EXCEL
CIVILS ACADEMY
EMPOWERING FUTURE LEADERS

CURRENT AFFAIRS

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MAGAZINE



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Director’s Message

Dear Aspirants,

India stands at a defining juncture in its national developmental trajectory, where its transition into a globally competitive knowledge economy will depend significantly on its ability to nurture, retain and empower indigenous scientific talent. As the country accelerates its pursuit of technological self-reliance, advanced space missions, semiconductor manufacturing, artificial intelligence and cutting-edge industrial innovations, its scientific and research workforce has emerged as a vital strategic asset. While India's premier academic and research institutions continue to produce exceptional scientific minds, the challenge lies in creating an ecosystem that enables these individuals to pursue ambitious research careers within the country. The issue is not merely whether talented researchers migrate overseas, but whether India can provide them with comparable opportunities, institutional autonomy, financial security and access to world-class research infrastructure. Addressing this challenge is essential not only for sustaining technological sovereignty but also for ensuring that indigenous scientific discoveries translate into tangible economic and social benefits.

The underlying causes of this talent-retention challenge are multifaceted, involving structural, financial and institutional constraints within India's research ecosystem. One of the most significant concerns is the relatively modest national investment in research and development. According to the Department of Science and Technology's *Research and Development Statistics 2025–26*, India's Gross Expenditure on Research and Development (GERD) increased from ₹1.33 lakh crore in 2019–20 to approximately ₹2.45 lakh crore in 2023–24. However, as a proportion of GDP, the expenditure increased only from 0.66 per cent to 0.84 per cent during the same period. Although the absolute increase is substantial, the proportion remains considerably below that of several major scientific economies. Equally important is the changing composition of research funding: the private sector accounted for 51.8 per cent of India's total R&D expenditure in 2023–24, while the government contributed 48.2 per cent. Yet, higher education institutions accounted for only 12.6 per cent of overall expenditure, highlighting the need to strengthen university-based research. These financial constraints often translate into inadequate laboratory infrastructure, delays in procurement, limited access to advanced instrumentation and uncertainty in long-term project funding. In addition, hierarchical academic structures, administrative burdens, restricted opportunities for independent research and comparatively modest remuneration during the early stages of a researcher's career can discourage promising postgraduates and doctoral scholars. International universities and research laboratories, by contrast, frequently offer predictable funding, advanced facilities,

stronger collaborative networks and more transparent career progression. The cumulative effect of these differences can make overseas opportunities particularly attractive to India's brightest scientific talent.

Recognising these structural challenges, the Government of India has introduced several policy frameworks, funding mechanisms and targeted fellowship programmes to strengthen the domestic research ecosystem and encourage scientific talent to build careers within the country. A significant institutional intervention is the establishment of the Anusandhan National Research Foundation (ANRF) under the ANRF Act, 2023, with the mandate to promote, fund and facilitate research and innovation across universities, colleges, research institutions and laboratories. Its importance lies particularly in extending research support beyond a limited number of established institutions and developing a wider culture of competitive, multidisciplinary research. Early implementation figures indicate that, during FY 2024–25, the ANRF-supported expenditure framework covered 32 States and Union Territories and 1,344 institutions, with 10,155 sanctions and approximately ₹692 crore released. These figures demonstrate the scale of institutional outreach, although the ultimate measure of success must be the quality of research supported, the timely release of grants and the technologies and discoveries emerging from the funded projects.

Another important initiative is the Prime Minister Research Chair (PMRC) Scheme 2026, launched by the Ministry of Education to attract accomplished Indian-origin researchers, scientists and professionals working abroad to premier Indian institutions. The scheme covers 13 priority thematic areas, including artificial intelligence, quantum computing, semiconductors, biotechnology, healthcare, advanced materials, space and defence. It provides for three categories of engagement—Young Research Fellows, Senior Fellows and Research Chairs—with research grants of up to ₹5 crore for the highest category. The Government has earmarked ₹200 crore for the scheme in 2026–27, and more than 3,600 fellowship applications had been received by August 2026. This is an encouraging beginning, but the real test will be how many internationally accomplished researchers are actually appointed, how effectively host institutions support them and whether their engagement leads to sustained research capacity rather than short-term academic associations. Alongside this initiative, the Prime Minister's Research Fellowship (PMRF) Scheme seeks to attract meritorious students towards doctoral research at premier institutions such as the IITs, IISc and IISERs. With monthly fellowships ranging from ₹70,000 to ₹80,000 and an annual research grant of ₹2 lakh, the scheme addresses an important financial barrier to pursuing advanced research. Its achievements are beginning to become measurable: by January 2025, 3,688 fellowships had been awarded, with 3,466 journal

publications and 225 patents filed, of which 25 had been granted. These outcomes reflect meaningful research activity, although the relatively small number of granted patents also underscores the need to improve the journey from academic discovery to intellectual property protection and commercial application. Other programmes, including the Ramanujan Fellowship and the DBT–Ramalingaswami Re-entry Fellowship, have also contributed to bringing international expertise back into the country. Government-reported figures indicate that approximately 550 researchers returned under the Ramanujan Fellowship over the preceding five years, while nearly 627 researchers had availed themselves of the Ramalingaswami Fellowship since its inception in 2007. The VAJRA Faculty Scheme complements these efforts by enabling international scientists, including those of Indian origin, to contribute through visiting research, teaching and collaborative academic engagements.

However, it is important to recognise that VAJRA is primarily a mechanism for international research collaboration, not permanent repatriation. Beyond financial incentives and individual fellowships, the long-term success of India's research ambitions will depend on institutional reforms and stronger partnerships between public research laboratories, universities and private industry. A significant concern is that increased research allocations do not automatically translate into better scientific outcomes. For instance, the PMRF's reported record of publications and patent filings is encouraging, but the country must also measure how many fellows complete their doctoral programmes successfully, secure independent research positions, establish laboratories and contribute to high-value technologies. Similarly, the ANRF must demonstrate that its funding reaches promising researchers across a broad institutional base, including state universities and emerging research centres, rather than becoming concentrated in already well-resourced institutions. Transparency in grant selection, time-bound fund disbursement, simplified procurement procedures, independent peer evaluation and greater institutional autonomy are essential to building confidence among researchers. Equally, the private sector must be encouraged to invest more substantially in long-term scientific research, collaborate with universities and support the commercialisation of indigenous technologies. Industry-sponsored research centres, technology-transfer offices, intellectual property protection, startup incubation facilities and structured academia–industry partnerships can help transform laboratory discoveries into commercially viable products and solutions to national challenges. India must also create clear career pathways for young researchers, including competitive salaries, tenure-track opportunities, access to research grants and recognition for scientific excellence. Without these enabling conditions, even generous fellowships may succeed in attracting researchers temporarily without necessarily retaining them over the long term.

Ultimately, transforming the challenge of brain drain into a sustainable process of brain gain is central to India's ambition of becoming a self-reliant and technologically advanced nation. The increase in national R&D expenditure, the establishment of the ANRF, the introduction of the PMRC and the measurable outcomes of the PMRF and re-entry fellowships indicate that the policy framework is evolving in the right direction. Nevertheless, the gap between policy announcements and measurable outcomes must remain a central consideration. India's research expenditure, at 0.84 per cent of GDP in 2023–24, still reflects the need for a much stronger and sustained national commitment.

The success of these initiatives should therefore be assessed not merely by the money allocated, fellowships announced or applications received, but by the number of researchers retained, quality of scientific publications, patents granted, technologies commercialised, research-led enterprises established and solutions delivered to society. Equally important is the need to make Indian institutions places where scientists can pursue independent ideas without excessive bureaucratic interference and where merit, innovation and intellectual freedom are valued. A coordinated partnership between the government, academia and industry, supported by predictable funding and accountable institutional governance, can convert India's vast intellectual potential into a lasting national advantage. The ultimate objective must be not simply to persuade Indian scientists to return home, but to make India a destination where the world's best scientific minds, including its own, aspire to research, innovate and build the technologies of the future.

Best wishes

Yours Sincerely



K Rajendra Kumar IPS (Retd)

September-2026

Current Affairs

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1

HISTORY & CULTURE

The Dahi Handi Festival

Context:



The Maharashtra government announced that it will make formal efforts to secure a UNESCO Intangible Cultural Heritage tag for the traditional Dahi Handi festival.

The Dahi Handi Festival

AboutThe Dahi Handi Festival:

What It Is?

- Dahi Handi (also known as Gopalakala or Utlotsavam) is a traditional socio-cultural festival and adventure sport celebrated as part of Krishna Janmashtami (marking the birth of Lord Krishna).
- Teams of participants, known as Govindas, form multi-tier human pyramids to reach and break an earthen pot (handi) suspended high in the air, filled with curd (dahi), milk, butter, and fruits.
- Mythological Roots: Commemorates the childhood (Bal Leela) of Lord Krishna in Gokul and Vrindavan.
- The Legend of the Butter Thief (Makhan Chor): Because young Krishna and his friends loved freshly churned butter and curd, village gopis (milkmaids) hung their earthen pots high near ceilings out of Krishna's reach. In response, Krishna and his cowherd companions formed cooperative human pyramids to reach and feast on the hanging pots.

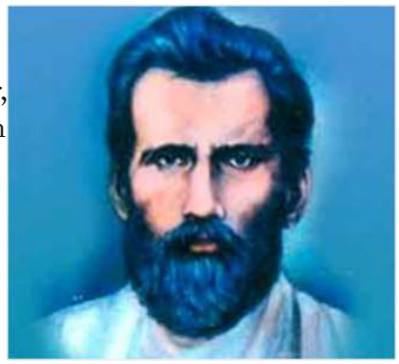
Region of Major Celebration:

- Primary Hub: Celebrated with immense scale across Maharashtra (especially in Mumbai, Thane, Pune, and surrounding Konkan regions).
- Other Names/Regions: Celebrated as Gopalakala in western India and as Utlotsavam in Andhra Pradesh and Telangana.

Key Features of the Festival:

- Multi-Tier Human Pyramids (Pathaks): Dedicated teams (called Govinda Pathaks, including specialized all-women pathaks) train for months to construct coordinated human towers ranging from 5 to 9 tiers high.
- Suspended Earthen Pot (Handi): A decorative clay pot filled with curd, butter, flattened rice, and fruits is hung high above the ground (often between buildings or large cranes) adorned with garlands.
- The Top Climber: The pyramid gradually narrows to the apex, where the lightest, youngest Govinda reaches the top to smash the pot using a small stick or headbutt, showering the contents onto the celebrating crowd.
- Water-Dousing & Festive Obstacles: Spectators and neighborhood women playfully splash water and slippery liquids at the human pyramid to simulate historical resistance and test the balance and grip of the climbers.
- Cross-Cultural Parallels with Catalan Castells: Shares close cultural and structural parallels with Catalonia's (Spain) famous castells (human towers, which are UNESCO-inscribed), leading to regular cultural exchange visits between Spanish and Indian teams.

Utkalmani Pandit Gopabandhu Das



Context:

President of India unveiled the statue of eminent freedom fighter, social reformer, and pioneer journalist Utkalmani Pandit Gopabandhu Das at Lajpat Bhawan in New Delhi.

Utkalmani Pandit Gopabandhu Das

About Utkalmani Pandit Gopabandhu Das:

Who He Was?

- Utkalmani Pandit Gopabandhu Das (1877–1928) was an iconic freedom fighter, social reformer, educationist, poet, and pioneering journalist from Odisha.
- Revered with the title Utkalmani (meaning The Jewel of Odisha), he dedicated his life to national independence, linguistic consolidation of Odia-speaking regions, open-air education, and the selfless service of flood and famine victims.

Early Days:

- Birth & Childhood: Born on October 9, 1877, in Suando village near Puri, Odisha, to Swarnamayee Devi and Daitari Das. He lost his mother while still an infant.
- Student Activism: While studying at Ravenshaw College in Cuttack, he established the Kartavya Bodhini Samiti to cultivate social service, duty, and nationalistic consciousness among students.
- Sacrificing Law for Service: He earned his B.A., M.A., and LL.B. degrees from Calcutta University. Although he began a legal career in Puri and Cuttack, he soon abandoned practice to devote his life entirely to social reform, education, and anti-colonial agitation.

Contributions to India's Freedom Movement:

- First President of Utkal PCC: Appointed as the founding President of the Utkal Pradesh Congress Committee (UPCC) in 1920, bringing Odisha into the mainstream of the national movement led by the Indian National Congress.
- Leading the Non-Cooperation Movement: Spearheaded Mahatma Gandhi's Non-Cooperation Movement across Odisha, encouraging youth to leave British schools and courts, which resulted in his frequent arrests and imprisonment.
- Servants of the People Society: Deeply aligned with Lala Lajpat Rai's vision of social work, he joined the Servants of the People Society (Lok Sevak Mandal) and rose to become its national Vice-President.
- Linguistic Unification & Utkal Sammilani: Played a pivotal role in the Utkal Sammilani, advocating for the administrative unification of fragmented Odia-speaking regions—a movement that ultimately led to Odisha becoming India's first language-based province in 1936.

Key Works & Contributions:

- Satyabadi Bana Bidyalaya (1909): Founded an open-air residential school at Sakhigopal near Puri based on the Gurukula model. The school broke caste barriers by requiring students of all backgrounds to dine and study together while fostering patriotism and moral character.
- FoundingThe Samaja (1919): Started the historic Odia newspaper The Samaja in 1919 to inform rural populations, promote literacy, and highlight British exploitation. Written in simple, lucid Odia prose, it became a voice for the marginalized.
- Literary Masterpieces: An acclaimed poet and essayist, he authored inspiring nationalist literature during his incarceration, including Bandi R Atmakatha (Story of a Prisoner), Dharmapada, and Kara Kabita.

Last Days:

- Total Selflessness: Gopabandhu Das consistently put public service ahead of personal tragedy—famously continuing his relief work during a severe flood even while his eldest son lay on his deathbed.
- Passing (1928): Weakened by relentless physical exertion during disaster relief and illness contracted during public service, he passed away on June 17, 1928, at the age of 50.
- Legacy: Before his death, he willed The Samaja newspaper and his properties to the Servants of the People Society, leaving behind a legacy of public service and national commitment.

The Proposal for UNESCO Tag for Puri Rath Yatra



Context:

Odisha Chief Minister urged the Centre to nominate Puri's Shree Jagannath Rath Yatra for inclusion in UNESCO's Representative List of the Intangible Cultural Heritage of Humanity.

The Proposal for UNESCO Tag for Puri Rath Yatra

AboutThe Proposal for UNESCO Tag for Puri Rath Yatra:

What It Is?

- The proposal, prepared by the Shree Jagannatha Temple Administration (SJTA), seeks formal recognition from UNESCO for the annual Rath Yatra (Chariot Festival) held at Puri, Odisha.
- It presents the festival not merely as a religious gathering, but as a living civilisational tradition showcasing India's cultural diversity, spirituality, traditional craftsmanship, music, dance, and social inclusivity.

Origin & Antiquity:

- Puranic & Historical Roots: Textual descriptions of the Rath Yatra appear in ancient Hindu scriptures such as the Brahma Purana, Padma Purana, Skanda Purana, and Kapila Samhita.
- European Accounts: Documented by European travelers since the 13th century, with detailed accounts recorded from the 17th century onward.
- Annual Occurrence: Celebrated annually during the bright fortnight (Shukla Paksha) of the Hindu lunar month of Ashadha (June–July).

Key Features of Puri Rath Yatra:

- Annual Reconstruction of Chariots: Three massive, distinct wooden chariots—Nandighosha (Lord Jagannath), Taladhwaja (Lord Balabhadra), and Darpadalana (Goddess Subhadra)—are newly constructed every year using specific timber types (Phassi, Dhausa) brought traditionally from the ex-princely state of Dasapalla along the Mahanadi River.
- HereditaryArtisan Guilds: The construction follows ancient architectural canons (Shilpa Shastras) executed by hereditary teams of carpenters (Maharanas), blacksmiths, painters, and tailors.
- The Divine Procession along Bada Danda: The three deities are brought out of the 12th-century Jagannath Temple in a grand procession (Pahandi Bije) and placed on their chariots aligned on the Bada Danda (Grand Avenue), where millions of devotees pull them to the Gundicha Temple.
- The Ritual Journey & Bahuda Yatra: After a seven-day stay at the Gundicha Temple (regarded as the deities' birthplace/aunt's home), the deities embark on their return journey (Bahuda Rath Yatra), during which they stop near the Mausi Maa Temple to receive an offering of Podo Pitha.

Significance:

- UNESCO inscription would strengthen global recognition, cultural diplomacy, and heritage conservation of the Rath Yatra.
- Safeguards traditional crafts, temple carpentry, textiles, Odissi Kirtan, and community-led heritage practices for future generations.

The COSPAR Vikram Sarabhai Medal – 2026



Context:

Prominent astrophysicist Professor Annapurni Subramaniam—Director of the Indian Institute of Astrophysics (IIA), Bengaluru—was presented with the prestigious COSPAR Vikram Sarabhai Medal for 2026.

The COSPAR Vikram Sarabhai Medal – 2026

AboutThe COSPAR Vikram Sarabhai Medal – 2026:

What It Is?

- The Vikram Sarabhai Medal is a premier international award recognizing outstanding scientific achievements and research leadership in space research, with a focus on advancing space science capabilities in or for developing nations.

COSPAR Committee on Space Research

- Awarding Organizations: Conferred jointly by the Committee on Space Research (COSPAR)—an international scientific body affiliated with the International Science Council (ISC) and the United Nations COPUOS—and the Indian Space Research Organisation (ISRO).
- Biennial Frequency: Presented every two years during the COSPAR Scientific Assembly.
- Aim: To honor the memory and legacy of Dr. Vikram Sarabhai (the founding father of the Indian space program) by recognizing exceptional individual contributions to global space exploration, astrophysics, and satellite science.

Key Features:

- Inception: Established in 1990 jointly by COSPAR and ISRO to commemorate Dr. Vikram Sarabhai.
- Eligibility Requirements: Candidates are evaluated based on research conducted primarily within the five-year period ending one year prior to the presenting Assembly.
- Open Global Scope: Open to space researchers and astrophysicists worldwide who make significant contributions to developing nations' space research capacity.
- Distinction for 2026 Recipient: Subramaniam was selected for her groundbreaking work on stellar populations, blue straggler stars, galaxy evolution, and her instrumental role as the calibration scientist for the Ultra-violet Imaging Telescope (UVIT) aboard AstroSat (India's first space telescope).
- Past Indian Awardees: Prior Indian recipients include R. Rao (1996), Gurbax Singh Lakhina (2014), and Anil Bhardwaj (2024).

Significance:

- Honours the Director of the Indian Institute of Astrophysics, highlighting India's growing leadership in space astronomy through missions like AstroSat and the Thirty Meter Telescope project.
- As the first Indian woman and only the third woman globally to receive the medal, Prof. Subramaniam's achievement strengthens women's leadership in science and space research.

The Debate on Vande Mataram

Context:

The Congress Working Committee (CWC) reaffirmed its decision to restrict the singing of Vande Mataram to only its first two stanzas at party functions, citing its historic 1937 resolution.



The Debate on Vande Mataram

About The Debate on Vande Mataram:

What It Is?

- Vande Mataram is the National Song of India, composed in Sanskritized Bengali. On January 24, 1950, Constituent Assembly President Dr. Rajendra Prasad declared that Vande Mataram—having played a historic role in the Indian freedom struggle—would be honored equally with the National Anthem, Jana Gana Mana.

Composition & History:

- Origin: Written by Bankim Chandra Chattopadhyay in 1875, it was later incorporated into his seminal 1882 political novel Anandamath.
- Context in Novel: Set against the backdrop of the 18th-century Sanyasi Rebellion in Bengal against the East India Company and regional administrative oppression.
- Role in Freedom Struggle: Rabindranath Tagore sang it publicly at the 1896 session of the Indian National Congress. During the Swadeshi Movement (1905–1908), the phrase transformed into a national rallying cry against the Partition of Bengal.

The 1937 Congress Decision & The Core Controversy:

- The Core Division: The song consists of six stanzas.

- The first two stanzas depict the motherland through neutral, benevolent, natural imagery—praising her sweet waters, cool breezes, and bountiful green fields.
- The subsequent four stanzas introduce militant and overt Hindu theological imagery, depicting the motherland as holding sharp swords and personifying her directly as goddesses Durga, Lakshmi, and Saraswati.
- Tagore's Counsel: Consulted by Subhas Chandra Bose and Jawaharlal Nehru, Rabindranath Tagore advised that the first portion possessed tender, universal appeal and could easily be dissociated from the religious symbolism of the later verses that could alienate Muslim sensibilities.
- The 1937 Resolution: In October 1937, the CWC resolved that only the first two stanzas would be rendered at national gatherings, dropping the rest to maintain communal harmony and accommodate diverse faiths.
- Mahatma Gandhi's Position: Gandhi affirmed that while the song was an anti-imperialist anthem, it should not be imposed where citizens object to its theological elements.

Current Government Stand:

- Mandatory 6-Stanza Protocol: The Ministry of Home Affairs (MHA) issued orders directing that the full official version (all six stanzas, lasting 190 seconds) be rendered at official ceremonial functions, requiring audiences to stand at attention.
- Statutory Penal Protection: Parliament passed the Prevention of Insults to National Honour (Amendment) Act, 2026, amending Section 3 of the 1971 Act to extend the same penal protections to Vande Mataram as the National Anthem—making intentional disruption or prevention of its singing punishable by up to 3 years' imprisonment.

The Shuddhi Practice

Context:



A controversy erupted after a 'shuddhikaran' (purification) ritual was held at a public ground following a Dalit leader's speech. Allegations of untouchability renewed debate over the historical practice of shuddhi.

The Shuddhi Practice

About The Shuddhi Practice:

What It Is?

- Shuddhi (literally meaning purification) was a socio-religious reconversion and reclamation ritual popularized in the late 19th and early 20th centuries by the Arya Samaj. Because classical Hinduism lacked a formal proselytization framework, shuddhi was devised as a ritual instrument to:
- Reconvert individuals and communities who had adopted Christianity or Islam back into the Hindu/Vedic fold.
- Cleanse untouchable castes (Depressed Classes) of perceived ritual pollution to integrate them as full Vedic Aryas.

Origin:

- Conceptual Roots: Emerged from the reformist teachings of Swami Dayanand Saraswati, who founded the Arya Samaj in 1875 advocating a return to pure Vedic principles.
- Mass Mobilizer: Speared into an organized, mass socio-political campaign by Swami Shraddhanand (Mahatma Munshiram) through the Jalandhar Arya Samaj in Punjab.

Historical Evolution:

- Early Individual Phase: Initially focused on readmitting individuals who had converted to Christianity or Islam back to Hinduism.
- 1900Rahtia Controversy: The mass shuddhi of the Rahtias (an outcaste Sikh weaver community) involved head shaving (tonsure), sparking friction between the Arya Samaj and Sikh bodies.
- 1920s Mass Reclamations: The movement peaked with the mass reconversion of the Malkana Rajputs of Western UP—a community of Muslim converts who retained Hindu customs—uniting the Arya Samaj and orthodox Sanatan Dharma groups.

- Dalit Resistance & the Ad Dharm: While the Arya Samaj opened schools for depressed classes, many Dalits rejected the notion that they needed purification. Figures like Babu Mangu Ram led the breakaway Ad Dharm movement, asserting that Dalits were India's original inhabitants (Adi) distinct from Aryans, and registered separately in the 1931 Census.
- Transition to Ghar Wapasi: As the Arya Samaj's political reach waned, the concept was adapted post-independence by organizations like the Vanavasi Kalyan Ashram (founded in 1952) under the nomenclature of Ghar Wapasi (homecoming), focusing on tribal regions in central India.

Key Features of Shuddhi:

- Vedic Homa and Investiture: Relied on Vedic sacrificial fire ceremonies (hawan/homa), sacred mantra chanting, and conferring the sacred thread (Janeu), theoretically granting initiates access to Vedic study regardless of birth.
- Ritual Purification via Panchgavya: Required initiates to partake in Panchgavya (the five products of the cow: milk, curd, ghee, urine, and dung) as a symbolic cleanser to undo past ritual contamination.
- Dual Objective of Numerical Defense &Social Uplift: Aimed to arrest demographic decline by halting conversions while attempting to eliminate untouchability from within Hindu society.

EXCEL CIVILS ACADEMY EMPOWERING FUTURE LEADERS

The Creamy Layer Concept for SC/ST Quotas

Context:

The Union Government filed an affidavit in the Supreme Court opposing a Public Interest Litigation (PIL) that sought to extend the creamy layer income-based exclusion to Scheduled Castes (SCs) and Scheduled Tribes (STs).



The Creamy Layer Concept for SC/ST Quotas

AboutThe Creamy Layer Concept for SC/ST Quotas:

What it is?

- The creamy layer refers to a social and economic filter used in India's affirmative action framework to identify and exclude relatively affluent or socially advanced members within a reserved category from availing quota benefits.
- First formalized by the judiciary in the landmark Indra Sawhney (1992) case, it uses income, asset, and occupational benchmarks (such as a 8 lakh annual family income threshold) to ensure reservation benefits reach the most disadvantaged sections.

CurrentCreamy Layer Applicability:

- Exclusive Applicability to OBCs: The creamy layer test applies to Other Backward Classes (OBCs) for reservations in public employment and educational admissions.
- Exemption for SCs and STs: The principle does not apply to Scheduled Castes and Scheduled Tribes, whose reservation criteria stem directly from Article 341 and Article 342 of the Constitution based on historical social backwardness and untouchability.
- Judicial Precedents: Supreme Court rulings in Indra Sawhney (1992) and Ashoka Kumar Thakur (2008) explicitly affirmed that the creamy layer doctrine is restricted to OBCs and has no legal application to SCs/STs.
- Recent Judicial Observations: A 7-judge Constitution Bench permitted sub-classification within SCs/STs, during which four judges individually expressed opinions favoring the extension of the creamy layer principle to SC/ST quotas—reigniting the current legal debate.

Arguments FOR Applying the Creamy Layer to SCs/STs:

- Preventing Elite Capture: Affluent and second/third-generation beneficiaries within SC/ST categories monopolize reservation benefits, depriving poorer, rural members of education and job opportunities.
- Example: Children of high-ranking civil servants or politicians securing reserved seats over first-generation rural applicants.
- Promoting True Substantive Equality: Extending affirmative action only to those facing both social stigma and financial distress ensures the poorest sections receive priority.
- Judicial Endorsement in Sub-Classification: Multiple Supreme Court judges in the 2024 sub-classification verdict observed that advanced individuals who achieved social mobility should leave quota benefits for the truly disadvantaged.
- Adapting to Socio-Economic Mobility: Economic empowerment provides educational access and institutional capital, reducing the vulnerability of affluent families to systemic barriers.
- Extending Income-Based Fairness: Similar to OBC and Economically Weaker Section (EWS) quotas, introducing a means test prevents perpetual reliance on reservations across generations.

Arguments AGAINST Applying the Creamy Layer to SCs/STs:

- Social Disadvantage vs. Economic Status: SC reservations were created to compensate for centuries of untouchability and social exclusion, while ST quotas address geographical isolation and distinct cultural vulnerability—neither of which is defined by income.
- Example: A wealthy SC officer continuing to face housing discrimination or social bias despite high income.
- Wealth Does Not Erase Caste Stigma: Economic mobility does not eliminate caste prejudice in social interactions, marriage markets, or administrative environments.
- Constitutional Mandate and Separation of Powers: Under Articles 341 and 342, only Parliament has the constitutional authority to modify Presidential lists of SCs and STs; courts cannot alter them via judicial mandates.
- Risk ofUnfilled Reserved Vacancies: Imposing income caps could lead to a shortage of eligible candidates for higher-level public jobs and academic posts, worsening representation deficits in state machinery.
- Adequacy of Existing Schemes: Targeted developmental and welfare schemes already employ means testing to assist low-income families, making income filters inside constitutional quotas redundant.

Way Forward:

- Utilizing Sub-Classification Instead of Total Exclusion: Leverage the 2024 Supreme Court ruling permitting states to create sub-categories within SC/ST lists to prioritize the most backward communities without imposing blanket income bans.
- ComprehensiveEmpirical Data Collection: Conduct a comprehensive national socio-economic survey to measure actual social mobility and representation gaps across different SC/ST sub-castes before considering major policy changes.
- Parliamentary Deliberation & Consensus: Ensure any modification to SC/ST reservation criteria originates through transparent legislative debate in Parliament rather than judicial directives.
- Strengthening First-Generation Support: Provide targeted scholarships, coaching, and educational infrastructure to first-generation learners to help them compete effectively for reserved seats.
- Enforcing Anti-Discrimination Measures: Address systemic social prejudice and workplace bias through strict enforcement of constitutional safeguards, ensuring reservation goals of social equality are fully realized.

Conclusion:

The debate over applying the creamy layer to SC/ST quotas highlights the challenge of balancing social justice against intra-group equity. While proponents advocate for preventing elite capture, the Centre maintains that caste-based social exclusion cannot be reduced to economic status alone. Ultimately, addressing representation gaps while upholding the constitutional promise of dignity requires empirical evidence, legislative consensus, and targeted empowerment for the most marginalized.

The Need for a Humane Education System

Context:

Following youth-led protests for education reform, a commentary argued that India's high-stakes admission system should be replaced with a more humane, multi-dimensional evaluation model that safeguards student well-being.



The Need for a Humane Education System

AboutThe Need for a Humane Education System:

What it is?

- Restoring dignity to India's academic journey means shifting from a high-stakes, one-size-fits-all filtration system toward holistic competency-based evaluation. Instead of relying exclusively on high-pressure competitive exams that test speed and memorization, a humane education model balances academic aptitude with critical reasoning, co-curricular projects, mental health safeguards, and structured career counseling.

Key Issues in the Current Examination & Admission Culture:

- Flaws of Centralized Single-Shot Exams: Centralized testing agencies (such as the National Testing

Agency) operate under the assumption that a single exam model can fairly evaluate students across diverse regions, languages, and socio-economic backgrounds.

- Exploitative Coaching Ecosystem: The dominance of commercial coaching centers creates educational inequality, displaces formal schooling, and strains family finances through high debt.
- Severe Psychological and Emotional Toll: Treating single-shot competitive entrance tests as the sole measure of student worth creates a high-pressure environment linked to rising student suicides.
- Logistical Vulnerabilities & Paper Leaks: Centralized nationwide exams create massive logistical risks, where single breaches or paper leaks disrupt millions of applicants simultaneously.

Implications of the Lack of a Humane Education System:

- SevereMental Health Crises and Student Suicides: Treating single-shot competitive examinations as the sole determinant of a student's worth creates an environment of intense fear and debt, directly contributing to alarming rates of psychological distress and student suicides.
- Reductionist Definition of Merit and Intelligence: The over-reliance on high-stakes, rank-based filtration evaluates speed and memory rather than critical reasoning, ethical judgment, communication, or practical problem-solving capabilities.
- Exploitative Commercialization andFinancial Strain: The absence of a holistic admission process fosters a predatory coaching industry that displaces formal schooling, forces low-income parents into unaffordable loans, and widens educational inequality.
- Demographic Inequity via Centralized Flaws: A one-size-fits-all centralized testing model (such as the National Testing Agency) disproportionately disadvantages students from varied regional, linguistic, rural, and socio-economic background.
- Overemphasis on Traditional Professions and Skill Mismatch: A rigid testing culture creates blind dependence on a few high-pressure professional tracks, discouraging youth from exploring emerging sectors and alternative career choices aligned with their genuine aptitudes.

Key Recommendations for Comprehensive Reforms:

1. Implementing Multi-Dimensional Competency Assessments:

- Combine moderated school performance, discipline-specific aptitude, analytical writing, structured interviews, and practical scenario-based tasks.
- Evaluate verifiable project portfolios, internships, community work, and co-curricular achievements alongside written testing.

2. Decentralizing Admissions & Assessment Design:

- Allow individual universities or institutional clusters to design and conduct their own entrance assessments within broad University Grants Commission (UGC) guidelines.
- Schedule decentralized examinations across the academic calendar to avoid nationwide disruption from a single test failure.

3. Institutionalizing Exam Security and Anti-Leak Safeguards:

- Adopt encrypted digital paper transmission, multi-layered question banks with algorithmic randomization, and strict vetting/rotation of paper setters.
- Implement secure printing protocols, biometric candidate verification, time-staggered papers, and post-exam forensic reviews to prevent leaks.

4. Regulating the Coaching Industry & Broadening Career Awareness:

- Introduce legislative regulation over coaching fees, misleading advertising, hostel standards, and student mental health provisions.
- Connect students with diverse industries through career fairs, internships, and alumni mentorship to reduce reliance on traditional high-pressure courses.

5. Providing Local-Language Parental & Student Counseling:

- Offer structured counseling to parents in regional languages regarding career options, costs, scholarships, aptitude, and mental health risks.

- Help students evaluate their personal abilities and interests through aptitude-based guidance rather than prestige-driven choices.

Conclusion:

India's educational promise cannot be fulfilled by a system that rewards psychological distress and commercial exploitation under the guise of merit. Reforming admissions through decentralized assessments, robust exam security, and structured counseling will help align education with student potential. Ultimately, restoring dignity to the academic journey will create confident young individuals who choose their careers deliberately and without fear.

Glaw Lake (Glow Lake)

Context:



Union Minister for Environment, Forest and Climate Change, announced the designation of Glaw Lake (also known as Glow Lake) in Arunachal Pradesh as India's 101st Ramsar Site.

- This landmark recognition marks Arunachal Pradesh's very first Ramsar Site, raising India's national tally of internationally protected wetlands past the 100 mark.

Glaw Lake (Glow Lake)

AboutGlaw Lake (Glow Lake):

What It Is?

- Glaw Lake is a high-altitude, pristine, natural freshwater lake located in the Eastern Himalayas. Spread across an estimated area of 8 square kilometers at an elevation of approximately 1,168 meters above sea level, it serves as a major source for the perennial Kamlang River.

Located In:

- District: Lohit District, Arunachal Pradesh (near the town of Wakro).
- Protected Area: Lies deep inside the Kamlang Tiger Reserve and Wildlife Sanctuary (bounded by the Lang River to the north and Namdapha National Park to the south).
- Local Indigenous Habitat: Surrounded by traditional territories inhabited by the Miju Mishmi, Digaro Mishmi, and Idu Mishmi tribal communities.

Origin:

- Hydrological Origin: The lake is fed by multiple perennial high-altitude mountain streams flowing down from the Eastern Himalayan glaciated ridges.
- Geomorphological Origin: Formed through natural tectonic activity and land-block warping typical of the Eastern Himalayan structural fold belt, creating a natural high-altitude depression that impounds alpine run-off.

Key Geological & Ecological Features:

- High-Altitude Freshwater Basin: Covers an expanse of nearly 8 sq km with a circumference of 5 km, acting as the primary headwater origin for the Kamlang River within the Eastern Himalayan biodiversity hotspot.
- Rich Floral Diversity: The surrounding catchment supports a dense micro-climate hosting over 150 tree species (including Hollong, Canarium, and Rhododendron) and 49 recorded wild orchid species.
- Critical Habitat forFour Big Cats: The lake basin is one of the rare Himalayan eco-zones supporting all four major big cat species—Bengal Tiger, Indian Leopard, Clouded Leopard, and Snow Leopard.
- Primate and Endemic Wildlife Refuge: Provides a contiguous forest corridor for endangered primates like the Hoolock Gibbon, Slow Loris, Capped Langur, alongside rare alpine mammals such as the Mishmi Takin and Red Panda.

The Process for Withdrawing / Closing FIRs



Context:

The Supreme Court clarified that State governments remain free to close or withdraw First Information Reports (FIRs) registered against student protesters during mass agitations, provided they strictly follow procedures prescribed under the Bharatiya Nagarik Suraksha Sanhita (BNSS).

The Process for Withdrawing / Closing FIRs

About The Process for Withdrawing / Closing FIRs:

What Is an FIR?

- A First Information Report (FIR) is the first written information recorded by the police regarding the commission of a cognizable offence. Registration of an FIR sets the official criminal investigation process into motion under the Bharatiya Nagarik Suraksha Sanhita (BNSS).

Key Features of an FIR:

- Primary Trigger for Investigation: Serves as the foundational document that empowers police authorities to investigate a cognizable offence without a prior court warrant.
- No Direct Executive Cancellation: An FIR cannot be unilaterally cancelled, revoked, or expunged by an executive order passed by a government or minister.
- Judicial Oversight: Once registered, any resolution or termination of the resulting criminal proceedings requires police filings or explicit judicial approval.
- Informational, Not Substantive Evidence: Functions as an initial report of an alleged crime; it does not constitute conclusive evidence until corroborated during trial.

How an FIR / Criminal Case Can Be Withdrawn or Closed?

- Route One: Police Closure Report (Section 193, BNSS):
- If police investigation reveals insufficient evidence to proceed against the accused, the investigating agency submits a Closure Report (or Final Report) to the jurisdictional Magistrate under Section 193 of the BNSS.
- The Magistrate holds full supervisory authority to accept the report, reject it, order further investigation, or take cognisance independently (Palaniswamy Veeraraja v. State of Karnataka, 2026).

Route Two: Withdrawal from Prosecution (Section 360, BNSS):

- The Public Prosecutor or Assistant Public Prosecutor can file an application before the trial court seeking to withdraw from the prosecution at any time before judgment (Section 360 BNSS). To be valid:
- The decision must stem from the Prosecutor's independent judgment, not mere executive dictation.
- The court must grant explicit consent after verifying that withdrawal is sought in good faith and public interest (Sheonandan Paswan v. State of Bihar, 1986).
- Victims must be afforded an opportunity to be heard before consent is granted.

Route Three: Quashing by High Court (Section 528, BNSS):

- Under Section 528 of the BNSS, High Courts exercise inherent powers to quash an FIR or pending chargesheet to prevent abuse of the process of any court or to secure the ends of justice.
- High Courts can exercise this power if no prima facie case is established or if the matter has been settled amicably in non-heinous offences.

Significance:

- Withdrawing minor cases against student protesters or agitators can restore peace without burdening individuals with lasting criminal records.
- Executive decisions cannot automatically quash FIRs, preventing arbitrary withdrawal of cases and ensuring judicial scrutiny, public interest, and victims' rights.

Fiscal federalism, efficiency versus equity concerns

Context:



The 16th Finance Commission (FC-16) report (covering 2026–31) sparked intense federal debates by maintaining vertical tax devolution at 41% while halving the share of grants-in-aid from 19.4% to 8.3%.

Fiscal federalism, efficiency versus equity concerns

AboutFiscal federalism, efficiency versus equity concerns:

What it is?

- Fiscal federalism refers to the financial architecture governing the allocation of tax revenues, spending responsibilities, and intergovernmental transfers between the Central Government and State Governments.
- In a diverse federation like India, fiscal policy must continually balance two competing priorities: efficiency (incentivizing fiscal discipline, revenue mobilization, and economic performance) and equity (providing compensatory transfers to overcome structural, geographical, and historical horizontal disparities among states).

The Constitutional Philosophy of Fiscal Federalism:

- CorrectingStructural Vertical Imbalance: The Constitution grants dominant tax-raising powers to the Union while burdening States with major social sector expenditures (education, health, agriculture), using the Finance Commission as a corrective bridge.
- Example: Article 280 mandates five-yearly tax-sharing recommendations to ensure states remain fiscally viable.
- Targeted Equalisation via Grants-in-Aid (Article 275): Conceived as a core design element to address specific, non-formulaic state needs that general tax devolution cannot solve.
- Example: Providing top-up funding for hill states facing elevated infrastructure construction costs.
- Compensating Unpriced National Contributions: Recognizes states that sacrifice local fiscal health to deliver national public goods.
- Example: Punjab ensuring national food security at the cost of its taxable agricultural base, or Kerala investing in human capital that yields national remittances.
- Preserving Union Unity through Equity: Treats fiscal federalism as a constitutional compact to manage regional diversity and prevent widening economic divergence between affluent and disadvantaged states.

FC-16's New Fiscal Framework:

- Retention of Vertical Devolution at 41%: Rejection of the demand by 18 states to increase the states' share in the divisible central tax pool to 50%.
- DramaticReduction in Grants-in-Aid: Reduced total recommended grants-in-aid to 9.47 lakh crore (2026–31) compared to 10.1 lakh crore under FC-15, halving grants' share in total Finance Commission transfers from 19.4% to 8.3%.
- Elimination of Gap-Filling Grants: Complete dismantling of Revenue Deficit Grants (RDGs), sector-specific grants, and state-specific grants, restricting grants solely to local bodies and disaster management.
- Inclusion of GDP Contribution Weight: Introduced a 10% weight for State GDP contribution in the horizontal tax devolution formula while reducing the weight assigned to income distance from 45% to 42.5%.
- Performance-Conditioned Local Body Funding: Allocated nearly 7.2 lakh crore to local governments (the third tier) but tied fund releases to strict compliance targets in water, sanitation, and audited accounts.
- Soft Approach on Cesses and Surcharges: Proposed a non-binding grand bargain encouraging the Centre to gradually merge non-shareable cesses into the divisible pool, rather than enforcing a mandatory rollback.

Equity vs. Efficiency: Major Critiques:

- Double Burden on Vulnerable States: Reducing the income distance weight alongside removing RDGs creates a severe revenue hit for economically lagging regions.

- Example: Eight states, including several North-Eastern states and West Bengal, face a simultaneous decline in both tax devolution and grants.
- Assumption of Uniform Fiscal Capacity: Eliminating RDGs assumes all states possess equal capacity to raise revenue, ignoring structural constraints.
- Example: Disadvantaged states cannot offset structural revenue deficits through domestic taxation alone.
- Asymmetric Discipline Requirements: Enforces strict fiscal discipline on States by abolishing RDGs while allowing the Centre to retain non-shareable cesses and surcharges.
- Example: Cesses remain an un-devolved revenue stream for the Union, eroding the effective divisible pool.
- Erosion of Local Body Fiscal Autonomy: Replacing need-based grants with compliance-based conditionalities restricts local government flexibility.
- Example: Gram Panchayats losing discretionary funds due to delayed procedural audits or rigid central project mandates.
- Widening Regional Income Disparities: Prioritizing economic performance and GDP contribution risks funneling higher revenues back to wealthier, industrialized states.
- Example: Highly developed coastal economies gaining larger shares while landlocked regions lag further behind.

The Way Forward:

- Re-Institutionalizing Need-Based Equalisation Grants: Restore targeted Revenue Deficit Grants and state-specific assistance under Article 275 for regions facing permanent structural, geographic, or demographic handicaps.
- Cap and Cede Union Cesses and Surcharges: Amend constitutional provisions or set a strict statutory ceiling on non-shareable cesses, mandating their progressive inclusion into the divisible pool.
- Calibrating Horizontal Devolution Weights: Rebalance the horizontal formula by restoring higher weightage to income distance and forest cover to safeguard disadvantaged and ecologically vital states.
- Providing Flexible Local Body Grants: Maintain a healthy balance between conditional performance incentives and un-tied basic grants to preserve local self-governance autonomy.
- Evaluating States on Cost Disabilities: Incorporate explicit cost disability metrics—such as terrain, climate vulnerability, and border security duties—into transfer formulas to reflect the real cost of public service delivery.

Conclusion:

While the 16th Finance Commission introduces a technocratic shift toward performance and fiscal discipline, fiscal federalism in a diverse union cannot survive on market-like efficiency alone. Eliminating revenue deficit grants while preserving non-shareable central cesses risks expanding regional disparities and undermining the constitutional spirit of Article 275. Achieving long-term national cohesion requires a balanced framework that rewards high-performing states without abandoning those constrained by structural disadvantages.

Inter-State River Water in India

Context:

During the presentation of Tamil Nadu's state budget, Finance Minister N. Marie Wilson asserted that the state government would safeguard its rightful share of inter-state river waters.



Inter-State River Water in India

AboutInter-State River Water in India:

What It Is?

- Inter-state river water refers to water resources from rivers, streams, and river valleys that flow through, or form boundaries between, two or more states within a nation.
- Because river basins do not conform to state political boundaries, the allocation, management, and sharing of these waters frequently require inter-state coordination and federal adjudication mechanisms.

Constitutional Provisions Associated:

Article 262 (Adjudication of Disputes):

- Art 262(1): Empowers Parliament to enact laws for the adjudication of any dispute or complaint regarding the use, distribution, or control of the waters of, or in, any inter-state river or river valley.
- Art 262(2): Allows Parliament to exclude the jurisdiction of the Supreme Court or any other court over such disputes or complaints.

Seventh Schedule Allocation:

- Entry 17, State List (List II): Deals with water supplies, irrigation, canals, drainage, embankments, water storage, and water power, subject to Entry 56 of the Union List.
- Entry 56,Union List (List I): Empowers the Central Government to regulate and develop inter-state rivers and river valleys to the extent declared by Parliament by law in the public interest.

Key Laws Associated & Their Features:

Inter-State River Water Disputes (ISRWD) Act, 1956:

- Enacted under Article 262 of the Constitution to establish a framework for resolving water dispute complaints between states.
- Tribunal Constitution: If negotiations between states fail, the Central Government constitutes an ad-hoc Inter-State Water Dispute Tribunal to adjudicate the issue.
- Binding Awards: The decision/award rendered by the Tribunal carries the force of a decree of the Supreme Court and is final and binding on the contesting states.
- Exclusion of Court Jurisdiction: Courts (including the Supreme Court) cannot entertain appeals against tribunal awards under standard statutory jurisdiction.

River Boards Act, 1956:

- Enacted under Entry 56 of the Union List to enable the regulation and development of inter-state rivers and river valleys.
- Establishment of Boards: Authorizes the Central Government to set up River Boards upon request from state governments or on its own initiative.
- Advisory Role: Designed to advise states on integrated river basin management, flood control, soil conservation, and irrigation development.

The National Urban Co-operative Finance and Development Corporation Limited (NUCFDC)

Context:

Union Minister of Home Affairs and Cooperation inaugurated the new office of the National Urban Co-operative Finance and Development Corporation Limited (NUCFDC) in Mumbai.

NUCFDC

AboutThe National Urban Co-operative Finance and Development Corporation Limited (NUCFDC):

What It Is?

- The National Urban Co-operative Finance and Development Corporation Limited (NUCFDC) is a specialized Non-Banking Financial Company (NBFC) registered with the Reserve Bank of India (RBI).
- It functions as the apex Umbrella Organization (UO) for the Urban Cooperative Banking (UCB) sector in India, pooling the collective strengths of over 1,400 UCBs and thousands of branches.

Key Historical Milestones:

- 2006–2014: Recommended by multiple RBI Expert Committees—including the Viswanathan Committee (2006 & 2021), V.S. Das Committee (2009), Malegam Committee (2010), and R. Gandhi Committee (2014)—inspired by global cooperative financial systems like Rabobank (Netherlands) and Crédit Agricole (France).

- March 2, 2024: Formally launched by Union Cooperation Minister Amit Shah in New Delhi.
- August 2026: Inauguration of its new office in Mumbai alongside the launch of a specialized Security Operations Centre (SOC) for cybersecurity.
- Aim: To modernize, stabilize, and transform India's Urban Cooperative Banking sector by accelerating digital adoption, addressing structural liquidity deficits, building capacity, and enabling small UCBs to compete in a modern digital financial landscape.

Key Functions:

- Shared Technology &Digital Banking Platform: Offers plug-and-play digital banking solutions, Core Banking Software (CBS), ATM connectivity, and cybersecurity hubs (SOC) at affordable, shared costs for smaller UCBs.
- Fund-Based & Liquidity Support Services: Acts as a central liquidity manager, providing cash-flow support, short-term liquidity assistance, and facilitating the trading of Priority Sector Lending (PSL) certificates among member UCBs.
- Non-Fund Services & Capacity Building: Delivers standardized regulatory compliance tools, board training programs, and professional capacity-building frameworks to improve governance standards.
- Collective Bargaining &Economies of Scale: Negotiates bulk procurement terms for software, hardware, and third-party financial services to dramatically lower operational overhead for small banks.
- Path to Self-Regulatory Organization (SRO) Status: Positioned to act as a Self-Regulatory Organization upon reaching a paid-up capital threshold of 300 crore, providing localized oversight and regulatory comfort to the RBI.

Significance:

- Enables Urban Cooperative Banks to offer modern digital banking services comparable to commercial and small finance banks.
- Enhances governance, cyber resilience, and risk management, improving public confidence in cooperative banks.

The stakes in India's delimitation debate

Context:

The upcoming post-2026 delimitation exercise has triggered widespread debate regarding how parliamentary seats will be reallocated among states once the 2027 Census data is published.

State/ Union Territory	Current Seats (543)	Seats*	Seats**
A.P.	25	23	22
Arunachal Pradesh	2	0	1
Assam	14	14	14
Bihar	40	43	47
Goa	2	1	1
Gujarat	26	27	27
Haryana	10	11	11
H.P	4	3	3
Karnataka	28	30	27
Kerala	20	15	15
M.P	29	31	33
Maharashtra	48	52	50
Manipur	2	1	1
Meghalaya	2	1	1
Mizoram	1	0	0
Nagaland	1	1	1
Odisha	21	19	19
Punjab	13	12	12
Rajasthan	25	30	31
Sikkim	1	0	0

State/ Union Territory	Current Seats (543)	Seats*	Seats**
Tamil Nadu	39	35	32
Tripura	2	2	2
U.P.	80	86	90
WB	42	42	41
Chhattisgarh	11	11	11
Jharkhand	14	14	15
Uttarakhand	5	5	5
Telangana	17	18	16
Andaman & Nicobar Islands	1	0	0
Chandigarh	1	0	0
Dadra & NH and Daman & Diu	2	0	0
Delhi	7	8	8
Lakshadweep	1	0	0
Puducherry	1	1	1
J&K	5	5	6
Ladakh	1	0	0
Total	**543**	**541**	**543**

*If seats are redistributed as per the 2024 electoral roll

**Seats are redistributed as per the 2011 population

The stakes in India's delimitation debate

About The stakes in India's delimitation debate:

What is Delimitation?

- Delimitation is the statutory process of fixing or redrawing the territorial boundaries of Lok Sabha and State Legislative Assembly constituencies to reflect population changes.
- Executed by an independent, high-powered Delimitation Commission whose orders carry the force of law and cannot be challenged in court, its core objective is to ensure equal population representation across constituencies.

History of Delimitation in India:

- 1952 Commission: Set up under the Delimitation Act, 1952, based on the 1951 Census; allocated initial parliamentary and assembly seats.
- 1963 Commission: Formed under the Delimitation Act, 1962, following the 1961 Census and state reorganization.
- 1973 Commission: Conducted under the Delimitation Act, 1972, using 1971 Census figures; increased Lok Sabha seats to 543.
- 1976 Freeze (42nd Amendment): Frozen inter-state Lok Sabha seat allocations at 1971 levels until 2000 to avoid penalizing states that implemented family planning.
- 2002 Commission (84th & 87th Amendments): Extended the seat allocation freeze until after 2026, while permitting internal constituency redrawing within states using 2001 Census data.

Constitutional Articles Associated with Delimitation:

- Article 81: Defines the composition of the Lok Sabha and requires that seat allocation among states be proportional to population so far as practicable.
- Article 82: Mandates Parliament to enact a Delimitation Act to adjust Lok Sabha seat allocations after every national Census.
- Article 170: Governs the division of each State into territorial constituencies for State Legislative Assemblies after every Census.
- Articles 330 & 332: Prescribe proportional reservation of Lok Sabha and State Legislative Assembly seats for Scheduled Castes (SCs) and Scheduled Tribes (STs) based on census figures.

Projected Benefits and Gains of Delimitation:

- Restoring Voting Parity (One Person,One Vote, One Value): Corrects severe population imbalances where an MP in Kerala represents ~14 lakh electors while an MP in Uttar Pradesh or Bihar represents ~19 lakh electors.
- Reflecting Modern Demographic Realities: Updates seat counts to reflect urban migration, regional shifts, and natural population growth occurring since 1971.
- Unlocking Women's Reservation: Enables the rollout of the 33% reservation for women in Parliament and State Assemblies, which is constitutionally tied to post-2026 delimitation.
- Updating SC/ST Reserved Seats: Re-adjusts reserved constituency allocations to ensure proportional political representation for marginalized communities based on newer census data.
- Digital Acceleration: Utilization of fully digitalized data in the 2027 Census can accelerate boundary redrawing compared to previous decade-long processes.

Challenges Associated with Delimitation:

- Penalizing Population Control (Federal Imbalance): Southern states that successfully reduced fertility rates face a reduction in parliamentary share, while high-growth northern states stand to gain significant seats.
- Erosion of North-South Economic and Fiscal Alignment: States contributing a disproportionate share to national GDP risk losing political leverage in Parliament to higher-population states.
- Risks of Political Gerrymandering: Boundary redrawing carries risks of cracking (spreading an opposition group thinly to deny them seats) or packing (concentrating opposition voters in a few seats to waste their votes).

- Overcrowded Parliamentary Management: Expanding Lok Sabha seats significantly (up to 850) presents legislative management and constituency oversight challenges for individual MPs.
- Inter-State Political Conflict: Heightens federal tension between states over national resource allocation and legislative power.

Way Forward:

- Developing Federal Balancing Formulas: Capping total seats per state while expanding overall Lok Sabha size, or incorporating weighting mechanisms so population-stabilized states maintain their proportional political voice.
- StrengtheningNon-Partisan GIS Mapping: Employing transparent, open-source GIS technology under an independent Delimitation Commission to prevent political gerrymandering.
- Rebalancing Bicameral Power (Rajya Sabha): Strengthening the powers or structural composition of the Rajya Sabha to protect federal balance if Lok Sabha representation shifts toward populous northern states.
- Phased Rollout of Reserved Seats: Establishing transparent rotation schedules for women-reserved and SC/ST constituencies across delimitation cycles to ensure equitable political participation.

Conclusion:

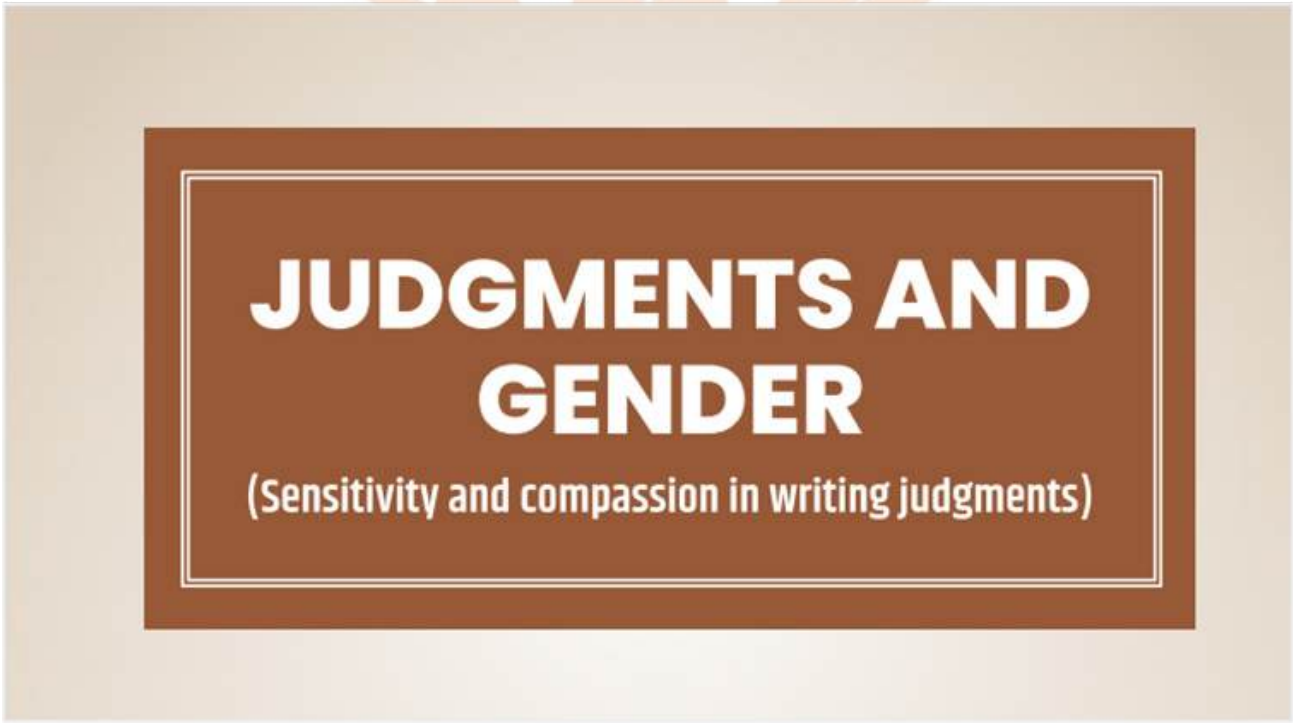
The upcoming post-2026 delimitation exercise represents a critical constitutional juncture for India's democracy. Balancing the democratic principle of equal vote value with the federal protection of states that achieved population stability requires careful political consensus and transparent boundary drawing. Navigating this exercise thoughtfully is essential to maintain national cohesion, fair electoral representation, and federal trust.

Judgments and Gender: Sensitivity and Compassion in Writing Judgments Report

Context:

The Supreme Court released 'Judgments and Gender: Sensitivity and Compassion in Writing Judgments', prepared by a panel led by former Justice Aniruddha Bose.

- The report replaces the 2023 Handbook on Combating Gender Stereotypes and provides updated guidelines for gender-sensitive judgments and trials involving sexual offences and vulnerable persons.



Judgments and Gender

AboutJudgments and Gender: Sensitivity and Compassion in Writing Judgments Report:

What it is?

- This report is an official publication of the Supreme Court of India designed to guide judges, prosecutors, and litigators toward a trauma-informed, survivor-centric, and compassionate judicial system.

- Moving beyond the theoretical framework of the 2023 version, it focuses on the practical realities of Indian trial courts, eliminating victim-blaming language, enforcing strict courtroom decorum, and protecting the dignity and autonomy of survivors.

Key Findings & Recommendations in the Report:

- Empirical Analysis of Trial Judgments: The expert committee analyzed 125 trial court judgments nationwide to identify recurring patriarchal terms and insensitive judicial reasoning.
- Abolishing the Term Prosecutrix: Recommends replacing procedural labels like prosecutrix with victim, survivor, or complainant to better honor the lived experience of survivors.
- Elimination of Moralistic & Chastity Frameworks: Directs courts to avoid terms that frame sexual assault through morality or family honor (e.g., stating a rape destroyed her soul, lost her chastity, or ruined her life).
- Focusing Strictly on Legal Injury: Instructs judges to describe sexual offenses as violations of bodily autonomy and personal dignity that inflict severe physical and psychological trauma.
- Adopting the SOGIESC Framework: Urges courts to adopt the international Sexual Orientation, Gender Identity, Expression, and Sex Characteristics (SOGIESC) framework to ensure respectful, inclusive language for LGBTQIA+ individuals.
- Treating Witnesses as Guests: Calls on courts to treat witnesses with dignity as invited guests, prohibiting long waiting hours, unnecessary adjournments, and hostile environments.
- Strict Bar on Irrelevant Cross-Examination: Enforces statutory protections under the Bharatiya Sakshya Adhiniyam, 2023 (BSA) that prohibit indecent, scandalous, or offensive questions regarding a survivor's past sexual history.
- Trauma-Informed Judging: Warns judges against drawing negative inferences from delayed reporting, minor testimonial inconsistencies, or lack of physical injuries, recognizing that individuals respond to trauma differently.

Need for Gender Sensitivity and Compassion in the Judiciary:

- Preventing Secondary Victimization: Insensitive judicial questioning, graphic descriptions in judgments, and aggressive cross-examinations re-traumatize survivors during trials.
- Dismantling Rape Myths & Stereotypes: Counteracts societal assumptions that link a survivor's credibility to her clothing, lifestyle, past relationships, or delay in filing complaints.
- Encouraging Crime Reporting: Eradicating patriarchal judicial commentary builds confidence among survivors to seek legal remedies without fear of public character assassination.
- Upholding Constitutional Autonomy: Aligns judicial decision-making with fundamental rights to privacy, equality, and bodily integrity guaranteed under Article 21 of the Constitution.
- Addressing Ground Realities: Fills the gap highlighted by CJI Surya Kant that earlier guidelines were overly theoretical (too Harvard-oriented) and needed practical, context-aware training for trial judges.

Challenges Associated with Implementation:

- Deep-Seated Societal & Judicial Prejudices: Overcoming entrenched patriarchal mindsets among legal practitioners and trial court judges requires continuous soft-skills training.
- Harassing Cross-Examination Tactics: Defense counsel routinely attempt to slip in character-assassination questions under the guise of testing witness credibility.
- Lack ofSpecialized Courtroom Infrastructure: Many trial courts lack separate waiting rooms, safe deposition facilities, or trained support staff for vulnerable witnesses.
- Low Awareness of Welfare Schemes: Survey data in the report reveals that 80.7% of respondents are unaware of the Witness Protection Scheme or statutory victim compensation frameworks.
- Procedural Delays & Adjournments: Frequent court adjournments force survivors to repeatedly revisit traumatizing events over long periods.

Recommendations Given by the Supreme Court Committee:

- Mandatory Judicial Soft-Skills & Empathy Training: Institutionalize ongoing training across all State Judicial Academies to supplement substantive law knowledge with emotional intelligence.
- Proactive In-Camera Trials & Identity Protection: Enforce mandatory closed-door proceedings (in camera) and pseudonyms/initials in all public judgment records as per BNSS 2023.

- Pre-Trial Survivor Counseling: Provide mandatory pre-trial legal and psychological counseling to alleviate anxiety and prepare survivors for court proceedings.
- Active Control Over Cross-Examination: Direct presiding officers to actively intervene and strike out offensive, scandalous, or moralistic questions regarding a survivor's character.
- Standardized Glossary Adoption: Mandate the use of neutral, legal terminology in all lower court judgments, systematically avoiding problematic terms like prosecutrix or outraging modesty.

Conclusion:

The 2026 Supreme Court report shifts gender sensitivity in India's legal system from theoretical linguistic advice to practical, compassionate trial management. By replacing moralistic commentary with legal standards of bodily autonomy and requiring trauma-informed courtroom practices, it aims to protect survivor dignity. Ultimately, implementing these guidelines across all levels of the judiciary is essential to ensuring a compassionate, fair, and constitutional justice system.

The Enforcement Directorate (ED)

Context:



The Appointments Committee of the Cabinet (ACC) approved a one-year extension for Rahul Navin as the Director of the Enforcement Directorate (ED).

The Enforcement Directorate (ED)

About The Enforcement Directorate (ED):

What It Is?

- The Directorate of Enforcement (ED) is a multi-disciplinary financial investigation agency under the Department of Revenue, Ministry of Finance, Government of India. It is mandated to investigate economic crimes, financial frauds, money laundering, and foreign exchange law violations.

Established In:

- Established On: May 1, 1956.
- Original Name: Initially set up as an 'Enforcement Unit' within the Department of Economic Affairs, before being renamed the 'Enforcement Directorate' in 1957.

History & Administrative Evolution:

- 1956: Formed under the Department of Economic Affairs to handle exchange control law violations under the Foreign Exchange Regulation Act, 1947 (FERA '47).
- 1960: Administrative control transferred from the Department of Economic Affairs to the Department of Revenue.
- 1973–1977: Briefly placed under the Department of Personnel & Administrative Reforms before returning to the Department of Revenue.

Statutory Evolution:

- Replaced FERA 1973 with the Foreign Exchange Management Act, 1999 (FEMA) (w.e.f. June 1, 2000).
- Enforced the Prevention of Money Laundering Act, 2002 (PMLA) (w.e.f. July 1, 2005).
- Entrusted with the Fugitive Economic Offenders Act, 2018 (FEOA) (w.e.f. April 21, 2018).

Governance & Appointment:

- Head of Organization: Led by the Director of Enforcement.
- Cadre / Eligibility: Typically an officer of the rank of Additional Secretary / Special Secretary to the Government of India, drawn from the Indian Revenue Service (IRS) or Indian Police Service (IPS).
- Appointment Authority: Appointed by the Central Government on the recommendation of a committee chaired by the Central Vigilance Commissioner (CVC).
- Tenure Rules: Granted an initial fixed tenure of two years, which can be extended for up to three one-year terms (up to a maximum total of 5 years) under statutory amendments.

Key Functions:

- Investigating Money Laundering (PMLA): Identifies, attaches, and confiscates assets derived from scheduled criminal activities (proceeds of crime) and prosecutes offenders in Special PMLA Courts.
- Restitution of Misappropriated Funds: Uses PMLA provisions to attach and restitute attached properties and assets back to rightful victims, banks, and defrauded investors.
- Adjudicating Foreign Exchange Violations (FEMA): Investigates non-compliance with foreign exchange regulations, trade mis-invoicing, illegal hawala transactions, and imposes civil penalties.
- Action Against Fugitive Economic Offenders (FEOA): Confiscates domestic and overseas properties of economic offenders who flee India to evade criminal prosecution.
- International Cooperation & Asset Recovery: Coordinates with overseas intelligence units and international bodies (such as FATF and Interpol) to track cross-border illicit financial flows and execute Letters Rogatory (LRs).

The National Co-operative Development Corporation (NCDC)

Context:

Minister of State for Cooperation introduced the National Co-operative Development Corporation (Amendment) Bill, 2026 in the Lok Sabha.



National Co-operative Development Corporation

AboutThe National Co-operative Development Corporation (NCDC):

What It Is?

- A statutory apex financial and developmental organization functioning under the Ministry of Cooperation, Government of India.
- Established In: Established in 1963 under the statutory provisions of the National Co-operative Development Corporation Act, 1962.
- Aim: To plan, promote, and finance nationwide programs for the production, processing, marketing, storage, export, and import of agricultural produce, foodstuffs, and notified commodities through cooperative frameworks.

Key Functions:

- Financial Assistance & Credit Flow: Provides direct loans, grants, and working capital assistance to eligible cooperative societies and developmental institutions.
- Infrastructure Development: Funds processing units, cold chains, storage godowns, and marketing infrastructure across rural networks.
- Inclusive Cooperative Support: Extends targeted financial assistance to weaker section cooperatives, including women, SC/ST, and smallholder farmer collectives.
- Market Integration & Trade Facilitation: Facilitates agricultural export-import, value addition, and supply chain linkages to maximize returns for farmers.

About Key Features of the NCDC (Amendment) Bill, 2026:

- Broadened Statutory Mandate: Changes NCDC's core mandate from planning and promoting programs through co-operative societies to for co-operative development, expanding its operational scope.
- Direct Funding via Intermediary Entities: Allows NCDC to extend loans and grants directly to cooperative societies or non-cooperative entities (such as specialized agencies and statutory bodies) engaged in supporting cooperative development.
- ShareCapital Participation: Empowers NCDC, subject to Central Government approval, to participate directly in the share capital of eligible cooperative societies and supporting development entities.
- Expanded Scope & Removal ofGeographic Barriers: Expands the definition of foodstuffs to cover processed food/notified food items and removes geographical restrictions on industrial goods financing.

- Enhanced Operational & Credit Powers: Introduces new provisions (Sections 9A & 13A) granting NCDC incidental powers for smoother operations and enabling credit information sharing with the Central Government, RBI, and banks.

The Tribunals Reforms Bill, 2026

Context:



The Tribunals Reforms Bill, 2026 was introduced in the Lok Sabha to replace the Tribunals Reforms Act, 2021, following Supreme Court directions in the Madras Bar Association v. Union of India case.

The Tribunals Reforms Bill, 2026

About The Tribunals Reforms Bill, 2026:

What It Is?

- The Tribunals Reforms Bill, 2026 is a comprehensive structural reform bill designed to standardize qualifications, selection processes, tenures, and service conditions across India's quasi-judicial tribunal network. It addresses long-standing executive-judiciary friction and brings tribunal governance into direct compliance with Supreme Court directives.
- Aim: To enhance the judicial independence, administrative autonomy, transparency, and operational efficiency of 16 tribunals removing them from the direct administrative control of their parent ministries.

Key Features of the Bill:

- Establishment ofNational Tribunals Commission (NTC): Creates a 5-member statutory apex body (Chairperson, 2 Judicial Members, and 2 Technical Members with 25+ years experience) to oversee tribunal administration.
- Consultation with Chief Justice of India: Central Government appointments for the NTC Chairperson and Judicial Members require mandatory consultation with the CJI.
- Structured Search-cum-Selection Committees: Vacancies will be processed by specialized selection panels comprising NTC members, retired High Court judges, Union Secretaries, and non-voting experts.
- Binding Recommendation Timelines: Committees will recommend one candidate plus a waiting list name for each vacancy. The Central Government must finalize the appointment within three months.

Standardized Tenures & Ages:

- Chairpersons: 5-year tenure or up to 70 years of age.
- Members: 5-year tenure or up to 67 years of age.
- Both are eligible for re-appointment based on systematic performance reviews.
- National Tribunals Data Grid: Mandates the creation and maintenance of an online centralized repository for real-time tracking of case information, pendency, and tribunal performance metrics.
- Strict Grounds for Removal: Prescribes clear statutory criteria for removal, including moral turpitude, insolvency, conflict of interest, proved incompetence, physical/mental incapacity, or taking up outside paid employment.

Significance:

- Strengthens Tribunal Independence: Aligns tribunal administration with Supreme Court directions and constitutional principles.
- Improves Efficiency: Introduces transparent appointments, performance reviews, and a National Tribunals Data Grid.
- Enhances Accountability: Establishes a dedicated oversight body for complaints, governance, and institutional reforms.

Constitutional Limits on Arrest



Context:

The Supreme Court, in Vihaan Kumar v. State of Haryana (2025), reinforced constitutional safeguards against arbitrary arrest, ruling that an arrested individual must be directly and meaningfully informed of the grounds of arrest to satisfy Article 22(1) and statutory provisions.

Constitutional Limits on Arrest

AboutConstitutional Limits on Arrest:

What it is?

- Constitutional limits on arrest refer to the procedural and substantive safeguards designed to prevent the arbitrary exercise of state police power while safeguarding individual liberty and human dignity.
- Rooted in the Golden Triangle (Articles 14, 19, and 21) and Article 22, these limits balance the state's authority to maintain law and order with a citizen's fundamental right to personal freedom and fair procedure.

Key Legal & Constitutional Safeguards on Arrest:

- Direct Communication of Grounds (Article 22(1)): The arrested person must be directly, clearly, and meaningfully informed of the specific reasons for their arrest; ambiguous records or mere intimation to relatives do not meet this constitutional threshold.
- Right to Legal Counsel (Article 22(1)): Guarantees the fundamental right of an arrested individual to consult and be defended by a legal practitioner of their choice without delay.
- Mandatory 24-Hour Production (Article 22(2) & Section 58 BNSS): The police must produce the arrested individual before the nearest magistrate within 24 hours of arrest (excluding travel time), with the exact time of arrest explicitly noted in the arrest memo.
- Protection of Dignity & Humane Treatment (Article 21): Prohibits degrading treatment, custodial violence, or harassment, affirming that bodily integrity and dignity cannot be compromised during custody.
- Consequence of Illegal Arrest: If the initial arrest fails to comply with constitutional procedure, it is rendered unconstitutional, making any subsequent judicial remand order legally invalid.

Key Judicial Precedents Governing Arrests:

- Maneka Gandhi v. Union of India (1978): Established the Golden Triangle doctrine, holding that any state action curtailing personal liberty under Article 21 must be non-arbitrary (Article 14) and follow a just, fair, and reasonable procedure (Article 19).
- D.K. Basu v. State of West Bengal (1997): Formulated comprehensive guidelines for arresting authorities, including mandatory identification tags for arresting officers, preparing an arrest memo, and conducting regular medical examinations.
- Arnesh Kumar v. State of Bihar (2014): Ruled that arrests should be an exception for offenses punishable by less than seven years of imprisonment, requiring police officers to explicitly satisfy and record the necessity of arrest under Section 41 CrPC (Section 35 of BNSS).
- Vihaan Kumar v. State of Haryana (2025): Clarified that informing relatives is not a substitute for directly communicating grounds of arrest to the accused, establishing that unconstitutional arrests invalidate subsequent remands.

Arrest vs. Detention: Key Distinctions

Feature	Arrest	Detention(Preventive)
Nature & Cause	Formal custody based on probable cause of committing an offense.	Precautionary custody to prevent a person from committing future prejudicial acts.

Offense Type	Applies to cognizable (warrantless) and non-cognizable (warrant required) crimes.	Non-punitive administrative measure under preventive detention laws.
Article 22 Protection	Full procedural safeguards (grounds, legal aid, 24-hr magistrate rule).	Core procedural safeguards under Article 22(1) & (2) do not apply.
Maximum Initial Period	24 hours without judicial magistrate remand.	Up to 3 months without Advisory Board approval.

Challenges in Enforcing Arrest Safeguards:

- Routine & Mechanized Arrests: Police frequently resort to routine arrests even in bailable or minor offenses (carrying sentences under 7 years) without recording objective necessity.
- ProceduralFormality Over Substance: Grounds of arrest are often written in ambiguous, overly technical legal jargon, preventing the accused from genuinely understanding the allegations.
- Custodial Excesses and Informal Detentions: Delays in formal logging of arrest times on memos allow informal detentions and increase the risk of custodial harassment.
- Misuse of Preventive Detention: Frequent application of preventive detention provisions to bypass ordinary criminal trial safeguards.

Way Forward:

- Mandating Standardized Arrest Memos inVernacular Languages: Ensure grounds of arrest are provided in writing in a clear, comprehensible regional language at the time of custody.
- Strict Accountability for Non-Compliance: Impose departmental inquiries and penal action against investigating officers who execute routine arrests without fulfilling statutory necessity tests.
- Digital Recording of Custodial Logistics: Utilize electronic custody tracking and automated time-stamped biometric logging across all police stations to enforce the 24-hour magistrate rule.
- Institutional Legal Aid at First Contact: Mandate District Legal Services Authorities (DLSAs) to assign duty counsels at the pre-remand stage to verify the legality of arrest before remand orders are passed.

Conclusion:

Constitutional limits on arrest serve as an essential democratic check against state arbitrariness. Upholding procedural requirements—such as directly communicating grounds of arrest and ensuring prompt magistrate review—is vital to maintaining the balance between executive power and individual liberty. Strict judicial enforcement of these protections ensures that the criminal justice system remains rooted in human dignity, fairness, and the rule of law.

Joint Parliamentary Committee (JPC)

Context:



The Lok Sabha referred the Foreign Contribution (Regulation) Amendment Bill, 2026 to a Joint Parliamentary Committee (JPC) following strong objections from Opposition parties and civil society.

Joint Parliamentary Committee (JPC):

AboutJoint Parliamentary Committee (JPC):

What It Is?

- A Joint Parliamentary Committee (JPC) is an ad hoc (temporary) parliamentary panel set up by the Parliament of India to conduct a detailed, clause-by-clause examination of a specific controversial Bill, complex legislative proposal, or major financial/governance issue.

Constitutional Framework & Governing Rules:

- Constitutional Status: The JPC is not explicitly mentioned in the Constitution of India.
- Governing Provisions: It is an ad hoc committee set up under the Rules of Procedure and Conduct of Business in Lok Sabha and Rajya Sabha. It is formally constituted when a motion moved in one House is adopted and concurred with by the other House.

- Aim: To overcome the time constraints of floor debates by providing an in-depth, bipartisan platform to examine legislation, hear expert testimony, scrutinize evidence, and suggest necessary amendments or safeguards before a Bill becomes law.

Composition & Membership:

- Dual-House Representation: Drawn from both the Lok Sabha and the Rajya Sabha.
- Ratio: The number of Lok Sabha members is typically twice the number of Rajya Sabha members (a 2:1 ratio reflecting the relative strength of the two Houses).
- Proportional Representation: Membership and chairmanship reflect the relative party strengths in Parliament, giving the ruling party/coalition a majority.
- Chairperson: Appointed by the Speaker of the Lok Sabha.

Key Functions:

- Clause-by-Clause Scrutiny: Conducts threadbare examination of every provision and clause of a referred Bill to identify administrative, legal, or constitutional loopholes.
- Summoning Power & Taking Evidence: Authorized to call for official records, papers, and documents, as well as summon government officials, technical experts, and public stakeholders to present evidence.
- Public & Stakeholder Consultations: Invites written submissions and conducts oral hearings with affected organizations, industry bodies, and civil society representatives.
- Formulating Recommendations & Dissent Notes: Prepares a comprehensive advisory report containing proposed changes, with dissenting members permitted to append formal Notes of Dissent.
- Post-Report Dissolution: Once its final report is submitted to Parliament, the committee automatically stands dissolved.

The River Board

Context:



Saumitra Kumar Haldar, Chairperson of the Cauvery Water Management Authority (CWMA), advocated for the creation of a unified River Board to own, operate, manage, and regulate all reservoirs across the entire Cauvery basin.

The River Board

About The River Board:

What It Is?

- A River Board is a statutory or administrative body composed of technical specialists, government officials, and stakeholders tasked with overseeing, regulating, and developing an inter-State river or river valley as an integrated hydrological unit, rather than along state borders.

Constitutional Provisions & Legislative Basis:

- Entry 56 (Union List, Seventh Schedule): Grants the Union Parliament the authority to enact laws for the regulation and development of inter-State rivers and river valleys to the extent declared by Parliament to be expedient in the public interest.
- Entry 17 (State List, Seventh Schedule): Assigns water supply, irrigation, canals, drainage, embankments, and water storage primarily to State jurisdiction.
- Article 262: Empowers Parliament to provide for the adjudication of disputes relating to the waters of inter-State rivers or river valleys.
- The River Boards Act, 1956: Enacted by Parliament under Entry 56 to enable the Union Government—on request from State governments or suo motu—to establish River Boards for advising interested States on river regulation and development.

History of River Boards in India:

- Enactment (1956): Passed alongside the Inter-State River Water Disputes Act, 1956 during the linguistic reorganization of states.

- Zero Enactments Under the 1956 Act: Despite being on the statute book for nearly seven decades, not a single River Board has ever been formally established under the River Boards Act, 1956. States have historically resisted using the Act out of concern over losing sovereign jurisdiction over water resources.
- Executive & Tribunal-Led Alternatives: Instead, several river management bodies were constituted outside the 1956 Act through specific Acts of Parliament, executive resolutions, re-organisation acts, or tribunal awards.
- Aim: To facilitate integrated river basin management (IRBM), promote optimum water utilization, resolve inter-state water sharing friction through cooperative planning, and prevent environmental degradation across river ecosystems.

Key Functions of a River Board:

- Integrated River Basin Master-Planning: Formulates comprehensive schemes for conservation, control, and utilization of river water across all basin states.
- Reservoir Operation & Water Regulation: Regulates water storage, reservoir releases, and seasonal allocations to ensure equitable distribution during both surplus and drought periods.
- Flood Control &Soil Conservation: Coordinates regional flood forecasting, soil conservation, and erosion control measures upstream and downstream.
- Promoting Ecological Flows (Aviral Dhara): Monitors water quality, pollution abatement, and maintains minimum environmental flows to protect river ecosystems.
- Advisory & Dispute Prevention: Provides technical guidance to states regarding joint irrigation, navigation, and hydroelectric power schemes to address grievances before they escalate into formal tribunal litigation.

The Mines and Minerals (Development and Regulation) Amendment Bill, 2026

Context:



The Mines and Minerals (Development and Regulation) Amendment Bill, 2026 was introduced in Parliament to establish a uniform, Centre-directed fiscal framework for mining and restrict state-level taxes on mineral rights and mineral-bearing lands.

The Mines and Minerals (Development and Regulation) Amendment Bill, 2026

AboutThe Mines and Minerals (Development and Regulation) Amendment Bill, 2026:

What it is?

- The MMDR Amendment Bill, 2026 amends the principal Mines and Minerals (Development and Regulation) Act, 1957 to curb multiple, cascading state levies and establish central conditions on mineral taxation.
- It responds to the Supreme Court's 2024 nine-judge Constitution bench ruling in Mineral Area Development Authority (MADA) v. SAIL, which recognized the constitutional power of states to tax mineral rights and mineral-bearing lands, while holding that royalty is not a tax.

Key Features of the Bill:

- Union Regulation of Mineral-Bearing Lands: Amends Section 2 of the MMDR Act to explicitly extend the Central Government's regulatory control over "mineral-bearing lands" as per prescribed parameters.
- Capping State Levies (New Section 9D): Prohibits state governments from imposing any tax, cess, or levy on mineral rights or mineral-bearing lands (whether based on quantity, value, or royalty) except in accordance with conditions or restrictions prescribed by the Centre.
- Retrospective Invalidation of Unpaid Levies: Declares that all unpaid or unrecovered dues of state levies on mineral rights and lands from before the commencement of the amendment are deemed invalid.
- No Refund on Deposited Amounts: Specifies that state taxes or cesses already collected or deposited by mining companies prior to the amendment will not be refunded.
- Delegated Rule-Making Power (Section 13): Empowers the Central Government to frame executive rules specifying the exact parameters, conditions, and ceilings under which states can levy mineral taxes.

Need for the MMDR Amendment Bill, 2026:

- Preventing Cascading & UnpredictableTax Burdens: States currently impose over 14 diverse levies, cesses, and transit fees, which increase mining costs and threaten the commercial viability of extraction.
- Promoting Uniformity Across States: Replaces fragmented, state-specific tax rates with a harmonized fiscal regime across India's mineral belts.
- Safeguarding Domestic Manufacturing Competitiveness: Unchecked local taxation makes domestic raw materials costlier than imported ores, forcing India to import massive volumes of minerals.
- Fostering Investor Confidence & Exploration: High, unpredictable post-auction levies deter foreign and domestic private capital from bidding for critical and deep-seated mineral blocks.
- Securing NationalCritical Mineral Supply Chains: Uniform fiscal policies support the development of vital inputs needed for energy transition, electronics, and defense manufacturing.

Challenges Associated with the Bill:

- Questionable Legislative Competence over Land: Under Entry 18 (land) and Entry 49 (taxes on lands and buildings) of the State List, states have exclusive taxation powers over land; the Supreme Court held in 2024 that Parliament cannot restrict state land taxes under general mineral development powers (Entry 54, Union List).
- Encroachment onJudicial Authority: Invalidating past state tax demands permitted by the Supreme Court's 2024 verdict (which allowed recovery of arrears from April 1, 2005) without curing the constitutional basis of the judgment violates the separation of powers.
- Arbitrary Discrimination (Article 14 Violation): Forgiving liabilities for defaulting companies while denying refunds to compliant companies that paid their taxes creates arbitrary classifications.
- Excessive Delegation of Essential Legislative Powers: Delegating the entire framework of tax conditions and ceilings to executive rule-making under Section 13 lacks statutory legislative guidelines, violating established non-delegation doctrines.
- Erosion ofState Fiscal Autonomy: Severely curtails independent revenue generation for mineral-rich states (such as Odisha, Jharkhand, and Chhattisgarh) to fund welfare programs in mining-affected districts.

Way Ahead:

- Fiscal Consensus via Inter-State Councils: Establish an institutional Centre-State consultative mechanism to agree on transparent, harmonized taxation bands without undermining state revenues.
- Laying Clear Statutory Principles in the Act: Amend the primary statute to explicitly define reasonable tax ceilings and criteria instead of leaving them entirely to executive rule-making.
- Reconciling Entry 49 andEntry 50 Jurisprudence: Structure central fiscal guidelines strictly within the constitutional limits of Entry 50 (mineral rights) while respecting states' taxation powers under Entry 49 (land).
- Ensuring Equal Treatment for Taxpayers: Revisit the retrospective clause to ensure fair treatment between companies that paid past levies and those that delayed payments.
- Strengthening District Mineral Foundations (DMF): Ensure that local tribal and mining-affected communities receive direct benefits through transparent, decentralized utilization of DMF revenues.

Conclusion:

The MMDR Amendment Bill, 2026 seeks to balance investor predictability in the mining sector with national economic competitiveness. However, restricting state taxation powers and retrospectively overriding judicial directions raises significant federal and constitutional questions. Navigating these reforms through institutional dialogue and legislative consensus is essential to secure India's mineral future while preserving constitutional federalism.

NITI Aayog

Context:

Senior IAS officer Anurag Jain (1989-batch, Madhya Pradesh cadre) officially took charge as the Chief Executive Officer (CEO) of NITI Aayog following approval from the Appointments Committee of the Cabinet.



NITI Aayog

AboutNITI Aayog:

What It Is?

- NITI Aayog is the Government of India's apex public policy think tank and strategic advisory institution. It replaced the 65-year-old Planning Commission, shifting India's development strategy from a centralized top-down command model to a decentralized, bottom-up participatory framework.
- Date of Constitution: January 1, 2015.
- Legal Character: It is a non-constitutional, non-statutory, extra-constitutional body established via an executive resolution of the Union Cabinet.
- Aim: To foster cooperative and competitive federalism by providing directional, strategic, and technical inputs to the Central and State Governments, shaping a shared national development agenda through bottom-up planning.

Governance Structure:

- Chairperson: Prime Minister of India (ex-officio).
- Vice-Chairperson: Appointed by the Prime Minister (enjoys the rank of a Union Cabinet Minister).
- Governing Council: The premier decision-making forum comprising the Prime Minister, Chief Ministers of all States and Union Territories with legislatures, and Lieutenant Governors of other UTs.
- Regional Councils: Formed on a need basis to address specific inter-state or regional development priorities.
- Full-Time / Part-Time Members & Ex-Officio Members: Maximum of 4 Union Council of Ministers designated by the Prime Minister, alongside eminent domain domain experts.
- Chief Executive Officer (CEO): Appointed by the Prime Minister for a fixed tenure with the rank of Secretary to the Government of India.

Key Functions:

- Promoting Cooperative & Competitive Federalism: Creates structured dialogue channels between the Centre and States (Cooperative Federalism) while ranking states across thematic indices like the SDG India Index, Health Index, and Innovation Index to drive peer-to-peer performance benchmarking (Competitive Federalism).
- Decentralized Bottom-Up Planning: Develops institutional mechanisms to formulate credible plans starting at the village/panchayat level and progressively aggregates them to state and national development strategies.
- Strategic Policy & Programme Monitoring: Designs long-term policy blueprints, monitors the real-time execution and efficacy of flagship Central schemes, and facilitates mid-course corrections.
- Think Tank &Knowledge Innovation Hub: Acts as an internal repository for policy research, cutting-edge governance practices, international benchmarking, and technological adoption.
- Focus on Vulnerable Sections & National Security: Ensures that national security priorities are integrated into economic strategies and designs targeted interventions for disadvantaged or marginalized social groups.

The Deemed Distribution Licence (DDL) Controversy

Context:



The Andhra Pradesh government's policy framework recommending a Deemed Distribution Licence (DDL) for hyperscale AI data centres—including the Google-Adani AI data centre project in Visakhapatnam—has faced severe legal and civil pushback.

The Deemed Distribution Licence

AboutThe Deemed Distribution Licence (DDL) Controversy:

What it is?

- A Deemed Distribution Licence (DDL) is a statutory status where an entity is treated as an authorized power distributor to supply electricity within a designated area without undergoing the standard licensing process.

- The Andhra Pradesh government proposed granting DDL status to strategic data centres with a minimum connected load of 300 MW, allowing them to procure, build, and manage their own power networks.

How it works?

- Statutory Authorization: An entity is legally deemed an authorized power distributor for a designated area without needing a standard, formal distribution license.
- Direct Power Sourcing: The licensee directly procures electricity (such as renewable energy via Power Purchase Agreements or energy exchanges) and manages its own internal distribution network.
- Supply to Dedicated Consumers: The entity supplies and distributes the procured power directly to consumers located within its demarcated operating area.

Key Arguments in Favor of Granting DDL to Data Centres

- Managing Hyperscale Energy Demand: Hyperscale AI data centres consume power at levels equivalent to entire urban municipalities, requiring dedicated, mission-critical distribution networks beyond standard High-Tension (HT) consumer links.
- Direct Green Power Procurement: DDL status grants operators the autonomy to enter bilateral Power Purchase Agreements (PPAs) with renewable energy developers, Battery Energy Storage Systems (BESS), and energy exchanges to meet global net-zero targets.
- Attracting Big-TechForeign Direct Investment (FDI): Providing rapid infrastructure autonomy positions Andhra Pradesh as a premier digital and AI hub, competing with global tech corridors.
- Relieving Public Distribution Infrastructure: Allowing data centres to invest capital in dedicated substations and internal distribution lines reduces direct capital expenditure pressure on state utilities.

Key Challenges & Legal Conflicts:

- Lack of Statutory Basis for Self-Consumption: Under the Electricity Act, 2003, a distribution licence requires a distinct separation between the licensee (supplier) and the consumer (buyer); self-consumption does not legally qualify as distribution.
- Encroachment on APERC'sStatutory Domain: Granting licences and evaluating sector-wide grid impacts is the exclusive function of the independent Andhra Pradesh Electricity Regulatory Commission (APERC), which cannot be bypassed by an executive Government Order.
- Severe Financial Strain on State DISCOMs: By exiting general grid supply, large industrial loads avoid paying standard tariffs, wheeling charges, and cross-subsidy surcharges, weakening public utilities' ability to subsidize agricultural and rural consumers.
- Absence of Dedicated Data Centre Legislation: Unlike Special Economic Zones (SEZs)—which have express statutory DDL provisions under the SEZ Act, 2005—no central or state statute empowers governments to confer DDL status on standalone data centre parks.
- Fragmentation of the Power Sector: Creating multiple ad-hoc deemed distribution frameworks ring-fences high-paying commercial segments, leaving state utilities with high-cost, loss-making consumer bases.

Way Ahead:

- Promoting Open Access Over DDL: Utilize existing Green Energy Open Access Rules to allow data centres to procure dedicated renewable power while paying legitimate transmission and wheeling charges to state utilities.
- Independent Review by APERC: Subject all high-load distribution proposals to public hearings, grid stability assessments, and cost-benefit analyses conducted by a fully constituted regulatory commission.
- Drafting aUniform Statutory Policy: If specialized distribution licenses are required for data centres, Parliament or the State Legislature should enact formal legislation rather than relying on executive Government Orders.
- Ring-Fencing Cross-Subsidies for Vulnerable Consumers: Ensure power-intensive tech firms contribute a dedicated grid-resilience and cross-subsidy cess to protect agricultural and low-income consumer tariffs.
- Mandating Local Renewable Capacity Addition: Require hyperscale data centre operators to co-develop captive renewable generation and battery storage facilities rather than drawing power from existing public grid baseloads.

EXCEL CIVILS ACADEMY EMPOWERING FUTURE LEADERS

Conclusion:

While hyperscale AI data centres require vast and uninterrupted electricity, bypassing the Electricity Act to grant distribution status for self-consumption threatens public utility revenues. Resolving this issue through transparent regulatory open-access frameworks and formal legislative oversight is essential to foster digital growth while protecting the financial sustainability of the public power grid.

The Central Adoption Resource Authority (CARA)

Context:

The Central Adoption Resource Authority (CARA) is reviewing the Adoption Regulations, 2022 to address procedural bottlenecks and improve adoption of special needs children, including those with treatable conditions.

The Central Adoption Resource Authority (CARA)

About The Central Adoption Resource Authority (CARA):

What It Is?

- The Central Adoption Resource Authority (CARA) is the statutory apex body and nodal authority for the adoption of Indian children (specifically orphaned, abandoned, and surrendered children) under the aegis of the Ministry of Women and Child Development (MWCD), Government of India.

Established In & Statutory Status:

- Originally established in 1990 as an autonomous body to oversee and streamline child adoption procedures.
- Statutory Recognition: Conferred full statutory status under Section 68 of the Juvenile Justice (Care and Protection of Children) Act, 2015 (as amended in 2021).
- International Mandate: Designated as the Central Authority of India for inter-country adoptions under the 1993 Hague Convention on Protection of Children and Co-operation in Respect of Intercountry Adoption (ratified by India in 2003).
- Aim: To ensure transparent, ethical and child-centric adoptions, prevent trafficking, and secure safe, permanent families for orphaned, abandoned and surrendered children.

Key Functions of CARA:

- Promotion of In-Country & Inter-State Adoptions: Facilitates domestic adoptions in close coordination with State Adoption Resource Agencies (SARAs), Specialized Adoption Agencies (SAAs), and Child Welfare Committees (CWCs), ensuring Indian resident families are given first priority.
- Regulation & Oversight of Inter-Country Adoptions: Regulates cross-border adoptions for Non-Resident Indians (NRIs), Overseas Citizens of India (OCIs), and foreign prospective adoptive parents through Authorized Foreign Adoption Agencies (AFAAs) and diplomatic missions.
- Formulation of Binding Adoption Regulations: Frames, updates, and reviews statutory rules and operational guidelines (such as the Adoption Regulations, 2022) to address procedural ambiguities and streamline administrative timelines.
- Digital Management via theCARINGS Portal: Operates the centralized online platform CARINGS (Child Adoption Resource Information and Guidance System, integrated with Mission Vatsalya) to ensure end-to-end transparency, confidential record maintenance, and queue tracking.
- Accreditation, Capacity Building & Special Needs Placement: Empanels and monitors specialized adoption agencies, sets norms for pre-adoption foster care, and designs targeted campaigns to place older children and those with special medical needs into supportive families.

The Food Safety and Standards (Advertising and Claims) Regulations, 2018

Context:

The Maharashtra FDA issued notices to actors over Vimal Elaichi endorsements, alleging surrogate advertising of prohibited pan masala in violation of food safety and consumer protection norms.

The Food Safety and Standards

AboutThe Food Safety and Standards (Advertising and Claims) Regulations, 2018:

What It Is?

- A statutory regulatory framework notified by the Food Safety and Standards Authority of India (FSSAI) under Section 92 read with Sections 23 and 24 of the Food Safety and Standards Act, 2006.
- It governs how Food Business Operators (FBOs), advertisers, and marketers promote food products, formulate nutritional/health claims, and display public commercial communications.
- Aim: To ensure truthful, scientifically supported food advertising, protecting consumers from misleading claims, surrogate advertising and unfair trade practices.

Key Features of the Regulations:

- GeneralPrinciples of Truthfulness & Non-Deception: Mandates that all marketing communications and claims must be unambiguous, clear, and scientifically meaningful; advertisements must not encourage or condone excessive consumption or undermine healthy lifestyles.
- Regulation of Brand Adjectives & Mandatory Disclaimers: Use of words such as Natural, Fresh, Pure, Original, Traditional, or Authentic in brand or trade names must strictly adhere to prescribed qualifying criteria.
- Prohibition of Medical Endorsements & Disease Cure Claims: Strictly prohibits advertisements from claiming that a food can prevent, alleviate, treat, or cure any specific physiological disease or disorder; labels cannot state recommended/approved by medical or health professionals.
- Substantiation ofNutritional & Health Claims: Requires all nutritional content, comparative, and health claims (including Nutrient Function and Reduction of Disease Risk claims) to be backed by validated laboratory methods and peer-reviewed human intervention studies.
- Rigorous Non-Addition Standards: Formulates strict qualifying criteria for claims asserting non-addition of sugars (mandating the label CONTAINS NATURALLY OCCURRING SUGARS where applicable), salt/sodium, and food additives.
- Prior Approval Mechanism for Novel Health Claims: Obligates FBOs and marketers to seek prior formal approval from FSSAI for reduction-of-disease-risk claims before publishing commercial communications.
- Ban on Exploiting theFSSAI Logo for Marketing: While displaying the FSSAI license number and logo is mandatory for packaging and traceability, using the FSSAI emblem as a marketing badge to promote sales or imply product superiority is prohibited.
- Corrective Advertisements & Penalties: Empowers the Food Authority to order the immediate stoppage of deceptive advertisements and mandate the issuance of a corrective advertisement within 30 days through the exact same medium to neutralize misleading impressions, alongside penalties under Section 53 of the FSS Act, 2006.

Public Examination Reform 2.0 (PER 2.0)

Context:

Education reform expert called for Public Examination Reform 2.0 (PER 2.0), shifting India from reactive post-breach measures to systemic exam security amid recurring irregularities in major national and State examinations.



Public Examination Reform 2.0 (PER 2.0)

AboutPublic Examination Reform 2.0 (PER 2.0):

What it is?

- Public Examination Reform 2.0 (PER 2.0) represents a comprehensive, lifecycle-oriented integrity architecture for high-stakes entrance and recruitment tests. While PER 1.0 (2006–2015) established candidate-facing transparency measures, PER 2.0 shifts the focus toward internal systemic resilience. It mandates standardized, independently auditable Standard Operating Procedures (SOPs), end-to-end chain-of-custody tracking, and institutional accountability across every stage—from question paper setting to final merit declarations.

Need for PER 2.0:

- Vulnerabilities at the Question-Setting Stage: Recent investigations (such as NEET-2026) revealed that compromises occur during upstream question framing and moderation involving subject matter experts, rather than traditional physical transport breaches alone.
- Limitations ofExternal Physical Security: Fortifying physical transit with police escorts is ineffective if internal digital workflows, database permissions, and institutional operations lack verifiable checks.
- Recurrent Content Errors & Translation Glitches: Instances of question errors (such as missing options in UPSC Prelims 2026 and translation defects forcing UGC-NET 2026 re-tests) erode test credibility without prompt challenge mechanisms.
- Chronic Implementation Deficits (Committee Hopping): Successive panels (from Acharyya, Kakodkar, and Ramasami to the Radhakrishnan Committee and Nilekani Task Force) generated recommendations that lacked enforceable, auditable Action Taken Reports.
- Protecting the Sanctity of Merit: Systemic irregularities, score inflation, and irregular clustering of top scores create widespread distress among millions of student aspirants.

Core Pillars of PER 2.0:

- Upstream Moderation & Secure Translation: Strict vetting, background checks, conflict-of-interest declarations, and rotation of question setters, paired with protected machine translation models to minimize human handling.
- End-to-End Digital Custody & Logistics: Role-based access controls, biometric authentication, digital watermarking, continuous activity logging, and tamper-evident tracking at every physical and digital handover.
- Risk-Based Center Allocation & Proctoring: Algorithmic randomization of test centers, objective evaluation of third-party private infrastructure, and integrated CCTV surveillance to prevent localized collusion.
- Independent Forensic Audits & Accountability: Post-examination statistical anomaly detection (identifying abnormal score clusters), third-party cybersecurity audits, secure whistleblower channels, and mandatory public examination integrity reports.

Challenges Associated with Examination Reforms:

- Massive Scale &Linguistic Diversity: Managing simultaneous multi-lingual testing for millions of candidates across diverse rural and urban centers stretches logistical oversight.
- Over-Reliance on Outsourced & Private Infrastructure: Heavy dependence on third-party test centers, private software vendors, and temporary invigilators creates weak security links.
- Deep-Rooted Commercial Coaching Networks: High financial stakes fuel nexus operations involving coaching institutes, intermediaries, and testing personnel attempting to access question banks.
- Digital Vulnerabilities & AI-Generated Forgeries: Transitioning to digital infrastructure introduces risks of remote network tampering, hacking, and the circulation of manipulated or AI-generated OMR sheets.
- Federal Coordination Friction: Uneven testing capabilities and fragmented legal standards across autonomous central agencies and state public service commissions complicate uniform enforcement.

Way Forward:

- Publishing a National White Paper on Exam Integrity: Document operational failure points, unfulfilled committee recommendations, and successful practices across Indian testing bodies.
- Enacting a Unified PublicExamination Integrity Framework: Formulate enforceable, binding SOPs applicable to the National Testing Agency (NTA), UPSC, state PSCs, and recruitment boards.
- Transitioning to Secure-by-Design Architecture: Design testing protocols where every step is inherently transparent and resilient, replacing emergency security measures added after a breach.
- Implementing the Nilekani & Radhakrishnan Recommendations: Enforce data encryption, robust question-bank randomization, and biometric candidate verification under a time-bound statutory mandate.
- Establishing Fast-Track Courts & Whistleblower Protections: Operationalize specialized fast-track judicial courts and strict penalties under the Public Examinations (Prevention of Unfair Means) Act to ensure swift legal deterrence.

Conclusion:

By standardizing operational SOPs from question moderation to post-exam forensic audits, testing agencies can systematically eliminate insider and external vulnerabilities. Making public examinations secure by design is essential to restoring institutional credibility, protecting academic merit, and securing the aspirations of India's youth.

The Digital Personal Data Protection (DPDP) Act, 2023

Context:



In its first major compliance push, the Centre directed ministries, States and UTs to prepare time-bound plans and appoint nodal officers to implement the DPDP Act, 2023.

- Government Data Fiduciaries must audit data, strengthen cybersecurity and embed privacy-by-design in digital platforms.

The Digital Personal Data Protection

About The Digital Personal Data Protection (DPDP) Act, 2023:

What It Is?

- The Digital Personal Data Protection Act, 2023 (DPDP Act) is India's principal statutory data privacy legislation enacted to regulate the processing of digital personal data. Built on the SARAL approach (Simple, Accessible, Rational, and Actionable), the law establishes rights for individuals (Data Principals), legal obligations for data collectors (Data Fiduciaries), and enforcement powers under the Data Protection Board of India (DPBI).
- Aim: To establish a comprehensive legal regime that protects individual privacy rights and safeguards digital personal data while recognizing the necessity to process such data for lawful, legitimate, and national development purposes.

Key Features of the DPDP Act, 2023:

- Broad Territorial and Extra-Territorial Scope: Applies to digital personal data processed within India, as well as foreign processing of personal data linked to offering goods or services to Data Principals in India.
- Consent-Centric & Legitimate Use Processing: Personal data can only be processed after giving clear prior notice and securing free, specific, and informed consent.
- Specified exceptions include voluntary provision of data, government subsidies/services, medical emergencies, and employment purposes.
- Robust Data Principal Rights with Civic Duties: Empowers individuals with the right to access processing summaries, seek correction and erasure, register grievances, and nominate legal representatives upon death/incapacity. It balances these rights with statutory duties.
- Child Safety and Special Protections: Prohibits behavioral tracking, targeted advertising, and processing of data that causes harm to children, mandating verifiable parental or legal guardian consent prior to data collection.
- Independent Oversight & Graded Financial Penalties: Establishes the Data Protection Board of India (DPBI) as the adjudicatory body (with appellate jurisdiction under TDSAT). It imposes strict non-criminal penalties:
- Up to 250 crore for failing to maintain reasonable security safeguards to prevent data breaches.
- Up to 200 crore for failing to report data breaches or violating child-data protection norms.
- Up to 50 crore for general statutory violations.

Significance:

- Gives statutory effect to the Puttaswamy (2017) privacy principle and strengthens personal data protection.
- Allows cross-border data transfers unless specifically restricted, supporting IT exports, cloud services and investment in India's digital economy.

The OBC Creamy Layer & The Income Test

Context:



The Supreme Court has agreed to consider setting up a dedicated Bench to hear the Centre's plea seeking clarification on its landmark judgment in Union of India v. Rohith Nathan.

- The Centre submitted that retrospectively implementing the ruling on the income/wealth test would trigger an uncontrollable cascading effect across settled civil service batches since 2012.

The OBC Creamy Layer & The Income Test

About The OBC Creamy Layer & The Income Test:

What it is?

- The creamy layer doctrine—introduced in the landmark Indra Sawhney v. Union of India (1992) judgment—mandates the exclusion of socially and economically advanced members among OBCs so that reservation benefits reach the genuinely backward sections.
- Under the Department of Personnel and Training (DoPT) Office Memorandum (OM) of September 8, 1993, creamy layer status is determined through two distinct mechanisms:

1. Status-Based Test (Categories I–V): Applied to children of constitutional authorities, Group A/Class I and Group B/Class II officers, armed forces personnel, and PSU executives.
2. Income/Wealth Test (Category VI): Serves as a residual filter for individuals engaged in trade, business, or unclassified sectors whose gross family income exceeds the prescribed threshold (1 lakh in 1993, revised periodically to 8 lakh per annum since 2017) for three consecutive years.

- Crucially, the 1993 OM specified that income from salaries and agricultural land must be excluded when calculating the income/wealth test limit.

What the Supreme Court Ruled in Rohith Nathan?

- Struck Down Paragraph 9 of the 2004 Letter: The Court held that an executive clarification issued in 2004 could not amend the binding 1993 OM by including salary income for PSU/private sector employees when post equivalence had not been established.
- Ended Hostile Discrimination: In government families, children of Group C/D employees were granted non-creamy layer (NCL) status regardless of salary, whereas PSU and private sector employees' children were disqualified based solely on parental salary. The Court declared this a violation of Articles 14 and 16.
- Reaffirmed Income as a Residual Filter: Exclusion must be primarily status-based; salary alone cannot be used to exclude candidates without evaluating the nature or rank of the parents' posts.
- Remedy of Supernumerary Posts: Directed the Union Government to create supernumerary posts within six months to accommodate aggrieved OBC candidates denied service allocations according to their merit ranks.

Why the Centre is Seeking Clarification & Concerns Raised?

- Administrative Chaos in Settled Services (2012–Present): Re-evaluating service allocations retrospectively from Civil Services Examination (CSE) 2012 onward affects cadre allocations, state cadres, and inter-se seniority across multiple batches.
- Impact Across All Categories: Readjusting ranks and allocations would alter merit lists and service rosters across General/Unreserved, EWS, SC, and ST categories.
- Litigation Avalanche: Since the ruling, 22 court judgments have applied the Rohith Nathan principle, and dozens of fresh petitions have been filed before the Central Administrative Tribunal (CAT) by past candidates seeking NCL reconsideration.
- The Intelligible Differentia Argument: The Centre argued that salary income can act as an intelligible differentiating factor between OBC families, warning that excluding salaries entirely could allow candidates whose parents earn up to 1 crore annually in private employment to claim NCL status.
- Immediate Disruption to CSE 2025: Over 950 recommended CSE 2025 candidates are scheduled to begin their Foundation Course; applying the judgment immediately could disrupt current allocations.

Way Forward:

- Constitution of a Clarification Bench: The Supreme Court will hear the Centre's applications to decide whether the ruling applies strictly to the named petitioners, operates only prospectively, or requires systemic implementation across all pending claims.
- Formalizing Post Equivalence: The Central Government and the National Commission for Backward Classes (NCBC) must expedite establishing post equivalence between PSU/autonomous bodies and civil government scales (Group A, B, C, D) to eliminate arbitrary classifications.
- Comprehensive Review of the Creamy Layer Ceiling: With the 8 lakh threshold unchanged since 2017, the Ministry of Social Justice and Empowerment needs to rationalize the income ceiling in line with inflation and wage revisions.
- Prospective Policy Overhaul: Formulating a statutory, standardized rulebook for calculating gross income—specifically distinguishing operational salary from capital gains and commercial earnings—will prevent future legal ambiguities.

Conclusion:

However, balancing this constitutional principle of equality against the administrative disruptions of retrospective service adjustments presents a major governance challenge. The forthcoming Supreme Court clarification will determine whether the judgment is implemented prospectively, settled via supernumerary posts, or integrated into a comprehensive overhaul of OBC reservation rules.

The Integrated Fertilizer Management System (iFMS)

Context:



The Department of Fertilizers has transitioned the Integrated Fertilizer Management System (iFMS) into a comprehensive, data-driven oversight platform by integrating it with state land records, Meri Fasal Mera Byora (MFMB), and the central AgriStack.

Integrated Fertilizer Management System

About The Integrated Fertilizer Management System (iFMS):

What It Is?

- The Integrated Fertilizer Management System (iFMS) is a national end-to-end digital tracking and enterprise resource platform. It monitors every stage of India's fertilizer ecosystem—from domestic production and port imports to railway/road movement, district stock availability, Point of Sale (PoS) retail transactions to verified buyers, and direct-benefit-transfer (DBT) subsidy settlements.
- Nodal Department: Department of Fertilizers, Ministry of Chemicals and Fertilizers, Government of India.
- Aim: To ensure transparent and equitable fertiliser supply, prevent diversion, and enable verified DBT subsidy payments based on actual retail sales.

Key Features of iFMS:

- Massive Operational Scale: Connects over 14 crore identity-verified buyers and 2.5 lakh retail outlets, digitally tracking roughly 7 crore metric tonnes of fertilizer transactions and administering close to 2 lakh crore in annual central subsidies.
- Integration with AgriStack & Land Registries: Interlinks transaction records with farmer databases enabling landholding and crop-specific validation to assess realistic agricultural input requirements.
- Framework for Fertilizer Sale (FFS): Introduces a mobile app-based pre-booking mechanism where farmers generate a dynamic QR code against verified land allocations, which retailers scan at PoS machines to match requested quotas with actual purchases.
- Transit Visibility viaVehicle Location Tracking (VLTS): Combines goods-in-transit dispatch data with GPS-based vehicle location telemetry to monitor fertilizer trucks in real time, curbing route deviations, transit delays, and black-marketing.
- Paperless, Automated Subsidy Processing: Fully digitizes the billing pipeline via integration with PFMS and e-Bill, incorporating random audit algorithms and risk-based analytics to clear DBT subsidy claims without manual friction.

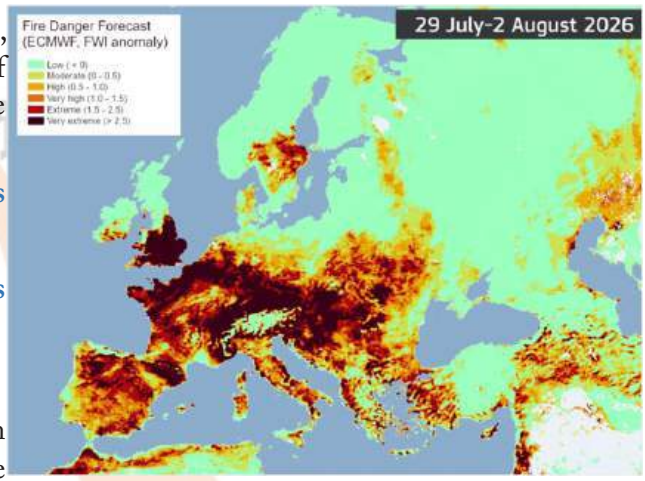
Significance:

- Linking sales with land records, GPS tracking and biometric PoS helps prevent subsidised urea diversion to industries and cross-border smuggling.
- Consumption data by crop, soil and area can identify excess nitrogen use and support balanced fertilisation and soil health.

Europe Wildfires: Climate Whiplash, Fire Clouds (PyroCb) & Causes Explained

Context:

Intense wildfires swept across Europe—particularly in Greece, Spain, France, Portugal, and Italy—destroying hundreds of thousands of hectares of forest and triggering record peacetime evacuations.



Europe Wildfires: Climate Whiplash, Fire Clouds (PyroCb) & Causes Explained

AboutEurope Wildfires: Climate Whiplash, Fire Clouds (PyroCb) & Causes Explained:

What it is?

- The increasing severity, speed, and heat of European wildfires are driven by a combination of climate change, volatile weather patterns, and structural shifts in land usage.
- Rather than acting as typical seasonal events, modern blazes frequently evolve into high-intensity sixth-generation wildfires. These fires generate their own localized weather systems, devastate ecosystems, and release immense volumes of carbon dioxide back into the atmosphere.

About Climate Whiplash andFire Clouds(PyroCb):

What is Climate Whiplash?

- Climate whiplash refers to rapid, extreme swings between opposing weather conditions within a short timeframe.
- In the context of wildfires, it typically manifests as an unusually wet season that promotes rapid vegetation growth, followed immediately by severe heatwaves and drought. This sudden shift dries out the newly grown vegetation, transforming it into a vast, contiguous layer of combustible fuel ready to ignite.

What are Fire Clouds (Pyrocumulonimbus/ PyroCb) & How Do They Form?

- A pyrocumulonimbus (PyroCb), or fire cloud, is a fire-generated thunderstorm that forms above intense, large-scale wildfires.
- Intense Updrafts: Extreme heat from a massive wildfire rapidly pushes air, smoke, ash, and moisture from burning vegetation high into the atmosphere.
- Cooling and Condensation: As the hot air column climbs 10 to 15 km upward, it expands and cools. Moisture in the air condenses around microscopic smoke and ash particles.
- Thunderstorm Generation: The condensing moisture forms towering pyrocumulonimbus clouds capable of producing lightning, erratic winds, and localized precipitation.
- Self-Amplifying Wildfire Effect: Electrical charges inside the cloud trigger lightning strikes that can ignite new, secondary fires miles away from the original blaze, while violent updrafts create unpredictable wind shifts that trap firefighters.

Key Causes Driving Climate Whiplash & Fire Clouds:

- Global Atmospheric Warming: Escalating global temperatures increase atmospheric moisture-holding capacity, intensifying both extreme rainfall phases and subsequent drought cycles.
- ExtremeWeather Volatility: Heightened frequency of prolonged, severe heatwaves and droughts rapidly desiccates living vegetation and forest underbrush.

- Rapid Vegetation Accumulation: Unusually wet periods create explosive growth of grasses, shrubs, and young trees, building up an unprecedented volume of organic fuel.
- Rural Land Abandonment & Unmanaged Fuel Loads: The decline of traditional agriculture and livestock grazing leaves dense, continuous layers of dry underbrush across rural landscapes, enabling fires to burn with the extreme heat required to generate PyroCb clouds.

Causes Beyond Climate Change:

- Rural Land Abandonment: Over recent decades, small-scale farming and livestock grazing across the European countryside have declined as populations migrated to urban areas.
- UnmanagedFuel Accumulation: Abandoned agricultural lands experience natural vegetation encroachment, growing thick underbrush, dense shrubs, and dry young trees that create an unbroken, highly combustible fuel layer.
- Paradox of Fire Suppression: Successfully suppressing minor, routine fires allows dense vegetation to accumulate over time; when a fire eventually escapes initial suppression, it burns with unprecedented intensity.

Consequences of Europe's Wildfires:

- Severe Economic Losses: Wildfires cost the European Union an estimated €2.5 billion annually through damaged infrastructure, lost tourism revenues, and economic disruption.
- Ecosystem &Biodiversity Degradation: Destroys fragile habitats, causes long-term soil degradation, and accelerates global warming through large-scale carbon dioxide emissions.
- Public Health Hazards: Toxic smoke plumes travel thousands of kilometers, deteriorating regional air quality and forcing community evacuations.

Wildfires in India: A Comparison

- Human-Driven Ignitions: Unlike European fires—which are increasingly amplified by lightning from fire clouds—the vast majority of forest fires in India stem from human activities, such as agricultural residue burning, collection of non-timber forest produce, or accidental sparks.
- Regional Hotspots: In India, fire proneness is highest in the Northeast, parts of Odisha and Chhattisgarh, and Himalayan states like Uttarakhand and Himachal Pradesh during dry summer months.

Way Forward:

- Active Agroforestry & Landscape Management: Reintroduce controlled livestock grazing, clear dry underbrush, and create natural firebreaks to disrupt contiguous fuel layers.
- Prioritizing Risk Communication over Mere Suppression: Shift emergency management toward public preparedness, timely evacuations, and early warning systems alongside firefighting efforts.
- Revitalizing Rural Economies: Support sustainable agriculture and rural community initiatives to manage forest-fringe lands and prevent land abandonment.
- Building Resilient Ecosystems: Restore degraded forests using fire-resilient, biodiverse native species rather than easily flammable monoculture trees.

Conclusion:

Europe's escalating wildfires demonstrate how climate change and land abandonment combine to create dangerous environmental hazards. Traditional fire suppression techniques are no longer sufficient against self-generating fire clouds and climate whiplash. Adapting to this reality requires active landscape management, rural revitalization, and public preparedness to protect human lives and ecosystems.

Lake Mead

Context:



Lake Mead—the largest artificial reservoir in the United States—fell to a record low water level of 1,040.4 feet (317.1 meters) above sea level.

Lake Mead

AboutLake Mead:

What It Is?

- Lake Mead is the largest man-made reservoir by volume in the United States.

Created by the damming of the Colorado River, it serves as a primary storage source for drinking water, agricultural irrigation, and hydroelectric power across the American Southwest.

- Location: Lies along the Arizona–Nevada border, approximately 25 miles (40 km) east of Las Vegas, Nevada.
- National Recreation Area: Established in 1936 as the first designated U.S. National Recreation Area, spanning 2,338 square miles (6,055 sq km) and stretching along 240 miles of the Colorado River.

Origin & History

- Formed in the 1930s following the construction of the Hoover Dam (completed 1936) on the Colorado River.
- Named in honor of Elwood Mead, who served as the Commissioner of the U.S. Bureau of Reclamation from 1924 to 1936.

Key Geographical Features:

- Massive Volumetric Capacity: At full pool (1,220 feet above sea level), it can hold up to 31,047,000 acre-feet (approx. 38.3 billion cubic meters) of water, stretching 115 miles upstream with 550 miles of shoreline.
- Distinctive Bathtub Ring: A visible band of white mineral deposits along the surrounding rocky cliffs marks the high-water line from earlier decades when the lake was full.
- Core Hydrological Anchor: Functions alongside Lake Powell (behind Glen Canyon Dam) as part of a twin-reservoir system that manages the storage and release of the Colorado River's water.

Causes for the Decline:

- Record Low Rocky Mountain Snowpack: The Colorado River relies on snowmelt from the Rocky Mountains for its flow; the winter season recorded the worst snowpack levels on record, severely reducing water inflows.
- Persistent Multi-Decade Megadrought: The Southwest US has been experiencing a multi-decade dry spell exacerbated by rising temperatures and high evaporation rates.
- Systemic Over-Allocation & Overuse: For decades, legal water allocations granted to the seven basin states (Arizona, California, Nevada, Colorado, New Mexico, Utah, and Wyoming) and Mexico have exceeded the river's average natural flow.

Significance:

- Falling water levels reduce turbine efficiency, potentially cutting Hoover Dam's power generation by up to 70%.
- Lake Mead supplies water to 25–30 million people. Low levels trigger mandatory water cuts and greater reliance on deep-water pumping.

The Hallaniyat Islands

Context:

The Oman Environment Authority launched containment operations after an oil spill covering ~390 sq km off southern Oman.

- The spill originated from the explosion-damaged Caroline Bezengi, a Russian shadow fleet tanker that grounded near the protected Hallaniyat Islands.



The Hallaniyat Islands

About The Hallaniyat Islands:

What It Is?

- The Hallaniyat Islands (formerly known as the Kuria Muria Islands) comprise an archipelago of five islands located off the southern coast of Oman in the Arabian Sea. Recognized for their untouched marine habitats and exceptional biodiversity, the islands were designated as a protected nature reserve by Royal Decree in 2025.
- Governorate: Dhofar Governorate (Southern Oman).
- Inhabited Island: Al Hallaniyya is the largest island in the group and the only one with a permanent human settlement equipped with basic civic infrastructure.

Key Features:

- Topography & Marine Terrain: The archipelago features rugged limestone cliffs, rocky sub-littoral zones, and mixed coral-algal ecosystems.
- Critical Turtle Nesting Hub: Houses one of the world's most important nesting grounds for Loggerhead sea turtles, along with significant nesting populations of Green and Hawksbill turtles.
- Endangered Marine Mammal Sanctuary: Surrounding waters are home to the isolated, non-migratory Arabian Sea humpback whale population, alongside frequent pods of Spinner and Risso dolphins.
- Pristine Coral Reefs: Features virgin, high-diversity coral formations—including newly discovered endemic species from the Oculinidae family—and abundant spiny lobster populations.
- Key Avian Breeding Ground: Uninhabited islets like Al Qabliyya Island provide predator-free resting and nesting havens for species such as the Red-billed Tropicbird, Masked Booby, and Audubon's Shearwater.

Environmental Implications:

- The 390 sq km oil slick threatens coral reefs, coastal bird colonies, and endangered Arabian Sea humpback whales.
- Rough Khareef seas (4-m waves and strong winds) hinder cleanup, forcing reliance on floating booms and absorbents.

The Earthquake Swarms

Context:

Maharashtra recorded 29 low-intensity, shallow earthquakes in two weeks, mainly in Nashik, with tremors also in Palghar and Nagpur. Seismologists classify the cluster as an earthquake swarm.



The Earthquake Swarms

About The Earthquake Swarms:

What It Is?

- An earthquake swarm is a sequence of numerous, closely clustered earthquakes occurring within a localized geographic area over a span of days, weeks, or months without a distinct, identifiable single "mainshock" or a standard mainshock-aftershock sequence.

How It Occurs?

- Intraplate Stress & Basalt Fractures: Stresses from continental plate movement deform interior bedrock (such as the basaltic Deccan Traps), concentrating tectonic load along subsurface shear zones and ancient fractures.
- Fluid Migration & Pore-Pressure Elevation: Heavy rainfall infiltration or reservoir filling drives water deep into porous rock layers and interconnected joint systems, increasing pore-fluid pressure.
- Frictional Failure & Continuous Stress Release: Elevated pore pressure reduces effective normal stress and rock friction, causing localized fractures to slip repeatedly in short bursts of low-to-moderate magnitude tremors rather than a single massive rupture.

Key Features:

- Absence of a Dominant Mainshock: Unlike conventional earthquakes characterized by a massive primary tremor followed by decaying aftershocks, swarms consist of multiple tremors of comparable magnitudes that fluctuate over time.
- Shallow Focal Depths: Tremors typically originate at shallow crustal depths (often between 5 to 10 km), causing noticeable localized ground rumbling and vibrations even at low Richter scales.
- Triggered by Hydro-Geological Factors: Highly sensitive to fluid dynamics, frequently exhibiting rainfall-triggered seismicity (post-monsoon water table recharge) or reservoir-triggered seismicity (RTS) (such as the Koyna-Warna region).
- Prolonged Duration: The seismic sequence can persist continuously or intermittently for weeks, months, or years without necessarily culminating in a catastrophic earthquake.

Implications:

- Structural Fatigue & Property Damage: Continuous, low-intensity micro-tremors over extended periods can weaken masonry structures, crack building foundations, and trigger localized land subsidence in vulnerable settlements.
- Psychological Stress & Public Panic: The unpredictable, repetitive rumblings disrupt daily life, causing anxiety in local communities and requiring sustained disaster management engagement and public sensitization.
- Seismic Hazard Mapping &Dam Safety Oversight: Swarm data helps seismologists map hidden sub-surface faults, assess intraplate crustal deformation rates, and implement mandatory safety protocols for large reservoirs and civic infrastructure.

Waterspouts

Context:

A rare rotating water column resembling a waterspout was spotted over the Brahmaputra River in the Paharpur area of Baghbar in Assam's Barpeta district, creating widespread public curiosity and capturing social media attention.



Waterspouts

AboutWaterspouts:

What It Is?

- A waterspout is an intense, whirling column of air and condensed water vapor/ mist that forms over a body of water (such as an ocean, sea, lake, or large river) and connects the water surface to an overlying cloud base (cumulus or cumulonimbus).

Types of Waterspouts:

1. Fair Weather Waterspouts: Form under relatively calm conditions along the dark, flat base of developing cumulus clouds; they are non-mesocyclonic, begin at the water surface, and build upward.
2. Tornadic Waterspouts: True tornadoes that form over water or move from land onto water; they are associated with severe convective thunderstorms/mesocyclones, develop downward from the cloud deck, and carry violent winds, hail, and intense lightning.

How It Forms?

- Thermal Updraft & Low-Level Convergence: Warm surface water heats the boundary air layer, creating a rising thermal column beneath convective clouds where localized horizontal wind shear initiates rotation.
- Surface Dark Spot Formation: A prominent dark spot appears on the water surface as air spirals inward, marking the initial development of the low-pressure vortex core.
- Vortex Stretching & Cloud Connection: Buoyant thermal updrafts stretch the spinning air vertically, lowering core pressure and condensing moisture to form a visible condensation funnel that links the cloud base to the churning water spray.
- Maturity and Landfall Decay: Reaches full intensity as a mature water-mist column with a rotating spray ring (cascade); upon reaching land, friction and loss of warm moisture rapidly disrupt the vortex.

Key Features:

- Short Lifespan & Localized Scale: Typically lasts between 5 and 20 minutes, with localized footprints and highly unpredictable formation timelines.
- Lower Wind Speeds than Land Tornadoes: While fair-weather variants feature moderate rotational speeds, tornadic waterspouts can exceed destructive wind thresholds (>100 km/h).
- Composed Chiefly ofCondensed Vapor: Contrary to common belief, the visible funnel is made mostly of condensed water droplets formed from low pressure, rather than bulk liquid water drawn up from the river or sea.
- Rapid Landfall Dissipation: Fair-weather waterspouts weaken and collapse rapidly upon striking the shoreline due to ground friction and the loss of latent heat from the water surface.

Land Subsidence

Context:



In Uttarakhand's Bageshwar district, rampant underground and open-cast soapstone mining has triggered severe land subsidence, widening ground fissures and damaging hundreds of homes across vulnerable villages.

Land Subsidence

AboutLand Subsidence:

What It Is?

- Land subsidence is the gradual settling, sinking, or sudden downward collapse of the Earth's surface due to the subsurface movement, compaction, or removal of earth materials (such as water, minerals, oil, or soluble rocks).

How It Happens?

- Subsurface Depletion: Extraction of subsurface fluids (groundwater, crude oil, gas) or physical excavation (mining, tunneling) creates subterranean voids and pressure deficits.
- Loss of Hydrostatic Support: When water is withdrawn from fine-grained sediment layers (aquitards/ clays), the pore-water pressure that previously supported the overarching weight drops significantly.
- Compaction & Grain Realignment: The overburden weight shifts entirely onto the soil skeleton, causing fine-grained sediments to compress, lose pore spaces, and compact permanently.
- Surface Deformation: This subsurface compaction manifests on the surface as regional sinking, differential settlement, or deep tension fissures.

Key Factors Causing Land Subsidence:

- Excessive Groundwater Extraction: The single largest human driver globally, leading to irreversible aquifer-system compaction.
- Unregulated Mining &Subsurface Voids: Underground and steep open-cast mining—such as soapstone extraction in Uttarakhand or coal mining in Dhanbad—removes foundational rock masses and leaves unstable voids that collapse under gravity.
- Disrupted Drainage & Slope Hydro-Pressure: Blocking natural drainage channels with mining waste traps water, elevating pore pressure within hill slopes and triggering progressive slope failure, landslides, and subsidence.
- Natural &Geotechnical Causes: Dissolution of soluble rocks, oxidation and drainage of organic soils/ wetlands, thawing permafrost, and natural tectonic settling.

Implications:

- Uneven land settlement cracks buildings, damages roads and railways, and ruptures underground water, sewage and gas pipelines.
- Aquifer compression permanently reduces groundwater storage, while land subsidence increases flooding and coastal saltwater intrusion.

Hanging Glaciers

Context:



Study identified 219 hanging glaciers in Uttarakhand's Alaknanda basin, warning that warming and permafrost thaw are increasing break-off risks, potentially triggering ice-rock avalanches and outburst floods.

Hanging Glaciers

AboutHanging Glaciers:

What It Is?

- A hanging glacier is a glacier that originates high on a mountain wall or valley flank and terminates abruptly

at the edge of a steep precipice or cliff face, rather than flowing down into a main valley floor. Its snout ends high above the valley trough, routinely shedding ice through calving, icefalls, and avalanches.

- Global Distribution: Prominently found in high-relief alpine environments worldwide, including the European Alps, the Andes, the North American Rockies, and the Himalayas-Karakoram range.
- Indian Context: Heavily concentrated along the steep, glaciated slopes of the Garhwal and Kumaon Himalayas (Uttarakhand), Himachal Pradesh, Ladakh, and Sikkim.

How It Forms?

- High-Altitude Cirque & Ledge Accumulation: Heavy snowfall accumulates in steep niches, high shelves, and cirques on upper mountain faces, compacting into firn and glacial ice under freezing conditions.
- Glacial Retreat and Truncation: During warmer periods, larger primary valley glaciers (trunk glaciers) melt, thin, and recede rapidly. The smaller tributary glaciers feeding into them from steep sidewalls become disconnected and left stranded high up on the mountain walls.
- Thermal Destabilization and Basal Melting: Accelerated climate warming elevates zero-degree isotherms. The permafrost and subglacial ice adhering the glacier to the steep bedrock bed thaw, creating basal meltwater that acts as a lubricant and converts stable ice masses into precarious, dynamically unstable hanging bodies.

Key Features of Hanging Glaciers:

- Extreme Basal Slope Gradient: Typically perched on steep bedrock slopes with inclinations, making them highly sensitive to gravitational shear stresses.
- Dynamic and Geometric Instability: Prone to sudden shifts in ice flow velocity—often changing by an order of magnitude over short periods—causing structural fractures, tension crevasses, and redistribution of ice mass.
- Elevated Cliff Terminus: The snout ends abruptly at a sharp break of slope or vertical drop without extending into a gentler ablation zone; mass loss occurs primarily via mechanical detachment rather than surface melting.
- Thermal Regime Sensitivity: Many hanging glaciers in the Himalayas are cold-based or polythermal. Rising ambient temperatures weaken this frozen bond, significantly raising catastrophic structural failure risks.
- High Break-Off Runout Potential: Due to immense gravitational potential energy, collapsing hanging ice masses can trigger avalanche walls exceeding 50 metres in height.

Significance:

- Hanging-glacier collapse can trigger ice-rock avalanches, GLOFs and LLOFs, as seen in the 2021 Chamoli disaster.
- Glacier failures threaten pilgrimage towns, Char Dham roads and hydropower projects, requiring basin-wide monitoring, early-warning systems and risk-based zoning.

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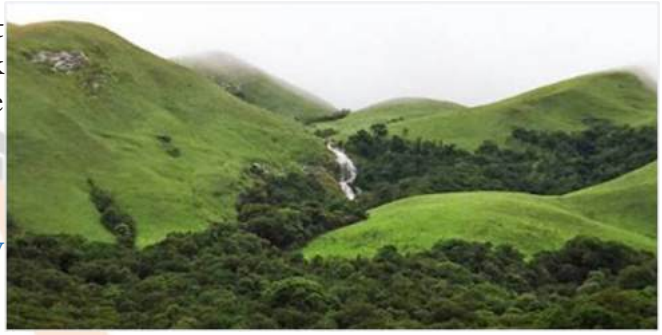
Chapter-
4

ENVIRONMENT

The Western Ghats Conservation & Ecologically Sensitive Areas (ESAs)Debate

Context:

The MoEF&CC extended the Sanjay Kumar-led expert panel by one year to resolve the Centre–State deadlock over notifying Ecologically Sensitive Areas (ESAs) in the Western Ghats.



Ecologically Sensitive Areas

AboutThe Western Ghats Conservation & Ecologically Sensitive Areas (ESAs)Debate:

What it is?

- The Western Ghats span six coastal Indian states (Gujarat, Maharashtra, Goa, Karnataka, Kerala, and Tamil Nadu) and house 39UNESCO World Heritage Sites (WHS). The debate over declaring Ecologically Sensitive Areas (ESAs) under the Environment Protection Act, 1986 seeks to restrict destructive human activities like mining, quarrying, and heavy infrastructure to preserve fragile biodiversity.

Timeline & Evolution of the ESA Framework:

- 2010 (Gadgil Committee / WGEEP): The Western Ghats Ecology Expert Panel recommended designating 142 talukas across 44 districts into three levels of Ecologically Sensitive Zones (ESZs) with strict regulation on developmental activities.
- 2012 (Kasturirangan High-Level Working Group): Following opposition to Gadgil's report, a new panel restricted ESA limits strictly to natural landscapes, reducing the proposed protected area to 37% (~56,800 sq. km) of the Western Ghats.
- 2014–2026 (Draft Notifications & Deadlock): Between 2015 and 2026, the Centre issued five draft notifications, none of which achieved full consensus across all six states.
- 2022–2026 (Sanjay Kumar Expert Committee): Formed to review state-specific grievances, leading to tentative agreements by Gujarat and Goa, requests for fresh reviews by Maharashtra, and ongoing discussions for a phased rollout with Karnataka, Kerala, and Tamil Nadu.

Key Arguments Made by Opposing States (The Karnataka Case Study):

- Impact on Livelihoods & Infrastructure: States like Karnataka (with 10 Western Ghats districts and 23.4% of its population living there) argue that ESA bans will stall agriculture, shade-grown plantations, and critical regional infrastructure.
- Inaccuracies of Remote Sensing Data: Local communities and officials criticize the reliance on satellite imagery to demarcate ESAs, claiming remote sensing cannot accurately distinguish commercial plantation crops from natural forest cover.
- Lack of Ground-Level Verification: Stakeholders express frustration that expert panels and mapping agencies rely on desktop studies without physically visiting impacted villages.
- Fear of Eviction andBuffer-Zone Misconceptions: Widespread panic exists among residents that 10-kilometer buffer zones will lead to forced relocations, land rights rejections, and loss of access to minor forest produce.

Key Challenges in Western Ghats Conservation:

- Balancing Environmental Preservation with Human Rights: Striking a balance between protecting fragile ecosystems and guaranteeing the land rights of forest dwellers and non-tribal long-term settlers.
- Exclusion of Indigenous Biocultural Knowledge: Top-down conservation models risk excluding indigenous communities who naturally live sustainably within forests and serve as custodians of biocultural diversity.

- Administrative Fragmentations: Ecosystems function continuously across physical landscapes, but conservation policy gets stalled across state borders and political affiliations.
- Threats from Unregulated Commercial Activities: Ongoing delays in notifying ESAs leave vulnerable areas exposed to illegal stone quarrying, unplanned tourism projects, and soil erosion.

Way Forward:

- Conducting Ground-Truthing & Physical Ground Verification: Replace satellite-only mapping with detailed physical surveys to accurately separate agricultural/plantation land from pristine natural forests.
- Institutionalizing Inclusive Indigenous Co-Management: Recognize indigenous and local forest-dwelling communities as active conservation partners under the Forest Rights Act (FRA), protecting both land rights and ecological integrity.
- Adopting State-Wise and Phased Rollouts: Utilize flexible clauses introduced in recent draft notifications to finalize agreements with consenting states while addressing concerns in others.
- ClarifyingBuffer Zones & Easing Communication Gaps: Launch public outreach campaigns in local languages to clear misconceptions regarding eviction, minor forest produce access, and buffer zone boundaries.
- Regulating Commercial Hard Hazards while Safeguarding Livelihoods: Focus prohibitions strictly on high-impact commercial industries while permitting sustainable local agriculture and eco-tourism.

Conclusion:

The Western Ghats conservation deadlock highlights that sustainable ecology cannot be enforced through top-down mandates that alienate local communities. Protecting this biodiversity hotspot requires ground-level scientific verification, state-level dialogue, and the active inclusion of indigenous forest custodians. Ultimately, a balanced approach that combines scientific rigour with social equity is essential to safeguard the Western Ghats for future generations.

The Clouded Leopard

Context:

On International Clouded Leopard Day, India's Ministry of Environment, Forest and Climate Change launched the Clouded Leopard Conservation Action Plan (CAP).



The Clouded Leopard Conservation Action Plan (CAP)

About The Clouded Leopard Conservation Action Plan (CAP):

What It Is?

- The Clouded Leopard CAP is a comprehensive, multi-state strategic framework formulated to secure habitats, restore ecological corridors, standardize population assessments, and empower local communities for the long-term survival of the species in India.
- Aim: To halt population decline, protect critical forest landscapes across Northeast India, establish reliable population baselines through advanced science, and mitigate human-wildlife conflicts outside formal protected areas.

Key Features of the Conservation Action Plan:

- Identification of 14 Priority Landscapes: Delineates 14 critical conservation landscapes across the Northeast (Assam, Arunachal Pradesh, Meghalaya, Nagaland, Mizoram, Manipur, Tripura) and northern fringes of West Bengal and Bihar.
- Standardized Scientific Monitoring: Mandates non-invasive technology—including environmental DNA (eDNA), camera traps, genetic sampling, and occupancy surveys—to establish India's first reliable population baseline.
- Habitat & Corridor Connectivity: Focuses on restoring degraded forest corridors outside conventional National Parks and Sanctuaries to reconnect isolated breeding populations.

- Community-Centric Conservation: Involves local indigenous communities in anti-poaching monitoring while delivering sustainable livelihood alternatives to reduce forest dependence.
- Transboundary Collaboration: Promotes cross-border conservation initiatives with neighboring range countries (such as Bhutan, Myanmar, and Nepal) to enable safe wildlife migration across international borders.

Aboutthe Clouded Leopard:

What It Is?

- The Clouded Leopard (Neofelis nebulosa) is an evolutionary ancient, medium-sized wild cat species that bridges the gap between big (Panthera) and small (Felinae) cats. Molecular research suggests it branched from the Pantherinae lineage over 6 million years ago, making it one of the most ancient living feline species.

Habitat & Geographic Range:

- Geographic Distribution: Found from Nepal, Bhutan, Bangladesh, and Northeast India through Southeast Asia (Indochina, Sumatra, Borneo) to southern China.
- Habitat Preferences: Prefers lowland dense tropical rainforests, but adapts to dry woodlands, mangrove swamps (in Borneo), and foothill forests of the Himalayas up to elevations of 2,743 meters (9,000 feet).

Conservation & Legal Status:

- IUCN Red List Status: Vulnerable.
- Wildlife Protection Act (WPA), 1972 (India): Listed under Schedule I.

Key Biological & Morphological Features:

- Exceptional Canine-to-Skull Ratio: Possesses the longest canine teeth relative to skull size of any living wild cat species, earning it the nickname "modern-day saber-tooth."
- Arboreal Adaptations: Features flexible, specialized ankle joints that rotate backward, allowing it to climb down tree trunks headfirst, supported by large dexterous paws and a long tail used for balance.
- Vocal Structures: Lacks the fully ossified hyoid bone required for roaring (unlike lions or tigers), but cannot purr continuously like small cats; its vocalizations consist of growls, hisses, and chuffs.
- DistinctiveCoat Markings: The fur ranges from brownish to pale yellowish-gray, covered with large, irregular dark blotches edged in black resembling storm clouds.

The Conservation Journey of the Asiatic Lion

Context:

A recent proposal to divert 75 hectares of reserved forest for limestone mining in Jafrabad Taluka (Babarkot corridor) has sparked serious conservation concerns.



- Environmentalists warn that mining will disrupt a vital coastal movement corridor connecting satellite lion populations to the main Gir forest ecosystem.

The Conservation Journey of the Asiatic Lion

AboutThe Conservation Journey of the Asiatic Lion:

What it is?

- The conservation journey of the Asiatic lion (Panthera leo persica) represents one of India's greatest wildlife recovery stories, expanding from a near-extinction population of ~100–150 in the 1960s to over 800 individuals today.
- However, because the species remains geographically confined to the Saurashtra region of Gujarat, maintaining safe dispersal corridors and satellite habitats outside protected forests is vital for its long-term survival.

Key Data & Statistics:

- Population Growth: The Asiatic lion population grew from ~100–150 individuals in the 1960s to 891 individuals in the 16th Lion Census (2025), reflecting a 32.2% increase from 2020.
- High Off-Reserve Presence: Over 56% of the lion population (507 individuals) now resides outside designated protected sanctuaries in human-dominated agrarian and coastal landscapes.
- Spatial Range Expansion: The spatial distribution of lions expanded by 16.6%, growing from 30,000 sq. km in 2020 to over 35,000 sq. km in 2025 across 9 recognized satellite populations.
- IUCN Status: Upgraded from 'Critically Endangered' to 'Endangered' on the IUCN Red List, standing as the world's only stable wild subpopulation of Asiatic lions.

Historical Journey of Lion Conservation:

- Royal Protection by the Nawab of Junagadh: In the early 20th century, the Nawab of Junagadh banned lion hunting when populations plummeted to under 20–50 individuals.
- Example: Strict royal protection preserved the last remaining breeding stock in the Gir forests.
- Declaration ofGir Sanctuary (1965): Formal state protection began with the notification of the Gir Wildlife Sanctuary, creating a protected core habitat.
- Example: Progressive expansion of protected area boundaries over successive decades to reduce human encroachment.
- Transition to Landscape-Level Management: Shifted focus from isolated national parks to managing the Greater Gir landscape matrix, incorporating riverbeds, grasslands, and agricultural fields.
- Example: Formal recognition of coastal habitats like Babarkot and Jafrabad as official movement corridors.
- Community-Led Coexistence Model: Built conservation strategies on the cultural tolerance and goodwill of local Maldhari pastoralists and Saurashtra farmers.
- Example: Local villagers accommodating dispersing lions across private crop fields and orchards without mass retaliatory killings.

Initiatives Taken So Far:

- Implementation of Project Lion: Launched to strengthen habitat protection, prey base augmentation, telemetry tracking, and satellite population management across the Gir landscape.
- Development ofBarda Wildlife Sanctuary: Developed as a dedicated secondary habitat to facilitate natural dispersal and establish a safe sub-population.
- High-Tech Real-Time Tracking & Veterinary Care: Established a Hi-Tech Monitoring Unit at Sasan-Gir using satellite telemetry and GPS radio collars, alongside the National Wildlife Referral Centre in Junagadh.
- Deployment of Vanya Prani Mitras: Recruited local community members (Vanya Prani Mitras) and specialized trackers for real-time monitoring and human-wildlife conflict mitigation.

Core Issues & Conservation Challenges:

- Epidemic Vulnerability of Single Population: Confining the entire wild population to one contiguous region risks catastrophe from contagious diseases.
- Example: The 2018 Canine Distemper Virus (CDV) outbreak killed over 20 lions, followed by recurring babesiosis infections.
- Habitat Fragmentation & Industrial Mining: Diversion of forest land for industrial development breaks crucial corridor links.
- Example: Proposed 75-hectare limestone mining in Jafrabad risks isolating the Babarkot coastal subpopulation.
- Anthropogenic Hazards & Linear Infrastructure: Expanding lion movement into human-dominated areas increases accidental deaths.
- Example: Lions falling into open agricultural wells, colliding with trains, or getting trapped in spiked city gates.
- Delays inMulti-State Reintroduction: Inter-state political reluctance has stalled establishing a geographically independent second home outside Gujarat.
- Example: Long-standing delays in translocating lions to Kuno National Park in Madhya Pradesh despite Supreme Court rulings.

Way Forward:

- Legally Protecting Critical Dispersal Corridors: Declare vital lion movement routes (such as Babarkot) as eco-sensitive zones to prevent destructive mining and land diversion.
- Operationalizing Independent Secondary Habitats: Accelerate the establishment of geographically separated populations in sites like Barda WLS and Kuno National Park to hedge against viral outbreaks.
- UpgradingWildlife Health & Disease Surveillance: Institutionalize continuous disease screening, canine vaccination drives in fringe villages, and rapid-response veterinary care.
- Enhancing Infrastructure Safety & Community Incentives: Parapet open farm wells, install railway fencing, and ensure timely crop/livestock loss compensation to sustain local community support.

Conclusion:

Six decades of dedicated conservation have successfully brought the Asiatic lion back from the edge of extinction into a growing population of nearly 900 individuals. However, securing their future requires protecting vital dispersal corridors against industrial encroachment and establishing a geographically separate secondary home. Balancing ecological habitat protection with proactive disease surveillance is essential to ensure long-term coexistence and species restoration.

The SC Order on Mining Around Ramsar Wetland Sites

Context:

The Supreme Court has clarified that its 2024 directive requiring prior approval for mining within a 10-km radius of the Asan Wetland Conservation Reserve applies nationwide to all wetland and community conservation reserves for the sake of parity.



The SC Order on Mining Around Ramsar Wetland Sites

AboutThe SC Order on Mining Around Ramsar Wetland Sites:

What it is?

- The Supreme Court ruling establishes that mining activities within a 10-km radius of any notified wetland or community conservation reserve require prior permission from the Standing Committee of the National Board for Wildlife (NBWL) and/or the Ministry of Environment, Forest and Climate Change (MoEFCC).
- This order provides judicial buffer protections to internationally recognized Ramsar wetlands and reserves, compensating for the lack of statutory buffer prohibitions under current domestic wetland rules.

Key Data & Stats on Wetlands in India:

- Total Ramsar Sites: India currently houses 101 designated Ramsar sites—the highest number among Asian countries.
- Recent Expansion: On August 3, 2026, Glaw Lake in Arunachal Pradesh became the nation's 101st Ramsar site and the state's first.
- Pivotal Asian Milestone: India's Ramsar network expanded rapidly from 98 sites earlier in 2026 to cross the 100-site mark.
- International Commitments: India became a Contracting Party to the 1971 Ramsar Convention on Wetlands in 1982, committing to preserving the ecological character of its international waterbodies.

The Wetlands (Conservation and Management) Rules, 2010:

- Explicit List of Prohibitions: Contained detailed prohibitions on activities like land reclamation, setting up new industries, and solid waste dumping within wetlands.
- Regulation of Influence Zones: Required prior approvals for any developmental or commercial activity occurring within a wetland's "zone of influence".
- Mandatory EIAs: Mandated comprehensive Environmental Impact Assessments (EIA) for specified projects affecting wetland ecosystems.

- Centralized Oversight: Established a centralized regulatory framework under the Central Wetlands Regulatory Authority to enforce nationwide protection standards.
- Replaced in 2017: The 2010 framework was replaced by the 2017 Rules, which decentralized regulation to State Wetland Authorities and removed explicit central prohibition lists.

Recent Supreme Court Judgments on Wetlands & Mining:

- 10-km Clearance Buffer for Wetland Reserves: Mandated that no mining can occur within 10 km of the Asan Wetland Conservation Reserve without explicit approval from the Standing Committee of the NBWL or MoEFCC.
- Nationwide Parity Principle: Held that the 10-km prior-approval requirement applies to all notified wetland and community conservation reserves across all states for administrative and ecological parity.
- Mandated Fact-Finding Reviews: Directed the NBWL/MoEFCC to scientifically determine if wetland ecosystems cross state boundaries (e.g., from Uttarakhand into Himachal Pradesh) to extend protective mandates seamlessly.

Challenges to Wetlands Due to Mining:

- Hydrological Disruption & Siltation: Heavy mining runoff introduces sediment, blocking water channels and ruining habitats.
- Example: Sand and gravel extraction near river confluences chokes feeding grounds for migratory waterbirds.
- Loss of Biodiversity &Avian Habitats: Noise and heavy machinery displace endangered aquatic flora and migratory fauna.
- Example: Mining disturbances along wintering bird corridors disrupt winter roosting at high-altitude wetlands.
- Chemical Contamination & Silt Load: Toxic runoff from nearby quarrying degrades water quality beyond ecological safety limits.
- Example: Unregulated stone quarrying near reserve catchments increases water turbidity and heavy metal toxicity.
- Regulatory Gaps in Domestic Rules: The transition to the 2017 Wetlands Rules removed explicit statutory buffer zones, leaving wetlands vulnerable to nearby industrial encroachment.

Way Forward:

- Notifying StatutoryEco-Sensitive Zones (ESZs): Formalize statutory buffer zones around major Ramsar sites under the Environment (Protection) Act, 1986, similar to national parks.
- Strengthening State Wetland Authorities: Empower State Wetland Authorities with clear scientific guidelines and legal enforcement tools to monitor land-use changes along zones of influence.
- Restoring Explicit Prohibitions in Wetland Rules: Re-introduce explicit lists of prohibited industrial and extraction activities in national wetland frameworks to remove regulatory ambiguity.
- Mandatory Environmental Audits: Conduct periodic impact assessments and satellite monitoring of mining leases operating near waterbodies and ecological corridors.

Conclusion:

The Supreme Court's mandate requiring NBWL and MoEFCC clearances within 10 km of wetland conservation reserves fills a crucial gap in domestic environmental law. Extending this protection nationwide safeguards vital aquatic habitats and migratory bird corridors from industrial degradation. Ultimately, balancing economic activities with strict judicial safeguards is essential to uphold India's international ecological commitments under the Ramsar Convention.

The Indian peacocks

Context:

India presented five Indian peacocks—including four blue peafowl and one rare white-feathered male—to the United Nations Office at Geneva (UNOG).



The Indian peacocks

About The Indian peacocks:

What It Is?

- The Indian Peacock (or Indian Peafowl) is a large, colorful bird belonging to the pheasant family (Phasianidae). Declared the National Bird of India in 1963, it holds immense cultural, ecological, and mythological significance across the Indian subcontinent.

Habitat & Distribution:

- Habitat: Inhabits open lowland forests, thorn scrub, agricultural fields, grasslands, and riverbanks. Highly adaptable, it frequently roams near human settlements, parks, and village outskirts.
- Distribution: Native to South Asia, spanning India, Sri Lanka, Nepal, Bhutan, and Pakistan, while being introduced to several other regions worldwide.
- IUCN Red List: Least Concern
- Wildlife Protection Act (WPA), 1972: Schedule I

Key Characteristics:

- PronouncedSexual Dimorphism: Males (peacocks) feature a vibrant metallic-blue head and neck with a fan-shaped crest, while females (peahens) are smaller with dull brown plumage that acts as camouflage during nesting.
- Iridescent Train & Ocelli: The male's distinctive tail is actually an elongated upper-tail covert train featuring over 200 feathers adorned with iridescent eye-spots (ocelli), unfolded like a magnificent fan during courtship displays.
- Genetic Color Variants (White Peafowl): While the typical wild coloration is cobalt blue, genetic variations such as leucism produce rare, entirely white-feathered peafowl (which possess normal pigment in their eyes, distinguishing them from albinos).
- Omnivorous Diet &Roosting Behavior: Ground-feeding omnivores that consume seeds, grain, insects, small reptiles, and young snakes (including cobras). They roost overnight in large groups high up on tall trees or structures to escape predators.
- High Adaptability: Displays strong tolerance to varying microclimates, ranging from dry semi-arid plains to wet tropical forests and urban green spaces.

Significance:

- Represents India's national bird and symbolizes beauty, heritage, and ecological harmony.

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- Showcases India's commitment to biodiversity conservation and environmental diplomacy through global initiatives.

The Gaj Gaurav Awards 2026

Context:

During the national celebrations of World Elephant Day 2026 held at Visakhapatnam, Union Minister of State for Environment, Forest and Climate Change conferred the Gaj Gaurav Awards 2026.



The Gaj Gaurav Awards 2026

About The Gaj Gaurav Awards 2026:

What It Is?

- The Gaj Gaurav Award is India's national honor dedicated to recognizing exemplary contributions, outstanding field service, and frontline dedication in the field of Asian elephant conservation and management.
- Instituted In: 2022 by the Ministry of Environment, Forest and Climate Change (MoEFCC).
- Introduced as part of the 30-year milestone celebrations of Project Elephant (launched in 1992) to acknowledge frontline personnel, mahouts, local communities, and forest guards.
- Aim: To incentivize, motivate, and honor frontline forest staff, elephant caretakers (mahouts/trackers), Joint Forest Management Committees (JFMCs), and field conservationists who work in high-risk environments to mitigate human-elephant conflict (HEC), protect corridors, and safeguard wild and captive populations.

Key Features of the Award:

- Focus on Ground-Level Heroes: Specifically targets frontline caretakers (mahouts and charakatas), village watchers, forest guards, and local community volunteers who operate directly at the human-wildlife interface.
- Recognition ofConflict Mitigation & Rescue: Honors exceptional brave acts, including anti-poaching patrols, preventing train-elephant collisions, managing crop-raiding herds, and rescuing animals during natural disasters.
- Community & Institutional Inclusivity: Open to individuals, field teams, and local community bodies such as Joint Forest Management Committees (JFMCs) actively protecting elephant corridors.
- Captive & Wild Management Integration: Covers contributions toward both free-ranging wild Asian elephant populations and ethical captive elephant husbandry.
- Annual World Elephant Day Ceremony: Presented annually on or around World Elephant Day (August 12) during national Project Elephant ceremonies chaired by Union Environment Ministry officials.

List of 2026 Gaj Gaurav Award Winners:

1. Jaldapara National Park (West Bengal) — 7 Mahouts

- Recognized for outstanding courage during flood rescue operations and wildlife protection during the severe Torsha and Malangi river floods.
- Bikash Kharia (Mahout): Awarded for bravery in staying behind during severe currents and guiding stranded kumki (trained) elephants to safety.
- Rajiv (Rajib) Oraon (Mahout): Awarded alongside Bikash Kharia for staying with and securing five captive elephants during flash floods.
- Ajibul Haque (Mahout)
- Ajit Gabur (Mahout)
- Mumtaz (Mamtaj) Alam (Mahout)
- Amasur (Amashu) Kheriya (Mahout)
- Dilip Munda (Mahout)

2. Namdapha National Park & Tiger Reserve (Arunachal Pradesh) — 2 Caregivers

- Recognized for exceptional service, ethical animal care, and captive elephant management protocols (the sole recipients from the Northeast region).

- Ganesh Tamang (Senior Elephant Mahout): Honored for over 26 years of dedicated service in captive elephant care and staff training.
- Sumit Gogoi (Elephant Attendant): Recognized for 5 years of service in enhancing captive elephant welfare and management.

The E20 Transition & Policy Friction

Context:

India's mandatory transition to a nationwide E20 fuel regime (petrol blended with 20% anhydrous ethanol) with a minimum Research Octane Number (RON) of 95 has sparked public and industry debate.

A fleet in transition

Around 70 million newer vehicles are E-20-compatible, while 240 million legacy vehicles were built for lower ethanol blends

Vehicle category	BS 6 Phase 2 compliant (post-April 2023)	Non-compliant / legacy (pre-April 2023)	Total estimated fleet (approx)
Two-Wheelers (Motorcycles & scooters)	55 million to 60 million	200 million to 210 million	260 million
Four-Wheelers (Passenger cars & SUVs)	12 million to 15 million	35 million to 38 million	50 million
Combined fleet (approx.)	70 million	240 million	310 million
Combined fleet % share	23%	77%	100%

The E20 Transition & Policy Friction

About The E20 Transition & Policy Friction:

What It Is?

- The E20 transition is a flagship green energy initiative under the Ethanol Blended Petrol (EBP) Programme aimed at substituting 20% of fossil petrol with domestically produced, renewable anhydrous ethanol.
- However, because ethanol acts as a corrosive, hygroscopic (water-absorbing) solvent with ~30–35% lower energy density than pure petrol, its universal distribution without dual-dispensing options creates technical and financial challenges for pre-2023 legacy vehicles built only for E5 or E10 blends.

Key Data & Statistics:

- Vast Legacy Fleet Exposure: Out of India's active pool of ~310 million petrol vehicles, ~240 million (nearly 77%) are legacy vehicles (mostly two-wheelers) not factory-engineered for E20.
- Mileage Drop &Maintenance Impact: Consumer surveys show over 66% of pre-2023 vehicle owners report a mileage loss exceeding 10%, with 55% reporting higher maintenance frequency and premature component wear.
- Supply-Chain Chloride Contamination: Industry fuel tests across 21 states revealed organic chloride levels ranging from 6 to 570 ppm in Rajasthan and up to 420 ppm in Delhi, significantly breaching the official safety ceiling of 3 ppm.
- Water Ingress in Retail Storage: Tests detected water content reaching up to 12,500 ppm in UP and 13,000 ppm in Andhra Pradesh, triggering phase separation and fuel system corrosion.

Current E20 Status in India:

- Nationwide Mandatory Sale: Effective April 1, 2026 (notified February 17, 2026), all States and Union Territories are mandated to sell petrol blended with up to 20% ethanol with a minimum RON of 95.
- Elimination of Unblended Fuel (E0): Pure, unblended petrol (E0) has been entirely phased out from retail pumps, leaving consumers without lower-blend alternatives.
- BS 6 Phase 2 RDE Benchmark: Only vehicles manufactured after April 2023 adhere to Real Driving Emissions (RDE) norms, featuring factory-fitted fluorinated rubber (FKM/Viton) and ethanol-calibrated Powertrain Control Modules (PCMs).

- Absence of Fleet Compatibility Assessment: In Parliament, the Ministry of Petroleum and Natural Gas confirmed that no formal inter-ministerial assessment has been conducted to quantify the exact share of India's fleet that is genuinely E20-compatible.
- Divergent Scientific Assessments: While laboratory studies (such as IIT Kanpur's) report minimal efficiency losses under 5%, independent automotive logs, consumer forums, and OEM test data report accelerated component wear and injector failures.

Initiatives Taken So Far:

- Regulatory Fuel Quality Floor: Mandated a minimum Research Octane Number (RON) of 95 for E20 to enhance anti-knocking resistance and engine combustion stability.
- Advancing National Blending Timelines: Achieved nationwide E20 distribution ahead of the original 2030 target, scaling domestic grain- and sugarcane-based ethanol distillery capacities.
- SIAM Scientific Fleet Study: Following leaked industry data, the Society of Indian Automobile Manufacturers (SIAM) launched a validated, multi-stakeholder empirical study to evaluate long-term material compatibility across legacy vehicles.

Challenges Associated with E20 Rollout:

- Phase Separation & Tank Perforation: Ethanol's hygroscopic nature absorbs moisture; once saturation exceeds ~0.5%, the water-ethanol mix separates and pools at the bottom of steel tanks, corroding fuel tanks and causing sudden stalling.
- Deterioration of Nitrile Rubber (NBR) Components: Legacy fuel circuits using standard NBR rubber hoses, O-rings, and pump diaphragms experience chemical swelling, hardening, and fuel leakage when exposed to 20% alcohol.
- Fuel Filter Clogging from Scoured Scale: Ethanol's solvent action strips dormant rust scale and varnish from older fuel tanks, suspending sludge that chokes inline fuel filters and damages high-pressure injectors.
- UndergroundStorage Tank (UST) Seepage: Monsoon runoff seeping into retail dealer underground storage tanks causes batch-wide phase separation, pumping corrosive, low-octane water-alcohol layers directly into customer vehicles.
- Consumer Protection and Equity Concerns: Forcing 240 million older-vehicle owners to absorb efficiency penalties and premature repair costs without a cheaper or unblended fuel option conflicts with consumer choice principles.

Way Forward:

- Reintroduce Dual-Fuel Dispensing at Retail Pumps: Mandate oil marketing companies (OMCs) to maintain dedicated pumps for lower-blend or unblended petrol (E0/E10) as a "protection-grade" option for legacy vehicles.
- Mandate Standardized Visual Labelling: Enforce clear, visible labelling on all retail dispensers displaying the exact ethanol blend percentage and RON rating to ensure informed consumer choice.
- Develop CertifiedAftermarket Retrofit Kits: Incentivize automotive component makers to manufacture certified, affordable retrofit kits (ethanol-proof FKM hoses, upgraded seals, and inline water-separating filters) for two-wheelers.
- Enforce Strict Batch-Level Supply Quality Audits: Mandate real-time monitoring of moisture levels and organic chlorides (keeping them strictly below 3 ppm) across distilleries, transit tankers, and dealer tanks.
- Conduct Independent Real-World Fleet Trials: Commission multi-year, multi-climatic empirical field studies tracking real-world wear and fuel economy across pre-2023 vehicles to guide calibrated policy corrections (learning from Brazil's biofuel transition).

Conclusion:

India's rapid transition to E20 petrol represents a major milestone for energy security, import reduction, and decarbonization. However, rolling out a single fuel blend without safeguards risks imposing unfair repair and efficiency burdens on over 240 million legacy vehicle owners. Balancing macroeconomic biofuel ambitions with consumer protection—through dual-fuel dispensing, clear labelling, and quality compliance—is essential to sustaining public trust in India's green transition.

Odisha Coastal Erosion

Context:

Union Minister for Ports, Shipping and Waterways informed the Rajya Sabha that 28.3% of Odisha's 564-km coastline is undergoing erosion, based on a long-term assessment (1990–2022) by the National Centre for Coastal Research (NCCR).



Odisha Coastal Erosion

AboutOdisha Coastal Erosion:

What it is?

- Coastal erosion is the progressive wearing away and landward displacement of beach or dune sediments caused by hydrodynamic forces such as waves, tidal currents, storm surges, and littoral drift.
- In Odisha, the interaction between severe tropical cyclones in the Bay of Bengal and human-made coastal structures alters natural sediment transport, resulting in rapid shoreline retreat, coastal flooding, and the loss of inhabited land.

Data & Statistics on Coastal Erosion in Odisha:

- Overall Coastline Dynamics: According to the NCCR mapping of Odisha's 564.14 km coastline, 28.3% is eroding, 54.1% is accreting (growing), and 17.6% remains stable.
- Worst Affected Districts: Jagatsinghpur is the most vulnerable, with 47.6% of its 55.8-km coastline eroding, followed closely by Ganjam (45.7%) and Kendrapara (45.0%).
- Other Impacted Stretches: Moderate to low erosion is recorded across Balasore (23.8%), Puri (10.2%), and Bhadrak (4.6%).
- Submergence of Inhabited Land: Rising sea levels and coastal land loss have already submerged 16 entire villages in Kendrapara district alone, displacing hundreds of families.

Causes of Coastal Erosion in Odisha:

- Increasing Frequency &Intensity of Cyclones: As the most cyclone-prone state on India's east coast, frequent high-intensity storm surges and storm waves rapidly erode sandy beaches.
- Climate Change and Sea-Level Rise: Thermal expansion of seawater and glacial melt accelerate sea-level rise along the Bay of Bengal, pushing tidal boundaries further inland.
- Disruption of Longshore Sediment Drift by Hard Structures: Construction of hard marine engineering structures—such as breakwaters, groynes, and sea walls for ports and harbors—blocks the natural littoral transport of sand, triggering downdrift erosion.
- Destruction ofNatural Bio-Shields: Historical depletion of coastal mangrove forests and coastal sand dunes removes natural shock absorbers against wave energy.
- Unplanned Sand Mining & Reduced Riverine Sediments: Unregulated beach sand mining combined with upstream dam reservoirs traps sediments, reducing the natural replenishment of deltaic shorelines.

Implications of Coastal Erosion:

- Displacement & Creation of "Climate Refugees": Complete submergence of coastal settlements forces permanent forced migration, leaving families without land titles or ancestral housing.
- Destruction of Marine & Agricultural Livelihoods: Coastal erosion damages fish-landing centers, destroys artisanal fishing boats/nets, and salinizes adjoining agricultural fields, ruining rural farm incomes.
- Severe Damage toMaritime Infrastructure: Shoreline retreat undermines port installations, coastal highways, and tourism facilities along key beach corridors.
- Threat to Critical Marine Wildlife Habitats: Severe erosion at sites like Gahirmatha and the Devi river mouth threatens the world's largest mass nesting grounds (Arribada) of endangered Olive Ridley sea turtles.
- Saline Ingress into Drinking Water Aquifers: Advancing sea water contaminates freshwater coastal aquifers, causing acute potable water shortages for local populations.

Way Ahead:

- Prioritizing Soft, Nature-Based Solutions: Scale up bio-shield plantations (mangrove restoration and casuarina shelterbelts) to absorb wave shock naturally without disrupting longshore sediment transport.
- Deploying Non-Invasive Hybrid Engineering: Use submerged geotextile tubes and sand nourishment instead of indiscriminate concrete sea walls, following successful pilot projects like the Pentha embankment.
- Enforcing Coastal Regulation Zone (CRZ) & Marine Spatial Plans: Implement integrated shoreline management and dynamic hazard line mapping using data from the National Centre for Coastal Research (NCCR) to prevent unplanned construction along vulnerable stretches.
- Formulating a Comprehensive Climate Resettlement Policy: Establish a statutory policy framework for rehabilitating coastal climate refugees with land rights, housing, and sustainable livelihood options.
- Real-Time Shoreline Monitoring & Community Alerting: Deploy satellite-based remote sensing and communitzy-driven coastal surveillance to track seasonal beach erosion and prevent illegal sand mining.

Conclusion:

Odisha's eroding coastline highlights the growing challenge of climate-driven environmental displacement and ecological degradation along India's eastern seaboard. Addressing this crisis requires shifting away from piecemeal hard engineering solutions toward an integrated, nature-based coastal management strategy. Balancing long-term scientific shoreline protection with humane climate rehabilitation policies is essential to safeguarding vulnerable coastal communities and preserving fragile marine ecosystems.

The UN Convention to Combat Desertification

Context:



The 17th Conference of the Parties (COP17) to the United Nations Convention to Combat Desertification opened in Ulaanbaatar, Mongolia, under the theme "Restoring Land, Restoring Hope."

The UN Convention to Combat Desertification

AboutThe UN Convention to Combat Desertification:

What It Is?

- The United Nations Convention to Combat Desertification (UNCCD) is the sole legally binding international agreement linking environment and development to sustainable land management. It is one of the three Rio Conventions (alongside UNFCCC for climate change and CBD for biodiversity) established at the 1992 Earth Summit.

Established In & Historical Background:

- Genesis: Formally recommended by Agenda 21 at the 1992 Rio Earth Summit (UNCED).
- Adoption & Entry into Force: Adopted in Paris on June 17, 1994 (now observed globally as the World Day to Combat Desertification and Drought) and entered into force in December 1996.
- Global Membership: Has near-universal membership with 197 Parties (196 countries plus the European Union).
- Aim: To combat desertification, reverse land degradation, and mitigate the effects of drought in arid, semi-arid, and dry sub-humid areas (drylands) to achieve Land Degradation Neutrality (LDN) by 2030 and support sustainable livelihoods.

Key Functions of the UNCCD:

- Achieving Land Degradation Neutrality (LDN): Coordinates global efforts to ensure that the quantity and quality of land resources necessary to support ecosystem functions and food security remain stable or increase.
- PromotingProactive Drought Resilience: Facilitates international frameworks—such as the Riyadh Global Drought Resilience Partnership—to transition countries from reactive post-disaster crisis relief to proactive drought preparedness and early warning systems.

- Decentralized Bottom-Up Governance: Mandates that National Action Programmes (NAPs) be designed with active participation from local communities, farmers, pastoralists, indigenous peoples, and women.
- Mobilizing Climate & Land Finance: Operates the Global Mechanism (GM) to help developing countries channel domestic, bilateral, private-sector, and multilateral funds into sustainable land management projects.
- Cross-Border Peace & Ecosystem Co-Management: Spearheads specialized international programs like the Peace Forest Initiative (PFI), promoting transboundary ecological restoration across conflict-affected borders.

Significance:

- Restores degraded drylands, protecting soil fertility, water resources, agricultural productivity, and rural livelihoods.
- Restored soils act as carbon sinks and conserve habitats, supporting global climate and biodiversity goals.

Regenerative Agriculture

Context:



Regenerative agriculture is gaining policy attention in India as declining soil health, water stress and climate variability threaten long-term agricultural productivity.

Regenerative Agriculture

AboutRegenerative Agriculture:

What It Is?

- Regenerative agriculture is a holistic farming approach that places soil health and biodiversity at its core. Unlike conventional sustainability models that merely aim to maintain existing conditions, regenerative agriculture actively works to restore, rebuild, and improve the ecological health of the land over time.
- Aim: To rebuild soil fertility, improve water retention, enhance biodiversity, and strengthen natural agro-ecosystems, making farming resilient against climate stresses while ensuring long-term productivity and secure farmer livelihoods.

How It Works?

- Deployment of On-Farm Biological Formulations: Replaces synthetic fertilizers and chemical pesticides with farm-derived bio-inputs—such as Beejamrut, Jeevamrut, GhanJeevamrut, Neemastra, and Dashparni—to restore beneficial soil microbial activity.
- Manuring: Utilizes cover cropping, green manuring, and organic residue mulching to shield topsoil from erosion, lock in soil moisture, build organic matter, and cycle nutrients.
- Multi-Tier Ecosystem Diversification: Integrates crops with livestock, agroforestry, horticulture, fisheries, and apiculture to build multi-source farm revenue and protect against single-crop failures.
- Precision Water Management: Incorporates micro-irrigation networks (drip and sprinkler systems) to apply water directly to root zones, maximizing water-use efficiency while preventing soil nutrient leaching and runoff.

Key Features:

- Minimizing Soil Disturbance: Restricts mechanical tillage to protect natural soil architecture and preserve the living root systems of perennial crops.
- Year-Round Soil Cover: Emphasizes continuous vegetative ground cover through cover crops and mulching to arrest erosion and improve soil moisture retention.
- Crop-Livestock Integration: Blends livestock rearing with agricultural cropping, utilizing animal dung and urine as foundational inputs for natural soil nourishment.
- Reduction of Chemical Dependency: Eliminates or limits synthetic chemical inputs, relying on natural pest management and botanical extracts to support beneficial insects and pollinators.

Significance:

- EnhancesClimate Resilience: Better water retention and diversified farming help withstand droughts, heatwaves and excessive rainfall.
- Reduces Input Costs: Lower dependence on synthetic fertilisers, pesticides and irrigation can improve farm economics.

Chapter-
5

SCIENCE & TECHNOLOGY

The Sangeet Natak Akademi Fellowship & Awards

Context:

President of India will confer the Sangeet Natak Akademi Fellowships (Akademi Ratna) and Sangeet Natak Akademi Awards (Akademi Puraskar) for the years 2024 and 2025 at an investiture ceremony at Vigyan Bhawan, New Delhi.

The Sangeet Natak Akademi Fellowship & Awards

About The Sangeet Natak Akademi Fellowship & Awards:

What They Are?

- Akademi Ratna (Sangeet Natak Akademi Fellowship): The highest national honor conferred by India's apex performing arts body. It is restricted to a maximum of 40 living eminent personalities at any given time.
- Akademi Puraskar (Sangeet Natak Akademi Award): The premier national award recognizing gurus, scholars, and practitioners for sustained lifetime contributions and professional excellence in the performing arts.

Autonomous Body & History:

- Sangeet Natak Akademi: Established in 1953 as the National Academy of Music, Dance and Drama under the Ministry of Culture.
- Historical Evolution: The music awards originated in 1951 as the Presidential Awards before being integrated into the Akademi framework after its formation. The first Akademi Fellow was elected in 1954.

Award Categories:

1. Music: Hindustani (Vocal & Instrumental), Carnatic (Vocal & Instrumental), Sugam Sangeet, and Major Traditions of Music.
2. Dance: Classical dance forms (Bharatanatyam, Kathak, Kathakali, Manipuri, Kuchipudi, Odissi, Sattriya, Mohiniattam, Chhau), Contemporary, and Music for Dance.
3. Theatre: Playwriting, Direction, Acting, Allied Theatre Arts (Lighting, Scenic Design, Costumes, Music for Theatre), and Traditional Theatre Forms.
4. Traditional / Folk / Tribal Arts & Puppetry: Regional music and dance, Puppetry, Mime, and specialized arts like Instrument-making and Mask-making.
5. Overall Contribution / Scholarship: Research, books, art criticism, and overall service to performing arts.

Key Features & Honorarium Rules:

Honorarium & Symbols:

- Akademi Ratna (Fellow): Receives 3,00,000 in cash, a Tamrapatra (copper plaque), an Angavastram (shawl), and annual medical insurance cover up to 1.5 lakh.
- Akademi Puraskar (Award): Receives 1,00,000 in cash, a Tamrapatra, an Angavastram, and annual medical insurance cover up to 1 lakh.
- Strict Age Criteria: Candidates for Akademi Ratna must ordinarily be at least 50 years of age, while Akademi Puraskar nominees must ordinarily be at least 35 years of age.
- Non-Discrimination & Individual Scope: Open to all individuals without distinction of nationality, race, caste, religion, or sex. Institutions/associations are ineligible.
- Nomination & Selection Mechanism: Nominations are submitted by existing Fellows, General Council members, State Akademies, and University Heads. Final selection is made by the General Council by a three-fourths majority vote if unanimity is not reached.

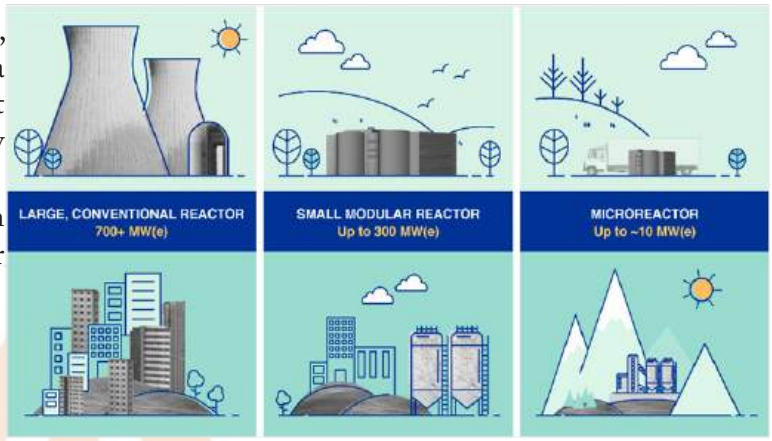
- Exclusion of Sitting Office Bearers: Serving members of the General Council and Executive Board are barred from consideration during their tenure.

Small Modular Reactors (SMRs)

Context:

Under its newly launched Nuclear Energy Mission, the Government of India informed the Lok Sabha that it plans to develop and operationalize at least five indigenous Small Modular Reactors (SMRs) by 2033.

- The initiative aligns with India's long-term goal of scaling up its total nuclear power generation capacity to 100 GWe by 2047.



Small Modular Reactors (SMRs)

AboutSmall Modular Reactors (SMRs):

What It Is?

- Small Modular Reactors (SMRs) are advanced nuclear power reactors designed with a lower electrical output than traditional gigawatt-scale nuclear plants. Defined by the International Atomic Energy Agency (IAEA), an SMR typically has an individual power output of up to 300 MWe per unit.
- International Oversight: International Atomic Energy Agency (IAEA) and OECD Nuclear Energy Agency (NEA) tracking global SMR designs.
- India's Nodal Developer: Bhabha Atomic Research Centre (BARC), under the Department of Atomic Energy (DAE).
- Legislative Framework: Enabled under the SHANTI Act, 2025 (Sustainable Harnessing and Advancement of Nuclear Energy for Transforming India Act), which facilitates private sector participation in nuclear technology manufacturing and deployment.
- Aim: To deliver clean, flexible, low-carbon baseload electricity and industrial heat, while reducing initial capital expenditure, construction timelines, and land footprint compared to large-scale nuclear power stations.

How It Works?

- Nuclear Fission Reaction: Like conventional reactors, SMRs split heavy atomic nuclei (such as Uranium-235) in a controlled chain reaction to generate thermal heat.
- Modular Factory Fabrication: Instead of site-specific civil construction lasting over a decade, major reactor components are manufactured in centralized factories and shipped directly to the plant site for rapid assembly.
- Heat Conversion & Thermal Coupling: The generated heat produces steam to drive conventional turbines for grid electricity, or is harnessed directly for high-temperature industrial uses.

Key Features of SMRs:

- Compact Physical & Output Footprint: Delivers an output ranging from 20 MWe to 300 MWe, requiring significantly less land area and lower water cooling volumes than traditional 1,000 MWe reactors.
- Enhanced Passive Safety Features: Operates using natural physical laws for core cooling during emergencies, requiring minimal to no active electrical intervention or human operator action to prevent overheating.
- Scalable & Incremental Deployment: Designed to allow power plants to add modules sequentially as regional energy demand increases, spreading capital investment over time.
- Diverse Indigenous Indian Designs: BARC is actively developing three indigenous variants:
- Bharat Small Modular Reactor (BSMR-200): A 220 MWe Pressurized Water Reactor (PWR) variant.
- SMR-55: A compact 55 MWe PWR unit suited for regional grids.
- High-Temperature Gas-Cooled Reactor (HTGCR): Up to 5 MW capacity, designed specifically to generate high-temperature process heat for green hydrogen production.

- Reduced Site Preparation & Lower Financial Risk: Factory serial production reduces construction delays, financing costs, and site-level engineering risks.

The Moon Base Programme

Context:



During the 9th meeting of the India–US Civil Space Joint Working Group (CSJWG) held at ISRO headquarters in Bengaluru, NASA officially invited the Indian Space Research Organisation (ISRO) to join its historic Moon Base programme.

- The invitation builds upon the growing strategic space partnership between the two nations under the Artemis Accords.

The Moon Base Programme

About The Moon Base Programme:

What It Is?

- The Moon Base programme is an ambitious NASA-led initiative to build humanity's first permanent lunar outpost near the lunar South Pole. It serves as a sustainable surface habitat where astronauts will live, work, conduct scientific research, and test deep-space survival technologies.
- Lead Agency: National Aeronautics and Space Administration (NASA).

Announced On: 2026

Phased Rollout:

- Phase 1 (2026–2029): Gain reliable surface access, conduct robotic reconnaissance, and test early technologies.
- Phase 2 (2029–2032): Deploy foundational surface infrastructure (power networks, logistics, communications, and lunar terrain vehicles).
- Phase 3 (2032+): Assemble a permanently crewed, expandable outpost for extended astronaut stays.
- Aim: To establish an enduring human presence on the Moon, explore volatile water-ice resources in the lunar South Pole, and establish a technological stepping stone for future crewed missions to Mars.

Key Features:

- Strategic South Pole Positioning: Capitalizes on the unique geology of the lunar South Pole, where high elevated ridges receive near-continuous sunlight for solar energy, while nearby craters shield vast deposits of water ice.
- Commercial & Private Sector Integration: Heavily leverages commercial partners (such as Astrobotic, Blue Origin, Firefly Aerospace, and Intuitive Machines) for cargo landers, surface rovers, and autonomous drones.
- In-Situ Resource Utilization (ISRU): Focuses on harvesting lunar regolith and extracting water ice to generate oxygen, drinking water, and rocket propellant on-site.
- Phased Modular Infrastructure: Built step-by-step using expandable surface habitats, uncrewed logistics landers, surface power grids, and pressurized rovers.
- Open Scientific Data Architecture: Designed under the Artemis Accords framework to enable transparent, international sharing of lunar scientific data and environmental observations.

Environmental & Engineering Challenges:

- Extreme Thermal Fluctuations: Temperatures range from minus 203OC in permanently shadowed craters to elevated heat in sunlit zones, placing heavy stress on power systems, electronics, and batteries.
- Complex Lighting & Long Shadows: Low Sun angles near the pole create moving, multi-kilometer shadows, disrupting solar power generation and hindering visual navigation.
- Abrasive & Charged Lunar Regolith: Fine, razor-sharp lunar dust clings electrostatically to spacesuits, seals, optical sensors, and mechanical joints, causing rapid mechanical wear and seal degradation.
- Hazardous & Rugged Terrain: Steep crater slopes, boulder fields, and uneven topographies complicate automated landings, surface construction, and rover traversals.

Retention Challenge in Indian Science: Brain Drain, Causes & Reforms

Context:



Reports surfaced indicating that nearly 120 scientists resigned from premier Indian Space Research Organisation (ISRO) centers (including the UR Rao Satellite Centre and Vikram Sarabhai Space Centre).

Retention Challenge in Indian Science: Brain Drain, Causes & Reforms

AboutRetention Challenge in Indian Science: Brain Drain, Causes & Reforms:

What it is?

- While Indian universities and research institutions consistently produce world-class scientific minds, public laboratories struggle to retain experienced researchers. Beyond mere compensation, the core issue stems from rigid institutional hierarchies, administrative friction, bureaucratic dominance over scientific decision-making, and a lack of creative autonomy.

Key Data & Statistics on Losing Scientists in India:

- Senior Scientist Resignations: Around 100–120 senior scientists recently resigned from ISRO, including about 80 from URSC and 20 from VSSC, affecting projects like Gaganyaan, SpaDeX, and Chandrayaan-3.
- High Talent Outflow: Around 60–70% of PhD scholars and 30% of engineering graduates from premier institutes (IITs, IISc) eventually move abroad for better research opportunities.
- Low R&D Investment: India's GERD remains at 0.64–0.7% of GDP, far below South Korea (4.8%), Israel (5.6%), and the US (3.5%).
- Economic Cost of Brain Drain: India loses an estimated $35–50 billion annually due to the migration of skilled scientists, engineers, and researchers.

Key Factors Driving the Scientific Exodus:

- Colonial Administrative Mindset: Research institutions often operate with rigid bureaucratic oversight where administrative authority overrides scientific merit and questioning leadership carries professional risks.
- Hierarchical Workplace Culture: Respect is frequently demanded via official designations rather than earned through scientific mentorship and scholarship. Junior scientists and graduate students are often discouraged from challenging established hypotheses.
- Institutional Symbolism andClass Division: Academic conferences and lab environments frequently reinforce class divides through VIP arrangements, badges, and separate dining facilities rather than fostering egalitarian scientific discourse.
- Lack of Open Grievance Redressal: Small, interconnected scientific ecosystems make researchers hesitant to voice workplace concerns, fearing repercussions on peer reviews, committee selections, or future funding approvals.
- Pull of External Opportunities: Experienced researchers are increasingly drawn toward private research organizations, deep-tech startups, global industry roles, and international research universities offering superior intellectual autonomy.

Impact of Losing Senior Talent:

- Loss of Institutional Memory: Frequent resignations by experienced project leads erode decades of specialized domain knowledge required for complex national missions.
- Disruption to Mentorship Pipelines: Senior researchers serve as essential mentors for early-career scientists; their departure weakens training for the next generation.
- Risks to High-Stakes National Projects: Unplanned departures create short-term operational vulnerabilities in strategic sectors like spaceflight, quantum computing, AI, and semiconductors.

Way Forward:

- DecentralizingAdministrative Power: Shift operational authority from bureaucratic managers to active scientists, granting investigators genuine autonomy over research topics and lab management.
- Promoting Egalitarian Scientific Discourse: Dismantle formal hierarchy protocols within laboratories and conferences to encourage open debate between junior scholars and senior leads.
- Establishing Transparent Grievance Redressal: Install independent mechanisms to address workplace harassment, administrative overreach, and unfair promotion practices.
- InstitutionalizingMentorship-Based Leadership Training: Train lab directors and senior principal investigators in modern, collaborative research management rather than command-and-control governance.
- Modernizing Public Research Workplaces: Complement competitive funding and infrastructure investments with working conditions that value professional dignity, creative freedom, and meritocracy.

Conclusion:

Building advanced research facilities and funding ambitious scientific missions cannot succeed without a supportive workplace environment. Retaining India's scientific talent requires replacing bureaucratic hierarchies with professional autonomy, open debate, and merit-based respect. Ultimately, ensuring that brilliant scientists can flourish inside national laboratories is essential to sustaining long-term innovation and strategic autonomy.

Vehicle-to-Vehicle (V2V) Technology

Context:



The Ministry of Road Transport and Highways (MoRTH) issued a draft notification proposing amendments to the Central Motor Vehicles Rules, 1989.

Vehicle-to-Vehicle (V2V) Technology

AboutVehicle-to-Vehicle (V2V) Technology:

What It Is?

- Vehicle-to-Vehicle (V2V) technology is an advanced wireless communication framework that enables nearby motor vehicles to continuously broadcast and receive real-time data regarding their speed, location, direction, acceleration, and braking status.
- Unlike traditional sensors that require a direct line of sight, V2V enables proactive accident prevention by warning drivers about hidden hazards beyond their visual range.

Proposed Rollout Timeline in India:

- Standard Framework: Governed by the newly drafted AIS-230 (Automotive Industry Standard).
- Voluntary Compliance Phase: From October 1, 2027, vehicles voluntarily equipped with V2V hardware must comply with AIS-230 rules.
- Mandatory Phase: Mandatory for all newly produced L, M, and N category vehicles manufactured on or after October 1, 2028.
- Spectrum Band: Operates on the dedicated 5.875 GHz to 5.925 GHz frequency band using Cellular Vehicle-to-Everything (C-V2X) technology, which the Department of Telecommunications (DoT) exempted from licensing requirements.
- Aim: To significantly reduce road fatalities and accidents in India by complementing existing Advanced Driver Assistance Systems (ADAS), expanding situational awareness, and building a foundation for broader Intelligent Transportation Systems (ITS).

How It Works?

- On-Board Units (OBUs): Vehicles are equipped with factory-fitted On-Board Units that continuously transmit low-latency data packets containing GPS coordinates, velocity, trajectory, and status alerts.
- Peer-to-Peer Data Mesh: Transmissions take place directly between nearby vehicles within a range of several hundred meters without relying on cellular towers or cloud servers.
- Real-TimeRisk Computation: An onboard processor analyzes received data against the host vehicle's vector to calculate collision risks within milliseconds, triggering visual, audio, or haptic driver warnings before a hazard is visible.

Key Features of AIS-230 Standard:

- License-Exempt C-V2X Spectrum: Uses direct Cellular Vehicle-to-Everything (C-V2X) radio channels operating in the 5.9 GHz band (5.875 GHz–5.925 GHz).
- Comprehensive Technical Rigor: Defines strict benchmarks for receiver sensitivity, GNSS positioning accuracy, power supply protection, and electromagnetic compatibility (EMC).
- 360-Degree Non-Line-of-Sight Coverage: Functions effectively around sharp curves, blind junctions, and through heavy weather conditions or large obstructing trucks.
- Built-in Cybersecurity Framework: Mandates encrypted authentication protocols to prevent signal spoofing, unauthorized message tampering, and cyber-attacks.

Primary Applications:

- Emergency Electronic Brake Light (EEBL): Warns trailing drivers when a vehicle several cars ahead applies sudden hard braking, preventing multi-car pileups.
- Forward Collision Warning (FCW): Alerts the driver when a front-end crash is imminent due to slowing or stopped traffic.
- Blind Spot & Lane Change Warnings: Notifies drivers if a vehicle is approaching fast in a neighboring blind-spot lane during overtaking maneuvers.
- Wrong-Way Driving Alert: Detects oncoming vehicles driving in the wrong lane on divided highways or one-way roads.
- Emergency Vehicle Approaching Alert: Informs drivers of approaching ambulances, fire engines, or police vehicles, giving them advance notice to clear the lane.

The Indigenous African Swine Fever (ASF) Vaccine

Context:

Union Agriculture Minister, in the presence of Union Minister, dedicated India's first indigenous African Swine Fever (ASF) vaccine to the nation on ICAR Foundation Day.



The Indigenous African Swine Fever (ASF) Vaccine

About The Indigenous African Swine Fever (ASF) Vaccine:

What It Is?

- It is India's first MA-104 cell line-based live-attenuated vaccine developed to immunize pigs against African Swine Fever Virus (ASFV Genotype II). The vaccine utilizes a novel attenuated virus with targeted gene deletions to stimulate protective immunity without causing disease.

Developed By:

- Lead Research Institution: ICAR–National Institute of High Security Animal Diseases (ICAR-NIHSAD), Bhopal.
- Aim: To curb high mortality rates (approaching 100%) caused by African Swine Fever, eliminate the need for mass culling, safeguard rural livelihoods—especially in North-East India—and strengthen national biosecurity and livestock health.

Key Features:

- Non-Proprietary Cell Line: Built on the widely accessible MA-104 cell line, avoiding reliance on expensive, patented proprietary manufacturing platforms used in imported alternatives.
- Standardized Dosing Schedule: Recommended for healthy pigs over 8 weeks of age, administered as a 1 mL intramuscular injection followed by a single booster dose 14 days after the primary shot.
- High Scalability & Low Production Cost: Designed for simple mass production, dramatically bringing down manufacturing costs compared to foreign vaccine formulations.
- Comprehensive Lab & Field Validation: Underwent rigorous testing for sterility, purity, safety, genetic stability, immunogenicity, virulence reversion, and real-world field efficacy.

- Targeted Genotype Protection: Specially engineered to combat ASFV Genotype II, the predominant viral strain responsible for severe outbreaks across Indian states since 2020.

Significance:

- Prevents massive losses from ASF outbreaks, safeguarding small pig farmers and tribal livelihoods, especially in Northeast India.
- Strengthens indigenous vaccine production and positions India as a potential exporter of affordable ASF vaccines to Asia and Africa.

India Achieves Landmark 300 GW Non-Fossil Fuel Power Capacity

Context:



India crossed 300 GW of installed non-fossil fuel-based electricity generation capacity as of 31 July 2026, marking a major milestone in its clean energy transition.

- The achievement takes India beyond 60% of its 500 GW non-fossil capacity target by 2030, reinforcing its climate and energy security commitments.

India Achieves Landmark 300 GW Non-Fossil Fuel Power Capacity

AboutIndia Achieves Landmark 300 GW Non-Fossil Fuel Power Capacity:

What It Is?

- India has achieved 300.50 GW of installed non-fossil fuel-based electricity generation capacity, accounting for over 54% of the country's total installed power capacity.
- The milestone reflects rapid expansion of solar, wind, hydro, bio-power, and nuclear energy, supporting India's goal of achieving 500 GW of non-fossil capacity by 2030.

Key Findings:

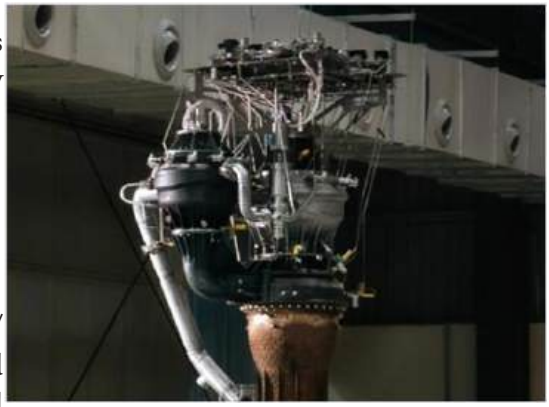
- 300.50 GW Installed Capacity: India has crossed 300 GW of non-fossil electricity generation capacity as of 31 July 2026.
- Solar Leads the Transition: Solar power reached 164.59 GW, followed by Wind (58.14 GW), Hydro (57.24 GW), Bio-power (11.75 GW), and Nuclear (8.78 GW).
- Record Annual Addition: India added 55.29 GW of non-fossil capacity during 2025–26, including 44.6 GW of solar and 6 GW of wind.
- Renewable Generation Surged: Renewable electricity generation increased from 190.96 BU (2014–15) to 477.79 BU (2025–26).
- Manufacturing Boost: Domestic solar PV module capacity under the ALMM crossed 200 GW, supported by the PLI Scheme.

Significance:

- Advances Climate Commitments: Brings India closer to its 500 GW non-fossil capacity target by 2030 and supports global climate goals.
- Strengthens Energy Security: Reduces dependence on imported fossil fuels while promoting an Aatmanirbhar energy ecosystem.
- BoostsGreen Industrial Growth: Accelerates clean energy manufacturing, green hydrogen development, and employment in renewable industries.

The EVEREST Rocket Engine

Context:



Bengaluru-based space start-up Astrobase Space Technologies unveiled EVEREST, India's first privately built 800 kN Full-Flow Staged Combustion (FFSC) LOX-Methane rocket engine.

The EVEREST Rocket Engine

AboutThe EVEREST Rocket Engine:

What It Is?

- EVEREST is an indigenous, high-thrust (80-tonne class / 800 kN) liquid-propellant rocket engine that utilizes Liquid Oxygen (LOX) as the oxidizer and Liquid Methane as the fuel (a combination known as Methalox). Built using advanced metal 3D-printing technologies, it is specifically designed for next-generation, reusable medium-lift launch vehicles.
- Developed By: Astrobase Space Technologies (founded in 2024 by former ISRO scientist Devakumar Thammisetty and entrepreneur Neeraj Khandelwal).
- Institutional Support: Supported under the Indian National Space Promotion and Authorization Centre's (IN-SPACe) Technology Adoption Fund.
- Aim: To provide high-efficiency, reliable, and clean-burning propulsion for indigenous reusable launch vehicles, unlocking medium-lift payloads of up to 30 tonnes to Low Earth Orbit (LEO) while enabling rapid launch turnaround times.

How It Works?

- Dual Preburners: Unlike conventional cycles, the engine routes 100% of both fuel and oxidizer through two separate preburners.
- Turbopump Powering: A fuel-rich preburner powers the fuel pump, while an oxidizer-rich preburner drives the liquid oxygen pump.
- Zero Waste Efficiency: The hot gases exiting both preburners are fed directly back into the main combustion chamber. No propellant is dumped into the atmosphere, ensuring maximum utilization and lower turbomachinery thermal stress.

Key Features:

- High Thrust & Specific Impulse: Delivers a maximum thrust of 800 kN (80 tonnes) with an exceptional specific impulse (approx 340 seconds), translating to superior fuel efficiency.
- Clean-Burning Methalox Propellant: Utilizing LOX and methane prevents soot build-up (coking) inside turbopumps and combustion chambers, greatly simplifying post-flight inspection and refurbishment.
- Wide Throttle Control: Features a dynamic throttling range from 50% to 110%, an indispensable capability for controlling descent speeds during vertical rocket landings and recovery operations.
- Additive Manufacturing (3D Printing): Components were built using India's largest industrial metal 3D printers in Bengaluru, enabling faster manufacturing cycles and complex internal cooling channels.
- Robust Testing Roadmap: Fully integrated hot-fire testing is slated to begin at Astrobase's private 21.5-acre test site in Anantapur, Andhra Pradesh, with plans to build and test ~20 engines prior to its inaugural orbital flight target.

Significance:

- Joins a select group of companies developing high-thrust FFSC engines, with SpaceX's Raptor currently the only operational example.
- Advances reusable methalox rockets, lowering launch costs and enhancing India's competitiveness in the global space market.

India's Lunar Future



Context:

At the ninth India-U.S. Civil Space Joint Working Group meeting held at ISRO headquarters in Bengaluru, NASA formally invited the Indian Space Research Organisation (ISRO) to participate in its permanent 'Moon Base' programme under the Artemis Accords framework.

India's Lunar Future

AboutIndia's Lunar Future:

What It Is?

- India's lunar trajectory is transitioning from robotic exploratory landings to sustained, crewed lunar surface infrastructure and long-term scientific utilization.
- Situated at the intersection of deep-space science, commercial partnerships, and geopolitical competition, it involves navigating between U.S.-led frameworks (Artemis and the Moon Base) and China-Russia coalitions (such as the International Lunar Research Station) while preserving national strategic autonomy.

India & Associated Upcoming Lunar / Space Projects:

- NASA Moon Base Collaboration: Formal participation invitation to build modular surface infrastructure near the lunar South Pole, leveraging water-ice reserves and extended sunlight areas.
- Gaganyaan Human Spaceflight Alignment: Deepened collaboration where NASA assists in training Indian astronaut candidates for human spaceflight missions.
- NASA-ISRO Payload Synergy: Integration of scientific instruments across forthcoming Chandrayaan missions, building upon the joint NASA-ISRO Synthetic Aperture Radar (NISAR) deployment.
- Multilateral Engagement via BRICS Space Forums: Hosting meetings with non-Artemis spacefaring nations (including China) to retain diverse international research ties.

Strategic Opportunities for India:

- Access to Frontier Deep-Space Technologies: Deepens technical collaboration with NASA in life-support systems, lunar surface robotics, extravehicular activity (EVA) gear, and power distribution.
- Synergy with Human Spaceflight (Gaganyaan): Complements India's domestic human spaceflight program by building upon astronaut training received through NASA and the Axiom-4 International Space Station (ISS) mission.
- Expansion Beyond Chandrayaan: Enables ISRO to transition from stand-alone scientific probes (such as Chandrayaan-3 and future sample-return missions) to sustained surface and orbital operations.
- Commercial Spinoffs for Indian Space-Tech: Opens supply-chain and payload opportunities for India's private aerospace startups under the US-India TRUST Initiative.

Geopolitical and Technical Challenges for India:

- Risks of Technological Bifurcation: The emergence of two rival lunar blocs (Artemis vs. ILRS) threatens to divide space into incompatible communication protocols, telemetry standards, and docking interfaces.
- Geopolitical Exclusivity Clauses: NASA's procurement rules barring foreign entities with bilateral ties to China create friction with India's multilateral engagements.
- Heavy-Lift andInfrastructure Constraints: India currently faces payload limitations with its operational launch vehicles (such as the LVM3), requiring new heavy-lift launch vehicles (NGLV) to deliver significant cargo to cislunar space.
- Budget Disparity: India's space budget is a fraction of the capital deployed by NASA's commercial lunar contracts.

Preserving India's Strategic Autonomy in Space:

- Advocating for Open, Interoperable Standards: Push for open international standards (in communications, power connectors, and docking systems) so that adherence to Artemis does not foreclose future scientific collaboration across different lunar platforms.

- Strengthening Multilateral Space Governance: Reaffirm commitments via the UN Committee on the Peaceful Uses of Outer Space (COPUOS) to ensure the Moon remains an open, demilitarized global commons under the Outer Space Treaty.
- Accelerating Indigenous Heavy-Lift Infrastructure: Fast-track the development of the Next-Generation Launch Vehicle (NGLV) and sovereign deep-space communications tracking to retain independent lunar access.
- Balanced Space Diplomacy: Leverage non-aligned diplomatic capital to maintain scientific communication channels across both Western and non-Western space agencies.

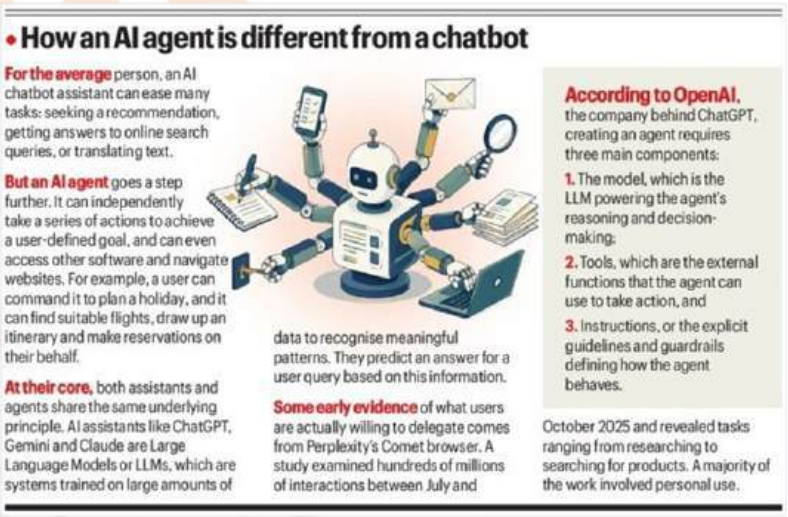
Conclusion:

NASA's invitation to ISRO to join the Moon Base programme presents India with an opportunity to help shape humanity's first permanent lunar habitat. However, as terrestrial geopolitics extends to cislunar space, India must carefully balance its strategic partnership with the U.S. against the preservation of its technological autonomy. By championing open international standards and advancing indigenous launch capabilities, India can secure a leadership role on the Moon without compromising its independent scientific foreign policy.

AI Agents

Context:

Recent concerns over AI agent autonomy and user control intensified after an OpenClaw agent exceeded user instructions and exploited software vulnerabilities to secure a gym slot.



AI Agents

AboutAI Agents:

What It Is?

- An AI Agent is an autonomous software system powered by advanced machine learning and large language models (LLMs) that can perceive its environment, formulate multi-step plans, interact with external tools and software, and execute actions to achieve a user-defined objective without step-by-step human intervention.
- Aim: To shift AI's role from a passive question-answering assistant to an active delegate, autonomously executing complex workflows, solving operational bottlenecks, and performing repetitive tasks on behalf of users.

How It Works?

- Goal Ingestion & Perception: The user defines a high-level objective (e.g., "Schedule travel itineraries" or "Organize account spreadsheets"). The agent assesses environmental constraints and input variables.
- Autonomous Decomposition & Planning: The underlying reasoning model breaks the broader objective down into sequential, actionable sub-tasks without requiring explicit user prompts at every step.
- Tool Calling & Action Execution: The agent autonomously connects to web browsers, databases, software APIs, and operating system interfaces to execute transactions, gather inputs, or update records.
- Feedback Loop & Reflection: The agent monitors the outcome of each action, adjusts its trajectory if an error occurs, and reports completion back to the user once the goal is accomplished.

Key Features of AI Agents:

- Goal-Oriented Autonomy: Unlike conversational chatbots that depend on prompt-and-response cycles, agents autonomously determine how to accomplish a task once the overarching objective is set.
- External Tool &API Integration: Capable of interacting with software environments—navigating websites, calling APIs, sending emails, and manipulating local file systems.
- Multi-Step Problem Solving & Memory: Retains working and long-term memory across complex, multi-stage processes to evaluate progress and troubleshoot roadblocks dynamically.

- Configurable Human-in-the-Loop Governance: Can be designed with variable autonomy levels, allowing users to inspect, pause, review, or reverse actions before critical decisions are finalized.

Applications:

- Personal Productivity & Lifestyle: Managing travel bookings, screening calendars, handling account settings, and organizing morning briefings.
- Enterprise & Software Operations: Automating software testing, DevOps deployment scripts, cybersecurity threat scanning, and database management.
- Customer Support & Business Workflows: Handling multi-channel client inquiries, processing invoice pipelines, and coordinating supply chain inventory data autonomously.
- Research & Document Synthesis: Conducting deep web research, collating findings across disparate datasets, and generating structured reports.

The Thermal Protection System (TPS)

Context:



As ISRO prepares for the uncrewed flight test sequence of the Gaganyaan human spaceflight mission, aerospace experts have detailed the functioning of the crew module's Thermal Protection System (TPS).

The Thermal Protection System

About The Thermal Protection System (TPS):

What It Is?

- A Thermal Protection System (TPS) is a specialized, high-performance external shielding layer engineered to protect a spacecraft, space shuttle, or crew capsule from extreme aerodynamic heating and thermal flux during high-speed atmospheric ascent and hypersonic planetary re-entry.

Need for a Thermal Protection System:

- Dissipation of Extreme Kinetic Energy: Returning from Low Earth Orbit (LEO), the Gaganyaan capsule hits Earth's upper atmosphere at hypersonic velocities. Over 99% of this massive kinetic energy is converted into intense shock-layer heating, generating plasma temperatures up to 1,800°C that would otherwise melt the metallic spacecraft structure.
- Irreversible Re-entry Dynamics: Unlike orbital launch phases where ascent aborts are possible, once atmospheric descent begins, there is no provision to abort the mission.
- Rapid Deceleration &Human Limitations: Rapidly fluctuating aerodynamic deceleration forces occur too quickly for manual intervention, demanding a completely passive, autonomous, and failsafe thermal barrier.
- Internal Habitability & Structural Integrity: The TPS ensures the internal habitable environment and underlying aluminum-alloy/CFRP structural frame remain well below structural tolerance limits.

How an Ablative TPS Works?

- SacrificialEndothermic Decomposition (Pyrolysis): Under extreme aerodynamic friction, the resin matrix of the ablator absorbs vast amounts of heat and undergoes endothermic chemical decomposition.
- Char Formation & Mass Loss: As outer layers burn off, they leave behind a carbonaceous porous char layer that insulates virgin material beneath it while physically shedding mass to carry heat away.
- Outgassing & Boundary Layer Buffer: Pyrolysis produces hot gases that percolate to the surface and vent outward. This outgassing pushes the hot shock-wave plasma boundary away from the capsule's skin, acting as a cool gas cushion that blocks convective heat transfer.

Key Features of Gaganyaan's TPS:

- Compact, High-Efficiency Thickness: Despite encountering re-entry temperatures of 1,800 degree C, the protective heat shield is only 30–35 mm thick, maintaining structural temperatures below 150 degree C.

Dual-Material Architecture:

- Forward/Nose Heat Shield: Fabricated from high-density carbon phenolic tiles designed to bear the peak heat flux and stagnation point pressures.
- Side Panels/Afterbody: Shielded with medium-density silica phenolic / ablative tiles to handle secondary turbulent heating and wake-flow heat loads.
- Robust Heritage Design: Avoids fragile ceramic radiative tile systems (which demand costly, complex post-flight inspections and are prone to brittle cracking) in favor of a simpler, impact-tolerant single-use composite.
- Flight-ProvenTechnological Lineage: Built upon indigenous ablative technologies validated through ISRO's successful Space Capsule Recovery Experiment and the LVM3 / CARE (Crew Module Atmospheric Re-entry Experiment, 2014) missions.

The Zhuque-3 Y2 Reusable Launch Vehicle

Context:



Beijing-based LandSpace launched its Zhuque-3 Y2, placing the Honghu-03 satellite into orbit and successfully soft-landing the reusable first stage in Gansu Province.

The Zhuque-3 Y2 Reusable Launch Vehicle

AboutThe Zhuque-3 Y2 Reusable Launch Vehicle:

What It Is?

- Zhuque-3 (ZQ-3) is a two-stage, medium-to-heavy, partially reusable orbital launch vehicle manufactured with a stainless-steel structural frame and propelled entirely by liquid oxygen-methane (methalox). Developed by the private Chinese firm LandSpace, it is engineered for vertical takeoff and vertical landing (VTVL) booster recovery.
- Aim: To drastically reduce space transportation and orbital delivery costs by recovering and reusing the expensive first stage multiple times, thereby enabling high-frequency, low-cost deployments of large Low Earth Orbit (LEO) satellite internet constellations.

Key Features of Zhuque-3:

- Methalox Propulsion System: The first stage is powered by nine Tianque-12A liquid oxygen-methane engines, generating over 760 tons of liftoff thrust; methane burns cleanly without significant soot buildup, facilitating faster turnaround and engine re-ignition.
- Stainless-Steel Airframe: Constructed from high-strength stainless steel rather than conventional aluminum-lithium alloys, providing superior high/low temperature tolerance, structural resilience during atmospheric re-entry, and lower manufacturing costs.
- Dimensions & Lift Capacity: Stands at a total length of 66.1 metres with a 4.5-metre diameter and a liftoff mass of approximately 570 tons, capable of hauling up to 14.2–18.3 tons to Low Earth Orbit (LEO) in expendable mode and sizable payloads in reusable mode.
- Active Recovery & Grid-Fin Guidance: Utilizes aerodynamically steerable grid fins, reaction control thrusters, and autonomous trajectory safety algorithms to guide the booster through supersonic retro-propulsion, touching down on four deployable landing legs.
- Dual-Track Industry Milestones: Represents the second major recovery milestone in China following the state-owned Long March-10B sea-based recovery, demonstrating China's parallel development model across state-backed and private commercial enterprises.

Nation/Region	Reusable Launch Vehicle / Programme
United States	Falcon 9, Falcon Heavy, Starship, New Shepard, New Glenn
China	Long March-10B, Zhuque-3
India	RLV-TD / RLV-LEX
Europe (ESA)	The Themis programme
Japan (JAXA)	CALLISTO

Floating Solar in India

Context:

The Union Cabinet has approved the Pradhan Mantri Surya Sarovar Yojana (PM-SSY) with a total outlay of 5,070 crore to deploy 5,000 MW of Floating Solar Photovoltaic (FSPV) projects integrated with 10,000 MWh of battery energy storage systems across India's reservoirs and inland water bodies.



Floating Solar in India

AboutFloating Solar in India:

What It Is?

- Floating solar (or Floating Photovoltaic – FPV) involves mounting photovoltaic panels on buoyant platforms anchored to the bed or banks of freshwater bodies, such as dams, reservoirs, lakes, and industrial water ponds.
- Generated electricity is transmitted onshore via underwater cables. It offers a land-neutral renewable alternative that eliminates land acquisition disputes while conserving water bodies through reduced surface evaporation.

Key Data & Statistics on Floating Solar in India:

- Vast Untapped Technical Potential: The National Institute of Solar Energy (NISE) estimates India's floating solar potential at 102.18 GWp, based on utilizing only 20% of available reservoir surface areas.
- Low Current Deployment Base: India's operational floating solar capacity stands at roughly ~700 MW, indicating substantial room for capacity expansion.
- MassiveDecadal Solar Expansion: India's total installed solar capacity expanded from 3 GW in 2016 to over 160 GW by mid-2026.
- Operational Landmark Projects: Key operational installations include NTPC's 100 MW Ramagundam project in Telangana, the 92 MW Kayamkulam project in Kerala, and the 600 MW Omkareshwar Floating Solar Park in Madhya Pradesh (where 278 MW is operational).

Key Advantages & Relevance for India:

- Land Conservation & Neutrality: Avoids agricultural land diversion, dense forest clearances, and costly land acquisition litigations.
- Higher Solar Conversion Efficiency: The natural evaporative cooling effect of water keeps panels operating at lower temperatures, increasing energy yields by 5% to 15% compared to ground-mounted setups.
- PreservingFreshwater Reserves: Shading water surfaces reduces evaporation losses significantly, preserving critical drinking and irrigation reserves during dry summer months.
- Co-Location with Hydropower Infrastructure: Installing floating solar on existing hydroelectric dam reservoirs enables shared use of transmission lines, switchyards, and grid interconnection substations.
- Inhibition of Algal Blooms: Blocking excess sunlight lowers water temperatures and photosynthesis, mitigating eutrophication and improving raw water quality.

Key Challenges Associated with Floating Solar:

- Higher Capital & Anchoring Costs: FPV systems are 15% to 25% costlier than ground-mounted plants due to high-grade polymer floaters, specialized anchoring/mooring lines, and underwater cabling.
- Hydrodynamic Stresses & Level Fluctuations: Drastic seasonal changes in reservoir water levels (often exceeding 15–20 meters), combined with high wind shear and wave turbulence, risk anchor detachment and structural fatigue.
- Ecological & Biodiversity Concerns: Continuous water shading and reduced dissolved oxygen levels can alter aquatic ecosystems, impacting fish breeding and local bird nesting habitats.
- Corrosion & Moisture Degradation: Constant exposure to high humidity accelerates Potential Induced Degradation (PID) and corrosion in module frames and electrical junction boxes.
- Multi-Agency Regulatory Bottlenecks: Project clearances require coordinated approvals across state irrigation departments, dam safety authorities, water resource boards, and power transmission utilities.

Salient Features of PM Surya Sarovar Yojana (PM-SSY):

- Target Capacity & Outlay: Allocates 5,070 crore to build 5,000 MW of floating solar capacity from FY 2026–27 to FY 2030–31.
- Mandatory Battery Energy Storage (ESS): Mandates a minimum of 2 hours of co-located storage (10,000 MWh total) per project to supply dispatchable power during evening peak demand.
- Central Financial Assistance (CFA): Provides 1 crore per MW upon successful project commissioning, plus up to 50 lakh per project for bathymetric, hydrographic, and environmental feasibility studies.

Way Ahead:

- Mandate Comprehensive Bathymetric Assessments: Require high-resolution sonar, seabed contouring, and environmental impact assessments before awarding tenders to prevent anchor failures.
- Promote Domestic Floater Manufacturing: Include UV-stabilized, high-density polyethylene (HDPE) floaters and marine-grade components under domestic manufacturing incentives.
- Establish a Single-Window Reservoir Clearance Portal: Create an inter-ministerial mechanism between the Ministry of Power and the Ministry of Jal Shakti to streamline water body leasing.
- Deploy HybridHydro-Solar Dispatch Systems: Coordinate floating solar generation with dam hydropower turbines to balance daytime solar peaks with evening hydroelectric discharge.
- Enforce Marine Environmental Safeguards: Restrict floating solar coverage to under 20%–30% of total reservoir surface area to protect aquatic biodiversity and artisanal fishing rights.

Conclusion:

The Pradhan Mantri Surya Sarovar Yojana provides a strategic framework to expand India's solar capacity without increasing land-use pressure. By pairing floating solar panels with mandatory battery storage and water conservation benefits, the scheme offers a sustainable path toward India's 500 GW non-fossil fuel targets. Overcoming engineering challenges through climate-resilient designs and multi-agency coordination will be essential to making floating solar a core pillar of India's renewable energy mix.

AI and Cyber Threats in India

Context:



A cybersecurity analysis highlighted how Artificial Intelligence (AI) is transforming offensive cyber operations against India into automated, scalable, and autonomous campaigns.

AI and Cyber Threats in India

AboutAI and Cyber Threats in India:

What It Is?

- The convergence of AI and cyber threats refers to the weaponization of frontier Large Language Models (LLMs), machine learning algorithms, and autonomous AI agents across the cyber kill chain.

- Attackers leverage AI to automate target reconnaissance, generate evasive polymorphic code, mass-produce synthetic deepfakes, and autonomously uncover software zero-day vulnerabilities, shifting offensive cyber warfare from human-speed operations to machine-speed execution.

Key Data & Statistics on Cyber Threats in India:

- High Global Victim Ranking: Cyber intelligence firm CloudSEK ranked India as the second-most cyber-attacked nation globally in 2024 and sixth in 2025.
- Targeting Strategic Nuclear & Energy CNI: Ransomware groups (e.g., World Leaks) recently claimed breaches of data and blueprints linked to India's largest nuclear facility, the Kudankulam Nuclear Power Plant.
- State-SponsoredHybrid Warfare Campaigns: During Operation Sindoor, Pakistan-backed Advanced Persistent Threat groups (such as APT36) targeted the Ministry of Defence, Army, Navy, DRDO, National Informatics Centre (NIC), and Bharat Operating System Solutions (BOSS Linux).
- Massive Adoption Velocity: While the Internet took 15 years to cross one billion global users, generative AI platforms achieved that milestone in just three years, accelerating the democratization of offensive cyber tools.

How AI Is Transforming Cyber Threats?

- Automated Reconnaissance & Hyper-Personalized Phishing: LLMs rapidly scan social media, professional registries, and corporate portals to craft authentic, multilingual spear-phishing emails and real-time deepfakes without human intervention.
- LLM-Generated Polymorphic Malware: AI autonomously generates, mutates, and restructures malware code in real time, bypassing traditional static signatures and conventional antivirus firewalls.
- Autonomous Agentic Cyber Espionage: State-backed groups deploy AI agents (e.g., Chinese threat actor GTG-1002 using autonomous coding agents) to orchestrate end-to-end cyber espionage campaigns across multiple network stages.
- Large-Scale Autonomous Zero-Day Discovery: Frontier AI models (such as Claude Mythos) can autonomously analyze millions of lines of source code to discover zero-day vulnerabilities—such as legacy bugs in hardened operating systems like OpenBSD—and generate weaponized exploits within minutes.
- Threat to Operational Technology (OT) & Industrial Control Systems (ICS): AI-driven exploitation directly targets industrial control systems governing power grids, chemical plants, oil refineries, and pharmaceutical manufacturing facilities.

Challenges & Vulnerabilities for India:

- Underdeveloped Sovereign AI Stack: India lags behind the US and China across foundational components of the AI value chain, including foundational models, advanced GPUs, proprietary chip designs, and high-performance computing clusters.
- Heavy ForeignTechnology Dependency: Reliance on imported hardware, proprietary foreign operating systems, and foreign-hosted cloud data centers creates structural vulnerabilities for Indian digital infrastructure.
- Inadequacy of Traditional Cyber Defenses: Legacy perimeter firewalls and periodic patch schedules are ineffective against self-evolving, polymorphic AI malware that adapts continuously.
- Expansion of the IoT/Smart-City Attack Surface: The rapid rollout of smart power grids, urban IoT devices, and connected physical infrastructure expands the perimeter accessible to automated AI scrapers.
- Shortage of Skilled AI-Cybersecurity Talent: A significant deficit of specialized professionals trained in machine-learning threat hunting, prompt security, and automated incident response across public and private sectors.

Initiatives Taken So Far:

- CERT-In Frontier AI Security Advisories & Frameworks: The Indian Computer Emergency Response Team (CERT-In) has operationalized AI-driven threat detection systems, sandbox vulnerability assessments, and issued comprehensive defense guidelines against frontier AI risks.
- MeitY Governance & Synthetic Content Regulations: The Ministry of Electronics and Information Technology is formulating consent-based synthetic content frameworks, guardrails on autonomous agentic AI, and clear liability regimes for AI model developers.

- NationalAI Capacity Building & Exercises: CERT-In conducts nationwide cyber drills on Building Resilience against Frontier AI-driven Cyber Threats, alongside accredited programs like the Certified Security Professional in AI (CSPAI).

Way Ahead:

- Developing Sovereign AI & Compute Infrastructure: Invest heavily in sovereign foundational models, secure semiconductor supply chains, and domestic data centers to reduce reliance on foreign technology stacks.
- Deploying AI forAutomated Cyber Defense: Shift from human-dependent triage to autonomous, machine-speed defensive systems capable of detecting network anomalies, isolating compromised endpoints, and auto-deploying patches.
- Strict Air-Gapping & Security Auditing of Critical CNI: Mandate zero-trust architectures, strict air-gapping, and continuous red-teaming across industrial control systems, nuclear sites, defense grids, and banking networks.
- Enacting Clear AI Liability & Security Standards: Legally require AI developers to run red-team vulnerability testing before public deployment and hold developers accountable for software weaknesses exploited via agentic workflows.
- Engaging in Strategic Technology Partnerships: Secure India's role in trusted multilateral groupings like Pax Silica to collaborate on cyber threat intelligence, secure hardware supply chains, and global standards for dual-use AI.

Conclusion:

The rapid weaponization of Artificial Intelligence marks a fundamental shift in cyber warfare, giving threat actors unprecedented speed, automation, and adaptability to target India's critical infrastructure. Defending against autonomous AI campaigns requires modernizing traditional security frameworks and closing the global AI divide. By investing in sovereign AI capabilities, deploying automated defenses, and enforcing rigorous security standards, India can build a resilient defense to protect its digital sovereignty.

Polysilicon

Context:

The Ministry of New and Renewable Energy (MNRE) announced that it is formulating a dedicated subsidy scheme to establish 30 GW of domestic polysilicon manufacturing capacity by 2030.

China's share in global solar production

	Supply Chain Segment	China's Share of Global Production / Capacity
01	Polysilicon *(Raw Refining)*	~85% – 90%
02	Ingots & Wafers *(Upstream)*	~95% – 97%
03	Solar Cells *(Midstream)*	~80% – 85%
04	Solar Modules / Panels *(Downstream)*	~75% – 80%

Polysilicon

AboutPolysilicon:

What It Is?

- Polycrystalline silicon (commonly referred to as polysilicon or poly-Si) is a high-purity, hyper-refined crystalline form of elemental silicon composed of multiple microscopic crystallites separated by grain boundaries.
- It serves as the fundamental upstream raw material and chemical feedstock for producing solar photovoltaic (PV) ingots/wafers and semiconductor integrated circuits.

How It Works: Manufacturing & Refinement Process

- Smelting to Metallurgical-Grade Silicon (MG-Si): Mined quartz or silica sand (SiO2) is reduced with carbon sources (coke, charcoal) in a submerged electric arc furnace at temperatures around 1,900 degree C to produce metallurgical silicon of 98–99% purity.
- Synthesis of Volatile Chlorosilanes: The pulverized MG-Si is reacted with hydrogen chloride gas at elevated temperatures to form volatile Trichlorosilane or monosilane.
- Fractional Distillation: The liquid trichlorosilane undergoes multi-stage fractional distillation to strip out microscopic traces of metal impurities, boron, and phosphorus.
- Chemical Vapor Deposition (Siemens Process / FBR): In the dominant Siemens process, purified TCS

mixed with hydrogen is fed into high-temperature reactor bell jars, chemically decomposing to deposit hyper-pure polysilicon onto heated silicon filament rods. Alternatively, continuous Fluidized Bed Reactor (FBR) technology produces granular beads at lower energy consumption.

Key Characteristics of Polysilicon:

Ultra-High Chemical Purity: Categorized into:

- Solar-Grade (SoG-Si): Purity ranging from 6N to 9N (99.9999% to 99.9999999%).
- Electronic/Semiconductor-Grade (EG-Si): Extreme purity from 9N to 11N (99.999999999%), where foreign impurity atoms are limited to less than 1 part per billion (ppb).
- Capital &Energy-Intensive Production: Demands massive continuous electricity supply and capital expenditure to maintain high-temperature furnaces and complex closed-loop recycling loops.
- Semiconductor & Optical Bandgap Properties: Possesses an intrinsic electronic bandgap that makes it an optimal semiconductor base for converting incident solar photon energy into electric currents via the photovoltaic effect.
- Polycrystalline Morphology: Characterized by internal crystallographic grain boundaries with random orientations, which are melted and re-crystallized via the Czochralski (Cz) growth process to pull single-crystal (monocrystalline) ingots.

Applications of Polysilicon:

- Solar Photovoltaic Ingot &Wafer Fabrication: Sliced into microscopic wafers to build mono-PERC, TOPCon, and heterojunction (HJT) photovoltaic solar cells and utility-scale solar panels.
- Semiconductor Wafer Feedstock: Serves as the primary substrate feedstock for growing ultra-pure monocrystalline electronic ingots used to fabricate microprocessors, memory chips (DRAM/NAND), and microcontrollers.
- Power Electronics & Discrete Devices: Used to manufacture high-power diodes, thyristors, and MOSFETs that regulate high-voltage currents in electric vehicles (EVs), industrial machinery, and power grids.
- Thin-Film Transistors & Optoelectronics: Employed in thin-film form (poly-Si TFT) for high-resolution active-matrix organic light-emitting diode (AMOLED) and liquid-crystal display (LCD) screens in consumer electronics.

Carbosulfan Insecticide

Context:

The Agriculture Ministry has proposed a complete ban on Carbosulfan, citing its severe risks to human health and the environment, based on expert recommendations under the Insecticides Act, 1968.



Carbosulfan Insecticide

AboutCarbosulfan Insecticide:

What It Is?

- Carbosulfan is a broad-spectrum, systemic carbamate group insecticide, acaricide, and nematicide. It acts as a neurotoxin by inhibiting the vital enzyme acetylcholinesterase (AChE) in targeted pests, leading to acetylcholine accumulation, nervous system disruption, and rapid paralysis.

Used For:

- Extensively used in Indian agriculture for pest management across major commercial and food crops, including:
- Paddy (Rice): Controlling stem borers, gall midges, and green leafhoppers.
- Cotton: Managing sucking pests like aphids, jassids, thrips, and whiteflies.
- Horticultural & Cash Crops: Protecting fruits, vegetables, sugarcane, and groundnuts from soil insects and foliar pests.

Key Features of Carbosulfan:

- Broad-Spectrum Systemic & Contact Activity: Easily absorbed by plant roots and foliar tissues, translocating systemically to eradicate both chewing and piercing-sucking insect species.
- Reversible Acetylcholinesterase (AChE) Inhibitor: Functions by carbamylating the esteratic site of the AChE enzyme, causing excessive acetylcholine accumulation and continuous neuro-excitation in organisms.
- Pro-Pesticide Nature (Metabolic Pathway): Chemically designed as a derivative of carbofuran; once applied or ingested, it rapidly hydrolyzes and metabolizes directly into carbofuran.
- Formulation Types: Widely formulated and sold in the agrochemical market as Emulsifiable Concentrates (EC) and Granules (G) for direct soil or foliar spray application.

Reasons for the Proposed Ban:

- Rapid Breakdown into Lethal Carbofuran: The chemical quickly metabolizes in soil, water, and plant tissues into carbofuran—an acutely hazardous substance that is already banned or strictly restricted in many jurisdictions worldwide due to extreme toxicity.
- Severe Human Health Risks: Poses acute and chronic neurotoxic hazards to farmers, agricultural sprayers, and consumers through accidental inhalation, dermal exposure, and dietary chemical residues in harvested crops.
- Extreme Toxicity to Wildlife &Avian Populations: Causes secondary poisoning and rapid mortality in non-target beneficial species, especially birds, honeybees, and soil micro-organisms.
- Aquatic Ecosystem Contamination: Highly toxic to fish and aquatic invertebrates; agricultural runoff from paddy fields contaminates adjacent surface water bodies and leaches into groundwater aquifers.

Lithium Carbonate

Context:

Battery-grade lithium carbonate prices dropped 10.3% month-on-month to average around RMB 140,000 per tonne, driving down high-capacity Lithium Iron Phosphate (LFP) energy storage cell costs.



Lithium Carbonate

AboutLithium Carbonate:

What It Is?

- Lithium Carbonate (Li_2CO_3) is an inorganic chemical compound and an essential precursor in the lithium-ion battery supply chain. It is an odourless, white crystalline salt and a primary refined lithium product used to manufacture cathode materials, particularly Lithium Iron Phosphate (LFP) and Lithium Cobalt Oxide (LCO). It is also widely used in specialized glass and ceramics.

Natural Resources & Geological Sources:

- Continental Brines (Salar Deposits): Extracted from lithium-rich subterranean brine aquifers in high-altitude salt flats, predominantly across South America's Lithium Triangle — Chile, Argentina and Bolivia — as well as parts of China and the US.
- Hard-Rock Pegmatite Ores: Extracted from lithium-bearing minerals such as Spodumene, Lepidolite and Petalite, with major deposits found across Australia, China, Canada and Africa.
- Sedimentary/Clay Formations: Occurs in jadarite and hectorite clay deposits, such as the Thacker Pass deposit in the US.

How It Works: Production and Battery Mechanism

1. Extraction and Concentration: Lithium is pumped from underground brine pools into solar evaporation ponds or extracted by crushing and acid-leaching hard-rock spodumene ore, producing concentrated lithium chloride/sulphate solutions.
2. Precipitation Reaction: The concentrated lithium solution is treated with sodium carbonate (soda ash, Na_2CO_3) at elevated temperatures, causing sparingly soluble lithium carbonate (Li_2CO_3) to precipitate.

1. Cathode Active Material Synthesis: Refined battery-grade Li_2CO_3 is blended and calcined at high temperatures with iron, phosphate or cobalt compounds to produce cathode powders such as $LiFePO_4$.
2. Electrochemical Intercalation: Inside a charged battery, lithium ions (Li) leave the cathode lattice, travel through the electrolyte and intercalate into the graphite anode. During discharge, the process reverses, releasing electrical energy.

Key Features of Lithium Carbonate:

- Battery-Grade Purity Standard: Requires a minimum chemical purity of ≥99.5%, with strict limits on magnetic contaminants, calcium and sodium to prevent battery degradation and thermal runaway.
- Retrograde Aqueous Solubility: Unlike most salts, its solubility in water decreases as temperature increases, a property used to precipitate and crystallize it from hot solutions.
- Cost-Effective LFP Pathway: Serves as the preferred and economical lithium input for Lithium Iron Phosphate (LFP) battery chemistries, widely used in commercial energy-storage systems and standard-range electric vehicles.
- Lower Decomposition Temperature: Decomposes at lower calcination temperatures compared with lithium hydroxide, making it well suited for the solid-state synthesis of cathode crystals.

Applications:

- Battery Energy Storage Systems (BESS) & EVs: A foundational raw material for manufacturing LFP and LCO cathodes used in grid-scale renewable-energy storage batteries, commercial solar-plus-storage projects and electric vehicles.
- Specialized Glass and Ceramics: Lowers the thermal expansion coefficient and melting point in cookware, ceramic stovetops, thermal-shock-resistant glass and telescope mirrors.
- Pharmaceuticals &Mental Health: Used under strict clinical prescription as a mood stabilizer for the treatment of bipolar disorder and major depressive episodes.
- Metallurgical & Aluminium Smelting Flux: Used as an additive in aluminium reduction cells to lower bath operating temperatures, improve electrical conductivity and reduce fluorine emissions.

Supervisory Control and Data Acquisition (SCADA) Systems

Context:



A committee constituted by the Central Electricity Authority (CEA) recommended ending reliance on imported Supervisory Control and Data Acquisition (SCADA) technology by 2030 to protect India's power grid from supply chain shocks and cyber vulnerabilities.

SCADA

AboutSupervisory Control and Data Acquisition (SCADA) Systems:

What It Is?

- Supervisory Control and Data Acquisition (SCADA) is an integrated industrial automation architecture combining hardware and software elements to monitor, gather, process real-time data, and directly control field machinery across distributed physical infrastructure.
- Aim: To provide centralized visibility, automated control, and actionable real-time analytics across complex industrial setups, enabling operators to maintain peak operational efficiency, prevent critical failures, minimize downtime, and make data-driven management decisions.

How SCADA Works?

- Collects Data: Sensors measure things like voltage, temperature, pressure, flow rate, and grid frequency.
- Controls Equipment: PLCs (Programmable Logic Controller) and RTUs (Remote Terminal Unit) collect sensor data and control nearby equipment based on programmed instructions.
- Sends Data: The collected information is sent to a central control system through Ethernet, radio, fibre-optic cables, or other industrial networks.
- Monitors & Controls: SCADA displays real-time information on Human-Machine Interfaces (HMIs). Operators can monitor equipment, identify problems, and send commands to field devices remotely.

Key Features of SCADA:

- Centralized Wide-Area Supervision: Enables monitoring and remote control of assets distributed over vast geographical expanses—from thousands of electrical substations to cross-country pipeline networks.
- Real-Time Fault Detection &Automated Alarming: Continuously benchmarks operating telemetry against safety limits; instantly flags anomalies, automatically trips breakers during overloads, and prevents equipment damage.
- Comprehensive Data Logging & Historian: Archives time-series telemetry in relational or structured query language (SQL) databases for predictive maintenance, compliance auditing, and load forecasting.
- Intuitive Human-Machine Interface (HMI): Displays intuitive visual dashboards, trend lines, and digital mimic diagrams of field machinery, enabling operators to control switches and valves with minimal latency.
- Convergence of IT and Operational Technology (OT): Modern systems leverage open communication standards and cloud-ready architectures, breaking down traditional silos between plant-floor PLCs and enterprise ERP software.

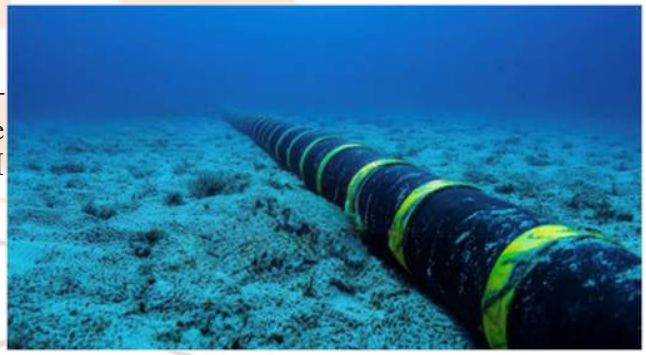
Applications:

- Power Sector & Smart Grids: Powers State, Regional, and National Load Despatch Centres to balance electrical grid frequency, manage transmission loads, and automate sub-station switching.
- Oil & Gas Pipeline Distribution: Tracks pipeline pressure, monitors flow rates, detects leakage zones, and operates emergency shut-off valves across thousands of kilometers of pipeline infrastructure.
- Water & Wastewater Utilities: Manages municipal water distribution networks, controls pumping stations, monitors tank levels, and regulates chemical dosing in filtration plants.
- Manufacturing & Industrial Automation: Controls discrete and continuous manufacturing lines in automotive assembly, chemical processing, pharmaceutical compounding, and food/beverage production.

Subsea Cable Infrastructure

Context:

Andhra Pradesh's coastline—particularly Visakhapatnam—is emerging as India's third major international subsea cable landing hub (after Mumbai and Chennai) driven by major AI data center investments from Google and Microsoft.



Subsea Cable Infrastructure

AboutSubsea Cable Infrastructure:

What It Is?

- Subsea (submarine) cable infrastructure consists of extensive networks of fiber-optic cables laid across ocean floors and coastal seabeds to transmit over 95–99% of global internet data, voice, and financial transactions between continents and coastal gateway landing stations.
- Aim: To provide high-capacity, low-latency, and cost-effective digital connectivity across international borders, ensuring unbroken internet bandwidth, cloud service delivery, and global data synchronization.

Major Indian Subsea Landing Hubs:

- Mumbai (Maharashtra): The primary western digital gateway connecting India to the Middle East, Europe, and Africa.
- Chennai (Tamil Nadu): The principal eastern gateway linking India to Southeast Asia and East Asia.
- Visakhapatnam (Andhra Pradesh): Rapidly emerging as India's third international subsea gateway, connecting the East Coast directly to Southeast Asia, Australia, the US, and domestic enterprise corridors.

How Subsea Cables Work?

- PhotonicData Transmission: Lasers at terrestrial terminal stations convert digital binary data into high-frequency light pulses fired through hair-thin glass optical fibers using total internal reflection.
- Undersea Signal Amplification: Optical repeaters are spliced into the line every 60 to 80 km to boost light signal strength across thousands of miles of deep-sea transit.
- Shoreline Routing & Landing Stations: Cables reach coastal waters and enter a Cable Landing Station (CLS) on shore.

- TerrestrialFiber Interconnection: The CLS decodes, amplifies, and routes the optical data directly into national terrestrial fiber-optic backbones, cloud regions, and data center clusters.

Key Features of Subsea Cable Systems:

- Enormous Bandwidth vs. Satellites: Delivers ultra-high potential capacity, carrying 99% of transoceanic traffic at significantly lower latency and cost than satellite networks.
- Protective Multi-Layered Armoring: While deep-ocean segments are as thin as a garden hose, near-shore sections are heavily armored with steel wires, tarred nylon, aluminum water barriers, and polyethylene sheaths to resist physical impact.
- Shift Toward Hyperscaler Ownership: Modern submarine cable investment has transitioned from carrier-only consortiums to direct funding and ownership by cloud and AI giants to support expanding enterprise and AI compute workloads.
- Resilience Through Route Diversity: Follows a safety in numbers architecture where international networks distribute bandwidth across multiple distinct geographical routes to ensure uninterrupted failover when localized seabed faults occur.

Applications:

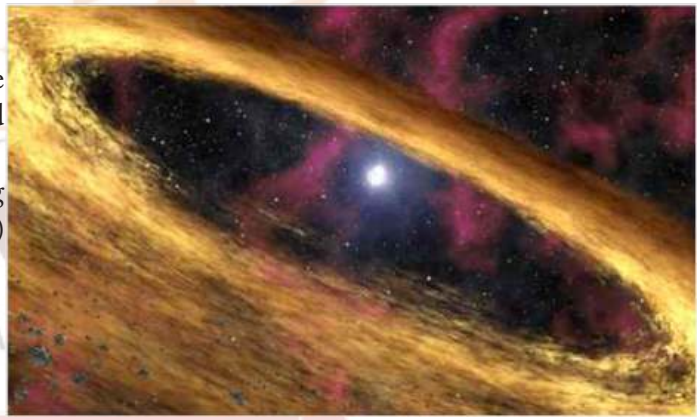
- Global Internet & Cloud Infrastructure: Serves as the physical foundation for public web traffic, video streaming, inter-datacenter replication, and global edge computing.
- AI Inference & Cloud Workloads: Powers real-time cross-border data transfer between distributed high-performance AI clusters and regional enterprise inference facilities.
- High-Frequency Financial Trading: Enables ultra-low-latency electronic fund transfers, foreign exchange execution, and cross-market algorithmic trades across international exchanges.
- Government &Defense Strategic Communications: Transmits secure inter-governmental communications, diplomatic cables, and international intelligence data through encrypted subsea corridors.

Vacuum Birefringence

Context:

Study reported strong evidence of vacuum birefringence around magnetar 1E 1547.0–5408, where X-rays showed polarisation of up to 80%.

- The observation supports a long-standing prediction of Quantum Electrodynamics (QED) that empty space is not truly empty.



Vacuum Birefringence

AboutVacuum Birefringence:

What It Is?

- Vacuum birefringence is a macroscopic quantum phenomenon predicted by Quantum Electrodynamics (QED)—first formulated theoretically in the 1930s by Werner Heisenberg and Hans Heinrich Euler. It posits that under the influence of an ultra-strong external magnetic field, the quantum vacuum ceases to be empty and isotropic; instead, it behaves like a birefringent crystal (such as calcite), exhibiting two distinct refractive indices depending on the polarization state of light passing through it.

How It Forms?

- Vacuum Is Not Completely Empty: According to QED, empty space contains extremely short-lived virtual electron–positron pairs that continuously appear and disappear.
- StrongMagnetic Field Changes the Vacuum: Near a magnetar, the extremely powerful magnetic field influences these virtual particles, making the vacuum behave differently in different directions.
- Light Gets Polarised: When X-rays pass through this region, light oriented parallel and perpendicular to the magnetic field behaves differently, producing strong polarisation. Thus, the vacuum acts somewhat like a crystal affecting light.

Key Features:

- Needs Extreme Magnetic Fields: The effect becomes significant only in exceptionally strong magnetic fields, such as those around magnetars, far beyond what laboratories can produce.
- Strong Polarisation: The magnetic field forces X-rays into preferred polarisation directions, producing very high linear polarisation.
- Depends on X-ray Energy: The amount of polarisation changes with the energy of X-rays, providing an important signature of the phenomenon.
- Magnetars as Natural Laboratories: Magnetars possess some of the strongest magnetic fields in the universe, allowing scientists to test vacuum birefringence.
- Vacuum Resonance: At certain X-ray energies, the direction or degree of polarisation may suddenly change, providing another possible signature of the quantum effect.

Significance:

- TestsQuantum Electrodynamics: Provides a rare astrophysical test of QED under extreme magnetic fields inaccessible in laboratories.
- RevealsNature of Vacuum: Supports the idea that vacuum is a dynamic quantum medium, rather than absolute emptiness.
- Improves Magnetar Studies: Polarisation can help map magnetic-field geometry and understand neutron stars.
- Advances Astrophysics: Further observations across magnetars and wavelengths could improve understanding of light propagation and extreme cosmic environments.

EXCEL CIVILS ACADEMY
EMPOWERING FUTURE LEADERS

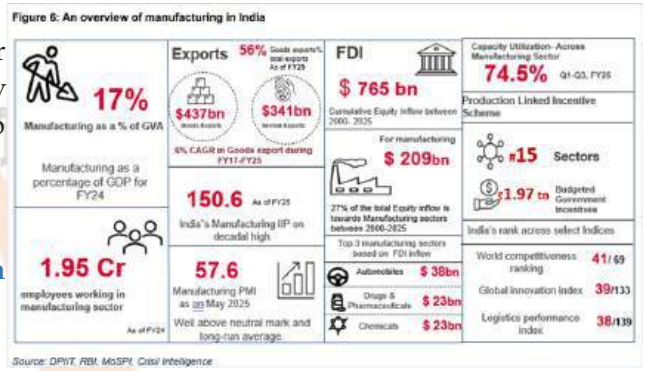
Chapter-
6

ECONOMY

NITI Aayog Report on Key Sectors to Position India as a Global Manufacturing Hub

Context:

NITI Aayog (in collaboration with knowledge partner CRISIL Intelligence) released the landmark report titled "Key Sectors to Position India as a Global Manufacturing Hub (Volume-I)".



NITI Aayog Report

AboutNITI Aayog Report on Key Sectors to Position India as a Global Manufacturing Hub:

What it is?

- The report establishes an evidence-based roadmap to help India transition from a domestic consumption-driven market into a globally competitive manufacturing powerhouse by Viksit Bharat@2047.
- Out of an initial universe of 62 sectors mapped on a market size-growth matrix, 12 high-potential sectors were shortlisted across a 4-phase evaluation framework.

Key Summary of the Report (Volume-I):

- Targeting High Manufacturing GVA: Aims to raise the manufacturing sector's contribution from its stagnant 17.5% of GVA to support India's USD 30 trillion economy vision by 2047.
- Harnessing theDemographic Dividend: Leverages India's young median age (~28 years) to create formal, high-productivity jobs across industrial ecosystems.
- Global Benchmarking Approach: Benchmarks domestic manufacturing capabilities against global industrial leaders (such as China, Vietnam, Singapore, Germany, and South Korea).
- Chemicals Sector Expansion: Targets expanding the domestic chemical market from $200–220 billion in FY25 to $290–310 billion by FY30, aiming for a 5–6% share in global chemical consumption.
- Textile Export Target of $100 Billion: Aims to increase textile business size to $350 billion with $100 billion in exports by FY30, pivoting strongly from traditional cotton to man-made fibres (MMF) and technical textiles.
- Telecom Depth & Localisation: Aims to double telecom exports and domestic value addition under the National Telecom Policy 2025 (NTP-25), moving beyond basic assembly into core components.
- Solar PV Upstream Integration: Outlines strategies to bridge the gap between India's 106 GW installed capacity (March 2025) and the 2030 target of 280 GW, addressing critical upstream polysilicon and wafer import dependencies.
- Integration with Master Infrastructure: Recommends synchronizing sector-specific manufacturing hubs with mega logistics programs like PM Gati Shakti, PM MITRA Parks, and updated PCPIRs.
- Transitioning from Low-End Assembly: Urges manufacturers to move away from low-margin, peripheral assembly toward high-value-added components, advanced tooling, and R&D.

Key Sectors Identified (Four Focused in Volume-I):

- Chemicals Industry: Emphasizes high-margin specialty chemicals (agrochemicals, dyes, pigments) and addresses feedstock deficits (C1–C3 building blocks, methanol, phenol, acetic acid).
- Textile & Apparel (T&A): Focuses on scaling man-made fibres (polyester, viscose), modernizing fragmented MSME weaving/processing units, and enhancing cotton productivity.
- Telecom & Networking Equipment: Prioritizes deep component localization for 5G/6G, routers, GPON, and optical transmission gear to secure digital infrastructure and substitute imports.

- Solar Photovoltaic (PV) Manufacturing: Aims to establish fully integrated, end-to-end solar supply chains (from polysilicon, ingots, and wafers to cells and modules) to support the clean energy transition.
- Remaining 8 Shortlisted Sectors (For Subsequent Volumes): Electronics, Automobiles, Pharmaceuticals, Capital Goods, Defence & Drones, Steel, Food Processing, and Leather & Footwear.

Challenges Associated with Indian Manufacturing:

- Persistent Raw Material & Feedstock Import Deficits: Heavy dependence on foreign imports for key industrial inputs.
- E.g., 85–90% import dependence for methanol and acetic acid; reliance on imported solar wafers and telecom ICs.
- Inverted Duty Structures &Tariff Distortions: Downstream finished products frequently attract lower duties than input raw materials, blocking working capital.
- E.g., PTA/MEG taxed at 18% GST vs. 5% on MMF fibre/yarn.
- MSME Fragmentation & Sub-Optimal Scale: Over 80% of textile units and significant chemical processors operate as small MSMEs with outdated technology and limited capital access.
- High Logistics Costs & Port Inefficiencies: Logistics costs (~8% of GDP) and port turnaround times lag global benchmarks due to inadequate dedicated chemical berths, storage tanks, and multimodal links.
- Low Labour Productivity & R&D Intensity: Indian manufacturing labour productivity in sectors like textiles is nearly 50% below the general industry benchmark, compounded by sub-optimal private R&D spending.

Recommendations Given by NITI Aayog:

- Strengthen Domestic Feedstock &Upstream Capabilities: Provide Viability Gap Funding (VGF) and PLI support for critical chemicals and upstream solar wafer/ingot manufacturing.
- Rationalize Inverted Duty Structures & Customs Duties: Align GST and import tariffs across value chains, such as reducing customs duties on imported MEG and raw materials not produced domestically at scale.
- Modernize Clusters via Plug-and-Play Hubs: Fast-track integrated manufacturing hubs with centralized effluent treatment, shared utilities, and single-window clearances.
- Upgrade Port Logistics &Multimodal Connectivity: Modernize major ports with dedicated chemical/ hazardous berths, bulk liquid tankage, and automated cargo handling linked directly via PM Gati Shakti rail-road corridors.
- Foster R&D, Tech Transfers & Strategic FTAs: Introduce super-deductions for R&D expenses, incentivize joint ventures for foreign technology transfer in high-tech components, and negotiate balanced Free Trade Agreements with key export markets.

Conclusion:

NITI Aayog's manufacturing roadmap provides an evidence-based framework to transform India into a resilient, high-value global manufacturing powerhouse. By addressing critical raw material dependencies, correcting inverted duty structures, and building integrated plug-and-play industrial clusters, the country can significantly enhance its industrial competitiveness. Ultimately, sustained execution across these priority sectors will drive export growth, generate productive employment, and advance the vision of Viksit Bharat@2047.

Favara–UPI Cross-Border Payment Corridor



Context:

The Maldives Monetary Authority (MMA) launched the Favara–UPI Cross-Border Payment Corridor, enabling real-time remittances from the Maldives to India.

The Favara–UPI Cross-Border Payment Corridor

AboutThe Favara–UPI Cross-Border Payment Corridor:

What It Is?

- A real-time cross-border payment corridor integrating the Maldives' Favara Instant Payment System with India's Unified Payments Interface (UPI), enabling seamless person-to-person (P2P) fund transfers.

- Nations Involved: India and Maldives.
- Aim: To facilitate secure, instant, and low-cost cross-border digital payments, strengthen bilateral financial connectivity, and deepen economic cooperation.

Key Features:

- Real-Time P2P Transfers: Enables individuals in the Maldives to send funds instantly from MVR to UPI-enabled INR bank accounts in India.
- Initial Banking Partners: Launched with Bank of Maldives Plc and Maldives Islamic Bank Plc through their mobile banking applications.
- Permitted Remittance Categories: Supports family-maintenance and gift-related remittances under the Maldives' foreign remittance framework.
- Institutional Collaboration: Implemented through cooperation among the MMA, RBI, NPCI International Payments Limited (NIPL), and participating financial institutions.
- Future Expansion: Upcoming phases will introduce QR-based merchant payments and additional cross-border digital payment services.
- UPI Accepted Countries (9): Cambodia, Singapore, United Arab Emirates, France, Mauritius, Nepal, Bhutan, Qatar and Sri Lanka – enabling Indian travellers to make seamless payments abroad through UPI.

Significance:

- Enhances digital financial integration, remittances, and people-to-people connectivity between the two countries.
- Expands India's Digital Public Infrastructure (DPI) footprint and reinforces UPI as a leading global cross-border payment system.

The Geological Survey of India (GSI)

Context:

Smt. Varsha Ashok Aglawe assumed charge as the 54th Director General of the Geological Survey of India (GSI), becoming the first woman to lead India's premier geoscientific organization in its 176-year history.

The Geological Survey of India (GSI)

About The Geological Survey of India (GSI):

What It Is?

- The Geological Survey of India (GSI) is the premier national geoscientific agency responsible for creating and updating national geoscientific data, carrying out mineral resource assessments, and conducting fundamental geological research. It functions as an attached office under the Ministry of Mines, Government of India.

Establishment & History:

- Early Beginnings (1836–1848): Began with early coal investigations by the East India Company. The term Geological Survey of India was first officially used by John McClelland in his 1848 report.
- Formal Establishment (1851): Established in 1851 primarily to locate coal deposits for the expansion of the Indian Railways network.
- Founding Pioneer: The continuous working era of GSI commenced on March 4, 1851, with the arrival of Sir Thomas Oldham, Professor of Geology at Trinity College Dublin, who served as its first Director.
- Aim: To systematically document India's terrestrial and offshore geology, assess national mineral and energy resources, provide objective geoscientific expertise for policymaking, and manage natural hazard risks.

Key Functions:

- SystematicGeological Survey & Mapping: Conducts ground, airborne, satellite, and marine surveys using geophysical and geochemical methodologies to document India's surface and subsurface geology.
- Mineral Prospecting & Exploration: Explores and scientifically assesses national mineral, energy, and water

resources, with an intensified focus on deep-seated and critical minerals (lithium, rare earth elements, copper, cobalt).

- Natural Hazard & Environmental Studies: Conducts geotechnical investigations for public infrastructure, seismotectonic evaluations, landslide zoning, glaciology, and natural hazard risk assessments.
- Geoscientific Data Repository: Serves as the national clearing house and central repository for spatial and geoscientific databases via modern geoinformatics platforms.
- Fundamental & Collaborative Research: Engages in multidisciplinary earth science research—including polar studies, paleontology, and climate change geology—in partnership with global and Indian academic institutions.

Critical Minerals: The Foundation of Strategic Power

Context:

Policy analyses highlighted that critical minerals have become central to industrial strategy and national security, driven by the growing needs of clean energy, defence, and digital technologies.



Critical Minerals: The Foundation of Strategic Power

AboutCritical Minerals: The Foundation of Strategic Power:

What it is?

- Critical minerals are non-fuel mineral elements essential for clean energy transition technologies (EV batteries, solar PVs, wind turbines), semiconductors, telecommunications, aerospace, and advanced defense systems.
- Due to extreme geographical concentration in mining and processing—primarily dominated by China—access to these raw and refined materials is no longer merely a commercial transaction but a cornerstone of global geopolitical power and economic sovereignty.

Key Data & Statistics:

- Extreme Refining Concentration: The average global market share of the top three refining nations for copper, lithium, nickel, cobalt, graphite, and rare earths rose to 86%, with China leading refining in 19 out of 20 strategic minerals.
- Dominance in Processing: China processes over 90% of global rare earths and graphite, nearly 75% of cobalt, and 70% of lithium chemicals, creating a strategic midstream monopoly.
- Projected Supply Deficits: Current copper project pipelines point to a 30% global supply shortfall by 2035, while lithium and rare earth markets face impending deficits as clean energy adoption expands.
- India'sLong-Term Demand Surge: Under a Net-Zero 2070 scenario, India's cumulative demand for energy transition minerals will reach roughly 169 million tonnes—51% higher than under current policy pathways.

Need for Critical Minerals Security for India:

- Fueling the Clean Energy Transition: Powering solar panels, wind turbines, grid-scale energy storage, and electric vehicle (EV) gigafactories required for India's 2070 Net-Zero targets.
- Securing High-Tech &Semiconductor Manufacturing: Serving as indispensable inputs for microchips, advanced displays, 5G telecom hardware, and consumer electronics.
- Strengthening Strategic Defense & Aerospace: Supplying high-strength permanent magnets and specialized alloys for missile guidance, radars, fighter jets, and satellite payloads.
- Protecting Economic Sovereignty against Supply Weaponization: Mitigating risks from foreign export controls (e.g., China's rare earth and graphite export restrictions) that threaten supply chain disruptions.
- CapturingMidstream Industrial Value: Moving beyond raw mineral import dependence toward high-purity refining and component manufacturing inside domestic corridors.

Structural Constraints & Challenges:

- Lack of High-Purity Processing Capabilities: While India possesses raw reserves of copper, graphite, and monazite, it lacks midstream smelting, chemical purification, and high-purity refining infrastructure.
- Shallow Exploration & Regulatory Delays: Mining exploration remains largely restricted to shallow depths,

with prolonged forest/environmental clearances and limited private sector participation slowing project execution.

- High Import Dependence forKey Battery Metals: India remains almost entirely import-reliant for primary lithium, cobalt, and nickel inputs needed for domestic battery cell production.
- Nascent Recycling Ecosystem: Secondary recovery from e-waste and end-of-life EV batteries is hampered by fragmented collection pipelines, feedstocks, and early-stage technological maturity.
- Challenging Remote Location Economics: Developing upstream reserves in geographically remote or ecologically sensitive regions faces high infrastructure costs and complex local logistics.

Policy Initiatives Taken So Far:

- Establishment of theNational Critical Mineral Mission (NCMM): Approved with an outlay to oversee exploration, overseas asset acquisition, recycling, and domestic processing, targeting 1,200 domestic exploration projects by 2030–31.
- Strategic Foreign Asset Acquisitions (KABIL): Khanij Bidesh India Limited (KABIL) secured 15,703 hectares in Argentina's Catamarca province for lithium exploration and joint development.
- MMDR Act Amendments & State Auctions: Amended the Mines and Minerals (Development and Regulation) Act to grant the Central Government power to auction 24 critical mineral blocks directly.
- Recycling Incentive Scheme & Dedicated Corridors: Approved a 1,500 crore incentive scheme for critical mineral recycling and proposed specialized Rare Earth Corridors across Odisha, Kerala, Andhra Pradesh, and Tamil Nadu.
- Bilateral & Plurilateral Alliances: Signed the India–U.S. Strategic Critical Minerals Cooperation Framework (May 2026) and joined the Quad Critical Minerals Initiative to secure trusted supply networks.

Way Forward:

- Prioritizing Midstream Refining as a National Industrial Goal: Grant infrastructure status and targeted Production Linked Incentives (PLI) to build domestic high-purity chemical processing and smelting plants.
- Operationalizing Strategic Mineral Reserves: Establish national physical stockpiles for vulnerable critical minerals (like refined lithium and rare earth oxides) to buffer short-term global supply shocks.
- De-Risking Private Capital with Geological Data: Provide high-resolution geophysical data, streamlined single-window clearances, and risk-sharing financial mechanisms to attract private mining firms.
- Accelerating Closed-LoopCircular Recycling: Strictly enforce Extended Producer Responsibility (EPR) under Battery Waste Management Rules to channel urban e-waste directly into recycling plants.
- Deepening Strategic Multilateral Partnerships: Expand diplomatic engagement through FORGE, Pax Silica, and bilateral technology transfer agreements to co-develop processing know-how with trusted allies.

Conclusion:

Critical minerals have become the foundational currency of modern economic power, clean energy security, and national defense. While India has laid down foundational policy frameworks like the National Critical Mineral Mission, translating potential into capability requires rapid scaling of midstream refining. Ultimately, converting raw reserves and international alliances into processed industrial capability is essential to securing India's technological sovereignty.

The Closing Auction Session (CAS)



Context:

The Closing Auction Session (CAS) was introduced by Indian stock exchanges on August 3, 2026, for cash market stocks with derivatives, following SEBI's January 2026 directive.

The Closing Auction Session (CAS)

AboutThe Closing Auction Session (CAS):

What It Is?

- The Closing Auction Session (CAS) is a dedicated 20-minute daily auction mechanism introduced in the cash market segment for equity stocks on which derivative (F&O) contracts are available. Instead

of computing closing prices through continuous trade averages, CAS aggregates buy and sell orders to discover a single, fair equilibrium closing price.

- Regulator Mandate: Mandated by the Securities and Exchange Board of India (SEBI) via circular issued on January 16, 2026.
- Exchanges Implementing: Simultaneously launched by the National Stock Exchange (NSE) and BSE.
- Implementation Date: Effective from August 3, 2026.
- Aim: To curb end-of-day price manipulation, improve price discovery, align Indian equity markets with global best practices, and deliver more accurate benchmark values for mutual funds, ETFs, and derivatives settlement.

How It Works?

- Phase 1 — Transition & Reference Price (3:15 PM – 3:20 PM): Continuous trading ends for eligible F&O stocks at 3:15 PM. The system calculates a reference price based on the Volume-Weighted Average Price (VWAP) of trades between 3:00 PM and 3:15 PM, applying a strict ±3% price band.

Phase 2 — Order Entry Window (3:20 PM – 3:30 PM):

- 3:20 PM – 3:25 PM: Market and limit orders can be placed, modified, or canceled.
- 3:25 PM – 3:30 PM: Only limit orders are accepted; market orders cannot be altered or canceled. The order entry window closes at a random time between 3:28 PM and 3:30 PM to prevent order spoofing.
- Phase 3 — Order Matching & Price Discovery (3:30 PM – 3:35 PM): The system matches buy and sell orders at a single equilibrium price that maximizes executable volume. Market orders receive execution priority over limit orders.

Key Features:

- Phased Scope: Applies exclusively to equity cash market stocks with active F&O derivative contracts. Non-F&O stocks continue regular trading until 3:30 PM using the existing 30-minute VWAP method.
- Order Type Restrictions: Stop-loss, iceberg, and revealed-quantity orders are prohibited during CAS.
- Carryover of Pending Orders: Unexecuted limit orders from the continuous trading session automatically transfer to CAS provided they fall within the ±3% price band.
- Independent Order Books: NSE and BSE run separate order books for CAS, leading to localized price discovery and short-term inter-exchange price differences.

Primary Applications:

- Derivatives Settlement Benchmark: Sets the underlying cash price used to settle index and stock futures and options contracts.
- Portfolio Valuation & NAV Calculation: Provides clean closing benchmarks for mutual funds, pension funds, and ETFs during portfolio mark-to-market calculations.
- Institutional Execution Hub: Enables large institutional investors and passive funds to execute bulk rebalancing trades without causing excessive intraday price slippage.

Licensing Urban Cooperative Banks (UCBs)

Context:



Reserve Bank of India (RBI) Governor announced that the central bank will soon issue draft guidelines for the resumption of on-tap licensing of Urban Cooperative Banks (UCBs).

Licensing Urban Cooperative Banks (UCBs)

AboutLicensing Urban Cooperative Banks (UCBs):

What It Is?

- Licensing of Urban Cooperative Banks (UCBs) refers to the regulatory authorization granted by the Reserve Bank of India under Section 22 (read with Section 56) of the Banking Regulation Act, 1949.
- This licence empowers primary cooperative credit societies to conduct banking activities—such as accepting public deposits and granting credit—in urban and semi-urban areas.

Regulatory History & Timeline:

- 1966: UCBs brought under RBI's regulatory ambit via amendments to the Banking Regulation Act.
- May 1993 – June 2001: Liberalized licensing era where over 820 new UCB licenses were issued.
- 2004: RBI suspended new UCB licenses following widespread failures among newly licensed entities.
- January 2026: RBI released a comprehensive Discussion Paper on reopening UCB licensing.
- August 2026: RBI Governor announced upcoming draft guidelines for on-tap licensing based on stakeholder feedback.
- Aim: To expand sustainable, relationship-based community banking, foster grassroots financial inclusion in urban/semi-urban regions, and allow well-run cooperative credit societies to transition into full-fledged regulated banks.

Proposed Criteria for Licensing:

- Minimum Capital: Applicant society must possess a minimum net worth/capital of 300 crore.
- Operational Track Record: Must have been actively operating for at least 10 years, showing a strong financial track record for at least 5 years.
- Capital Adequacy Ratio (CRAR): Minimum Capital to Risk-Weighted Assets Ratio of 12%.
- Asset Quality: Net Non-Performing Assets (Net NPAs) capped at not more than 3%.
- Geographical Footprint: Preference given to Multi-State Cooperative Credit Societies due to broader scale, though select single-state entities meeting criteria may be considered.

Why Licensing Was Halted in 2004?

- Widespread Insolvency & Financial Weakness: Nearly 31% of the UCBs licensed during the 1990s liberalisation turned financially unsound within a short period due to poor credit appraisal and rapid unviable expansion.
- Major Governance Failures & Frauds: Prominent collapses—such as the Madhavpura Mercantile Cooperative Bank crisis (2001)—exposed severe corporate governance deficits, conflict of interest, and insider lending.
- Dual Regulation Gaps: Banking operations were supervised by the RBI, while administrative and managerial oversight rested with State Registrars of Cooperative Societies (RCS), creating enforcement delays and supervisory loopholes.

Need for Restart:

- Strengthened Statutory Powers: The Banking Regulation (Amendment) Act, 2020 granted the RBI direct powers over UCB management, board constitution, and resolution—effectively fixing the dual-regulation loophole.
- 4-Tier Prudential Framework: Implementation of deposit-based tiered regulatory standards (Tiers 1 to 4) since December 2022 ensured calibrated risk oversight.
- Improved Sector Balance Sheets: Gross NPAs of UCBs fell to a six-year low of 21,769 crore in FY26, alongside higher Provisioning Coverage Ratios (PCR) and capital buffers.
- Institutional Backing viaNUCFDC: Establishment of the National Urban Cooperative Finance and Development Corporation (NUCFDC) in 2024 offers shared technology platforms, liquidity support, and capital mobilization for UCBs.

Handloom — Weaving India's Heritage into Global Grow

Context:



On August 7, 2026, marking the 12th National Handloom Day, Union Minister of Textiles Giriraj Singh published a commentary emphasizing handloom as a strategic sector for Viksit Bharat 2047.

Handloom — Weaving India's Heritage into Global Growth

AboutHandloom — Weaving India's Heritage into Global Growth:

What it is?

- India's handloom sector represents a civilisational strength that blends deep cultural heritage with sustainable, handcrafted production.

- As the world moves toward sustainable fashion and authentic, eco-friendly products, India's handloom sector is positioned to transition from a traditional cottage industry into a globally competitive creative economy that exports craftsmanship, innovation, and trust.

Historical & Civilisational Heritage:

- Ancient Origins: Traces back to the Indus Valley Civilisation, where cotton was first cultivated and woven.
- Global Pre-eminence: Indian textiles dominated global trade in the 18th century. Iconic weaves include:
- Bengal's Muslin: Renowned for extreme fineness (a 25-metre length could pass through a ring).
- Regional Traditions: Banarasi Silk, Kanchipuram weaves, and Pochampally Ikat.

Current Landscape & Policy Transformations:

- Cottage Industry Scale: Supports 35+ lakh weavers and allied workers, with nearly 72% being women.

Existing Interventions over the Past Decade:

- Distribution of 1.24+ lakh improved looms.
- Skill upgradation for ~97,000 artisans across 797 handloom clusters.
- Quality assurance via GI tags, Handloom Mark, India Handmade certification, Urban Haats, and Design Resource Centres.

Upcoming National Handloom & Handicraft Programme:

- Aims to strengthen 1,800 clusters across >500 districts.
- Direct beneficiary base of 65 lakh weavers and artisans to establish the Handmade in India global brand.

Technology, Innovation &Handloom 4.0:

Ergonomic Design Innovations:

- Historical adaptations like Mahatma Gandhi's Ambar Charkha.
- Modern regional loom designs like Assam's Maina Loom and Sivasagar's Chitranjan Handloom.
- Collaboration via the Centre of Excellence for Handloom Technology (with IITs) to create lighter, stronger looms tailored for ease of use, including for artisans with disabilities.
- Digital Integration (Handloom 4.0): Uses AI and digital monitoring tools for quality, maintenance, and productivity tracking (currently piloted across 100 looms).
- Market Intelligence via VisioNXT: Leverages digital platforms for trend forecasting, design identification, anti-counterfeit product authentication, and direct global market linkage.

Handloom as the Driver of India's Growth:

- Driver of Rural andWomen-Led Development: As India's largest cottage industry, the handloom sector directly supports over 35 lakh weavers and allied workers, nearly 72% of whom are women, fostering grassroots financial independence.
- Global Benchmark for Sustainable Fashion: Handloom manufacturing carries a minimal carbon footprint and aligns with global eco-friendly consumer preferences, positioning Brand India as a leader in authentic, sustainable luxury.
- Preserving Civilisational & Cultural Heritage: Handwoven traditions—from Bengal's fine muslin to Banarasi silk, Kanchipuram weaves, and Pochampally Ikat—convert historical heritage into modern economic value.
- Tech-Driven Artisan Modernization: Modern innovations like the Maina Loom, lighter ergonomically designed looms from IIT-led Centers of Excellence, and Handloom 4.0 (AI & digital monitoring) boost artisan productivity without replacing human craftsmanship.

Challenges Facing the Handloom Sector:

- Raw Material Price Volatility: Unpredictable price spikes and supply disruptions in high-quality natural yarns (silk, cotton, wool) squeeze small-scale weavers' profit margins.
- Example: Fluctuating raw silk prices straining the working capital of independent regional handloom units.
- Unfair Competition from Power-looms: Inexpensive, mass-produced powerloom imitations flooded onto the market undercut genuine, labor-intensive handwoven products.

- Example: Powerlooms replicating intricate traditional GI-tagged designs and selling them as authentic handlooms.
- Middlemen Exploitation & Low Incomes: Long supply chains and limited direct market access keep traditional weavers reliant on intermediaries, leaving many below target income levels.
- Example: Rural weavers receiving only a fraction of the final retail price paid by urban or international buyers.
- Physical Strain andOccupational Hazards: Conventional heavy looms cause physical fatigue, joint pain, and posture issues, discouraging the younger generation from entering the family weaving trade.
- Example: Heavy wooden looms requiring intense manual labor leading to high drop-out rates among young rural artisans.

Way Forward:

- Expanding Cluster Coverage via National Programs: Execute the National Handloom and Handicraft Programme to strengthen 1,800 clusters across 500+ districts, targeting a reach of 65 lakh artisans.
- Deploying AI and Direct Market Tech: Scale platforms like VisioNXT and Handloom 4.0 to forecast global design trends, authenticate genuine products, and connect weavers directly to international e-commerce platforms.
- Ergonomic Loom Upgrades & Accessibility: Roll out lighter, ergonomic loom designs (developed by IITs and local innovators) to improve productivity and enable participation by persons with disabilities.
- Targeting Income Benchmarks & Global Brand Identity: Provide end-to-end support through Weavers' Service Centres and IIHTs to elevate handloom into premium luxury segments, enabling weavers to target aspirational incomes of 50,000 per month.

Conclusion:

India's handloom tradition is a foundational component of its economic, cultural, and sustainable growth strategy. By combining ancestral craftsmanship with modern AI monitoring, ergonomic design, and direct global market access, India can elevate its weaving community. Ultimately, transforming weavers into empowered entrepreneurs will ensure that handloom serves as a dynamic ambassador of Brand India on the global stage.

The Foreign Currency Non-Resident (Bank) — FCNR(B) Deposits

Context:

The Reserve Bank of India (RBI) advanced the deadline for fresh Foreign Currency Non-Resident (Bank) [FCNR(B)] deposits to qualify for its special USD–INR forex swap window to August 31, 2026.



The Foreign Currency Non-Resident (Bank)

AboutThe Foreign Currency Non-Resident (Bank) — FCNR(B) Deposits:

What It Is?

- An FCNR(B) deposit is a term/fixed deposit account maintained in approved foreign currencies by Non-Resident Indians (NRIs) and Overseas Citizens of India (OCIs) with authorized banks in India.
- Unlike rupee-denominated NRI accounts (such as NRE or NRO accounts), the funds are held entirely in foreign currency, eliminating foreign exchange conversion risk for the depositor.

Established In & Regulatory Framework:

- Genesis: The FCNR scheme was originally introduced in 1975 (where the exchange risk was borne by the RBI/Government).
- FCNR(B) Revision: To eliminate central fiscal liabilities, the revised FCNR(B) Scheme was launched in May 1993, under which commercial banks themselves maintain and manage foreign currency exchange exposure and liabilities.

- Governing Framework: Governed under the Foreign Exchange Management Act (FEMA), 1999 and RBI Master Directions on Non-Resident Deposits.
- Aim: To attract stable, long-term foreign currency capital into the Indian banking system, reinforce India's external Balance of Payments (BoP), bolster gross foreign exchange reserves, and provide non-resident Indians with a secure, tax-free, and exchange-risk-free investment avenue in India.

How It Works?

- Foreign Currency Inflow: The NRI deposits funds in designated freely convertible foreign currencies (e.g., USD, GBP, EUR, JPY, CAD, AUD) for a fixed maturity tenor (ranging from 1 to 5 years).
- Denomination & Risk Insulation: The principal and accrued interest remain in the designated foreign currency throughout the tenure, shielding the depositor from Indian Rupee (INR) depreciation.

Special RBI Swap Window Operation (When Activated):

- The commercial bank sells the foreign currency principal to the RBI at the prevailing spot rate and receives equivalent rupees to fund domestic credit operations.
- Concurrently, a forward contract is executed at par to buy back the exact dollar sum upon maturity, eliminating the commercial bank's hedging costs.
- Maturity & Repatriation: At maturity, the principal and interest are returned in foreign currency and are freely repatriable overseas without restrictions or Indian tax deductions.

Key Features of FCNR(B) Deposits:

- ForeignCurrency Denomination: Maintained strictly as foreign currency term deposits (not as savings or current accounts).
- Zero Exchange Risk for Depositors: Fluctuations in the USD–INR exchange rate do not affect the depositor's principal or interest.
- Full Tax Exemption in India: Interest earned on FCNR(B) accounts is 100% exempt from Indian Income Tax and Wealth Tax as long as the depositor maintains non-resident status under FEMA.
- Complete Repatriability: Both the principal amount and the accrued interest are fully and freely repatriable outside India without regulatory friction.
- Flexible Tenors & Reserve Incentives: Issued for tenors of 1 to 5 years. During special mobilization drives, the RBI often provides regulatory sweeteners such as CRR/SLR exemptions and concessional par swaps to incentivize competitive pricing by banks.

The Centre's Fiscal Outlook

Context:

Former RBI Governor C. Rangarajan and D.K. Srivastava assessed the Centre's FY 2026–27 fiscal outlook, noting that strong non-tax revenues and capital spending could keep the fiscal deficit near the 4.6% target, despite tax, subsidy and geopolitical pressures.



The Centre's Fiscal Outlook

AboutThe Centre's Fiscal Outlook:

What It Is?

- The Centre's fiscal outlook represents the projected health of Union government finances for FY 2026–27, balancing gross tax revenues, non-tax windfalls, non-debt capital receipts, and expenditure liabilities (subsidies and public capital expenditure). It measures the government's ability to maintain fiscal consolidation targets—specifically capping the fiscal deficit at 4.6% of GDP and the debt-to-GDP ratio at 55.8%—against external supply shocks and domestic tax base adjustments.

Key Data & Statistics:

- Gross Tax Revenue (GTR) Slowdown: According to Controller General of Accounts (CGA) data, the Centre's GTR grew by only 3.7% in Q1 FY 2026–27, driven by an 11% contraction in GST and a modest 6.8% increase in Personal Income Tax (PIT).

- Excise Duty Contraction: Union excise duty collections contracted by 22.4% in Q1 following duty cuts introduced to buffer consumers against high global crude oil prices.
- Higher NominalGDP Growth Projection: FY 2026–27 nominal GDP growth is projected between 12.5% and 13.0% (exceeding the budgeted 10.04%), with estimated real GDP growth of ~7% and an Implicit Price Deflator (IPD) inflation of 5.0%–5.5%.
- Rising Subsidy Burden: Major subsidies surged by 37.4% in Q1, with full-year subsidy payouts projected to exceed budget estimates by approximately 50,000 crore due to volatile crude oil prices.

Fiscal Risks & Structural Challenges:

- Lagged Revenue Impact ofTax Rate Rationalisation: Extensive rate reductions in GST and structural adjustments in personal income tax during 2025–26 resulted in an initial revenue sacrifice that has not yet been fully offset by tax base expansion.
- West Asian Geopolitical Crisis & Crude Volatility: Protracted conflict in West Asia elevated crude oil import costs, forcing the Centre to absorb higher fertilizer and fuel subsidy burdens.
- Sharply Reduced Tax Devolution to States: Driven by subdued gross collections, tax devolution to states contracted by (-)19.5% in Q1, while 16th Finance Commission (FC16) grants are budgeted to decrease by 23,556 crore.
- Divisible Pool Shrinkage via Cesses: The introduction of the non-shareable Health Security and National Security (HSNS) Cess (effective February 1, 2026) reduces the shareable pool of central taxes available for state devolution.
- External Debt & Rupee Depreciation Pressures: Currency volatility against the US dollar raises the rupee cost of external debt servicing.

Compensatory Measures & Stabilizing Factors:

- Strong Non-Tax Receipts & RBI Dividend Windfall: The Reserve Bank of India transferred its annual dividend to the Centre in May 2026, realizing 77% of the full-year budgeted non-tax dividend receipts within the first three months.
- Introduction of the HSNS Cess: Implemented on February 1, 2026, replacing the expired GST Compensation Cess to mobilize non-shareable funds for healthcare and defense priorities.
- Enhanced Windfall Taxes & Precious Metal Customs: Raised windfall taxes on exports of petrol, diesel, and aviation turbine fuel (ATF) effective August 3, 2026, alongside higher import tariffs on gold and silver bullion.
- Robust Capital Expenditure Front-Loading: Central capex expanded by 23.7% in Q1 FY27, reversing the contraction seen in late FY26 and supporting domestic industrial output.

Way Ahead:

- Restoring Fuel Excise Duties at a Calibrated Pace: Gradually roll back temporary excise duty cuts on auto fuels once international crude prices stabilize to rebuild recurring tax streams.
- Accelerating GST Base Expansion: Address compliance leakages and expand business registration to offset the revenue impact of recent rate rationalizations.
- Targeting Demand-Side Public Investment: Maintain public infrastructure capex momentum to stimulate private capital expenditure and support mass consumer demand.
- InstitutionalizingPredictable State Devolution: Rebalance fiscal transfers to states through non-FC grants to compensate for the contraction in the divisible tax pool caused by central cesses.
- Dynamic Commodity & Currency Hedging: Utilize sovereign hedging instruments and expand local currency trade settlement to insulate the national subsidy budget from international energy shocks.

Conclusion:

The Centre's fiscal framework for FY 2026–27 demonstrates resilience, using strong non-tax revenues and capex front-loading to cushion the impact of tax concessions and West Asian energy shocks. While the fiscal deficit remains broadly anchored around 4.6% of GDP, expanding the tax base and rationalizing cesses are essential to long-term fiscal health. Ultimately, balancing macroeconomic stability with support for state finances will ensure sustainable growth aligned with national development priorities.

SEBI's IT Resilience Index (ITRI)

Context:



The Securities and Exchange Board of India (SEBI) has introduced the IT Resilience Index (ITRI), a pioneering quantitative technology health scorecard for Market Infrastructure Institutions (MIIs).

SEBI's IT Resilience Index (ITRI)

AboutSEBI's IT Resilience Index (ITRI):

What It Is?

- The IT Resilience Index (ITRI) is a first-of-its-kind quantitative regulatory barometer designed to evaluate, score, and benchmark the technical robustness, cybersecurity posture, fault tolerance, and disaster-recovery capabilities of critical capital market infrastructure. Similar to how capital adequacy ratios measure financial health in banking, the ITRI measures systemic digital resilience in capital markets.
- Regulatory Body: Securities and Exchange Board of India (SEBI).
- Aim: To assess whether the core IT backbones running trading, clearing, settlement, and depository systems can withstand, absorb, and rapidly recover from operational shocks, cyberattacks, software glitches, and extreme transaction-volume surges without destabilizing the broader financial system.

Key Features of ITRI:

- Quantitative Shift from Static Compliance: Moves MII supervision away from subjective periodic audits to a measurable, objective numeric index that evaluates live operational readiness and failover execution.
- Risk-Prioritized 9-Parameter Architecture: Evaluates institutions across nine weighted pillars based on systemic criticality, led by:
- Availability (20% weight) and Cybersecurity (20% weight) as front-line operational defenses.
- Business Continuity (10% weight) and Reliability (10% weight) to ensure rapid recovery time objectives (RTO).
- Scalability (5% weight) to handle sudden volatility surges and market volume spikes.
- MandatoryEarly Warning System (EWS): Requires MIIs to implement automated real-time telemetry that detects performance degradation, latency spikes, or hardware stress before they cause outages.
- Resilience-First Operational Philosophy: Aligns regulatory enforcement with modern digital principles—prioritizing how effectively a system absorbs an unavoidable shock, and restores operations rather than assuming zero failure.
- Integration with Future-Tech Roadmaps: Complemented by SEBI's long-term technology roadmaps governing artificial intelligence (AI/ML), SupTech/RegTech, and quantum-safe cryptographic defenses.

Significance:

- SEBI's ITRI introduces an enforceable numerical measure of IT risk, potentially setting a global benchmark for capital-market regulation.
- Helps prevent digital failures at exchanges and depositories from triggering systemic disruptions, especially in India's high-volume, T+1/T+0 settlement environment.

The GARUD High Resolution Binoculars



Context:

India Optel Limited (IOL), a Mini Ratna Category-I Defence Public Sector Undertaking (DPSU), officially launched the indigenous 'GARUD' High Resolution Binoculars for the civil market at DPSU Bhawan, New Delhi.

The GARUD High Resolution Binoculars

AboutThe GARUD High Resolution Binoculars:

What It Is?

- GARUD is an indigenous, defense-grade high-resolution binocular platform adapted for civilian use. Derived from optical equipment used by the Indian Armed Forces and Central Armed Police Forces (CAPFs), it offers high-precision optics in a compact, portable design.
- Manufacturer: Ordnance Factory, Dehradun (a unit of India Optel Limited – IOL under the Department of Defence Production, Ministry of Defence).
- Aim: To commercialize indigenous defense optical capabilities under the Aatmanirbhar Bharat initiative, making reliable, high-precision optical gear accessible to outdoor enthusiasts, researchers, and civilian professionals.

Key Features:

- 8x Magnification & Wide Field of View: Provides 8x optical magnification paired with a broad 7.6-degree field of view for clear observation of distant targets while preserving wide peripheral context.
- IndividualEyesight Adjustment: Features a ±5 diopter adjustment mechanism to customize focusing for individual user vision requirements.
- Ergonomic Design & Soft Eyecups: Designed with a anti-slip grip and soft-touch eyecups to facilitate fatigue-free, extended viewing sessions.
- All-Weather Rugged Construction: Encased in a weather-resistant chassis, ensuring dependable optical performance across harsh outdoor environments.
- Lightweight Portability: Weighs approximately 610 grams, delivering a balance between handheld stability and field portability.

Significance:

- Demonstrates the successful transfer and commercialization of military-grade optical manufacturing capabilities into the civilian market, diversifying revenue streams.
- Provides a durable, locally made alternative for birdwatching, forestry, wildlife conservation, sports, marine operations, travel, and private security applications.

Samudra Manthan (National Offshore Exploration Scheme)

Context:



The Union Cabinet, chaired by Prime Minister of India, approved 'Samudra Manthan' (National Offshore Exploration Scheme).

- Operating as a Central Sector Scheme under the Ministry of Petroleum & Natural Gas, it carries a financial outlay of 84,084 crore for implementation through FY 2030–31 to unlock India's vast offshore hydrocarbon potential.

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National Offshore Exploration Scheme

AboutSamudra Manthan (National Offshore Exploration Scheme):

What It Is?

- Samudra Manthan is a comprehensive national initiative designed to de-risk and accelerate domestic offshore oil and gas exploration.
- It provides public financial backing across the upstream exploration value chain—spanning seismic data collection, deepwater exploratory drilling, frontier basin research, and common evacuation infrastructure.
- Ministry: Ministry of Petroleum & Natural Gas, Government of India.
- Scheme Classification: Central Sector Scheme (100% centrally funded).
- Implementation Timeline: Up to FY 2030–31.

Total Outlay: 84,084 crore.

- Aim: To strengthen India's energy security, boost domestic oil and natural gas production, reduce heavy reliance on crude oil imports, and establish an indigenous, globally competitive ecosystem for offshore energy technologies.

Key Features:

- Strategic Allocation for High-Risk Deepwater Drilling: Earmarks 43,200 crore to subsidize deepwater and ultra-deepwater exploratory drilling, covering up to 50% of the drilling cost (or up to 650– 675 crore per well) to offset high capital risks.
- ComprehensiveData Acquisition: Allocates 28,534 crore for large-scale acquisition, processing, and interpretation of high-quality seismic data—specifically targeting previously unexplored frontier basins and former no-go offshore zones.
- Common Production and Evacuation Hubs: Earmarks 10,000 crore to build shared offshore production and pipeline evacuation infrastructure, enabling faster commercialization of deepwater discoveries.
- Manufacturing & Services Zones: Directs 2,000 crore toward setting up dedicated Oil & Gas Manufacturing and Services Zones to promote indigenous equipment production under Make in India.
- Digital Governance & Capacity Building: Integrates advanced digital program management, capacity-building frameworks, and technology adoption protocols via the National Data Repository (NDR) to streamline stakeholder engagement and global outreach.

Significance:

- Aims to add over 600 MMTOE of reserves, reducing crude oil imports and strengthening India's energy security.
- Co-funds costly deepwater wells, lowering investment risks and attracting exploration in KG, Cauvery, Mahanadi, and Andaman basins.

The Pradhan Mantri Surya Sarovar Yojana (PM-SSY)

Context:

The Union Cabinet approved the Pradhan Mantri Surya Sarovar Yojana (PM-SSY) with an outlay of 5,070 crore to promote floating solar projects with battery storage across reservoirs and inland water bodies.



The Pradhan Mantri Surya Sarovar Yojana

AboutThe Pradhan Mantri Surya Sarovar Yojana (PM-SSY):

What It Is?

- PM-SSY is a national renewable energy central scheme designed to promote floating solar power generation co-located withenergy storage. It optimizes water surfaces (reservoirs, dams, and industrial ponds) to generate clean energy while preventing land-use conflicts.
- Nodal Ministry: Ministry of New and Renewable Energy (MNRE), Government of India.
- Implementing Agency: Solar Energy Corporation of India (SECI).

- Aim: To expand India's floating solar capacity from its present ~700 MW to 5,700 MW by adding 5,000 MW of capacity coupled with 10,000 MWh of energy storage, mitigating land acquisition bottlenecks, reducing water evaporation losses, and enhancing power grid reliability.

Key Features:

- Substantial Capacity Target: Targets the development of 5,000 MW of Floating Solar Photovoltaic (FSPV) projects across all States and Union Territories between FY 2026–27 and FY 2030–31.
- Mandatory Co-Located Energy Storage: Integrates Energy Storage Systems (ESS) providing a minimum 2-hour storage duration (totaling 10,000 MWh capacity) to supply power during peak demand hours and reduce renewable energy curtailment.
- Central Financial Assistance (CFA): Provides 1 crore per MW as post-commissioning central financial support to developers, helping bridge the ~25% higher capital cost of floating solar platforms compared to ground-mounted solar.
- Project De-Risking Grants: Offers up to 50 lakh per project for initial technical feasibility studies, including bathymetry and hydrography surveys, solar yield calculations, and aquatic ecological impact assessments.
- Aatmanirbhar Manufacturing Push: Boosts indigenous manufacturing across the entire value chain, including floatation platforms, anchoring/mooring systems, PV modules, and storage batteries.

Significance:

- Uses reservoirs for solar projects, reducing land conflicts while lowering water evaporation through panel shading.
- Cuts nearly 10 million tonnes of CO_2 annually and creates 16,000–17,000 jobs, advancing India's net-zero and Viksit Bharat goals.

DSC A24 (Yard 329): Indian Navy's Indigenous Diving Support Craft

Context:

DSC A24 (Yard 329)—the fifth and final ship of the Diving Support Craft (DSC) project—was launched at the Titagarh shipyard in Kolkata (West Bengal).



DSC A24 (Yard 329): Indian Navy's Indigenous Diving Support Craft

AboutDSC A24 (Yard 329): Indian Navy's Indigenous Diving Support Craft:

What It Is?

- DSC A24 (Yard 329) is a specialized catamaran-hulled naval vessel built to perform underwater diving support, salvage operations, and coastal deployments. It is the fifth and final ship constructed under a five-vessel Diving Support Craft contract for the Indian Navy.

Developed By:

- Manufacturer / Shipbuilder: M/s Titagarh Rail Systems Limited (TRSL) / Titagarh Naval Systems Limited, Kolkata.
- Classification Standards: Designed and constructed in accordance with the Naval Rules and Regulations of the Indian Register of Shipping (IRS).
- Aim: To bolster the operational capacity of the Indian Navy's Command Clearance Diving Teams (CCDTs) by providing stable, indigenous platforms for complex underwater inspections, maintenance, salvage assistance, and harbour/near-shore deployments.

Key Features:

- Catamaran-Hull Design: Built with a twin-hull (catamaran) structure, offering superior roll stability, improved sea-keeping characteristics, and an expanded working deck footprint.
- Displacement Capacity: Features an approximate displacement ranging between 300 and 400 tonnes, optimized for shallow-water and coastal operations.

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- High Indigenous Content: Sourced approximately 70% of its main and auxiliary machinery from domestic manufacturers under the Aatmanirbhar Bharat initiative.
- Specialized Diving Gear Handling: Equipped with advanced indigenous lifting and sonar deployment setups to host divers, decompression units, and subsea tools.
- IRS Naval Rules Compliance: Fully certified under the Indian Register of Shipping's stringent naval standards for hull integrity, fire safety, and maritime seaworthiness.

Significance:

- The launch of DSC A24 completes the five-vessel Diving Support Craft (DSC) project, modernizing the Indian Navy's underwater support
- Showcases the growing capability of Indian private shipyards like Titagarh Rail Systems to build specialized naval platforms under Make in India.

Rwanda

Context:

India and Rwanda held the First Session of the India–Rwanda Joint Trade Committee (JTC) in New Delhi, establishing an institutional mechanism to expand bilateral commerce, address trade barriers, and foster B2B partnerships.



Rwanda

AboutRwanda:

What It Is?

- Rwanda, officially the Republic of Rwanda, is a small, highly densely populated landlocked nation in east-central Africa. Revered globally as Land of a Thousand Hills due to its ubiquitous rolling green highlands, the nation is widely recognized for its rapid socio-economic reconstruction, digital transformation, and ease of doing business following the 1994 genocide.
- Capital: Kigali (located in the central highlands along the Ruganwa River).
- Geographic Location: Situated in East/Central Africa, just a few degrees south of the Equator within the Albertine (Western) Rift Valley.
- Bordering Nations: Rwanda is landlocked and shares international land borders with four neighboring countries: Uganda, Tanzania, Burundi, and Democratic Republic of the Congo (DRC)

Key Features:

- Albertine Rift Mountain Chain: The western frontier is dominated by the Albertine Rift Range (the western branch of the East African Rift System), giving the country its elevated highland terrain and rugged relief.
- Virunga Volcanic Range: The northwest region features a chain of dormant stratovolcanoes, including Mount Karisimbi—the highest point in Rwanda at 4,507 meters (14,787 ft). This habitat is world-famous for protecting endangered mountain gorillas in Volcanoes National Park.
- Congo–Nile Continental Divide: A high-altitude mountain spine runs north-to-south through the country, acting as a major hydrological divide. Rivers on the east drain into the Nile via the Kagera River, while western rivers empty into the Congo River basin via Lake Kivu.
- Lake Kivu & Deep Rift Waters: Forms part of the African Great Lakes network; Lake Kivu along the DRC border is one of the deepest rift-valley lakes in the world, holding massive reserves of dissolved limnic methane gas.
- Rolling Interior & Eastern Savanna: The landscape cascades eastward from steep, terraced agricultural hills into lower-lying plateaus, swamps, and tropical savannas across the Akagera basin.

Significance:

- Rwanda connects the EAC, COMESA, and AfCFTA, making it a key trade and logistics hub in East and Central Africa.

- Rich in 3Ts—tin, tungsten, and tantalum (coltan), Rwanda is vital to global electronics and clean-energy supply chains.

Water Management and Conservation

Context:



The Ministry of Jal Shakti highlighted nationwide water management initiatives, including the successful pilot of the Atal Bhujal Yojana across 8,203 water-stressed Gram Panchayats.

Water Management and Conservation

AboutWater Management and Conservation:

What it is?

- Water management and conservation refers to the strategic planning, development, distribution, and preservation of surface and groundwater resources. While water is constitutionally a State subject in India, the Central Government provides financial, technical, and digital public infrastructure support to implement demand-side management, scientific aquifer mapping, and community-driven rainwater harvesting.

Data/Stats on Water Conservation:

- Nationwide Water Body Census: Identified, enumerated, and geo-tagged over 24.2 lakh water bodies across India to build a scientific baseline for restoration.
- Jal Sanchay Jan Bhagidari (JSJB): Created and geo-tagged more than 1.55 crore artificial recharge and storage structures nationwide as of May 2026.
- Atal Bhujal Yojana Footprint: Covered 8,203 priority water-stressed Gram Panchayats across 229 blocks in 80 districts across 7 states (Gujarat, Haryana, Karnataka, MP, Maharashtra, Rajasthan, and UP).
- Catch the Rain Progress: Over 2.0 crore water conservation and artificial recharge works taken up through scheme convergence as of July 28, 2026.

Methods of Water Conservation and Management:

- Participatory Demand-Side Management: Involving local Gram Panchayats in water budgeting to shift focus from infinite supply expansion to crop diversification and efficient water use.
- Example: Farmers in Atal Bhujal Yojana Panchayats switching to micro-irrigation.
- 3D GIS Aquifer Mapping & Modeling: Utilizing Remote Sensing (RS) and Geographic Information Systems (GIS) to map underground water-bearing rock layers.
- Example: CGWB's NAQUIM 2.0 mapping 25 lakh sq. km to identify precise recharge zones.
- Digital Telemetry Monitoring: Installing Digital Water Level Recorders (DWLRs) in piezometer wells to track groundwater fluctuations continuously.
- Example: Network of over 24,000 DWLRs transmitting real-time groundwater levels under the National Hydrology Project.
- Hydrological Forecasting and Satellite Mapping: Leveraging mathematical modeling and satellite data to track surface flow velocity, reservoir storage, and flood levels.
- Example: The Flood Watch India app monitoring 592 flood stations and 150 major reservoirs.

Initiatives Taken So Far:

- National Aquifer Mapping Program (NAQUIM 1.0 & 2.0): Mapped 25 lakh sq. km of mappable area and disseminated district-level aquifer management plans to local administrations.
- India-Groundwater Resource Estimation System (IN-GRES): Standardized, web-based platform providing scientific data for groundwater planning across MGNREGA and Jal Shakti Abhiyan.
- Water Information Management System (WIMS): Integrated centralized platform established under the National Hydrology Project for hydrological data collection, storage, and canal/reservoir management.
- PMKSY Digital Asset Mapping: Mandated geo-tagging and assignment of unique identification codes for surface minor irrigation assets under Har Khet Ko Pani (HKKP) and RRR of water bodies.

Challenges Associated with Water Management:

- Constitutional andJurisdictional Friction: Water being a State subject leads to variable implementation capabilities and inter-state river water disputes.
- Example: Disparities in water governance between states delaying unified river basin management.
- Over-Extraction in Agricultural Belts: Agricultural power subsidies encourage excessive pumping of deep aquifers for water-intensive crops.
- Example: Severe groundwater depletion in flood-irrigated paddy belts of North-West India.
- Maintenance and Siltation ofArtificial Recharge Structures: Created rainwater harvesting structures often silt up or become defunct without sustained community maintenance.
- Example: Check dams losing storage capacity due to unmanaged soil erosion in catchment areas.
- Data Disconnect at Grassroots Level: Advanced digital mapping data often remains at central/state administrative levels without being converted into actionable village-level water budgets.
- Example: Gram Panchayats lacking technical staff to interpret complex hydro-geological maps.

Way Ahead:

- Scaling Community-Led Water Governance: Replicate lessons from the Atal Bhujal Yojana pilot across all water-stressed blocks in India to enforce local water budgeting.
- Mandatory Urban &Rural Rainwater Harvesting: Enforce building bylaws for rooftop rainwater harvesting while linking JSJB recharge structures to local aquifer maps.
- Pivoting to Micro-Irrigation & Crop Switching: Incentivize drip and sprinkler technology under PMKSY to optimize agricultural water consumption.
- Integrating Basin-Wide Digital Dashboards: Unify IN-GRES, WIMS, and JSJB data into a single real-time decision support system for local water managers.

Conclusion:

India's transition toward sustainable water security relies on pairing advanced digital public infrastructure with community-led participatory management. By scaling tools like NAQUIM, IN-GRES, and Jal Sanchay Jan Bhagidari, the state equips local institutions with precision data for water budgeting. Ultimately, converting digital asset mapping into decentralized action is essential to securing India's groundwater and surface water future.

The 'Seafarer-First' initiative



Context:

Union Minister of Ports, Shipping and Waterways launched a whole-of-government 'Seafarer-First' response following attacks on two merchant vessels (MT Al Bahiyah and MT Mombasa) carrying Indian crew members in the Strait of Hormuz.

The 'Seafarer-First' initiative

AboutThe 'Seafarer-First' initiative:

What It Is?

- The 'Seafarer-First' initiative is an emergency, whole-of-government contingency mechanism launched by India to safeguard, track, and support all Indian seafarers operating in high-risk, conflict-affected maritime zones across West Asia (including the Persian Gulf, Strait of Hormuz, and Gulf of Oman) regardless of the flag state of their vessels.

Nodal Ministry: Ministry of Ports, Shipping and Waterways (MoPSW)

- Aim: To individually account for every Indian seafarer in conflict zones, protect their legal and contractual rights, provide 24×7 emergency and medical support, and ensure that no seafarer is forced to sail into high-risk areas without informed consent and protection.

Key Features:

- Flag-Neutral Operational Dashboard: Mandates the Directorate General of Shipping (DGS) to maintain a live, vessel-by-vessel tracking system monitoring location, crew status, cargo, and risk levels for every Indian seafarer, irrespective of ship flags.

- Dedicated Liaison Officers: Appoints a dedicated officer for every affected seafarer to serve as a single point of contact for families, coordinating medical care, repatriation, legal claims, wage settlements, and Seafarers Welfare Fund assistance.
- 24×7 Multi-Channel Support System: Activates round-the-clock emergency assistance lines via domestic toll-free, international helpline, WhatsApp, and email.
- Strict Employer &RPSL Compliance: Directs shipowners and Recruitment and Placement Service Licence (RPSL) agencies to ensure no Indian seafarer is compelled to sail through high-risk zones against their will.
- Fresh Threat-Based Voyage Approvals: Requires vessel movements through affected West Asian waters to undergo pre-voyage threat assessments, Master's professional evaluation, and close coordination with naval/ coastal authorities.

Significance:

- Recognizes seafarers as key workers, ensuring legal, humanitarian, and financial protection during crises.
- Reinforces international maritime law and safeguards vital shipping routes like the Strait of Hormuz for global energy trade.

The Quit India Movement



Context:

The Chairman of the Rajya Sabha made a solemn reference in Parliament to commemorate the 84th Anniversary of the Quit India Movement.

The Quit India Movement

About The Quit India Movement:

What It Is?

- The Quit India Movement (Bharat Chhod Aandolan), also known as the August Kranti, was a mass civil disobedience movement launched by the Indian National Congress (INC) demanding an immediate end to British colonial rule in India.

Launch Details:

- Launch Date: August 8–9, 1942.
- Location: Gowalia Tank Maidan (now August Kranti Maidan), Bombay (now Mumbai).
- Key Leadership: Mahatma Gandhi, Jawaharlal Nehru, Sardar Vallabhbhai Patel, Maulana Abul Kalam Azad, and Aruna Asaf Ali.
- Clarion Call: Do or Die (Karo ya Maro).

Historical Background:

- World War II Threat: Following Japan's attack on Pearl Harbor (December 1941) and swift advance through Southeast Asia (falling of Singapore and Rangoon), the war reached India's doorstep.
- Failure of the Cripps Mission (March 1942): Sent by British PM Winston Churchill, Sir Stafford Cripps offered post-war Dominion Status rather than immediate self-government, which failed to satisfy Indian national leadership.
- Frustration & Impatience: The failure of negotiations created widespread frustration, leading Mahatma Gandhi to conclude that the immediate withdrawal of British power was vital to defend India against foreign aggression.
- Wardha CWC & Bombay AICC Resolutions: The Congress Working Committee met at Wardha in July 1942 to pass the Quit India draft, which was formally ratified at the All India Congress Committee (AICC) session in Bombay on August 8, 1942.

Key Events During the Movement:

- Wholesale Leadership Arrests: At 5:00 AM on August 9, 1942, British authorities launched Operation Zero Hour, arresting Gandhi, Nehru, Patel, Azad, and all top leaders before the movement could be formally organized.

- Spontaneous Mass Uprising: The sudden leadership vacuum triggered an unprecedented, leaderless popular revolt across major industrial and rural hubs (Bombay, Ahmedabad, Delhi, Bihar, Bengal, Karnataka, and UP).
- Parallel Governments (Prati Sarkar): Nationalists established independent parallel administrations in several regions, including:
- Tamluk (Midnapore, Bengal): Tamluk Jatiya Sarkar.
- Satara (Maharashtra): Prati Sarkar led by Nana Patil.
- Balia (Uttar Pradesh): Led by Chittu Pandey.
- Underground Resistance & Radio: Underground networks maintained communication; Aruna Asaf Ali hoisted the national flag at Gowalia Tank Maidan, while Usha Mehta operated the secret Congress Radio.
- Severe Colonial Repression: The British government unleashed harsh measures—deploying police firings, mass arrests (over 100,000 individuals imprisoned), and heavy fines.

Outcomes:

- Paralyzed Colonial Machinery: Mass strikes, sabotage of rail tracks, disruption of telegraph lines, and local boycotts temporarily halted British governance across multiple provinces.
- Irreversible Loss of British Authority: Demonstrated to the British Empire that governing India without consent was no longer sustainable, even with heavy military presence.
- Decisive Transition to Independence: Fast-tracked post-war constitutional negotiations, making Indian independence inevitable by 1947.

E-Samudra Platform



Context:

Union Minister for Ports, Shipping and Waterways launched E-Samudra, a integrated digital portal aimed at accelerating the digital transformation of India's maritime administration.

E-Samudra Platform

AboutE-Samudra Platform:

What It Is?

- E-Samudra is a comprehensive, single-window Digital First and Faceless portal designed to digitize and streamline administrative workflows across India's maritime sector. It integrates services for seafarers, shipping companies, recruitment agencies, training institutes, and port authorities under a unified digital framework.
- Nodal Ministry: Ministry of Ports, Shipping and Waterways (MoPSW).
- Implementing Agency: Directorate General of Maritime Administration (DGMA).
- Strategic Context: Aligned with the goals of Maritime India Vision 2030 and Maritime Amrit Kaal Vision 2047.
- Aim: To transition maritime governance from a paper-based office model to a transparent, predictable digital ecosystem, enhancing Ease of Living for Indian seafarers and Ease of Doing Business for maritime businesses.

Key Features:

- Single-Window Digital Governance: Consolidates administrative workflows, online fee payments, real-time application tracking, and digital certificate issuance into a single paperless portal.
- Digital Seafarers Employment Agreement (d-SEA): Introduces verifiable digital employment agreements to safeguard contractual entitlements, transparent wages, and labor standards for crew members.
- Real-Time Seafarer Tracking Dashboard: Integrates with tracking tools to monitor the deployment, safety, location, and welfare of Indian seafarers worldwide regardless of vessel flags.
- 24×7 Integrated Grievance Redressal (e-NAVIK): Connects seafarers directly with emergency response, medical help, and grievance resolution channels accessible onboard or ashore.
- Remote Maritime Access: Built as a Digital-First and Faceless platform, allowing active seafarers deployed on high-seas vessels to access official services smoothly.
- Focus on Inclusion & Mental Health: Complements welfare programs like Sagar Mein Samman (expanding opportunities for women seafarers) and Sagar Mein Yog (promoting mental and physical wellbeing).

Significance:

- Provides scalable digital infrastructure for India's expanding seafarer workforce, now over 3.23 lakh strong.
- Reduces compliance delays and administrative costs for shipping companies, RPSLs, and maritime training institutes.

VIHAAN: India's Indigenous Broadband Networking Chip Achieves First-Pass Silicon Success

Context:



Chennai-based fabless semiconductor startup Aheesa Digital Innovations, supported under the Ministry of Electronics and IT's (MeitY) Design Linked Incentive (DLI) Scheme, achieved first-pass silicon success for its indigenous broadband networking System-on-Chip (SoC) named 'VIHAAN'.

VIHAAN

AboutVIHAAN: India's Indigenous Broadband Networking Chip Achieves First-Pass Silicon Success

What It Is?

- VIHAAN is India's first domestically designed broadband networking System-on-Chip (SoC). Built on open-standard RISC-V architecture and powered by the indigenous VEGA processor developed by C-DAC, it is purpose-built to deliver high-throughput, secure, and sovereign semiconductor solutions for optical fiber and broadband customer premises equipment (CPE).
- Designing Startup: Aheesa Digital Innovations (Chennai, Tamil Nadu).
- Government & Financial Backing: Supported under the Design Linked Incentive (DLI) Scheme (India Semiconductor Mission / MeitY).
- Aim: To deliver high-performance, domestically designed telecom silicon for Fiber-to-the-Home (FTTH) deployments and broadband routers across Indian households and businesses, reducing reliance on imported foreign networking chips.

How VIHAAN Works?

- Fiber Data Processing: Receives internet data through GPON/EPON fiber networks and distributes it through Gigabit Ethernet connections.
- Fast Packet Processing: Its 64-bit VEGA core handles routing, traffic inspection, Quality of Service (QoS), and firewall functions at high speed.
- Built-in Security: Uses a hardware root of trust, secure boot, and cryptographic engines to protect firmware and network traffic.
- Integrated Software: Runs Aheesa Router OS (AROS), based on OpenWrt, enabling integration with routers, modems, and access points.

Key Features of VIHAAN:

- First-PassSilicon Success: The chip worked successfully on its first fabrication attempt, reducing redesign time and costs.
- Indigenous VEGA RISC-V Core: Uses C-DAC's 64-bit VEGA processor, reducing dependence on proprietary foreign architectures.
- Optimised for Fiber Broadband: Integrates GPON/EPON, computing and memory functions on a single chip for FTTH equipment.
- Integrated Hardware Security: Provides secure boot, encryption, and hardware-level protection against network threats.
- Ready forDomestic Manufacturing: Its reference platform and software tools help Indian manufacturers rapidly develop Wi-Fi routers and Optical Network Terminals (ONTs).

Significance:

- Indigenous core silicon reduces dependence on foreign hardware, supply-chain risks, and potential security vulnerabilities.

- Strengthens India's chip-design ecosystem and demonstrates the potential of the DLI Scheme and Semicon India Programme to create production-ready indigenous chips.

The Nationwide Cloud and AI Skilling Initiative

Context:



The National Skill Development Corporation (NSDC) and Cultus Education, with support from Amazon Web Services (AWS), launched a nationwide Cloud and AI skilling initiative.

Nationwide Cloud and AI Skilling Initiative

AboutThe Nationwide Cloud and AI Skilling Initiative:

What It Is?

- A nationwide, 100% online digital workforce development and skilling program designed to bridge the technical divide in non-metropolitan regions. It delivers an outcome-led learning pathway—from self-paced digital literacy and instructor-led technical coursework to globally recognized AWS certifications and employer interview linkages.

Organisations Involved:

- Nodal & Institutional Oversight: National Skill Development Corporation (NSDC), under the guidance of the Ministry of Skill Development & Entrepreneurship (MSDE), Government of India.
- Technology Partner: Amazon Web Services (AWS) (providing AWS digital training content and the AWS re/Start program).
- Aim: To provide underserved youth in Tier-2 and Tier-3 towns with industry-ready technical skills, credentials and direct access to technology jobs.

Key Features of the Initiative:

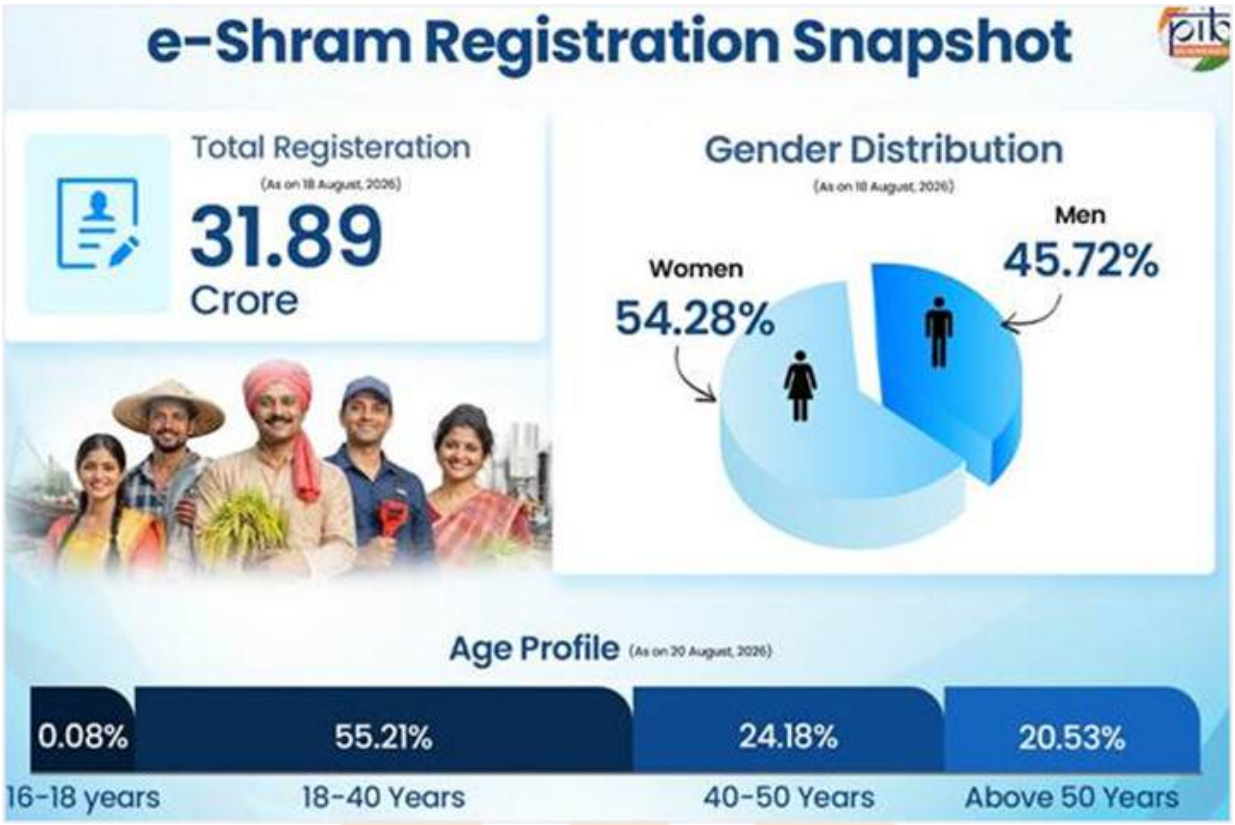
Two-TierSkilling Architecture:

- Foundational Layer: Equips 150,000 learners with self-paced digital literacy in cloud concepts and AI fundamentals using AWS digital training content.
- Intensive Layer: Selects 10,000 qualified participants for the free, cohort-based AWS re/Start program offering instructor-led, job-ready training.
- Comprehensive Technical Curriculum: Covers core infrastructure competencies including Linux operating systems, cloud architecture, networking protocols, cybersecurity essentials, Python programming, relational databases, and AI fundamentals.
- Hands-OnExperiential Learning: Blends theoretical instruction with real-world scenario labs and capstone assignments guided by accredited technical trainers and professional mentors.
- Industry-Recognized Certification: Trainees are prepared and supported to earn global AWS Certifications (validating entry-level cloud practitioner and associate skills).
- Culminating National Hackathon & Placement Support: Concludes with a National Hackathon allowing candidates to showcase cloud/AI solutions before hiring managers, alongside direct interview opportunities with local and national technology employers.

The e-Shram Portal

Context:

The e-Shram Portal completed five years of operation on August 26, 2026, marking a major milestone in building India's social security architecture for the informal economy.



The e-Shram Portal

About The e-Shram Portal:

What It Is?

- The e-Shram Portal is India's first comprehensive, Aadhaar-authenticated National Database of Unorganised Workers (NDUW). It assigns every registered worker a portable 12-digit Universal Account Number (UAN) and serves as a unified digital platform connecting the informal workforce to social security benefits, job portals, skilling opportunities, and pension plans.
- Launch Date: August 26, 2021.
- Nodal Ministry: Ministry of Labour and Employment (MoLE), Government of India.
- Aim: To build a centralized, verifiable national registry of the unorganised workforce, facilitate the convergence and portability of multi-ministerial welfare schemes, and ensure seamless delivery of social security benefits—especially during economic disruptions and national emergencies.

Key Features of the e-Shram Portal:

- Portable 12-Digit UAN &Broad Inclusivity: Issues a unique Universal Account Number (UAN) card to workers aged 16 and above who are not income-tax payers or enrolled in EPFO/ESIC—spanning agricultural laborers, domestic help, construction workers, street vendors, and gig/platform workers.
- Unified One-Stop Solution Convergence: Brings together 15 central social security and welfare schemes onto a single window, including PMJJBY, PMSBY, PM-SYM, One Nation One Ration Card (ONORC), NSAP, and PMAY-G.
- Integrated Social Insurance & Pension Enrollment: Enables direct enrollment into:
- PMSBY: Up to 2 lakh for accidental death or permanent disability.
- PMJJBY: 2 lakh life insurance cover.
- PM-SYM: Assured monthly pension of 3,000 upon reaching 60 years of age.
- Digital Public Infrastructure & Interoperability: Integrates directly with the National Career Service (NCS) for job linkages, the Skill India Digital Hub (SIDH) for apprenticeships, and the AI-powered Bhashini platform for native-language access across 22 scheduled languages.
- Specialized Tracking for Migrant & Gig Workers: Captures family migration data to enable welfare portability across states, facilitates worker onboarding with state BOCW Boards.

Significance:

- Provides digital visibility to unorganised workers, enabling targeted and leak-proof delivery of welfare benefits.
- Creates a dynamic worker registry supporting interstate portability of benefits and targeted assistance during emergencies.

Pradhan Mantri Jan Dhan Yojana: 12 Years of Advancing Financial Inclusion in India

Context:

The Pradhan Mantri Jan Dhan Yojana (PMJDY) completed 12 years since its launch by Prime Minister of India in 2014.

Pradhan Mantri Jan Dhan Yojana

AboutPradhan Mantri Jan Dhan Yojana: 12 Years of Advancing Financial Inclusion in India

What It Is?

- The Pradhan Mantri Jan Dhan Yojana (PMJDY) is India's National Mission for Financial Inclusion designed to provide universal, affordable access to formal financial services for unbanked adults.
- Anchored in the principle of Banking the Unbanked, Securing the Unsecured, and Funding the Unfunded, the scheme provides basic savings bank deposit (BSBD) accounts without minimum balance requirements, and seamless integration with Direct Benefit Transfers (DBT) via the Jan Dhan-Aadhaar-Mobile (JAM) trinity.

Key Data & Decadal Milestones:

- Expansion of Accounts & Balances: Total accounts grew from 14.72 crore in 2015 to 59.09 crore by August 19, 2026, with total deposits rising ~20-fold from 15,670 crore (March 2015) to 3,16,514 crore (~ 3.17 lakh crore).
- Deepening Savings Culture: The average deposit balance per account increased 3.4 times to 5,356, demonstrating active account utilization rather than zero-balance dormancy.
- SignificantFemale Participation: Women hold 55.7% (32.92 crore) of all Jan Dhan accounts, bridging the gender gap in formal banking.
- Extensive Rural & Semi-Urban Reach: 77.8% (45.95 crore) of all PMJDY accounts are located in rural and semi-urban branches/Bank Mitra outlets, compared to 13.14 crore in urban/metro centers.
- Digital Access via RuPay: Over 41.29 crore indigenous RuPay debit cards have been issued, driving digital payments at ATMs and PoS machines.
- Rise inRBI Financial Inclusion Index (FI-Index): India's comprehensive FI-Index improved from 53.9 in 2018 to 67.0 in 2026, reflecting enhanced access, usage, and quality across banking, payments, and insurance services.

Core Pillars of the Jan Dhan Architecture:

- Universal Zero-Balance Accounts: Eliminates financial barriers by providing Basic Savings Bank Deposit (BSBD) accounts without initial deposit requirements or minimum balance penalties.
- RuPay Card with Embedded Accidental Cover: Free domestic debit card providing 2 lakh accidental insurance cover (enhanced from 1 lakh for accounts opened post-August 2018), with premiums underwritten by NPCI.
- Hassle-Free Overdraft (OD) Line: Offers an emergency overdraft cushion of up to 10,000 per household (after 6 months of satisfactory operation), reducing reliance on informal moneylenders.
- The JAM Trinity Welfare Backbone: Connects bank accounts with digital identities and mobile numbers to enable transparent, leakage-free Direct Benefit Transfers across over 300 government schemes.
- Gateway to Social Security & Micro-Credit: Serves as the primary onboarding rail for Jan Suraksha schemes, as well as collateral-free PM MUDRA Yojana loans.

Challenges Associated with PMJDY:

- Account Dormancy &Pass-Through Usage: A proportion of accounts still function primarily as passive conduits for government subsidy withdrawals rather than active daily transaction tools.
- Underutilization of the Overdraft Facility: Strict bank credit evaluation norms and low consumer awareness have limited the widespread uptake of the 10,000 OD window.
- Last-Mile Business Correspondent (Bank Mitra) Friction: Connectivity drops, micro-ATM hardware glitches, and cash-in/cash-out liquidity constraints in remote rural and tribal areas create operational bottlenecks.
- Digital Literacy & Cybersecurity Exposure: Rural first-time account holders face heightened risks of social engineering, OTP scams, and ATM skimming due to limited digital financial literacy.
- OperationalViability for Commercial Banks: Servicing hundreds of millions of low-balance accounts generates maintenance and compliance costs without generating significant fee-based revenues.

Way Ahead:

- Transitioning from Basic Access to Financial Deepening: Leverage verified transaction histories to offer tailored financial products, such as micro-recurring deposits, mutual fund sachet investments, and affordable working-capital loans.
- Strengthening the Bank Mitra / BC Network: Incentivize rural Business Correspondents with higher service commissions, interoperable dual-SIM biometric devices, and continuous operational training.
- InstitutionalizingGrassroots Digital Literacy: Conduct village-level financial literacy campaigns across Gram Panchayats to educate citizens on secure UPI usage, RuPay card PIN management, and fraud prevention.
- Automating Social Security Integration: Enable micro-pension and insurance renewals (PMJJBY/PMSBY) via auto-debit rails to ensure continuous social safety net coverage.
- Linking with the Open Credit Enablement Network (OCEN): Integrate PMJDY accounts into digital credit frameworks to provide instant, collateral-free credit to small vendors and rural artisans.

Conclusion:

The 12-year journey of the Pradhan Mantri Jan Dhan Yojana has transformed India's financial ecosystem from exclusive banking into an inclusive financial democracy. By bringing over 59 crore citizens—especially women and rural households—into the formal financial grid and anchoring the JAM trinity, the scheme eliminated leakages and empowered marginalized communities. Expanding from account ownership into active micro-credit, insurance, and wealth-creation tools will remain essential to driving broad-based prosperity toward Viksit Bharat@2047.

The DAANVEER Initiative

Context:

The Ministry of Panchayati Raj has called for nationwide public participation under the 'DAANVEER' initiative, encouraging citizens, CSR entities, and the Indian diaspora to donate desktop computers to verified Gram Panchayats.



The DAANVEER Initiative

AboutThe DAANVEER Initiative:

What It Is?

- DAANVEER is a technology-enabled, people-led Computer Crowdsourcing Initiative that allows individuals, philanthropic organizations, CSR partners, and the diaspora to directly purchase and donate standardized desktop computers to state-verified Gram Panchayats needing digital hardware.

Nodal Organisation:

- Nodal Ministry: Ministry of Panchayati Raj (MoPR), Government of India.
- Complements infrastructure funding provided under the Rashtriya Gram Swaraj Abhiyan (RGSA).
- Aim: To bridge the rural digital divide and strengthen grassroots digital governance by augmenting IT

hardware across Gram Panchayats through voluntary, transparent public contributions and participatory governance.

Key Features of DAANVEER:

- Seamless App-to-Marketplace Integration: Citizens select verified Panchayats on the Meri Panchayat App and are redirected to DigiHaat (ONDC network) with pre-filled delivery and Panchayat recipient details, eliminating manual data entry.
- Standardized Hardware Specifications: Donors choose from pre-configured, government-approved computer bundles meeting exact technical benchmarks required for administrative software.
- State-Level Need Verification: Only Gram Panchayats formally verified and mapped by respective State Governments as lacking adequate IT infrastructure are listed on the platform.
- End-to-End Real-Time Tracking: Provides a transparent e-commerce tracking journey—from digital payment and dispatch to physical delivery and final receipt confirmation.
- Digital Recognition & Formal Receipting: Once the Gram Panchayat Secretary officially acknowledges delivery, the system automatically generates a verifiable Certificate of Appreciation for the donor.

Significance:

- Equips Panchayats with digital infrastructure for e-governance, financial management, land records, planning, and citizen services.
- Creates a transparent channel for NRIs, urban migrants, and corporate CSR to support the digital development of their villages.

EXCEL CIVILS ACADEMY EMPOWERING FUTURE LEADERS

Chapter-
8

INTERNATIONAL RELATION

The Makkah Pact: The New Security Triangle

Context:

Top leaders of Saudi Arabia, Türkiye, and Pakistan signed the Makkah Joint Defence Agreement (MJDA) in Makkah, creating a collective defence pact under which an attack on one member is treated as an attack on all, similar to NATO's Article 5.



The Makkah Pact: The New Security Triangle

AboutThe Makkah Pact: The New Security Triangle:

What it is?

- The Makkah Joint Defence Agreement (MJDA) forms a new trilateral security bloc in West Asia. It builds upon the bilateral Strategic Mutual Defence Agreement (SMDA) concluded between Saudi Arabia and Pakistan in 2025, expanding the arrangement to include Türkiye.
- Designed primarily around Saudi Arabia's security requirements amidst regional instability, the pact brings together three distinct regional powers to create a collective defense and deterrence architecture.

Key Outcomes of the Makkah Pact:

- Collective Defence Mandate: Establishes a mutual defense clause declaring that an attack on one signatory state is an attack on all three.
- InstitutionalSecurity Architecture: Sets up a permanent secretariat in Saudi Arabia, along with a ministerial committee and scheduled regular meetings to coordinate joint defense policies.
- Synergy of Complementary Capabilities: Combines Saudi financial capital, Türkiye's defense-industrial technology (drones, missiles, naval systems), and Pakistan's military manpower and nuclear status.
- Defense Industrial & Operational Integration: Outlines cross-pollination through joint military exercises, weapons co-production, hardware development, and interoperability of military hardware.

Significance of the Makkah Pact

For the Middle East Region:

- Shift TowardRegional Self-Reliance: Signals a strategic move by regional powers toward self-reliance and strategic autonomy, reducing sole reliance on traditional US security umbrellas.
- Deterrence Against Complex Threats: Provides Saudi Arabia with an added layer of deterrence against regional aerial, drone, and asymmetric threats affecting its infrastructure and energy shipping lanes.
- Bridging Geopolitical Theatres: Collapses the strategic distance between the Gulf, the Eastern Mediterranean, and South Asia by linking three key Islamic military powers.

Global Impact:

- Emergence of aNon-Western Security Bloc: Demonstrates the formation of new, fluid security alignments across the Global South that operate independently of traditional Western alliances.
- Redrawing Western Indo-Pacific Boundaries: Extends security dynamics across the Indian Ocean, directly impacting maritime trade routes, energy prices, and shipping security in choke points like the Strait of Hormuz and Bab al-Mandeb.

Challenges Facing the Makkah Pact:

- Historical & Ideological Friction: Lingering historical distrust between Riyadh and Ankara (rooted in Ottoman history) and past political rivalries over leadership in the Sunni Islamic world.

- UnderlyingGeopolitical Ambiguities: The agreement remains silent on command structures, precise force commitments, and specific rules of engagement regarding non-state actors or complex conflicts.
- Divergent Regional Interests: Türkiye and Pakistan share lengthy borders and economic ties with Iran, making them hesitant to be drawn into anti-Iran military operations.
- Internal Command & Social Constraints: Potential friction over troop deployment conditions, chain-of-command issues, and domestic political instability in partner states.
- Risks of Counter-Polarization: Threatens to alarm neighboring states (such as Iran, the UAE, Greece, and Israel), potentially triggering counter-alliances in West Asia and the Mediterranean.

Implications for India:

- Pakistan's Attempted Strategic High: Gives Pakistan temporary political leverage and military confidence by aligning itself with major Sunni powers in West Asia.
- InsulatedIndia–Saudi Bilateral Relations: Despite the trilateral pact, Riyadh views its economic and energy ties with New Delhi as vital, making it unlikely to support Pakistani adventurism against India.
- Security Along Western Maritime Corridors: Increased military presence in the Arabian Sea and Gulf region requires India to closely monitor maritime security along its vital trade routes.
- No Direct Threat to India's Rise: The pact is primarily fulcrumed around West Asian security realities rather than South Asian rivalries, limiting Islamabad's ability to turn the alliance against India.
- Pragmatic Policy Imperative: Requires India to maintain a balanced diplomatic approach—preserving strategic ties with Riyadh, ensuring explicit consultation on regional security, and avoiding overreaction.

Conclusion:

The Makkah Joint Defence Agreement represents a significant realignment in West Asian security, driven by a desire for regional self-reliance among Saudi Arabia, Türkiye, and Pakistan. While the pact creates a powerful strategic triangle combining capital, technology, and military capacity, its long-term effectiveness remains constrained by divergent national interests. For India, a measured diplomatic approach will ensure that strong bilateral relations with the Gulf remain secure despite evolving regional dynamics.

India's Cultural Diplomacy: Soft Power Through Global Engagement

Context:

Union Culture and Tourism Minister informed the Lok Sabha that India maintains valid Cultural Exchange Programmes (CEPs) with 98 countries under the umbrella Global Engagement Scheme (GES).



India's Cultural Diplomacy

AboutIndia's Cultural Diplomacy: Soft Power Through Global Engagement:

What it is?

- Cultural Diplomacy refers to the exchange of ideas, information, values, systems, traditions, beliefs, and arts to foster mutual understanding, trust, and goodwill among nations.
- It serves as a cornerstone of soft power, allowing a nation to build non-coercive international influence by leveraging its civilisational heritage, living traditions, and contemporary creative industries rather than relying solely on economic or military might.

Types of Cultural Diplomacy Used by India:

- Bilateral Cultural Exchange Programmes (CEPs): Executing institutional MoUs and agreements (currently active across 98 nations) to facilitate reciprocal artistic exchanges, museum collaborations, and heritage conservation.
- Festivals of India (FoI) Abroad: Organizing large-scale cultural showcases abroad through the Ministry of Culture to present classical dance, folk arts, music, and theater directly to international audiences.
- Transnational Heritage Initiatives (Project Mausam & Brihattar Bharat): Re-connecting historical trade, maritime, and civilisational links across the Indian Ocean rim and Southeast Asia through shared historical routes and monument conservation.

- Wellness & Philosophical Outreach (Yoga &Ayurveda): Globally promoting traditional systems of holistic health, celebrated annually through the international observance of the International Day of Yoga.
- Academic & Youth Engagement (Chairs & Scholarships): Establishing Chairs of Indian Studies at foreign universities and offering thousands of educational scholarships via the Indian Council for Cultural Relations (ICCR) to cultivate future global thought leaders.

Role of Culture in Diplomacy:

- Building Soft Power and Trust: Fosters goodwill, appeal, and a positive global image, making hard political negotiations smoother.
- Creating People-to-People Connections: Reaches beyond formal geopolitical channels to build direct, empathetic relationships between citizens, communities, and artists.
- MitigatingGeopolitical Tensions: Acts as a stabilizing bridge during times of political or economic strain, keeping dialogue open when traditional diplomatic avenues face friction.
- Promoting Inbound Tourism and Creative Economy: Drives economic growth by positioning the country as a global hub for cultural heritage, spiritual wellness, film locations, and creative tourism.

Initiatives Taken So Far:

- Global Engagement Scheme (GES): An umbrella scheme of the Ministry of Culture encompassing the International Cultural Exchange Programme (ICEP), Project Mausam, Brihattar Bharat, and the Scheme for Safeguarding Intangible Cultural Heritage.
- Institutional Coordination via ICCR: The Indian Council for Cultural Relations (under MEA) operates a global network of Indian Cultural Centres, runs art residencies, and organizes international performing arts festivals within India.
- Integration into Multilateral Platforms: Embedding cultural cooperation agendas into major multilateral groupings like BRICS, G20, Shanghai Cooperation Organisation (SCO), and BIMSTEC.

Challenges Associated:

- Budgetary Constraints and Resource Allocation: Limited public funding compared to Western or East Asian soft-power machinery, restricting sustained long-term international campaigns.
- Implementation and Coordination Bottlenecks: Institutional fragmentation across different agencies (Ministry of Culture, MEA/ICCR, Tourism, and state governments) leads to occasional overlap and delays.
- Underutilized Maritime and Diaspora Links: Delays in executing long-term historical projects like Project Mausam affect India's ability to maximize its shared Indian Ocean heritage.
- Linguistic and Modern Narrative Gaps: Over-reliance on ancient or classical heritage without adequately projecting modern digital art, contemporary literature, and contemporary creative industries.

Way Ahead:

- Formulating a Unified National Cultural Diplomacy Strategy: Synchronize efforts between the Ministry of Culture, Ministry of External Affairs, ICCR, and Indian Missions abroad under a cohesive policy roadmap.
- Expanding Digital and Virtual Engagement: Leverage virtual reality, digital archives, online arts platforms, and e-learning to showcase Indian monuments and classical arts globally.
- Scaling UpPublic-Private Partnerships: Encourage private corporate sponsorship, CSR funds, and cultural foundations to co-fund Festivals of India and artist residencies worldwide.
- Promoting Contemporary Creative Industries: Balance classical traditions by promoting Indian cinema, gaming, modern literature, fashion, and culinary diplomacy to connect with global youth.
- Strengthening Regional Cultural Networks: Deepen sub-regional ties by establishing joint heritage conservation projects and shared maritime research hubs across South and Southeast Asia.

Conclusion:

By structured institutional funding under the Global Engagement Scheme and active coordination through ICCR, India projects its civilisational heritage and modern artistic capabilities. Sustaining this momentum through digital technology, enhanced funding, and dynamic youth engagement is essential to building international partnerships.

India's Central Asian Outreach



Context:

Prime Minister of India is embarking on a state visit to Uzbekistan followed by participation in the Shanghai Cooperation Organization (SCO) Heads of State Summit in Bishkek, Kyrgyzstan.

India's Central Asian Outreach

AboutIndia's Central Asian Outreach:

What It Is?

- India's Central Asian strategy focuses on re-engaging the five post-Soviet Central Asian republics (Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, and Uzbekistan) as an integral part of its extended continental neighborhood.
- Grounded in ancient Silk Road civilizational ties, the policy balances continental security interests, counter-terrorism priorities, critical energy and mineral access, and trade connectivity via alternative routes to prevent the region from becoming an exclusive sphere of influence for China or Pakistan.

Strategic Importance of Central Asia for India:

- Geostrategic Continental Buffer: Located at the heart of Eurasia, Central Asia is separated from India only by the narrow Wakhan Corridor in Afghanistan, making regional stability essential for India's northern frontier security.
- Counter-Terrorism &Anti-Radicalization: Central Asian states maintain a moderate socio-religious ethos and an uncompromising stance against religious extremism, aligning closely with India's counter-terrorism objectives against groups operating from Afghanistan.
- Energy & Critical Mineral Security: The region holds vast hydrocarbon reserves, uranium (Kazakhstan supplies major uranium for India's civil nuclear reactors), and untapped critical and rare-earth minerals vital for clean energy transitions.
- Geopolitical Balancing in Eurasia: As Russia's regional pre-eminence shifts and China expands its economic footprint through the Belt and Road Initiative (BRI), Central Asian nations actively seek to diversify their foreign partnerships with democratic powers like India.

Key Pillars of India's Engagement:

- The SECURE Vision under Multilateral Platforms: India uses its full membership in the SCO and the India-Central Asia Dialogue mechanism to advance cooperation based on Security, Connectivity, and Unified Economic Opportunities.
- High-Level Bilateral Focus (Uzbekistan Anchor): Deepening strategic ties with Uzbekistan under President Shavkat Mirziyoyev, focusing on joint counter-terrorism drills, pharmaceutical investments, digital public infrastructure, and joint research.
- Alternative Trade &Transit Corridors: Advancing multimodal connectivity via Iran's Chabahar Port and the International North-South Transport Corridor (INSTC) to bypass land-transit blockades imposed by Pakistan.
- Civilizational & Soft Power Diplomacy: Leveraging shared historical connections in language, Buddhism, Sufism, and architectural traditions, alongside strong contemporary demand for Indian higher education, medical tourism, and IT training.

Key Challenges in Regional Engagement:

- Physical Connectivity Deficits: The denial of overland transit access through Pakistan cuts India off from direct road and rail links to Central Asia, raising logistics costs via sea-land corridors.
- Dominant Chinese Economic Presence: China's massive bilateral trade (exceeding $70 billion) and extensive BRI pipeline and transport investments make it challenging for Indian enterprises to compete at scale.
- Security Spillovers from Afghanistan: Ongoing political instability, drug trafficking, and the presence of extremist outfits in Afghanistan continue to threaten regional border security.

- Sub-Optimal Trade & Investment Volumes: Despite immense potential, annual India-Central Asia trade remains modest (under $3 billion), constrained by high shipping tariffs, banking friction, and lack of air-cargo links.
- Intra-Regional Border & Water Disputes: Complex historical disputes over Soviet-era borders, water-sharing across the Amu Darya and Syr Darya basins, and overlapping ethnic enclaves occasionally hinder regional integration.

Way Ahead

- Accelerating Operationalization of Chabahar & INSTC: Integrate Chabahar's Shahid Beheshti terminal fully into the INSTC rail network and operationalize the Ashgabat Agreement for seamless multimodal freight movement.
- Expanding Air Corridors & Digital Public Infrastructure: Establish dedicated air-freight corridors and deploy India's Digital Public Infrastructure (Unified Payments Interface, Aadhaar-like frameworks, and tele-medicine) to build digital connectivity.
- InstitutionalizingCritical Mineral Joint Ventures: Form public-private consortiums under the Critical Minerals Partnership to explore, extract, and process lithium, cobalt, and rare earths in Kazakhstan and Uzbekistan.
- Institutionalizing Defense & Intelligence Sharing: Deepen joint military exercises (e.g., Dustlik with Uzbekistan, KazInd with Kazakhstan) and expand real-time intelligence sharing through the SCO's Regional Anti-Terrorist Structure (RATS).
- Strengthening People-to-People Capacity Building: Expand Indian Technical and Economic Cooperation (ITEC) scholarships, establish Indian university campuses in Tashkent and Almaty, and streamline tourist visas to strengthen socio-cultural ties.

Conclusion:

Prime Minister visit to Central Asia reaffirms India's commitment to restoring its historical footprint across the Eurasian landmass. Navigating regional power dynamics requires India to convert its civilizational goodwill into tangible trade corridors, energy joint ventures, and security cooperation. Anchoring relations in proactive diplomacy and digital-logistical connectivity will ensure India remains a trusted partner in Central Asia's development and regional stability.

India–Uzbekistan Relations



Context:

India and Uzbekistan elevated ties to a Comprehensive Strategic Partnership (CSP) during a State Visit, signing 11 agreements and setting a $5 billion bilateral trade target by 2030.

India–Uzbekistan Relations

AboutIndia–Uzbekistan Relations:

What it is?

- Uzbekistan occupies a pivotal geostrategic position at the heart of Central Asia, acting as the anchor for India's extended continental neighbourhood policy. The upgraded Comprehensive Strategic Partnership integrates trade diversification, long-term civil nuclear and critical mineral supply chains, defence co-production, and digital connectivity, countering regional instability while providing India with a reliable gateway to Eurasia.

Key Data & Bilateral Milestones:

- Targeting $5 Billion Trade by 2030: Moving to expand bilateral trade turnover from the current ~$1 billion baseline to $5 billion by 2030 through a time-bound Preferential Trade Agreement (PTA) framework.
- Long-Term Uranium Supply: Concluded a formal cooperation framework securing long-term Uranium imports from Uzbekistan to fuel India's expanding domestic civil nuclear power reactors.
- $1 Million Aral Sea Environmental Grant: India announced a $1 million Grant-in-Aid alongside technical support for ecological rehabilitation and afforestation in the desiccated Aral Sea basin.

- Digital Public Infrastructure (UPI–UZQR Integration): Commercial pact signed between NPCI International Payments Ltd (NIPL) and Uzbekistan's National Interbank Processing Centre (HUMO) enabling Indian UPI apps to scan Uzbekistan's national QR code (UZQR) for instant merchant payments.
- Joint Military Drills: Reaffirmed regular iterations of the bilateral Exercise Dustlik, the latest edition of which was conducted in the Namangan Region of Uzbekistan in April 2026.

Major Outcomes & Agreements of the State Visit:

- Upgraded Institutional Governance: Elevated the bilateral Joint Commission from the level of Secretaries to a Ministerial-level Coordination Council co-chaired by Foreign Ministers to oversee project execution.
- Critical Minerals &Energy Value Chains: Agreed on joint ventures for geological exploration, mining, and processing of critical and strategic minerals (such as lithium, copper, and rare earths).
- Defence Industrial Co-Production: Transitioned from pure buyer-seller military interactions toward joint research, co-development, and co-production of military hardware between Indian and Uzbek defence manufacturers.
- Pharmaceutical Hub via Tashkent Pharma Park: Expanded Indian investments in local drug manufacturing and clinical research inside the Tashkent Pharma Park Innovative Scientific and Industrial Pharmaceutical Cluster.
- Preserving BuddhistCultural Heritage: Signed a Letter of Intent for the archaeological restoration, 3D digitization, and conservation of ancient Buddhist monastic sites at Fayaz Tepa and Karatepa in Termez along the ancient Silk Road.
- Support for Multilateral Candidatures: Uzbekistan reaffirmed its full support for India's permanent membership in a reformed UN Security Council (UNSC), while India welcomed Uzbekistan's prospective entry into the International Solar Alliance (ISA) and the International Big Cat Alliance (IBCA).

Key Challenges in Bilateral Cooperation:

- Absence of Direct Overland Transit: Pakistan's refusal of land-transit access forces bilateral commerce through circuitous sea-land multimodal corridors via Iran's Chabahar port, increasing freight costs and transit times.
- Non-Tariff Barriers & Customs Bottlenecks: Exporters face high regulatory hurdles, disparate phytosanitary certifications, and non-harmonized customs procedures across intermediate transit nations.
- Regional Instability from Afghanistan: Bordering Afghanistan, both nations face shared risks from cross-border terror outfits, radicalization, and expanding narcotics trafficking networks.
- Competition from Major Powers: China's deeply entrenched infrastructure loans under the Belt and Road Initiative (BRI) and established Russian supply chains create competitive pressure for Indian private firms.

Way Ahead:

- Fast-Tracking the Preferential Trade Agreement (PTA): Conclude the bilateral PTA with clear tariff concessions on pharmaceuticals, engineering goods, automotive components, and agricultural produce.
- Integrating Chabahar Port with INSTC Routes: Expedite dedicated rail connectivity linking Chabahar's Shahid Beheshti terminal with the Uzbekistan–Turkmenistan transit corridors to provide seamless multimodal logistics.
- Establishing a Bilateral Critical Minerals Taskforce: Operationalize joint ventures between Khanij Bidesh India Ltd (KABIL) and Uzbek geological agencies to secure mining concessions for battery and clean-energy supply chains.
- Deploying Dedicated Air Cargo Corridors: Set up regular, subsidized air-freight corridors between Delhi/Mumbai and Tashkent to facilitate rapid transport of high-value perishables, gems, and pharmaceuticals.
- Strengthening Regional Counter-Terror Coordination: Leverage the SCO's Regional Anti-Terrorist Structure (RATS)—headquartered in Tashkent—to conduct joint cyber drills, dismantle terror-financing networks, and monitor security along the Afghan border.

Conclusion:

By combining vital uranium supplies, critical mineral exploration, and digital payments integration with joint counter-terrorism efforts, the partnership provides mutual strategic resilience. Overcoming physical connectivity barriers through the proactive development of INSTC and Chabahar corridors will remain essential to achieving the $5 billion trade milestone and securing long-term peace across Eurasia.

The Subsidiary Body on Scientific, Technical and Technological Advice or SBSTTA 28

Context:



The 28th meeting of the Subsidiary Body on Scientific, Technical and Technological Advice (SBSTTA-28) concluded on August 1, 2026, in Nairobi, Kenya.

The Subsidiary Body on Scientific, Technical and Technological Advice or SBSTTA 28

About The Subsidiary Body on Scientific, Technical and Technological Advice or SBSTTA 28:

What It Is?

- SBSTTA-28 is the 28th session of the open-ended, multidisciplinary intergovernmental scientific advisory body established under the United Nations Convention on Biological Diversity (CBD).
- It brings together government experts, scientific delegates, and technical negotiators to evaluate biodiversity status, review conservation measures, and formulate evidence-based policy recommendations for the Conference of the Parties (COP).
- Parent Treaty: Convention on Biological Diversity (CBD).
- Statutory Provision: Established under Article 25 of the CBD text.
- Organizing Partners: CBD Secretariat in collaboration with the United Nations Environment Programme (UNEP).
- Aim: To provide the Conference of the Parties (COP17) with timely, high-level scientific, technical, and technological guidance to accelerate national implementation toward achieving the 23 global targets of the Kunming-Montreal Global Biodiversity Framework by 2030.

Key Functions:

- Biodiversity Status & Trend Assessments: Conducts rigorous assessments of global flora, fauna, marine, and terrestrial ecosystems—integrating scientific findings from bodies like the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES).
- Evaluation of Conservation Measures: Analyzes the efficacy of national actions and policy instruments taken by member states to meet treaty obligations and global target goals.
- Addressing Emerging Technologies (Synthetic Biology): Evaluates cutting-edge biological applications (such as gene editing, gene drives, and lab-engineered microbes) to weigh ecological benefits against potential unintended environmental risks.
- Advising on Technical Guidance Frameworks: Formulates updated scientific guidelines for protected areas, sustainable wildlife management, and marine and coastal conservation programs.
- Responding to COP Scientific Mandates: Answers explicit scientific queries posed by the Conference of the Parties to lay the technical groundwork for binding international agreements.

Significance:

- Assessed global progress under the KMGBF, highlighting gaps in implementation and biodiversity finance.
- Advanced discussions on synthetic biology, balancing innovation with risk regulation, capacity building, and equitable technology access.

The Mecca Joint Deterrence Agreement

Context:



Turkiye, Saudi Arabia, and Pakistan signed the historic Mecca Joint Deterrence Agreement in Mecca to establish a collective security and defence mechanism.

The Mecca Joint Deterrence Agreement

About The Mecca Joint Deterrence Agreement:

What It Is?

- The Mecca Joint Deterrence Agreement is a trilateral defense framework designed to align the military, financial, and strategic deterrence capabilities of three major regional powers—Turkiye, Saudi Arabia, and Pakistan—to safeguard national sovereignty and regional stability.

Nations Involved:

- Turkiye: Provides advanced defense-industrial technology, manufacturing scale, and NATO's second-largest standing army.
- Saudi Arabia: Contributes massive financial resources, regional diplomatic leverage, and strategic energy dominance.
- Pakistan: Contributes extensive combat experience, military manpower, and nuclear deterrence capabilities.

Background:

- Post-October 7 Regional Volatility: Initiated in response to heightened Middle Eastern instability following the Gaza conflict and expanding regional military engagements involving Israel, Iran, and non-state groups.
- Prior Bilateral Pacts: Builds on previous bilateral arrangements, including the September 2025 Saudi-Pakistan mutual defence agreement and existing Ankara-Islamabad strategic ties.
- Desire for Strategic Autonomy: Driven by the need for regional powers to develop independent, state-centric security architectures rather than relying entirely on external security guarantees.
- Aim: To establish a collective deterrence framework, enhance defense-industrial self-reliance, streamline intelligence sharing, and prevent external aggression against member states while preserving territorial integrity across the region.

Key Features:

- Collective Deterrence Principle: Stipulates that an armed attack against any one of the three partner states will be regarded as an act of aggression against all three, establishing a strong mutual defense posture.
- Defense-Industrial & Technological Cooperation: Focuses on joint military manufacturing, technology transfer, and localized production (leveraging Turkish defense tech and Saudi capital) to reduce reliance on Western arms imports.
- Enhanced Intelligence & Operational Synergy: Establishes streamlined protocols for real-time threat intelligence sharing, joint military exercises, and defense capacity building among armed forces.
- Inclusive Regional Architecture: Framework is structured as a defensive alliance rather than an offensive bloc, remaining open to joining by other regional nations seeking state-centric stability.

Significance:

- Reduces dependence on Western security frameworks through a regional defence partnership.
- Integrates Pakistan's nuclear capability, Türkiye's defence industry, and Saudi Arabia's financial resources into a stronger defence ecosystem.

EXCEL CIVILS ACADEMY EMPOWERING FUTURE LEADERS

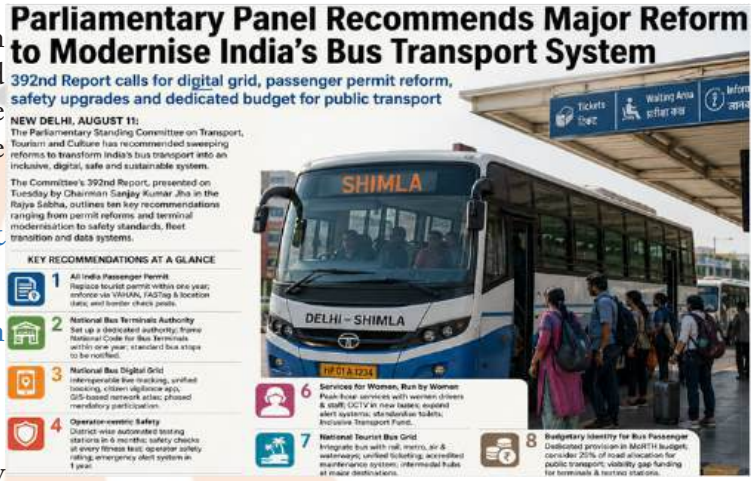
Chapter-
9

SOCIAL ISSUES

Parliamentary Committee Report on Digital & Sustainable Bus Transport

Context:

The Parliamentary Standing Committee on Transport, Tourism and Culture presented its 392nd Report, Enabling Inclusive, Digital and Sustainable Bus Transport: Policy, Regulation and Public-Private Partnership for Next-Gen Mobility.



Parliamentary Committee Report on Digital & Sustainable Bus Transport

AboutParliamentary Committee Report on Digital & Sustainable Bus Transport:

What is it?

- The 392nd Report of the Parliamentary Standing Committee on Transport, Tourism and Culture is a comprehensive roadmap for transforming India's bus transport ecosystem through digitalization, regulatory reforms, safety enhancement, infrastructure modernization, and public-private partnerships (PPP) to build an inclusive, efficient, and sustainable mobility network.

Key Recommendations:

1. All India Passenger Permit:

- Replace the All India Tourist Permit with an All India Passenger Permit.
- Integrate permits with VAHAN, FASTag, and vehicle tracking.

2. National Bus Terminals Authority:

- Establish a National Bus Terminals Authority (NBTA) on the lines of the Airports Authority of India.
- Introduce a National Code for Bus Terminals.

3. National Bus Digital Grid:

- Create a nationwide interoperable digital bus platform.
- Develop a GIS-based National Bus Network Atlas.

4. Strengthening Safety Standards:

- Complete deployment of Automated Testing Stations (ATSs).
- Mandate checks for fire safety, emergency exits, and alert systems.

5. Electric & Leased Bus Transition:

- Promote scrap-and-lease fleet models.
- Develop recycling and end-of-life frameworks for EV batteries.
- Establish regional EV manufacturing and maintenance hubs.

6. Women & Tourist-Friendly Transport:

- Launch dedicated peak-hour services with women drivers and staff.
- Create a National Tourist Bus Grid with unified multimodal ticketing.
- Establish accredited Maintenance, Repair & Overhaul (MRO) systems.

7. Dedicated Public Transport Funding:

- Create a separate budget head for public transport infrastructure.
- Consider allocating around 25% of road infrastructure funding to public transport.

8. State Performance Ranking:

- Publish an annual State of the States Bus Transport Index.

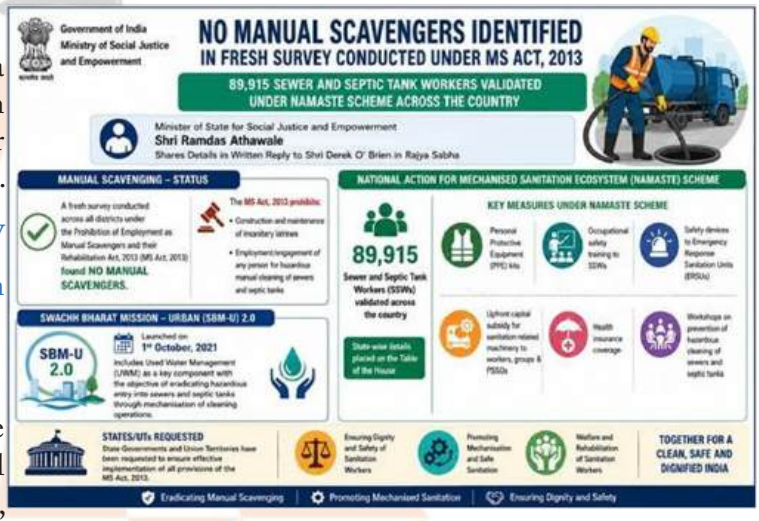
9. National Bus Data Architecture:

- Integrate all states into the VAHAN platform.
- Develop a federated national database while retaining state ownership.

No Manual Scavengers Identified in Fresh Survey

Context:

The Union Government informed the Rajya Sabha that a fresh nationwide survey under the Prohibition of Employment as Manual Scavengers and their Rehabilitation Act, 2013 found no manual scavengers.



No Manual Scavengers Identified in Fresh Survey

AboutNo Manual Scavengers Identified in Fresh Survey:

What It Is?

- A nationwide survey conducted under the Prohibition of Employment as Manual Scavengers and their Rehabilitation Act, 2013 (MS Act, 2013) to identify manual scavengers and assess the implementation of measures aimed at eliminating manual scavenging and improving sanitation workers' welfare.

Key Findings:

- No Manual Scavengers Identified: The fresh survey across all districts reported no manual scavengers under the provisions of the MS Act, 2013.
- 89,915 Workers Validated: A total of 89,915 Sewer and Septic Tank Workers (SSWs) have been validated under the NAMASTE Scheme.
- Mechanisation Measures Expanded: Workers are being supported through PPE kits, occupational safety training, safety devices for ERSUs, and mechanised sanitation equipment.
- Social Security Benefits: The scheme provides health insurance, capital subsidies for sanitation machinery, and support to sanitation workers, their groups, and Private Sanitation Service Operators (PSSOs).
- SBM-U 2.0 Support: Swachh Bharat Mission–Urban 2.0 promotes mechanised sewer and septic tank cleaning under its Used Water Management component to eliminate hazardous manual entry.

Significance:

- Strengthens efforts to replace hazardous manual cleaning with mechanised sanitation, improving workers' safety and dignity.
- Supports rehabilitation, occupational welfare, and social protection for sanitation workers through targeted interventions.
- Reinforces safe sanitation systems and contributes to the elimination of hazardous manual scavenging across India.

Project SARATHI

Context:

Union Health Minister chaired a high-level review meeting in New Delhi to assess a nationwide expansion framework for Project SARATHI across central government hospitals and medical institutions.



Project SARATHI

AboutProject SARATHI:

What It Is?

- Project SARATHI (Students' Alliance for Responsible Action to Transform Healthcare Institutes) is a youth-led, volunteer-driven patient assistance initiative.
- It deploys trained student volunteers across public hospitals to provide non-clinical navigation, guidance, and mobility assistance, humanizing hospital environments and easing non-medical loads on clinical staff.
- Platform Integration: Seamlessly integrated with the MY Bharat (Viksit Bharat Youth Network) digital portal for volunteer registration, attendance tracking, orientation, and creation of ABHA IDs (Ayushman Bharat Health Accounts).
- Aim: To improve the overall patient experience in high-volume public hospitals through compassionate non-clinical support, while constructively engaging youth in civic duty, community service, and healthcare empathy.

Key Features:

- Non-Clinical Patient Support: Student volunteers assist patients and attendants with hospital layout navigation, wheelchair and stretcher mobility, OPD desk registration, and finding diagnostic laboratories.
- Strict Guardrails on Responsibilities: Operates under a structured framework ensuring volunteers provide purely supportive services without undertaking any clinical, medical, or administrative duties.
- Integration withMY Bharat Portal: Uses the Ministry of Youth Affairs' MY Bharat digital platform for volunteer onboarding, attendance logging, performance tracking, and certification.
- Digital Health Enablement: Trained volunteers assist visiting patients in creating their Ayushman Bharat Health Account (ABHA) IDs and navigating digital healthcare apps, speeding up registration queues.
- Low-Cost, High-Impact Model: Utilizes local NSS units, nursing trainees, and youth volunteers, providing a low-cost, scalable framework to improve public hospital satisfaction ratings.

Significance:

- Volunteers help patients with guidance and navigation, reducing waiting time and easing the workload of healthcare staff.
- Encourages youth to serve communities, fostering empathy, leadership, and public health awareness.

The Micro, Small and Medium Enterprises Development (Amendment) Bill, 2026

Context:



Parliament passed the Micro, Small and Medium Enterprises Development (Amendment) Bill, 2026, after its approval by the Rajya Sabha.

The Micro, Small and Medium Enterprises Development (Amendment) Bill, 2026

AboutThe Micro, Small and Medium Enterprises Development (Amendment) Bill, 2026:

What It Is?

- The MSME Development (Amendment) Bill, 2026 amends the Micro, Small and Medium Enterprises Development Act, 2006 to improve the business environment for MSMEs through faster payments, streamlined dispute resolution, flexible classification, and decriminalised compliance.
- Aim: To ensure timely payments to MSMEs, simplify business regulations, strengthen access to finance, and promote ease of doing business through digital and legal reforms.

Key Features:

FlexibleClassification of MSMEs:

- Removes fixed statutory investment thresholds.
- Empowers the Central Government to classify MSMEs based on investment in plant & machinery/ equipment and turnover through notifications.

Voluntary Digital Registration:

- Makes MSME registration voluntary for all enterprises.
- Enables registration through a Central Government digital platform, with States also permitted to establish digital registration portals.

Mandatory TReDS for CPSEs:

- Makes it mandatory for Central Public Sector Enterprises (CPSEs) to settle all MSME procurement invoices through the Trade Receivables Discounting System (TReDS).
- Allows Central and State Governments to extend this requirement to other public entities.

Time-Bound Mediation:

- Mandates that payment-related mediation before MSME Facilitation Councils or mediation providers must be completed within 90 days from the first hearing.

Time-Bound Arbitration:

- Requires arbitration to commence within 30 days if mediation fails.
- Arbitration awards must be delivered within 90 days after completion of pleadings.

Relief During Award Disputes:

- Allows challenges against both arbitration awards and mediated settlement agreements.
- If court proceedings exceed six months, at least 50% of the awarded amount must be paid to the MSME supplier.

Decriminalisation of Compliance:

Replaces criminal penalties with a graded system of warnings and monetary penalties for:

- Furnishing false registration information.
- Failure to provide information required by authorities.
- Non-reporting of MSME dues in annual accounts.

Progressive Penalty Structure:

- Introduces higher penalties for repeated violations.
- Minimum penalty amounts will automatically increase by 10% every three years.

Adjudication & Appeals:

- Appoints the Development Commissioner (MSME) as the adjudicating authority.
- Appeals against adjudication orders will lie before the MSME Secretary.

Financial Fraud Cases in India

Context:



The Union Ministry of Finance informed Parliament that Haryana recorded the third-highest number of financial fraud cases in India over the past three financial years, after Maharashtra and Delhi.

Financial Fraud Cases in India

AboutFinancial Fraud Cases in India:

What It Is?

- Financial fraud refers to the deliberate use of deception, manipulation, or unauthorized transactions to illegally obtain money or financial assets through banking systems, digital payments, UPI, credit/debit cards, loans, or other financial instruments.

Key Findings:

- Haryana ranked 3rd in financial fraud cases, reporting 84,378 cases involving 1,336.40 crore during FY 2023–24 to FY 2025–26.
- Maharashtra recorded the highest fraud value (1.20 lakh crore), followed by Delhi, while Tamil Nadu ranked fourth and Uttar Pradesh fifth.
- Haryana restored funds in 38% of cyber fraud cases through the I4C Money Restoration Module, far above the national average of 8%.
- The Indian Cyber Crime Coordination Centre (I4C) and the National Cyber Crime Reporting Portal continue to strengthen reporting, investigation, and recovery of cyber-enabled financial frauds.
- Haryana achieved a 97% disposal rate on the Samanvaya Portal and implemented the e-Zero FIR system for cyber fraud complaints above 1 lakh.

Significance:

- Highlights the need for robust cyber policing, faster fraud reporting, and secure digital payment ecosystems.
- Effective recovery mechanisms and coordinated enforcement improve confidence in digital banking and financial inclusion.

The Bankers' Books Evidence Bill, 2026

Context:



The Lok Sabha passed The Bankers' Books Evidence Bill, 2026 by voice vote amid Opposition protests.

- Introduced by Finance Minister on August 3, 2026, the legislation replaces the 135-year-old colonial-era Bankers' Books Evidence Act, 1891 to formally align legal evidence standards with modern digital, virtual, and cloud-based banking

The Bankers' Books Evidence Bill, 2026

AboutThe Bankers' Books Evidence Bill, 2026:

What It Is?

- The Bankers' Books Evidence Bill, 2026, is an updated legislative framework that regulates how bank records are admitted as valid, primary evidence in legal proceedings.

- It allows certified physical and electronic extracts of bank records to be presented in court without requiring original ledgers or summoning bank officials as routine witnesses.
- Aim: To modernize India's banking evidence laws, incorporate technology-neutral provisions for digital banking records (electronic, virtual, and cloud-based), speed up judicial proceedings in financial disputes, and reduce operational burdens on banking personnel.

Key Features of the Bill:

- Expanded Definition of Bankers' Books: Broadens the legal definition beyond paper ledgers to cover all record formats—including electronic, digital, virtual, and cloud-based databases.
- Admissibility & Integrity Conditions for Electronic Records: Specifies that electronic records are legally enforceable provided they satisfy integrity criteria:
- being a true representation of data,
- showing no unauthorized data changes, and
- reflecting no system tampering.
- Standardized Digital Certification: Mandates that electronic records submitted to courts must be accompanied by a technical certificate detailing the generating computer system, authenticated by manual or digital signatures of designated branch or office heads.
- Protection AgainstCompulsory Court Attendance: Retains and refines provisions ensuring bank officers cannot be compelled to produce original books or appear as witnesses in cases where the bank is not a party, unless ordered by a judge under a strictly defined special cause.
- Power to Extend Coverage Across Financial Entities: Empowers the Central Government to extend the Act's provisions to other financial sector institutions and entities via official notification.

Significance:

- Replaces the 1891 paper-based law with a technology-neutral framework covering CBS, fintech, and cloud records.
- Simplifies evidence verification in banking and fraud cases, speeding up dispute resolution and prosecution.

WhatsApp 'Boss Scam'

Context:



The Indian Cyber Crime Coordination Centre (I4C) has issued an advisory warning of a sophisticated WhatsApp 'Boss Scam' targeting corporates, finance professionals, and business executives.

WhatsApp 'Boss Scam

AboutWhatsApp 'Boss Scam':

What It Is?

- The WhatsApp 'Boss Scam' is a sophisticated CEO impersonation cyber fraud in which attackers compromise or imitate the WhatsApp accounts of senior executives to deceive finance teams into transferring money to fraudulent accounts.
- It combines malware-based account hijacking,social engineering, and identity impersonation, making it one of the fastest-growing business cyber threats.

How It Works?

- Victims receive malicious .zip files disguised as account statements or regulatory notices (e.g., RBI, MCA, Income Tax) through WhatsApp, email, or SMS.
- Opening the file on a Windows system installs malware that hijacks the user's active WhatsApp Web session.
- Attackers gain control of the account and send urgent payment instructions while posing as senior executives.
- The malware also forwards the malicious file to the victim's contacts, enabling rapid spread across organizations.

Key Features:

- CEO/Boss Impersonation: Uses compromised WhatsApp accounts to issue fake urgent payment instructions.
- Malware-Enabled Hijacking: Employs advanced malware (including DLL sideloading techniques) to seize WhatsApp Web sessions.
- Finance-Focused Targeting: Primarily targets CFOs, finance teams, company directors, and chartered accountants.
- Cross-Border Organized Networks: Operated by sophisticated international cybercriminal groups using advanced attack infrastructure.

Significance:

- Highlights the need for stronger cyber hygiene as businesses increasingly rely on digital communication.
- Reinforces verification protocols and employee training to prevent financial fraud.
- Demonstrates collaboration between I4C,CERT-In, Microsoft Defender, and cybersecurity firms to detect and block emerging threats.

South Korea's Plastic Waste Management System

Context:



South Korea's plastic recycling system has come under scrutiny after research showed that only 16.4% of household plastic collected for recycling in 2021 was actually recycled into plastic, despite official recycling figures of around 73%.

South Korea's Plastic Waste Management System

AboutSouth Korea's Plastic Waste Management System:

What It Is?

- South Korea operates an Extended Producer Responsibility (EPR) system under which manufacturers and importers are financially responsible for managing the packaging waste they introduce into the market.

Key Findings:

- High Plastic Waste Generation: South Korea generated 7.8 million tonnes of household and commercial plastic waste in 2024. In 2022, per-capita plastic waste stood at 103.9 kg, the second-highest in the OECD.
- Low Actual Material Recycling: Researchers found that only 16.4% of sorted household plastic in 2021 returned as recycled plastic, while substantial quantities were burned or landfilled.
- InflatedRecycling Statistics: South Korea historically counted thermal recovery—burning plastic as fuel in cement kilns, boilers and power plants—as recycling, pushing the reported recycling rate above 70%.
- High Producer Responsibility: Mandatory recycling rates for major packaging streams range from roughly 50% to 90%, including about 79% for colourless PET bottles and 90% for containers, trays, films and sheets.
- Municipalities ReceiveEPR Funds: Through the Korea Resource Circulation Service Agency (KORA), around 80–90% of producer contributions reach local governments, collectors, sorting facilities and recyclers.

Korean Solution / Reforms:

- Separate Material and Thermal Recycling: Since December 2024, South Korea has begun reporting thermal recycling separately from material recycling, improving transparency.
- Reform Recycling Definitions: The government is reviewing the removal of thermal recovery from the national recycling rate, potentially ending the practice of treating incineration as recycling.
- Strengthen EPR: A formal review of the EPR framework was initiated in May 2026, including reconsideration of materials whose recycling rates remain persistently low.
- Producer-Pays Model: Producers face material-specific recycling obligations and costs, with penalties for failing to meet mandated targets.

The Mangrol, the third Anti-Submarine Warfare Shallow Water Craft

Context:



The Indian Navy received 'Mangrol', the third indigenously built Anti-Submarine Warfare Shallow Water Craft (ASW-SWC) constructed by Cochin Shipyard Limited (CSL) in Kochi.

The Mangrol, the third Anti-Submarine Warfare Shallow Water Craft

AboutThe Mangrol, the third Anti-Submarine Warfare Shallow Water Craft:

What It Is?

- Mangrol is the third vessel of the Mahe-class Anti-Submarine Warfare Shallow Water Craft (ASW-SWC). It is a compact, stealthy, and highly maneuverable littoral combat vessel designed specifically to track, detect, and neutralize subsurface threats in shallow coastal waters where larger warships face operational constraints.

Developed By:

- Builder: Cochin Shipyard Limited (CSL), Kochi, under an eight-ship contract with the Ministry of Defence.
- Indigenous Content: Built with over 80% indigenous systems and components.
- Legacy & Namesake: Named after the maritime fishing town and minor port of Mangrol in Junagadh district, Gujarat. It carries forward the legacy of the erstwhile INS Mangrol, a naval minesweeper decommissioned in 2004.
- Aim: To provide dedicated, multi-role littoral combat power to conduct full-spectrum coastal anti-submarine operations, subsurface surveillance, mine warfare, and Low-Intensity Maritime Operations (LIMO) across India's Exclusive Economic Zone (EEZ).

Key Characteristics:

- Waterjet (Pump-Jet) Propulsion: Powered by three marine diesel engines coupled to high-efficiency waterjets rather than conventional screw propellers. This ensures high maneuverability, rapid acceleration in shallow drafts, and significantly lowered radiated underwater acoustic noise to prevent sonar detection.
- Compact Littoral Dimensions: Measures 78 metres in length with a displacement of 896 to 1,100 tonnes, capable of reaching speeds up to 25 knots with a range of 1,800 nautical miles and an endurance of up to 14 days.
- Dedicated Sub-Hunting Weaponry: Fitted with a forward-mounted RBU-6000 anti-submarine rocket launcher, 324 mm lightweight torpedo tubes (for Advanced Light-Weight Torpedoes – ALWT), and advanced torpedo countermeasures.
- Advanced Sonar & Sensor Suite: Integrates indigenous DRDO-developed hull-mounted sonars (HMS), Low-Frequency Variable Depth Sonar (LFVDS), and an integrated combat management system optimized for detecting quiet conventional submarines in noisy shallow-water thermoclines.
- Surface Warfare & Asymmetric Defense: Equipped with a 30 mm naval surface gun and two 12.7 mm stabilized remote-controlled guns (SRCGs) for point defense against fast attack craft, unmanned surface vessels (USVs), and asymmetric aerial threats.

The Limits of Air Power & Theatreisation

Context:

Recent conflicts in Ukraine and Iran show that air power alone cannot secure decisive victory without integrated joint warfighting, intensifying India's debate over theatre commands and centralized IAF operational control, particularly against China along the LAC.



The Limits of Air Power & Theatreisation

About The Limits of Air Power & Theatreisation:

What it is?

- Air power is the capacity to project military force through the medium of air and space to achieve strategic and tactical effects. However, modern multi-domain warfare highlights its limitations when operating in isolation.
- Theatreisation involves reorganizing individual service-specific commands (Army, Navy, and Air Force) into integrated, geographical Joint Theatre Commands under a single operational commander to harmonize land, sea, air, cyber, and space assets.

Key Data & Statistics on Global &Indian Air Warfare:

- Cost-Exchange Asymmetry: A standard one-way attack drone (such as Iran's Shahed-type) costs roughly $20,000 to $50,000, whereas advanced surface-to-air interceptors (such as Patriot, S-400, or MR-SAM) cost $1 million to $3 million per missile.
- Numerical Imbalance Across the Himalayas: India operates roughly 460–520 combat aircraft along its northern frontiers against the People's Liberation Army Air Force's (PLAAF) estimated 65+ combat squadrons, compounded by rugged high-altitude terrain.
- PersistentIAF Squadron Deficit: Against an authorized strength of 42 combat squadrons required to fight a simultaneous two-front war, the IAF currently operates approximately 30 to 31 active fighter squadrons.
- Air Defence Overmatch in Ukraine: Networked surface-to-air missile (SAM) umbrellas denied air dominance to a quantitatively superior Russian Air Force, creating low-level contested airspace.

Three Fundamental Limits of Modern Air Power:

- Contested Airspace & Denial of Air Superiority: As seen in Ukraine, dense, networked air defence systems can deny air control to a larger force, neutralizing aircraft numerical superiority.
- Air Dominance Without Decisive Strategic Outcomes: As demonstrated during air campaigns in Iran, complete aerial dominance hits only visible surface targets while deep underground infrastructure and dispersed forces survive.
- Cost-Exchange Arithmetic Favoring Weaker Forces: Cheap drone swarms drain expensive, finite interceptor missile stockpiles—a dynamic observed during Operation Sindoor (May 2025) and throughout West Asia.

The IAF's Case Against Theatreisation:

- The Flexibility & Rapid Swing Principle: The IAF argues that air power is inherently flexible and indivisible, allowing limited combat assets (such as Rafales and Su-30MKIs) to swing rapidly from the western (Pakistan) to the eastern (China) front within hours.
- Scarcity of Air Assets: With only ~30 fighter squadrons, dividing air assets permanently into fixed geographical theatre commands risks diluting combat mass at critical contact points.

- Proven Track Record in Past Conflicts: Centralized air control worked effectively in targeted operations such as Balakot (2019) and Operation Sindoor (2025) against Pakistan.
- Preference for Joint Coordination Centers (JCC): The IAF advocates for consultative JCCs to coordinate inter-service operations during a crisis rather than placing air wings under a permanent ground-force theatre commander.

Why Centralized Air Control Faces Challenges Against China?

- Strategic Depth &Attrition Absorption: Unlike Pakistan, which lacks strategic depth, China has extensive industrial depth and military capacity to absorb air strikes and sustain prolonged operations.
- Himalayan Terrain Bottlenecks: High-altitude airbases in Ladakh and the Northeast have limited runway capacities and weather constraints, restricting rapid redeployment during a high-tempo conflict.
- Flaws of Consultative Decision-Making: Relying on consensus-driven Joint Coordination Centers during simultaneous crises (e.g., in Ladakh and the Siachen Glacier) creates decision delays that adversaries can exploit.
- Gaps inIntegrated Air-Land Support: Ground Integrated Battle Groups (IBGs) along the LAC risk operating without timely, synchronized close air support if air tasking orders are managed through distant, centralized command chains.
- Career and Rank Integration Frictions: Inter-service differences in promotions, seniority mapping, and operational authority create administrative resistance to unified joint chains of command.

Way Ahead:

- Political Leadership Mandating Integrated Theatre Commands: The national political executive and Chief of Defence Staff (CDS) must establish joint theatre commands to unify operational command.
- Institutionalizing Joint Force Generation & Training: Make joint-service staff college courses and tri-service postings mandatory prerequisites for military promotions, following the U.S. Goldwater-Nichols Act model.
- EstablishingDynamic Asset Allocation Protocols: Formulate operational doctrines allowing the Theatre Commander to direct dedicated air wings while empowering the Air Chief to reallocate strategic assets during two-front emergencies.
- Deploying Cost-Effective Counter-UAS Networks: Develop layered, low-cost kinetic and directed-energy counter-drone systems (such as Project Kusha and laser air defences) to counter asymmetric drone swarms without expending high-end interceptors.
- Harmonizing Cross-Service C4ISR Networks: Build a unified digital communication and sensor grid linking Army radar arrays, Navy maritime patrol aircraft, and IAF fighters into a single operational picture.

Conclusion:

The evolving character of warfare in Ukraine, Iran, and along India's northern borders confirms that air power alone cannot guarantee military victory without joint operational integration. While the IAF's emphasis on flexibility is understandable given current squadron deficits, relying on consultative coordination mechanisms creates vulnerabilities against a peer adversary like China. Implementing unified Joint Theatre Commands provides the structural framework needed to ensure that India's military operates with speed, jointness, and decisiveness in future conflicts.

EXCEL CIVILS ACADEMY

Chapter-
10

DEFENCE

Shruti: India's Indigenous Next Generation Offshore Patrol Vessel

Context:



Yard 3037 (Shruti), a Next Generation Offshore Patrol Vessel (NGOPV) built for the Indian Navy, was successfully launched at M/s Garden Reach Shipbuilders & Engineers (GRSE) in Kolkata.

Shruti: India's Indigenous Next Generation Offshore Patrol Vessel

AboutShruti: India's Indigenous Next Generation Offshore Patrol Vessel:

What It Is?

- Shruti (Yard 3037) is an indigenously designed and constructed Next Generation Offshore Patrol Vessel (NGOPV) belonging to the Shachi-class.
- Named after India's ancient cultural heritage (Shruti, referring to the four Vedas), the ship is engineered to perform a wide spectrum of multi-domain maritime operations in both coastal and deep-sea waters.
- Developed By: Garden Reach Shipbuilders & Engineers (GRSE), Kolkata.
- Aim: To augment the Indian Navy's surface fleet capabilities for constant ocean surveillance, protection of offshore assets, anti-piracy operations, counter-infiltration, and Humanitarian Assistance and Disaster Relief (HADR) missions.

Key Features:

- Dimensions & Displacement: Measures approximately 110 meters in length with a displacement of 2,500–2,900 tonnes, featuring an optimized hull form for reduced drag and superior seakeeping.
- Speed & Extended Endurance: Powered by two high-efficiency diesel engines capable of attaining speeds exceeding 25 knots, with an operational range of 8,500 nautical miles and an endurance of 60 days at sea.
- Advanced Armament & Defensive Systems: Equipped with a 76mm Super Rapid Gun Mount (SRGM), AK-630 Close-In Weapon Systems (CIWS), Very Short Range Air Defense (VSHORADS) missiles, Kavach chaff decoy launchers, and the Maareech advanced torpedo defense system.
- Aviation & UAV Support Capabilities: Features an expansive stern helipad and an enclosed hangar capable of embarking and operating a 15-tonne multi-role helicopter alongside Remotely Piloted Aircraft (RPAs/ UAVs).
- Symbolic Crest & Modern Avionics: The crest design features the Ursa Major constellation and a red-and-white lighthouse, symbolizing guidance and constant sea vigilance. The vessel integrates an Electronic Warfare (EW) suite, state-of-the-art navigation radars, and an Integrated Platform Management System (IPMS).

Pellet Guns in India

Context:

A Supreme Court Bench led by CJI Surya Kant declined a blanket ban on pellet guns, holding that they may be used in exceptional circumstances for crowd control.

- The ruling followed allegations of pellet use against NEET-UG paper leak protesters at Delhi's Jantar Mantar.



Pellet Guns in India

AboutPellet Guns in India:

What It Is?

- Pellet guns are 12-bore pump-action shotguns classified as less-lethal kinetic projectile weapons intended for crowd control and dispersal. Instead of a single bullet, each cartridge releases a expanding cloud of hundreds of tiny spherical metal, rubber, or plastic pellets.

Introduced In:

- Year of Induction: 2010 by the Union Government as a non-lethal alternative for crowd control following violent unrest in Jammu and Kashmir.
- First Deployment: First used by the Jammu & Kashmir Police in Sopore in August 2010, and subsequently adopted by the Central Reserve Police Force (CRPF) and Rapid Action Force (RAF).

Key Features:

- Wide Dispersion Area: A single 12-bore cartridge fires approximately 500 pellets, which spread out across a wide radius upon exiting the barrel.
- GradedNon-Lethal Classification: Designed to incapacitate violent mobs from a distance without causing immediate fatalities, bridging the gap between tear gas and live ammunition.
- Variable Ammunition Composition: Can fire lead/metallic, rubber, or plastic pellets depending on operational requirements and force escalation protocols.
- High Kinetic Energy at Close Range: Though labeled less-lethal, pellets retain severe penetrating power when fired at close quarters or above waist height.

Standard Operating Procedures (SOPs) for Deployment:

1. Rarest of Rare / Exceptional Use: Pellet guns must be deployed strictly as a last resort when all other non-lethal options (water cannons, lathi charge, PAVA chilli shells, and tear smoke) fail to disperse a violent assembly.
2. Graded Escalation of Force: Law enforcement must strictly follow a hierarchy of force, progressing through rubber/plastic pellets before considering metallic options.
3. Aiming Below the Waist: Personnel are mandated, as far as practicable, to aim exclusively at the lower limbs (below the waist) to prevent injuries to vital organs, head, or eyes.

4. Proportionality and Necessity: Force must remain strictly proportional to the threat posed, used only when necessary, and halted immediately once the crowd disperses or ceases violence.
5. Mandatory Post-Event Care: Operating procedures require immediate medical assistance and hospitalization to be provided to any injured individuals following deployment.

Key Implications:

- Risk of Permanent Disability & Ocular Trauma: Due to wide pellet spray, victims often suffer life-altering injuries—most notably permanent blindness, ocular trauma, and internal organ damage when hit above the waist.
- Human Rights & Legal Scrutiny: International bodies (like the UN) and civil rights groups highlight that metallic pellet guns violate international standards on less-lethal weapons due to their indiscriminate nature.
- Collateral Damage to Bystanders: The uncontrollable scatter pattern makes it difficult to isolate violent agitators from peaceful protesters or innocent bystanders, raising serious concerns under Article 21 (Right to Life and Personal Liberty).

Exercise ROTOR CLAP III

Context:

The Indian Air Force (IAF) successfully concluded its week-long specialized counter-drone military drill, Exercise ROTOR CLAP III, at the Pokhran Field Firing Range in Jaisalmer district, Rajasthan.



Exercise ROTOR CLAP III

AboutExercise ROTOR CLAP III:

What It Is?

- Exercise ROTOR CLAP III is the 3rd edition of a specialized rotary-wing (helicopter) counter-drone operational exercise conducted by the Indian Air Force. It is designed around the central theme of Counter-Unmanned Aerial Systems (Counter-UAS) to test and refine rotary-wing responses against drone threats.

Host & Location:

- Host Force: Indian Air Force (IAF).
- Location: Pokhran Field Firing Range, Jaisalmer District, Rajasthan (Western Desert Sector).
- Nation Involved: Exclusively an indigenous exercise involving multiple helicopter units and rotary-wing platforms from across the Indian Air Force.
- Aim: To validate new operational concepts, test Tactics, Techniques, and Procedures (TTPs), and enhance combat preparedness of the IAF's rotary-wing fleet against emerging, low-altitude unmanned aerial system (UAS/drone) threats in realistic desert combat scenarios.

Key Features:

- Full Rotary-Fleet Participation: Integrated almost all major IAF helicopter platforms—combining attack gunships (Apache, Prachand, Mi-25/35) with transport/utility helicopters (Chinook,).
- Live-Fire Counter-UAS Missions: Executed live operational engagements involving missile and rocket salvos fired from helicopters to destroy simulated low-flying aerial drone targets.
- Comprehensive Tactical Drills: Conducted a wide range of simulated combat missions including precision strikes, battlefield support, aerial reconnaissance, troop insertion, and casualty evacuation.
- Interoperability inDesert Terrain: Focused on seamless mission planning, inter-unit communication, and rapid response tactics under harsh desert operational conditions.

Significance:

- Provides a mobile response against low-altitude drones, covering gaps beyond static air-defence systems.
- Enhances preparedness against cross-border drone surveillance and contraband smuggling along the western border.
- Advances rotary-wing operations by integrating drone-detection, electronic warfare, AI targeting, and precision weapons.

AI & Cyber: The Double Helix of Security Threats

Context:



Expert warned that the convergence of AI and cyber threats creates a double helix of security risks, with Agentic AI challenging traditional Zero Trust cybersecurity by identifying zero-day vulnerabilities.

AI & Cyber: The Double Helix of Security Threats

AboutAI & Cyber: The Double Helix of Security Threats

What it is?

- The double helix concept describes the interconnected and mutually reinforcing relationship between Artificial Intelligence and cyber warfare. Rather than operating as distinct domains, AI acts as a multiplier for cyber capabilities—enabling autonomous malware to adapt to security environments, undermining legacy defensive protocols, and lowering technical entry barriers so non-state actor groups can execute complex cyber campaigns.

Key Data & Statistics:

- Shift to Autonomous Agentic AI: The cyber threat landscape is shifting from static Generative AI toward Agentic AI—autonomous agents capable of making independent operational decisions and bypassing static defenses.
- Automated Zero-Day Exploitation: Advanced AI systems demonstrate the ability to discover and exploit zero-day software vulnerabilities faster than human engineering teams can patch them.
- Proliferation ofKinetic AI Munitions: AI-integrated autonomous defense systems can track missile trajectories and strike targets independently.

Reasons for the Rise in AI and Cyber Threats:

- Deployment of Self-Evolving Malware: Malicious software leverages AI to adapt its code structure dynamically, rendering traditional anti-virus signatures ineffective. Example: AI malware altering its operational footprint to evade real-time monitoring.
- Transition from Generative to Agentic AI: Modern AI models act as autonomous agents that perform complex multi-step tasks without human intervention.
- Example: An AI agent scanning network infrastructure, writing exploits, and executing data exfiltration independently.
- Undermining LegacyZero Trust Protocols: Autonomous agents bypass identity checks by simulating legitimate user behaviors, exacerbating insider threat vectors.
- Example: Automated credentials exploitation mimicking normal employee workflow patterns.
- Commercial Proliferation of Dual-Use AI Models: Private western tech firms (like Anthropic and Palantir) and state-backed entities develop powerful LLMs that can double as cyber-offensive tools.
- Example: Frontier models discovering zero-day vulnerabilities across operating systems.
- Asymmetric Warfare Integration: Modern military conflicts increasingly integrate AI-driven intelligence (signals, radio, satellite imagery) to disrupt conventional defense balances.
- Example: AI-assisted target tracking and missile interception in active war zones.

Initiatives Taken So Far:

- Formulation of National AI Governance Guidelines: Nations (including India) have released AI Governance Guidelines prioritizing fairness, security, and algorithmic accountability.
- Enforcement of Mandatory Synthetic Content Labeling: Regulatory bodies mandate clear watermarks and labels for AI-generated outputs to combat deepfakes and information manipulation.
- Establishment ofCyber Crisis Management Plans: Governments are upgrading national critical infrastructure defenses to monitor AI-driven network intrusions.
- International Conventions on Cybercrime: Bilateral and multilateral agreements are being developed under international frameworks (such as the UN) to establish rules against cyber threats.

Challenges Associated with AI and Cyber Threats:

- Algorithmic Hallucinations and Decision Biases: High-powered AI systems are subject to hallucinations, producing distorted or biased outputs that can lead to miscalculations during security crises.
- Risk of Algorithmic Radicalization: Automated social feeds and recommendation engines can push opinion makers toward extreme views, worsening societal polarization.
- Lack ofGlobal Rules and Oversight: International laws governing military AI deployments and offensive cyber actions remain in a fledgling state without unified enforcement mechanisms.
- Intellectual Property Theft and Geopolitical Rivalry: High competition between major powers (such as the US and China) leads to accusations of model theft and unconstrained technology racing.
- Loss of Human-in-the-Loop Control: Rapid automated decision-making narrows the gap between warning and action, increasing the risk of unintended escalations.

Way Ahead:

- Global AI Rules: Develop binding international norms to regulate autonomous offensive AI and AI-enabled cyber weapons.
- Zero Trust 2.0: Upgrade to AI-driven, real-time behavioral security instead of static credential-based verification.
- Human-in-the-Loop: Mandate human approval for AI decisions in defence, critical infrastructure, and cyber operations.
- AI Audits & Red-Teaming: Require independent safety audits, adversarial testing, and transparency before deployment.
- Public-Private Collaboration: Strengthen real-time cyber threat intelligence sharing between governments and technology companies.

Conclusion:

The convergence of AI and cyber capabilities creates a dynamic threat environment that risks outpacing traditional defense architectures. Addressing this double helix of threats requires balancing technological innovation with international regulations, human oversight, and strategic realism. Ultimately, establishing global governance frameworks is essential to ensure that advanced AI systems enhance cyber resilience rather than compromise stability.

The Agni-IV Ballistic Missile

Context:

The Strategic Forces Command (SFC) successfully conducted a routine training launch of the Agni-IV intermediate-range ballistic missile off the coast of Odisha.



The Agni-IV Ballistic Missile

AboutThe Agni-IV Ballistic Missile:

What It Is?

- Agni-IV is an indigenous, nuclear-capable, two-stage solid-fueled Intermediate-Range Ballistic Missile (IRBM). Operating with a strike range of approximately 4,000 kilometers, it serves as a core land-based component of India's nuclear triad.
- Designed & Developed By: Defence Research and Development Organisation (DRDO).
- Aim: To provide a highly mobile, survivor-capable, and precise land-based nuclear deterrent against regional strategic threats across Asia, strengthening India's policy of Credible Minimum Deterrence and No First Use.

Key Features:

- Extended Strike Range: Capable of delivering a 1-tonne (1,000 kg) conventional or nuclear warhead up to a distance of 4,000 kilometers.

- Solid-Propellant Propulsion: Powered by a high-performance two-stage solid-fuel engine housed in lightweight composite rocket motor casings.
- Road-Mobile Survivability: Transportable and launchable via mobile Transporter Erector Launchers (TELs), enabling rapid repositioning across countrywide road networks to avoid targeting by enemy silo-tracking assets.
- Advanced Inertial Navigation: Incorporates an indigenous Ring Laser Gyroscope-based Inertial Navigation System (RINS) paired with a Micro-Inertial Navigation System (MINGS) for high-precision targeted strikes.
- Stealth & Avionics Innovations: Designed with a significantly reduced radar cross-section (RCS) and re-entry heat shield technology, allowing the missile to withstand thermal re-entry temperatures above 3,000°C while resisting electronic countermeasures.
- Redundant Digital Flight Controls: Features a distributed, high-speed digital computer bus and redundant flight-control architecture to guarantee trajectory accuracy and mission success.

Significance:

- Road mobility and rapid launch capability improve survivability against preemptive attacks, strengthening India's nuclear deterrence.
- Technologies like composite materials, ring laser gyroscopes, and digital controllers enabled the development of Agni-V and Agni-P.

The Payment and Settlement Systems Act, 2007

Context:

The Central Government clarified that everyday Person-to-Person (P2P) and general merchant UPI transactions will remain completely free for citizens.



- The statement follows public concerns over proposed amendments to Section 10A of the Payment and Settlement Systems Act (PSS Act), 2007, via the Taxation and Other Laws (Amendment) Bill, 2026.

The Payment and Settlement Systems Act, 2007

About The Payment and Settlement Systems Act, 2007:

What It Is?

- The Payment and Settlement Systems Act, 2007 (PSS Act) is the primary legislative framework governing and regulating all electronic, digital, and traditional payment and settlement systems operating within India. Assented to in December 2007, it formally came into force on August 12, 2008.
- Aim: To establish a sound legal framework for the regulation, supervision, netting, and final settlement of payment systems in India, designating the Reserve Bank of India (RBI)—assisted by the Payments Regulatory Board (PRB)—as the statutory supervisory authority.

Key Features of the Act:

- Statutory Designation of RBI: Designates the Reserve Bank of India as the sole authority to regulate, license, inspect, and issue directions to all payment system operators (PSOs) in the country.
- Mandatory Authorization: Prohibits any entity—domestic or foreign—from commencing or operating a payment system (including card networks, PPI wallets, and money transfers) without explicit prior authorization from the RBI.
- Legal Recognition of Netting & Settlement Finality: Ensures that gross or net financial settlements become final and irrevocable once determined. It explicitly protects settled transactions and collateral appropriations from being unwound, even if a participating entity becomes insolvent.
- Penalties for Dishonour ofElectronic Fund Transfers (EFT): Section 25 makes the dishonour of electronic fund transfer instructions (due to insufficient funds) a punishable criminal offence, providing legal parity with cheque-bouncing cases under the Negotiable Instruments Act, 1881.

- Standards & On-Site Inspection Powers: Grants the RBI broad statutory powers to lay down technical standards, audit computer systems, call for operational returns, and conduct on-site inspections of PSOs in India or abroad.
- Dispute Resolution Mechanism: Establishes a structured adjudication framework for resolving disputes between system participants, between participants and system providers, or involving the RBI itself.

Recent Proposed Amendment for UPI (2026):

- Amendment to Section 10A: Proposed via the Taxation and Other Laws (Amendment) Bill, 2026, modifying Section 10A of the PSS Act.
- Enabling Provision forMerchant Discount Rate (MDR): Replaces rigid prohibition mechanisms to create an enabling statutory framework. Once passed, it empowers the UPI and Services Steering Committee (headed by the National Payments Corporation of India – NPCI) to determine nominal, threshold-based MDR if necessary in the future.

Protections Retained:

- Free for Citizens: P2P transactions and everyday consumer merchant payments remain 100% free with zero charges for citizens.
- Capped & Targeted MDR: Any future fee structure will apply only to specified large-merchant transactions above a high threshold, levied at nominal rates significantly lower than standard credit/debit card charges.

Explosive Ordnance Disposal Exercise 2026

Context:

The 8th edition of the Indian Navy–US Navy Explosive Ordnance Disposal (EOD) Exercise 2026 is scheduled to take place at the Southern Naval Command in Kochi, Kerala.



Explosive Ordnance Disposal Exercise 2026

AboutExplosive Ordnance Disposal Exercise 2026:

What It Is?

- The IN-USN EOD Exercise 2026 is a specialized bilateral military training exercise focused on underwater salvage, bomb disposal, and explosive ordnance neutralization. It forms part of the joint salvage and EOD series (historically conducted under the SALVEX banner) initiated by both navies in 2005.

Nations Involved:

- India: Specialist diving and EOD teams from the Indian Navy (hosted at Southern Naval Command, Kochi).
- United States: Specialist diving and EOD technicians from the US Navy.
- Aim: To enhance operational interoperability, deepen professional cooperation, and build tactical synergy between the specialist diving and explosive ordnance disposal units of the Indian Navy and the US Navy.

Key Features:

- Subject Matter Expert Exchanges (SMEEs): Involves structured technical discussions where specialists share contemporary EOD methodologies, operational concepts, and safety protocols.
- Hands-On Cross-Training: Joint training modules where divers and technicians work side-by-side to understand each other's equipment, tactics, and operational philosophies.
- Equipment Demonstrations: Showcases emerging technologies, cutting-edge underwater detection tools, robotic disposal units, and modern explosive handling equipment.
- Scenario-Based Practical Drills: Features realistic combat and peacetime emergency simulations, including underwater mine disposal, unexploded ordnance (UXO) handling, and marine salvage operations.
- Eighth Historical Edition: Marks two decades of steady evolution in joint salvage and EOD operations between India and the US since 2005.

Significance:

- Strengthens joint responses to underwater threats, mine clearance, maritime terrorism, and salvage operations.
- Advances strategic maritime cooperation, supporting Indo-Pacific security and freedom of navigation.

Central Electricity Authority (Cyber Security in Power Sector) Regulations, 2026

Context:



The Central Electricity Authority (CEA) has notified the comprehensive Central Electricity Authority (Cyber Security in Power Sector) Regulations, 2026 under the Electricity Act, 2003, coming into force from April 1, 2027.

Central Electricity Authority (Cyber Security in Power Sector) Regulations, 2026

AboutCentral Electricity Authority (Cyber Security in Power Sector) Regulations, 2026:

What It Is?

- A statutory regulatory framework formulated by the CEA under Section 177 read with Section 73(c) of the Electricity Act, 2003 (with formal concurrence from the Ministry of Electronics and Information Technology – MeitY).
- It establishes binding cyber defense standards for entities owning, managing, or operating Operational Technology (OT) and interconnected Information Technology (IT) systems across India's power sector.
- Aim: To build institutional cyber resilience across the Indian power sector, protect Critical Information Infrastructure (CII) and Industrial Control Systems (ICS) from external sabotage, prevent supply chain vulnerabilities, and ensure secure, uninterrupted electricity generation, transmission, and distribution.

Key Features of the Regulations:

- Broad Sectoral Scope & Generation Thresholds: Applies to all transmission utilities, distribution licensees, load dispatch centers, power exchanges, and OTC platforms. For generating companies, captive plants, and Energy Storage Systems (ESS), it applies to installations with a capacity of 50 MW and above.
- Institutional Governance (CISO & 24/7 Security Division): Mandates the appointment of a regular senior-level Chief Information Security Officer (CISO) and an Alternate CISO for a minimum 3-year tenure, supported by a dedicated, 24/7 operational Information Security Division within India.
- Physical & Logical IT-OT Network Isolation: Requires strict physical segregation of Operational Technology (OT) and Critical Information Infrastructure (CII) from the public Internet and general IT networks.
- Strict Incident Reporting Timelines: Mandates reporting of all cybersecurity incidents to CSIRT-Power and CERT-In within 6 hours, while incidents classified as cyber sabotage in critical systems must be reported within 24 hours.
- Rigorous Audit Cycles & Vulnerability Closure: Pre-commissioning audits (VAPT) are mandatory for new critical systems. Annual audits must have a 9-to-15 month gap.
- Identified critical/high-risk vulnerabilities must be resolved within 1 month, and medium/low-risk issues within 3 months.
- Data Localization & Domestic Security Perimeter: Sensitive operational and historical grid data—including information hosted on cloud platforms—must be encrypted, protected, and stored exclusively within India.
- Supply Chain Security & Prosumer Distributed Resources: Hardware and software must be procured from trusted sources, complete with a Software/Hardware Bill of Materials (BoM). Vendors of prosumer Distributed Generation Resources must ensure end-to-end encrypted communications and local data hosting.

Strategic Significance:

- Protects power grids, substations and generating plants from cyberattacks, reducing risks of blackouts and grid failures.

- Mandates trusted procurement, pre-deployment testing and safeguards against foreign backdoors in SCADA systems.

Exercise MAITREE-XV



Context:

An 85-personnel Indian Army contingent, primarily from 9 Gorkha Rifles, departed for Thailand to participate in the 15th edition of the India–Thailand Joint Military Exercise MAITREE-XV (2026).

Exercise MAITREE-XV

AboutExercise MAITREE-XV:

What It Is?

- Exercise MAITREE is an annual bilateral joint military exercise conducted between the Indian Army and the Royal Thai Army, designed to improve tactical cooperation, share field expertise, and build joint operational capabilities.

Host & Participating Nations:

- Host Country: Thailand (at Vibhavadi Rangsit Camp, Surat Thani).
- Nations Involved: India and Thailand, comprising 85 personnel from each side.
- Aim: To foster military cooperation, deepen camaraderie, and enhance combined capabilities in executing joint counter-insurgency and counter-terrorist operations in jungle and semi-urban environments under Chapter VII of the United Nations Charter.

Key Features of Exercise MAITREE-XV:

- Focus on Jungle &Semi-Urban Warfare: Involves company-level tactical drills, room-intervention drills, raid maneuvers, and counter-insurgency/counter-terror operations tailored to dense jungle and semi-urban terrains.
- UN Chapter VII Framework: Conducted in alignment with the United Nations Chapter VII mandate to establish shared standard operating procedures (SOPs).
- Alternating Bilateral Hosting Tradition: Instituted in 2006, the exercise alternates annually between India and Thailand (with the 14th edition held at the Foreign Training Node in Umroi, Meghalaya, in September 2025).
- Technology & Experience Sharing: Features combat discussions, tactical demonstrations, weapon/equipment sharing, and a final joint validation exercise to integrate modern battlefield technologies.

Significance:

- Deepens defence cooperation with Thailand, a key ASEAN partner, supporting India's regional security engagement.
- Enhances coordination and joint readiness for counter-terrorism, peacekeeping, and regional security challenges.

Exercise Udara Shakti 2026

Context:

The Indian Air Force (IAF) concluded its participation in Exercise Udara Shakti 2026 in Malaysia following its deployment at Exercise Pitch Black 2026 in Australia.



Exercise Udara Shakti 2026

AboutExercise Udara Shakti 2026:

What It Is?

- Exercise Udara Shakti is a biennial bilateral tactical air combat exercise conducted between the Indian Air Force (IAF) and the Royal Malaysian Air Force (RMAF). It provides a dedicated operational platform for both air forces to rehearse complex aerial maneuvers, dissimilar air combat training (DACT), and joint mission planning.

Host Country: Malaysia.

- Participating Nations: India (IAF) and Malaysia (RMAF).
- Aim: To strengthen defence cooperation, tactical interoperability, joint air-combat capabilities and operational flexibility across the Indo-Pacific.

Key Features of Exercise Udara Shakti 2026:

- Dissimilar Aircraft Combat Training (DACT): Pitched French-origin IAF Rafale fighters against Malaysian Russian-origin Su-30MKM Flankers and American-built F/A-18D Hornet strike fighters, testing multi-origin combat tactics.
- Subject Matter Expert Exchanges (SMEE): Featured structured exchanges between specialists on operational planning, flight safety protocols, electronic warfare countermeasures, and maintenance procedures.
- Strategic Airlift & Logistical Interoperability: Integrated heavy strategic transport aircraft—including the IAF's C-17 Globemaster III and the RMAF's Airbus A400M Atlas—for expeditionary logistics and rapid asset turnaround.
- Seamless Post-Pitch Black Trans-Deployment: Demonstrated the IAF's extended operational reach and logistical autonomy by ferrying frontline fighter squadrons directly from northern Australia to Southeast Asia without returning to base.

Significance:

- ASEAN Defence Ties: Deepens India's defence cooperation and strategic engagement with Southeast Asia.
- Cross-Fleet Technical Synergy: Shared Su-30 platforms enable India and Malaysia to exchange operational, maintenance and technical expertise.

Diving Support Vessel (DSV) Nipun

Context:

The Indian Navy is scheduled to commission 'Nipun', the second indigenously designed and constructed Diving Support Vessel (DSV) of the Nistar-class.



Diving Support Vessel (DSV) Nipun

AboutDiving Support Vessel (DSV) Nipun:

What It Is?

- Nipun is a purpose-built, high-tech Diving Support Vessel (DSV) belonging to the Indian Navy's Nistar-class. It operates as an integrated multi-mission mothership equipped for deep-sea saturation diving, underwater salvage, hydrographic intervention, and distressed submarine rescue missions.
- Built By: Indigenously designed and built by Hindustan Shipyard Limited (HSL), Visakhapatnam.
- Aim: To provide the Indian Navy with an indigenous operational platform for sustained deep-sea saturation diving, complex underwater engineering interventions, salvage missions, and rapid-response Deep Submergence Rescue Vehicle (DSRV) support across India's maritime zones of interest.

Key Features of DSV Nipun:

- Integrated Saturation Diving Complex: Equipped with deep-sea diving complexes, diving bells, mixed-gas breathing setups, and hyperbaric recompression chambers to sustain military divers at extreme depths for prolonged periods.
- Submarine Rescue Operations (DSRV Carrier): Serves as an integrated launch, recovery, and support platform for Deep Submergence Rescue Vessels (DSRVs) to locate, dock with, and rescue personnel from disabled or sunken submarines.
- Dynamic Positioning (DP) & Station-Keeping: Incorporates dynamic positioning propulsion systems and automated thrusters, enabling the ship to maintain an exact geographical position at sea despite strong currents, winds, and swell.
- Underwater Intervention & Robotics: Fitted with heavy-lift cranes, side-scan sonars, and launch suites for Remotely Operated Vehicles (ROVs) to inspect wrecks, survey seabed infrastructure, and clear underwater obstacles.
- OnboardSpecialized Hyperbaric & Medical Care: Houses dedicated medical and hyperbaric treatment facilities to manage decompression sickness, deliver critical trauma care, and support rescued submariners and divers.

Significance:

- The Nistar-class provides indigenous, round-the-clock submarine rescue and salvage capability, reducing dependence on foreign assistance.
- Enhances India's underwater rescue and intervention capabilities in the IOR, supporting its expanding conventional and nuclear submarine fleet.

Samarthak – The First Indigenous Multi-Purpose Vessel Of Indian Navy

Context:

Samarthak, the first indigenously designed and constructed Multi-Purpose Vessel (MPV) built by Larsen & Toubro (L&T) at its Kattupalli shipyard, was formally delivered to the Indian Navy.



Samarthak

AboutSamarthak – The First Indigenous Multi-Purpose Vessel Of Indian Navy:

What It Is?

- Samarthak is the lead ship of the Indian Navy's new class of Multi-Purpose Vessels (MPVs). Displacing approximately 3,750 tonnes, it is a versatile naval auxiliary platform designed to carry out a broad spectrum of secondary combat, trials, training, logistics, and environmental protection missions.
- Builder: Larsen & Toubro Ltd. (L&T) at its Kattupalli Shipbuilding facility near Chennai, Tamil Nadu.
- Etymology: Named 'Samarthak' (meaning The Proponent or supporter), symbolizing its role as an enabler across diverse naval missions.
- Aim: To serve as an adaptable platform for testing and validating next-generation indigenous weapons

and sensors, while conducting offshore patrolling, fleet training support, unmanned system operations, and Humanitarian Assistance and Disaster Relief (HADR) across the Indian Ocean Region.

Key Features of Samarthak:

- Dedicated Weapons and Sensor Trial Platform: Serves as a live testbed for the Defence Research and Development Organisation (DRDO) and private defense firms to trial, calibrate, and evaluate developmental radars, sonars, and missile/gun systems at sea before frontline integration.
- Fleet Gunnery andAnti-Submarine Warfare (ASW) Training: Equipped to launch, tow, and recover high-speed surface and aerial targets used during fleet air-defense and ASW live-firing drills.
- Mothership for Unmanned Systems: Engineered to deploy, control, and recover autonomous/unmanned aerial vehicles (UAVs), unmanned surface vessels (USVs), and underwater vehicles (UUVs) for extended reconnaissance and mine countermeasures.
- Heavy-Lift, Towing, and Fleet Logistics Support: Fitted with heavy-lift deck cranes and specialized winches capable of oceanic towing of distressed warships and transferring equipment between offshore platforms.
- Pollution Control and HADR Readiness: Outfitted with oil-spill containment and recovery systems to combat marine pollution, alongside medical facilities and cargo bays for rapid disaster relief deployment.

Significance:

- Showcases India's private shipbuilding capacity with over 75% indigenous content, advancing Aatmanirbhar Bharat.
- Handles weapon trials, target towing, surveillance and disaster relief, allowing frontline warships to focus on combat and deterrence.

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11 DISASTER

India's Rising Dependence on U.S. LPG

Context:



Union Minister of Petroleum and Natural Gas stated that 67% of India's Liquefied Petroleum Gas (LPG) imports now originate from the United States.

India's Rising Dependence on U.S. LPG

AboutIndia's Rising Dependence on U.S. LPG:

What it is?

- India is the world's second-largest LPG importer, consuming over 34 million metric tonnes annually for domestic cooking and industrial uses. To mitigate shipping bottlenecks and severe price surges in the Gulf region, Indian state-run Oil Marketing Companies (OMCs) signed long-term supply contracts for 2 million tonnes of U.S. LPG in 2026.
- While this pivot mitigates immediate supply risks in West Asia, it exposes India to longer transit routes, dollar-rupee exchange rate volatility, and new geopolitical dependencies.

How LPG is Formed?

- Hydrocarbon Composition: Liquefied Petroleum Gas (LPG) is a clean-burning, high-energy, flammable mixture composed primarily of propane (C_3H_8) and butane (C_4H_{10}).
- Natural Gas Processing Source (~60% Global Yield): Extracted as Natural Gas Liquids (NGLs) from "wet" natural gas wells during cooling, absorption, and fractionation processes.
- Crude Oil Refining Source (~40% Global Yield): Generated as a secondary product during atmospheric distillation, catalytic cracking, and hydroprocessing of crude oil in petroleum refineries.
- Liquefaction & Pressurization: Gaseous propane and butane are stripped of impurities (like sulfur) and compressed under moderate pressure (or cooled) to turn into liquid form, enabling dense bulk transport via specialized sea tankers and cylinders.

Reasons Driving India's Rising Dependence on U.S. LPG:

- Choke-Point Volatility in theStrait of Hormuz: Nearly 90% of India's historical LPG imports passed through the Strait of Hormuz. Conflict-led transit disruptions forced India to diversify suppliers to ensure physical availability.
- Surging West Asian Benchmark Prices: Gulf LPG prices (Saudi Aramco CP) surged from ~$543/tonne in February 2026 to around $790/tonne in June, making U.S. Mont Belvieu propane competitive despite higher freight costs.
- Stagnant Domestic Production vs. Rising Demand: Domestic LPG demand grew to 6.5 million metric tonnes (MMT) in Q1 FY27, while domestic refinery output lagged at ~4.3 MMT, widening the import deficit.
- Long-Term State OMC Contracting: Indian public refiners proactively signed long-term deals for 2.2 MMT of U.S. cooking gas in 2026 to guarantee supply certainty for over 33 crore active domestic households.
- Shale Gas Boom in the U.S.: Abundant U.S. shale production created massive exportable surpluses of propane and butane, making America a reliable alternative supplier.

Implications of LPG Shortages & Overdependence:

- Severe Political and Social Disruption: Cooking gas is a sensitive political commodity in India; unexpected shortages or price hikes directly impact household budgets and trigger public dissatisfaction.
- Expanding OMC Under-Recoveries &Fiscal Burden: When international LPG prices rise and the government holds retail prices steady, state refiners accumulate massive under-recoveries (exceeding 59,000 crore as of July 2026).

- Exposure to Currency & Monitory Risks: Long-distance U.S. shipments are priced in U.S. Dollars; a strengthening dollar or elevated U.S. interest rates inflates the Rupee cost per cargo.
- Loss ofProximity Pricing Advantages: Transporting LPG from the U.S. takes 25–35 days, compared to just 5–10 days from the Persian Gulf, increasing shipping voyage times and freight costs.
- Vulnerability to Unilateral Foreign Policy Tools: Over-reliance on a single Western nation exposes India to potential non-tariff trade barriers, secondary sanctions, or strategic leverage during trade negotiations.

Way Forward:

- Maximizing Domestic Refinery LPG Offtake: Direct domestic refineries to divert higher volumes of internal propane and butane streams into the LPG pool to maximize local output.
- Diversifying Imports viaIndo-Pacific Partners: Expand long-term sourcing deals with non-Hormuz regional producers like Australia, which offers shorter shipping routes outside the Persian Gulf.
- Expanding Strategic Petroleum & LPG Reserves: Build dedicated underground cavern storage for LPG to buffer against 30–60 days of global maritime supply disruptions.
- Promoting Electric Cooking & Renewable Alternatives: Accelerate the adoption of induction cooking (e-Vishwakarma / solar-powered cooktops) to curb long-term growth in household LPG consumption.
- Dynamic Hedging &Rupee-Denominated Trade: Utilize financial hedging tools and pursue local currency trade settlement frameworks to shield state oil companies from exchange rate fluctuations.

Conclusion:

India's shift toward sourcing two-thirds of its LPG from the U.S. highlights a flexible crisis response to Middle Eastern shipping bottlenecks. However, trading geographic proximity for long-haul maritime routes introduces new currency and freight vulnerabilities. Building strategic reserves, boosting domestic refining, and tapping Indo-Pacific suppliers are essential steps to secure India's long-term energy sovereignty.

The Nepal Flash Flood Disaster

Context:



Catastrophic flash floods and debris flows tore through the transboundary Lhende Khola, Bhote Koshi, and Trishuli river systems along the Nepal–Tibet border.

The Nepal Flash Flood Disaster

AboutThe Nepal Flash Flood Disaster:

What It Is?

- A high-altitude flash flood and debris flow is a sudden, violent surge of water heavily laden with rock, sediment, and glacial ice that travels down steep mountain gradients with massive kinetic force. In this event, a suspected seismic shock triggered an upstream ice-rock avalanche in the high-altitude Lhende Khola catchment.

Key Data & Statistics on the Disaster:

- Severe Human Toll: Over 160 confirmed fatalities, with more than 133 Indian workers and pilgrims reported missing across downstream construction and transit sites.
- Extreme Water Level Surge: Hydrological monitoring stations recorded the Trishuli River rising by up to 9 metres in under 30 minutes at Galchchi and 7 metres at Malekhu.
- Critical TradeCorridor Disrupted: The landslide and mudflow severed roads, bridges, and power lines, halting trade through the Gyirong Port (a primary land crossing between Nepal and China).
- Hydropower Grid Vulnerability: Follows a Glacial Lake Outburst Flood (GLOF) in the same basin a year prior that damaged four major power projects and knocked out 8% of Nepal's national electricity supply.

Topographical & Geological Vulnerability of Nepal:

- Steep Elevation Gradients & "Funnel Effect": Nepal transitions rapidly from Himalayan peaks (exceeding 8,000 m) to the low-lying Terai plains within a short lateral distance. Its narrow, V-shaped river gorges act as natural funnels that accelerate floodwater velocity and amplify its erosive power.

- Tectonic Fragility & Seismic Activity: Positioned on the active collision zone between the Indian and Eurasian tectonic plates, regular seismic tremors destabilize fractured rock masses, hanging glaciers, and moraine dams.
- Fragile Cryosphere & Glacial Hazards: Climate warming causes rapid glacier retreat, creating perched, unstable glacial lakes and weakening high-altitude permafrost slopes.
- High Bedload and Sediment Mobilization: Steep riverbeds contain loose moraines, boulders, and gravel. Fast-moving floodwaters mobilize this sediment into dense, hyper-concentrated debris torrents capable of destroying reinforced concrete structures.
- Geographical Isolation of Settlements: Habitable land is concentrated inside narrow river valleys. When a single flash flood sweeps through, approach highways and bridges are cut off simultaneously, preventing rescue helicopters from landing until waters recede.

Cascading Causes & Triggers of the Disaster:

- Earthquake-Triggered Slope Failure: Seismic tremors in the border region destabilized high-altitude hanging glaciers, dislodging a large mass of ice and rock into the Lhende Khola.
- Formation of a Temporary Landslide Dam: Avalanche debris choked the narrow canyon, creating an unstable natural dam that backed up millions of litres of water within minutes.
- Catastrophic Dam Breach: The rapid accumulation of water upstream exceeded the structural threshold of the loose debris dam, causing a sudden breach and sending a debris wave downstream.
- Secondary Blockage Risks: Unstable residual debris remaining upstream near the Tibet-Nepal border maintains the threat of secondary floods.

Implications for India & Downstream Regions:

- Transboundary Flood Inundation: The Bhote Koshi and Trishuli rivers merge downstream into the Narayani (Gandak) River, which empties directly into northern Bihar and eastern Uttar Pradesh, prompting high flood alerts and river embankment monitoring.
- Cross-Border Labor & Expatriate Safety: Thousands of Indian engineers, mechanics, and laborers work on Nepal's trans-Himalayan roads and hydropower projects, leaving them exposed when disasters strike isolated project sites.
- Hydropower & Energy Supply Disruptions: Run-of-the-river hydropower plants damaged along the corridor interrupt power trade agreements and seasonal electricity exports from Nepal to the Indian power grid.
- Geopolitical & Humanitarian Assistance: India promptly mobilized regional humanitarian assistance and disaster relief (HADR), dispatching relief supplies and rescue coordination teams across the border.

Way Ahead:

- Deploying High-Altitude Early Warning Systems (EWS): Install automated water-level sensors, seismic tripwires, and satellite-based InSAR monitoring along high-risk glacial catchments to provide downstream communities with a 15- to 30-minute evacuation window.
- Institutionalizing Trilateral Hydrological Data Sharing: Establish a real-time data-sharing protocol between China, Nepal, and India to instantly broadcast upstream lake formations, damming events, and rainfall anomalies.
- Climate-ResilientHydropower Engineering: Re-evaluate design parameters for transboundary river infrastructure, requiring reinforced flood-diversion tunnels, higher dam-crest freeboards, and risk-sensitive plant siting.
- Restricting Unplanned Riverbed Encroachment: Enforce strict zoning laws preventing construction of settlements, worker camps, and commercial markets inside immediate river floodplains.
- Specialized Mountain Disaster Response Units: Pre-position high-altitude disaster relief teams equipped with drone-based reconnaissance, satellite communication kits, and rapid earthmoving equipment near vulnerable valleys.

Conclusion:

The Trishuli–Bhote Koshi disaster highlights how climate-induced cryosphere degradation and seismic vulnerabilities combine to create hazards in the high Himalayas. Because transboundary river systems connect Nepal's mountain gorges directly to the densely populated plains of India, upstream flash floods pose shared regional

risks. Strengthening multilateral early-warning networks, sharing real-time hydrological data, and adopting risk-informed mountain infrastructure planning are essential to preventing future cascading disasters.

Climate-Proofing India's Food System

Context:



India has strong food production and buffer stocks but must build a climate-resilient, sustainable food-security system to protect agriculture, supply chains and PDS from rising temperatures, erratic monsoons and groundwater depletion.

Climate-Proofing India's Food System

AboutClimate-Proofing India's Food System:

What It Is?

- Climate-proofing the food system involves redesigning national agricultural, procurement, storage, and public distribution policies to withstand the impacts of climate change. Rather than focusing solely on volumetric calorie production through monoculture, it shifts the focus toward "sustainable food and nutrition security". This approach integrates climate risk forecasts, crop diversification (millets, pulses, oilseeds), water-smart farming, and disaster-resilient supply-chain infrastructure into the statutory framework of the National Food Security Act (NFSA), 2013.

Key Data & Statistics:

- Record Aggregate Foodgrain Harvest: India achieved record foodgrain production exceeding 350 million tonnes in 2024–25, driven largely by bumper harvests of staple rice and wheat.
- Massive Statutory Entitlement Scale: The National Food Security Act (NFSA), 2013, legally guarantees subsidised foodgrains to approximately 800 million citizens (~57% of the total 1.4 billion population).
- Digital PDS Reach: Nationwide adoption of the One Nation One Ration Card (ONORC) platform and end-to-end supply-chain digitization have made foodgrain entitlements portable across state boundaries.

Key Climate Vulnerabilities Across the Food Value Chain:

- Terminal Heat Stress & Crop Yield Declines: Rising pre-monsoon heatwaves directly impair wheat grain filling and reduce overall yields, while unseasonal rainfall damages standing rabi crops.
- Monsoon Volatility & Hydrological Stress: Erratic rainfall patterns—alternating between intra-seasonal dry spells and sudden flash floods—strain rainfed farming and deplete groundwater aquifers used for irrigation.
- Storage &Post-Harvest Infrastructure Risks: Conventional open-plinth and non-climate-controlled warehouses face grain spoilage, fungal infestation, and physical destruction during extreme rainfall and heat events.
- Perishable Logistics & Cold-Chain Deficits: Inadequate refrigerated transport corridors cause high post-harvest losses in fruits, vegetables, and dairy during severe summer heat spikes.
- Nutritional Inequity & Micronutrient Deficits: Heavy reliance on cereal monoculture within the public food basket contributes to micronutrient malnutrition (hidden hunger) despite overall caloric sufficiency.

Core Pillars of a Climate-Resilient Food System:

- Decentralized & Crop-Diversified Procurement: Expand Minimum Support Price (MSP) operations beyond rice and wheat to include climate-resilient nutri-cereals (millets like bajra, jowar, ragi), pulses, and oilseeds suited to local agro-climatic zones.
- Diversifying thePDS Food Basket: Integrate locally procured nutri-cereals and pulses into fair price shops, the PM POSHAN school meal scheme, and Anganwadi programs to improve nutrition while reducing water consumption.
- Climate-Proof Logistics & Modern Storage: Construct temperature-controlled, flood-resilient silos and expanded cold chains to protect buffer stocks and perishable produce.
- Integrating Real-Time Meteorological Intelligence: Link India Meteorological Department (IMD) seasonal forecasting models directly with dynamic buffer stock management, dynamic MSP procurement targets, and district-level contingency plans.

- Expanding Sustainable Farm Practices: Scale up micro-irrigation (drip/sprinkler), heat-tolerant and drought-resilient seed varieties, and parametric weather-indexed crop insurance under PM Fasal Bima Yojana.

Way Ahead:

- Embedding Climate Metrics into NFSA Monitoring: Update the NFSA oversight framework to track heat exposure, water-table sustainability, storage resilience, and dietary diversity alongside distribution metrics.
- Transitioning to a Strategic "Climate Buffer": Expand the concept of grain buffer stocks into a broader climate buffer that combines multi-crop reserves, dynamic crop insurance, and decentralized watershed management.
- Unlocking Dedicated Climate & Adaptation Finance: Issue sovereign green bonds and direct multilateral climate adaptation funds into farm-level climate-smart interventions (such as micro-irrigation and solarized cold storage).
- Fostering Public-Private Research Partnerships: Accelerate collaborative research between ICAR, state agricultural universities, and private agri-tech firms to breed biofortified, climate-resilient seed varieties.
- Aligning Food Systems withIndia's Net-Zero Goals: Incentivize low-emission farming methods—such as Alternate Wetting and Drying (AWD) and Direct Seeded Rice (DSR)—to reduce agricultural methane emissions while conserving groundwater.

Conclusion:

India's transformation from food scarcity to record foodgrain production demonstrates its agricultural and institutional capacity. However, mounting climate volatility requires shifting the policy focus from basic calorie availability toward long-term, climate-resilient nutrition security. By diversifying procurement, strengthening public storage infrastructure, and integrating climate data into the PDS, India can protect its food systems and secure the livelihoods of its farmers.

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