures, thereby ensuring long-term water security and resilience.
- Features:
  - Guided by the 3Cs mantra — Community, CSR, and Cost.
  - Districts were encouraged to build 10,000 recharge structures (3,000 for hilly/North-Eastern districts).
  - Collaboration between Ministry of Jal Shakti and Ministry of Housing & Urban Affairs for urban water recharge.
- Rankings and Recognition:
  - 100 awardees selected — including States, 67 Districts, 6 Municipal Corporations, NGOs, industries, and philanthropists.
  - Top-performing districts receive ₹2 crore (Category 1), ₹1 crore (Category 2), and ₹25 lakh (Category 3).
- Ranking: Telangana, Chhattisgarh, and Rajasthan were ranked the top three states in the JSJB Awards 2025.

9. Bridging the Gender Gap in Civil Services

Context: UPSC's decade-long data (2010–2021) reveals that women constitute less than 40% of Civil Services aspirants, while transgender participation remains negligible, exposing persistent gender disparities in one of India's most prestigious examinations.

About Bridging the Gender Gap in Civil Services:

Trends and Data (2010–2021):

- Female participation rose from 23.4% in 2010 to 32.98% in 2021, indicating slow progress yet staying below 40%.
- In 2021, women made up 32.98% of prelims candidates, 14.75% cleared prelims, and only 15.66% (201 women) appeared in the final merit list.
- Transgender participation remains below 0.001%, with only 4 candidates appearing in 2021 and none qualifying for later stages.
- Despite legal inclusion of the third gender in 2016, meaningful participation remains absent.

Factors Behind Low Gender Representation:

- Social constraints and patriarchy: Cultural norms and early marriage expectations continue to restrict women's mobility and preparation time — over 60% of female aspirants cite familial or societal pressure as a deterrent (CSDS Youth Survey, 2023).
- Financial inequality in education: High coaching costs (₹2–3 lakh annually) limit access; rural women's education spending is 30% lower than men's, reducing their ability to compete (NSO Education Report, 2022).

UPSC Women Participation Trends (2010-2021)

Year	Total Candidates	Women Appeared	% Women
2010	280,901	65,738	23.40%
2011	254,466	60,529	23.78%
2012	283,632	64,489	22.74%
2013	332,362	78,194	23.53%
2014	462,909	111,477	24.08%
2015	478,033	116,923	24.46%
2016	474,808	121,882	25.67%
2017	469,685	127,536	27.15%
2018	504,218	142,527	28.27%
2019	579,756	179,121	30.90%
2020	493,113	152,723	30.97%
2021	510,438	168,352	32.98%

- Safety and mobility barriers: Many women avoid relocating to hubs like Delhi due to security fears — India ranks 127/146 in Global Gender Gap Report 2024 (WEF) for mobility freedom.
- Psychological and social burden: Aspirants face time-bound marriage pressure; 40% of women drop preparation by age 27 (Vision IAS Survey, 2024), reflecting gendered expectations of "settling down."
- Institutional and policy gaps: UPSC lacks targeted facilities such as gender hostels, counselling, or mentorship; only 15% of coaching institutes offer women's hostels or safety provisions, limiting inclusivity.

Emerging Social Change:

- Steady upward trend: Women's participation in UPSC rose from 23.4% in 2010 to 32.98% in 2021, showing slow but consistent empowerment through education access and awareness.
- Inspirational visibility: Role models like IAS Ira Singhal and IPS Rema Rajeshwari have challenged stereotypes, motivating more women from Tier-II and Tier-III towns.
- Government empowerment schemes: Initiatives such as PM-DAKSH and Mission Karmayogi include women's capacity-building components, strengthening their representation in public service.
- Legal inclusion of transgender aspirants: The Transgender Persons (Protection of Rights) Act, 2019 enabled inclusion in UPSC forms (since 2016), symbolising an evolving rights-based framework.
- Social awareness through education: NEP 2020's emphasis on gender inclusion and career counselling in higher education is gradually transforming societal perceptions of women's professional roles.

Importance of Gender-Balanced Representation in Civil Services:

- Diverse governance lens: Women officers bring community-oriented perspectives, improving welfare delivery and social policy sensitivity (World Bank Gender and Gov. Report, 2024).
- Policy inclusivity and empathy: Studies show states with higher female bureaucratic presence achieve better health and education indicators (UNDP India, 2023).
- Curbing corruption and bias: Female officers are statistically less likely to engage in rent-seeking behaviour, promoting integrity in governance (NCAER, 2022).
- Symbolic leadership impact: Visible women leaders like Smita Sabharwal (IAS) normalize female authority, inspiring broader participation in governance and politics.
- Administrative resilience: A balanced bureaucracy ensures representative decision-making, crucial for gender justice in programmes like Beti Bachao, Jal Jeevan, and PM Awas Yojana.

Way Ahead:

- Targeted scholarships & mentorship: Launch Women-in-Administration Fellowships under DoPT to fund coaching and mentorship for women and transgender aspirants.
- Transparent gender data: Mandate UPSC Annual Diversity Reports disaggregated by gender and region to track equity outcomes.
- Work-life flexibility in service: Institutionalise creche facilities, flexible postings, and sabbatical options for women officers to balance motherhood and service demands.
- Inclusive preparation infrastructure: Expand state-run coaching centres and women's hostels in district HQs, reducing dependence on metro-based institutes.
- Societal reorientation: Integrate gender-sensitivity modules in schools and media campaigns to challenge patriarchal notions linking women's worth solely to marriage.

Conclusion:

Gender diversity in the civil services is not a symbolic pursuit but a democratic necessity. True equality in governance begins with equal opportunity in entry. Empowering women and transgender aspirants through systemic, social, and institutional reforms will create a bureaucracy that reflects India's real social fabric.

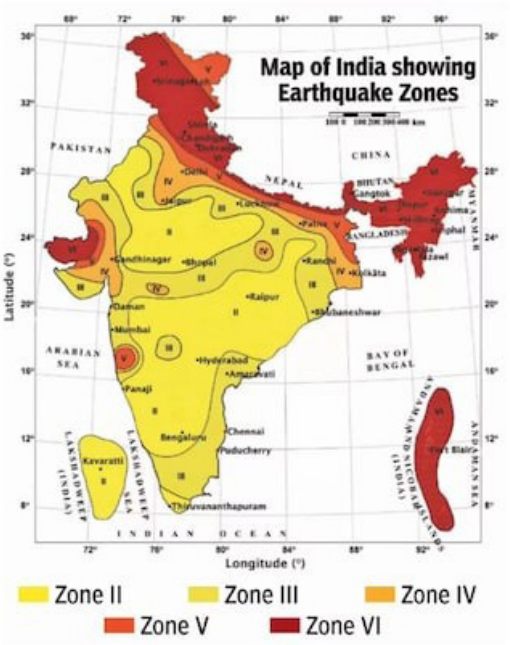
1. India Revised Earthquake Design Code, 2025

Context: India has released a radically updated seismic zonation map under the revised Earthquake Design Code (2025), placing the entire Himalayan arc in a newly created highest-risk Zone VI for the first time.

About India Revised Earthquake Design Code, 2025:

What is the Seismic Zonation Map?

- A seismic zonation map classifies different regions of India based on their earthquake hazard potential, helping determine how strong structures must be to withstand earthquakes.



Published by:

- The updated map is issued by the Bureau of Indian Standards (BIS) as part of the revised Earthquake Design Code, 2025 (IS 1893).
- It uses internationally accepted Probabilistic Seismic Hazard Assessment (PSHA)

Key Features of the Revised Zonation Map:

1. Introduction of Highest-Risk Zone VI:
   - Entire Himalayan arc (J&K–Ladakh to Arunachal) placed in Zone VI, the most hazardous zone, for the first time.
   - Recognises consistent, extreme tectonic stress along the Indian–Eurasian plate boundary.
2. 61% of India Now in Moderate to High Hazard Zones:
   - A major jump from older estimates relying mainly on past epicentres.
   - Reflects scientific modelling of fault segments, locked sections, and rupture potential.
3. Boundary Towns Auto-Upgraded to Higher-Risk Zone:
   - If a city lies on the border of two zones, it defaults to the higher-risk one.
   - Moves away from administrative lines to geological realities.
4. Inclusion of Rupture Propagation Southward:
   - Acknowledges that Himalayan Frontal Thrust ruptures may extend south to populated foothill regions like Dehradun (near Mohand).
5. Mandatory Structural & Non-Structural Safety:
   - New norms for anchoring parapets, ceilings, tanks, façades, HVAC units, etc., if their weight exceeds 1% of total load.
   - Buildings near active faults must withstand pulse-like ground motions typical of near-fault quakes.
6. New Soil & Ground-Response Requirements:
   - Detailed provisions for liquefaction, soil flexibility, site-specific shaking spectra.
   - Encourages geotechnical investigations before major construction.
7. Exposure Mapping (PEMA Method):
   - Incorporates population density, infrastructure concentration and socioeconomic vulnerability.
   - Integrates impact-based assessment with geological hazard.

Significance:

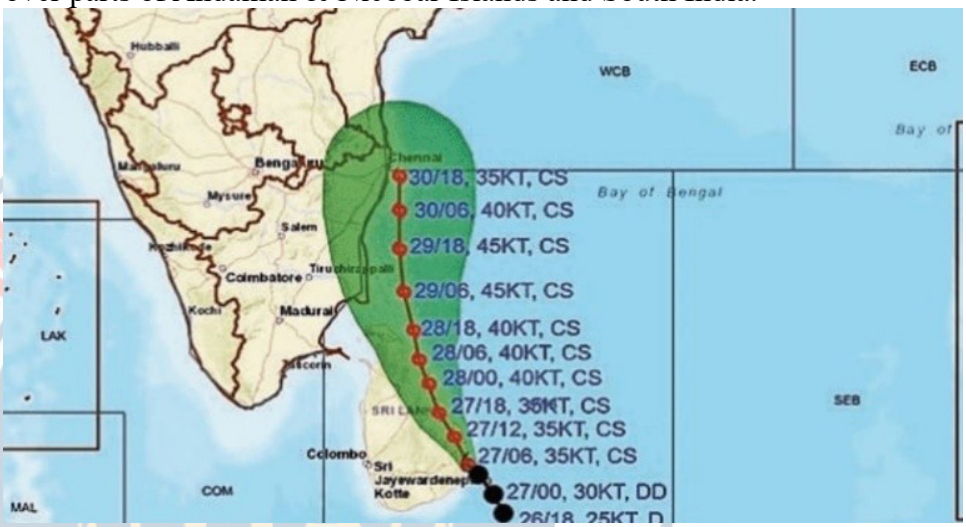
- Improved Earthquake Preparedness: Accurate hazard modelling ensures stronger building codes for at-risk regions, especially the Himalayas.
- Retrofitting Imperative: Old structures, especially in Himalayan towns, must be retrofitted, including schools, hospitals, and bridges.
- Uniformity Across the Himalayan Arc: Fixes decades of underestimation due to inconsistent older maps (Zones IV & V), despite identical tectonics.

2. Cyclone Ditwah and Cyclone Senyar

Context: Cyclone Ditwah has formed over the southwest Bay of Bengal and is moving towards Tamil Nadu, Andhra Pradesh and Puducherry.

- Around the same time, a separate system in the Strait of Malacca intensified into Cyclone Senyar, triggering very heavy rain over parts of Andaman & Nicobar Islands and South India.

About Cyclone Ditwah and Cyclone Senyar:



About Cyclone Ditwah:

- What it is & where formed:
  - Cyclone Ditwah is a tropical cyclonic storm that formed over the southwest Bay of Bengal, rapidly intensifying from a depression to a cyclonic storm in less than 24 hours.
  - It is Yemen's recommended name.

About Cyclone Senyar:

- What it is & where formed:
  - Cyclone Senyar originated from a low-pressure system near Malaysia/Strait of Malacca over the South Andaman Sea and adjoining region of Bay of Bengal, which intensified into a depression and further strengthened.
  - It is UAE's recommended name.
- Current status: Senyar later weakened over the Strait of Malacca, but the moisture and remnant circulation helped feed ongoing rain systems over South India and the Bay.

Why More Cyclones Form in Bay of Bengal During Retreating Southwest Monsoon?

1. Very Warm Sea Surface Temperatures (SSTs)
   - The Bay of Bengal retains high SSTs (~28–30°C or more) after the summer monsoon, providing huge latent heat, which is the primary fuel for cyclogenesis in October–November.
2. High Moisture & Humidity:
   - Abundant moisture inflow from equatorial Indian Ocean and Bay creates a deep, humid troposphere, favourable for strong convection and low-pressure formation.
3. Shift of ITCZ & Monsoon Trough:
   - The Inter-Tropical Convergence Zone (ITCZ) and monsoon trough shift southwards over the Bay in the retreating phase, creating a preferred zone of convergence and vorticity for cyclones.
4. Low Vertical Wind Shear:
   - In October–early November, upper-level winds become comparatively less hostile over the Bay, with reduced vertical wind shear, allowing nascent systems to organise into depressions and

cyclones.

5. Remnant Monsoon Lows Re-intensify:
   - Monsoon depressions and lows moving from land back over the warm Bay waters during withdrawal often re-intensify into deep depressions/cyclones, especially in central and southwest Bay.
6. Bay of Bengal vs Arabian Sea Contrast:
   - The Bay is smaller, semi-enclosed and receives large river inflows (Ganga–Brahmaputra, etc.), maintaining warmer, stratified surface waters compared to the Arabian Sea, making it more cyclone-prone in this season.

3. Geological Survey of India (GSI)

Context: The Union Minister of Coal & Mines inaugurated GSI's International Seminar in Jaipur to mark 175 years of the Geological Survey of India (GSI).

About Geological Survey of India (GSI):

भारतीय भूवैज्ञानिक सर्वेक्षण
GEOLOGICAL SURVEY OF INDIA

What it is?

- GSI is India's premier national geoscientific organisation, responsible for geological surveys, mineral exploration, and creation of national geoscience databases. It functions as an attached office under the Ministry of Mines.

Established In: Formally established in 1851.

- Founded primarily to locate coal resources for expanding Indian Railways during British rule.

Historical Evolution:

- Early 1800s: Initial geological work done by Survey of India and Army officers like W. Voysey (first geological map of Hyderabad, 1818–23).
- 1837: Committee for "Investigation of Coal and Mineral Resources" created; John McClelland used the term "Geological Survey of India" in 1848.
- 1851: Under Sir Thomas Oldham, continuous institutional geological work started, marking the true beginning of GSI.
- Over 175 years, it evolved into a national repository of geological and mineral data and a globally respected scientific institution.

Key Functions:

- Geological Mapping & Surveys: Systematic mapping of India's surface and subsurface geology (ground, airborne, marine surveys).
- Mineral Exploration: Scientific assessment of mineral, energy, and water resources.
- Geohazard Studies: Conduct seismotectonic studies, glaciology, climate-change geostudies, and hazard risk investigations.
- Geotechnical & Geoenvironmental Studies: Support infrastructure planning, land stability, groundwater, and environmental assessments.
- National Geoscience Repository: Maintain spatial databases, remote sensing records, geological archives, museums, and data dissemination platforms.
- International Collaboration: Engage with USGS, BGS, Geoscience Australia, polar agencies, and global earth-science missions.
- Capacity Building & Education: Partnerships with universities, training institutions; popularising geoscience among students and public.
- Coordination Role: Aligns with Central & State agencies for mineral exploration, resource management,

and scientific advisory support.

4. Supreme Court Clarification on Governor's Powers to Assent Bills

Context: The Supreme Court delivered a landmark five-judge Constitution Bench opinion clarifying the powers of Governors and the President regarding assent to state Bills.

About Supreme Court Clarification on Governor's Powers to Assent Bills:

What it is?

- The case concerns the constitutional process under Articles 200 and 201, which govern how Governors and the President act when a Bill passed by a State Legislature is placed before them for assent.
- Multiple States complained that Governors were withholding or delaying assent, creating legislative paralysis.

Constitutional Powers of the Governor (Article 200):

When a Bill is presented, the Governor has only three options:

1. Give Assent
2. Withhold Assent AND return the Bill to the Legislature with recommendations (except Money Bills).
3. Reserve the Bill for the President's consideration (mandatory in a few cases, discretionary in others).

The Governor cannot "withhold assent simpliciter" — meaning they cannot keep a Bill pending indefinitely without action.

Major Clarifications Provided by the Supreme Court:

- No indefinite delay: "Prolonged, unexplained, indefinite inaction" by Governors is unconstitutional and subject to judicial review.
- No 'deemed assent':
  - The SC rejected the earlier ruling suggesting that if a Governor delays assent, the Bill becomes law automatically.
  - Article 142 cannot be used to bypass constitutional procedure.
- Discretion exists — but is limited:
  - While Governors exercise discretion under Article 200, they are not bound by Cabinet advice for assent decisions.
  - But this discretion cannot be misused to block elected governments.
- No judicial timelines: Courts cannot impose fixed deadlines on Governors or the President because the Constitution uses the phrase "as soon as possible".
- President's powers under Article 201:
  - Similar to the Governor's powers but operate only when a Bill is reserved.
  - The President's decision is not justiciable, and courts cannot impose timelines.
- Courts can review ONLY inaction, not the merits: Courts cannot question why the Governor withheld assent, only whether the process was followed.
- Validity of Laws not bills: Courts cannot adjudicate the constitutional validity of a Bill; only a law enacted after assent can be challenged.

5. Cold Wave

Context: A cold wave has gripped parts of Telangana, with districts like Kohir and Yalal recording temperatures near 8°C—3–5°C below normal.

About Cold Wave:

What is a Cold Wave?

- A cold wave refers to a sharp and unusual drop in minimum temperatures, severe enough to cause physiological stress or danger to humans. It is declared when temperatures fall below defined IMD thresholds in plains or hilly regions.

IMD Criteria for Cold Wave:

- Plains:
  - Minimum temperature ≤10°C and departure –4.5°C to –6.4°C (Cold Wave).
  - Departure ≤ –6.4°C (Severe Cold Wave).
  - Independent of normal: ≤4°C (Cold Wave), ≤2°C (Severe Cold Wave).
- Hilly regions: Minimum temperature 0°C or less.
- Coastal regions: Cold wave when departure ≤ –4.5°C and minimum temperature ≤15°C.
  - Must be observed in at least two stations for two consecutive days.

How a Cold Wave Occurs (Mechanism)?

- Cold waves originate when high-pressure systems over North/Northwest India push cold, dry continental winds
- Clear skies and low moisture allow rapid radiational cooling at night, dropping temperatures sharply over inland regions like the Deccan plateau.

Key Features of Cold Waves:

- Sharp fall in minimum temperatures at night despite warm days (28–31°C in Telangana).
- Enhanced cooling over rural/open landscapes and elevated plateaus.
- Urban areas like Hyderabad experience milder cooling due to urban heat island effect.
- Occur mainly in post-monsoon and winter months (Nov–Feb).

Implications of Cold Waves:

- Increases risk of hypothermia and frostbite among the vulnerable (elderly, homeless, infants).
- Exacerbates pulmonary diseases such as asthma, COPD, and bronchitis due to dry air.
- Surge in common respiratory infections (flu, pneumonia).
- Impacts agriculture through cold stress on crops in northern districts.

6. The Rare Earth Hypothesis

Context: Recent data from NASA's Kepler and James Webb Space Telescopes (JWST) suggest that while Earth-sized planets in habitable zones are common, the specific conditions required for complex life remain extremely rare, reviving interest in the Rare Earth Hypothesis.

About the Rare Earth Hypothesis:

What it is?

- The Rare Earth Hypothesis posits that while microbial life might be widespread across the universe, complex, multicellular life is exceptionally uncommon due to the need for a unique and finely tuned set of planetary, stellar,

and cosmic conditions.

Propounded by:

- Proposed by Peter Ward (palaeontologist) and Donald Brownlee (astronomer) in their 2000 book "Rare Earth: Why Complex Life is Uncommon in the Universe."

Aim:

- To explain why Earth-like complex ecosystems may be an extraordinary rarity in the cosmos despite the abundance of stars and planets.

Key Features:

- Multiple Conditions Required: Complex life depends on a rare combination of factors — stable climate, plate tectonics, magnetic field, atmospheric regulation, and a protective gas giant (like Jupiter).
- Habitable Zone Constraint: Not enough to be in a "habitable zone"; the planet's composition, orbit, and atmosphere must also remain stable over billions of years.
- Planetary System Architecture: Giant planets can either shield inner planets from impacts or destabilize them depending on mass and orbit.
- Climate Stability: Long-term carbon-silicate cycling and plate tectonics are vital to maintain a life-supporting atmosphere.
- Atmospheric Retention: Only few planets, particularly around Sun-like stars, can sustain thick atmospheres against stellar radiation.

Significance:

- Challenges the Copernican Principle (that Earth is not special) by suggesting Earth's conditions are uniquely fine-tuned for complex life.
- Guides astrobiology and exoplanet research, focusing on planetary systems with Earth-like stability.

1. National Green Tribunal (NGT)

Context: The NGT has directed the CPCB, Kerala SPCB and Plantation Corporation of Kerala to trace hundreds of missing barrels of banned pesticide Endosulfan.

About National Green Tribunal (NGT):

What it is?

- A specialised judicial body for speedy disposal of environmental disputes, functioning with expertise in environmental science and law.

Established in: Set up on 18 October 2010 under the National Green Tribunal Act, 2010 to provide dedicated and time-bound environmental justice.

Aim: To ensure effective environmental protection, conservation of natural resources, and provide relief and compensation for environmental damage.

Jurisdiction:

- Handles civil cases involving substantial environmental questions linked to laws listed in Schedule I (e.g., Water Act, Air Act, EPA, Forest Conservation Act, Biodiversity Act).
- The following important Acts are NOT within NGT's jurisdiction:
  - Wildlife Protection Act, 1972: Wildlife crimes, poaching, sanctuary matters fall outside NGT's powers and go to regular courts.
  - Indian Forest Act, 1927: Issues of forest offences, transit rules, and forest land rights are not heard by the NGT.
  - Forest Rights Act, 2006 (FRA): Claims, titles, individual/community forest rights are outside NGT jurisdiction.
- Has appellate jurisdiction over decisions relating to environmental clearances, pollution control orders, and biodiversity benefit-sharing disputes.

Governance Structure:

- Chairperson: Head of the Tribunal – must be a retired Supreme Court Judge or Chief Justice of a High Court and appointed by the Central Government in consultation with the CJI.
- Judicial Members: Retired Judges of SC/HC and handle adjudication of environmental disputes based on legal principles.
- Expert Members: Specialists in environmental science, forestry, pollution control, or related fields; ensure interdisciplinary decision-making.

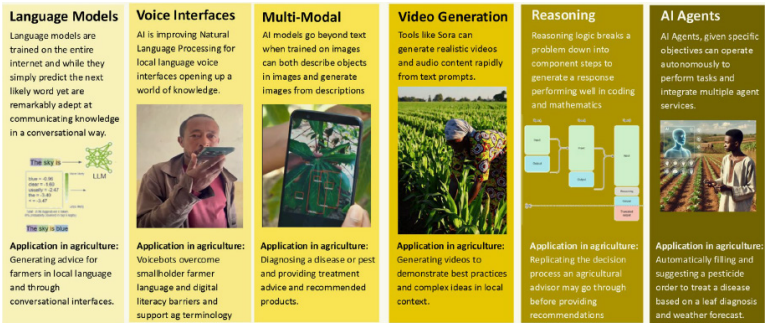
Powers & Functions:

- Can provide relief, compensation, and restitution for victims of pollution, environmental damage, and hazardous substance accidents.
- Applies the polluter pays, precautionary, and no-fault liability principles while awarding compensation.
- Not bound by the Civil Procedure Code; guided instead by principles of natural justice for faster adjudication.
- Aims to decide cases within six months, reducing burden on High Courts and the Supreme Court.
- Can enforce environmental rights, impose penalties, direct restoration work, and monitor compliance with its orders.

2. Artificial Intelligence for Agricultural Transformation

Context: A new World Bank–led report "Harnessing Artificial Intelligence for Agricultural Transformation" outlines how AI can be responsibly scaled across agrifood systems, especially in low- and middle-income countries.

About Artificial Intelligence for Agricultural Transformation:



Current trends of AI in agriculture:

- Shift to GenAI & multimodal AI: New models combine text, images, satellite data and sensor feeds to give natural-language, local-language advisories and predictive insights for farmers.
- Systems-level adoption: AI is now used across the value chain—crop discovery, advisory, insurance, logistics and market intelligence—rather than in isolated pilots.
- Rapid growth in investments: The AI-in-agriculture market (~US$1.5 bn in 2023) is projected to reach about US$10.2 bn by 2032.
- LMIC-focused experiments: Numerous projects in Africa and Asia now use AI for hyperlocal weather, pest diagnosis, and input optimisation tailored to smallholders.
- "Small AI" on phones: Lightweight models that run on basic smartphones or offline devices are emerging to serve farmers in low-connectivity environments.

Opportunities of AI in agriculture:

- Higher yields & input efficiency: AI-based precision farming, irrigation, and fertilizer tools can cut chemical use (up to ~95% in some drone-based pilots) while raising yields by 20–30%.
- Climate resilience: AI helps breed climate-resilient varieties, model climate risks, and plan cropping patterns using high-resolution agro-ecological and weather data.
- Better incomes & market access: Projects like Saagu Baagu in India show AI advisories can raise farmer income per acre, improve quality and reduce input costs, while tools like Hello Tractor optimise machinery access.
- Inclusive finance & risk mitigation: Alternative credit scoring, AI-based micro-insurance and climate-indexed products can expand formal finance to previously unbanked smallholders.
- Smarter public policy: Governments can use AI for early-warning systems, yield and price forecasting, and targeted subsidies, improving food-security planning and resource allocation.

Initiatives already taken:

- Global AI roadmap by World Bank & partners: The report itself, with 60 use cases, gives a structured roadmap for LMICs on applications, governance and investments.
- Research institutions using AI: IRRI, CIMMYT and others use ML and computer vision to speed up phenotyping and genebank screening, tripling the number of accessions screened while cutting costs.
- Data coalitions & exchanges: Ethiopia's "Coalition of the Willing" and India's Agricultural Data Exchange (ADeX) create shared data layers to train local AI models while protecting sovereignty.
- Public–private digital platforms: Initiatives like the Agriculture Information Exchange Platform (AIEP) in Kenya and Bihar pilot GenAI advisory tools in multiple local languages for tens of thousands of users.

Key challenges associated:

- Digital divide & infrastructure gaps: Only a small share of rural populations in regions like Sub-Saharan Africa have reliable internet and electricity, limiting AI deployment and real-time services.
- Data bias and scarcity: Most training data comes from high-income regions; local crops, soils and

indigenous practices are under-represented, leading to biased or irrelevant recommendations.

- Low human capital & trust: Many farmers, especially women and older farmers, lack digital skills; distrust of automated advice and language barriers can slow adoption.
- Weak governance & regulation: Clear rules on data ownership, privacy, algorithmic transparency and liability for AI errors are still evolving in most LMICs.
- Risk of exclusion & concentration: Without safeguards, AI could deepen inequalities, create vendor lock-in, or favour large agribusinesses over smallholders in access to insights, finance and markets.

Way ahead:

- Adopt national AI strategies with agri focus: Countries should explicitly integrate agriculture into AI strategies, with budgets, timelines and links to food-security, climate and nutrition goals.
- Invest in digital public infrastructure & connectivity: Expand rural broadband, green data centres, and interoperable registries so that AI tools can plug into common, publicly governed rails.
- Build inclusive data ecosystems: Support Agricultural Data Exchange Nodes and FAIR/open data principles so local data (crops, soils, weather, practices) can safely train context-specific models.
- Strengthen skills and extension systems: Train farmers, extension workers and agri-startups in digital and AI literacy, using local-language, multimodal interfaces and train-the-trainer models.
- Create robust governance & ethical frameworks: Enact laws on data rights, transparency, environmental standards and accountability for AI, using sandboxes and participatory policy-making.

Conclusion:

AI has the potential to significantly boost productivity, resilience, and efficiency across agrifood systems. However, to realise these gains, countries must bridge digital infrastructure gaps, strengthen data ecosystems, build farmer-level capacities, and ensure robust governance. Used responsibly and inclusively, AI can complement wider agricultural reforms and support long-term food security, income growth, and environmental sustainability.

3. COP30 Draft Outcome

Context: The COP30 climate summit in Belém, Brazil, has entered its final hours amid a major global split after the new draft outcome text removed all references to fossil fuels—including the roadmap for a transition away, demanded by over 80 countries.

About COP30 Draft Outcome:

What it is?

- The COP30 draft outcome text is the proposed final political declaration prepared by the Brazilian Presidency, summarising the agreed global commitments on climate mitigation, adaptation, finance and implementation under the Paris Agreement.
- It will become the summit's formal "cover decision" only if adopted by consensus.

Key Outcomes as feature:

- No mention of "fossil fuels" or phase-out roadmap: The revised draft removes all language on transitioning away from coal, oil and gas—a reversal from earlier drafts and from the COP28 Global Stocktake commitment to shift away from fossil fuels.
- No timeline or milestones for fossil-fuel transition: Despite support from 80+ countries, the draft avoids setting deadlines or mechanisms for an orderly fossil-fuel phase-down or phase-out.
- Push for climate finance enhancement: Calls for tripling climate finance by 2030 relative to 2025 levels, but does not specify who must pay or how the target will be met.
- References to adaptation and NCQG discussions: Mentions progress on adaptation, including a high-level ministerial roundtable on the New Collective Quantified Goal (NCQG)—the new climate finance

target to replace the old -billion goal.

- Avoidance of politically sensitive commitments: Draft avoids strong language on trade barriers, just transition measures, and emissions reduction pathways—reflecting pressure from major fossil-fuel producers and large developing economies.

Significance:

- Triggers a major diplomatic standoff: 29 nations formally threatened to block the draft, marking one of the sharpest divisions in COP history.
- Seen as a rollback from COP28 Dubai: COP28's historic agreement to "transition away from fossil fuels" risks being undermined if COP30 does not reaffirm or build on it.
- Raises questions on credibility of global climate process: Environmental groups warn that passing a weak, fossil-fuel-free text would signal a breakdown of climate multilateralism.

4. Dugong

Context: A new global report released at the IUCN Conservation Congress in Abu Dhabi has warned that India's dugong (sea cow) populations in the Gulf of Kutch, Gulf of Mannar–Palk Bay, and Andaman & Nicobar Islands.

About Dugong:

What it is?

- Dugong (Dugong dugon) is a large herbivorous marine mammal, closely related to manatees and more distantly to elephants.
- They are slow-moving, gentle sea-grazers that inspired ancient myths of mermaids due to their appearance and behaviour.

Habitat (Indian & Global):

- Found in warm, shallow coastal waters of the Indian and Pacific Oceans.
- Major Indian habitats: Gulf of Mannar–Palk Bay (TN), Andaman & Nicobar Islands, and Gulf of Kutch (Gujarat).
- Globally distributed from East Africa to Australia, with the largest stable population near northwestern Australia.

Conservation Status:

- IUCN Red List: Vulnerable (declining populations since 1982).
- Wild Life (Protection) Act, 1972 (India): Schedule I – highest level of legal protection.

Key Features of Dugongs:

- Grow up to 3 m long and weigh 300–420 kg: Dugongs are large, streamlined marine mammals whose considerable size supports slow movement and constant grazing in shallow coastal waters.
- Have a whale-like tail fluke and paddle-shaped flippers: Their tail fluke enables gentle, rhythmic swimming, while broad flippers help in manoeuvring through seagrass meadows where they forage.
- Exclusively herbivorous, feeding mainly on seagrass meadows: Dugongs rely entirely on seagrass for nutrition, making them one of the few strictly plant-eating marine mammals and tightly linking them to coastal ecosystems.
- Consume 30–40 kg of seagrass daily, acting as "ecosystem engineers": Their heavy grazing naturally trims seagrass beds, preventing overgrowth and encouraging healthy regrowth, which sustains diverse marine life.
- Seagrass habitats maintained by dugongs are excellent blue carbon sinks: By promoting seagrass productivity and turnover, dugongs indirectly support the storage of large amounts of carbon in

sediments, aiding climate regulation.

- Long lifespan (up to 70 years) but very low reproductive rate: Female dugongs give birth only once every 3–7 years, making population recovery slow and increasing vulnerability to environmental and human pressures.

Major Threats to Dugongs:

- Habitat Loss & Seagrass Degradation: Coastal pollution, sedimentation, turbidity, dredging, and port development destroy seagrass meadows—the dugong's only food.
- Fisheries Bycatch: Accidental entanglement in fishing nets is the biggest killer across Tamil Nadu, A&N Islands, and Gujarat.
- Marine Pollution & Heavy Metals: A recent study detected arsenic, cadmium, chromium, mercury & lead in dugong tissues, entering through wastewater discharge and agricultural runoff.

5. The Great Indian Bustard

Context: The Great Indian Bustard (GIB) returned to spotlight after Supreme Court Justice P.S. Narasimha observed that Western-origin environmental doctrines like "inter-generational equity" are inadequate to save critically endangered species.

About the Great Indian Bustard:

What it is?

- The Great Indian Bustard (GIB) is one of the heaviest flying birds in the world, endemic to the Indian subcontinent.
- Once widespread across India and Pakistan, it now survives in small pockets—mainly the Thar Desert (Rajasthan) and parts of Gujarat, Maharashtra, and Karnataka.

Habitat: Prefers arid and semi-arid grasslands with sparse vegetation, often sharing its habitat with blackbucks and chinkaras. It nests on open, undisturbed plains, making it highly vulnerable to human activities.

Conservation Status:

- IUCN Red List: Critically Endangered
- Wildlife (Protection) Act, 1972: Schedule I
- CITES: Appendix I
- CMS Convention: Appendix I
- Part of the Integrated Development of Wildlife Habitats (IDWH) species recovery programme

Physical Characteristics:

- Height: ~1 metre; Weight: 15–18 kg
- Distinctive black crown, white neck and underparts, and brown wings with grey and black markings
- Males have a prominent black breast band and a gular pouch that produces a booming mating call audible up to 500 m
- Diet: Omnivorous — feeds on grass seeds, insects, small reptiles, and rodents

About Intergenerational Equity:

What it is?

- The principle of intergenerational equity holds that each generation acts as a trustee of the Earth, enjoying its resources while ensuring they are passed on to future generations in no worse condition.
- It forms the ethical and legal foundation of sustainable development.
- Core Principles:
  - Trusteeship: Every generation must protect and preserve the planet as a shared trust.
  - Conservation of Options: Maintain resource diversity so future generations have comparable

choices.

- Conservation of Quality: Preserve environmental quality—air, water, soil, biodiversity—for future resilience.
- Conservation of Access: Use resources equitably today without denying fair access to tomorrow's users.

6. COP30 – UN Climate Summit 2025

Context: The 30th Conference of the Parties (COP30) to the UNFCCC began in Belém, Brazil, marking the decade since the Paris Agreement and focusing on translating global climate commitments into concrete implementation.

About COP30 – UN Climate Summit 2025:

What it is?

- COP30 is the annual UN Climate Conference under the UN Framework Convention on Climate Change (UNFCCC), where nations assess progress on the Paris Agreement, strengthen emission targets, and negotiate finance and adaptation frameworks.

Host: Hosted by Brazil in the Amazonian city of Belém.

Aim:

- To make COP30 an "Implementation COP" that turns pledges into measurable outcomes, ensuring fair, inclusive, and equitable climate transitions aligned with the principles of Common but Differentiated Responsibilities and Respective Capabilities (CBDR-RC).

Key Initiatives Expected:

1. Global Stocktake (GST): First major review since the Paris Agreement to assess global progress and identify gaps in mitigation and adaptation.
2. New Collective Quantified Goal (NCQG): To scale climate finance from $100 billion to $300 billion annually by 2035, with a roadmap to mobilise $1.3 trillion per year from all actors.
3. Global Goal on Adaptation (GGA): Establishing quantifiable, measurable targets and funding for climate resilience.
4. Baku-to-Belém Climate Finance Roadmap: Framework to operationalise predictable finance for developing nations.
5. Tropical Forests Forever Facility (TFFF): Brazil-led blended-finance fund to reward nations conserving tropical forests.
6. Integration of Climate and Biodiversity Agendas: Linking carbon reduction with forest, ocean, and soil restoration.

Significance:

- Marks 10 years since the Paris Agreement, focusing on implementation over intent.
- Reinforces equity and justice by spotlighting the Global South's priorities, especially finance, technology, and capacity building.
- Emphasises just transitions in energy, industry, and transport for developing economies.

7. A Policy Framework for Relocation and Co-existence in India's Tiger Reserves

Context: The Ministry of Tribal Affairs has released "A Policy Framework for Relocation and Co-existence in India's Tiger Reserves" to safeguard forest-dwelling tribes' rights under the Forest Rights Act, 2006

during relocation and promote community-inclusive conservation.

About A Policy Framework for Relocation and Co-existence in India's Tiger Reserves:

What it is?

- A national-level policy framework developed by the Ministry of Tribal Affairs (MoTA) in 2025 to guide how forest-dwelling Scheduled Tribes and other traditional forest dwellers are to be treated during relocation from tiger reserves.
- It seeks to balance tiger conservation with constitutional and legal safeguards for tribal communities.

Organisations Involved:

- Ministry of Tribal Affairs (MoTA) – Nodal Ministry drafting the framework.
- Ministry of Environment, Forests and Climate Change (MoEFCC) – To collaborate in implementing the framework.
- National Tiger Conservation Authority (NTCA) – Existing regulatory authority for tiger reserves whose directives prompted the new framework.

Key Features:

1. Last-resort Relocation Principle: Relocation of forest-dwelling communities to be undertaken only as a last option, and strictly after settling rights under the Forest Rights Act (FRA), 2006.
2. Consent-based Process: Mandates free, prior, and informed consent from every Gram Sabha and household before declaring any area as part of a tiger reserve.
3. Co-existence Option: Recognises the right of communities to continue residing within tiger reserves, exercising FRA rights with State support for basic amenities and co-management roles.
4. Collaborative Governance: Proposes a National Framework for Community-Centred Conservation and Relocation, co-led by MoEFCC and MoTA, to set procedural standards, timelines, and accountability.
5. Transparency and Monitoring: Establishes a National Database on Conservation–Community Interface (NDCCI) to track relocations, compensation, and post-relocation outcomes.
6. Independent Audits: Annual third-party audits of relocation projects to ensure compliance with FRA, Wildlife Protection Act (WPA), 1972, and human rights norms.
7. Affirmative State Duty: Reiterates that the State has a constitutional duty to protect FRA rights, which may be curtailed only upon demonstrable ecological necessity.
8. Joint Ministry Oversight: Encourages inter-ministerial coordination to ensure relocation is voluntary, rights-compliant, and scientifically justified.

Significance:

- Protects tribal rights: Reinforces the constitutional and legal safeguards under FRA, ensuring communities are not displaced without consent or rehabilitation.
- Balances conservation with justice: Marks a shift from exclusionary conservation models to community-inclusive, co-management approaches in tiger reserves.
- Prevents forced relocations: Responds to protests following NTCA's 2024 directive prioritising village relocations, ensuring ethical and voluntary processes.

8. FAO released The State of Food and Agriculture 2025 report

Context: The Food and Agriculture Organization (FAO) released The State of Food and Agriculture 2025 report titled "Addressing Land Degradation Across Landholding Scales," highlighting how human-induced land degradation undermines global food production.

About FAO released The State of Food and Agriculture 2025 report:

What it is?

- An annual flagship publication of the FAO, assessing global agricultural and food systems performance.

- Published by: Food and Agriculture Organization (FAO), Rome (2025).
- Aim: To examine human-induced land degradation and its implications for agricultural productivity, livelihoods, and environmental sustainability, while guiding policies to avoid, reduce, and reverse degradation across scales

Key Trends Identified in the FAO Report:

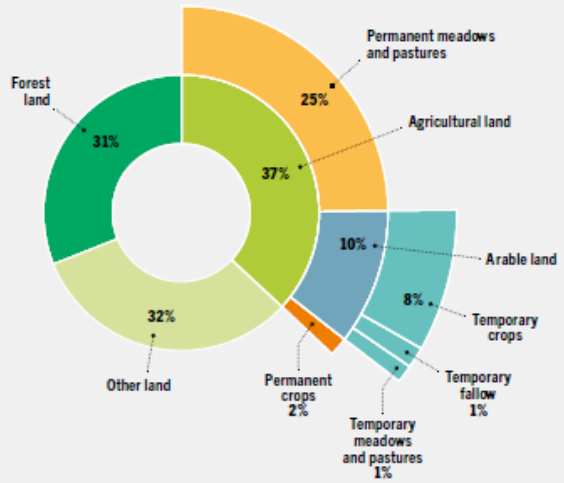
1. Global Cropland Decline: About 20% of the world's cropland shows declining productivity due to human-induced degradation, including soil erosion and organic carbon loss, particularly across Asia, Africa, and Latin America.
2. Regional Yield Gap Severity: Yield gaps for 10 major crops reach up to 70% below potential levels in sub-Saharan Africa and South Asia, linked to low soil fertility, nutrient depletion, and limited access to inputs.
3. Soil Organic Carbon Loss: Global decline in soil organic carbon (SOC) is reducing water retention and microbial activity, weakening resilience to droughts and floods in semi-arid regions.
4. Smallholder Constraints: Small farms under 2 hectares represent 84% of all farms but hold only 12% of farmland, leaving them vulnerable to land degradation due to poor access to finance and technology.
5. Large Farm Impacts: The top 1% of farms control over 70% of agricultural land, often intensifying degradation through monocropping and excessive fertilizer use, yet having more resources for restoration.
6. Land Abandonment Expansion: From 1992 to 2015, over 60 million hectares of cropland were abandoned globally—mainly in Eastern Europe, Central Asia, and South America—due to yield decline and migration.
7. Climate–Degradation Nexus: Degraded soils now emit significant greenhouse gases, worsening climate change; FAO links this to reduced productivity, carbon sequestration, and SDG 15.3 setbacks in land neutrality.

Analysis — Success and Gaps:

Successes:

- Land Degradation Debt Model: FAO 2025 introduces a machine learning-based model comparing current and natural soil states, revealing a 30% loss in tree cover, 20% loss in biomass carbon, and a fourfold rise in soil erosion due to human activity — offering the most accurate global assessment yet.
- Quantifying Global Economic Costs: The report estimates the global cost of land degradation at around USD 300 billion annually, with over three-fourths of losses from land-use and cover change, establishing land restoration as an essential public investment priority.

FIGURE 1 WORLD AGRICULTURAL LAND AREA BY MAIN CATEGORY, 2023



SOURCE: Authors' own elaboration based on Figure 1 in FAO. 2025. *Land statistics 2001–2023*. FAOSTAT Analytical Briefs, No. 107. Rome. https://doi.org/10.4060/cd5765en

- Yield Gap and Socioeconomic Risk Correlation: A 10% increase in degradation debt widens agricultural yield gaps by 2%, particularly in Southeast Asia and Western Europe, showing that intensive cultivation hides underlying soil fertility decline and rising vulnerability.

- Multi-Scale Policy Design: Through the GAEZ v5 global dataset, FAO links land degradation data to farm-size structures, enabling scale-sensitive restoration policies that balance interventions for both smallholders and large commercial farms.

Gaps / Failures

- Weak Institutional and Monitoring Capacity: Low-income nations face limited technical and satellite-monitoring capacity to track land degradation, unlike advanced models such as Inner Mongolia's satellite-based grazing regulation system, which shows measurable success.
- Inadequate Financing and Coordination: Although USD 19 billion has been pledged under initiatives like the Great Green Wall, poor donor coordination, weak national alignment, and short project cycles cause restoration fatigue and inconsistent outcomes.
- Limited Integration with Climate and Livelihood Goals: Land restoration projects are poorly aligned with SDG 13 (Climate Action) and SDG 8 (Decent Work), rarely embedding gender-sensitive livelihood benefits, which reduces their social and economic inclusiveness.
- Underrepresentation of Indigenous Stewardship: Despite proven ecological success in East African pastoral and Latin American community systems, indigenous land governance models remain marginal in formal policy, limiting culturally rooted restoration outcomes.

Challenges Identified:

- Land Inequality: Top 1% of farms control over 70% of global farmland, limiting equitable access to restoration finance and technology.
- Investment Deficit: Less than 15% of agricultural investment is directed toward sustainable land management practices.
- Policy Fragmentation: Disconnect between land, water, and energy policies leads to inconsistent regional implementation.
- Data and Knowledge Gaps: Weak monitoring of soil carbon, erosion, and biodiversity impedes global reporting on SDG 15.3.
- Climate Shocks: Frequent droughts and floods are intensifying land degradation, particularly in semi-arid zones of Africa and Asia.

FAO Recommendations:

- Scale-Specific Interventions: Tailor restoration policies by farm size—incentivize smallholders through payments for ecosystem services, and regulate large-scale farms for sustainable input use.
- Invest in Land Restoration: Expand public–private partnerships for carbon farming and regenerative agriculture, using models tested in Latin America and sub-Saharan Africa.
- Empower Local and Indigenous Actors: Integrate community-led and gender-inclusive restoration projects into national strategies.
- Enhance Global Monitoring: Establish a Global Land Degradation Data Hub integrating remote sensing and ground data for real-time tracking.
- Align with SDGs: Link national restoration policies to SDG 2 (Zero Hunger), SDG 13 (Climate Action), and SDG 15 (Life on Land) for policy coherence.

Conclusion:

The 2025 FAO report confirms that land degradation threatens nearly one-fifth of global cropland, with smallholders and developing nations hit hardest. It calls for science-driven, equity-centered, and scale-sensitive solutions to close yield gaps and restore soil health. Without immediate action, global food security and climate targets could face irreversible setbacks by 2030.

9. Bihar's Gogabeel Lake – 94th Ramsar Site of India

Context: Gogabeel Lake in Katihar district, Bihar, has been officially added to the list of Ramsar Sites,

becoming India's 94th Wetland of International Importance under the Ramsar Convention.

About Bihar's Gogabeel Lake – 94th Ramsar Site of India:

What it is?

- Gogabeel is a natural oxbow lake—a crescent-shaped waterbody formed by the meandering of rivers—located between the Ganga and Mahananda rivers in Katihar district, Bihar. It acts as a seasonal floodplain connecting both rivers during high water levels.

Location and formation:

- Formed from the flow of Mahananda and Kankhar rivers in the north and Ganga in the south and east.
- Spread over 57 hectares as a Community Reserve and 30 hectares as a Conservation Reserve.
- Declared Bihar's first Community Reserve in 2019 under the Wildlife (Protection) Act, 1972.

Historical background:

- Initially declared a "Closed Area" in 1990, renewed till 2000.
- Lost its legal protection after the 2002 amendment to the Wildlife Act removed the "Closed Area" provision.
- Regained recognition as an Important Bird Area (IBA) in 2004 and 2017 by the Indian Bird Conservation Network (IBCN) and BirdLife International.
- After community efforts led by NGOs like Janlakshya and Goga Vikas Samiti, it was notified as a Community Reserve in 2019.
- Now recognized globally as a Ramsar Site (2025), acknowledging its ecological importance.

Ecological and biodiversity features:

- Supports over 90 bird species, including 30 migratory ones using the Central Asian Flyway.
- Habitat for vulnerable species such as Common Pochard (Aythya ferina) and Lesser Adjutant Stork; Black-necked Stork, White Ibis, and White-eyed Pochard are listed as Near Threatened.
- Also serves as a breeding ground for the vulnerable catfish Wallago attu.
- Identified as an Important Bird and Biodiversity Area (IBA) by BNHS and IUCN.
- Provides livelihood through fishing, cattle grazing, and irrigation, though excessive fertilizer use threatens its ecosystem.

10. The Research, Development and Innovation (RDI) Scheme

Context: Prime Minister of India inaugurated the Emerging Science & Technology Innovation Conclave (ESTIC) 2025 at Bharat Mandapam, New Delhi, and launched the ₹1 lakh-crore Research, Development, and Innovation (RDI) Scheme Fund to boost private investment in high-risk, high-impact R&D projects.

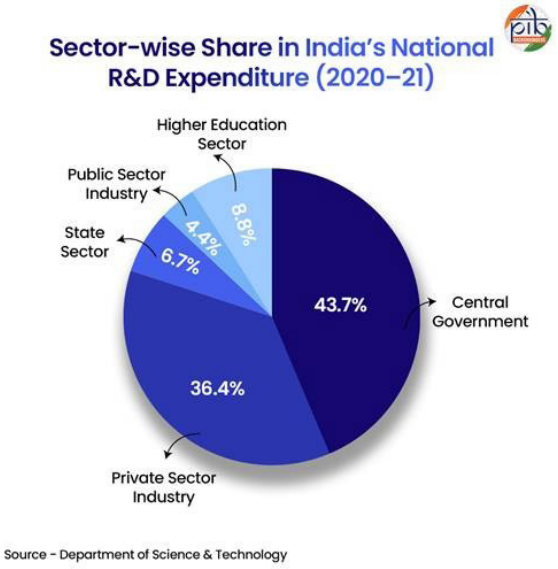
About India Leap in R &D:

India's R&D Push:

- Strategic pivot: India is making a decisive shift toward an innovation-driven economy, strengthening collaboration between academia, industry, and government to pursue high-risk, high-impact technologies.
- GERD trend: The nation's Gross Expenditure on R&D has doubled from ₹60,196.75 crore in 2010–11 to ₹1,27,380.96 crore in 2020–21, though it still remains below 0.7% of GDP, far lower than global leaders.
- Funding mix: The Central Government contributes about 43.7% of total R&D spending, with the government sector accounting for 64% and the private sector 36%, showing the need for greater

corporate participation.

- Human capital: India awarded 40,813 doctorates in 2018–19, with 60% in Science and Technology, ranking third globally in S&E PhDs and highlighting strong potential for research expansion.
- Innovation output: Patent filings in India tripled from 24,326 in 2020–21 to 68,176 in 2024–25, reflecting a surge in domestic innovation and intellectual property creation.



About The Research, Development & Innovation (RDI) Scheme:

What it is?

- A landmark ₹1 lakh-crore corpus, launched on November 3, 2025, to fund and refinance private-sector research, development, and innovation (RDI) projects through long-tenure, low or zero-interest loans—promoting bold, high-risk scientific ventures.

Aim: To de-risk high-TRL and high-impact projects, attract private capital into frontier technologies, and accelerate the lab-to-market transition in areas critical to national competitiveness and self-reliance.

Features:

- Long-term capital access: Offers flexible, long-duration financing to encourage private R&D in high-risk, deep-tech sectors that usually lack commercial funding support.
- Deep-Tech Fund of Funds: Creates a dedicated fund ecosystem to back start-ups and innovation-driven enterprises working on cutting-edge technologies like AI, semiconductors, and biotechnology.
- Critical technology acquisition: Supports companies in procuring or developing strategic technologies vital for national security, energy, and digital sovereignty.
- Innovation pipeline strengthening: Provides growth and risk capital for translating prototypes into scalable, market-ready products, ensuring faster commercialisation.
- Industry–academia collaboration: Incentivises joint R&D ventures between private firms, universities, and research institutions to enhance knowledge exchange and innovation efficiency.
- Focus on sunrise sectors: Targets emerging areas such as quantum tech, green hydrogen, space, bioengineering, and next-gen communication, aligning with India's Viksit Bharat 2047 vision.

Initiatives Taken So Far:

- ANRF (Act 2023; operational 2024): Mobilise ₹50,000 cr (2023–28); ₹14,000 cr public + non-governmental sources; tighten academia–industry links.
- National Quantum Mission (₹6,003.65 cr): Quantum computing, comms, materials—2023–31 timeline for domestic platforms.
- National Supercomputing Mission: Indigenous HPC + 5 training centres (Pune, Kharagpur, Chennai, Palakkad, Goa) to scale compute skills.
- India Semiconductor Mission (PLI ₹76,000 cr): 10 projects cleared; ₹1.60 lakh cr investments incl. first SiC fab (Odisha).
- Deep Ocean Mission (₹4,077 cr): Blue-economy tech, resource mapping, marine biodiversity for sustainable exploitation.
- IndiaAI Mission (₹10,371.92 cr): Compute scaled to 38,000 GPUs; AI innovation, governance, and skilling stack.
- AIM 2.0 (till Mar 2028; ₹2,750 cr): Extend ATLs/AICs, MSME engagement, school-to-startup innovation pipeline.

Challenges Associated:

- Low R&D intensity: GERD <0.7% of GDP vs global avg ~1.8%; constrains frontier infrastructure and long-horizon science.
- Private under-investment: ~36% private share (vs >70% in R&D leaders) due to risk aversion and long payback cycles.
- Fragmented translation: Weak university–industry collaboration slows tech transfer and productisation.
- Talent & autonomy gaps: Research careers less attractive; institutional bureaucracy and limited operational autonomy.
- Innovation depth: High patents, but domestic ownership/commercialisation and global partnerships need scaling.

Way Ahead:

- Lift GERD to 2%+ of GDP: Stage-wise targets; ring-fenced mission budgets and stable multi-year grants.
- Crowd-in private capital: Expand RDI corpus, tax credits for BERD, outcome-linked procurement, and co-funded challenge grants.
- Supercharge translation: IP acceleration funds, tech transfer offices, standard IPR/royalty norms, and sandboxed regulation.
- Talent flywheel: Tenure-track hiring, global fellowships, reverse-brain-drain chairs, and performance-based autonomy.
- Globalisation of labs: Big-science partnerships, open-data platforms, and standards leadership in AI/quantum/6G.

Conclusion:

India has built strong innovation rails and is now backing them with risk-tolerant capital via the ₹1 lakh-cr RDI Scheme. To convert scale into scientific depth, India must raise R&D intensity, crowd-in private BERD, and fast-track translation. With coherent funding, autonomy, and global linkages, India can move from islands of excellence to a continent of innovation by 2047.

11. Setting Up an Early Warning System (EWS) for the Himalayas

Context: The Himalayas are witnessing an alarming rise in climate-induced disasters—from floods and landslides to glacial lake bursts—prompting scientists to call for robust early warning systems (EWS) across the fragile mountain range to reduce loss of life and property.

About Setting Up an Early Warning System (EWS) for the Himalayas

Rising Disaster Trend in the Himalayas:

- Between 1900–2022, India faced 687 disasters, of which 240 occurred in the Himalayan belt (DTE 2024).
- The number of disasters rose sharply—only 5 incidents before 1962, but 68 between 2013–2022, accounting for 44% of India's total disasters.
- NASA data (2007–2017) recorded 1,121 landslide events, reflecting growing instability.
- The region is warming at 0.15°C–0.60°C per decade, faster than the global average, intensifying snowmelt and flash floods.
- Extreme weather events—including cloudbursts, avalanches, and GLOFs—are increasing in both frequency and scale.

Cruciality of Early Warning Systems (EWS):

- Life-saving Mechanism: Early alerts allow timely evacuation and response, preventing large-scale loss

of life in flood and landslide-prone Himalayan valleys.

- Disaster Preparedness: EWS facilitates real-time detection and forecasting of hazards like GLOFs, cloudbursts, and avalanches for rapid action.
- Scientific Data Backbone: Creates a continuous, data-driven record for risk modelling, helping design safer infrastructure and mitigation plans.
- Community Resilience: Engaging locals in EWS operations builds awareness, accountability, and faster ground-level response during crises.
- Proven Success: Successes in Switzerland and China show that early warning and community coordination can avert glacier-related disasters.

Successful International and Domestic Examples:

- Switzerland: Local early alerts and community coordination averted glacier-collapse disasters.
- China (Cirenmaco Lake): EWS based on satellite-fed glacial lake monitoring using unmanned boats.
- India: Environment Ministry-funded project to develop AI-based hailstorm EWS for apple farmers in the Himalayas.

Role of Artificial Intelligence and Technology:

- AI-aided models can process live data into predictive warnings with sub-kilometre accuracy.
- Satellite links and unmanned monitoring boats can track lake levels and glacier movement (as used by Chinese Academy of Sciences, 2022).
- Drone surveillance helps in localized assessments but remains limited by scale, weather, and cost.
- AI-integrated EWS prototypes are being tested for hailstorm and cloudburst predictions in Uttarakhand and Himachal Pradesh.

Challenges to Installing EWS in the Himalayas:

- Rugged Terrain: The Himalayas' steep, remote landscapes make sensor installation, calibration, and year-round maintenance difficult.
- Poor Connectivity: Many valleys lack telecom and internet access, hindering the real-time transmission of hazard data to control centres.
- High Cost and Technology Gaps: The absence of affordable, weather-proof indigenous EWS technology limits large-scale deployment.
- Fragmented Governance: Weak inter-agency coordination and overlapping mandates delay decision-making and operational execution.
- Lack of Community Involvement: Without local training and ownership, systems remain underused and fail to trigger timely evacuation.

Way Ahead:

- Develop Indigenous Systems: Create AI-integrated, solar-powered, and low-cost EWS prototypes designed for Himalayan geography.
- Valley-Level Coverage: Deploy EWS networks in every major Himalayan valley, ensuring coordination across borders and watersheds.
- Integrate AI and Satellite Data: Use AI forecasting models and satellite imaging to enhance real-time hazard mapping and accuracy.
- Empower Local Communities: Train village task forces and youth groups to manage and act on EWS signals independently.
- Institutional Reform: Establish a National Himalayan Early Warning Mission (NDMA) to unify research, deployment, and response under one command.

Conclusion:

The Himalayas stand at the frontline of the climate crisis, yet remain poorly equipped with disaster alert systems. Building an integrated, community-driven, and technology-powered early warning network is vital for saving lives and ecosystems.

Safeguarding the "third pole" must now be treated as a national climate-security priority.

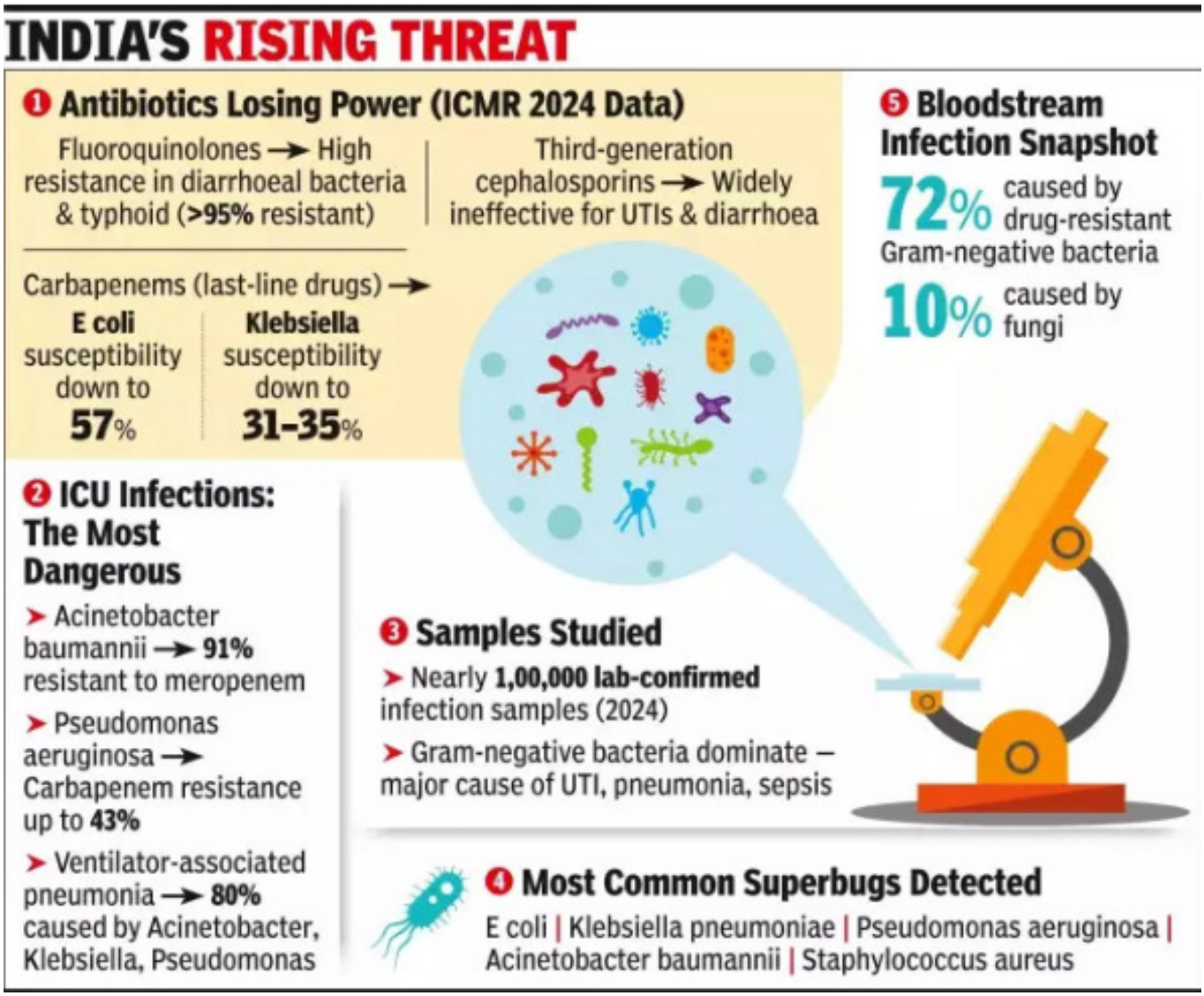
Chapter-
5

SCIENCE & TECHNOLOGY

1. Superbugs

Context: ICMR's AMRSN Report 2024 warns that common infections in India—UTIs, pneumonia, sepsis, diarrhoea—are becoming harder to treat as routine antibiotics fail.

- Superbugs like coli, Klebsiella, Acinetobacter and Pseudomonas now show high resistance to fluoroquinolones, cephalosporins and even last-line carbapenems.



About Superbugs:

What is a Superbug?

- A superbug is a bacteria or fungus that becomes resistant to multiple antibiotics or antifungals, making routine infections extremely difficult to treat.

How Superbugs Form?

- They evolve resistance due to misuse/overuse of antibiotics, incomplete dosing, hospital overexposure to high-end drugs, and gene transfer between microbes.

Types of Common Superbugs:

- Bacterial: coli, Klebsiella pneumoniae, Acinetobacter baumannii, Pseudomonas aeruginosa, MRSA, CRE.

- Fungal: Candida auris, Aspergillus fumigatus with rising antifungal resistance.

Symptoms of Superbug Infections:

- Symptoms vary by organ but include persistent fever, chills, septic shock, painful skin lesions, breathing difficulty, extreme fatigue, rapid heart rate or low blood pressure.

Implications:

- Treatment Failure: Even strong antibiotics stop working, forcing toxic or expensive drug combinations.
- Higher Mortality: ICU infections like ventilator-associated pneumonia become life-threatening.
- Longer Hospital Stays: Patients require prolonged isolation, raising healthcare burden.
- Economic Loss: Increased cost of treatment, lost productivity, and higher burden on public hospitals.
- Threat of Untreatable Infections: Everyday illnesses could become fatal like in the pre-antibiotic era.

Significance:

- Highlights urgent need for India-wide antibiotic stewardship and infection-control protocols.
- Signals rising global AMR threat, jeopardising SDG targets on health and well-being.
- Calls for surveillance strengthening, new drug discovery, and regulated antibiotic sales.

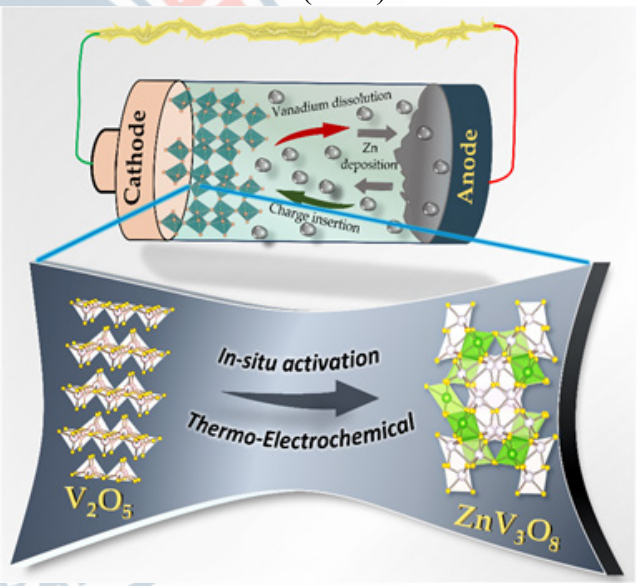
2. Zinc-Ion Batteries (ZIBs)

Context: A Bengaluru-based DST institute (CeNS) has developed a breakthrough cathode activation technique that dramatically improves the performance of zinc-ion batteries (ZIBs).

About Zinc-Ion Batteries (ZIBs):

What they are?

- Aqueous zinc-ion batteries are rechargeable batteries that use zinc metal as the anode and an aqueous electrolyte, offering a safer and more eco-friendly alternative to lithium-ion systems.
- Developed By: The new high-performance ZIB cathode was developed by researchers at the Centre for Nano and Soft Matter Sciences (CeNS), Bengaluru.
- Aim: To create a stable, high-energy-density, eco-friendly battery technology that overcomes limitations of lithium batteries (fire risk, resource scarcity, high cost).



- How it works?
  - Scientists applied a thermo-electrochemical activation process to modify the structure of V_2O_5 (vanadium oxide).
  - This treatment introduces useful defects, converting it into Zn-V_2O_5, with porous pathways that allow zinc ions and hydrogen ions to move easily.
  - Result: faster ion transport, higher energy storage, and longer battery life.

Key Features:

- Higher Energy Density: Zn-V_2O_5 stores far more energy than untreated V_2O_5.
- Exceptional Longevity: Can withstand thousands of charge cycles with minimal degradation.
- Hydrogen-ion Stabilisation: The modified structure improves stability during ion insertion.
- Fully Aqueous Electrolyte: Makes the system non-flammable and safer than lithium batteries.
- Low-Cost Materials: Uses abundant zinc, avoiding expensive lithium and cobalt.
- Significance:
  - Eco-friendly & safer energy storage for grid-scale and consumer applications.
  - Reduces India's dependence on imported lithium and cobalt.
  - Supports clean-energy transitions, renewables integration, and electric mobility.

3. BIRSA 101 Gene Therapy

Context: India has launched its first indigenous CRISPR-based gene therapy for Sickle Cell Disease, named BIRSA 101, marking a major milestone in affordable genomic medicine.

About BIRSA 101 Gene Therapy:

What it is?

- BIRSA 101 is India's first indigenously developed CRISPR gene-editing therapy designed to cure Sickle Cell Disease (SCD)—a severe hereditary blood disorder disproportionately affecting India's tribal communities.

Developed by: CSIR–Institute of Genomics & Integrative Biology (IGIB)

- In partnership with the Serum Institute of India (SIIPL) for technology transfer, scale-up, and affordable national deployment.
- Named in honour of Birsa Munda, whose 150th birth anniversary was recently observed.

Objective:

- To support India's mission of becoming Sickle Cell–Free by 2047, as envisioned by the Prime Minister.
- To make cutting-edge gene therapy affordable, replacing global treatments costing ₹20–25 crore with indigenous, low-cost solutions.

How It Works?

- BIRSA 101 uses CRISPR technology like "precise genetic surgery" to edit defective genes inside the patient's cells.
- It corrects the mutation responsible for producing sickle-shaped red blood cells, thereby enabling normal haemoglobin production.
- Once edited, the corrected stem cells are infused back into the patient, offering a potential one-time, lifelong cure.

Key Features:

- Fully indigenous CRISPR platform (enFnCas9) engineered by IGIB.
- Low-cost alternative to global therapies costing crores.
- Developed under India's Atmanirbhar Bharat push for medical self-reliance.
- Backed by a public–private partnership ensuring scalability, safety, and regulatory readiness.
- Supported by a new advanced translational research facility at CSIR-IGIB.

Significance:

- Positions India among the global leaders in advanced gene-editing therapies.
- Major step toward eliminating a debilitating disease common in Gond, Munda, Bhil, Santal, and other tribal groups.
- Enhances India's capability to produce world-class therapies at a fraction of international prices.

4. Kodaikanal Solar Observatory (KoSO)

Context: Scientists from ARIES, IIA and global collaborators have reconstructed over 100 years of the Sun's polar magnetic history using archival data from the Kodaikanal Solar Observatory (KoSO).

About Kodaikanal Solar Observatory (KoSO):

What it is?

- KoSO is one of India's oldest and globally renowned solar observatories, conducting continuous solar observations for more than 120 years.

- Location: Situated in the Palani Hills, Tamil Nadu, KoSO functions as a field station of the Indian Institute of Astrophysics (IIA), Bengaluru.

History:

- Established in 1899.
- Systematic solar imaging in the Ca II K wavelength began in 1904, creating one of the world's longest solar data archives.

Key Features:

- Continuous solar observations for over a century — among the longest consistent solar records globally.
- Multi-wavelength imaging of the chromosphere capturing plages, sunspot groups, magnetic networks.
- A digitised database now publicly available, enabling global scientific access.

About Sun's Magnetic Future:

What it is?

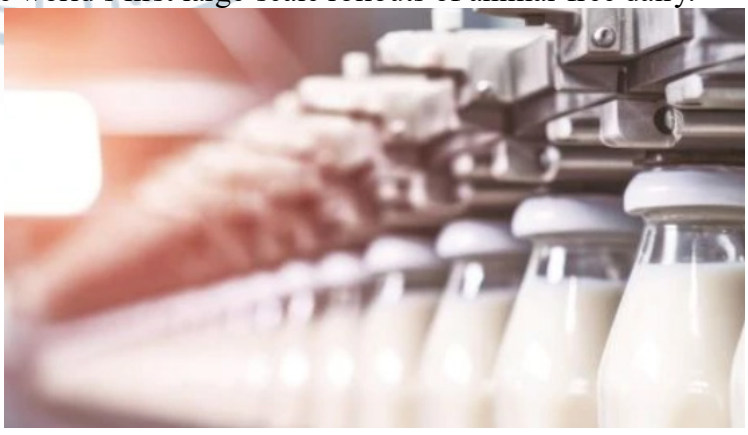
- The Sun's magnetic future refers to the predicted behaviour of its polar magnetic fields—key drivers of the 11-year solar cycle, sunspots, flares, and geomagnetic storms.

- Breakthrough:
  - ARIES-led researchers reconstructed the Sun's polar magnetic fields from 1904 to 2022 by analysing KoSO's Ca II K images.
  - They used Rome-PSPT data, AI-based feature recognition, and Polar Network Index (PNI) to identify faint bright structures near the poles.
  - These structures act as proxies for magnetic field strength before direct polar field measurements began in 1976.
- Significance:
  - Offers the first reliable, century-long reconstruction of solar magnetism.
  - Helps predict the strength of ongoing Solar Cycle 25 and future solar activity.
  - Crucial for forecasting solar storms that can disrupt GPS, communications, satellites, aviation, and power grids.

5. Lab-Grown Milk

Context: Israel-based startup Remilk has announced the commercial launch of its lab-grown "cow-free" milk from January 2026, marking one of the world's first large-scale rollouts of animal-free dairy.

About Lab-Grown Milk:



What it is?

- Lab-grown milk, or animal-free dairy, is real milk made without cows using biotechnological methods.
- Unlike plant-based milks (soy, almond, oat), it contains actual dairy proteins—casein and whey—identical to cow's milk, making it suitable for traditional dairy uses like cheese, curd, and yogurt.

Developed by:

- Pioneered by Israeli food-tech firms such as Remilk, Imagindairy, and Wilk.

Process:

1. Precision Fermentation: Milk-producing genes are inserted into microbes like yeast.

2. These microbes are grown in bioreactors, where they secrete milk proteins when fed sugar.
3. Proteins are then blended with fats, minerals, and carbohydrates to replicate cow's milk—lactose-free, cholesterol-free, and hormone-free.

Features:

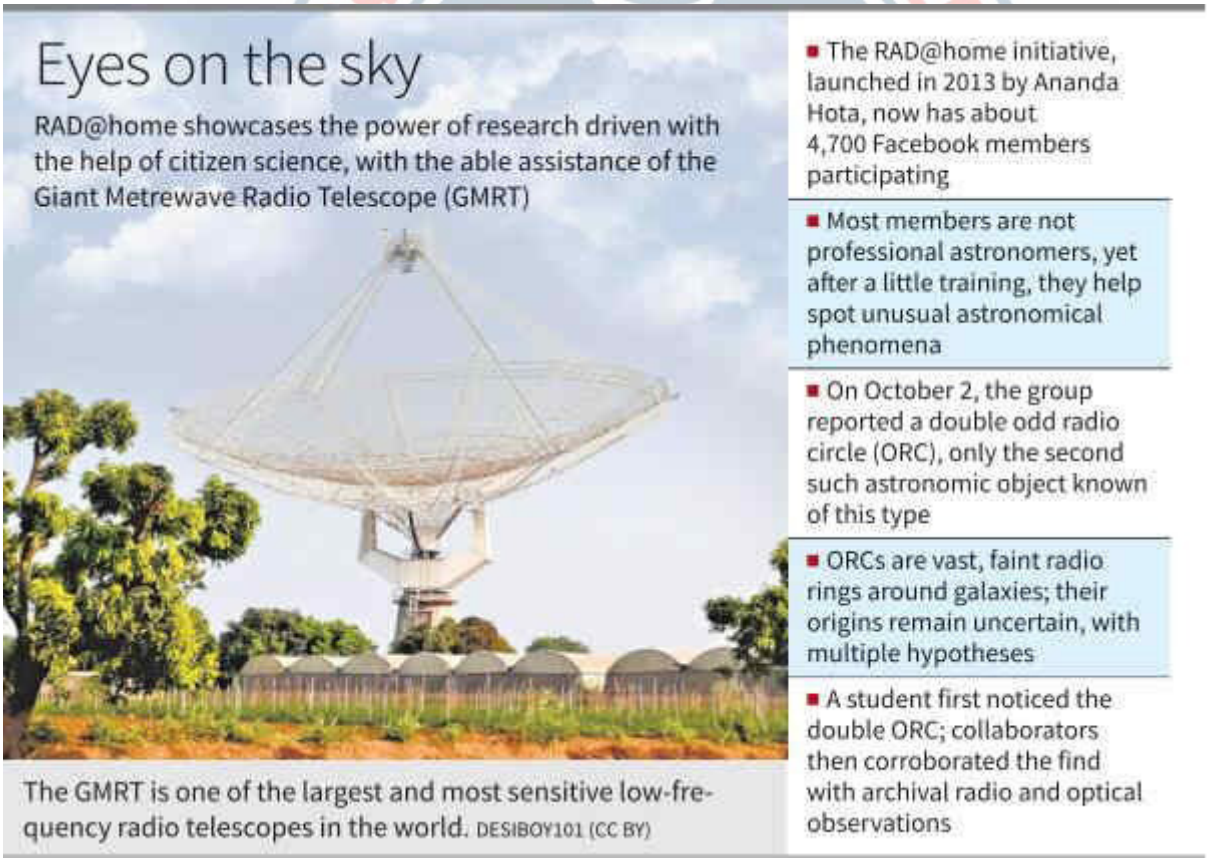
- Nutritionally identical to traditional milk—contains all nine essential amino acids, calcium, and similar fat/protein content.
- Customizable: Fat or lactose content can be altered; suitable for lactose-intolerant consumers.
- Ethical and sustainable: No animal use, antibiotics, or methane emissions.
- Allergen label required since proteins are identical to cow's milk.

Significance:

- Offers a climate-friendly alternative to conventional dairy—reducing land, water, and emissions.
- Addresses animal welfare and ethical concerns.
- For India, it opens new avenues for biotech innovation but faces cultural, cost, and regulatory challenges under FSSAI.

6. Odd Radio Circles (ORCs)

Context: Citizen scientists from India's RAD@home astronomy group, led by Prof. Ananda Hota of the University of Mumbai, have discovered a rare twin "Odd Radio Circle" (double ORC) using LOFAR telescope data — only the second such known instance globally.



About Odd Radio Circles (ORCs):

What it is?

- Odd Radio Circles (ORCs) are mysterious, circular astronomical structures visible only in radio wavelengths.
- They are vast rings of radio emission surrounding distant galaxies, thought to arise from powerful shockwaves caused by extreme galactic events such as black hole mergers or massive energy outflows.

Discovered in:

- First identified in 2019 through data from the Australian Square Kilometre Array Pathfinder (ASKAP)

telescope, and later studied using international facilities such as LOFAR and India's Giant Metrewave Radio Telescope (GMRT).

Characteristics:

1. Radio-only visibility: Detected exclusively in radio frequencies—no visible, X-ray, or infrared emission observed.
2. Circular morphology: Appear as faint, ring-like or bubble-like structures, often bright along their edges.
3. Immense scale: Among the largest cosmic structures, extending millions of light-years across.
4. Central galaxy presence: Some ORCs surround a galaxy, while others exist in isolation, deepening their mystery.
5. Twin ORCs: The newly discovered "double ORC" shows two giant plasma rings expanding in opposite directions, possibly from a central galactic outburst or collision event.

Significance:

- Scientific importance: Offers rare insights into galactic evolution, black hole activity, and intergalactic shockwave dynamics.
- Technological collaboration: Demonstrates the synergy between citizen science and advanced observatories like LOFAR and GMRT.
- Indian contribution: Highlights India's growing role in radio astronomy and public-led scientific discovery through initiatives like RAD@home, bridging education and research.

7. Project Suncatcher

Context: Google has announced Project Suncatcher, a pioneering plan to build AI-powered data centres in space to harness continuous solar energy and reduce Earth's carbon footprint.

About Project Suncatcher:

What it is?

- Project Suncatcher is Google's research initiative to create solar-powered AI data centres in space by deploying high-performance TPUs (Tensor Processing Units) aboard orbiting satellites that communicate through optical data links.

Launched by: Developed and launched by Google, under its AI and Advanced Infrastructure Division, as part of a long-term sustainability and innovation roadmap.

Aim:

- To reduce energy, water, and carbon costs of terrestrial data centres.
- To harness uninterrupted solar power available in space for round-the-clock AI computation.
- To develop a scalable space-based computing network with interlinked, high-speed satellites.

Key Features:

- Solar-Powered Satellite Constellation: Uses solar panels up to 8 times more efficient in orbit than on Earth.
- Orbiting TPUs: AI accelerators (Trillium v6e) tested under radiation for space durability.
- High-Speed Optical Links: Free-space optical communication capable of tens of terabits per second, connecting satellite nodes.
- Prototype Launch: Two test satellites planned for early 2027 to validate hardware and communication

systems.

- Scalability: Analytical models suggest satellites can operate just hundreds of meters apart, allowing clustered space-based data hubs.
- Future Cost Efficiency: By mid-2030s, falling launch costs (as low as $200/kg) could make orbital data centres economically viable.

Significance:

- Sustainability Breakthrough: Eliminates dependency on Earth's power and water resources.
- Technological Innovation: Opens avenues for distributed, radiation-resistant AI computing beyond Earth.
- Climate Impact Reduction: Helps offset the rising carbon emissions of expanding AI infrastructure.

8. Black Hole Morsels

Context: A new theoretical study proposes that tiny "black hole morsels"—micro-black holes formed in violent cosmic collisions—could produce detectable gamma-ray bursts and offer a rare test of quantum gravity via Hawking radiation.

About Black Hole Morsels:

What they are?

- These are extremely tiny black holes, much smaller than the usual ones we hear about — imagine something as massive as an asteroid, but squeezed into a point. Because they're so small, they get very hot and shine faintly by giving off energy known as Hawking radiation.

Proposed by: Scientists Giacomo Cacciapaglia and Francesco Sannino came up with this idea in a recent study accepted in Nuclear Physics B.

How they form?

- When two huge black holes crash into each other, the collision might "pinch off" tiny blobs of space so dense that they become mini–black holes, or "morsels." These morsels don't last long — they slowly evaporate, disappearing in anything from a split second to a few years, depending on their size.

What makes them special?

- Because they're small, they're much hotter and give off stronger radiation than normal black holes.
- As they vanish, they release powerful flashes of energy—bursts of gamma rays that could be seen from Earth.
- These bursts would spread out in all directions, unlike normal gamma-ray bursts, which are usually narrow beams.

Why it matters?

- Detecting one would give scientists a real-world glimpse of quantum gravity — the link between gravity and quantum physics that's never been observed directly.
- The team has already looked at telescope data to check for signs of these events — their first step toward testing the theory.
- These tiny black holes could act as "natural cosmic labs," helping us study the universe at energy levels far beyond what any human-made experiment can reach.

Chapter-
6

ECONOMY

1. Sensex and Nifty Record High

Context: Sensex and Nifty are again touching record highs, driven mainly by a narrow set of large-cap heavyweights such as leading banks and Reliance.

About Sensex and Nifty Record High:

- What is BSE?
  - BSE (Bombay Stock Exchange) is India's and Asia's oldest stock exchange, based on Dalal Street, Mumbai.
- Brief History of BSE:
  - Originated in 1870s as the Native Share and Stock Brokers Association, where brokers literally traded under a banyan tree in Mumbai.
  - Formally became the Bombay Stock Exchange in 1875, evolving from open-cry floor trading to a fully electronic platform.
  - In 1995, BSE launched BOLT (BSE On-Line Trading), moving to screen-based trading and widening retail participation.

About NSE:

What is NSE?

  - NSE (National Stock Exchange) is a nationwide, fully electronic stock exchange, created to bring transparency, speed and equal access to all investors.
  - It is now India's largest exchange by trading volume.
- Brief History of NSE:
  - Incorporated in 1992 and recognised as a stock exchange by SEBI in 1993.
  - In 1994, NSE pioneered screen-based, order-driven trading in India with the cash and wholesale debt segments, breaking the old floor-trading cartel mindset.

Difference Between BSE and NSE:

Parameter	BSE (Bombay Stock Exchange)	NSE (National Stock Exchange)
Year of Establishment	1875 — Oldest stock exchange in Asia	1992 — Set up to modernise Indian markets
Flagship Index	Sensex (30 large-cap stocks)	Nifty 50 (50 large-cap stocks)
Trading System	BOLT (BSE Online Trading)	NEAT (National Exchange for Automated Trading)
Trading Volume	Lower compared to NSE	Highest trading volume in India
Liquidity	Moderate; varies across stocks	High liquidity, especially for derivatives
Derivatives Market	Smaller derivatives segment	India's largest derivatives market (F&O dominance)

2. IMF Gives 'C' Grade for India's National Accounts Statistics

Context: The IMF's latest Article IV review has given India's national accounts statistics a 'C' grade, citing methodological weaknesses.

- Regarding India's main inflation measure, the Consumer Price Index, the IMF graded India a 'B', which means the data provided "have some shortcomings but are broadly adequate for surveillance".

About IMF Gives 'C' Grade for India's National Accounts Statistics:

- What the Grade Means?
  - A 'C' grade indicates that while data is available regularly, methodological shortcomings hamper effective economic surveillance and cross-country comparability.
- Reasons Stated by IMF:
  - Outdated Base Year (2011–12): GDP and CPI rely on an old consumption and production structure that no longer reflects the modern economy.
  - Use of WPI as Deflators: Lack of a full Producer Price Index (PPI) forces reliance on wholesale prices, weakening real GDP estimation.
  - Production vs Expenditure Gaps: Large and recurring discrepancies suggest under coverage of expenditure data and informal sector activity.
  - Limited Seasonal Adjustment: Quarterly GDP lacks robust seasonal adjustment, affecting interpretation of growth trends.
  - Need for Better Statistical Techniques: IMF points to scope for improved modelling practices in national accounts.

About India's National Accounts Statistics (NAS):

What it is?

- A comprehensive macroeconomic database published by MoSPI that provides GDP, GVA, consumption, savings, investment and related aggregates at current and constant prices.
- Methodology Used:
  - UN System of National Accounts (SNA-2008): India follows globally accepted standards for compiling macroeconomic aggregates.
  - Income Approach (Primary): GDP estimated using incomes earned by households, enterprises and government.
  - Expenditure Approach (Supplementary): Estimates GDP based on consumption, investment, government spending and net exports.
  - Sectoral GVA Method: Computes value added across agriculture, industry and services at current and constant (2011–12) prices.
- Key Indicators Published:
  - GDP & GVA—sector-wise and aggregate.
  - Consumption Expenditure—private and government.
  - Gross Capital Formation (GCF)—machinery, construction, valuables.
  - Savings & Investment Rates across sectors.
  - National Income, Disposable Income & Per-Capita Indicators.

3. IMF to Alter Classification of India's Forex Framework

Context: The International Monetary Fund is expected to change the way it classifies India's exchange rate regime, potentially describing it as having "crawling peg" like features in its 2025 Article IV report.

About IMF to Alter Classification of India's Forex Framework:

What this issue is about?

- The IMF maintains a de facto exchange rate regime

classification for all member countries based on how their currencies actually behave in the market, not only on official claims.

- For India, the IMF now likely plans to describe the regime as having crawling peg type features because the rupee is allowed to adjust gradually while the RBI still intervenes to smooth volatility.

What governs IMF exchange rate classification?

- The classification is anchored in the IMF's Articles of Agreement and its surveillance mandate under Article IV.
- IMF staff apply a uniform global methodology that looks at the actual path of the currency, the scale and pattern of intervention, and the degree of policy commitment to any exchange rate path.

Types of exchange rate classifications relevant for India:

1. No separate legal tender:
   - Use of another country's currency or membership in a currency union.
   - Monetary policy is fully surrendered to the issuing authority of that currency.
2. Hard pegs and conventional pegs:
   - Currency board arrangements with a legally fixed conversion rate and full foreign asset backing.
   - Conventional fixed peg where the domestic currency is kept within a very narrow band around a central rate using active intervention.
3. Pegged within horizontal bands:
   - The exchange rate is allowed to move within a somewhat wider announced band around a central rate.
4. Crawling pegs:
   - The central rate is adjusted periodically in small steps, often based on inflation differentials with trading partners or preannounced crawl.
   - Gives some flexibility but still constrains monetary policy like a peg.
5. Crawling bands:
   - A band around a crawling central rate where both the parity and band move over time.
   - Flexibility depends on how wide the band is.
6. Managed float with no predetermined path:
   - Central bank intervenes to smooth volatility but without any announced or systematic path for the currency.
   - Decisions are more judgment based, often linked to reserves, balance of payments and financial stability.
7. Independently floating:
   - Exchange rate is mainly market determined.
   - Intervention is limited to moderating excessive short-term fluctuations rather than targeting any level.

4. India's Labour Reforms

Context: The Government highlighted the progress of India's labour reforms through the implementation of four Labour Codes aimed at simplifying compliance and strengthening worker welfare.

About India's Labour Reforms:

What it is?

- India's labour reforms consolidate 29 complex and outdated labour legislations into four integrated Labour Codes to streamline compliance, enhance worker protection, and promote a business-friendly environment.
- This overhaul modernises labour regulation to match today's economic realities and digital economy

Key Reasons for Reforms:

- Multiplicity of laws: Overlapping provisions and 29 sector-specific laws caused compliance burden and confusion.
- Fragmented enforcement: Multiple authorities created procedural complexity and weak enforcement.
- Outdated legal framework: Many laws were drafted during pre-Independence era and needed modernization.
- Need for ease of doing business: Simplified processes like single registration, license, and return were required.
- Employment generation: Simplified labour governance promotes investment and job creation.

Labour codes and its Features:

1. Key Features Code on Wages, 2019:

- Universal Minimum Wage: Ensures minimum wages for all workers across organized and unorganized sectors for wider wage protection.
- National Floor Wage: Sets a central floor wage preventing States from fixing wages below a uniform baseline for fair nationwide standards.
- Gender-Neutral Pay: Prohibits wage discrimination across gender, including transgender workers, ensuring equal pay for similar work.
- Overtime at 2x Rate: Mandates overtime wages at twice the normal rate for work beyond standard hours to safeguard fair compensation.
- Inspector-cum-Facilitator: Replaces traditional inspectors with facilitators who guide employers toward compliance rather than penal focus.
- Decriminalized Offences: Converts minor violations into monetary penalties, promoting compliance-friendly and non-punitive governance.

2. Key Features Industrial Relations Code, 2020:

- Fixed-Term Employment: Allows time-bound contracts with full benefits, including gratuity after one year, reducing contract labour misuse.
- Re-skilling Fund: Provides 15 days' wages for retrenched workers to aid quick skilling and improve post-retrenchment employability.
- Trade Union Recognition: Recognizes a union with 51% membership or forms a negotiating council, improving collective bargaining clarity.
- Higher Layoff Threshold: Raises approval requirement from 100 to 300 workers, offering flexibility to firms while preserving worker rights.
- Strike Notice Rule: Enforces a 14-day notice for strikes/lockouts to reduce disruptions and encourage negotiation-based conflict resolution.
- Expanded Definitions: Broadens "industry" and "worker" categories to cover journalists, sales staff, and supervisory employees upto ₹18,000.

3. Key Features Code on Social Security, 2020:

- Universal Social Security: Extends life, health, maternity and old-age benefits to unorganized, gig, and platform workers through flexible schemes.
- ESIC & EPF Expansion: Removes notified-area limits, making ESIC universal while ensuring EPF inquiries are time-bound and transparent.
- Social Security Fund: Creates a dedicated fund for gig/unorganized workers, financed through aggregator contributions and penalties.
- Self-Assessed Cess: Allows builders to self-assess construction cess digitally, reducing delays and discretionary inspections.
- Gratuity for FTEs: Grants gratuity to fixed-term employees after one year, improving social protection for project-based workers.
- Uniform Wage Definition: Standardizes wage components to curb under-reporting and ensure accurate EPF, ESIC, and gratuity calculations.

4. Key Features Occupational Safety, Health & Working Conditions Code, 2020:

- Single Registration/Return: Replaces multiple registrations with one unified system to reduce compliance burden and improve efficiency.
- Migrant Worker Benefits: Expands coverage to self-migrated workers with annual travel allowance and nationwide portability of entitlements.
- Women's Night Work: Permits women to work night shifts with consent and safety provisions, promoting inclusion and workforce equality.
- National Worker Database: Creates a digital database for unorganised and migrant workers to enable benefits delivery and skill mapping.
- Working Hours Limit: Caps working hours at 8 hours/day and 48 hours/week, ensuring rest, safety, and global labour-standard alignment.
- Safety Committees: Establishments with 500+ workers must form joint employer–employee safety committees to strengthen workplace governance.
- Decriminalized Penalties: Converts minor offences into compounding/fines, ensuring compliance without harsh criminal proceedings.

Significance Of Labour Codes:

- Simplifies India's labour regulation into a unified, predictable framework.
- Boosts ease of doing business through single registration, single return, and digital inspections.
- Strengthens worker welfare with universal minimum wages, safety norms, and expanded social security.
- Supports formalisation through transparent contracts, appointment letters, and EPF/ESIC expansion.
- Promotes employment and investment by giving industries flexibility while retaining worker protection.
- Enables modern workforce practices such as work-from-home, fixed-term employment, and gig worker coverage.

Conclusion:

India's four Labour Codes represent a landmark shift towards a modern, equitable, and simplified labour governance framework. They balance worker protection with industrial flexibility and transparency, fostering a future-ready labour ecosystem. These reforms strengthen India's growth trajectory by promoting formalisation, job creation, and sustainable economic development.

5. The Inland Waterways Authority of India (IWAI)

Context: The Inland Waterways Authority of India (IWAI) signed MoUs worth ₹3,000 crore during India Maritime Week 2025 to boost cargo transport, water-based urban mobility, and river tourism in the Northeast.

About The Inland Waterways Authority of India (IWAI):

What it is?

- IWAI is a statutory authority under the Inland Waterways Authority of India Act, 1985, responsible for the development, regulation, and maintenance of inland waterways for navigation and shipping.
- Headquarters: Noida (Uttar Pradesh), with regional offices in Patna, Kolkata, Guwahati, Varanasi, Bhubaneswar, and Kochi.

History:

- Established on 27 October 1986 to operationalise National Waterways and develop India's inland water transport (IWT) as a fuel-efficient, cost-effective logistics system.
- Key Functions:
  - Developing National Waterways (NW-1 Ganga, NW-2 Brahmaputra, NW-16 Barak, etc.).
  - Fairway development (dredging, channel marking, river training works).

- Navigation infrastructure: terminals, jetties, Ro-Ro/Ro-Pax services, night navigation systems.
- Regulation: vessel movement, pilotage, and coordination with state IWT departments.

About Waterways in the Northeast:

What it is?

- A network of major rivers—Brahmaputra, Barak, Subansiri, Lohit, Siang, Tlawng, Chhimtuipui, Imphal, Gumti—identified for inland water transport under the National Waterways Act.

- Identified Routes:
  - National Waterway-2 (Brahmaputra): Dhubri–Sadiya, main artery for Assam's cargo and passenger movement.
  - National Waterway-16 (Barak River): Lakhipur–Bhanga—key route for Manipur, Mizoram, and southern Assam.
  - Indo-Bangladesh Protocol (IBP) Routes: Link the Northeast with Bangladesh ports, enabling trade access to Southeast Asia.
  - Proposed/Developing Routes: Siang (Arunachal Pradesh), Gumti (Tripura), Doyang & Shilloi Lakes (Nagaland), Tlawng & Chhimtuipui (Mizoram), Umiam & Umngot (Meghalaya).

6. India's Fisheries & Aquaculture

Context: World Fisheries Day 2025 highlighted India's rapid rise in fisheries and aquaculture and the FAO's call for renewed commitment to "India's Blue Transformation".

- The FAO representative noted that despite India becoming the world's 2nd-largest aquaculture producer, sustainability gaps and ecosystem pressures require urgent policy strengthening.

About India's Fisheries & Aquaculture:

Trends / Data:

1. Rapid Output Growth (1980s → 2023): India's total aquatic production rose from 44 million tonnes (1980s) to 17.54 million tonnes (2022–23), reflecting a seven-fold expansion driven mainly by inland aquaculture.
2. India as Global Aquaculture Leader: According to FAO SOFIA 2024, India contributed 23 million tonnes of aquatic animals, becoming the world's 2nd-largest aquaculture producer after China.
3. Shrimp & Marine Export Strength: Marine products exports increased 08%, from USD 0.81 bn (Oct 2024) to USD 0.90 bn (Oct 2025), driven by high-value shrimp aquaculture and better value-addition.
4. Inland Aquaculture Driving Growth: Between 2013–14 and 2024–25, total fish output doubled from 96 lakh tonnes to 195 lakh tonnes, with inland fisheries alone growing 140%, becoming India's key production engine.
5. Sectoral Base & Livelihood Footprint: India sustains 30 million livelihoods, with 3,477 coastal fishing villages producing 72% of national output, showing high dependence on coastal ecosystem stability.

Opportunities For India:

1. Global Seafood Market Expansion: India's competitive labour, strong shrimp sector, and GST cuts (12%→5% on key fish products) create a cost advantage for expanding presence in markets like the U.S., EU, and East Asia.
2. Blue Economy Potential Through EEZ Rules: New Sustainable Harnessing of EEZ Rules (2025) open deep-sea fishing opportunities for Fish Farmer Producer Organisations, unlocking underutilised high-value pelagic stocks.
3. Digital Governance for Traceability: Platforms like ReALCraft, NFDP and the National Traceability Framework can help India meet global compliance norms, improving export premiums and reducing rejection risks.
4. Climate-Resilient Aquaculture Models: FAO-supported projects in Andhra Pradesh demonstrate climate-resilient pond systems that reduce footprint, offering models for replication across other coastal States.
5. Women-Centric Growth Opportunities: Schemes under PMMSY provide 60% assistance to women, enabling their entry into value-addition, retail fish kiosks, and processing units—strengthening inclusive sectoral growth.

Initiatives Taken:

1. PM Matsya Sampada Yojana (PMMSY): With ₹20,312 crore outlay (2020–26), PMMSY created 730 cold storages, 26,348 transport facilities, 6,410 kiosks, boosting national logistics and reducing post-harvest loss.
2. Climate-Resilient Coastal Fishermen Villages: 100 existing coastal villages are being upgraded into Climate-Resilient CFVs, adding cyclone-resilient housing, early warning systems, and livelihood diversification support.
3. EEZ Sustainable Harnessing Rules, 2025: Rules provide priority access to cooperatives for deep-sea fishing, introduce a digital Access-Pass via ReALCraft, and ban destructive practices to protect marine biodiversity.
4. Marine Fisheries Census 2025: Using VyAS-NAV, BHARAT, SUTRA apps, the census geo-references 2 million households across 5,000 villages, creating real-time socio-economic datasets for targeted policy.
5. Fisheries Infrastructure Development (FIDF): FIDF (₹7,522 crore corpus) finances ports, cold chains and aquaculture parks; 178 projects worth ₹6,369 crore were approved by July 2025 with interest subvention support.

Challenges Associated:

1. Overfishing & Stock Decline: Intensive coastal fishing and juvenile catch deplete nearshore stocks,

reducing availability of species like sardines and mackerel across Western and Eastern coasts.

2. Habitat Degradation & Pollution: Seagrass loss, coastal sedimentation, and harbour pollution undermine nursery grounds, reducing recruitment of commercially valuable species in high-density coasts.
3. IUU Fishing Pressure: Illegal and unregulated fishing vessels frequently operate beyond permitted zones, bypassing catch reporting and undermining fair access for small-scale fishers.
4. Post-Harvest Losses & Poor Cold Chains: Despite improvements, India still loses 15–20% of fish post-harvest, lowering export quality due to gaps in hygienic handling, grading, and value-addition practices.
5. Limited Access to Credit & Insurance: Small-scale fishers face difficulty obtaining boat repair loans, affordable insurance, and working capital despite PM-MKSSY incentives, restricting technological upgrades.

Way Ahead:

1. Strengthen Science-Based Stock Management: Adopt zone-wise stock assessments, seasonal closures, and mesh-size regulation to restore declining coastal stocks and align with FAO's ecosystem-based approaches.
2. Expand Deep-Sea Fisheries Capacity: Modernise cooperative-owned vessels, promote onboard cold storage, and expand training for deep-sea navigation to shift pressure away from overfished coastal waters.
3. Build National Traceability & Certification Systems: Implement the National Framework on Traceability across exporters, landing sites, and hatcheries to meet EU/U.S. standards and increase export competitiveness.
4. Strengthen Aquaculture Biosecurity: Enforce hatchery certification, disease-free seed systems, and water quality monitoring to reduce disease outbreaks and enhance productivity in inland aquaculture.
5. Invest in Climate-Resilient Infrastructure: Upgrade harbours with smart-harbour guidelines, cyclone-resilient structures, early warning systems, and climate-adaptive pond designs to reduce climate vulnerability.

Conclusion:

India's fisheries and aquaculture are entering a transformative phase marked by rapid growth, digital governance, and global market expansion. Sustained policy reforms, climate-resilient practices, and science-driven management can convert this momentum into long-term sectoral stability. With inclusive support for small fishers and strong institutional backing, India can lead a resilient and globally competitive blue economy.

7. Index of Eight Core Industries

Context: India's core infrastructure output stagnated in October 2025, recording 0% growth—the worst performance in 14 months.

Sector	Coal	Crude Oil	Natural Gas	Refinery Products	Fertilizers	Steel	Cement	Electricity	Overall Index
Weight	10.33	8.98	6.88	28.04	2.63	17.92	5.37	19.85	100.00

About Index of Eight Core Industries:

What it is?

- The Index of Eight Core Industries (ICI) is a monthly economic indicator that measures the combined and individual performance of eight crucial infrastructure sectors that drive industrial activity in India.

Published by: Office of the Economic Adviser (OEA)

- Ministry of Commerce & Industry, Government of India

History / Background:

- Introduced to track the health of India's industrial base and serve as a leading indicator for Index of Industrial Production (IIP).

- Base year: 2011–12, aligned with the base revision of national accounts.
- Over time, it has become a key tool for assessing monthly economic momentum.

Sectors Covered:

The eight core industries are:

These sectors collectively make up 40.27% of the weight of the entire IIP.

Key Features:

- Measures infra-sector performance, reflecting the supply-side strength of the economy.
- Published every month, offering high-frequency economic insights.
- Helps forecast IIP growth trends, influencing policy decisions and industry expectations.
- Tracks both sectoral performance (individual industries) and overall combined index.
- Acts as an early-warn indicator for slowdown or recovery in industrial output.

8. Exploited Workers, a Labour Policy's Empty Promises

Context: The ongoing debate around the draft Shram Shakti Niti 2025 has intensified concerns over weak social protection and enforcement.

- Critics argue that despite its "future-ready" vision, the policy fails to address the systemic rights violations and precarious conditions faced by millions of informal workers.

About Exploited Workers, a Labour Policy's Empty Promises:

What is Labour exploitation?

- Labour exploitation refers to the unjust or coercive treatment of workers, where individuals are denied fair wages, safe working conditions, and legal rights.
- It often involves forced labour, excessive hours, or contract manipulation, leaving workers trapped in dependency or debt.
- Fundamentally, it violates the principles of dignity, equality, and freedom enshrined in labour and human rights laws.

Key Observations on Worker Exploitation:

- Modern Slavery Scale: India is home to over 11 million forced labourers, the highest in the world, reflecting the chronic vulnerability of workers deprived of contractual and legal protection mechanisms.
- Informal Workforce Dominance: Nearly 90% of the workforce remains outside formal employment, excluded from provident fund, health insurance, or pension coverage, exposing the fragility of India's labour system.
- Systemic Rights Violations: The arbitrary reclassification of employees as "daily wagers" enables wage theft and denial of benefits, violating Articles 14 (Equality), 16 (Equal Opportunity), and 23 (Prohibition of Forced Labour) of the Constitution.
- Union Decline: The growing dependence on contractors and casual labour has weakened trade unions, eroding collective bargaining and diminishing the workers' capacity to negotiate fair conditions.
- ILO Non-Compliance: India's weak adherence to ILO Conventions 29 and 155 on forced labour and occupational safety undermines global commitments and moral credibility in labour governance.

Key Features of draft Shram Shakti Niti 2025:

1. Unified Vision and Mission: Envisions a world of work where every labourer enjoys dignity, safety, and opportunity through seven core objectives — universal social security, occupational safety, gender and youth empowerment, future-readiness, and green jobs.
2. Digital Public Infrastructure for Employment: The National Career Service (NCS) will evolve into

India's Employment DPI, offering transparent, AI-driven job matching, credential verification, and career guidance across Tier-II and Tier-III cities.

3. Universal Social Security: Establishment of a Universal Social Security Account integrating EPFO, ESIC, PM-JAY, and e-Shram, ensuring portable and lifelong protection for every worker.
4. Women and Youth Empowerment: Targets 35% female workforce participation by 2030, while promoting flexible work models, childcare, entrepreneurship, and vocational pathways for youth.
5. Ease of Compliance and Formalisation: Launch of a single-window digital compliance portal with risk-based self-certification to reduce paperwork and enhance trust-based governance.
6. Technology and Green Transitions: Promotes AI-enabled workplace safety systems, digital upskilling, and creation of green and sustainable jobs in line with India's climate goals.
7. Convergence and Good Governance: Establishes a three-tier institutional structure—National, State, and District Labour Missions—with data-driven dashboards and annual Labour & Employment Policy Evaluation Index (LEPEI) for performance tracking.
8. Labour and Employment Stack: Creates a unified digital backbone integrating worker identities, enterprise databases, and social-security entitlements for paperless and portable governance.
9. Tripartite Dialogue & Cooperative Federalism: Ensures Centre–State coordination and dialogue among government, employers, and workers to promote participatory policy implementation.

Gaps in Shram Shakti Niti 2025:

- Funding Void: The proposed Universal Social Security Account merges existing schemes but provides no clarity on funding sources or employer contributions, risking unsustainable implementation.
- Digital Exclusion: Dependence on digital IDs and e-platforms risks excluding women, elderly, and low-literacy workers in rural areas, thereby deepening inequality and violating Article 15 on non-discrimination.
- Weak Enforcement: While targeting "zero workplace fatalities by 2047," the absence of adequate labour inspectors, penalties, and monitoring mechanisms renders this goal aspirational rather than actionable.
- Gender Gaps: The aim of achieving 35% female labour participation by 2030 lacks mandatory quotas, childcare infrastructure, and maternity benefits, undermining substantive gender equity.
- AI and Gig Economy Risks: Integration of AI for job matching and skill mapping through the National Career Service lacks ethical guidelines or bias audits, risking caste, regional, and gender-based discrimination.

Way Ahead:

- Pilot-Based Implementation: The government must initiate pilot projects in diverse sectors to test inclusivity and administrative feasibility before national deployment of Shram Shakti Niti 2025.
- Tripartite Participation: Ensuring a governance model that involves government, employers, and unions will restore accountability and shared ownership in labour reforms.
- Offline Accessibility: Providing offline enrolment, grievance redressal, and awareness campaigns will safeguard digitally excluded workers and enhance social security outreach.
- Ethical and Algorithmic Oversight: Union-vetted audits and bias checks in AI systems must be institutionalised to prevent discrimination in digital labour governance platforms.
- Dedicated Funding and Enforcement: Establishing a legally mandated social security corpus and strengthening inspection capacity are essential to translate policy commitments into tangible protection.

Conclusion:

The Shram Shakti Niti 2025 aspires to build a resilient and equitable labour ecosystem, yet its promise falters without financial credibility, institutional oversight, and inclusivity. A rights-driven policy must prioritize workers' dignity over administrative efficiency. India's true labour reform will be measured not by dashboards or slogans, but by the restoration of justice, fairness, and human dignity in the world of work.

9. India's First MWh-Scale Vanadium Flow Battery at NTPC NETRA

Context: India inaugurated its first MWh-scale Vanadium Redox Flow Battery (VRFB) system of 3 MWh capacity at NTPC NETRA, Greater Noida, marking a breakthrough in long-duration energy storage (LDES) and renewable energy integration.

About India's First MWh-Scale Vanadium Flow Battery at NTPC NETRA:

What it is?

- The Vanadium Redox Flow Battery (VRFB) is an advanced liquid-electrolyte–based energy storage system, designed as a sustainable alternative to lithium-ion batteries for grid-scale storage.
- It enables large-scale, long-duration energy retention crucial for renewable energy

Located in: NTPC NETRA (National Energy Technology Research Alliance), Greater Noida, Uttar Pradesh

Organisation Involved: Developed by NTPC's R&D Centre (NETRA) under the Ministry of Power

Aim: To strengthen India's energy transition and grid resilience by developing indigenous, safe, and long-duration storage technologies that reduce dependence on imported lithium.

Key Features:

- Capacity: 3 MWh — India's largest and first-of-its-kind installation
- Technology: Uses vanadium electrolyte instead of lithium; highly scalable, safe, and long-lasting
- Lifespan: 15–20 years with minimal degradation
- Applications: Supports renewable energy integration, microgrids, and industrial storage
- Eco-friendly: Enables recycling of electrolytes and non-flammable operation

Significance:

- Marks India's entry into next-generation, non-lithium energy storage.
- Enhances renewable energy reliability by storing excess solar and wind power.
- Promotes Atmanirbhar Bharat through indigenous clean energy innovation.
- Positions NTPC as a global leader in R&D across green hydrogen, carbon capture, and LDES technologies.

1. 1st Blind Women's T20 World Cup 2025

Context: Prime Minister of India met and felicitated the Indian Women's Blind Cricket Team after they created history by winning the inaugural Blind Women's T20 World Cup 2025, defeating Nepal in the final.

About 1st Blind Women's T20 World Cup 2025:

What it is?

- The Blind Women's T20 World Cup 2025 is the first-ever global cricket championship exclusively for women cricketers with visual impairment.
- It marks a historic step toward inclusivity, representation and international recognition for blind women athletes.

Organised By: World Blind Cricket Ltd. (WBC)

- Hosted jointly with the Cricket Association for the Blind in India (CABI) and the Cricket Association for the Blind in Sri Lanka.

Hosts & Venues:

- The World Cup was co-hosted by India and Sri Lanka.
- Tournament venues included:
  - Delhi (India)
  - Bengaluru (India)
  - Colombo (Sri Lanka) — venue for the final at P. Sara Oval Stadium

Features of the Tournament:

- Six participating nations: India, Nepal, Pakistan, Sri Lanka, Australia, USA.
- Format: Round-robin league → semifinals → final
- Team composition:
  - Players grouped as B1 (fully blind), B2, B3.
  - Every team must field a mix of all categories.
- Specialised equipment:
  - White plastic ball with metal bearings (rattling sound helps tracking).

- Underarm bowling along the ground.
- B1 batters use runners, and each B1 run counts double.

Results:

- Champion: India (Unbeaten campaign)
  - India won the first-ever Blind Women's T20 World Cup, defeating Nepal by 7 wickets in the final.
- Player of the Final: Phula Saren.
- Captain: Deepika TC (Deepika Gaonkar)

2. Paradip Port

Context: Paradip Port Authority (PPA) has achieved the fastest-ever 100 MMT cargo throughput in its history, and for the 9th consecutive year, crossing the 100 MMT mark—this time 12 days earlier than last fiscal.

About Paradip Port:

What is Paradip Port?

- Paradip Port is one of India's Major Ports, operated by the Paradip Port Authority under the Ministry of Ports, Shipping & Waterways.
- It is a key deep-water port on the eastern coast of India, handling large volumes of coal, POL, iron ore, steel, containerised cargo and coastal shipments.

Location: Located in Jagatsinghpur district, Odisha.

- Situated near the confluence of the Mahanadi River and the Bay of Bengal.

History:

- Foundation stone laid by Prime Minister Jawaharlal Nehru on 3 January 1962.
- Government of India took over management from the Odisha government on 1 June 1965.
- Declared the 8th Major Port of India on 18 April 1966—the first Major Port on the East Coast to be commissioned after Independence.
- Operates as an autonomous body under the Major Port Trusts Act, 1963, governed by a Board of Trustees.

Key Features:

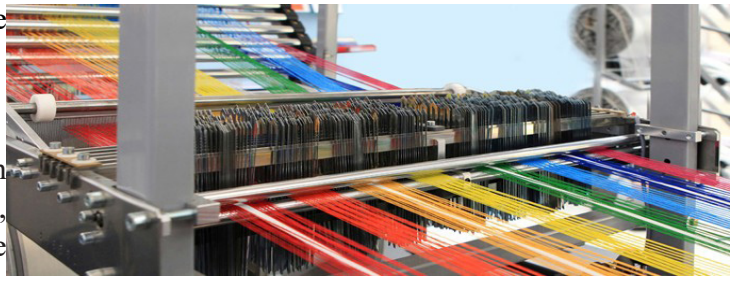
- Handles a diverse cargo profile: coal (45% share), containers, steel, gypsum & flux, POL, and coastal cargo
- Consistent year-on-year cargo growth; achieved 100 MMT for 9 consecutive years
- Advanced mechanised cargo handling systems and improved operational efficiency
- Strong support from Indian Railways and coastal shipping networks

Significance:

- One of India's top-performing Major Ports in cargo handling.
- Acts as a critical gateway for coal-based power plants, steel industries and mineral exports.
- Strengthens India's coastal shipping ecosystem, reducing logistics costs.
- Enhances connectivity to the eastern industrial corridors.

3. Tex-Ramps Scheme

Context: The Government of India has approved the Tex-RAMPS Scheme to strengthen research, innovation and data systems in the textiles se



About Tex-Ramps Scheme:

What it is?

- A Central Sector Scheme focused on research, assessment, monitoring, planning, and start-up support for the textiles sector.
- Ministry: Implemented fully by the Ministry of Textiles, Government of India.

- Aim: To future-proof India's textiles and apparel ecosystem through innovation, data systems, capacity building and start-up support.
- Key Components:
  - Research & Innovation: Supports advanced R&D in smart textiles, sustainability, process efficiency and emerging textile technologies.
  - Data, Analytics & Diagnostics: Builds strong data systems including employment mapping, supply chain studies and the India-Size project.
  - Integrated Textiles Statistical System (ITSS): A real-time analytics platform enabling structured monitoring and evidence-based decisions.
  - Capacity Development: Enhances State-level planning, best-practice sharing, workshops and creation of a strong knowledge ecosystem.
  - Start-up & Innovation Support: Funds incubators, hackathons and academia–industry partnerships to boost textile entrepreneurship

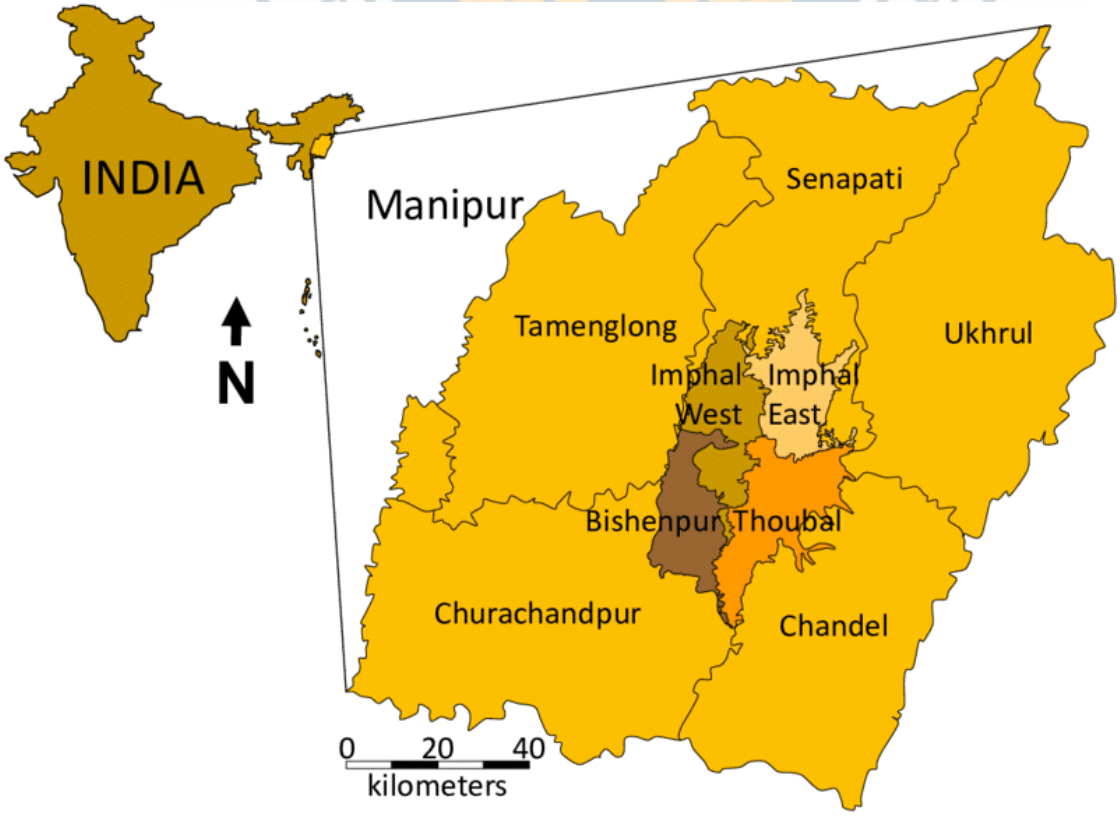
Key Features:

- ₹305 crore outlay for 2025–31: Co-terminus with next Finance Commission cycle for long-term continuity.
- Central Sector Scheme: Fully funded by the Ministry for uniform nationwide implementation.
- Focus on smart, sustainable textiles: Aligns India's textile sector with global technology and green manufacturing trends.
- Structured monitoring: ITSS ensures real-time visibility into sector performance.

- Significance:
  - Boosts Global Competitiveness: Helps Indian textiles compete on quality, technology and sustainability.
  - Strengthens R&D Ecosystem: Creates a robust pipeline of innovations in smart and technical textiles.
  - Improves Policymaking: High-quality data enhances sectoral planning and targeted interventions.

4. 37,000-year-old Bamboo from Manipur

Context: Scientists from BSIP (DST) discovered a 37,000-year-old thorny bamboo fossil in the silt-rich deposits of the Chirang River, Manipur, revealing the earliest evidence of thorniness in Asian bamboo.



About 37,000-year-old Bamboo from Manipur:

What it is?

- A remarkably preserved Ice Age–era bamboo fossil belonging to the genus Chimonobambusa, found with clear thorn scars, nodes and buds — features that almost never fossilise due to bamboo's hollow, fragile structure.

- Discovery:
  - Microscopic analysis confirmed it as Chimonobambusa manipurensis, showing traits similar to modern thorny bamboos like Bambusa bambos.
- Significance:
  - Earliest fossil evidence of thorny bamboo in Asia, proving that herbivore-defence traits evolved before or during the Ice Age.
  - Shows that Northeast India acted as a climatic refugium while harsh Ice Age conditions wiped bamboo out from regions like Europe.
  - Offers rare insight into palaeoclimate, plant evolution, and biodiversity resilience in the Indo-Burma hotspot.
  - Preservation of delicate structures (thorn scars, buds) marks a major palaeobotanical milestone, helping reconstruct ancient ecosystems.

About Manipur:

- Location:
  - Manipur lies on India's eastern frontier, positioned between 23.83°N–25.68°N latitudes and 93.03°E–94.78°E longitudes.
  - It covers an area of 22,327 sq. km, comprising a central valley surrounded by highlands.
- Neighbouring States & Nations: Myanmar (Burma), Nagaland, Assam, Mizoram and Myanmar.
- Geographical Features:
- Manipur consists of two major physical regions:
- Hills (≈ 90% of total area)
  - Surround the valley on all sides, forming a protective mountain ring.
  - Higher elevations in the northern ranges, gradually decreasing toward the south.
- Valley (≈ 10% of the area)
  - The central Manipur Valley sits at about 790 metres above sea level.
  - The valley slopes gently southward, forming a natural drainage pathway.
- Chirang River:
  - The Chirang River in Manipur's Imphal Valley hosts silt-rich sediment deposits that preserve plant remains, including the newly discovered 37,000-year-old bamboo fossil.

5. INS Mahe

Context: INS Mahe, India's first Mahe-class Anti-Submarine Warfare Shallow Water Craft (ASW-SWC), was commissioned into the Indian Navy at Mumbai.

About INS Mahe:

What it is?

- INS Mahe is the lead ship of the indigenously designed Mahe-class ASW Shallow Water Craft, built to conduct anti-submarine warfare in coastal and shallow waters.
- It serves as the first line of coastal defence, supporting larger ships, submarines and naval aviation assets.

Developed By:

- Designed and built by Cochin Shipyard Limited (CSL), Kochi.

- Over 80% indigenous content, making it a major milestone in Aatmanirbhar Bharat and indigenous naval capability.

Aim:

- To detect, track and neutralise submarine threats in India's littoral zones.
- To enhance India's coastal security architecture and provide persistent maritime surveillance.

Key Features of INS Mahe:

- ASW Shallow Water Craft: Optimised for operations in coastal, low-depth waters where larger platforms cannot manoeuvre effectively.
- Stealth and readiness: Embodied in its motto "Silent Hunters".
- Advanced combat suite: A compact yet powerful network of
  - modern weapons
  - high-precision sensors
  - advanced communication systems
- Superior ASW capability: Can detect, track, and neutralise sub-surface threats with high accuracy.
- Modern systems: Equipped with technologically advanced machinery and integrated control systems.
- Design inspiration:
  - Named after the historic coastal town Mahe on the Malabar Coast
  - Crest features the Urumi (flexible sword of Kalaripayattu)
  - Mascot: Cheetah symbolising speed and focus

Significance:

- Boosts India's ASW capabilities: Enhances surveillance and submarine-tracking capacity in crucial littoral waters.
- Strengthens coastal defence: Forms the forward layer of India's multi-layered maritime security grid.
- Major stride in indigenisation: Reinforces India's ability to design and build complex naval combatants.

6. Georgia

Context: India has strengthened its textile and sericulture cooperation with Georgia during a high-level visit by the Central Silk Board delegation, including India's participation at the 11th BACSA International Conference – CULTUSERI 2025.

About Georgia:

What it is?

- Georgia is a Transcaucasian country located at the intersection of Eastern Europe and Western Asia, known for its ancient cultural heritage, diverse landscapes, and strategic geopolitical position between the Black Sea and the Caucasus mountains.

Location:

- Located in the South Caucasus region at the eastern end of the Black Sea.
- Lies between Europe and Asia, making it a crucial geopolitical bridge.

Capital: Tbilisi (Tiflis)

Neighbouring Nations: Russia, Azerbaijan, Armenia, Turkey, and Black Sea.

Geological Features:

- Dominated by mountainous terrain, especially the Greater Caucasus in the north and Lesser Caucasus in the south.
- Home to Mount Shkhara (5,068 m) — the country's highest peak.
- Kolkhida Lowland (ancient Colchis) — fertile plains near the Black Sea.
- Rivers: Rioni, Inguri, Kodori, flowing westward.
- Climate varies from humid subtropical in the west to dry subtropical and alpine climates in central and eastern regions.
- Over one-third forest cover, rich in biodiversity with oak, beech, fir, and alpine vegetation.

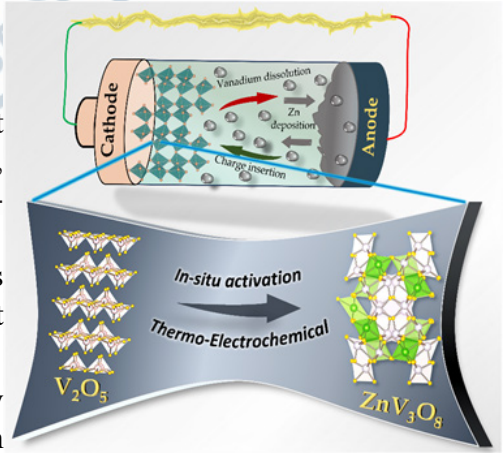
Significance:

- Strategic Location: Serves as a gateway between Europe, Russia, Central Asia, and the Middle East.
- Geopolitical Importance: Historically contested zone between Russia, Turkey, and Persia; key transit route for pipelines (energy corridor).
- Cultural-Historical Value: Ancient Christian heritage; powerful medieval kingdom (10th–13th centuries).

7. Zinc-Ion Batteries (ZIBs)

Context: A Bengaluru-based DST institute (CeNS) has developed a breakthrough cathode activation technique that dramatically improves the performance of zinc-ion batteries (ZIBs).

About Zinc-Ion Batteries (ZIBs):



- What they are?
  - Aqueous zinc-ion batteries are rechargeable batteries that use zinc metal as the anode and an aqueous electrolyte, offering a safer and more eco-friendly alternative to lithium-ion systems.
- Developed By: The new high-performance ZIB cathode was developed by researchers at the Centre for Nano and Soft Matter Sciences (CeNS), Bengaluru.
- Aim: To create a stable, high-energy-density, eco-friendly battery technology that overcomes limitations of lithium batteries (fire risk, resource scarcity, high cost).
- How it works?
  - Scientists applied a thermo-electrochemical activation process to modify the structure of V_2O_5 (vanadium oxide).
  - This treatment introduces useful defects, converting it into Zn-V_2O_5, with porous pathways that allow zinc ions and hydrogen ions to move easily.
  - Result: faster ion transport, higher energy storage, and longer battery life.

Key Features:

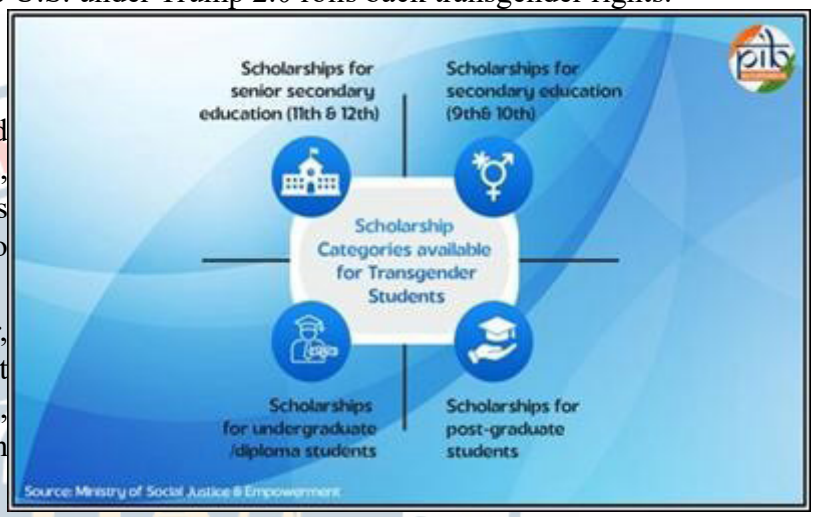
- Higher Energy Density: Zn-V_2O_5 stores far more energy than untreated V_2O_5.
- Exceptional Longevity: Can withstand thousands of charge cycles with minimal degradation.
- Hydrogen-ion Stabilisation: The modified structure improves stability during ion insertion.
- Fully Aqueous Electrolyte: Makes the system non-flammable and safer than lithium batteries.
- Low-Cost Materials: Uses abundant zinc, avoiding expensive lithium and cobalt.

- Significance:
  - Eco-friendly & safer energy storage for grid-scale and consumer applications.
  - Reduces India's dependence on imported lithium and cobalt.
  - Supports clean-energy transitions, renewables integration, and electric mobility.

8. Transgender Rights in India

Context: India has announced major reforms and welfare initiatives for transgender persons, alongside global attention shifting to India as the U.S. under Trump 2.0 rolls back transgender rights.

About Transgender Rights in India:



Status of Transgender Persons in India:

- India had 4.87 lakh self-declared transgender persons (Census 2011), though the actual population is estimated to be much higher due to stigma and under-reporting.
- India legally recognises a third gender, and has introduced protection laws, but social acceptance, healthcare access, and livelihood opportunities remain limited.
- Growing demand for gender-affirming healthcare, with India's private sector witnessing rising medical tourism potential.
- Digital inclusion increasing through the National Portal, yet large regional disparities persist in legal documentation and welfare access.

Constitutional Provisions:

- Article 14: Right to equality applicable to "any person," including transgender individuals.
- Article 15 & 16: Prohibit discrimination based on sex → interpreted to include gender identity.
- Article 19: Freedom of expression protects the right to express one's gender identity.
- Article 21: Right to dignity, privacy, health, and personal autonomy.
- NALSA (2014): Recognised transgender persons as the third gender, affirmed right to self-identification, and directed affirmative action.

Initiatives Taken for Transgender Persons:

1. Transgender Persons (Protection of Rights) Act, 2019: Legal recognition, non-discrimination, inclusive education, healthcare obligations, complaint officers, and punishment for offences.
2. Transgender Persons (Protection of Rights) Rules, 2020: Mandate Transgender Protection Cells, Welfare Boards, and simplified certification processes.
3. National Council for Transgender Persons: Statutory body advising government, monitoring schemes, and redressing grievances.
4. National Portal for Transgender Persons (2020): Online self-identification certificate, ID card issuance, and access to schemes in multiple languages.
5. SMILE Scheme (2022): Livelihood, scholarships, skill training, Ayushman Bharat TG Plus health coverage, and Garima Greh shelters in 20+ states.
6. Equal Opportunity Policy: Mandates equitable employment practices for transgender persons in public

and private institutions.

Challenges Faced by Transgender Persons in India:

- Social Stigma & Violence: Transgender persons face routine discrimination, abuse, family rejection, and exclusion from schools and workplaces, which pushes many into unsafe environments and limits their social mobility.
- Healthcare Barriers: Lack of trained professionals, limited gender-affirming services, high medical costs, and poor insurance coverage prevent transgender persons from accessing safe, dignified, and continuous healthcare.
- Documentation Issues: Complex, inconsistent processes for updating gender in ID documents restrict access to welfare schemes, education, employment, banking, and housing, creating barriers across the life cycle.
- Economic Marginalisation: Low formal employment, limited skilling programmes, and exclusion from mainstream labour markets force many into informal or unsafe livelihoods such as begging or sex work.
- Housing & Safety: High homelessness, family abandonment, and discrimination in renting push many transgender persons into unsafe shelters or community-based living with minimal protection and dignity.
- Inadequate Funding: Budget allocations for transgender welfare remain low across ministries, resulting in weak implementation of schemes, poor outreach, and limited rehabilitation or skilling programmes.

Way Ahead:

- Strict Implementation of the 2019 Act & 2020 Rules: States must operationalise protection cells, welfare boards, grievance redressal systems, and anti-discrimination mandates to ensure uniform rights enforcement across India.
- Expand Ayushman Bharat TG Plus & Hospital Services: Full rollout of TG Plus with gender-affirming surgeries, hormone therapy, counselling, and post-operative care in government hospitals can drastically reduce medical and financial vulnerability.
- Integrate Transgender Healthcare into Medical Curricula: Mandatory LGBTQIA+ competencies and dedicated training for surgeons, endocrinologists, nurses, and counsellors will ensure sensitive, specialised, and evidence-based healthcare.
- Establish National Centres of Excellence & Promote Medical Tourism: Centres specialising in gender-affirmation, research, training, and community care can position India as a global hub for affordable, high-quality transgender healthcare.
- Create a Robust National Strategy with Greater Funding: A unified, well-funded policy with inter-ministerial coordination can address livelihood, health, housing, and social protection needs with long-term measurable outcomes.
- Strengthen Legal Frameworks for Documentation & Inclusion: Simplifying ID changes, enforcing anti-discrimination laws, and mandating inclusive hiring practices can ensure equal citizenship, workplace dignity, and social acceptance.

Conclusion:

India stands at a pivotal moment where legal recognition and welfare reforms must translate into real, lived equality for transgender persons. With robust policy implementation and investment in healthcare, skilling, and social protection, India can become a global leader in transgender rights. The opportunity now is to build a dignified, inclusive ecosystem where every transgender person can thrive with autonomy and respect.

9. Defence Atmanirbharta: Record Production and Exports

Context: India recorded its highest-ever defence production and exports in FY 2024–25 under the Atmanirbhar Bharat initiative, marking a major shift towards indigenous manufacturing.

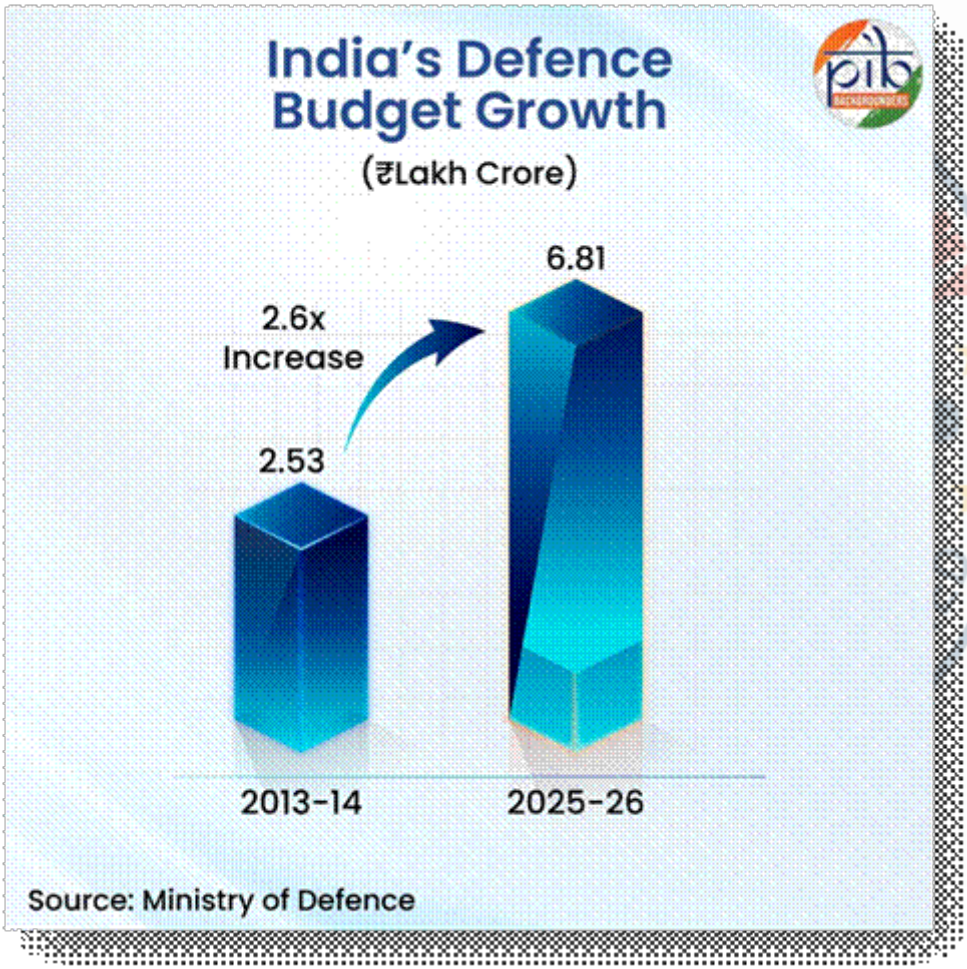
- The Government announced ambitious targets to reach ₹3 lakh crore production and ₹50,000 crore

exports by 2029, signalling India's rise as a global defence exporter.

About Defence Atmanirbharta: Record Production and Exports

Trends / Key Statistics of India's Defence Industry:

1. Record Defence Production: Indigenous defence manufacturing touched ₹1,27,434 crore in FY 2023–24, rising sharply from ₹46,429 crore in 2014–15—a 174% growth driven by sustained policy reforms.
2. Highest Ever Overall Output: India's total defence production for FY 2024–25 reached ₹1.54 lakh crore, reflecting continuous annual expansion across DPSUs, private firms, and MSMEs.
3. Rising Defence Exports: Exports climbed to ₹23,622 crore in FY 2024–25, up from less than ₹1,000 crore in 2014, showing India's growing global competitiveness and platform reliability.
4. Private Sector Participation: The private sector's share grew from 21% to 23% within a year as over 16,000 MSMEs entered the supply chain producing high-value sub-systems and components.
5. Massive Domestic Procurement: In FY 2024–25, the Ministry of Defence signed 193 contracts worth ₹2.09 lakh crore, with 177 contracts awarded to domestic companies, boosting self-reliance.



Opportunities for India's Defence Industry:

1. Defence Industrial Corridors: UPDIC and TNDIC attracted ₹9,145 crore actual investment with ₹66,423 crore potential, creating clusters for aerospace, land systems, and advanced manufacturing.
2. Expanding Export Markets: India now exports defence products to 80–100 countries, offering opportunities to expand partnerships through training, maintenance, logistics, and technology packages.
3. High FDI Inflow Potential: Liberalised norms allowing 74% automatic FDI and 100% through approval make India a preferred destination for foreign OEM collaboration and technology transfer.
4. Digital Export Authorisations: An end-to-end digital portal issued 1,762 export approvals in FY 2024–25, reducing clearance time, improving transparency, and raising exporter participation by 17%.
5. Innovation Ecosystem: Schemes like the ₹1 lakh crore RDI Scheme, iDEX grants, and DRDO's TDF

(₹500 crore) offer huge opportunities for start-ups and academia to co-develop next-gen defence tech.

Government Initiatives:

- Defence Acquisition Procedure (DAP) 2020 prioritises Buy Indian–IDDM, speeds clearances, integrates advanced tech (AI, robotics, cyber).
- Defence Procurement Manual (DPM) 2025 streamlines ₹1 lakh crore revenue procurement with uniform rules and digital processes.
- Positive Indigenisation Lists ban imports of thousands of items, encouraging domestic production.
- Reorganisation of Ordnance Factories into seven DPSUs to improve autonomy and efficiency.
- Export Facilitation Reforms: Open General Export Licences, simplified SOPs, digital authorisation, and export promotion cell.

Challenges Associated with India's Defence Industry:

1. Shallow Technological Base: India still lacks indigenous capability in high-end propulsion, sensors, materials, and electronics, leading to 58% of procurement through licensed production.
2. Insufficient Production Scale: Despite improvements, domestic output is still too low to meet annual procurement needs, keeping India dependent on foreign OEMs for major platforms.
3. Export Limitations of DPSUs: DPSUs have struggled internationally—examples include HAL's Tejas losing to Korean KF-21 and GRSE losing major global tenders, impacting export ambitions.
4. Policy–Implementation Gap: Many reforms announced since 2014 see slow on-ground execution due to bureaucratic delays, lengthy negotiations, and multi-layered compliance pathways.
5. Dependence on Imported Components: India relies heavily on foreign suppliers for speciality steels, composites, servos, avionics, and electronics, creating supply-chain vulnerabilities.

Way Ahead:

1. Build Deep-Tech Capability: Increase investments in propulsion, stealth materials, seeker technology, and advanced sensors to reduce dependence on foreign components and raise export competitiveness.
2. Strengthen Private Industry: Offer long-term procurement commitments, testing infrastructure, and transparent competition so private firms and MSMEs can scale production and innovate freely.
3. Boost R&D Spending: Raise defence R&D allocation from <1% to 8–10% of the defence budget, matching global defence leaders and enabling India to design complex strategic platforms.
4. Expand Export Diplomacy: Use concessional finance, maintenance hubs, and joint training to enhance India's attractiveness in African, ASEAN, and Middle Eastern defence markets.
5. Accelerate Procurement Reforms: Introduce single-window clearances, real-time PMUs, and digital monitoring to cut procurement delays and ensure timely delivery to the Armed Forces.

Conclusion:

India's defence sector has entered a decisive phase of self-reliance with record production, exports, and ecosystem growth. To sustain this momentum, India must expand deep-tech capacity, accelerate private-sector participation, and strengthen global partnerships. With consistent reforms, India is poised to emerge as a major global defence manufacturing hub by 2030.

10. Janjatiya Gaurav Varsh 2025

Context: Nationwide celebrations under Janjatiya Gaurav Varsh 2025 are underway to mark the 150th birth anniversary of Bhagwan Birsa Munda and 150 years of "Vande Mataram".

About Janjatiya Gaurav Varsh 2025:

What it is?

- Janjatiya Gaurav Varsh 2025 is a nationwide year-long celebration dedicated to honouring the legacy of tribal freedom fighters—especially Bhagwan Birsa Munda, known as Dharti Aaba—and commemorating 150 years of the national song "Vande Mataram."
- It seeks to promote awareness of India's tribal contributions to nation-building and cultural identity.

Organisations Involved:

- Ministry of Tribal Affairs (MoTA) is the nodal agency.
- Supported by Tribal Research Institutes (TRIs), State Governments, Eklavya Model Residential Schools (EMRS), and cultural bodies.

Aim:

- To celebrate India's tribal heritage, resilience, and patriotism while deepening national pride and fostering cultural inclusivity in line with the vision of Sabka Saath, Sabka Vikas, Sabka Vishwas, Sabka Prayas.

Key Features:

1. Cultural Commemoration: Mass events, exhibitions, and Janjati Gaurav Yatras showcasing tribal heroes and their contributions to India's freedom struggle.
2. Educational Outreach: Competitions, literacy workshops, and museum visits to promote awareness of tribal history among students.
3. Community Empowerment: Activities like digital and financial literacy programmes in EMRS schools to enhance tribal socio-economic inclusion.
4. National Integration: Mass singing of Vande Mataram, sports meets, and art exhibitions across States to foster unity and pride.
5. Inclusive Development Focus: Events across states such as Jharkhand, Odisha, Gujarat, Nagaland, and Ladakh, blending traditional culture with modern aspirations.
6. Major Highlight: The Janjati Gaurav Yatra (Tribal Pride March) from Ambaji and Umargam to the Statue of Unity (Ektanagar), symbolising national unity through tribal heritage.

11. Exercise MILAN 2026

Context: India will host a historic maritime convergence in February 2026 at Visakhapatnam, featuring the International Fleet Review (IFR), Exercise MILAN 2026, and the IONS Conclave of Chiefs, under the MAHASAGAR vision.

About Exercise MILAN 2026:

What it is?

- Exercise MILAN is a biennial multilateral naval exercise hosted by the Indian Navy since 1995, aimed at fostering naval diplomacy, interoperability, and regional maritime cooperation.
- Nations Involved: It began with four navies at Port Blair and has grown into a premier global event, with participation from over 40 friendly foreign navies including those from the Indo-Pacific, Africa, Europe, and ASEAN regions.
- Aim: The exercise aims to enhance maritime domain awareness, anti-submarine warfare capabilities, air defence coordination, and search-and-rescue preparedness, reinforcing a rules-based maritime order.

Key Features of MILAN 2026:

- Dual-Phase Structure: The exercise will comprise Harbour and Sea phases, focusing on both operational drills and strategic-level exchanges.
- Advanced Naval Drills: Includes anti-submarine warfare, air defence, maritime domain awareness, and search-and-rescue operations, enhancing multi-navy interoperability.

- International City Parade: A grand parade at RK Beach, Visakhapatnam, featuring contingents from participating navies, the Indian Army, and Indian Air Force, showcasing maritime diplomacy to the public.
- Showcase of Indigenous Capability: India will display INS Vikrant, Visakhapatnam-class destroyers, and Nilgiri-class frigates, reflecting its evolution into a Builder's Navy.
- Significance of MILAN 2026:
- Strengthening Maritime Diplomacy: Positions India as a regional convenor for maritime cooperation, advancing the MAHASAGAR vision of collective security and growth.
- Enhancing Naval Interoperability: Builds trust, communication, and tactical synergy among participating navies for coordinated multilateral operations.
- Supporting the Indo-Pacific Vision: Reinforces India's role in ensuring a free, open, and inclusive Indo-Pacific, aligned with Act East and IPOI initiatives.

Chapter-
8

INTERNATIONAL RELATION

1. G20 Johannesburg 2025: Strong Outcomes, Weak Great-Power Commitment

Context: The 2025 Johannesburg G20 Summit exposed a sharp geopolitical split, with the US, China and Russia absent and South Africa pushing through a declaration over US objections.

About G20 Johannesburg 2025: Strong Outcomes, Weak Great-Power Commitment

G20: Origin And Evolution

1. Origin in Financial Crises: The G20 began as a forum of Finance Ministers and Central Bank Governors after the Asian Financial Crisis (1997–98) to stabilise global finance.
2. Upgrade after 2008 Crash: In 2008, after the Lehman Brothers collapse, it was elevated to Leaders' Summit level to coordinate responses to the Global Financial Crisis.
3. From G8 to G20 Core: The G7/8 could no longer manage crises alone, so key emerging economies like China, India, Brazil, Saudi Arabia were brought in, creating a de-facto "economic security council".
4. Mandate Expansion: Over time, the G20 moved beyond finance to cover trade, climate, health, food security, energy transition, digital governance and development.
5. Platform for Emerging Powers: For countries like India, Brazil, South Africa, G20 became a crucial stage to seek influence amid slow UN reforms and a stagnant UNSC expansion agenda.

G20 Johannesburg Leaders' Declaration 2025:

1. 122-Paragraph Document: Members agreed a 122-para-Declaration covering climate finance, UNSC reform, debt, gender, youth, Africa-centric development and critical minerals.
2. UNSC Reform Push: It calls for reforming the UNSC to better represent Africa, Latin America and Asia-Pacific, reflecting today's power realities instead of 1945 structures.
3. Climate & Finance Commitments: Leaders endorsed scaling climate finance from "billions to trillions", just transitions and support for vulnerable economies under the Paris Agreement.
4. Debt & Cost of Capital: A Cost of Capital Commission was launched to tackle unfair risk premia on

Global South borrowers and address Africa's USD 1.8 trillion debt burden.

5. Social Targets: The Declaration adopted the Nelson Mandela Bay Target (cut NEET youth share by 5% by 2030) and a goal of 25% gender parity in labour force participation by 2030.
6. Critical Minerals Framework: Leaders welcomed a G20 Critical Minerals Framework to secure sustainable, diversified mineral value chains and local beneficiation in developing countries.
7. Mission 300 & Energy Access: The summit backed Mission 300 to bring electricity to 300 million people in Sub-Saharan Africa by 2030, linking energy access with development.

Opportunities In The G20:

1. Platform for Global South: With AU as a member and South Africa as host, G20 2025 gave Africa and the broader Global South greater voice in setting global economic priorities.
2. Economic Governance Reforms: It can drive reforms in IMF–World Bank voting shares, lending norms and debt restructuring, making finance fairer for developing countries.
3. Technology & AI Governance: It offers a forum to shape rules on AI, data governance, digital public infrastructure and critical minerals, preventing techno-monopolies.
4. Security & Drug-Terror Nexus: G20 can coordinate responses to terror financing, drug trafficking (e.g., fentanyl) and cyber threats that cut across regions.
5. India's Agenda-Shaping Role: India uses G20 to promote African skills initiatives, healthcare response teams, traditional knowledge repositories and space data sharing, becoming a norm-setter.

Geopolitical Tensions & Erosion Of G20's Role:

1. Absence of Big Three: With Trump, Xi and Putin skipping Johannesburg, the summit tilted towards "middle powers", weakening the forum's clout on core strategic issues.
2. Trump's Unilateralism: Trump's tariff wars, suspicion of multilateralism, and preference for bilateral deals (e.g., G2 with China, G8+Russia) undercut the logic of G20 collective action.
3. US–South Africa Clash: The US opposed climate and debt language, refused to join the declaration, and accused Pretoria of "weaponising" its presidency, breaking G20's consensus norm.
4. Argentina's Late Exit: Argentina, led by Javier Milei, withdrew support over references to Middle East conflict, exposing ideological and geopolitical fissures inside the grouping.
5. Europe's Ukraine Focus: European leaders framed Ukraine as the defining security crisis, while many Global South states foregrounded Gaza and humanitarian issues, deepening narrative divides.

Way Ahead For The G20:

1. Re-centering Economic Mandate: The G20 must refocus on macro-financial stability, debt sustainability, trade and climate finance, areas where its decisions directly shape outcomes.
2. Bridging North–South Agendas: It needs deliberate coalitions to reconcile European security concerns (Ukraine) with Global South priorities (debt, Gaza, development, climate justice).
3. Rebuilding US–G20 Engagement: Durable relevance requires re-engagement of the US and other great powers, even while preserving space for African and Asian voices.
4. Deliverables Over Declarations: Credibility now depends on implementable initiatives—actual climate finance, debt swaps, SDR re-channelling, infrastructure and energy projects—not just communiqués.
5. Synergy with UN & Regional Forums: G20 outcomes should feed into UN processes (COP, SDG Summit) and complement bodies like EAS, AU, BRICS, not compete with them.
6. Institutionalising Inclusivity: Permanent mechanisms for Global South consultation, civil society inputs, and vulnerable country representation can anchor G20's legitimacy beyond big power politics.

Conclusion:

The 2025 Johannesburg summit delivered strong Africa-focused outcomes, yet lacked commitment from major powers. Without the US, China and Russia, the G20's role as the world's economic steering forum will weaken further. Sustaining its relevance now needs renewed big-power engagement, stronger Global South leadership and real, actionable results.

2. United Nations Secretary-General

Context: The UN has formally begun the process to elect the next Secretary-General to replace Antonio Guterres when his term ends on 31 December 2026.

- Member states have been invited to submit nominations, with a strong push for selecting the first woman Secretary-General in UN history.

About United Nations Secretary-General:

What the UN Secretary-General is?

- The Secretary-General (SG) is the chief administrative officer of the United Nations, as defined under Article 97 of the UN Charter.
- Often described as "equal parts diplomat, advocate, civil servant and CEO", the SG represents the UN globally and serves as its moral voice.

Legal Basis (Governed By):

- Article 97, UN Charter – SG appointed by the General Assembly on the recommendation of the Security Council.
- Traditional practices such as regional rotation, though not formally binding.

The Selection Procedure Works:

- Nominations Begin:
  - Member states nominate candidates after a joint letter from the UNSC President and UNGA President.
  - Increasing emphasis on gender balance and regional diversity.
- Security Council Screening:
  - The 15-member UN Security Council conducts a series of straw polls (secret ballots).
  - Each member marks a candidate as "encourage", "discourage", or "no opinion".
  - The five permanent members (P5 — US, UK, China, Russia, France) have veto power and their ballots are colour-coded.
- Security Council Recommendation:
  - A candidate requires 9 votes and no veto.
  - A formal UNSC resolution recommends one name to the General Assembly.
- General Assembly Appointment: The 193-member UNGA votes (usually a formality) to appoint the candidate as the next Secretary-General.
- Term: 5-year term, renewable (usually once and Guterres is serving his second).

Functions of the Secretary-General:

- Administrative & Executive Roles: Heads the UN Secretariat, supervising over 30,000 staff and managing a core budget (~USD 3.7 billion) and the peacekeeping budget (~USD 5.6 billion).
- Diplomatic & Mediation Role:
  - Acts as a global mediator, using "good offices" to prevent or resolve conflicts.
  - Appeals to the world community on humanitarian crises, climate, peace and security.
- Agenda-Setting Role:
  - Brings issues before the Security Council that threaten international peace (Article 99).
  - Launches global initiatives on development, climate action, human rights, gender equality, and humanitarian relief.
- Symbolic & Advocacy Role: Promotes multilateralism, peace, human rights and sustainable development.

3. South Africa G20 Summit 2025

Context: The G20 Summit 2025 concluded in Johannesburg, the first G20 summit ever hosted on African soil, marked by the adoption of a declaration despite a U.S. boycott.

About South Africa G20 Summit 2025:

- What is the G20?
  - The Group of Twenty (G20) is the world's premier forum for international economic cooperation, representing 85% of global GDP, 75% of world trade, and two-thirds of global population.
  - It includes 19 major economies plus the EU and African Union.
- Evolution of the G20:
  - 1999: Created after the Asian Financial Crisis as a meeting of Finance Ministers and Central Bank Governors to stabilise the global economy.
  - 2008–09: Elevated to Leaders' Summit level after the global financial crisis to strengthen crisis coordination at the highest political level.
  - Since then, its agenda has broadened to trade, health, climate change, sustainable development, energy, anti-corruption, agriculture, etc.
  - Presidency rotates annually; supported by a Troika (past, present, next presidents).
- Functions of the G20:
  - Ensure global macroeconomic stability and coordinated policy responses.
  - Shape global rules on trade, finance, taxation, energy, and digital public goods.
  - Mobilise financing for Sustainable Development Goals (Agenda 2030).
  - Coordinate collective action on climate change, debt relief, green transitions, and global inequality.
  - Serve as the bridge between developed and developing economies.

Key Outcomes of the Johannesburg G20 Summit 2025:

- Adoption of the G20 Leaders' Declaration (despite U.S. boycott): Reaffirmed commitment to multilateralism, climate action, debt relief, and sustainable development—significant because it passed over U.S. objections.
- Strong Climate Action Language: Declaration prioritised adaptation finance, renewable energy expansion, and support for vulnerable countries facing climate-induced disasters.
- Focus on Developing Countries' Needs: Emphasis on debt restructuring, affordable financing, and resilience for low-income nations—central to Africa's and Global South's agenda.
- ACITI Partnership (Australia–Canada–India Technology & Innovation): India launched a new trilateral framework for cooperation in critical technologies, AI, supply chains, and clean energy.
- India's Proposals Accepted: Global Traditional Knowledge Repository, skills multiplier for Africa, global satellite data partnership, healthcare response team, and anti–drug-terror nexus initiative.
- G20 Troika for 2025–26: Brazil (past), South Africa (current), and the United States (incoming) to guide G20 continuity.

Challenges / Issues in G20:

- S. Boycott & Diplomatic Tensions: American non-participation reflected geopolitical tensions with South Africa, undermining unity among major economies.
- Divergence on Climate Commitments: High-consuming and oil-producing nations resisted ambitious fossil-fuel phase-out language—echoing failures at COP30.
- Ukraine War Divisions: Deep disagreements persisted on Russia's invasion of Ukraine, fracturing transatlantic consensus.
- Inequity in Global Financial Architecture: Developing nations emphasised the burden of crippling debts, high interest rates, and limited climate finance, demanding systemic reforms.
- Protocol Dispute Over Presidency Handover: South Africa–U.S. spat over the symbolic presidency

transition highlighted diplomatic sensitivities.

India's Stand at the G20 Summit:

1. Reimagining Global Growth Parameters: PM of India called for development models aligned with equity, sustainability, and human-centric values, invoking "Integral Humanism".
2. Technology & Innovation Leadership: Launched the ACITI trilateral (Australia–Canada–India) to deepen cooperation in emerging technologies, AI, and resilient supply chains.
3. Global South Priorities: Strong focus on climate finance, traditional knowledge systems, skill development for 1 million Africans, and digital public goods.
4. Security & Anti-Terror Focus: Proposed a G20 Drug–Terror Nexus Initiative addressing narcotics financing of terrorism, particularly synthetic drugs like fentanyl.
5. Data, Minerals, and Sustainability: Pitched the Open Satellite Data Partnership for agriculture and disaster management and a Critical Minerals Circularity Initiative.

Way Ahead:

- Strengthen Multilateral Consensus-Building: G20 must insulate itself from great-power politics and act as a collective forum addressing global crises with shared responsibility.
- Prioritise Climate Finance & Debt Relief: Operationalising commitments on adaptation finance, loss & damage, and concessional lending is crucial for the Global South.
- Institutionalise Africa's Voice: With the African Union's permanent membership, the G20 must embed Africa's development priorities into mainstream decision-making.
- Reform Global Financial Architecture: World Bank, IMF, and development banks need restructuring to ensure fair financing, inclusive representation, and transparent debt mechanisms.

Conclusion:

The Johannesburg G20 Summit demonstrated that meaningful multilateralism is still possible despite geopolitical tensions and boycotts. Prioritising climate justice, equitable growth, and developing-country needs can restore global trust. Strengthening cooperation, dialogue, and institutional reforms will determine whether the G20 can remain the world's most influential platform for economic stability and sustainable development.

4. 28-Point Peace Plan

Context: The United States has privately shared a 28-point draft peace proposal for ending the Russia–Ukraine war with President Volodymyr Zelenskyy, reportedly prepared under former U.S. President Donald Trump's team.

About 28-Point Peace Plan:

What it is?

- A US-drafted, 28-point roadmap aimed at ending the Russia–Ukraine war through a negotiated settlement involving security guarantees, constitutional changes, economic arrangements, and territorial compromises.

Proposed by: Prepared under the strategic framework associated with US President Donald Trump's 2024 foreign-policy team.

Aim:

- To freeze the conflict and prevent further territorial expansion by either side.
- To restructure European security by limiting NATO expansion.
- To rebuild Ukraine's economy with U.S.–EU investment mechanisms.

Key Features of the 28-Point Plan:

- Security Architecture Reset:
  - Ukraine must abandon NATO membership, enshrine neutrality in its Constitution, and accept permanent restrictions on military size (600,000 troops).
  - NATO must formally guarantee Ukraine will never be admitted and must avoid stationing troops on Ukrainian soil.
- Territorial & Political Concessions:
  - Ukraine expected to make unspecified territorial concessions to Russia.
  - Dialogue between Russia–Ukraine–Europe to settle all "ambiguities" of the last 30 years.
- Western Economic Reconstruction Package:
  - Creation of a Ukraine Development Fund for tech, energy, AI, urban rebuilding, and resource extraction.
- Reintegration of Russia into the Global Economy:
  - Gradual lifting of sanctions.
  - Russia invited to rejoin the G8.
  - U.S.–Russia long-term cooperation in energy, rare earths, AI, Arctic projects, etc.
- Frozen Asset Utilisation:
  - $100 billion in frozen Russian assets used for Ukraine's reconstruction under U.S. management.
  - U.S. receives 50% of profits; EU adds another $100 billion.

Significance of the Plan:

- Represents the most detailed U.S.-brokered proposal since the war began.
- Could reshape the NATO–Russia–Ukraine security balance for decades.
- Criticised for being Russia-leaning and undermining Ukrainian sovereignty.

5. G20

Context: South Africa has assumed the G20 Presidency for 2025 with the theme "Solidarity, Equality, Sustainability", unveiling priorities centred on disaster resilience, debt relief, climate finance and just energy transitions.

- This marks the first G20 Summit hosted on African soil, coinciding with India's strong advocacy for Global South

About G20:

What it is?

- The G20 is the world's premier forum for international economic cooperation, bringing together major advanced and emerging economies to coordinate on global

economic, developmental, and governance challenges.

History:

- Formed in 1999 after the Asian Financial Crisis as a forum for Finance Ministers and Central Bank Governors.
- Upgraded to Leaders' Summit level in 2008–09 to coordinate responses to the global financial crisis.
- Over time, expanded its agenda beyond macroeconomics to include climate change, health, energy, development, food systems, digital economy, taxation, and anti-corruption.

Members:

- It comprises 19 countries + European Union (EU) + African Union (AU).
- The members together represent ~85% of global GDP, 75% of world trade, and two-thirds of humanity.

Present G20 Troika (2024–2026):

- Brazil (2024 – previous President)
- South Africa (2025 – current President)
- United States (2026 – next President)

This ensures continuity in agenda-setting.

Functions of the G20:

- Coordinating global macroeconomic policies and financial stability.
- Reforming multilateral institutions (IMF, MDBs).
- Driving climate commitments and energy transitions.
- Strengthening global health systems and pandemic preparedness.
- Ensuring resilient supply chains, sustainable development, and digital governance.
- Facilitating consensus on taxation, anti-corruption, trade, and inclusive growth.

6. Major Non-NATO Ally (MNNA)

Context: The United States has officially designated Saudi Arabia as a Major Non-NATO Ally (MNNA), signalling a major upgrade in defence ties after Trump's meeting with Crown Prince Mohammed bin Salman.

About Major Non-NATO Ally (MNNA):

What it is?

- MNNA is a special U.S. strategic designation that grants close defence partners military, financial, and technological privileges—without offering formal NATO-style security guarantees.

History:

- Created under U.S. law in the 1980s.
- Intended to strengthen America's global alliance network outside NATO.

Aim:

- To promote defence collaboration, advanced weapons access, joint training, and security coordination.
- To reinforce U.S. strategic partnerships in geopolitically sensitive regions.

Current MNNA Countries:

- 20 nations across Asia, Africa, South America, and Oceania.
- Argentina, Australia, Bahrain, Brazil, Colombia, Egypt, Israel, Japan, Jordan, Kenya, Kuwait, Morocco, New Zealand, Pakistan, Philippines, Qatar, South Korea, Thailand, Tunisia, and now Saudi Arabia.

Key Features of MNNA Status:

- Priority Defence Access: MNNA countries get priority delivery of U.S. Excess Defence Articles and

easier access to advanced military equipment.

- War Reserve Stockpiles: They can host U.S. War Reserve Stockpiles on their territory, enabling rapid joint military response.
- Joint R&D Collaboration: Eligible to conduct cooperative research, development, testing, and evaluation of defence technologies with the U.S.
- Training & Contracting Benefits: Can enter bilateral/multilateral training agreements and MNNA firms can bid for U.S. DoD repair and maintenance contracts abroad.
- Counter-Terror & Special Tech Funding: Eligible for U.S. funding for counter-terrorism technologies and advanced security research projects.

India's Status:

- India is NOT an MNNA.
- India is designated as a "Major Defence Partner" (MDP) since 2016—

a unique category created specifically for India, granting access to high-end U.S. defence technology.

7. Second Regional Open Digital Health Summit 2025

Context: India is hosting the second Regional Open Digital Health Summit (RODHS) 2025 in New Delhi, bringing together WHO-SEARO nations to advance interoperable digital health systems.

About Second Regional Open Digital Health Summit 2025:

What it is?

- The Regional Open Digital Health Summit 2025 is a three-day multilateral platform convened by India, WHO-SEARO, UNICEF, and partner governments to accelerate standards-based digital health transformation in South-East Asia.
- It serves as a capacity-building and policy harmonization forum for LMICs in the region.

Objectives:

- Build interoperable, people-centric digital health ecosystems aligned with UHC and SDGs.
- Promote adoption of global standards such as FHIR, open APIs, and open-source health tools.
- Integrate and modernise legacy health information systems, reducing fragmentation.

Key Features of the Summit:

- Two focused tracks: Standards and Digital Public Infrastructure (DPIs).
- Technical sessions and hands-on learning from India's ABDM, CoWIN, UPI, Aadhaar.
- Showcases on Generative AI in diagnostics, clinical documentation, and health data analytics.
- Focus on interoperability, full-stack digital health architecture, and ecosystem-wide collaboration.
- Demonstrations by innovators such as eClinicalWorks, Google, NiramAI, IIT Delhi, showcasing scalable AI health solutions.

Significance:

- Positions India as a regional leader in Digital Public Infrastructure and open-source digital health.
- Helps SEAR countries move from isolated digital pilots to scalable, interoperable national health systems.
- Strengthens regional preparedness for pandemics and public health emergencies through shared standards and data exchange models.

8. BRICS is Challenging SWIFT: Building a Multipolar Financial Architecture

Context: At the 16th BRICS Summit in Kazan (2024), member nations unveiled the BRICS Cross-Border Payments Initiative — "BRICS Pay", signalling an intent to reduce dependence on the U.S.-controlled SWIFT system.

About BRICS is Challenging SWIFT: Building a Multipolar Financial Architecture

Context and Background:

1. Western dominance in global finance: For decades, global financial flows have been controlled by Western-led institutions and the SWIFT network, which connects over 11,000 banks in 200+ countries, enabling secure international money transfers under U.S.–EU influence.
2. Exposure to geopolitical sanctions: The 2022 exclusion of Russia from SWIFT after its Ukraine invasion exposed the vulnerability of developing economies to Western financial sanctions and unilateral decisions, prompting calls for alternative systems.
3. BRICS' strategic response: In response, BRICS nations (Brazil, Russia, India, China, South Africa)—later joined by Iran and other BRICS+ partners—initiated steps to create parallel financial infrastructures that safeguard monetary autonomy.
4. Institutional groundwork (2014 Fortaleza Summit): The formation of the New Development Bank (NDB) and the Contingent Reserve Arrangement (CRA) in 2014 marked the first effort by developing nations to establish independent financial institutions outside Western control.
5. Advancing monetary multipolarity (Kazan Declaration 2024): The 16th BRICS Summit in Kazan (2024) formally advanced this agenda by operationalising BRICS Pay, underscoring a collective drive toward monetary multipolarity, digital sovereignty, and reduced dollar dependence.

Understanding BRICS Pay:

- What is BRICS Pay?
  - BRICS Pay is a decentralised, interoperable digital payment platform developed under the BRICS Business Council, designed to enable fast, secure, and low-cost cross-border transactions among BRICS+ nations.
- Core Architecture
  - Interoperable systems: Connects national platforms such as India's UPI, China's CIPS, Russia's SPFS, and Brazil's Pix, ensuring cross-compatibility and scalability.
  - Decentralised Messaging System (DCMS): Offers a secure alternative to SWIFT's centralised messaging, minimising vulnerabilities and single-point failures.
  - Multi-currency support: Enables direct settlements in local currencies, reducing foreign exchange risks and dollar dependency.
  - DAO Governance Model: Decentralised and transparent decision-making, allowing all members equitable participation.
  - Regulatory alignment: Fully compliant with KYC/AML norms, ensuring global legitimacy and financial transparency.

Goals and Mission

- Promote financial sovereignty without isolation.

- Ensure inclusive growth by lowering transaction costs and enabling SME participation.
- Support UN SDGs (1, 8, 9, 10) — financial inclusion, innovation, and poverty reduction.
- Foster a resilient alternative architecture, not to replace SWIFT but to diversify and democratise global finance.

Comparative Analysis: SWIFT vs. BRICS Pay:

Aspect	SWIFT	BRICS Pay
Control	G10 central banks (mainly U.S. and EU)	BRICS Business Council (decentralised governance)
Architecture	Centralised	Decentralised (no single point of failure)
Currency Basis	Dollar-dominated	Multi-currency, local settlements
Inclusivity	Favors Western compliance frameworks	Focused on Global South inclusion
Objective	Global interoperability for Western-led trade	Sovereign financial connectivity within BRICS+
Approach	Monopoly-oriented	Multipolar, interoperable, SDG-aligned

Opportunities Created by BRICS Pay:

- Financial Autonomy for the Global South: Enables emerging economies to transact independently, reducing exposure to sanctions or unilateral policy shifts.
- Boost to South–South Trade: Local currency settlements can lower costs and enhance intra-BRICS trade, currently valued at over $600 billion annually.
- Digital Diplomacy: Projects like UPI, Pix, and CIPS serve as instruments of soft power, promoting digital trust and shared infrastructure.
- Alignment with Sustainable Finance: By integrating with SDGs and climate-linked payments, BRICS Pay could foster green fintech ecosystems.
- Stimulus for Fintech Innovation: Encourages indigenous blockchain, cybersecurity, and cross-border fintech collaborations among BRICS start-ups.

Challenges in Realising BRICS Pay:

- Divergent National Ambitions: India, China, and Russia each seek to globalise their own payment systems (UPI, CIPS, SPFS), potentially causing strategic overlap.
- Technical Interoperability: Harmonising different digital architectures and data standards poses complex engineering challenges.
- Geopolitical Trust Deficit: Political frictions (e.g., India-China tensions) could slow down consensus on governance models.
- Regulatory and Legal Barriers: Cross-jurisdictional KYC, anti-money-laundering norms, and data localisation laws need harmonisation.
- Western Retaliation Risks: Threats of sanctions or tariffs (e.g., U.S. warning post-2024 BRICS currency discussions) may deter early adoption.
- Limited Acceptance Beyond BRICS: Global credibility will depend on cooperation with neutral partners (ASEAN, African Union, SCO) to expand user base.

The Way Forward:

- Incremental Integration: Begin with bilateral settlements (e.g., India–Russia, China–Brazil) before scaling up to full BRICS interoperability.
- Institutional Backing: Link BRICS Pay with the New Development Bank for liquidity support and risk insurance.
- Digital Diplomacy Framework: Build technical and legal harmonisation under a "BRICS Fintech

Charter" to ensure common standards.

- Diversified Technology Stack: Incorporate blockchain-based auditing, AI-powered fraud detection, and cybersecurity protocols for trust building.
- Global Outreach: Extend the platform to BRICS+ members (e.g., Saudi Arabia, UAE, Egypt) to anchor it in global trade corridors.
- Balancing Autonomy with Inclusion: Maintain openness to Western interoperability — ensuring complementarity, not confrontation.

Conclusion:

BRICS' pursuit of financial sovereignty through BRICS Pay is an act of diversification, not defiance. By creating a decentralised, interoperable, and compliant network, it aims to make global finance more balanced and inclusive. If implemented with technological and diplomatic prudence, BRICS Pay could usher in a multipolar monetary order where sovereignty and interdependence coexist.

9. UN at 80 – Decline of Global Governance and Rise of New Multilateralism

Context: As the United Nations turns 80, concerns grow over its diminishing relevance in maintaining peace and security. While Ban Ki-Moon calls for urgent reform, thinkers like argue that the UN's original purpose has eroded, and that a new multilateralism is essential for a multipolar world order.

Background

Founded in 1945 after World War II to prevent future wars, the UN began with 51 members and now has 193, symbolising near-universal membership. Yet its dual structure—"one nation, one vote" coupled with the P-5 veto—has created an enduring imbalance between democratic equality and power privilege.

Major Successes of the UN

1. Peacekeeping and conflict resolution – Over 70 peacekeeping missions since 1948 reduced conflict in Bosnia (1990s), Cambodia (1992) and Mozambique (1994).

Eg: The UN Transitional Authority in Cambodia (UNTAC) restored democracy and oversaw successful elections in 1993.

2. Humanitarian and development assistance – Bodies like WFP, WHO, UNICEF and UNHCR deliver vital food, health and refugee support.

Eg: During the 2023 Sudan crisis, WFP fed nearly 6 million displaced people amid famine risk.

3. Global norm-building – Key instruments like UDHR (1948), Paris Climate Agreement (2015) and SDGs (2015) established shared frameworks for rights and sustainability.

Eg: India's National SDG Index (NITI Aayog) tracks local implementation of global goals.

4. Nuclear non-proliferation – The UN facilitated NPT (1968), CTBT (1996) and mediated the North Korea nuclear freeze (1994).

Eg: IAEA monitoring under UN auspices has slowed Iran's weaponisation efforts.

5. Diplomatic platform for small nations – Provides equal visibility to smaller or developing states.

Eg: Small island states like Fiji and Tuvalu used UN platforms to push climate-loss compensation at COP-28.

Persistent Challenges and Failures

1. Veto paralysis – The P-5 veto obstructs consensus; Russia (161 vetoes) and the US (95) block accountability on crises.

Eg: In 2024, Russia vetoed a Security Council resolution calling for a Gaza ceasefire.

2. Selective human-rights enforcement – States with poor rights records often head UN committees,

reducing credibility.

Eg: In 2023, Iran chaired a UN Human Rights Social Forum even amid domestic crackdowns.

3. Failure to prevent conflicts – Inability to stop wars in Rwanda (1994), Iraq (2003), Syria (2011-), and Ukraine (2022-) exposes core weakness.

Eg: UN peacekeepers' passive role during Rwanda's genocide led to 800,000 deaths despite prior warnings.

4. Reform fatigue and apathy – Declining global engagement, with only 43 heads of government attending UNGA-2025.

Eg: Neither Xi Jinping nor Vladimir Putin has attended the UNGA more than once in the last decade.

5. Unrealistic reform models – Expansion of permanent members or abolition of veto lacks consensus among major blocs.

Eg: The G-4 proposal (India, Germany, Japan, Brazil) remains stalled for 20 years.

Rise of a New Multilateralism

1. Shift to multipolarity – Power diffusion across Asia, Africa and Latin America challenges Western-centric governance.

Eg: India-Brazil-South Africa (IBSA) and BRICS+ reflect growing southern coalitions.

2. Issue-based coalitions – Flexible forums like G-20, Quad, and BRICS address climate, health, and trade where UN stagnates.

Eg: The G-20 Delhi Declaration (2023) reached consensus on digital public infrastructure and debt relief, unlike UN forums.

3. Networked global governance – Multilayered cooperation among regional and functional institutions replaces UN centrality.

Eg: ASEAN's Regional Forum and AU's Peace and Security Council now manage local crises more effectively than the UN.

India's Vision and Role

1. Reformed multilateralism – India advocates a democratic and representative UN, echoing its G-20 Presidency (2023) call for "One Earth, One Family, One Future."
2. Developmental diplomacy – Initiatives like International Solar Alliance, CDRI, and Vaccine Maitri link technology and humanitarianism.
3. Voice of the Global South – Hosted the Global South Summit (2023) to shape equitable global decision-making.
4. Strategic autonomy and norm-setting – Balances relations across blocs while promoting human-centric globalisation.

Way Forward

1. Pragmatic reform – Prioritise transparency, financial accountability, and restraint on veto use rather than mere expansion.

Eg: The France-Mexico proposal (2015) for voluntary veto suspension in mass-atrocity cases can be revived.

2. Regional empowerment – Strengthen AU, ASEAN, SAARC-plus and other regional security frameworks for faster conflict response.
3. Functional multilateralism – Build coalitions around specific issues like climate finance, pandemic preparedness, and AI governance.
4. Inclusive global governance – Rebalance power toward the Global South; integrate Agenda 2030 goals into trade and finance regimes.
5. Leadership for a new charter – Like Roosevelt-Churchill's Atlantic Charter (1941) birthed the UN, new visionary statesmen must design a framework for the 21st century's multipolar order.

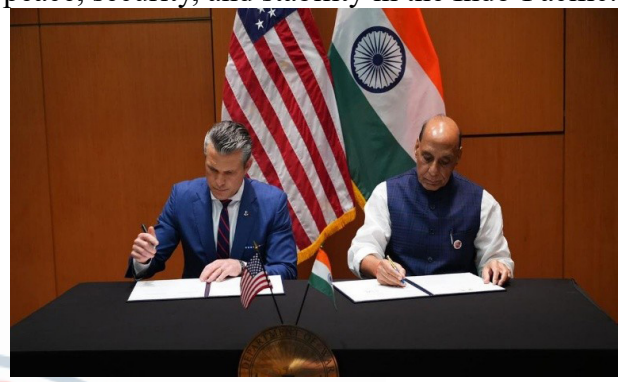
Conclusion

The UN today mirrors the League of Nations' decay in the 1930s. Rather than clinging to obsolete

structures, nations must reimagine multilateralism anchored in accountability, inclusivity, and shared responsibility. The call is not to abandon global governance but to reinvent it—transforming the UN's legacy into a new cooperative order suited for today's realities.

10. Framework for the U.S.–India Major Defence Partnership:

Context: India and the United States have unveiled a 10-year Defence Partnership Framework, marking a new phase in their strategic cooperation to advance peace, security, and stability in the Indo-Pacific.



About Framework for the U.S.–India Major Defence Partnership

- A comprehensive 10-year framework to deepen collaboration across all defence domains — land, maritime, air, space, and cyberspace.
- Signed in Kuala Lumpur on the sidelines of the 12th ASEAN Defence Ministers' Meeting-Plus (ADMM-Plus) by Defence Minister Rajnath Singh and U.S. Secretary of War Pete Hegseth.
- Builds on the 2013 Joint Principles for Defence Cooperation and the 2016 recognition of India as a Major Defence Partner (MDP).
- Provides policy direction to transform and expand the India–U.S. defence partnership over the next decade.

Objectives and Key Features:

1. Free, Open, and Rules-Based Indo-Pacific: Ensures an open and rules-bound Indo-Pacific region, safeguarding maritime security and free flow of commerce.
   - Reaffirms commitment to regional peace, sovereignty, and stability.
2. Enhanced Interoperability and Coordination: Strengthens joint readiness, information sharing, and coordination across all domains.
   - Aims for joint response to common security threats and deterrence against regional instability.
3. Defence Industry and Technology Collaboration: Promotes industrial innovation, R&D, and co-production through advanced technology partnerships.
   - Builds upon the COMPACT initiative (Catalyzing Opportunities for Military Partnership, Accelerated Commerce and Technology) to drive transformative defence cooperation.
4. Strategic and Regional Cooperation: Expands coordination with like-minded partners through the Quad and other mechanisms.
   - Focuses on strengthening collective security architecture in the Indo-Pacific.
5. Unified Policy Direction: Provides a long-term roadmap for policy coherence and institutional alignment in bilateral defence cooperation.
   - Lays the foundation for collective peace, prosperity, and deterrence in the region.

Significance:

- Institutionalises Defence Cooperation: Establishes a structured 10-year vision for sustained strategic and military engagement.
- Strengthens Strategic Deterrence: Enhances maritime and regional security architecture to deter conflict and ensure stability.
- Deepens Defence Industrial Partnership: Encourages technology sharing and joint development, supporting defence innovation and industrial capacity.
- Reinforces Strategic Trust: Positions India as a priority defence partner for the U.S. and a pillar of regional stability.

Chapter-
9

SOCIAL ISSUES

1. Bamboo Scaffolding

Context: A massive fire in Hong Kong's Tai Po apartment complex killed over 65 people, with bamboo scaffolding reported to have accelerated the spread of the blaze.

About Bamboo Scaffolding:

What it is?

- A traditional construction support system made of interlocked bamboo poles tied with nylon or plastic straps, used as temporary platforms for workers in building repairs or construction.

- How it works?
  - Bamboo poles are cut, dried, and tied together in a grid-like frame; they are anchored to buildings and wrapped with protective mesh, forming lightweight yet strong external scaffolds even on tall structures.
- Why it is widely used?
  - Extremely lightweight, flexible, and strong, making it ideal for Hong Kong's dense urban spaces.
  - Cheaper and faster to assemble than metal scaffolding.
  - A long-standing cultural and skilled-trade tradition in Hong Kong's construction sector.
- Limitations:
  - Highly combustible when dry, increasing fire-spread risk in high-rises.
  - Mechanical strength varies due to natural material differences.
  - Deteriorates faster than metal scaffolding and is less suitable for long-duration or high-rise renovation works.
  - Mesh covering can ignite quickly unless fire-retardant.

2. Digital Divide Across Caste and Class

Context: A new MOSPI study (MIS 79th round) highlights deep digital divide patterns across caste, class, gender, and rural-urban lines in India.

About Digital Divide Across Caste and Class:

Trends & Data on Digital Divide:

- Caste Divide: Individuals without ICT skills — STs (89.49%), SCs (86.62%), OBCs (81.73%), Others (73.71%) — showing persistent caste-linked deprivation.
- Gender Divide: ICT skills nationally — Men (22.78%) vs Women (13.91%); in UP — Men (14.62%) vs Women (6.93%).
- Class/Income Divide: Access to a computer with internet — Poorest 20% (6.8%) vs Richest 20% (66.3%), a ten-fold gap.
- Rural–Urban Divide: ICT skills highly concentrated among urban households; rural areas face low device availability, poor infrastructure, and low digital exposure.

- Schooling Divide: Private ICSE/CBSE schools teach coding from Class 3; government schools often lack electricity or computers even in Class 8.

Factors Causing the Digital Divide:

1. Caste-linked structural exclusion leading to poor school infrastructure, fewer devices, and delayed ICT introduction in public schools.
2. Income disparity & consumption inequality restricting access to digital devices, internet, and home learning environments.
3. Rural infrastructural gaps—poor electricity, weak broadband, and resource-starved schools in rural/semi-rural India.
4. Weak training ecosystem with low-quality skilling centres, limited formal training, and reliance on informal apprenticeships.
5. Educational inequalities—urban private schools provide early ICT training; government schools lack basic labs and trained teachers.
6. Household digital literacy deficit—first-generation learners receive little parental support for ICT learning.
7. Institutional apathy—Dalit-majority settlements receive weaker investment, low-quality schools, and delayed digital infrastructure.

Implications of the Digital Divide:

1. Unequal access to jobs—ICT skills strongly correlate with regular salaried employment; marginalised groups remain trapped in low-wage work.
2. Weak participation in digital economy despite smartphone ownership; "ownership ≠ capability" leads to under-utilisation of digital tools.
3. Widening caste and class inequality as better-off groups move ahead in digital skilling, compounding historical disadvantages.
4. Low productivity and poor competitiveness due to limited availability of digitally skilled workers in rural and low-income regions.
5. Gender exclusion from future-ready jobs, restricting women's mobility, income, and professional participation.
6. Intergenerational disadvantage, as children from marginalised groups remain several steps behind even when they enter higher education.

Challenges in Eradicating the Digital Divide:

1. Persistent structural caste discrimination affecting quality of schooling, access to devices, and public investment.
2. Resource constraints in government schools, including lack of computers, trained ICT teachers, and stable electricity.
3. Low digital capability despite high smartphone ownership, with very limited hands-on digital learning opportunities.
4. Fragmented skilling ecosystem lacking baseline assessments, outcome evaluation, and alignment with labour market needs.
5. Uneven public expenditure—ICT projects often bypass backward regions or are implemented poorly.
6. Data limitations—current surveys offer static snapshots and fail to track long-term, generational disadvantage.

Way Ahead:

1. Bridge school-level digital gaps by universalising computer labs, trained ICT faculty, and reliable electricity in government schools.
2. Introduce digital skilling early in government and rural schools to match the exposure enjoyed by private schools.

3. Targeted digital inclusion for SC/ST, OBC, and women through scholarships, community digital centres, and device subsidies.
4. Strengthen formal skilling infrastructure with industry-linked courses, evaluation systems, and rural training hubs.
5. Develop digital public infrastructure for skilling—open-source learning platforms in regional languages with hands-on content.
6. Track digital inequality longitudinally via continuous MIS rounds to capture generational changes and policy impact.
7. Promote home-based digital capability by supporting shared devices, low-cost laptops, and community learning models.

Conclusion:

India's digital transformation risks becoming exclusionary unless structural caste, class, and rural barriers are actively dismantled. A combination of inclusive schooling, targeted skilling, and equitable public investment is essential to ensure that technology becomes a bridge, not a barrier, for India's marginalised communities.

3. Integrated Child Development Services (ICDS)

Context: India's flagship Integrated Child Development Services (ICDS) has completed 50 years since its launch in 1975, prompting renewed evaluation of its impact as a lifeline for child nutrition, early learning and maternal health.

About Integrated Child Development Services (ICDS):

What it is?

- ICDS is India's largest early childhood care and nutrition programme, providing a package of health, nutrition and pre-school services through Anganwadi Centres to children (0–6 years), pregnant women and lactating mothers.

History:

- Launched on 2 October 1975 in two pilot blocks—Dharani (Amravati) and Dharavi (Mumbai)—as a centrally sponsored scheme to combat childhood malnutrition and mortality.
- Over five decades, it has expanded nationwide, becoming one of the world's largest community-based child development initiatives, with nearly 14 lakh Anganwadi Centres

Aim:

- Improve nutritional and health status of children (0–6 years).
- Lay foundation for psychological, physical and social development.
- Reduce child mortality, morbidity, malnutrition and school dropouts.
- Ensure inter-departmental coordination for holistic child development.
- Empower mothers through nutrition and health education.

Key Features:

- Six core services: Supplementary nutrition, pre-school education, health check-ups, immunisation, referral services, and nutrition-health education.
- Delivered through Anganwadi Centres staffed by Anganwadi Workers (AWWs) and Helpers.

- Services converge with NRHM for immunisation, ANCs, and health referrals.
- Targets children below 6, pregnant women, lactating mothers, and women aged 15–45.
- Maharashtra alone runs 10 lakh+ Anganwadi and mini-Anganwadi centres, reflecting scale and penetration.

Significance:

- A cornerstone of India's fight against child malnutrition, stunting and anaemia, especially in high-burden districts.
- Provides the first point of contact for maternal and child healthcare in rural and tribal regions.
- Crucial for early childhood education, school readiness and socialisation among 3–6-year-olds.

4. Does India need nutritional transformation?

Context: India is witnessing a growing debate on nutritional transformation driven by the rise of functional foods and smart proteins, as the government explores biotech-based solutions to shift from food security to nutritional security under the BioE3 policy framework.

About Does India need nutritional transformation?

What are Functional Foods?

- Definition: Functional foods are nutrient-enriched or fortified foods designed not just to provide energy but to improve health and prevent diseases. They often contain added vitamins, minerals, antioxidants, or bioactive compounds that support immunity, digestion, or heart health.

Eg: Vitamin-enriched rice, omega-3 fortified milk, probiotic yogurt.

- Technologies Used:
  - Nutrigenomics: Studies how food interacts with genes to enhance health outcomes.
  - Biofortification: Increases the nutritional content of crops during their growth (e.g., iron-rich or zinc-rich cereals).
  - Bioprocessing: Uses microorganisms or enzymes to improve nutrient absorption and shelf life.
  - 3D Food Printing: Customises food shape, texture, and nutrient content, especially useful for healthcare diets.
- Examples from India:
  - Zinc-Enriched Rice developed by the Indian Institute of Rice Research (IIRR), Hyderabad, helps combat zinc deficiency.
  - Iron-Rich Pearl Millet bred at ICRISAT improves iron intake in rural diets.
  - Private Sector Innovations: Companies such as Tata Consumer Products, ITC, and Marico are producing fortified staples and health-oriented food lines that target both rural nutrition and urban wellness markets.

What are Smart Proteins?

- Definition: Smart proteins are sustainably produced proteins derived through biotechnology, offering alternatives to conventional meat, dairy, and eggs. They aim to meet global protein needs while reducing environmental impact and animal dependency.
- Major Types:
  - Plant-Based Proteins: Extracted and restructured from legumes, cereals, or oilseeds to mimic the

taste and texture of meat and dairy.

Eg: Soy, pea, or mung bean–based meat substitutes.

- Fermentation-Derived Proteins: Produced using microbes (yeast, fungi, bacteria) to generate protein ingredients, enzymes, or fats identical to those found in animal products.

Eg: Precision fermentation used to create milk proteins without cows.

- Cultivated Meat: Made by growing real animal cells in controlled bioreactors — providing genuine meat without animal slaughter.

India's Emerging Ecosystem:

- Startup Growth: Over 70 startups, such as GoodDot, Blue Tribe Foods, and Evo Foods, market around 377 plant-based and alternative protein products.
- Government Support: The Department of Biotechnology (DBT) and Biotechnology Industry Research Assistance Council (BIRAC) are funding R&D in cultivated and fermentation-based proteins.
- Research Milestone: The Centre for Cellular and Molecular Biology (CCMB) received a ₹4.5 crore DBT grant to advance cultivated meat research.

Why Nutritional Transformation is Needed?

- Persistent malnutrition: Over 35% of children are stunted and 57% of women are anaemic (NFHS-5), showing that food sufficiency hasn't translated into nutrition security, necessitating a shift to micronutrient-rich diets.
- Protein deficiency crisis: Average Indian protein intake is 47 g/day vs ICMR's 60 g/day norm, leaving both rural and urban populations vulnerable to low immunity and chronic diseases, underscoring the need for alternative protein sources.
- Evolving dietary aspirations: With rising incomes, India's consumers demand nutrient-dense and ethically produced foods, as reflected in the booming $25 billion functional food market projected by 2030.
- Environmental sustainability concerns: Traditional livestock farming drives 5% of global GHG emissions and stresses water and land ecosystems, making smart proteins and biofortified crops key to climate-resilient nutrition.
- Economic and health rationale: Malnutrition drains $12 billion annually in lost productivity (World Bank, 2023); investing in bio-fortification and precision nutrition can transform health outcomes and boost India's bioeconomy.

Global Experience

1. Singapore: Became the first country to approve cultivated chicken (2020), signalling regulatory openness toward sustainable and slaughter-free protein sources.
2. European Union: Through its "Farm to Fork" strategy, the EU is heavily investing in sustainable protein production and transparent food systems to achieve carbon neutrality.

Significance:

- Health: Addresses India's hidden hunger by improving access to nutrient-dense, protein-rich foods essential for public health.
- Economy: Taps into a booming $85–240 billion global smart protein market by 2030, creating jobs in biotech, agriculture, and logistics.
- Sustainability: Reduces the environmental footprint by cutting livestock-related emissions, land use, and freshwater dependency.
- Equity: Ensures that nutrition innovations reach all strata of society, bridging the rural–urban divide and promoting inclusive well-being.

Way Forward for India:

- National Framework under FSSAI: Establish clear definitions, safety norms, and labelling guidelines for functional and novel foods to ensure consumer trust and industry compliance.
- Policy Coordination: Foster synergy among Agriculture, Biotechnology, and Health Ministries to align

innovation, regulation, and nutrition goals under one vision.

- Public-Private Partnerships: Strengthen biomanufacturing and precision fermentation through PPPs, ensuring both scalability and affordability in next-gen nutrition technologies.
- Public Awareness: Combat scepticism about lab-grown foods through transparent communication, awareness drives, and evidence-based education campaigns.
- Farmer Inclusion & Skill Development: Train farmers and workers for the bioeconomy, integrating them into alternative protein and biofortification value chains for inclusive growth.

Conclusion:

India's next food revolution lies not in quantity but in quality — nourishing people while sustaining the planet. By integrating biotechnology, clear regulation, and public awareness, functional foods and smart proteins can bridge the nutrition gap. A science-led, inclusive approach can make India a global hub for sustainable nutrition and food innovation.

5. QS Asia University Rankings 2026

Context: Prime Minister of India hailed India's record performance in the QS Asia University Rankings 2026, where 294 Indian universities were listed — the highest ever.

About QS Asia University Rankings 2026:

What it is?

- The QS Asia University Rankings is an annual regional assessment that evaluates Asia's leading higher education institutions based on academic reputation, employability, research productivity, and international outlook.

Published by: Compiled by Quacquarelli Symonds (QS), a UK-based higher education analytics firm, known globally for its QS World University Rankings.

Aim:

- To benchmark Asian universities using globally comparable indicators.
- To highlight academic excellence, innovation, and research impact in the region.
- To promote quality, global competitiveness, and collaboration in Asian higher education.

Criteria Used (11 Indicators):

1. Academic Reputation (30%) – Based on global survey of academics.
2. Employer Reputation (20%) – Assesses employability of graduates.
3. Faculty/Student Ratio (10%) – Reflects quality of academic engagement.
4. International Research Network (10%) – Evaluates global research partnerships.
5. Citations per Paper (10%) – Measures impact of published research.
6. Papers per Faculty (5%) – Indicates research productivity.
7. Staff with PhD (5%) – Represents academic qualifications.
8. International Faculty Ratio (2.5%)
9. International Student Ratio (2.5%)
10. Inbound Exchange Students (2.5%)
11. Outbound Exchange Students (2.5%) – Reflect internationalisation and student mobility.

Key Features (2026 Edition):

- Covers 900+ universities across Asia.
- India's representation reached an all-time high of 294 institutions, the second-highest in Asia after China.

Top 5 Indian Institutions (QS Asia University Rankings 2026):

1. IIT Delhi – Rank 59 (fell from 44th in 2025)
2. IISc Bengaluru – Rank 64
3. IIT Madras – Rank 70

4. IIT Bombay – Rank 71
5. IIT Kanpur – Rank 77

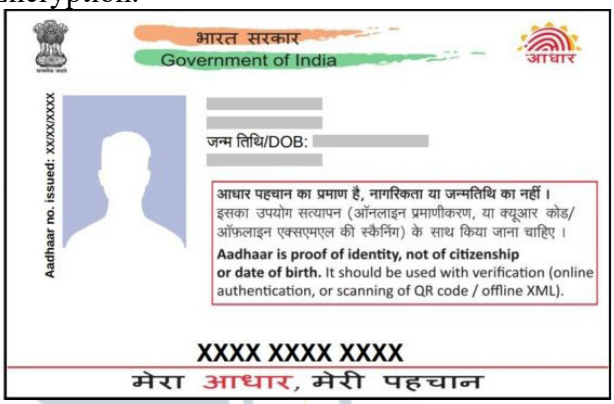
Top 5 Universities in Asia (QS Asia University Rankings 2026):

1. The University of Hong Kong – Rank 1
2. Peking University (China) – Rank 2
3. Nanyang Technological University (Singapore) – Rank 3
4. National University of Singapore (NUS) – Rank 3 (joint)
5. Fudan University (China) – Rank 5

6. UIDAI launches Aadhaar Vision 2032 Framework

Context: The Unique Identification Authority of India (UIDAI) has launched the 'Aadhaar Vision 2032' framework — a decade-long strategic roadmap to modernize India's digital identity system using AI, Blockchain, Quantum Computing, and Advanced Encryption.

About UIDAI launches Aadhaar Vision 2032 Framework:



What it is?

- 'Aadhaar Vision 2032' is a technological and strategic roadmap to future-proof India's digital identity infrastructure.
- It envisions a next-generation Aadhaar ecosystem built on innovation, security, and inclusivity to sustain its role as the backbone of India's digital governance and economy.

Launched by: the Unique Identification Authority of India (UIDAI), under the Ministry of Electronics and IT.

- Guided by a High-Level Expert Committee chaired by Neelkanth Mishra.

Aim:

- To strengthen Aadhaar's technology foundation for the next decade.
- To align with Digital Personal Data Protection (DPDP) Act, 2023 and global cybersecurity standards.

Key Features of Aadhaar Vision 2032:

- AI-Enabled Authentication: Artificial Intelligence will be deployed for intelligent identity verification, anomaly detection, and fraud prevention, ensuring faster and more reliable authentication for millions of users simultaneously.
- Blockchain Integration: Blockchain technology will be used to enhance transparency, traceability, and immutability in digital transactions, creating a tamper-proof and trust-based Aadhaar data ecosystem.
- Quantum-Resilient Security: The framework will adopt quantum-safe cryptographic techniques to future-proof Aadhaar against next-generation cyber threats emerging from quantum computing advancements.
- Advanced Encryption Mechanisms: Aadhaar systems will integrate multi-layered, next-gen encryption protocols to strengthen privacy, data integrity, and compliance with global cybersecurity standards.
- Privacy-by-Design Compliance: All system upgrades will follow Digital Personal Data Protection (DPDP) Act, 2023 principles, embedding consent-based data use, user control, and minimal data retention.
- Next-Generation Technology Stack: UIDAI will overhaul its tech architecture for scalability and interoperability, enabling seamless Aadhaar-linked services across governance, fintech, and welfare platforms.

10 DEFENCE

1. S-500 Air Defence System

Context: PM of India and President of Russia are set to meet during the India–Russia Summit, where both defence ministers are expected to discuss India's potential interest in Russia's next-generation S-500 air defence system.

About S-500 Air Defence System:

What it is?

- The S-500 Prometey is Russia's most advanced long-range surface-to-air and anti-space defence system, capable of intercepting aircraft, ballistic missiles, hypersonic weapons, and even low-orbit satellites.

Developed By: Developed by Almaz-Antey, Russia's premier air-defence manufacturer.

Key Features:

- Ultra-long range: Can intercept targets up to 600 km away.
- Near-space interception: Works at altitudes up to 200 km, including low-Earth-orbit objects.
- Hypersonic interceptors: Missiles like 77N6-N / 77N6-N1 fly at Mach 5–7, using "hit-to-kill" accuracy.
- Multi-target engagement: Tracks and destroys stealth jets, ballistic missiles, hypersonic glide vehicles, and drones.
- Advanced radar suite: 91N6A(M) & 96L6-TsP radars can detect threats up to 800 km away, including stealth aircraft.
- Rapid response: Reaction time of 3–4 seconds, nearly twice as fast as S-400.
- Highly mobile: Mounted on all-terrain transporters for quick deployment.

Advancements Over S-400:

Feature	S-400	S-500
Max Range	380 km	600 km
Target Altitude	~30–40 km	Up to 200 km (near-space)
Hypersonic Interception	Limited	Full capability (Mach 5–7)
Satellite Kill Capability	No	Yes – Low Earth Orbit
Response Time	9–10 sec	3–4 sec
Stealth Tracking	High	Superior multi-band radar

Significance:

- Massive strategic upgrade to India's layered air-defence shield.
- Enhances India's capability against China's hypersonic missiles and Pakistan's ballistic arsenal.
- Gives India anti-space defence—a rare capability globally.

2. Operation Sagar Bandhu

Context: India has launched Operation Sagar Bandhu to deliver urgent humanitarian assistance to Sri Lanka after Cyclone Ditwah caused severe floods and over 80 deaths.

About Operation Sagar Bandhu:

What it is?

- Operation Sagar Bandhu is India's rapid Humanitarian Assistance and Disaster Relief (HADR) mission launched to support Sri Lanka during the devastating floods triggered by Cyclone Ditwah.

Launched By: Government of India

- Coordinated by the Ministry of External Affairs, Indian Navy, and Indian Air Force.

Aim:

- To provide immediate relief and essential supplies to Sri Lanka, ensuring rapid support under India's Neighbourhood First and Vision MAHASAGAR maritime cooperation frameworks.

Key Features:

- Immediate deployment of INS Vikrant, INS Udaigiri, and IAF C-130J aircraft with relief cargo.
- Supplies include tents, tarpaulins, blankets, hygiene kits, ready-to-eat meals, and HADR equipment.
- Ensures sea–air integrated relief for fast delivery across affected regions.
- Continuous monitoring with readiness for additional assistance as the disaster evolves.

Significance:

- Reinforces India's role as the first responder in the Indian Ocean Region.
- Strengthens India–Sri Lanka diplomatic ties at a moment of humanitarian crisis.
- Demonstrates India's expanding capability in HADR logistics, naval deployment, and regional leadership.

3. LCA Tejas

Context: The LCA Tejas crashed during an aerial display at the Dubai Air Show, leading to the death of IAF pilot Wing Commander Namansh Syal.

About LCA Tejas:

What it is?

- LCA Tejas is India's indigenous 4.5-generation, all-weather, multi-role light combat aircraft, forming a key element of the IAF's fighter fleet modernisation.

Developed by: Designed by Aeronautical Development Agency (ADA) and produced by Hindustan Aeronautics Limited (HAL) under the Light Combat Aircraft (LCA) programme.

Evolution:

- Conceived in the 1980s as a replacement for the MiG-21 fleet, the LCA Tejas made its first flight in 2001 and was formally inducted into the Indian Air Force in 2016.
- Over time, it has evolved into improved variants such as Tejas Mk-1 and Mk-1A, with the more advanced Tejas Mk-2 currently under development.

Key Features:

- Lightest & smallest in its class: Composite airframe for high maneuverability and reduced weight.
- 4.5-gen avionics: AESA radar, advanced EW suite, digital flight controls, SMFDs, and open architecture mission computer.
- Quadruplex fly-by-wire: Ensures high agility with enhanced pilot control and safety.
- Multi-role capability: Air-to-air, air-to-ground, BVR missiles, precision bombs, and maritime strike roles.
- IFR capability: In-flight refuelling for extended range.
- Variants: Single-seat fighter (IAF/Navy), twin-seat trainer, and advanced Mk-1A with superior sensors and survivability features.

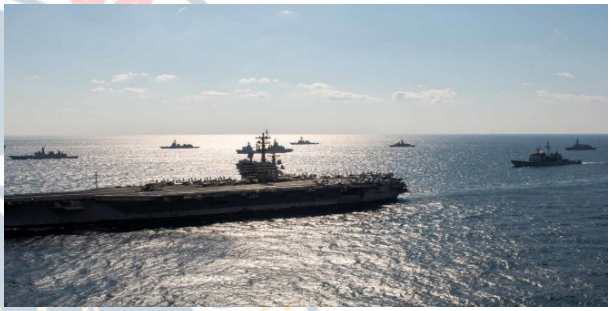
Significance:

- Strengthens Atmanirbhar Defence: A major milestone in India's indigenous aerospace capabilities.
- MiG-21 replacement: Provides a modern, agile and cost-effective fighter for IAF.
- Export potential: Several countries, including in Asia–Africa, have expressed interest.

4. Exercise Malabar 2025

Context: INS Sahyadri has reached Guam in the Northern Pacific to participate in Exercise Malabar 2025, reaffirming India's commitment to maritime cooperation, regional stability, and interoperability among the Quad nations.

About Exercise Malabar 2025:



What it is?

- Exercise Malabar is a multilateral naval exercise involving the navies of India, the United States, Japan, and Australia.
- It serves as a premier platform for enhancing maritime security coordination, interoperability, and joint operational capabilities among the participating nations.

Origin:

- Initiated in 1992 as a bilateral naval exercise between India and the United States.
- Japan became a permanent member in 2015, followed by Australia in 2020, making it a Quad-level exercise.

History:

- Over three decades, the exercise has evolved from basic maritime coordination drills to advanced joint operations, reflecting growing strategic cooperation in the Indo-Pacific region.
- It has been hosted rotationally by member countries, symbolising shared responsibility for regional security.

Nations Involved: India, United States, Japan, and Australia — collectively representing the Quad (Quadrilateral Security Dialogue) nations committed to a free, open, and rules-based Indo-Pacific.

2025 Host: Guam, a U.S. Island territory in the Western Pacific, is hosting Malabar 2025, featuring both harbour and sea phases of the exercise.

Features of Malabar 2025:

1. Harbour Phase: Operational planning meetings, communication alignment, cross-deck visits, and cultural exchanges to enhance mutual understanding.
2. Sea Phase: Advanced maritime operations including joint fleet manoeuvres, anti-submarine warfare, surface gunnery drills, air defence operations, and cross-deck helicopter flights.
3. Focus Areas: Strengthening maritime domain awareness, joint logistics, and coordinated response to emerging security challenges in the Indo-Pacific.
4. Symbol of Aatmanirbhar Bharat: India's participation with INS Sahyadri, an indigenously designed and built stealth frigate, underscores indigenous naval capability.

11 DISASTER

1. India's Disaster Response: Centralisation Concerns and the Road Ahead

Context: The Wayanad landslides (Kerala, 2024) and the Centre–State mismatch in relief have raised concerns that disaster funds are becoming more centralised and conditional.

About India's Disaster Response: Centralisation Concerns and the Road Ahead

What Is India's Disaster Response?

- It is a national, multi-level system created under the Disaster Management Act, 2005 to manage prevention, preparedness, response, relief, and recovery.
- It brings together Union, State, district, local bodies and specialised forces to reduce disaster risk and support affected communities.

Existing Disaster Response Models:

1. Relief-Centric Model (Traditional):
   - Historically focused on post-disaster relief and compensation, not on prevention or resilience.
   - States depended heavily on central grants after each major calamity.
2. Risk Reduction & Preparedness Model (Current Policy Direction): NPDM 2009 and NDMP 2016/2019 shift emphasis to prevention, mitigation and preparedness.
3. Institutional Multi-Tier Model:
   - NDMA leads at national level, with SDMAs and DDMAs implementing at State and district levels.
   - This creates vertical coordination from Delhi to Gram Panchayat.
4. Multi-Hazard Vulnerability Approach: Recognises that India faces earthquakes, floods, cyclones, landslides, droughts, industrial accidents, etc.
5. Sendai Framework–Aligned Model:
   - Aligns Indian policy with Sendai Framework 2015–2030 on risk reduction and resilience.
   - Stresses "build back better", inclusive response and risk-informed development.

Guidelines for First Responders (e.g., NDRF, SDRF, Fire Services, Police, Civil Defence)

Engage in **action-based exercises**, such as mock drills and field exercises.
Ensure **operational readiness** and **training** as per the DMEx scenario.
Coordinate with Emergency Operations Centres and follow the **IRS structure** during exercises.
Contribute to **scenario planning** with ground-level expertise.

Guidelines for Urban Local Bodies (ULBs), PRIs & Local Authorities

Actively participate in DMEx within their jurisdictions.
Facilitate **community participation** and provide **infrastructure/logistics** support.
Ensure **alignment of local emergency plans** with broader DM plans tested in DMEx.

Successes So Far:

1. Robust Institutions (NDMA, NDRF, SDMAs, DDMAs): India now has a full legal–institutional chain from national to district level for disaster governance.
2. Reduced Cyclone Mortality: Odisha and Andhra Pradesh are often cited as global best practices for cyclone response.
3. Improved Forecast & Early Warning:

- IMD now offers more accurate track and intensity forecasts for cyclones and extreme weather.
- Use of satellites, Doppler radars and SMS alerts has strengthened last-mile communication.

4. Mock Drills & DMEx Culture: Large-scale exercises like Suraksha Chakra in Delhi-NCR test responses to major earthquakes.
5. Volunteer Involvement: Programs like Aapda Mitra train community volunteers for first response. Civil society and local NGOs are increasingly embedded in planning and drills.

Challenges Associated with India's Disaster Response:

1. Centralisation & Fiscal Asymmetry:
   - Centre often releases much less than assessed losses, forcing States to borrow or cut other spending.
   - Negotiated, delayed NDRF support weakens trust in cooperative federalism.
2. Outdated Relief Norms & Inadequate Compensation: Fixed amounts for death and house damage do not match present-day costs of rebuilding.
3. Ambiguity and Discretion in 'Severe Disaster' Tag: "Severe" disaster is not clearly defined, enabling subjective decisions on NDRF eligibility.
4. Procedural Delays & Bureaucratic Layers: Relief depends on memorandums, central teams, high-level approvals and file movement. This delays fund release at a time when speed is most critical.
5. Weak Risk-Based Allocation Criteria: Finance Commission uses population and area rather than hazard maps and exposure indices. Vulnerability is approximated by poverty, not by scientific risk assessment.
6. Capacity and Implementation Gaps at Local Level: DDMA/ULB capacities in planning, GIS, and enforcement remain uneven across states.

Way Ahead:

1. Rules-Based, Trigger-Linked Financing:
   - Use objective indicators (rainfall thresholds, per capita loss, loss–GSDP ratio) to trigger aid.
   - This reduces political discretion and ensures predictable, timely relief.
2. Revise Norms & Expand Eligible Uses of Funds:
   - Periodically revise compensation norms to reflect real reconstruction costs.
   - Allow SDRF/NDRF to also support livelihood restoration and basic rebuilding, not just immediate relief.
3. Empower States, Districts and Local Bodies:
   - Give SDMAs and DDMAs greater operational control over funds and planning.
   - Strengthen ULBs and panchayats with training, EOCs and clear local response protocols.
4. Develop a National Disaster Vulnerability Index:
   - Combine hazard, exposure, population density, ecology and socio-economic vulnerability.
   - Use this index to prioritise funds and mitigation projects transparently.
5. Mainstream Risk Reduction into Development:
   - Enforce building codes, zoning laws, CRZ norms and floodplain regulation strictly.
   - Make all major infrastructure climate and disaster resilient by design.
6. Strengthen Cooperative Federalism & Trust:
   - Institutionalise Centre–State consultation on criteria, triggers and norms.
   - Keep Union's role as supportive and rules-based, not ad hoc and discretionary.

Conclusion:

India has built a strong legal and institutional base for disaster management, but its financing and federal practices lag behind its ambitions. As climate shocks intensify, disaster response must shift from negotiated, discretionary relief to a transparent, rules-based partnership. Only then can India's federal system protect both lives and the constitutional spirit of cooperative, resilient governance in times of crisis.

Chapter 1: Education for the Visually Impaired

Empowering persons with visual impairment through education is a transformative process requiring legal, institutional, and societal commitment. Ensuring equitable access to education enables dignity, independence, and equal opportunity—moving India closer to inclusive development.

Empowerment Through Education

Empowerment begins when individuals recognise their potential and actively participate in shaping their futures. For persons with disabilities, education is the foundation of empowerment—fostering independence, self-advocacy, and civic participation. It breaks the cycle of dependency, enhances employability, and promotes social inclusion.

- India's National Education Policy (NEP) 2020 and the Rights of Persons with Disabilities (RPwD) Act, 2016 form the cornerstone of this vision. Both emphasize inclusive, barrier-free education and align with constitutional and human rights commitments.

Legal and Policy Framework

- RPwD Act, 2016: Mandates inclusive education, accessibility, and reasonable accommodation. Sections 16–17 require schools to adapt curricula, train teachers, and provide assistive technologies.
- NEP 2020: Calls for barrier-free access, curriculum adjustments, and comprehensive teacher training to support visually impaired students.
- Rehabilitation Council of India (RCI) Act, 1992: Governs training and certification of special educators, ensuring professional support for visually impaired learners.

Major Government Schemes

- Samagra Shiksha Abhiyan: Promotes inclusive education from pre-primary to Class XII through assessment, provision of aids, and special educators for Children with Special Needs (CWSN).
- Scheme for Implementation of the RPwD Act (SIPDA): Provides financial assistance to states and institutions for barrier-free infrastructure, skill training, and assistive technologies.
- Deendayal Disabled Rehabilitation Scheme (DDRS): Funds NGOs and special schools for communitybased rehabilitation of visually impaired persons.
- National Scholarships for Persons with Disabilities: Supports post-matric and professional education to ease financial barriers.
- Assistance to Disabled Persons for Purchase/Fitting of Aids and Appliances (ADIP) Scheme: Active since 1981 (revised in 2024), it provides Braille kits, smart canes, accessible mobile phones, and mobility aids to enhance independence.
- National Action Plan for Skill Development of Persons with Disabilities (NAP-SDP): Targets skilling 2.5 million PwDs, with training, mentorship, and placement support, in collaboration with the Ministry of Skill Development and Entrepreneurship.

Institutional Support

- National Institute for the Empowerment of Persons with Visual Disabilities (NIEPVD), Dehradun: Offers academic and vocational training, produces Braille materials, and conducts research. It introduced science courses for visually impaired students in 2024, promoting inclusion in STEM fields.
- NCERT Initiatives: Through DIKSHA and PM e-Vidya, NCERT provides DAISY-format textbooks, audiobooks, tactile visuals, and teacher training resources. The Barkha Reading Series and accessible e-content exemplify Universal Design for Learning.

Key Enablers for Inclusive Education

1. Accessible Learning Materials- Standard print formats exclude visually impaired learners. To bridge this, the government provides Braille, tactile, audio, and digital formats under the DALM Project (Development of Accessible Learning Material)—an evolved version of the 2014-15 Braille Books Scheme under SIPDA.
    - Since 2015-16: Over 115 crore Braille pages produced, benefiting 1.58 lakh students through 25 implementing agencies nationwide.
2. Assistive Technologies- Assistive technologies convert visual data into tactile, auditory, or magnified formats—enabling reading, writing, and communication. Devices include Braille displays, OCR tools, magnifiers, AI-powered reading aids, and smart canes. Under the ADIP Scheme (revised 2024), modern aids are distributed through certified agencies, enhancing rehabilitation and employment potential.
3. Qualified Educators- Section 17(c) of the RPwD Act mandates teachers trained in Braille and multisensory instruction. The Rehabilitation Council of India (RCI) develops curricula, accredits training institutes, and maintains the Central Rehabilitation Register (CRR) for qualified professionals.
4. Barrier-Free Infrastructure- Inclusive campuses must have ramps, handrails, tactile paving, audio cues, and Braille signage. The Accessible India Campaign (Sugamya Bharat Abhiyan) drives universal accessibility across educational spaces and public infrastructure.
5. Social and Emotional Support Empathy-based classrooms, peer interaction, and counselling combat isolation and stigma. The Awareness Generation and Publicity (AGP) scheme by DEPwD promotes sensitisation and inclusion, fostering confidence and belonging among students.

Legal and Institutional Oversight

The Office of the Chief Commissioner for Persons with Disabilities (CCPD) ensures compliance with the RPwD Act and monitors the implementation of inclusive education across India. It also acts as a grievance redressal authority for accessibility-related issues.

Recent Developments (Last 10 Years)

- RPwD Act, 2016 enacted, legally mandating inclusive education.
- Unicode-mapped Braille codes launched by DEPwD for digital inclusion.
- DALM Project (2023 update) expanded to include talking books, e-pub, and large-print formats.
- Science stream education introduced (2024) at NIEPVD's Model School.
- Strengthening of Orientation & Mobility (O&M) training by RCI.
- Revised skill development curricula and introduction of new vocational courses.
- Launch of free coaching schemes for higher education and employment.
- Flexible assessment guidelines introduced for visually impaired students.

Needs	Requirements	Interventions
Educational Needs	Access to Braille books, audio materials, tactile diagrams, screen readers, trained special educators, etc.	Availability of accessible formats; integration of inclusive pedagogy; appointment of RCI (Rehabilitation Council of India)-certified/ registered teachers.
Mobility Needs	Orientation and mobility training, smart canes, tactile paths, and accessible infrastructure.	Include mobility training in the curriculum; design barrier-free school infrastructure; provide assistive mobility tools.
Communication Needs	Screen-reading software, speech-to-text tools, and accessible digital platforms.	Equip ICT (Information, Communication and Technology) labs with accessible software; train teachers and students in digital literacy for VI.
Technological Needs	Affordable assistive devices like Braille displays, OCR (Optical Charater Recognition) tools, and AI-powered reading aids.	Provide subsidies or grants for devices; integrate assistive tech into classroom learning.
Social and Emotional Needs	Peer inclusion, counselling services, and awareness programmes to reduce stigma.	Conduct inclusive classroom activities, provide school-based counselling, and organise disability awareness programmes.
Daily Living Needs	Talking devices, accessible household tools, and support for independent living.	Introduce life skills education; provide accessible tools in hostels and vocational labs.
Legal and Institutional Needs	Enforcement of rights under the RPwD Act, 2016, and access to schemes like ADIP (Assistance to Disabled Persons).	Ensure school compliance with RPwD norms; facilitate access to government schemes and entitlements.
Economic Needs	Vocational training, employment opportunities, and financial assistance.	Offer skill-based courses; link students with inclusive vocational training and scholarship programmes.

Challenges Ahead

Despite progressive laws and policies, gaps remain in:

- Regional disparities in infrastructure and teacher availability.
- Limited awareness among educators and peers.
- Insufficient access to modern assistive technologies in rural areas.
- Societal stigma and emotional isolation.

Sustained investment, technological innovation, and social sensitization are needed to bridge these divides.

Chapter 2: Cultivating Creativity and Enterprise

The National Education Policy (NEP) 2020 emphasises fostering critical thinking, creativity, and problem solving among students, moving beyond rote learning. As India aims to become an innovation-based knowledge economy under Viksit Bharat @2047, education must become the foundation for innovation and nation-building.

Preparing for Industry 5.0

With rapid advances in AI, robotics, and machine learning, education needs to align with emerging industry demands. Institutions of 2047 must focus on interdisciplinary learning, emotional intelligence, and a human centric approach. Building innovation ecosystems within institutions will empower students with real-world problem-solving abilities.

AICTE Initiatives for Innovation

The All-India Council for Technical Education (AICTE) promotes innovation through:

- Smart India Hackathon (SIH) – world's largest open innovation model engaging 15 lakh+ students.
- KAPILA (Kalam Program for IP Literacy and Awareness) – led to a 247% rise in patent filings.
- Institution's Innovation Councils (IICs) – 16,300+ councils across India nurturing innovation culture.
- National Innovation and Start-up Policy (NISP) – adopted by 3,000+ institutions to promote entrepreneurship.
- AICTE Innovation Centers – hubs for research collaboration and IP commercialization.

These initiatives embed creativity into academic culture, promoting hands-on learning and tech-driven solutions.

Innovation at the School Level

The National Policy for Promoting Innovations in Schools fosters problem-solving and entrepreneurial skills among 250 million students in 1.5 million schools.

Key initiatives:

- School Innovation Ambassador Training Program (SIATP) – trained 26,800 teachers from 14,120 schools in 5 domains:
- (1) Design Thinking, (2) Idea Generation, (3) Entrepreneurship, (4) IPR, (5) Finance & HR.
- School Innovation Councils (SICs) – established in 20,000+ schools, fostering local problem-solving and connecting with higher education & industry.
- Design Thinking and Innovation (DTI) module - world's first structured DTI module for schools; 2,400 schools and 1.3 lakh students enrolled.

Digital and Experiential Learning

Online platforms like SWAYAM offer structured courses on Design Thinking and Intellectual Property Rights, democratizing access to innovation education.

Innovation Design and Entrepreneurship (IDE) Bootcamps by AICTE, MIC, and DoSEL trained 9,692 participants in schools and 10,000+ in higher education, across 40+ locations, providing hands-on exposure, mentorship, and industry linkages.

Towards a New Educational Era

These collective efforts are shaping an innovation-driven academic ecosystem across all levels of

education. They align with the goals of Atmanirbhar Bharat and Viksit Bharat @2047, building a generation of innovators, problem-solvers, and entrepreneurs. Education is thus redefined as "Shiksha for Innovation"— not just acquiring knowledge but creating, experimenting, and innovating.

Chapter 3: Indian Knowledge System (Iks) in Education

India's civilizational legacy spans over 5,000 years, encompassing vast knowledge across science, art, philosophy, and governance.

- Despite foreign invasions and colonial influence, this intellectual heritage survived through oral traditions and later written records. However, over the last 200 years, Western epistemic models marginalized indigenous traditions.
- The National Education Policy (NEP) 2020, India's first major education reform in the 21st century, aims to revitalize these traditions by integrating Indian Knowledge Systems (IKS) into all levels of education — aligning modern learning with India's cultural heritage and SDG 4 (Quality Education).

Understanding Indian Knowledge Systems (IKS)

IKS refers to India's vast body of indigenous intellectual and cultural heritage, developed over millennia and preserved across regions and languages. It encompasses:

- Tacit knowledge (through experience and tradition) and explicit knowledge (texts, theories, frameworks).
- A systematic classification of wisdom spanning spiritual, scientific, artistic, and social domains.
- The Bharatiya Gyana Parampara, a living tradition that evolved with time while retaining cultural roots.

The book "Introduction to Indian Knowledge Systems: Concepts and Applications" defines IKS as knowledge emerging from Akhanda Bharata—from Afghanistan to Burma and the Himalayas to the Indian Ocean.

Iks Under Nep 2020

NEP 2020 recognizes IKS as essential for holistic education, encouraging infusion of Knowledge of India (KoI) across all stages and subjects.

Key provisions include:

- Curriculum rooted in Indian context, ethos, and heritage (Clause 4.29).
- Use of local stories, arts, sports, and examples to enhance relatability and creativity.
- Integration of indigenous traditions, philosophy, language, and science to make learning experiential and culturally grounded.

National Curriculum Framework (Ncf) 2023: Subject-Wise Iks Integration

Formulated by NCERT, NCF 2023 operationalizes NEP 2020 by embedding IKS across subjects:

- Art Education: Draws on Natyashastra, Abhinaya Darpanam, Shilpashastra, Vaastushastra, Chitrasutra; students learn raga, tala, laya, rasa, bhava.
- Mathematics: Introduces India's contributions—zero, negative numbers, geometry, algebra; includes figures like Aryabhata, Brahmagupta, Ramanujan.
- Science: Highlights India's advancements in astronomy, metallurgy, medicine, chemistry, and space research.
- Social Sciences: Encourages pride in Bharatiyata, exploring India's democratic ideals, diversity, and values like ahimsa and coexistence.
- Languages: Promotes learning in mother tongue/regional language (R1); India's 19,500+ dialects strengthen multilingualism and identity.
- Physical Education: Integrates traditional sports — Yoga, Mallakhamb, wrestling, archery, martial arts, and local games (50+ introduced at preparatory stage).

Technological Innovations

Established in 1961, NCERT leads curriculum design, textbook development, teacher training, and digital

content creation (e-Pathshala, DIKSHA).

Post-NEP 2020, NCERT:

- Formed a Curricular Area Group on IKS to guide integration across subjects (Grades 1–12).
- Ensured IKS inclusion in textbooks till Grade 8 and in new subjects like The World Around Us, Arts Education, Health and Well-being.
- Developed content in Hindi, English, and Urdu, embedding shlokas, local traditions, and cultural references in lessons.
- Promotes innovative materials like Jaadui Pitara and special IKS modules for experiential learning.

Significance

Revitalising IKS is not about returning to the past but harmonising tradition with modernity. It fosters:

- Holistic learning integrating ethics, science, and creativity.
- Cultural pride and national identity among learners.
- Critical thinking and innovation rooted in indigenous wisdom.
- Alignment with Atmanirbhar Bharat and global educational standards.

Chapter 4: Skill-Based Education

Five years since the rollout of the National Education Policy (NEP) 2020, vocational education in India has undergone a strategic transformation. The policy mainstreams skill-based learning by integrating vocational education from Grade 6 onwards, ensuring every student gain practical exposure and employable skills.

Integration of Skills in School Educationintegration of Skills in School Education

- Grades 6–8: Students undertake 10-day 'bagless' internships with local artisans like potters, carpenters, and artists, promoting curiosity and hands-on learning.
- Grades 9–12: Structured skill training through partnerships with ITIs, polytechnics, and industries, often leading to certification or employability pathways.
- Emphasis on bridging the education-employability gap, reducing the academic-vocational divide, and developing community-linked, market-relevant skills.

Key Reforms and Mechanisms

- National Curriculum Framework (NCF) integrates vocational components.
- Skill Labs established under a hub-and-spoke model.
- Digital platforms like SWAYAM and DIKSHA expand access to virtual skill learning.
- Inclusion of Lok Vidya (traditional knowledge) along with modern sectors like AI, Robotics, and IoT.
- Every child to learn at least one vocation and be exposed to several others.

Expansion and Institutional Growth

- Schools offering NSQF-aligned vocational subjects increased from 12,292 (2021–22) to 18,610 (2023–24) — a 51% rise.
- The focus has shifted from "Education for All" to "Skills for All," promoting education as an equitable opportunity.
- Employability skills module made mandatory, covering communication, self-management, ICT, entrepreneurship, and green skills.

State-Level Implementation

- Rajasthan: Vocational education integrated into 1,867 schools across 33 districts; 2.56 lakh students trained in 15 trades in 2022–23.
- Himachal Pradesh: Introduced vocational courses in 416 schools (2023–24); 98,000 students enrolled; implemented '10 Bagless Days' in 2,500+ schools; adopted 48-hub model for shared resources.
- Maharashtra: Proposed mandatory internships for all industries receiving state incentives under its new Industrial Policy; promotes academia-industry collaboration.

Digital and Higher Education Initiatives

- AI-powered career guidance tools offer personalized pathways across 1,500 options.
- SWAYAM enrolment rose from 25,905 (2020–21) to over 1 lakh (2024–25).
- Academic Bank of Credits (ABC): Over 32 crore IDs issued; 2,469 institutions onboarded.
- B.Voc degrees and work-integrated programs gaining traction at IIT Delhi, IIT BHU, etc.
- ITIs report rising enrolment under PM SHRI and Samagra Shiksha initiatives.

Challenges

- Dropout rate: 14.1% at the secondary level (2023–24), limiting access to vocational pathways.
- Outdated curricula: Slow alignment with fast-changing sectors like digital services and green energy.
- Societal stigma: Persistent divide between academic and vocational streams; gendered stereotypes restrict girls to "safe" fields like tailoring or beauty services.
- Trainer shortages: Lack of certified, pedagogically trained vocational educators.

Way Forward

- Mainstream vocational education: Integrate into school timetables with clear mandates and funding.
- Shift societal perceptions: Campaigns, teacher sensitisation, and alumni success stories to elevate dignity of labour.
- Strengthen infrastructure: Use cluster models, PPPs, and align with the 6% GDP education spending goal.
- Develop skilled trainers: Establish state-level vocational educator cadres with certification and growth pathways.
- Dynamic curricula: Continuous industry-academia collaboration via standing curriculum boards.
- Career guidance: Annual counselling and aspiration mapping; encourage girls into non-traditional sectors.
- Inclusive design: Accessible labs and curricula for Divyangjan (CwSN) with employer sensitisation.
- Institutionalize internships: Through local partnerships with industries and government schemes like e-Mitra.
- Leverage technology: Integrate DIKSHA and SWAYAM; track participation via UDISE+ and household surveys.

Conclusion

NEP 2020 marks a paradigm shift from rote learning to skill-integrated, inclusive, and future-ready education. By promoting early vocational exposure, industry collaboration, and digital empowerment, India is redefining education as a bridge between learning and livelihood. The success of this reform lies in dismantling the academic-vocational hierarchy and fostering the dignity of labour, paving the way for a skilled, employable, and equitable India.

Chapter 1- Rashtriya Poshan Maah

Malnutrition in India remains a multidimensional challenge impacting health, productivity, and economic growth. Globally, it costs the economy US$3.5 trillion annually, or about US$500 per person, underscoring that nutrition is not just a health issue but an economic necessity.

- India's fight against malnutrition has evolved over decades, beginning with the Integrated Child Development Services (ICDS) in 1975, one of the world's largest community-based programmes delivering health, nutrition, and early childhood education services to children under six, pregnant women, and lactating mothers.

Evolution of India's Nutrition Policy

POSHAN Abhiyaan (2018)

Launched in 2018, the POSHAN Abhiyaan (National Nutrition Mission) marked a paradigm shift in India's nutrition strategy, focusing on the first 1,000 days of life — from conception to a child's second birthday.

It rests on a three-pronged approach:

- Jan Andolan: Community-led behaviour change campaigns.
- Digital Monitoring: Real-time service tracking via the POSHAN Tracker.
- Capacity Building: Training 1.4 million Anganwadi Workers through the Incremental Learning Approach (ILA).

To strengthen convergence, the Government launched Saksham Anganwadi and Mission Poshan 2.0 in 2021, integrating POSHAN Abhiyaan, Anganwadi Services, and the Scheme for Adolescent Girls. Functional across 28 States and 8 UTs, it now serves nearly 10 crore beneficiaries, delivering Supplementary Nutrition, Growth Monitoring, and Behaviour Change Communication (BCC).

Rashtriya Poshan Maah: The SBCC Engine

Introduced in September 2018 as part of the Jan Andolan, Rashtriya Poshan Maah serves as the annual focal point of a year-round Social Behaviour Change Communication (SBCC) and service delivery framework.

It translates policy ambition into household practice through coordinated action among communities, local governance institutions, and frontline systems.

SBCC Strategy

Poshan Maah uses a three-tier communication approach:

- Mass Media: TV, radio, and digital platforms for large-scale outreach.
- Mid-Media: Local radio, wall paintings, folk performances, and school activities for community engagement.
- Interpersonal Counselling: Home visits and awareness drives by Anganwadi Workers using digital tools.

This ensures participation from mothers, fathers, adolescents, teachers, Panchayat leaders, and community influencers.

Journey of Poshan Maah: 2018–2025

Year	Theme / Focus	Theme / Focus

2018	Launch Year	Awareness drives in schools, communities, Anganwadis – foundation for Jan Andolan.
2019	Poshan Tyohar Se Vyavahar	Emphasised translating celebration into healthy behaviour; focus on first 1,000 days, anaemia, diarrhoea, sanitation, and dietary diversity.
2020	Digital Outreach during COVID-19	Use of e-Samvads, webinars, social media campaigns, and promotion of Poshan Vatikas (nutri-gardens).
2021	Thematic Weekly Activities (Azadi Ka Amrit Mahotsav)	Plantation drives, yoga-based awareness, nutrition kit distribution.
2022	Panchayat-led Poshan Maah	Focus on Mahila aur Swasthya and Bacha aur Shiksha; organisation of Poshan Panchayats, tribal food promotion, recipe exhibitions.
2023	Life-cycle Approach	Integration of health, education, and nutrition; focus on diet diversity, anaemia prevention, and technology-enabled governance.
2024	Consolidation Phase	Focus on anaemia prevention, growth monitoring, complementary feeding, Poshan Bhi Padhai Bhi, and digital service delivery.
2025	Swasth Naari, Shashakt Parivar	Focus on obesity prevention, reduced sugar-salt-oil intake, ECCE, IYCF, men's participation, and convergence across sectors.

Over time, Poshan Maah has transformed from a limited awareness drive into one of India's largest peopleled movements, engaging crores of citizens annually and creating a culture of nutrition awareness and local accountability.

Significance of Rashtriya Poshan Maah

- Behavioural Transformation: Moves beyond information dissemination to foster sustained social behaviour change through community engagement.
- Convergence Platform: Aligns multiple ministries and programmes — Health, Education, Jal Shakti, Rural Development, and Panchayati Raj — ensuring holistic service delivery.
- Community Ownership: Empowers local governance institutions, especially Gram Panchayats, to lead nutrition campaigns.
- Technology-Enabled Governance: Use of digital dashboards, mobile-based monitoring, and the POSHAN Tracker ensures transparency and accountability.
- Economic and Human Development Impact: Improved nutrition enhances productivity, reduces healthcare costs, and contributes to human capital formation.

Challenges Ahead

- Regional Disparities: Malnutrition indicators vary widely across states, with higher prevalence in tribal and rural areas.
- Behavioural Inertia: Deep-rooted cultural food practices and gender biases limit adoption of improved nutrition habits.
- Supply Chain Gaps: Irregular supply of supplementary nutrition and weak last-mile monitoring affect outcomes.

- Convergence Deficit: Coordination among departments remains uneven across states.

Way Forward

- Strengthen Last-Mile Delivery: Ensure seamless supply of supplementary nutrition through technologybased tracking.
- Men-streaming Nutrition Awareness: Engage men as active participants in family nutrition and child health.
- Promote Local Food Systems: Encourage dietary diversity through local, seasonal, and traditional food practices.
- Institutionalise SBCC: Integrate nutrition and health communication modules in school and Panchayatlevel training.
- Measure and Review: Use Poshan Maah as an annual evaluation point for progress, innovation, and course correction.

Chapter 2- Nourishing India's Future

Nutrition and early childhood care form the foundation of a nation's human capital. India's flagship POSHAN Abhiyaan (2018) reflects this vision, aiming to reduce malnutrition through convergence, technology, and behaviour change communication.

- The 8th Rashtriya Poshan Maah (September 2025) highlights themes such as Infant and Young Child Feeding (IYCF), Early Childhood Care and Education (ECCE), and Nutrition Literacy to Tackle Obesity, aligning with the goal of a Suposhit and Viksit Bharat by 2047.

1. Infant and Young Child Feeding (IYCF)

Why Early Nutrition Matters

The first 1,000 days — from conception to age two — determine lifelong health, cognitive ability, and productivity. According to WHO, indicators like stunting and wasting often emerge in the first six months, underscoring the importance of timely feeding practices.

Exclusive Breastfeeding: The Superfood Advantage

- Exclusive breastfeeding for the first 6 months is both traditional wisdom and a scientifically proven intervention against infections, malnutrition, and infant mortality.
- Breast milk provides antibodies, nutrients, and growth factors, reducing risks of asthma, obesity, and diabetes.
- For mothers, it lowers risks of breast and ovarian cancers and type-2 diabetes.
- WHO advises initiating breastfeeding immediately after birth to ensure immunity and survival.

The Ministry of Women and Child Development (MoWCD) promotes IYCF through Anganwadi home visits and Social and Behaviour Change Communication (SBCC) under Mission Saksham Anganwadi and Poshan 2.0, counselling families on optimal feeding.

Complementary Feeding (6–24 months)

Beyond six months, a child's nutritional needs surpass what breast milk provides. The WHO recommends:

- 6–8 months: 2–3 small meals plus breastfeeding
- 9–24 months: 3–4 meals + 1–2 nutritious snacks daily

Dietary diversity is crucial — meals should include cereals, pulses, milk, eggs, meat/fish, fruits, and vegetables while limiting sugar, salt, and oils.

The Annaprashan Diwas initiative celebrates the introduction of complementary foods, promoting local, low-cost recipes rooted in tradition and science.

Responsive Feeding and Shared Responsibility

Nutrition is more than food — it is responsive caregiving, involving emotional bonding and interactive feeding. Studies show this practice:

- Builds healthy food preferences,

- Reduces undernutrition and obesity risks, and
- Fosters emotional and cognitive growth.

Through Jan Andolan-style campaigns, the government ensures families adopt IYCF practices — exclusive breastfeeding for 6 months, timely complementary feeding, and responsive caregiving — to break the intergenerational cycle of malnutrition.

2. Early Childhood Care and Education (ECCE)

Constitutional and Policy Framework

- The 86th Constitutional Amendment (2002) inserted Article 45, directing the State to provide ECCE for all children up to six years.
- The RTE Act (2009) extended this through Section 11, mandating free pre-school education for children above three years.
- ECCE ensures holistic development — physical, cognitive, emotional, and social — making children school-ready, resilient, and developmentally on track.

ECCE within Mission Saksham Anganwadi and Poshan 2.0

The Anganwadi network (over 14 lakh centres, reaching 46% of India's under-six population) remains the world's largest early childhood development programme.

Originally for Below Poverty Line families, it was universalised in 2009 to ensure free access to nutrition, health services, and preschool education for all.

The Saksham Anganwadi and Poshan 2.0 scheme aims to transform Anganwadis into vibrant early learning hubs with improved infrastructure and training.

Poshan Bhi Padhai Bhi (PBPB) Initiative

Launched on 10 May 2023, PBPB integrates play-based, inclusive ECCE at Anganwadi Centres.

- Training: 14 lakh Anganwadi Workers are being trained (5 days each) through a two-tier model by SPNIWCD (formerly NIPCCD); over 7 lakh workers are already trained.
- Curricula:

1. Navchetana – National Framework for Early Childhood Stimulation (birth–3 years).
2. Aadharshila – National Curriculum for ECCE (3–6 years).

- Digital Support: Daily ECCE activity videos and voice notes via the Poshan Tracker app guide Anganwadi workers with low-cost, play-based learning materials.
- Recognition: Children completing ECCE receive an ECCE Certificate, linked to APAAR ID and UDISE databases for continuity into formal schooling.
- Co-location guidelines ensure Anganwadi Centres function alongside government primary schools.

Community and Behavioural Outreach

Monthly events like Sports Day, Creativity Day (Nanhe Kalakaar), and Annual Day engage parents and local communities.

Campaigns during Poshan Maah (September) and Poshan Pakhwada (March) promote awareness through Shiksha Chaupal, DIY toy fairs, and play-based demonstrations.

This community-based model underscores that "play is learning", shaping empathy, curiosity, and lifelong learning.

3. Advancing Nutrition Literacy to Tackle Obesity

The Emerging Challenge

As India reduces undernutrition, overnutrition and obesity are emerging as twin threats. The Household Consumption Expenditure Survey (HCES) shows processed foods and beverages now dominate food spending across rural and urban India.

Unhealthy dietary shifts, sedentary lifestyles, and digital habits are fuelling a public health crisis involving obesity, diabetes, and cardiovascular diseases.

Health and Socioeconomic Impacts

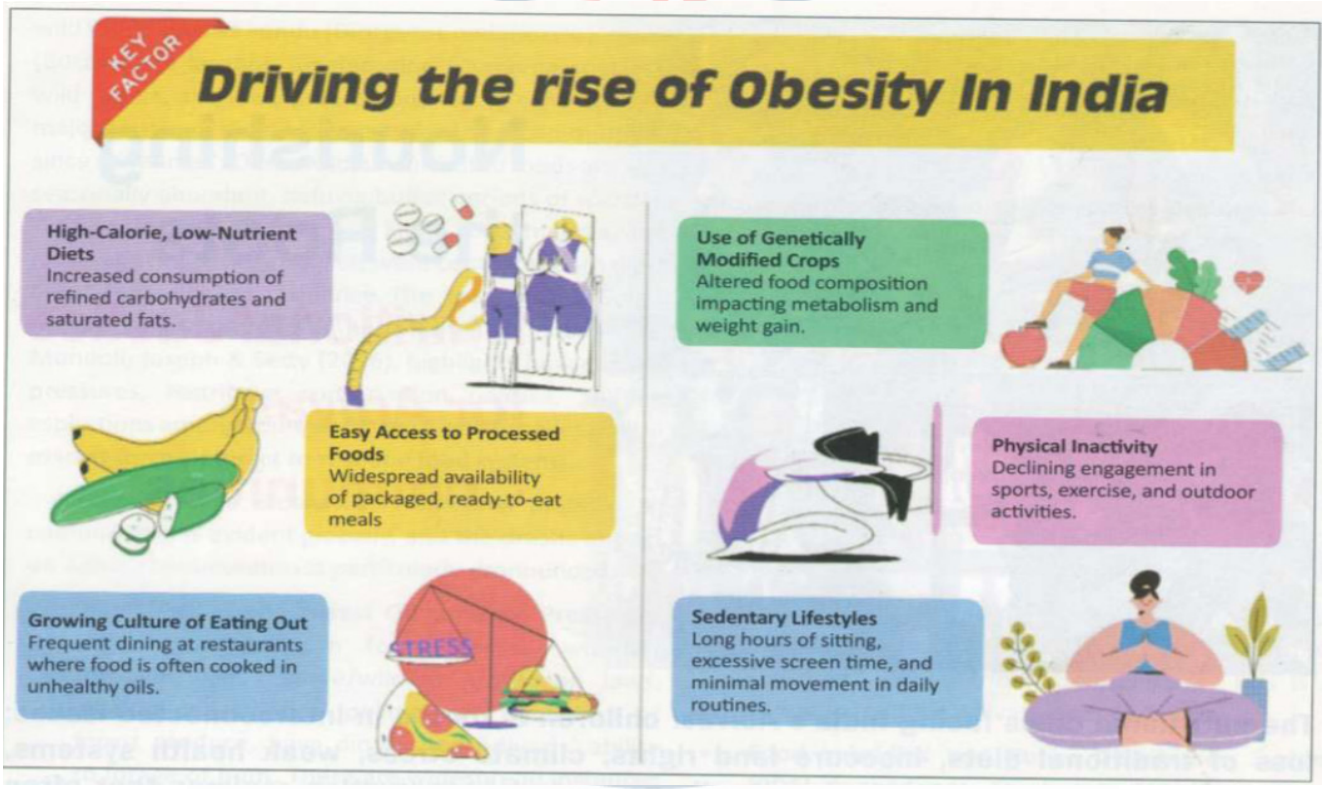
- Among children: low self-esteem, teasing, early-onset diabetes, and cardiac risks.
- Among adults: higher incidence of PCOS, infertility, cancers (colon, breast, liver), and cognitive decline.
- Economic effects include reduced productivity and higher healthcare costs, perpetuating intergenerational obesity

Policy and Behavioural Response

The 8th Poshan Maah (2025) emphasizes nutrition literacy — empowering citizens to make informed food choices through SBCC and community engagement.

Key public messages include:

- Regular weight monitoring to track nutrition status.
- Limit salt, sugar, and oils; prefer local, balanced meals.
- Read food labels, practice mindful eating, and ensure adequate sleep.
- 60 minutes of daily physical activity or yoga and reduced screen time.



To drive awareness, the MoWCD has introduced "Oil and Sugar Boards" at Anganwadi Centres — visual tools prompting families to reflect on daily consumption patterns and adopt moderation.

Chapter 3- Nutrition Sensitive Agriculture in Rural India

In rural India—home to nearly 900 million people, where agriculture employs 44% of the workforce—Nutrition Sensitive Agriculture (NSA) integrates farming and nutrition to address undernutrition, micronutrient deficiencies, and obesity. By promoting biofortified crops, dietary diversity, women's empowerment, and climate-resilient farming, NSA directly contributes to SDG 2 (Zero Hunger) and SDG 3 (Good Health and Well-being).

India's Nutrition Paradox

Despite being the world's largest milk producer (220 million tonnes) and a major exporter of pulses and spices, India faces severe malnutrition.

- Global Hunger Index 2024: Rank 105/127, score 27.3 ("serious").
- NFHS-5 (2019–21): 35.5% of children under 5 are stunted, 19.3% wasted, and 67.1% anaemic. Monotonous cereal-based diets dominate rural areas, eroding nutritional outcomes.

Concept and Core Elements

According to FAO, NSA strengthens agricultural systems to improve nutrition outcomes through diversification, equity, and health linkages.

Key Components:

- Crop diversification: Millets, pulses, fruits, and vegetables.
- Biofortification: Zinc-rich wheat, iron-fortified millets, vitamin A sweet potatoes.
- Women's empowerment: Women form 70–80% of the agricultural workforce but own <13% of land (World Bank, 2020).
- Health linkages: Nutrition education and convergence with public health schemes.

World Bank (2022) estimates NSA could reduce child stunting by 20% by 2030, saving $11 billion in malnutrition-related losses.

Rural Nutrition Burden

- CNNS (2016–18): 40% of rural children under five are anaemic (vs 28% urban).
- SOFI 2023: 224 million Indians (16.6%) undernourished.
- Rural poverty: 19.28% (NITI Aayog MPI, 2023).
- Micronutrient deficiencies:
  - Zinc deficiency in 30% of preschoolers.
- Vitamin A deficiency causes blindness in 6.1 million children annually (WHO 2023).
- 54.3% of pregnant women anaemic, leading to 18.2% low birth weight infants.

Climate stress: Erratic rainfall reduced pulse output by 15% in rainfed areas (ICAR 2024). Post-harvest losses reach 40% for perishables (FAO 2023).

Economic loss: 4% of GDP annually (~$1.4 trillion, World Bank 2019).

Implementation in India

NSA has been integrated into several national policies and missions:

- POSHAN Abhiyaan (2018): Targets 2% annual reduction in stunting.
- Biofortification Mission (2022–25): ₹10,000 crore to promote nutrient-rich crops for 10 million farmers.
- ICAR "Seeds for Nutrition" (2020): Distributed 50 million seed packets; 30% rise in iron-fortified millet cultivation in Rajasthan.

- FAO Project (Madhya Pradesh): Dairy intake up 25%, child anaemia down 15% (2023).
- UNICEF "Nutrition-Smart Villages" (Bihar): 15,000 women trained; dietary diversity up from 3.5 to 4.7 food groups (2023).
- World Bank Climate Plan (Maharashtra): Drought-tolerant crops across 2 million ha raised yields by 20%. Yet, only 40% of targeted districts have operational NSA plans (NITI Aayog 2024).

Food Security Dimensions

1. Availability:

- HarvestPlus (2017–23): 15 million farmers adopted vitamin A-enriched maize/potatoes, increasing nutrient availability by 10–15% (IFPRI 2023).
- Tamil Nadu's millet mission raised production to 1.5 million tonnes.

2. Access:

- Women's SHGs under NRLM saw income rise 20–30%.
- World Bank (2022): 18% higher spending on diverse foods among SHG households in UP.

3. Utilisation:

- USAID (2023): Jharkhand households' child nutrient intake rose 22% through local superfood recipes.

4. Stability:

- CGIAR (2024): Stabilised yields in 10 states; seasonal hunger down 12%.
- Hunger Watch (2023): NSA households 25% less likely to face food shortages.

Health and Economic Impact

- Kerala: NSA districts show 15% lower stunting than Bihar (NFHS-5).
- Odisha (IFPRI 2022): Iron-fortified crops reduced anaemia by 16%, improved cognition by 8%.
- Punjab (WHO 2023): Livestock-based NSA cut vitamin D deficiency by 20%.
- UNICEF 2024: 10% fewer preterm births with improved folate intake.
- Lancet 2023: NSA scaling could prevent 1 million child deaths by 2030, boost rural GDP by 2–3%.
- NIMHANS 2024: 15% decline in women's depression rates in NSA communities.

Case Studies

- Rajasthan (Bundi): BAIF–FAO's "Nourish the Future" (2019–24) — dietary diversity up from 2.8→5.2 food groups, stunting down 12%, incomes up 28%.
- Andhra Pradesh (RySS): Watershed-linked NSA boosted vegetable yield by 35%, anaemia fell 22% (World Bank 2023).
- Kerala: NSA in 80% panchayats reduced underweight children by 18% (2024). Digital innovations like the POSHAN Tracker now monitor 100 million nutrition records monthly.

Challenges and Future Pathways

- NSA receives only 5% of agriculture budgets; outreach covers 30% of smallholders (ICRIER 2024).
- Persistent gender inequities and weak inter-ministerial convergence.

Way Forward:

- Expand digital and AI-based crop-nutrition advisories.
- Strengthen public–private partnerships.
- National Agriculture Policy 2025 (draft): ₹2.5 lakh crore to scale NSA, targeting 50% dietary diversity coverage by 2030.
- Collaboration with CGIAR India Hub (2024) for innovation and capacity building

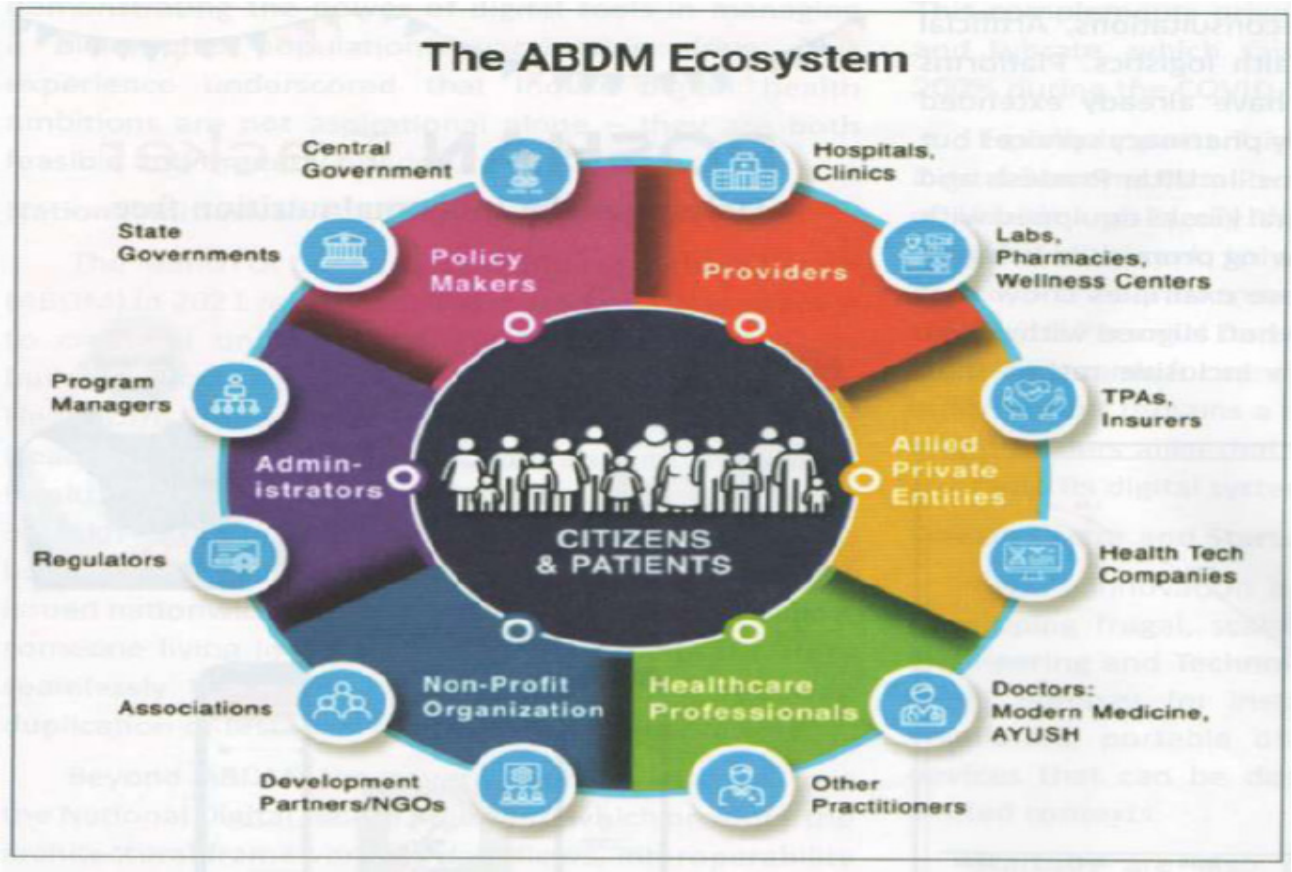
Chapter 4- Digital Transformation in Healthcare

India's healthcare sector stands at a critical juncture. Over the past decade, there has been a surge in digital health innovations — telemedicine, electronic health records (EHRs), wearable technologies, and health-tech startups — along with government reforms like the Ayushman Bharat Digital Mission

(ABDM).

- These aim to make healthcare accessible, efficient, and equitable, particularly for rural India, where malnutrition and disease remain deeply interconnected.
- Globally, the COVID-19 pandemic accelerated digital health adoption. The WHO noted how nations like Singapore and South Africa relied on telemedicine during lockdowns.
- India's CoWIN platform became a model of digital deployment for a billion-plus population, proving digital health is both feasible and necessary.

National Digital Initiatives



The Ayushman Bharat Digital Mission (ABDM), launched in 2021, seeks to create a unified digital health infrastructure. Its pillars include:

- Health Facility Registry,
- Healthcare Professionals Registry,
- Ayushman Bharat Health Account (ABHA), and
- Unified Health Interface (UHI).

As of August 2025, over 3.3 lakh facilities and 4.7 lakh professionals are registered, with millions of ABHA IDs issued, enabling seamless transfer of medical records nationwide.

The National Digital Health Blueprint (NDHB) provides the framework for interoperability and secure data exchange, envisioning a "digital health highway" for citizens.

The eSanjeevani telemedicine platform has delivered over 150 million consultations, making it the world's largest telemedicine initiative. Private platforms like Practo and Lybrate saw consultations rise by 200% during COVID-19.

The Digital Personal Data Protection Act (2023) and Health Ministry guidelines now safeguard patient data and consent — crucial for building trust in digital health systems.

Private Sector and Innovation

The Biomedical Engineering and Technology Innovation Centre (BETIC) at IIT Bombay has developed low-cost ventilators, portable dialysis units, and point-of-care devices suited for rural India.

Indian health-tech startups attracted nearly USD 1.2 billion (2021–23) in funding across teleconsultation, AI diagnostics, and logistics. Firms like 1mg and PharmEasy expanded to tier-II and rural regions, offering e-consultations and diagnostics.

Pilot "Health ATMs" in Uttar Pradesh and Bihar — digital kiosks with diagnostic tools — are bridging rural health gaps, proving the impact of public–private synergy.

Digital Health and Rural India

According to NFHS-5, 35.5% of children under five are stunted, and 57% of women (15–49) are anaemic. Digital tools can help address these issues:

- Frontline empowerment: Apps for ASHA and Anganwadi workers track anaemia and immunisation in real time.
- POSHAN Tracker: Integrates nutrition data for targeted interventions.
- Example: An Anganwadi worker in Madhya Pradesh used it to identify a severely anaemic girl, ensuring timely care.
- Tele-nutrition counselling: Connects mothers in rural areas to nutritionists.

State-wise contrasts — 42% stunting in Bihar vs 23% in Kerala — show the need to integrate nutrition data into ABDM for focused resource allocation.

Challenges

- Provider adaptation: Many doctors and nurses lack digital training.
- Connectivity gaps: Rural internet penetration (TRAI, 2023) is 38%, compared to 70% in urban India.
- Privacy risks: Data misuse can erode trust, as seen in the UK's Care.data failure (2016).
- Fragmentation: Multiple non-interoperable platforms hinder efficiency.
- AI caution: Biased algorithms may compromise diagnostics.

Global experiences — Singapore's HealthHub and New Zealand's digital insurance model — show that technology must be paired with governance, data standards, and trust.

Way Forward

- Build interoperable EMRs with open APIs and consent-driven access.
- Strengthen capacity building for ASHAs, ANMs, and clinicians.
- Expand public–private partnerships for telemedicine kiosks and IoT-based health ATMs.
- Integrate nutrition and health data into national dashboards.
- Use digital surveillance to predict disease outbreaks linked to climate change.

Case Studies

- eSanjeevani: 150+ million consultations.
- Delhi's Health Information Management System: Reduced OPD waiting times.
- KLES Hospital, Belagavi: Fully paperless system reduced errors.
- Andhra Pradesh Real-Time Monitoring System: Tracks maternal health, reducing referral delays.
- POSHAN Tracker: Nationwide tool for monitoring nutrition outcomes.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