



INSIGHTSIAS

SIMPLIFYING IAS EXAM PREPARATION

LUNAR MODULE LAUNCH VEHICLE (LMLV)

The Indian Space Research Organisation (ISRO) has announced the development of its heaviest rocket ever — the Lunar Module Launch Vehicle (LMLV), expected to be ready by 2035.

INSIGHTS CURRENT AFFAIRS

AUGUST 2025

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INSIDE

GENERAL STUDIES – 1 7

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

1. India's Fossil Heritage 7

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

1. Bengali Women Revolutionaries 8

Topics: History of the world will include events from 18th century such as industrial revolution, world wars, redrawing of national boundaries, colonization, decolonization, political philosophies like communism, capitalism, socialism etc.- their forms and effect on the society.

1. Atomic bombing on Hiroshima and Nagasaki 9

Topics: Salient features of Indian Society, Diversity of India.

1. Honour Killings in India 10

Topics: Women and women related issues.

1. What True Empowerment of Women Entails 12

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

1. Protecting India's Geriatric Population from the Rising Heat Burden 13
2. India's demographic dividend as a time bomb 15

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

1. Cloudburst 16

GENERAL STUDIES – 2 18

Topics: Indian Constitution- historical underpinnings, evolution, features, amendments, significant provisions and basic structure; Comparison of the Indian constitutional scheme with that of other countries.

1. Constitution's Ninth Schedule 18
2. Creamy Layer Equivalence in OBC Quota: Ensuring Uniformity in Reservation Benefits 19

Topics: Structure, organization and functioning of the Executive and the Judiciary; Ministries and Departments of the Government; pressure groups and formal/informal

associations and their role in the Polity.

1. Supreme Court Directive on Social Media Conduct Guidelines 20

Topics: Appointment to various Constitutional posts, powers, functions and responsibilities of various Constitutional Bodies.

1. India's Democracy and the Migrant Citizen Crisis 21
2. ECI Voter Roll Allegations 22

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

1. Navigating the New Techno-Capitalist World Order 23

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

1. Pradhan Mantri Jan Dhan Yojana: Eleven Years of Financial Inclusion 24
2. Legal Aid and NALSA 26

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

1. India's unique genetic legacy 27
2. Higher Education Commission of India (HECI) 28
3. AI in Education: From Answer Engines to Thinking Partners 29
4. Digital Push in Education: Access, Equity, and Empathy at the Crossroads 30

Topics: Issues relating to poverty and hunger.

1. The Path to Ending Global Hunger Runs Through India 31

Topics: Role of civil services in a democracy.

1. Breaking the Colonial Steel Frame for a Deep-Tech Future 33

Topics: India and its neighbourhood- relations.

1. India-China Reform Deficit 34

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

1. India-Middle East-Europe Economic Corridor & Gaza War 36

2. India–U.S. tariffs 2025 37
3. India–Philippines Strategic Partnership 38

GENERAL STUDIES – 3 40

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

1. System of National Accounts 2025 40
2. From 2017 to 2025: India's GST Journey 41
3. RBI has released a report on the Framework for Responsible and Ethical Enablement of Artificial Intelligence (FREE-AI) 42
4. Inflation targeting and the test of credibility 43

Topics: Government Budgeting.

1. Should States Be Compensated for Revenue Loss from GST Reforms? 44

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

1. Energy sovereignty is the new oil 46
2. Regulating Coal Operations 47
3. Ethanol Blended Petrol (EBP) programme. 48
4. India's Green Hydrogen Potential: FICCI–EY 2025 Report 50

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

1. Biochar in India 51

Topics: Awareness in space.

1. Why India Needs a National Space Law 52
2. India's Private Space Talent Crisis 54

Topics: Awareness in the fields of IT, Computers, robotics, nano-technology, bio-technology and issues relating to intellectual property rights.

1. Satellite Internet 55
2. AI and the Restructuring of India's Infotech Sector 56

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

1. Extreme Heat and the Future of Work 57
2. Revival of Reefs in the Gulf of Mannar 58
3. Geneva Deadlock: Global Plastic Treaty Talks Fail Again 59
4. Groundwater Contamination in India 60

5. Unlocking a \$200 Billion Opportunity: Electric Vehicles in India Report 62
6. Ethanol Blending in India: Promise of Cleaner Fuel vs Risks to Engine Efficiency 63
7. Changing Trends in India's Pesticide Market 64
8. Bird Deaths and Wind Energy in India 66
9. Right to Repair in India 67
10. Why the World Needs Better Green Technologies in 2025? 68
11. Restoring Mangroves to Secure India's Coasts 69
12. ICJ Ruling Revives Legal Status of Kyoto Protocol 70

Topics: Challenges to internal security through communication networks, role of media and social networking sites in internal security challenges, basics of cyber security; money-laundering and its prevention

1. India's Joint Doctrines for Cyberspace Operations 71
2. Money Laundering via Cryptocurrency 73

GENERAL STUDIES – 4 75

1. SC Orders Removal of Free-Ranging Dogs from Delhi-NCR Localities 75
2. Algorithms of the Mind 76

FACTS FOR PRELIMS 78; GENERAL STUDIES – 1 78

ART & CULTURE; Religion and Festivals

1. Chhath festival 78

Music

1. 1st-ever BIMSTEC Traditional Music Festival 78

MEDIEVAL HISTORY; Important Terminologies and Miscellaneous Medieval History

1. Guru Tegh Bahadur 79

MODERN HISTORY; Socio–Religious Reform Movements

1. Shiromani Gurdwara Parbandhak Committee (SGPC) 80

Freedom Movement

1. Kakori Conspiracy Case 80

Post-Independence

1. COMMON WEALTH GAMES 81

Important Personalities

1. Sardar Vallabhbhai Patel 82
2. Sri Aurobindo 82
3. Mahatma Jyotiba Phule 83
4. Lokmanya Bal Gangadhar Tilak 83

GEOGRAPHY: Geomorphology

1. The Mines and Minerals (Development and Regulation) Amendment Bill, 2025 84

Climatology

1. Typhoon Kajiki 85

River System

1. Mahanadi River 85
2. Tawi River 86

Map Based Questions from World

1. Mercator Projection Map 87

FACTS FOR PRELIMS 88; GENERAL STUDIES – 2 88

POLITY: Salient Features, Schedules and Preamble

1. The 130th Constitution (Amendment) Bill, 2025 88
2. Overseas Citizens of India (OCI) Scheme 88

Emergency Provisions

3. Extension of President's Rule in Manipur 89

Parliament and State Legislature

4. Lok Sabha Passes Online Gaming Regulation Bill, 2025 89
5. Nominations to Union Territory Assemblies 90
6. Ladakh Statehood & Sixth Schedule 91

Union and State Executive

7. Great Nicobar Project 92
8. Kartavya Bhavan 92
9. Framework Agreement 93

Bodies (Constitutional, Statutory, Regulatory Bodies)

10. Rethinking Homestays: Navigating Policy Pathways Report by NITI Aayog 94
11. Machine Readable Electoral Rolls in India 94
12. CEC Removal Process 95
13. TRAI launches India's first property rating framework for digital connectivity 95
14. UPSC Marking 100 Years of Commitment to Merit and Public Service 96

Local Government

15. AI-Powered 'SabhaSaar' 97

Welfare schemes

16. Pradhan Mantri Ujjwala Yojana (PMUY) 97

Miscellaneous

17. National Sports Day 98

18. UMEED Portal 99
19. Open-Book Assessments (OBE) 99
20. National Anubhav Awards 100

International Relations

21. Shanghai Cooperation Organization (SCO) 101

Current Affairs

22. UN declares famine in Gaza 102
23. Nepal declared free of rubella 102
24. United Nations High Commissioner for Refugees (UNHCR) 103
25. Great Recall Vote 103
26. July Declaration 104

FACTS FOR PRELIMS 105

ECONOMY: Banking and Money (Monetary Policy)

1. Monetary Policy Committee (MPC) 105
2. NPCI has rolled out revised UPI operational rules 105

Financial Markets (Capital Market, Money Market)

1. SEBI Moots 'Regulated Venue' for Pre-Listing Companies 106
2. S&P Global Upgrades India's Sovereign Credit Rating to 'BBB' 107

Industry and Infrastructure

1. State Energy Efficiency Index (SEEI) 2024 Released 107
2. India Semiconductor Mission (ISM) 108
3. Asia's Longest Freight Train – Rudrastra 109
4. Carriage of Goods by Sea Bill, 2025 109
5. Apna Ghar Initiative 110

Public Finance (Fiscal Policy and Budget, Taxation)

1. Digital Services Taxes (DSTs) 111
2. GST Revamp – Next-Gen Reform 111
3. Revised Income Tax Bill, 2025 112

Schemes

1. Project Aarohan 112
2. PM SVANidhi Scheme 113

Miscellaneous

1. Rethinking Homestays: Navigating Policy Pathways Report by NITI Aayog 114
2. CCPA Penalty on Rapido for Misleading Advertisements 114
3. New Export Promotion Mission 115

4. Jute	116	<u>Indian Laws/Schemes/Acts</u>	
5. World Trade Organization (WTO)	116	1. State Energy Efficiency Index (SEEI) 2024 Released	134
<u>Agri-finance</u>		2. National Designated Authority for Carbon Markets	135
1. Haat on Wheels Initiative	117	3. Sundarbans Tiger Reserve	136
2. National Cooperative Development Corporation (NCDC)	117	4. NTCA Limits Definition of Tiger Corridors	137
<u>Agri-practices and New Technologies</u>		5. India's draft Climate Finance Taxonomy	138
1. ICAR's AI-Powered Agromet Advisory	118	6. Revised National Action Plan on Glanders	139
<u>Crops</u>		7. Dibru-Saikhowa National Park	139
1. Apricot	119	8. World Elephant Day 2025	140
<u>Schemes and Organizations</u>		9. PM E-Drive Subsidy Scheme	141
1. FAO Food Price Index (FFPI)	119	10. Strategic Interventions for Green Hydrogen Transition (SIGHT) Scheme	142
<u>Miscellaneous</u>		11. India Electric Mobility Index (IEMI)	143
1. Fortified Rice Scheme Extended till 2028	120	<u>International Policies/Efforts</u>	
<u>Ecology and Functions of an Ecosystem</u>		1. Joint Crediting Mechanism (JCM)	144
1. Sunflower Sea Stars	121	2. Rio Earth Summit (1992)	144
<u>Biodiversity</u>		<u>Miscellaneous</u>	
1. Samudrayaan Project	122	1. Vanatara Zoo	145
2. Invasive Alien Species	122	<u>Chemistry</u>	
3. Saltwater Crocodile	123	1. Soaps and Detergents	146
4. World Orangutan Day 2025	124	<u>Biotechnology</u>	
5. Arctic Reindeer Could Decline Sharply by 2100	125	2. National Biofoundry Network	146
6. Jellyfish	126	3. E. coli Turned into Mercury Sensor	147
7. Operation Falcon	126	4. Bioactive Peptides	148
8. 16th Lion Population Estimation Report	127	5. India's first State-of-the-Art Animal Stem Cell Biobank and Laboratory	149
9. Nilgiri Tahr Population Sees 21% Rise	127	<u>Health</u>	
10. Asian Giant Tortoise Reintroduction in Nagaland	128	1. National Organ and Tissue Transplant Organisation (NOTTO)	149
11. Mouse Deer	129	2. Brain-Eating Amoeba	150
12. Asiatic Lion	130	3. Indian polyvalent antivenom	151
<u>Environmental Pollution</u>		4. Rabies	151
1. Wastewater Surveillance	130	5. Nasha Mukh Bharat Abhiyaan (NMBA)	152
2. India's First Sustainable Aviation Fuel (SAF) Plant from Used Cooking Oil	131	6. African trypanosomiasis (sleeping sickness)	153
3. Great Barrier Reef has recorded its largest Coral Bleach	132	7. SHRESTH – State Health Regulatory Excellence Index	153
4. Restitutionary Damages	133	8. Envelope Dimer Epitope (EDE)	154
<u>Climate Change</u>		9. S.H.I.N.E. Initiative	155
1. India commissioned its first indigenously developed 1 MW green hydrogen plant	133	10. WHO officially classified Hepatitis D virus as carcinogenic	155
<u>Renewable Energy</u>		11. Ectopic Pregnancies	156
1. Removable Solar Panel System	134		

12. Definitive list of Ayurveda Aahara Products	157
13. PM National Dialysis Programme	158

Emerging Technologies

1. National Deep Water Exploration Mission	158
2. India's First 5G Captive Non-Public Network in Refinery Sector	159
3. Global Artificial Intelligence (AI) City Index 2025	160

Space:

1. UPM J1040-3551 AabBab	161
2. Lunar Module Launch Vehicle (LMLV)	161
3. ISRO Integrated Air Drop Test (IADT-01)	162
4. Indian astronaut to land on moon in 2040	163
5. New type of supernova detected	163
6. India's First Private EO Satellite Constellation under PPP Model	164
7. 18th International Olympiad on Astronomy and Astrophysics	165
8. India's 3rd Launch Pad in Sriharikota by 2029	165
9. LEAP-1 Mission	166
10. Human Outer Planetary Exploration (HOPE)	167

Nuclear Technology

1. Tritium	167
2. TRI-structural ISOtropic Particle Fuel (TRISO)	168

Defence and Security

1. Exercise Bright Star 2025	169
2. MiG-21	169
3. Super Garuda Shield 2025	170
4. INS Udaygiri and INS Himgiri	170
5. Integrated Air Defence Weapon System (IADWS)	171
6. India Successfully Test-Fires Agni-5 Intermediate-Range Ballistic Missile	172
7. Sarvottam Yudh Seva Medals (SYSM)	173
8. Golden Dome Missile Defense System	174
9. Mission Sudarshan Chakra	174
10. Intermediate-Range Nuclear Forces (INF) Treaty	175
11. BrahMos Supersonic Cruise Missile	176
12. Airbus C-295 Aircraft	176

Miscellaneous

1. Sci-Hub Ban and the 'One Nation, One Subscription' Scheme	177
2. India Launches First Veterinary Blood Transfusion Guidelines 2025	178
3. National Anubhav Awards	178

4. Khelo India ASMITA	179
-----------------------	-----

Mapping **180**

1. US Sanctions 6 Indian Companies Over Iran Trade	180
2. Slovenia	180
3. Krasheninnikov Volcano	181
4. India-Philippines Naval Exercise	182
5. Uttarkashi District	182
6. Bhalukona-Jamnidihi block	183
7. Sudan Civil War	184
8. Sea of Galilee	184
9. Bhagirathi River	185
10. Dardanelles Strait	186
11. Nepal	186
12. Kishtwar District	187
13. Cauvery Wildlife Sanctuary (CWS)	187
14. Mount Elbrus	188
15. Ranthambore National Park	188
16. Mithi River	189
17. Nigeria	189
18. Uganda	190
19. Algeria	191
20. Fiji	191
21. Oman	192
22. East China Sea	192
23. Gangotri Glacier	193
24. Japan	193
25. Ravi River	194

GENERAL STUDIES – 1

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

INDIA'S FOSSIL HERITAGE

Context: India's fossil heritage is under threat as rare specimens like the 47-million-year-old snake *Vasuki indicus* risk theft, vandalism, and illegal auctions abroad due to the absence of a national fossil protection law or repository.



About India's Fossil Heritage:

Heritage:

- **Diverse Fossil Record** – India preserves fossils from the **Precambrian to Cenozoic eras**, including earliest plant life, dinosaur nests and eggs, giant snakes like *Vasuki indicus*, and ancestors of whales (*Indohyus*).
- **Unique Evolutionary Insights** – Due to its isolation after separating from Gondwanaland, India's **fossil beds** reveal crucial evidence of **dinosaur evolution, mammal emergence, and marine transitions** after the India–Asia collision.
- **Key Fossil Sites** – Rich deposits lie in **Kutch (Gujarat), Narmada Valley (Madhya Pradesh), Deccan basalts, and Himalayan foothills**, yielding rare vertebrate and invertebrate fossils.
- **Global Significance** – **India's fossil heritage** provides unparalleled insights into **earth's evolutionary history**, but remains vulnerable due to lack of national laws, secure repositories, and protection against illegal trade.

Significance of Fossils for India:

1. **Scientific Value** – Fossils provide evidence of evolution (e.g., *Indohyus* → whale lineage, Gondwanaland flora/fauna).
2. **Cultural Value** – **Ammonites (Shaligrams)** are revered in Hindu rituals, linking palaeontology with spiritual traditions.
3. **Educational Value** – Fossils are natural history

archives that help young students understand earth's past.

4. **Economic Potential** – Fossil parks and museums can spur **geo-tourism** (e.g., **Dinosaur Fossil Park, Balasinor, Gujarat**).
5. **Global Relevance** – Indian finds are critical for world science (e.g., *Vasuki indicus* rivals global fossil snake finds; *Indohyus* is key to mammalian evolution studies).

Challenges & Risks:

- **No Legal Framework:** Unlike archaeological artefacts, fossils are not protected by any strong national legislation.
- **Commercialisation & Auctions:** Dinosaur eggs, bones, ammonites sold openly online or abroad (e.g., Sotheby's \$44.6 mn stegosaurus sale).
- **Vandalism & Theft:** Dinosaur eggs stolen from Mandav Museum (2013); local fossil nests looted.
- **Private Hoarding:** Important collections like Ranga Rao–Obergfell Trust remain unsorted and inaccessible.
- **Neglect & Decay:** Fossils stored in poor facilities, exposed to rain/heat, or lying unsafeguarded in riverbeds.
- **Global Smuggling Networks:** High demand among private collectors, celebrities, and auction houses fuels illegal trade.

Comparative Global Practices

- **United States & Europe:** Strict curation, fossil export regulations, and strong **public museum culture**.
- **China:** Fossils are treated as state property with harsh penalties for smuggling.
- **India:** Draft plan for a **national fossil repository** exists but remains unimplemented.

Ethical Dimensions:

- **Heritage Responsibility:** Fossils are part of earth's shared heritage — selling them for private gain erodes public trust.
- **Equity of Knowledge:** Private auctions deny scientists and students access to study key evolutionary evidence.
- **Intergenerational Justice:** Loss of fossils deprives future generations of knowledge and identity.

Way Forward

1. **Legislative Action:** Enact a **National Fossil Protection Act**, making extraction and sale without permission illegal.
2. **National Repository:** Establish a **centralised fossil vault** with cataloguing, digitisation, and open research access.
3. **Geo-Conservation Zones:** Declare fossil-rich areas as **protected geoparks** under Environment Protection Act.

4. **Museum & Tourism Promotion:** Develop regional fossil parks and interactive museums for public outreach.
5. **Community Custodianship:** Involve local teachers, enthusiasts, and villagers (e.g., Vishal Verma in MP) as heritage guardians.
6. **International Cooperation:** Collaborate with UNESCO's Global Geopark Network and strengthen fossil repatriation from overseas auctions.
7. **Technology Integration:** Use AI-driven inventory systems, blockchain-based provenance tracking, and 3D digital fossil replicas to prevent loss.

Conclusion:

India's fossils are not just stones but **pages of earth's autobiography**. They reveal how life evolved, how continents drifted, and how species adapted. Without legal safeguards, many of these treasures risk vanishing into **auction houses and private living rooms**.

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

BENGALI WOMEN REVOLUTIONARIES

Context:

An editorial highlighted the untold stories of Bengali women revolutionaries, stressing their crucial role in India's freedom struggle and the need to recognise them as foundational architects of independence, not mere footnotes in history.



About Bengali Women Revolutionaries:

1. **Pritilata Waddedar (1911–1932)**
 - Led the **armed attack on the European Club at Chittagong (1932)**, infamous for racial segregation.
 - Consumed **cyanide** to avoid capture, leaving a legacy of courage.
 - Called upon Indian women to “not remain

in the background” of the freedom struggle.

2. **Kalpana Datta (1913–1995)**
 - Participated in the **Chittagong Armoury Raid (1930)** led by Surya Sen.
 - Arrested, imprisoned, and later wrote about her experiences, documenting women's equal role as “tacticians and partners.”
3. **Bina Das (1911–1986)**
 - Attempted to **assassinate Governor Stanley Jackson** at Calcutta University convocation (1932).
 - Earlier defied orthodoxy by wearing **khadi**, distributing revolutionary pamphlets, and writing about banned books in exams.
 - Symbolised intellectual and armed protest.
4. **Begum Rokeya Sakhawat Hossain (1880–1932)**
 - Pioneering **social reformer, feminist, and writer**.
 - Wrote **Sultana's Dream (1905)** envisioning a feminist utopia (*Ladyland*).
 - Founded **Sakhawat Memorial Girls' School** in Kolkata; campaigned door-to-door for Muslim women's education.
5. **Kamala Das Gupta (1907–2001)**
 - Member of **Jugantar group**; combined domestic cover with covert resistance.
 - Smuggled **arms in food baskets**, hid fugitives, coordinated logistics.
 - Memoir **Rakter Akshare** documents underground female networks.
6. **Nanibala Devi (1898–1977)**
 - A widowed Brahmin who disguised herself as a mother, wife, servant for revolutionary tasks.
 - Arrested and **tortured in Peshawar**, but chose silence over betrayal.
 - Embodied endurance and sacrifice.
7. **Labanya Prabha Ghosh (1886–1956)**
 - Social reformer and writer; organised **reading groups**, contributed to nationalist journals like *Mukti*.
 - Opened her home for underground meetings.
 - Used **literacy as resistance** to mobilise rural women.
8. **Matangini Hazra (1869–1942) – “Gandhi Buri”**
 - Illiterate widow from Tamluk, Bengal.
 - Led Quit India procession in 1942, chanting *Vande Mataram*.
 - Shot multiple times while holding the tricolour; became a symbol of **popular, grassroots resistance**.

Significance of Women in Indian Freedom Movement:

- **Dual Struggle** – They fought not only against British colonialism but also against entrenched patriarchy, redefining women's role in public life.

- **Broadening the Meaning of Revolution** – Their contributions ranged from armed assaults and covert operations to education and literature, proving resistance was multi-dimensional.
- **Symbol of Courage and Sacrifice** – By embracing martyrdom, enduring torture, or leading protests, women revolutionaries inspired mass participation and moral strength.
- **Social Reform with Nationalism** – Through schools, writings, and grassroots mobilisation, they linked freedom of the nation with emancipation of women.
- **Mass Mobilisation Across Classes** – From educated elites to rural widows, women bridged caste, class, and community, making the freedom struggle more inclusive.
- **Legacy of Gender Justice** – Their acts challenged the notion of women as auxiliaries, laying foundations for later feminist and empowerment movements in India.

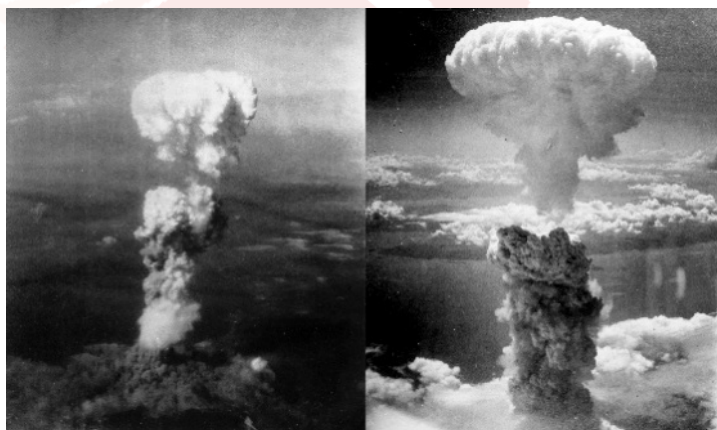
Conclusion:

The role of women in India's freedom struggle went beyond support; it was revolutionary in scope and spirit. By combining courage, intellect, and social reform, they challenged both colonialism and patriarchy. Their legacy reminds us that true freedom is incomplete without gender justice and equal participation.

Topics: History of the world will include events from 18th century such as industrial revolution, world wars, redrawing of national boundaries, colonization, decolonization, political philosophies like communism, capitalism, socialism etc.- their forms and effect on the society.

ATOMIC BOMBING ON HIROSHIMA AND NAGASAKI

Context: August 2025 marks 80 years since the atomic bombings of Hiroshima and Nagasaki, which ended [World War II](#) and began the nuclear age.



[About Atomic bombing on Hiroshima and Nagasaki:](#)

[The Pearl Harbor Attack: The Beginning of Hostilities](#)

- On **7 December 1941**, Japan launched a surprise attack on the **Pearl Harbor naval base** in Hawaii.
- Over **2,400 Americans** were killed, and much of the Pacific fleet was damaged or destroyed.
- This attack led to the United States' formal entry into World War II the next day.
- It shifted American public opinion decisively and laid the foundation for a no-compromise strategy against Japan.

Context Leading to the Bombings:

- **Brutality and Stalemate in the Pacific:**
 - The Pacific theatre saw **fierce island-hopping battles**: Guadalcanal, Iwo Jima, and Okinawa.
 - The **Battle of Okinawa (April–June 1945)** alone caused over **200,000 casualties** — signalling how costly a land invasion of Japan would be.
- **Japanese Resistance to Surrender:**
 - Despite catastrophic losses and conventional bombings (e.g., **Tokyo firebombing** in March 1945), Japan **refused unconditional surrender**.
 - The **Potsdam Declaration (July 1945)** warned Japan of “prompt and utter destruction” if it did not surrender.
 - Japan's leadership was divided: Emperor Hirohito may have sought peace, but military hardliners resisted.
- **The Manhattan Project and Bomb Readiness:**
 - The **Manhattan Project** had secretly developed atomic weapons since 1942.
 - The **Trinity Test (16 July 1945)** in New Mexico proved successful.
 - The U.S. now had a powerful weapon that could potentially end the war swiftly.

The Bombings:

- **Hiroshima – 6 August 1945**
 - **Bomb:** “Little Boy” (uranium-based)
 - Dropped by: **B-29 Enola Gay**
 - Immediate deaths: Approx. **80,000**; total deaths by end of 1945: **~140,000**
 - Targeted due to its military-industrial significance
- **Nagasaki – 9 August 1945**
 - **Bomb:** “Fat Man” (plutonium-based)
 - Targeted after cloud cover blocked Kokura
 - Immediate deaths: Approx. **40,000**; total by end of 1945: **~73,000**

Key Reasons Behind the Decision:

- **To Avoid a Bloody Land Invasion:**
 - **Operation Downfall** (planned invasion of Japan) was expected to cause **up to 1 million**

Allied casualties.

- The bomb was seen as the lesser evil to end the war quickly and save lives on both sides.
- **To Shock Japan into Surrender:**
 - Conventional bombings and blockades hadn't worked.
 - The **sheer psychological devastation** was intended to force a surrender from the Japanese military leadership.
- **To Contain Soviet Influence:**
 - The **USSR declared war on Japan on 8 August 1945**, fulfilling a Yalta Conference promise.
 - The U.S. feared Soviet advances into Japanese territory.
 - Demonstrating the atomic bomb's power served as a **geopolitical warning** — marking the beginning of **Cold War posturing**.
- **Justification for Manhattan Project:**
 - The U.S. had invested **\$2 billion** in secret research.
 - Not using the bomb might have been hard to justify domestically and diplomatically.

Immediate Consequences:

- **Japanese Surrender:**
 - Japan communicated willingness to surrender on **10 August 1945**; accepted terms on **14 August 1945**.
 - **2 September 1945**: Formal surrender signed on **USS Missouri**, ending World War II.
- **Birth of the Nuclear Age:**
 - Nuclear weapons became central to post-war security doctrines.
 - The world entered an era of **Mutual Assured Destruction (MAD)** during the Cold War.

Long-Term Implications:

- **Nuclear Proliferation:** Spurred arms races (USA–USSR), NPT debates, and modern concerns over rogue states.
- **Strategic Doctrine:** Introduced the concept of deterrence through overwhelming power.
- **International Law:** Influenced formation of **Geneva Conventions** and **ICRC protocols**.
- **Ethics of War:** Sparked enduring debates on civilian protection, proportionality, and wartime responsibility.

Conclusion:

The **atomic bombings** were not merely acts of military force but a convergence of strategic necessity, political calculus, scientific breakthrough, and moral compromise. While they brought a quick end to a devastating global war, they opened a **Pandora's box of nuclear fear**, ethical dilemmas, and geopolitical tensions that defined the 20th century — and continue to shape the 21st.

Topics: [Salient features of Indian Society, Diversity of India.](#)

HONOUR KILLINGS IN INDIA

Context:

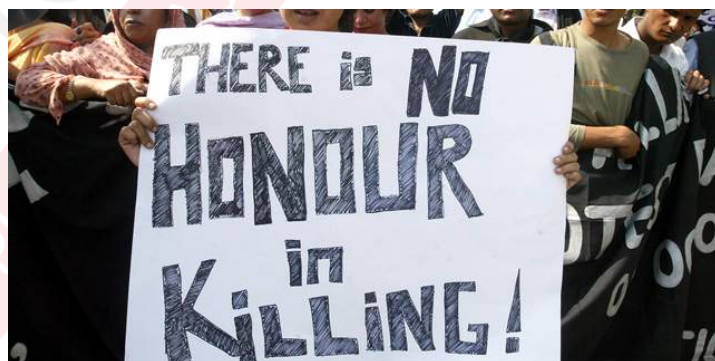
Recent caste-based killings in Tamil Nadu and other States have reignited debate on honour crimes.

- These incidents highlight how family and community structures continue to legitimise violence in the name of caste and honour.

About Honour Killing

What is Honour Killing?

- **Definition:** Murder committed by family or community members when individuals marry or choose partners outside caste, religion, or clan norms.
- **Target:** Most victims are inter-caste or inter-faith couples, particularly Dalit men with dominant-caste women.
- **Underlying Belief:** Families claim to “**protect honour**,” but in reality, it is about safeguarding social control, hierarchy, and patriarchal dominance.



Causes Behind Honour Killings

1. Caste and Community Pressures

- Caste endogamy is central to preserving caste hierarchy. Families fear loss of “status” if marriages cross caste boundaries.
- Example: Inter-caste marriages involving Dalits provoke strong backlash in Tamil Nadu.

2. Patriarchal Control

- Women's autonomy in choosing life partners threatens male dominance. Families treat women as “bearers of family honour,” restricting their choices.

3. Economic and Social Interests

- Marriages within caste maintain dowry systems, property rights, and business ties. Inter-caste unions are seen as threatening these advantages.

4. Fear of Social Boycott

- Families fear humiliation or expulsion from caste networks. Honour killings act as a “deterrent” to others considering similar marriages.

5. Khap and Jati Panchayats

- In some regions (e.g., Haryana, UP), caste councils issue diktats against inter-caste marriages. Such bodies legitimise violence and weaken formal law enforcement.

6. Weak Law Enforcement

- Police often avoid confronting powerful caste groups. Lack of protection for couples increases their vulnerability.

Consequences

1. Violation of Fundamental Rights

- Strikes at the heart of Article 21 (right to life with dignity) and Article 19 (personal liberty).

2. Gender Injustice

- Women face disproportionate violence, treated as symbols of community honour.

3. Perpetuation of Casteism

- Instead of weakening caste, honour crimes reinforce its social legitimacy.

4. Threat to Democracy and Rule of Law

- When parallel caste councils override constitutional courts, democracy is undermined.

5. Psychological and Social Fear

- Youth face trauma, insecurity, and reluctance to marry outside caste or religion.

Legal and Constitutional Safeguards

• Constitutional Provisions:

- *Article 14*: Equality before law.
- *Article 15*: Prohibits discrimination on grounds of caste, religion, sex.
- *Article 19*: Right to freedom of choice and association.
- *Article 21*: Right to life and personal liberty.

• Statutory Provisions:

- Indian Penal Code (now BNS): Section 103 BNS (murder/culpable homicide), Section 109 BNS (attempt to murder), Section 61 BNS (conspiracy).
- Prohibition of Child Marriage Act, 2006 & Hindu Marriage Act, 1955: Protect right to marriage autonomy.

• Proposed Law:

- *Prevention of Crimes in the Name of Honour Bill*: Seeks to specifically criminalise honour killings.

Judicial Stand

- **Lata Singh v. State of UP (2006)**: SC upheld inter-caste marriages as a valid exercise of freedom.
- **Arumugam Servai v. State of Tamil Nadu (2011)**: SC termed khap panchayat diktats illegal and unconstitutional.
- **Shakti Vahini v. Union of India (2018)**: Landmark ruling directing States to:
 - Establish safe houses for couples.
 - Monitor illegal caste gatherings.
 - Punish officials who fail to prevent honour killings.

Way Forward

1. Dedicated Law on Honour Crimes

- Enact a specific law with stringent punishments and accountability for police failure.

2. Strengthening Law Enforcement

- Train police to handle honour crime cases sensitively.
- Ensure swift trials and witness protection for couples.

3. Community-Level Reform

- Engage caste and religious leaders in public campaigns against honour killings.
- Promote inter-caste marriages as socially beneficial.

4. Safe Houses and Support Systems

- Expand government-run shelters with counselling, legal aid, and financial assistance.

5. Educational and Digital Counter-Narratives

- Introduce awareness programmes in schools/colleges on constitutional morality.
- Use social media to challenge caste pride and spread stories of successful inter-caste unions.

6. Incentives for Inter-Caste Marriages

- Strengthen the Dr. Ambedkar Scheme for Social Integration by timely financial aid and social protection.

Conclusion

Honour killings are not only crimes against individuals but also against the Constitution itself. They reveal caste hierarchies under siege, struggling to maintain control. The way forward lies in **asserting constitutional morality, empowering youth, enforcing strict laws, and dismantling family-based caste control**. A society that values freedom of choice over “family honour” will move closer to real equality and justice.

Topics: Women and women related issues.

WHAT TRUE EMPOWERMENT OF WOMEN ENTAILS

Context:

The recent case of a domestic help in Karnataka who stood firm against a powerful politician highlights how **true empowerment goes beyond applause** — it requires systemic support for survivors of abuse.



About Women Empowerment

What is Women Empowerment?

- **Definition:** The process of enabling women to exercise agency over their lives, access equal opportunities, and participate fully in social, economic, and political spheres.
- True empowerment is **not only representation in boardrooms and parliaments**, but also protection and rehabilitation of women at the margins who stand against entrenched power.

Causes Behind Weak Empowerment

1. Patriarchal Social Structure

- Patriarchy shapes family, workplace, and community norms. Women are often silenced when they seek justice.
- Example: Victims of sexual harassment face **character assassination and social boycott**, discouraging others from reporting crimes.

2. Tokenism in Empowerment

- Women CEOs, entrepreneurs, and politicians are showcased as role models, but grassroots survivors are ignored.
- Empowerment narratives often remain limited to **urban elite spaces**, excluding domestic workers, rural women, and marginalized communities.

3. Economic Insecurity of Survivors

- Women pursuing legal battles lose jobs, wages, and often incur **heavy legal debts**.
- Employers label them as “troublemakers,” leaving them unemployable.

4. Weak Access to Legal Aid

- Though free legal aid exists under [Article 39A](#) and Legal Services Authorities Act, **inadequate funding and lack of awareness** make it inaccessible.
- Survivors often face **procedural delays**, exhausting resources and morale.

5. Retaliatory Stigma and Isolation

- Communities stigmatise survivors, questioning their morality rather than supporting their courage.
- This often leads to **mental health breakdowns, social alienation, and re-victimisation**.

Consequences of Half-Empowerment

1. Justice Without Rehabilitation

- Legal victories remain hollow when survivors are forced back into hostile environments without financial or psychological support.

2. Underreporting of Crimes

- When women see survivors punished socially for speaking out, many remain silent, perpetuating cycles of abuse.

3. Perpetuation of Power Imbalances

- Powerful perpetrators exploit legal loopholes, delay tactics, and social pressure to silence victims.

4. Weak Trust in Governance

- Empowerment slogans lose credibility when **state support ends after the verdict**.
- This erodes trust in justice institutions.

India's Role in Combating Gender Injustice

1. Legal Frameworks

- **Constitutional Provisions:** Articles 14, 15, 21, and 39A guarantee equality and protection.
- **Laws:** [POSH Act \(2013\)](#), [Domestic Violence Act \(2005\)](#), Criminal Law Amendments (2013 & 2018).
- **Judicial Precedents:** Vishaka Guidelines, Nirbhaya Case reforms.

2. Government Schemes

- **Beti Bachao Beti Padhao (2015):** Awareness and education for girls.
- **Nirbhaya Fund (2013):** Dedicated fund for women's safety projects.
- **Mission Shakti (2022):** Umbrella scheme for women's empowerment (Sambal + Samarthya sub-schemes).
- **Support to Training and Employment Programme (STEP):** Economic empowerment through skills.

3. Limitations

- Most schemes focus on **prevention and**

awareness, not **rehabilitation and survivor reintegration**.

- Lack of convergence between central, state, and corporate CSR initiatives.

Way Forward for True Empowerment

1. Survivor Compensation Schemes

- State-funded financial packages covering **legal expenses, rehabilitation costs, and livelihood security**.
- Similar to compensation given for victims of terrorism or industrial accidents.

2. Dedicated Legal Aid Cells

- Create **specialised survivor litigation centres** staffed with advocates, forensic experts, and counsellors.
- Fund them on par with public prosecutors in high-profile cases.

3. Guaranteed Employment Pathways

- Direct quotas for survivors in government, PSUs, and corporate CSR policies.
- Example: Similar to how states provide jobs to kin of martyrs.

4. Psychological and Trauma Support

- Institutionalise **long-term counselling, therapy sessions, and peer support groups**.
- Recognise trauma recovery as a **basic right, not a privilege**.

5. Institutionalise Survivor Expertise

- Train survivors as **mentors, police counsellors, and ICC (Internal Complaints Committee) members** under POSH Act.
- Their lived experience can improve empathy and credibility in grievance redressal.

Conclusion

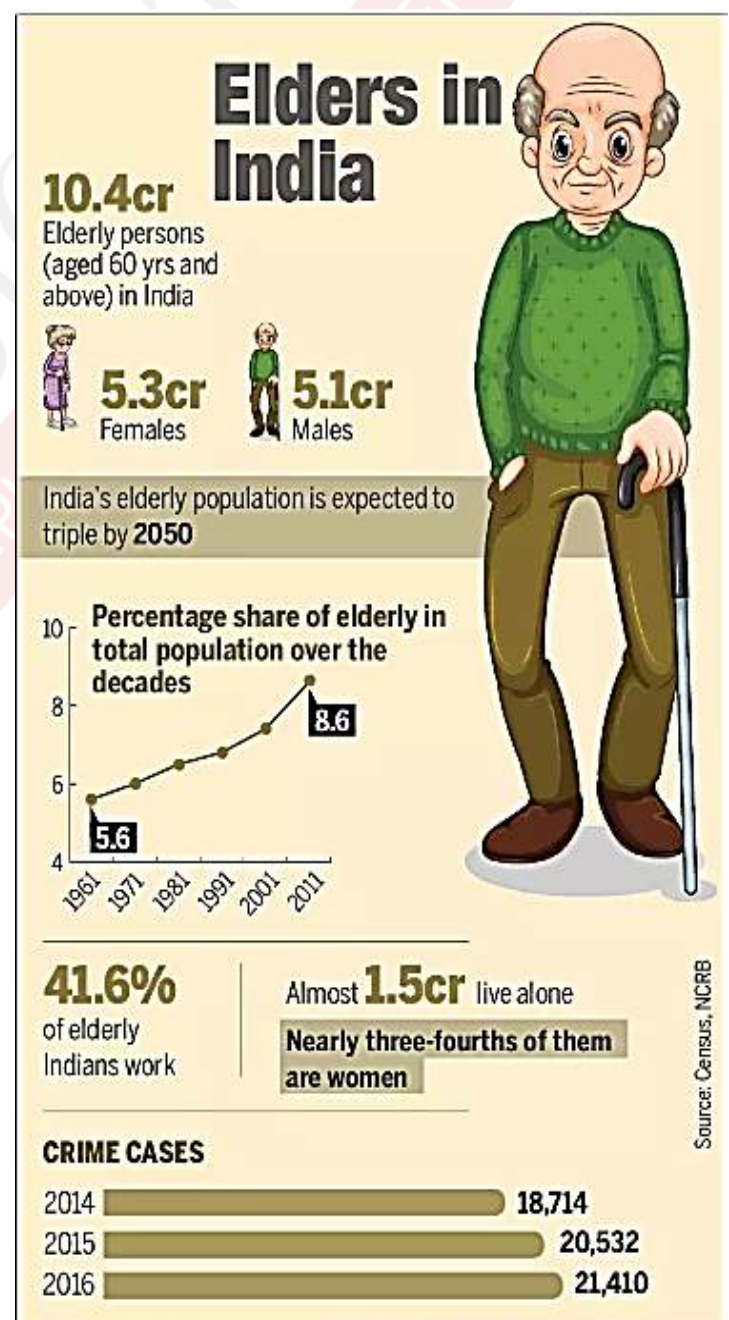
Empowerment is not magazine covers or awards — it is about **structural justice**. Women who resist entrenched power are performing **public service**, strengthening jurisprudence and democracy. Society owes them more than applause: it owes them **economic security, psychosocial support, and institutionalised recognition**. Only when survivor courage translates into **sustainable life opportunities** can empowerment be said to be **delivered, not just declared**.

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

PROTECTING INDIA'S GERIATRIC POPULATION FROM THE RISING HEAT BURDEN

Context: Heatwaves are becoming more frequent and severe in India, raising mortality among older adults.

- A study shows heat-related deaths among India's elderly rose by **55% between 2000–04 and 2017–21**, with states like **Uttar Pradesh and Rajasthan** worst affected.



About Geriatric Population:

What it is?

- The **geriatric population** refers to people aged **65 years and above** who experience physiological decline in immunity, metabolism, and resilience.
- They are more prone to chronic diseases, mobility issues, and environmental stressors like extreme heat.

India's Geriatric Population

- In 2022, **10.5% of India's population** was elderly (~14 crore people).
- By 2050, this share is projected to **nearly double**, surpassing the youth population.
- **71% of elderly live in rural areas**, often with poor infrastructure and limited healthcare.
- Elderly women outnumber men by **4 million** (71 million women vs 67 million men), especially vulnerable due to gendered roles and poverty.

Causes of Heat-Related Vulnerability in the Elderly

1. Biological Factors

- Reduced sweating, impaired blood circulation, and poor thermoregulation make it difficult for older adults to cool their bodies.
- Pre-existing conditions (heart, kidney, mental health) amplify risks.

2. Dehydration and Thirst Perception

- Elderly individuals often fail to feel thirsty, leading to low fluid intake, electrolyte imbalance, and kidney stress.

3. Gender Dimensions

- Elderly women face **prolonged heat exposure in non-ventilated kitchens**, caregiving burdens, and limited access to resources.
- Elderly men continue **outdoor labour in farming or construction**, with inadequate hydration and protective breaks.

4. Tropical Nights Effect

- When night temperatures remain above 20°C, older bodies fail to recover from daytime heat, straining cardiovascular and respiratory health.

5. Social Isolation and Poverty

- Living alone delays help-seeking. Lack of social participation worsens mental health and reduces adaptive capacity.

Current Gaps in Protection

- **Policy Blind Spot:** [Heat Action Plans](#) exist but lack elderly-specific strategies.

- **Data Discrepancy:** NCRB and NDMA report widely different figures on heat deaths, limiting targeted planning.
- **Affordability of Cooling Tech:** Innovations like [thermoelectric garments](#) remain out of reach for poor rural elderly.
- **Weak Surveillance:** No robust system to track heat mortality in real time, or to map urban heat islands.
- **Gendered Neglect:** Women's vulnerabilities (domestic confinement, resource inequality) are rarely acknowledged in policies.

Solutions and Strategic Action

1. Targeted Social Protection

- Subsidise cooling devices, hydration packs, and energy support for poor elderly households in heatwave zones.

2. Health System Strengthening

- Train ASHA workers, health staff, and disaster teams to detect and treat heat stroke among elderly populations.
- Establish **temporary cooling centres** in rural blocks and urban wards.

3. Data and Research

- Publish real-time heat mortality data.
- Encourage scientific studies on how **income, gender, and disease conditions** shape heat vulnerabilities.

4. Technology Access

- Scale low-cost cooling technologies under MoHFW with **subsidies and PLI incentives** for mass production.

5. Institutional Coordination

- Regular meetings between **Health, Environment, Urban Development, and Agriculture ministries** to refine State and National Heat Action Plans.

6. Early Warning Systems

- Develop a **unified mobile app** integrating IMD's UMANG, MAUSAM, Meghdoot, and Damini apps to issue heat alerts.
- Use **social media for real-time outreach** in local languages.

7. Long-Term Climate Action

- Transition to **renewables and low-carbon strategies** to curb fossil-fuel-driven warming.
- Promote **sustainable housing designs** with ventilation for rural elderly.

Conclusion

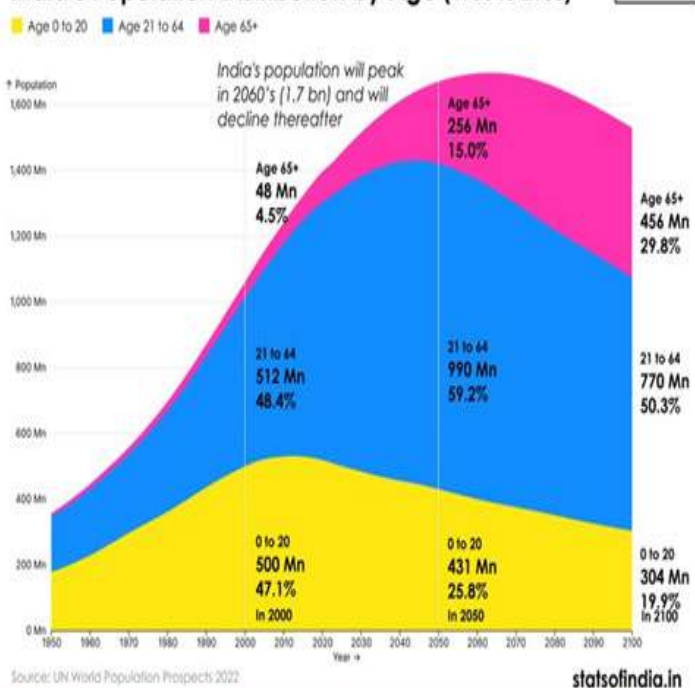
India's geriatric population is expanding rapidly, just as heatwaves are intensifying. This convergence makes the elderly **highly vulnerable to climate stress**. Protecting them requires **elderly-focused heat action plans, better data, subsidised cooling solutions, and stronger social protection systems**.

INDIA'S DEMOGRAPHIC DIVIDEND AS A TIME BOMB

Context: India's [demographic dividend](#), once seen as its greatest economic strength, is now being described as a **potential time bomb** due to rising automation, outdated curricula, and low employability among graduates.

- Experts warn that without urgent skilling reforms, India's youth bulge could turn into a liability.

India's Population Distribution by Age (1950 to 2100)



About Demographic Dividend

What it is?

- It refers to the **economic growth potential** that arises when a country has a larger share of working-age population compared to dependents.
- This window is time-bound and requires **productive employment** to realise the benefits.

India's Position

- India has over **800 million people below 35 years** — the largest youth population in the world.
- The demographic dividend window is expected to remain open till **2045**, giving India about two decades to harness this advantage.

Significance

- Boost to GDP** — IMF estimates closing the gender gap alone could raise GDP by **27%**.
- Global Workforce Supplier** — India can provide skilled labour to ageing economies.
- Innovation Hub** — Young population can drive entrepreneurship and digital adoption.
- Export Competitiveness** — Labour-intensive industries (textiles, leather, gems) depend on youthful manpower.

- Social Development** — Productive employment improves poverty reduction, social mobility, and inclusive growth.

Key Concerns

- Skill Gap** — Only **43% of Indian graduates are job-ready** (Graduate Skills Index 2025).
- Education Mismatch** — 40–50% of engineering graduates remain unemployed due to poor alignment with industry.
- Automation Risks** — McKinsey projects **70% of jobs at risk from AI** by 2030.
- Low Female Participation** — Female Labour Force Participation Rate (FLFPR) remains at **37–41.7%**, below global averages.
- Career Awareness Deficit** — 93% of students know only 7 career options, ignoring over **20,000 available paths**.

Consequences of Inaction

- Economic Fragility** — Jobless growth, falling exports, and underutilisation of youth potential.
- Social Unrest** — Risk of protests and instability, similar to the [Mandal agitation](#) of 1990.
- Missed Opportunity** — India may fail to replicate China or Japan's success in leveraging demographic windows.
- Brain Drain** — Skilled youth may migrate, weakening domestic innovation capacity.

Way Forward

- Curriculum Overhaul** — Embed AI, digital literacy, and critical thinking in schools.
- National Skilling Framework** — Align education, skills, and industry through one cohesive plan.
- Women-Centric Policies** — Childcare, safe transport, and flexible work models to raise FLFPR.
- Career Guidance at Scale** — Mandatory counselling and exposure to modern job markets in schools.
- Leverage Technology** — Use AI-driven learning platforms for re-skilling and cross-skilling.
- Public-Private Partnerships** — Collaborate with industry for apprenticeships and gig economy formalisation.
- Promote Regional Best Practices** — Expand schemes like Karnataka's *Shakti Yojana* and Rajasthan's *Urban Employment Guarantee*.

Conclusion

India is in its **decisive decade** of demographic advantage, with the window closing by 2045. The choice is stark: either equip youth with future-ready skills and transform them into an economic powerhouse, or allow the mismatch between degrees and employability to push the nation into a **demographic crisis**. As Tagore's words remind us, we must prepare our children "*for another time*" — the AI-driven world of tomorrow.

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

CLOUDBURST

Context: A devastating cloudburst in Uttarkashi's Dharali region triggered flash floods and landslides, killing at least four people and sweeping away homes.

About Cloudburst:

What is a Cloudburst?

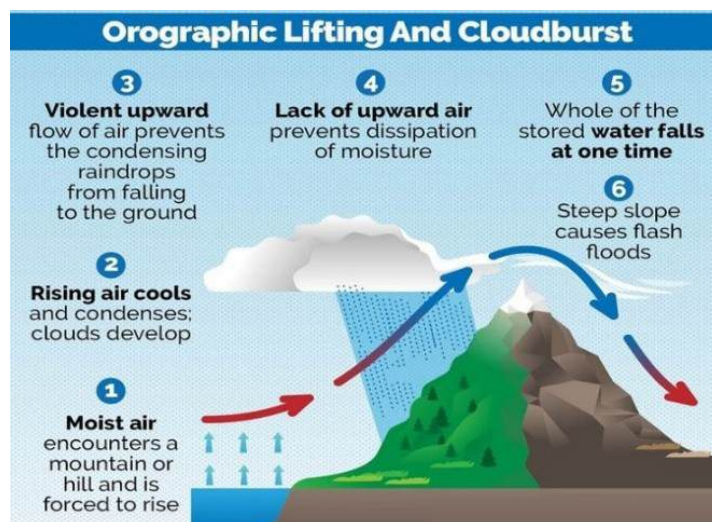
- A **cloudburst** is defined by the **India Meteorological Department (IMD)** as **rainfall exceeding 100 mm/hour over a small area (20–30 sq km)**.
- A **2023 IIT Jammu & NIH study** redefined it as **100–250 mm/hour over just 1 sq km**, making it one of the most localized and intense weather events.
- These events are often **associated with cumulonimbus clouds** in mountainous regions, caused by **orographic lift** and **convection currents** that rapidly accumulate moisture before collapsing violently.

Why Are Hilly Areas More Prone?

- Topography:** Steep slopes accelerate water runoff and debris flow.
- Orographic lifting:** Moist monsoon air is rapidly lifted over hills, intensifying precipitation.
- Rocky terrain:** Poor water absorption causes rapid accumulation on surface.
- Altitude (1,000–2,000m):** High vulnerability zone due to dense valley populations and fragile ecosystems.

Historical Cloudburst Disasters in India:

Year	Location	Impact
1908	Musi River, Hyderabad	15,000 deaths, 80,000 homes destroyed
1970	Alaknanda River, Uttarakhand	Massive floods in pilgrimage towns
2010	Leh, Ladakh	179 dead, 400 injured
2023–25	Multiple incidents in Uttarakhand & Himachal	Loss of life, flash floods, infrastructure collapse



Mechanism and Climate Linkage:

- Rapid Condensation:** Strong upward air currents (updrafts) in a storm system hold massive amounts of moisture aloft. When these air currents suddenly weaken or collapse, the entire volume of suspended water rapidly condenses and falls as torrential rain over a very small area, leading to a catastrophic downpour.
- Climate Change Influence:** With global warming, the atmosphere can hold approximately **7% more water vapour per 1°C rise in temperature**. This enhances the potential for extreme, short-duration rainfall events like cloudbursts, especially in the moisture-laden monsoon season.
- Lightning and Rain Delay:** In towering cumulonimbus clouds, lightning activity causes electrical disturbances that **inhibit droplet coalescence**, delaying rainfall release. This allows the cloud to accumulate more water before it eventually bursts, releasing rain in destructive quantities.
- Carbon Loading in the Himalayas:** Increased **black carbon and aerosols** from forest fires, vehicular emissions, and crop burning alter the cloud microphysics in the Himalayan region. These particles act as **cloud condensation nuclei (CCN)**, increasing cloud density and further contributing to cloudburst-like conditions under orographic pressure.

Hazards of Cloudbursts:

- **Flash Floods:** Intense rainfall overwhelms streams and drains, causing sudden flooding that devastates homes, farms, and public infrastructure.
- **Landslides:** Saturated soil on steep slopes leads to slope failures, blocking roads and burying settlements under debris.
- **Mudflows and Debris Slides:** Rainwater mixes with soil and rocks to form high-speed flows that destroy everything in their path.
- **Infrastructure Collapse:** Floodwaters erode roads, damage bridges, and disrupt electricity and communication systems, isolating affected areas.
- **Human Casualties:** The suddenness and intensity leave no time for response, leading to high fatalities from drowning or building collapse.

Why Prediction is Difficult?

- **Small Spatial Scale:** Cloudbursts occur in limited areas (10–30 sq km), making them hard to detect with standard radar systems.
- **Short Duration:** The event lasts under an hour, offering little time for forecasting and issuing effective alerts.
- **Inadequate Infrastructure:** Hilly regions lack dense [Doppler radar](#) and weather stations, limiting real-time monitoring.
- **Cost Barrier:** Installing advanced radar and AI-based forecasting models in remote areas remains expensive and underfunded.

Policy and Institutional Gaps:

- **No Unified Cloudburst Strategy:** India lacks a dedicated national framework under [NDMA](#) or IMD to tackle cloudbursts systematically.
- **Limited Early Warning at Local Level:** Alerts often don't reach vulnerable blocks and villages in time, increasing disaster impact.
- **Weak Land Use Planning:** Unregulated construction in fragile zones increases risk to life and property

during intense rainfall.

- **Low-Resilience Infrastructure:** Many buildings and roads in hilly areas are not designed to withstand extreme weather conditions.

Suggestions & Way Forward

1. Predictive Infrastructure:

- Expand **Doppler Weather Radar** and **AWS networks** in Himalayan states.
- Use **AI/ML hydromet forecasting models** to improve short-term local prediction.

2. Institutional Coordination:

- Develop a [National Cloudburst Monitoring Programme](#) under NDMA & ISRO.
- Launch **village-level micro-risk assessments** using satellite data and GIS.

3. Land Use and Planning:

- Enforce **no-construction zones** in high-risk slopes and catchments.
- Update [zonal rainfall intensity maps](#) for all Himalayan towns.

4. Community Preparedness:

- Develop **village disaster protocols** in local languages.
- Involve **Panchayats and SHGs** in evacuation planning and relief drills.

5. Resilient Infrastructure:

- Promote **eco-engineering** for slope stabilization.
- Incentivize **flood-proof homes**, green roofs, and local [rainwater harvesting](#).

Conclusion:

Cloudbursts are no longer isolated disasters but **symptoms of an accelerating climate emergency** in ecologically fragile zones like Uttarakhand. Mitigation requires not just high-tech forecasting but also **localised planning**, [resilient development](#), and **community-based preparedness** to minimise loss of life and property. A national strategy is now a necessity, not an option.

GENERAL STUDIES – 2

Topics: Indian Constitution- historical underpinnings, evolution, features, amendments, significant provisions and basic structure; Comparison of the Indian constitutional scheme with that of other countries.

CONSTITUTION'S NINTH SCHEDULE



Context

The **Ninth Schedule**, introduced by the **First Constitutional Amendment, 1951**, was originally proposed by **V.K. Thiruvengatchari**, Advocate General of Madras, to safeguard land reform laws from being struck down by courts. Over decades, it has become a flashpoint in the **legislature–judiciary tussle**, oscillating between enabling **social justice reforms** and risking **erosion of constitutional liberties**.

Historical Context and Rationale

- The **Patna High Court (1951)** invalidated Bihar's land reforms, creating a deadlock between Parliament and judiciary.
- Responding, the First Amendment inserted:
 - **Article 31A** – protecting agrarian reform laws from challenge.
 - **Article 31B & Ninth Schedule** – granting blanket immunity to listed laws.
- Initially, **13 state laws** (mostly on **zamindari abolition**) were placed in the Ninth Schedule, later expanding to **over 280 laws**.
- Political intent: to dismantle feudal hierarchies and uphold **Directive Principles (Article 38, 39(b), 39(c))** on equitable distribution of resources.

Judicial Evolution

- **Sankari Prasad (1951)**: SC upheld the First Amendment and validity of the Ninth Schedule.
- **Golaknath v. State of Punjab (1967)**: SC held

Parliament could not amend Fundamental Rights—raising doubts over Ninth Schedule validity.

- **Kesavananda Bharati (1973)**: Introduced the **basic structure doctrine**—Parliament cannot alter constitutional fundamentals.
- **Waman Rao v. Union of India (1981)**: Drew a line—laws inserted in Ninth Schedule **before 24 April 1973** upheld, later ones subject to scrutiny.
- **I.R. Coelho v. State of Tamil Nadu (2007)**: Clarified that **post-1973 Ninth Schedule laws** are open to judicial review if they damage the **basic structure**.

Positive Aspects

1. **Agrarian Transformation**: Enabled abolition of zamindari, benefiting millions of tenants (UP alone abolished **2 crore acres of landlord holdings** by 1960).
2. **Social Justice**: Protected welfare measures like ceiling on landholdings, tenancy rights, and affirmative action laws.
3. **Policy Certainty**: Reduced litigations—by 1970s, **over 50 land reform acts** survived due to Ninth Schedule protection.
4. **Constitutional Flexibility**: Allowed democratic mandates to prevail over rigid colonial-era property rights.
5. **Equity Orientation**: Supported implementation of **Directive Principles**, aligning state action with social justice goals.

Challenges

1. **Legislative Overreach**: By 2000s, Ninth Schedule held **over 284 laws**, many unrelated to agrarian reforms.
2. **Erosion of Fundamental Rights**: Blanket immunity undermined **Articles 14, 19, and 21**.
3. **Judiciary–Legislature Conflict**: Sparked recurring confrontations, especially after Kesavananda and Coelho.
4. **Scope for Misuse**: Governments used it to bypass scrutiny of politically expedient measures (e.g., TN reservation laws exceeding 69% cap).
5. **Uncertainty in Application**: Post-Coelho, ambiguity persists on how courts apply “basic structure” to welfare measures.

Way Forward

1. **Restrict Use**: Confine the Ninth Schedule to genuine land and equity reforms, avoiding its use as a political shield.
2. **Judicial Clarity**: Courts should apply consistent

tests under the **basic structure doctrine** to reduce uncertainty.

3. **Legislative Restraint:** [Parliament](#) must exercise self-discipline, using insulation sparingly and only after robust debate.
4. **Safeguards:** Introduce tools like **sunset clauses or periodic review** to prevent blanket, permanent immunity.
5. **Balanced Approach:** Legislature should advance social justice, while judiciary upholds constitutional values of equality, liberty, and rule of law.

Conclusion

The Ninth Schedule was a bold innovation that enabled India's **agrarian and social justice reforms**. But its overuse risks undermining constitutional guarantees. Going forward, its use must remain **narrow, restrained, and consistent with the basic structure**, so that it continues to serve as a shield for reform without eroding rights.

CREAMY LAYER EQUIVALENCE IN OBC QUOTA: ENSURING UNIFORMITY IN RESERVATION BENEFITS

Context:

The Centre is considering introducing "equivalence" in applying the creamy layer condition for [OBC reservation](#) across central/state institutions, PSUs, universities, and aided bodies to remove anomalies and ensure fairness.



About Creamy Layer Equivalence in OBC Quota: Ensuring Uniformity in Reservation Benefits:

Background: The Concept of Creamy Layer

- Originates from [Indra Sawhney vs Union of India \(1992\)](#), where the Supreme Court upheld OBC reservations but excluded the affluent section ("creamy layer").
- **DoPT Circular, 1993:** Listed children of high officials, professionals, and property owners as ineligible. Introduced **income/wealth tests**.

- **2004 Clarification:** Expanded rules for non-government sectors, using income thresholds (later revised to ₹8 lakh in 2017)

The Problem: Anomalies in Implementation

- Different treatment of **similar positions** across government, PSUs, and aided institutions.
- Example: Children of university professors get OBC benefits, while children of aided-college teachers of equivalent rank are excluded.
- PSU staff treated differently at central and state levels.
- Over **100 civil service aspirants (2016–24 batches)** disqualified after being classified as "creamy layer" despite earlier acceptance of their caste certificates.

Proposed Reform: Ensuring Equivalence

- **University Teachers:** From Assistant Professor upward = [Creamy Layer](#) (equivalent to Group A entry).
- **Autonomous/Statutory Bodies:** Posts aligned with central/state pay scales.
- **State PSUs:** Executive-level posts equated to creamy layer (with income exemption ≤ ₹8 lakh).
- **Govt-Aided Institutions:** To follow service conditions/pay equivalence of central or state government.
- **Private Sector:** No equivalence due to vast variation; only income/wealth criteria apply.

Significance of the Move:

- **Fairness & Uniformity:** Removes arbitrary exclusion/inclusion among candidates of similar socio-economic status.
- **Correcting Anomalies:** Helps beneficiaries like children of aided-institution staff who were unfairly excluded.
- **Social Justice:** Strengthens credibility of [OBC reservations](#) as a tool for equity.
- **Legal & Administrative Clarity:** Avoids multiple interpretations by state and central bodies.
- **Political Sensitivity:** Ensures trust of OBC communities in reservation policies.

Challenges Ahead:

- **Resistance from Interest Groups:** Those set to lose benefits may oppose.
- **Complexity in Defining Equivalence:** Wide diversity in [PSU](#), aided, and university posts.
- **Private Sector Ambiguity:** Income test alone may fail to capture real affluence.
- **Judicial Scrutiny:** Reform must withstand constitutional tests of equity and non-discrimination.
- **Periodic Income Revision:** Ceiling of ₹8 lakh (2017) may soon become outdated.

Way Forward:

- **Transparent Criteria:** Clear DoPT guidelines with rational basis for equivalence.
- **Dynamic Review:** Regular revision of income ceiling and categories.

- **Data-Backed Policy:** Use surveys on OBC socio-economic mobility to calibrate rules.
- **Judicial Backing:** Seek SC validation to avoid prolonged litigations.
- **Balanced Approach:** Preserve benefits for truly disadvantaged OBCs while excluding elites.

Conclusion:

The proposed **equivalence in creamy layer norms** is not merely a bureaucratic reform—it is a step towards restoring **trust, fairness, and rationality** in India's reservation system. By addressing anomalies, it strengthens the **constitutional vision of social justice**, while ensuring that benefits reach the genuinely disadvantaged sections among OBCs.

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

SUPREME COURT DIRECTIVE ON SOCIAL MEDIA CONDUCT GUIDELINES

Context:

The Supreme Court of India has directed the Union government to frame comprehensive guidelines to regulate conduct on social media, balancing freedom of speech with the right to dignity of individuals and communities.



About Supreme Court Directive on Social Media Conduct Guidelines:

Background:

- India has over **800 million internet users** with rapidly growing social media penetration.
- Social media influencers, comedians, and podcasters often **commercialise speech** through monetised content.
- Increasing incidents of **hate speech**, misinformation,

and **derogatory humour** have triggered legal scrutiny.

- **Current frameworks:**

- IT Rules, 2021 (intermediary due diligence, grievance redressal).
- Broadcasting Content Standards by NBSA.
- IPC, IT Act & Disability Rights laws provide limited safeguards.

- **Gaps:** Absence of **future-ready, comprehensive rules** addressing online humour, commercial speech, and community sensitivities.

Supreme Court's Key Observations:

1. **Need for Balanced Regulation**
 - Free speech is fundamental but **not absolute**; cannot infringe on dignity of others.
 - Humour is essential but should not cross into **prohibited speech**.
2. **Guideline Framework**
 - To be drafted in consultation with **News Broadcasting Standards Authority (NBSA)** and stakeholders.
 - Must avoid knee-jerk reactions, instead adopt a **forward-looking, flexible framework**.
3. **Consequences for Violations**
 - Rules must specify **proportionate penalties**.
 - Not just advisory—violations should attract **effective accountability**.
4. **Vulnerable Groups**
 - Online content must protect **persons with disabilities, women, children, minorities, and senior citizens**.
 - Insensitive humour damages constitutional goals of **inclusivity and equality**.

The Larger Issue: Free Speech vs Social Responsibility

Aspect	Concerns
Free Speech (Art. 19(1)(a))	Vital for democracy, creativity, humour, dissent.
Reasonable Restrictions (Art. 19(2))	Needed to protect dignity, public order, morality, security.
Commercialisation of Speech	Monetised content creates added responsibility for influencers.
Digital Ecosystem	Speed, virality, and anonymity increase potential for harm.

Implications of the Guidelines:

- **Legal:** May set **precedent for codified standards** on online humour, influencer speech, and community sensitivities.
- **Social:** Promotes **inclusive digital spaces** protecting marginalised groups.
- **Technological:** Push for **AI-enabled monitoring, content flagging, and grievance redressal**.
- **Political/Administrative:** Balancing state regulation

with **free speech protection** to avoid censorship concerns.

Way Forward:

1. **Stakeholder Consultations** – Engage comedians, influencers, tech platforms, civil society, and marginalised groups.
2. **Sensitisation over Penalisation** – Prioritise awareness campaigns and [digital ethics](#) training.
3. **Clear Categorisation** – Distinguish free, commercial, and prohibited speech.
4. **Tech Solutions** – AI-based content moderation with **independent oversight**.
5. **Proportional Penalties** – Ensure accountability without chilling effect on free speech.
6. **One-Stop Redressal** – Create a **Digital Content Ombudsman** for speedy grievance resolution.

Conclusion:

The SC's directive is a timely attempt to balance [constitutional freedoms with dignity](#) in a rapidly evolving digital ecosystem. The guidelines must be **future-ready**, safeguard free expression, and uphold the rights of vulnerable communities.

Topics: Appointment to various Constitutional posts, powers, functions and responsibilities of various Constitutional Bodies.

INDIA'S DEMOCRACY AND THE MIGRANT CITIZEN CRISIS

Context:

Nearly **3.5 million voters (4.4% of Bihar's electorate)**, mostly migrants, have been deleted from electoral rolls during the [Special Intensive Revision](#) (SIR), raising concerns of **systemic migrant disenfranchisement** ahead of elections.



About Migrant Disfranchisement:

What it is?

- It refers to the **exclusion of migrant workers from exercising their [right to vote](#)** either in their home states or at their destination states.
- Migrants often fall into a "political limbo": not registered at destination, and deleted at origin due to absence during verification.

Current Safeguards Against Migrant Disenfranchisement

1. [Representation of the People Act, 1950 & 1951](#) – Provides every citizen the right to be enrolled in the constituency of ordinary residence.
2. [Electoral Roll Management \(ERONET\)](#) – Allows continuous updating of rolls.
3. [Special Provisions by ECI](#) – e.g., *One Nation, One Voter ID portability discussions* (not yet implemented).
4. [Proxy Voting Proposals](#) – For overseas Indians, but not extended to internal migrants.
5. [Civil Society Interventions](#) – Migrant surveys in states like Kerala highlight gaps.

Structural Causes of Migrant Disenfranchisement

1. [Sedentary Electoral Framework](#)
 - Voter registration in India is still tied to **fixed residence and physical verification**.
 - Migrants, often living in rented rooms, slums, or worksites, lack documentation and are easily excluded.
2. [Circular and Split-Family Migration](#)
 - Bihar's out-migrants (~7 million annually) move seasonally for survival, leaving homes locked.
 - State machinery interprets absence as "permanent migration", striking names off rolls.
3. [Administrative & Social Barriers](#)
 - **TISS-ECI Study (2015)**: Migrants face a **triple burden**: administrative hurdles, digital illiteracy, and social exclusion.
 - Host states often discourage migrant enrolment fearing **altered political outcomes**.
4. [Regionalism and Sub-Nationalism](#)
 - Migrants are viewed as outsiders or "job-stealers".
 - Domicile norms for jobs fuel resistance to their **political inclusion in host states**.
5. [Comparison with Welfare Portability](#)
 - Like the [One Nation, One Ration Card scheme](#), uptake of dual-residency rights is limited.
 - Fear of losing entitlements discourages migrants from shifting political/food security identity to host states.

Consequences

1. [Democratic Deficit](#)
 - Bihar's average turnout (last four Assembly elections) **53.2%** vs Gujarat (66.4%) & Karnataka (70.7%).
 - Migrant-heavy states record **systematically [lower voter participation](#)**.
2. [Disenfranchisement of the Poor](#)
 - Striking names of absent voters

disproportionately affects poor, seasonal, and vulnerable groups.

- Creates a **two-tier democracy** where the mobile poor lose political voice.

3. **Gendered & Border Impact**

- Along the **India–Nepal border**, women migrants face **documentation and citizenship hurdles**, deepening disenfranchisement.
- Risks xenophobic and gender-biased exclusion.

Way Forward

1. **Portable Voter Identity**

- Develop a **national, mobile electoral ID system** allowing voting across states of work and residence.
- Link with [Aadhaar-enabled authentication](#), with privacy safeguards.

2. **Cross-State Coordination**

- EC should adopt **cross-verification with destination rolls** before deletion.
- Enable **temporary voter registration** for seasonal migrants.

3. **Civil Society Outreach**

- Panchayats and NGOs must be empowered for **migrant re-enrolment drives**.
- Replicate the **Kerala model of migration surveys** in Bihar, UP, and other source states.

4. **Policy Harmonisation**

- Align migration-sensitive reforms with **labour codes, portability of welfare schemes, and voting rights**.
- Recognise **circular migration patterns** as part of India's economic fabric.

Conclusion

India's democracy cannot afford to silence millions of **migrant workers**, whose remittances sustain states like Bihar. Electoral systems rooted in a **sedentary citizen model** now need urgent reform. Without **portable voter identity, inter-state coordination, and inclusive outreach**, India risks its largest-ever disenfranchisement — not of dissenters, but of citizens who migrate for survival.

ECI VOTER ROLL ALLEGATIONS

Context:

Opposition party has accused the [Election Commission of India \(ECI\)](#) of large-scale voter list manipulation in Karnataka, Maharashtra, and other states, alleging bias and “vote theft” favouring the ruling party.

About ECI Voter Roll Allegations:

What it is Election Commission of India (ECI)?

- A **constitutional, autonomous body** responsible for conducting free and fair elections in India.
- Established on **25 January 1950**; headquarters in **New Delhi**.

Constitutional Articles Governing ECI:

- **Article 324** – Superintendence, direction, and control of elections.
- **Articles 325–329** – Provisions on electoral rolls, adult suffrage, powers of Parliament/State legislatures, and judicial limitations in electoral matters.

Structure:

- **Chief Election Commissioner (CEC)** + two [Election Commissioners](#).
- Appointed by the **President of India** and tenure of 6 years or up to 65 years.

Powers and Functions:

- **Administrative** – Delimitation of constituencies, preparation & revision of electoral rolls, recognition of parties, symbol allotment, and enforcement of the **Model Code of Conduct**.
- **Quasi-Judicial** – Resolving party splits/mergers, deciding on disqualification, and monitoring election expenditure.
- **Advisory** – Advising the President/Governor on disqualification matters and corrupt practices.

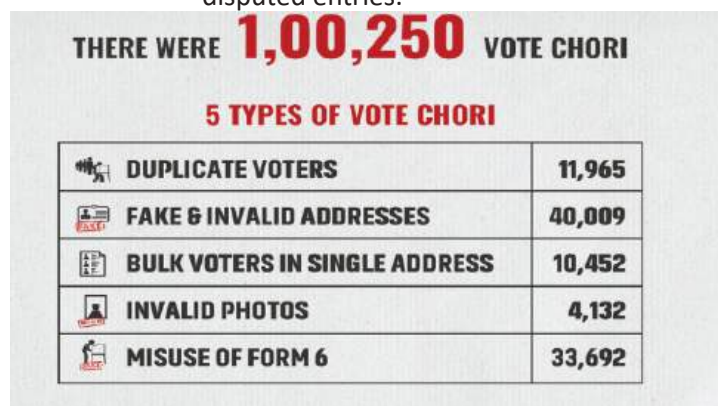
Issues & Allegations on Election Conduct:

- **Duplicate Voter Entries:**
 - Over **11,900 voters** allegedly appeared multiple times in the same constituency rolls.
 - Example: One individual reportedly listed in **four different polling booths**.
- **Fake & Invalid Addresses:**
 - Around **40,000 entries** carried non-existent or unverifiable addresses with fictitious personal details.
 - Example: Father's name fields containing random characters indicated poor verification.
- **Bulk Voters at a Single Address:**
 - Dozens of unrelated voters were registered at the same small residence.
 - Example: A single-room house listed **80 voters** from different families.
- **Commercial Premises as Residences:**
 - Some voters were registered at business establishments instead of actual homes.
 - Example: A brewery address had **68 registered voters**, none found living there.
- **Misuse of Form 6 (New Voter Registration):**
 - Alleged cases where the form meant for first-time voters was used for repeat or ineligible entries.
 - Example: An elderly voter reportedly registered twice in two months and voted in separate booths.
- **Multiple-State Enrolment:**
 - Individuals allegedly enrolled in voter lists of more than one state.
 - Example: A single person's name appeared

in **two booths in one state and additional rolls in two other states.**

• **Pattern Beyond One Constituency:**

- Similar anomalies reportedly observed in multiple states during different elections.
- Example: In one assembly election, the victory margin was close to the number of disputed entries.



Importance of Elections in Democracy

- **Legitimacy of Governance** – Provides lawful authority to govern through a people's mandate (e.g., 67% turnout in 2019).
- **Citizen Empowerment** – Safeguards universal adult suffrage under Article 326, enabling public participation in governance.
- **Political Stability** – Ensures smooth power transitions, avoiding political unrest.
- **Rule of Law** – Reinforces constitutional morality and accountability of those in power.

Way Ahead:

- **Digital Transparency** – Making voter rolls available in machine-readable formats will allow researchers, civil society, and citizens to easily detect errors or duplication. This promotes accountability and reduces scope for manipulation.
- **Third-Party Audits** – Independent verification by neutral agencies can ensure electoral rolls are accurate and unbiased, strengthening institutional credibility. Such audits can identify systemic errors before polls.
- **Legal Reforms** – Amending the [Representation of the People Act, 1951](#) to include stricter penalties for voter fraud will deter malpractice and reinforce electoral integrity. This ensures offenders face swift consequences.
- **Public Confidence Building** – Regular public briefings on the status of complaints and their resolution create transparency and restore voter trust in the electoral process. It also keeps institutions answerable to the public.
- **Technology Integration** – Introducing [blockchain-based voting systems](#) can create secure, tamper-proof records of votes. This would enhance transparency, prevent manipulation, and boost voter confidence in digital elections.

Conclusion:

Free and fair elections are the cornerstone of democracy, and the ECI must rise above political fray to maintain trust. Allegations like those raised by Opposition, whether proven or not, demand thorough investigation. Transparency, impartiality, and [accountability](#) remain the ECI's strongest shields against erosion of public confidence.

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

NAVIGATING THE NEW TECHNO-CAPITALIST WORLD ORDER

Context:

The global technological landscape is undergoing a radical shift driven by a new techno-capitalist philosophy emerging from the United States, symbolised by the Trump administration's aggressive AI and cryptocurrency policies.

TECHNO-CAPITALISM

A system where technology and capital are co-architects of power, with the state acting not as a regulator but as an enabler of private tech monopolies.



Core Features

-  Deregulation of AI and fintech sectors
-  Massive public-private investment flows
-  Alliance between state and Silicon Valley elites ("tech bro oligarchy")
-  Technological dominance as a geopolitical strategy, not

About Navigating the New Techno-Capitalist World Order:

What is Techno-Capitalism?

- **Definition:** A system where technology and capital are co-architects of power, with the state acting not as a regulator but as an enabler of private tech monopolies.
- **Core Features:**
 - Deregulation of AI and fintech sectors.
 - Massive public-private investment flows.
 - Alliance between state and Silicon Valley elites ("tech bro oligarchy").
 - Technological dominance as a geopolitical strategy, not a developmental ideal.

E.g.: The Trump administration's AI push dismantles regulation and promotes AI-led manufacturing with billions

in capital—prioritising power over global norms.

Global Shifts in Tech Ecosystems: US, China, and India

United States:

- **Trajectory:** Shift from state-led NASA-era science to private sector-led innovation (e.g., SpaceX).
- **Current Trend:** Techno-capitalism enabling strategic dominance through [AI](#), crypto, and fintech.
- **Ideological Engine:** Peter Thiel's vision blending libertarianism and techno-nationalism.

China:

- **Model:** Mission-driven, centralised technological expansion under state control.
- **Focus Areas:** AI, space technology, [digital surveillance](#), and the Digital Silk Road.

India:

- **Status:** Hybrid model with slow private sector integration.
- **Strengths:** Robust IT services, expanding space sector (e.g., ISRO reforms), digital public goods (e.g., UPI, Aadhaar).
- **Weaknesses:** Underinvestment in R&D, weak higher education linkages, regulatory uncertainty, and slow scale-up of startups.

India-US Technology Cooperation: From Scientific Idealism to Strategic Realism

- **Past:** SITE project (1975) embodied Cold War-era scientific internationalism.
- **Breakdown:** Post-1974 nuclear test distrust led to decades of stalled collaboration.
- **Renewal:** The ICET ([Initiative on Critical and Emerging Technologies](#)) under Biden revived cooperation.
- **New Tension:** Divergences on trade, Russia, Pakistan, and Trump's America-first techno-policy challenge continuity.

India's Emerging Challenges in the Techno-Capitalist Order:

1. **AI and Job Displacement:**
 - Automation in AI threatens traditional IT-BPO jobs.
 - India's services-based export economy is vulnerable.
 - E.g.: [Generative AI tools](#) replacing human coders, translators, and customer support.
2. **H-1B Visa Uncertainty:**
 - US techno-nationalism may curtail Indian tech migration.
 - **Impact:** Weakens India's soft power and tech remittance base.
3. **Investment Deficit in R&D:**
 - India invests less than 0.7% of GDP in R&D vs. US (3.5%) and China (2.4%).
 - **Implication:** Limits capacity for cutting-edge innovation.
4. **Fragmented Tech Regulation:**
 - [Digital Personal Data Protection Act](#) (DPDP) is a step, but lacks clarity on AI ethics, crypto law, and deep tech compliance.
5. **Lack of Strategic Start-Up Scale:**
 - Indian start-ups face capital shortages, market barriers, and exit limitations.

- **Contrast:** US tech firms benefit from DoD contracts, national data policies, and deep capital pools.

Way Forward: Strategic Reorientation for India

1. National Tech-Industrial Strategy:

- Integrate defence, space, AI, [semiconductors](#), and quantum computing in a coordinated plan.
- Provide incentives and sandbox frameworks for domestic champions.

2. Reform Research and Higher Education:

- Link universities with industry and mission-mode projects (e.g., AI in healthcare, space, agri-tech).
- Create elite innovation clusters modelled on [Silicon Valley](#) and Shenzhen.

3. Rethink India-US Tech Engagement:

- Move beyond transactionalism to strategic co-innovation.
- Protect domestic tech autonomy while ensuring access to global capital and standards.

4. Regulate for Innovation, Not Control:

- Build smart regulation that encourages crypto and AI innovation while mitigating systemic risks.
- Ensure open standards, consumer rights, and cross-border data protocols.

5. Human Capital Re-skilling:

- Launch a [National AI Reskilling Mission](#) for the IT workforce.
- Integrate GenAI, cybersecurity, robotics in school and college curricula.

Conclusion:

The techno-capitalist order being shaped by America's new tech elite and state synergy is not just a policy trend—it is a civilisational pivot. India stands at a crossroads. Either it becomes a strategic player in the global digital economy, or it risks being a peripheral exporter of outdated tech services. A [coherent innovation strategy](#), investment in people, and strategic diplomacy are India's tools to remain sovereign and competitive in this new global reality.

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

**PRADHAN MANTRI JAN DHAN
YOJANA: ELEVEN YEARS OF
FINANCIAL INCLUSION**

Context:

PMJDY completes 11 years on August 28, 2025, emerging as the world's largest financial inclusion programme.

- Nearly **100% households** and over **90% adults** in India now have a bank account.



About Pradhan Mantri Jan Dhan Yojana

What is PMJDY?

- Launched in **2014**, PMJDY was designed to provide **universal access to banking** for the unbanked.
- Its objectives include **zero-balance accounts, RuPay debit cards, insurance, pensions, and Direct Benefit Transfers (DBTs)**.
- The scheme has reduced reliance on moneylenders and informal credit networks, historically a trap for the poor.

Progress Over 11 Years

1. **Massive Account Growth**
 - Over **56.2 crore accounts** opened, compared to ~15 crore in 2015.
 - This represents the world's **largest financial inclusion drive**.
2. **Gender Inclusion**
 - **56% of accounts** are held by women, reflecting PMJDY's role in **empowering female participation** in financial decisions.
3. **Rural Penetration**
 - **37.5 crore accounts** belong to rural/semi-urban areas.
 - Over **16.2 lakh banking correspondents** ("Bank Mitras") provide doorstep access in remote villages.
4. **Deposits Expansion**
 - Total balance stands at **₹2.68 lakh crore**, up **17 times since 2015**.
 - Indicates a shift from mere account opening to **actual savings behaviour**.
5. **Digital Ecosystem**
 - More than **38.7 crore RuPay cards** issued.
 - Enabled surge in **UPI-based transactions**, strengthening India's digital economy.

Impact of PMJDY

- **Direct Benefit Transfers (DBT):** Subsidies for LPG, pensions, and Covid-relief payments reached beneficiaries **without intermediaries**, reducing corruption and leakage.

- **Crisis Response:** During **demonetisation (2016)** and the **Covid-19 pandemic**, Jan Dhan accounts enabled rapid cash transfers to millions of poor households.
- **Financial Security:** Linked with micro-insurance (PMJJBY, PMSBY) and pensions (Atal Pension Yojana), giving the unorganised sector a basic social safety net.
- **Banking Access:** Today, **99.9% villages** have a bank branch, correspondent, or India Post Payments Bank outlet within 5 km — a milestone in rural inclusion.

Issues and Challenges

1. **Dormant Accounts**
 - A proportion of **Jan Dhan accounts** remain inactive, showing limited usage beyond initial opening.
2. **Credit Gap**
 - Many account holders lack access to **formal credit facilities**, still relying on microfinance or informal lenders.
3. **Digital Divide**
 - In Tier 4 & Tier 5 centres, poor smartphone penetration and low digital literacy limit full benefits of digital banking.
4. **Financial Literacy Deficit**
 - Many beneficiaries are unaware of insurance and pension schemes linked to PMJDY, restricting long-term empowerment.
5. **Overdependence on DBTs**
 - Accounts are heavily used for subsidy inflows but less for **investment or productive economic activity**.

Way Forward

- **Revive Dormant Accounts:** Conduct awareness drives and incentivise regular transactions.
- **Expand Credit Linkages:** Integrate PMJDY with **microcredit and small loans**, enabling entrepreneurship.
- **Promote Financial Literacy:** Use local languages and community campaigns to spread awareness about savings, insurance, and pensions.
- **Leverage Technology:** Develop **voice-based and AI-driven banking tools** for low-literacy populations without smartphones.
- **Deepen Social Security:** Broaden Jan Suraksha schemes so more informal workers gain insurance and pension coverage.
- **Encourage Savings-Investment:** Use rising balances in Jan Dhan accounts to connect beneficiaries with small savings, mutual funds, and other financial products.

Conclusion

PMJDY has emerged as the **largest financial inclusion initiative in the world**, transforming how subsidies are delivered and empowering marginalised households. Yet, its success will be complete only when accounts are

used actively for **savings, credit, and insurance**, not just DBT inflows. The next decade must focus on **financial literacy, technology-driven access, and credit empowerment**, turning Jan Dhan into a true driver of **inclusive growth and social security**.

LEGAL AID AND NALSA

Context:

As per the [India Justice Report 2025](#), only 15.5 lakh people availed legal aid in 2023–24, despite nearly 80% of India's population being eligible. This reveals persistent gaps in NALSA's reach, budget utilisation, and service quality.

About Legal Aid and NALSA:

- **What it is?**
 - The **National Legal Services Authority (NALSA)** is the apex statutory body under the [Legal Services Authorities Act, 1987](#), mandated to provide **free and competent legal services** to the weaker sections of society.
- **Launched in:** Formally constituted in **1995**, with the **Chief Justice of India** as Patron-in-Chief.
- **Powers & Functions:**
 - Lays down **policies and principles** for legal aid delivery across India.
 - Supervises and funds [State Legal Services Authorities \(SLSAs\)](#) and [District Legal Services Authorities \(DLSAs\)](#).
 - Organises **Lok Adalats**, legal awareness campaigns, and supports **ADR mechanisms**.
 - Ensures legal aid to eligible persons under **Section 12** of the Act, including SCs/STs, women, children, disabled, poor, and prisoners.

Key Initiatives Taken by NALSA:

- **Legal Aid Defence Counsel (LADC) Scheme (2022):** Dedicated defence for accused persons across 610 districts.
- **Para-Legal Volunteers (PLVs):** Trained community legal workers for outreach, awareness, and local dispute resolution.
- **Permanent Lok Adalats:** For pre-litigative and pending dispute settlement with focus on conciliation.
- **Legal Literacy Clubs:** Initiated in schools and colleges to foster early legal awareness.
- **Jail Legal Aid Clinics:** Legal support to undertrial and convicted prisoners.
- **Special Schemes:** Legal aid for [transgender persons](#), disaster victims, industrial workers, and custodial populations.



Legal Aid Defence Counsel (LADC) Scheme

- **Launched in 2022:** Dedicated legal aid for accused persons, modelled on the public defender system
- **Operational in 610 districts and ₹200 crore fully utilised in 2023–24**
- **Allocation reduced to ₹147.9 crore in 2024–25, raising sustainability concerns**
- **Potential:** Can decongest overburdened court-assigned systems, but still early for measurable outcomes

Challenges Faced by NALSA:

- **Budget Constraints:** Legal aid gets <1% of the total justice budget and NALSA's own funds declined from ₹207 crore (2017–18) to ₹169 crore (2022–23).
- **Underutilisation of Funds:** Utilisation dropped from 75% to 59% due to rigid expenditure restrictions.
- **Shrinking Frontline:** PLV density fell by 38% (2019–2024) and many States pay honorariums below minimum wage.
- **Uneven Access:** Only one legal aid clinic per 163 villages and per capita spending ranges from ₹2 to ₹16.
- **Service Quality & Trust Deficit:** Legal aid recipients often perceive services as inferior to private counsel.
- **Centralised Fund Control:** SLSAs need prior approval for basic expenditures like staff hiring or outreach logistics.

Way Ahead:

- **Enhance Fiscal Allocation:** Mandate minimum 2–3% of the justice budget for legal aid, with flexible spending autonomy.
- **Strengthen PLV System:** Ensure minimum honorarium, performance-based deployment, and regular training.
- **Decentralise Decision-Making:** Delegate operational authority to DLSAs for swift fund usage at the grassroots.
- **Digital Monitoring:** Launch a nationwide portal to track legal aid delivery, pendency, and accountability metrics.
- **Expand LADC & Lok Adalats:** Scale successful models with independent evaluations and focus on underrepresented regions.

Conclusion:

NALSA embodies India's constitutional commitment under [Article 39A](#) to ensure justice for all, irrespective of

socio-economic status. However, persistent budgetary, administrative, and delivery bottlenecks hinder its full potential. Strengthening legal aid must become a governance priority to uphold the rule of law and foster inclusive justice.

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

INDIA'S UNIQUE GENETIC LEGACY

Context:

A recent *Cell* study revealed India's unparalleled genetic diversity—stemming from ancient migrations, interbreeding with archaic humans, and centuries of endogamy—has profound implications for health, [ancestry mapping](#), and personalised medicine.

About India's Unique Genetic Legacy:

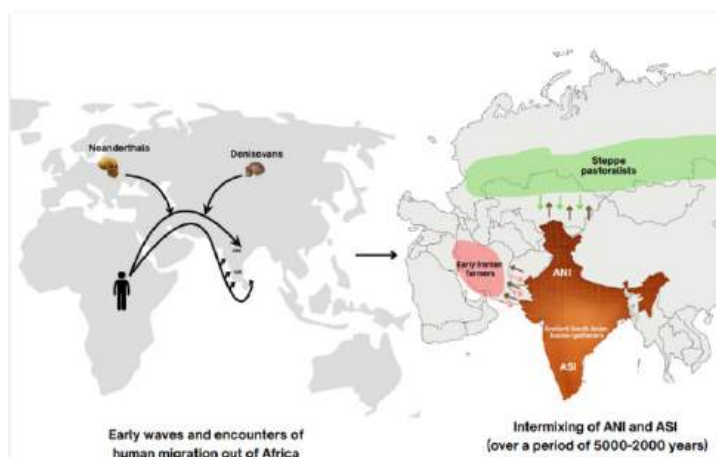
Definition – India's genetic wealth arises from ancient migrations, mixing with Neanderthals and Denisovans, and the practice of marrying within defined social groups (endogamy). This heritage makes it a living archive of evolutionary history.

Key Features:

- **Over 5,000 ethnic groups** each have distinct [DNA](#) signatures, reflecting millennia of isolation and adaptation.
- **Founder mutations**—rare genetic changes preserved within communities—are highly prevalent due to limited gene flow.
- Holds **millions of rare variants** that influence disease resistance, metabolism, and environmental adaptation.
- Positions India to lead in [personalised medicine](#) and global genomics research.

Charting India's Genetic Landscape:

- The **first settlers from Africa (~50,000 years ago)** formed the core population, later enriched by diverse ancient gene flows.
- Genetic blending between **Ancestral North Indians (ANI)** and **Ancestral South Indians (ASI)** created a distinct Indian genome.
- Inputs from **hunter-gatherers, Iranian farmers, and [Steppe herders](#)** added complexity to the genetic fabric.
- Despite this richness, **India is poorly represented in global genome projects**, limiting medical and historical insights.



Endogamy and Genetic Diseases:

- **Preservation & Similarity** – Endogamy maintained ancient genetic traits but also increased relatedness within groups, concentrating certain genetic patterns.
- **Founder Effects** – This led to stronger founder events and higher [identical gene copies](#) compared to most global populations.
- **Rare Disorders** – Community-specific rare diseases, like butyrylcholinesterase deficiency in the Vysya community, are far more prevalent.
- **Unique Variants** – Large-scale [genome mapping](#) identified over 1.6 lakh unique variants linked to congenital, metabolic, and neurological conditions.

India's Genetic Mosaic:

- **Natural Genetic Labs** – Each community functions as an isolated genetic repository, preserving rare variants for centuries.
- **Research Opportunity** – Enables direct study of natural gene functions without lab-induced mutations.
- **Medical Innovation** – Opens pathways for novel drugs, targeted disease prevention, and personalised treatment protocols.
- **Economic Impact** – Strengthens public health systems while boosting India's biotech and pharmaceutical competitiveness.

Future Perspectives:

- **Scaling Genome Sequencing** – Extend genome mapping to millions, capturing diversity across geography and disease categories.
- **National Biobank** – Build a comprehensive, long-term health data repository, modeled on the UK Biobank, for research and healthcare planning.
- **Genomics in Healthcare** – Integrate genetic screening into public health policy for early detection and customised treatment.
- **Global Leadership** – Position India as a key hub for genome-driven innovation, attracting biotech and [pharmaceutical investment](#).

Conclusion:

India's genetic diversity is both a scientific treasure and a public health imperative. Harnessing it requires large-scale sequencing, ethical frameworks, and inclusive healthcare strategies. With the right investments, India can become a **global epicentre for genomics-led innovation**.

HIGHER EDUCATION COMMISSION OF INDIA (HECI)

Context:

The government has announced the formation of the Higher Education Commission of India (HECI) to replace UGC, [AICTE](#), and NCTE with a unified, tech-driven regulator.

About Higher Education Commission of India (HECI):

- **Vision:** To create a globally competitive, innovation-driven higher education ecosystem that ensures equitable access, high-quality learning, and strong industry-academia integration.
- **Core Objectives:**
 - Unify fragmented regulation into a single, transparent, and accountable authority.
 - Shift from **input-based** to **outcome-based** governance.
 - Foster institutional autonomy with rigorous accountability.
 - Integrate technology—AI, [blockchain](#), predictive analytics—into quality assurance.
 - Position India as a **global education hub** by 2030.

Structural Framework: The Four Pillars of HECI

HECI will operate through **four specialised verticals**, each addressing a critical systemic need:

1. **National Higher Education Regulatory Council (NHERC)**
 - Unified approval and oversight body.
 - Real-time, AI-powered monitoring to replace periodic paper submissions.
2. **National Accreditation Council (NAC)**
 - Outcome-focused quality assurance.
 - Metrics: graduate employability, research impact, industry collaboration.
3. **Higher Education Grants Council (HEGC)**
 - Performance-linked funding, akin to the UK's Research Excellence Framework.
 - Incentives for innovation, research excellence, and societal impact.
4. **General Education Council (GEC)**
 - Curriculum modernisation via the [National Higher Education Qualification Framework](#).
 - Ensures global compatibility while retaining Indian relevance.

Key Tools and Technologies:

- **National Education Intelligence Platform (NEIP)**
 - AI-powered nerve centre processing 500+ data points/institution/month.
 - Predictive analytics for early detection of quality decline (up to 18 months in advance).
 - Dashboards at national, regional, and institutional levels.
- **Blockchain-secured Credential System**
 - [Cryptographic verification](#) of degrees and transcripts.
 - Instant employer access to credential authenticity.
- **Regional Education Excellence Centres (REECs)**
 - Six semi-autonomous hubs covering India's regions.
 - Tailored oversight accounting for linguistic, cultural, and economic diversity.
- **AI-enhanced Quality Assurance**
 - NLP for multi-language student feedback analysis.
 - Computer vision for infrastructure assessment via images/satellite data.

Global Inspirations and Best Practices

	US	Institutional autonomy with strong accountability
	UK	Single regulatory authority (Office for Students model)
	GERM	Industry-academia integration for employability
	CHINA	Large-scale quality upgrade through targeted funding
	NORDIC NATIONS	Equity with excellence via public investment

Implementation Roadmap:

- **Phase 1 (2026–27): Foundation**
 - Constitutional amendment & legal establishment of HECI.
 - [National Education Intelligence Platform \(NEIP\)](#) development and pilot testing in 100 institutions.
 - Regional Education Excellence Centre infrastructure set-up.
- **Phase 2 (2027–28): Regional Rollout**
 - Full NEIP deployment with real-time monitoring.
 - Blockchain credential system launch.
 - 25% migration from legacy systems.
- **Phase 3 (2028–29): Scale and Integration**
 - Full transfer of [UGC](#), AICTE, NCTE functions.
 - Performance-based funding operational.
 - Expanded global partnerships.
- **Phase 4 (2030 onwards): Global Positioning**
 - Target: 20 Indian universities in top-500 global rankings.
 - Aim to host 500,000 international students.

Challenges and Risks:

- **Digital Divide:** Many institutions, especially in rural areas, lack the digital infrastructure and [high-speed connectivity](#) needed for real-time monitoring and data integration.
- **Change Management:** Shifting from a rule-compliance mindset to performance-based governance requires a deep cultural shift at all institutional levels.
- **Resistance from Vested Interests:** Existing regulatory bodies and stakeholders may resist reforms due to loss of control, entrenched systems, or fear of accountability.
- **Capacity Building:** Regulators, faculty, and administrators need extensive training to adapt to [AI-driven systems](#) and new evaluation methods.
- **Ensuring Equity:** Policies must prevent widening gaps between elite institutions with abundant resources and rural colleges with limited means.

Constitutional and Financial Safeguards:

- **Constitutional Autonomy:** HECI will have a protected legal status like the Election Commission, with staggered terms to ensure independence from political cycles.
- **Financial Independence:** It will receive guaranteed funding equal to 1.5% of GDP, adjusted for inflation, to prevent budget cuts from affecting operations.
- **Transparency:** All decisions will be [blockchain](#)-recorded and institutional data made public via dashboards to ensure accountability and trust.

Expected Outcomes:

- **Academic Excellence:** Improved teaching quality, research impact, and employability will push Indian universities up in global rankings.
- **Governance Efficiency:** A single, tech-driven regulator will streamline approvals, reduce duplication, and increase transparency.
- **Innovation Ecosystem:** Closer industry-academia ties will lead to more patents, startups, and applied research projects.
- **Global Competitiveness:** Indian degrees will gain greater international recognition, attracting more global students and collaborations.

Conclusion

The **Higher Education Commission of India** is not merely an administrative merger—it is a structural and cultural transformation of India's higher education. If implemented effectively, HECI can bridge the quality gap, strengthen global recognition of Indian education, and drive [India's knowledge economy](#) in the 21st century.

AI IN EDUCATION: FROM ANSWER ENGINES TO THINKING PARTNERS

Context:

AI in education is witnessing a paradigm shift globally—from being used as a shortcut for quick answers to being redesigned as a Socratic partner that promotes critical thinking, inquiry, and deeper learning.



About AI in Education: From Answer Engines to Thinking Partners

- Artificial Intelligence (AI) is transforming education worldwide. Initially seen as a tool for efficiency, it led to concerns of academic dishonesty and intellectual complacency. A new paradigm—Socratic AI—is now emerging, which promotes critical thinking, inquiry, and deeper learning rather than rote outputs.

Problems with Traditional AI:

- **Promotes academic shortcuts** – Students copy-paste AI responses instead of engaging with concepts, leading to superficial learning.
- **Weakens critical thinking** – Instant solutions prevent students from analyzing, reflecting, and constructing their own reasoning.
- **Encourages plagiarism** – Over-dependence on machine-generated answers erodes originality and academic honesty.
- **One-size-fits-all learning** – AI outputs are generic and fail to address diverse learner contexts, backgrounds, or abilities.
- **Misalignment with pedagogy** – Education values inquiry and effort, whereas traditional AI emphasizes quick answers.

What is Socratic AI & Its Features?

- **Definition:** A pedagogy-oriented AI that encourages inquiry by asking questions, prompting students to think deeper rather than providing readymade solutions.
- **Features:**
 - **Inquiry-driven dialogue** – Uses probing questions to stimulate reasoning and curiosity.
 - **Adaptive questioning** – Modifies its approach based on student's prior

knowledge and answers.

- **Multi-disciplinary applicability** – Can guide thinking in subjects like economics, medicine, law, and sciences.
- **Ethical design** – Refuses to provide answers that undermine [integrity](#), ensuring responsible learning.
- **Teacher support** – Acts as a supplement to classroom teaching, not a replacement for educators.

Advantages of Socratic AI:

- **Strengthens reasoning** – Builds analytical and [problem-solving skills](#) through guided inquiry.
- **Improves argumentation** – Helps students construct logical, evidence-based arguments.
- **Fosters humility** – Encourages learners to question assumptions and revise views when challenged.
- **Enables applied learning** – Promotes interdisciplinary thinking and real-world application of knowledge.
- **Prepares for life skills** – Equips students to solve complex problems faced in professional and civic life.

Challenges of Socratic AI:

- **Digital divide** – Many students lack access to stable internet or devices, widening inequality.
- **Faculty resistance** – Teachers may fear AI replacing their role instead of aiding their teaching.
- **Student reluctance** – Learners accustomed to quick answers may resist effort-based inquiry.
- **Technical limits** – AI still struggles with nuanced, context-rich questioning like a human mentor.
- **Ethical risks** – [Issues of privacy](#), bias, and accountability remain unresolved in AI deployment.

Way Ahead:

- **Bridge infrastructure gaps** – Invest in digital access to ensure [equitable AI](#) use across regions.
- **Teacher training** – Equip educators to integrate Socratic AI as a supportive pedagogical tool.
- **Context-specific tools** – Develop regional-language and culturally relevant AI systems.
- **Stronger ethics** – Build [transparent guidelines](#) on privacy, accountability, and safe use.
- **Reform assessments** – Shift focus from rote memorization to evaluating reasoning and inquiry.

Conclusion:

Socratic AI represents a shift from **answer-driven learning** to [inquiry-driven education](#). It can nurture independent, critical thinkers if guided by ethics and inclusivity. The future of education lies in **AI that makes students think harder, not less**.

DIGITAL PUSH IN EDUCATION: ACCESS, EQUITY, AND EMPATHY AT THE CROSSROADS

Context:

Recent reports have highlighted the increased integration of AI and digital devices in classrooms — including rural [anganwadis](#) — and the digitisation of administrative processes such as pension disbursement for army veterans.



About Digital Push in Education: Access, Equity, and Empathy at the Crossroads:

Background:

- **Digital Transformation in Education:** NEP 2020 envisions technology-enabled learning through platforms like [DIKSHA](#), SWAYAM, and AI-based tools.
- **AI in Early Learning:** Experiments in rural preschools introduce interactive boards and VR devices to children under three years.
- **Digitisation in Administration:** Initiatives like SPARSH for defence pensions and centralised admission portals for higher education aim for streamlined processes.
- While these are steps towards a “[Digital India](#)”, they raise concerns over equity, pedagogical soundness, and empathy in service delivery.

Opportunities of Digital Integration:

- **Bridging Geographic Barriers:** Students in remote areas can access quality lectures, resources, and interactive content without relocation.
- **Transparency in Processes:** Centralised portals for admissions and pensions reduce discretion, enhancing accountability.
- **Alignment with Future Skills:** Digital exposure prepares students for a technology-driven job market and higher education requirements.
- **Faster Administrative Services:** Automation reduces delays in pension disbursement, admissions, and certification processes.
- **Scalable Solutions:** Once developed, digital platforms can serve millions without proportionate increases in cost.

Challenges and Cracks Emerging:

- **Digital Divide:** Unequal access to devices and internet services excludes rural and [economically weaker students](#).
- **Pedagogical Disconnect:** AI and [VR](#) may replace hands-on, sensory learning in early education, affecting cognitive development.
- **Loss of Teacher–Student Bond:** Over-reliance on screens can erode the relational trust and empathy crucial for early learning.
- **Administrative Complexity:** Veterans and first-generation learners often struggle to navigate complex portals and data entry requirements.
- **Psychological Fatigue:** Prolonged [digital exposure](#) may cause stress, reduced attention span, and disengagement in learners.

Ethical and Governance Dimensions:

- **Equity in Education:** Policies must ensure that tech adoption does not deepen socio-economic disparities.
- **Teacher Autonomy:** Excessive standardisation can undermine educators' freedom to adapt teaching methods to student needs.
- **Right to Holistic Learning:** [Article 21A](#) implies access to not just digital content but also emotional and social learning experiences.
- **Empathy in Governance:** Digital governance must consider human support mechanisms for those struggling with technology.
- **Informed Consent and Data Privacy:** Collecting student data through ed-tech tools must respect privacy norms and informed consent.

Way Forward:

- **Hybrid Model of Learning:** Blend digital tools with traditional teaching to retain relational learning while enhancing access.
- **Strengthen Digital Infrastructure:** Expand broadband connectivity and device access in rural and underserved areas.
- **Teacher Training:** Provide structured training for educators to integrate technology without losing pedagogical depth.
- **Simplified Digital Interfaces:** Design user-friendly portals with multilingual support and offline help desks.
- **Regular Impact Audits:** Monitor and evaluate the effects of digital adoption on learning outcomes and inclusivity.

Conclusion:

A balanced digital transformation must preserve the human touch in education while enhancing reach and efficiency. In India's diverse [socio-economic](#) context, inclusion and empathy must be the guiding principles of all tech-driven reforms.

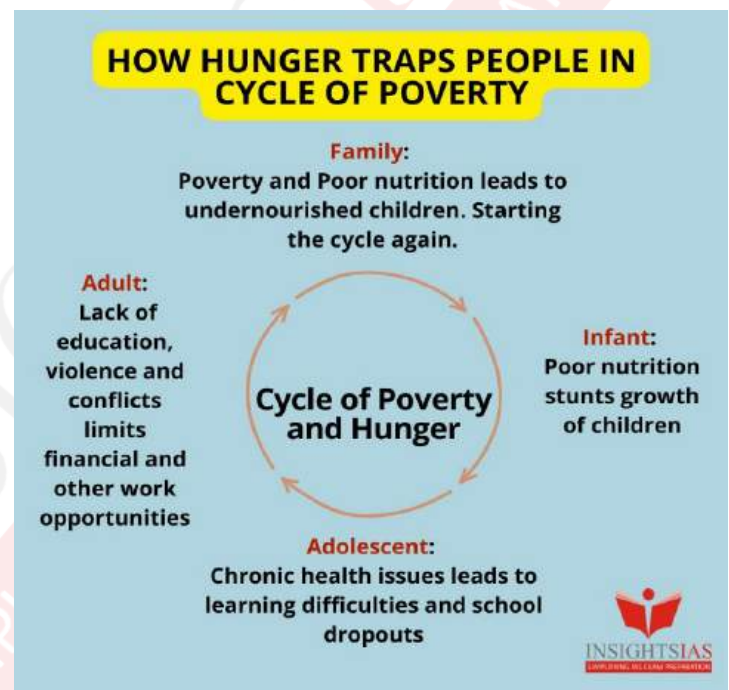
Topics: Issues relating to poverty and hunger.

THE PATH TO ENDING GLOBAL HUNGER RUNS THROUGH INDIA

Context:

The [UN FAO's State of Food Security and Nutrition in the World 2025](#) report highlights a decline in global undernourishment to 8.2% (673 million people), with India playing a decisive role.

- India reduced its prevalence of undernourishment from **14.3% (2020–22) to 12% (2022–24)**, meaning 30 million fewer hungry people.



About Hunger

What is Hunger?

- **Definition:** [Hunger](#) refers to the condition of chronic undernourishment where individuals fail to obtain sufficient calories or nutrients to maintain health and productivity.
- It manifests in three forms:
 1. **Undernourishment:** Calorie deficiency (not enough energy intake).
 2. **Malnutrition:** Poor quality diet lacking protein and micronutrients.
 3. **Hidden Hunger:** Micronutrient deficiency (iron, iodine, vitamin A, zinc).

Causes Behind Hunger

1. Poverty and Inequality

- Poverty remains the **biggest driver** of hunger. Low incomes restrict household food access even when supply is available.
- Example: As per NITI Aayog's Multidimensional Poverty Index 2023, about **11.28% of India's population remains multidimensionally poor**.

2. Agricultural Challenges

- Low productivity due to fragmented landholdings, erratic monsoons, and poor irrigation coverage.
- **Post-harvest losses (13% of food output)**, as per FAO estimates, reduce food availability.

3. High Food Prices

- FAO notes the **cost of a healthy diet in India remains unaffordable for 60% of the population**.
- Inflation in pulses, fruits, vegetables, and protein-rich foods keeps nutrition out of reach for the poor.

4. Weak Infrastructure & Supply Chains

- Inadequate cold storage and poor logistics increase food wastage.
- India loses **₹92,000 crore annually in post-harvest losses** (ICAR 2022 report).

5. Governance, Conflict & Climate Change

- Global hunger is worsened by conflicts (Ukraine war), pandemics (COVID-19), and climate shocks (floods, droughts).
- India too faces **frequent climate-induced crop losses**, affecting farmer income and food availability.

6. Health & Sanitation Issues

- Poor maternal health, open defecation, and lack of clean drinking water aggravate child malnutrition.
- **NFHS-5 (2019–21)**: 35.5% of children under 5 are stunted, 19.3% are wasted.

Consequences of Hunger

1. Human Capital Loss

- Children with stunting and wasting suffer poor learning outcomes and reduced adult productivity.
- Hunger perpetuates **intergenerational poverty cycles**.

2. Economic Burden

- Hunger costs nations billions in lost productivity and increased healthcare expenses.
- The **Global Nutrition Report (2021)** estimates malnutrition costs India **2–3% of GDP annually**.

3. Health Risks

- Increases susceptibility to infections (TB, diarrhoea, anaemia).
- Micronutrient deficiencies lead to blindness (Vitamin A), poor immunity (zinc), and cognitive impairment (iodine deficiency).

4. Social Instability

- Food insecurity can trigger unrest, migration, and social tensions, as seen in multiple food riots globally.

5. Failure of SDGs

- Hunger directly blocks achievement of **SDG**

2 (Zero Hunger) and undermines progress on SDG 3 (Health), SDG 4 (Education), and SDG 8 (Decent Work).

India's Role in Combating Hunger

1. Revamped Public Distribution System (PDS)

- **Digitisation, Aadhaar authentication, and ONORC (One Nation One Ration Card)** improved targeting.
- Provides subsidised grains to **800 million beneficiaries under NFSA & PMGKAY**.

2. Nutrition-Specific Programmes

- **PM POSHAN (2021)**: Expanded school meals into nutrition-sensitive interventions.
- **ICDS & POSHAN Abhiyaan**: Focus on dietary diversity, maternal and child health.
- **Anaemia Mukht Bharat**: Aims to reduce anaemia prevalence among women and children.

3. Digital and Technological Advantage

- **e-NAM, AgriStack, Geospatial tools**: Enhance farmer-market linkages and reduce food losses.
- **Bhavishya & CPENGRAMS portals**: Improve pensioners' food security and grievance redressal indirectly.

4. Agri-food System Transformation

- Promoting **climate-resilient crops, Farmer Producer Organisations (FPOs), and women-led food enterprises**.
- Expanding cold chains and logistics to reduce wastage.

5. Global Leadership

- India's scale of poverty reduction and hunger control contributes significantly to global **SDG 2 progress**.
- As FAO notes, India is a **model for Global South countries**, showcasing digital governance and mass food security interventions.

Way Forward

1. Shift from Calories to Nutrition

- Fortify staple foods (rice, wheat, salt, edible oils).
- Subsidise protein-rich foods like pulses, milk, and eggs.

2. Strengthen Infrastructure

- Expand cold chains, warehouses, and farmer cooperatives to reduce **₹92,000 crore post-harvest losses**.

3. Affordable Diets

- Ensure access to fruits, vegetables, and animal-source foods for low-income families.
- Use **DBT subsidies** for nutrient-rich foods.

4. **Empower Small Farmers & Women Enterprises**

- Scale up FPOs, SHGs, and women-led agribusinesses.
- Promote cultivation of climate-smart, biofortified crops.

5. **Tackle Malnutrition & Obesity Together**

- Double-duty policies: Address both undernutrition and rising obesity in urban poor.
- Expand nutrition literacy campaigns at schools and workplaces.

6. **Global Knowledge Sharing**

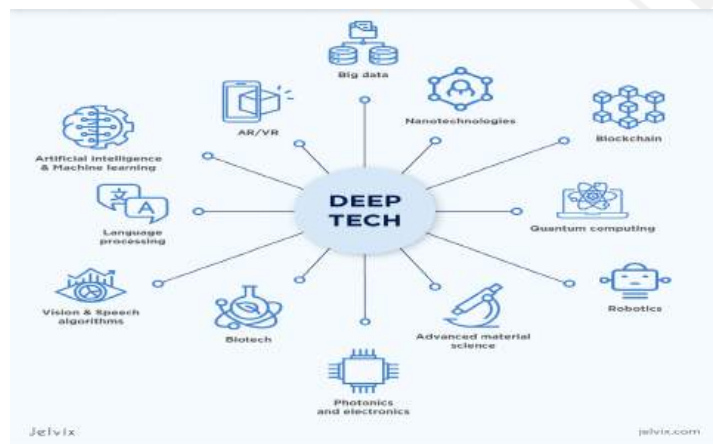
- Share India's models like ONORC, PDS digitalisation, and nutrition schemes with other developing nations.

Conclusion

India has emerged as a **symbol of hope in global hunger reduction**. The shift from mere calorie security to nutrition, resilience, and agrifood system transformation is crucial. With only five years left for the **2030 SDGs**, India's leadership will determine whether the world can realistically achieve **Zero Hunger**.

Topics: Role of civil services in a democracy.

BREAKING THE COLONIAL STEEL FRAME FOR A DEEP-TECH FUTURE



Context:

India has achieved global leadership in [fintech and digital penetration](#), yet it remains import-dependent in semiconductors, aerospace, and advanced technologies. Realising the Viksit Bharat 2047 deep-tech vision requires dismantling colonial-era bureaucratic, regulatory, and judicial legacies that constrain innovation.

India's Deep-Tech Ambition

1. In his **Independence Day 2025 address**, the Prime Minister highlighted self-reliance in **semiconductors, clean energy, nuclear technology, jet engines, artificial intelligence,**

quantum computing, biotechnology, and space exploration.

2. **Key Achievements:**

- [UPI transactions](#) have crossed **14 billion per month (NPCI, 2025)**; IndiaStack is being adopted in **Singapore, UAE, and France**.
- Over **800 million smartphone users**, with the lowest mobile data costs globally (~₹10/GB).
- Global deep-tech companies such as **Nvidia, IBM, and Microsoft** maintain R&D centres in Bengaluru, Hyderabad, and Pune.

3. **Persistent Gaps:**

- [Semiconductor imports amounted](#) to **₹1.2 lakh crore in 2023–24 (Commerce Ministry)**.
- India contributes **less than 5% to global AI patents (WIPO, 2024)**.
- Critical defence technologies still rely on foreign collaborations, e.g., **GE–HAL partnership for Tejas jet engines (2023)**.

Colonial Roots of Governance Constraints

1. **Bureaucracy** – The Westminster-style “steel frame,” designed for colonial rule, remains largely unchanged. Recruitment through UPSC continues to emphasise generalist skills.
 - The [Second Administrative Reforms Commission](#) recommended lateral entry and enforceable ethics codes, but implementation has been partial.
2. **Regulatory Structures** – India's system is compliance-heavy, with **over 39,000 compliances across sectors (DPIIT)**.
 - The **Deregulation Commission** was tasked with pruning these, but progress has been limited.
3. **Judiciary** – [Over 5 crore cases are pending \(SC E-Committee, 2025\)](#), and contract enforcement averages **1,445 days (World Bank, 2020)**. Weak intellectual property enforcement further discourages deep-tech innovation.

Challenges

1. **Political–Administrative Balance** – Bureaucratic insulation slows policy execution, unlike the **US DARPA** model where political leadership ensures direction with minimal red tape.
2. **Federal Deficit** – Deep-tech clusters rely on State policies such as the **UP-Semiconductor Policy** and the **Bengaluru–Chennai Corridor**,

but centralisation restricts their autonomy.

3. **Private Sector and Start-ups** – Although India has the **third-largest start-up ecosystem (100+ unicorns)**, fewer than 10% are deep-tech due to uncertain regulations and slow approvals. The **Drone Rules, 2021** liberalised licensing, but bottlenecks remain.
4. **Human Capital Management** – Over **two lakh STEM students migrate abroad annually (MEA)**, reflecting weak domestic retention. Public labs face rigid hierarchies and limited incentives.
5. **Global Standards Gap** – India risks being a rule-taker. Frameworks like the **EU AI Act (2024)** and the **US CHIPS and Science Act** already shape global norms, while India lacks comparable regimes.
6. **Cultural Ethos** – Colonial proceduralism prioritises control and hierarchy over outcomes, discouraging risk-taking and innovation.

Implications

1. **Economic** – Semiconductor and aerospace import dependence raises the **current account deficit** and constrains export competitiveness.
2. **Strategic** – Foreign reliance heightens vulnerability. The **US ban on advanced chip exports to China** highlighted risks of dependence.
3. **Social** – Limited deep-tech jobs risk excluding India's youth from Industry 4.0 opportunities.
4. **Governance** – Delayed reforms weaken state capacity, reducing efficiency in digital service delivery and eroding institutional trust.
5. **Innovation Ecosystem** – Weak regulatory and judicial support deters venture capital inflows and IP creation, leading to continued dominance of multinational corporations in India's deep-tech sector.

Way Forward

1. **Civil Service Reform** – Redesign UPSC to emphasise domain expertise; institutionalise lateral entry; enforce a **Public Service Code of Ethics**.
2. **Regulatory Modernisation** – Adopt **risk-based regulation**; expand **regulatory sandboxes** (as RBI piloted in 2019 for fintech) to AI and biotech; establish single-window approvals for deep-tech.
3. **Judicial Transformation** – Strengthen commercial courts under the **Commercial Courts Act, 2015**; deploy AI-enabled case management; bolster IP tribunals.

4. **Federal Empowerment** – Provide States fiscal incentives for semiconductor fabs, e.g., **Gujarat's Micron facility (2023)**; expand localised skilling through **Skill India 2.0**.
5. **Global Leadership** – Shape norms on AI, digital trade, and data governance at **G20, BRICS, and UN platforms**; champion open-source deep-tech for the Global South.
6. **Cultural Reset** – Replace colonial "file-pushing" with innovation-first, outcome-oriented governance, echoing the Prime Minister's 2022 call to shed the "colonial mindset."

Conclusion

India's digital achievements highlight its transformative capacity, but deep-tech leadership requires dismantling colonial-era governance legacies. Comprehensive reforms in bureaucracy, regulation, and judiciary are indispensable for realising Viksit Bharat 2047.

Topics: India and its neighbourhood- relations.

INDIA-CHINA REFORM DEFICIT

Context:

Both India and China are facing structural economic challenges often described as a "reform deficit." India is struggling with low private investment and stagnant manufacturing, while China is dealing with over-investment, weak household consumption, and rising debt concerns.



About India-China Reform Deficit:

- **Historical Context**
 - Ancient trade and cultural links via the **Silk Route** and spread of **Buddhism**.
 - Panchsheel Agreement (1954) and the short-lived "Hindi-Chini Bhai Bhai" phase.
 - Relations soured after the **1962 border war**.
- **Political & Security Dimension**
 - Unresolved **boundary disputes** in Aksai Chin and Arunachal Pradesh.

- Recent tensions: Doklam (2017), Galwan clash (2020).
- Border agreements exist (e.g., 1993, 1996 CBMs) but remain fragile.
- **Economic & Trade Relations**
 - China is one of India's largest trading partners (trade > USD 135 bn in 2023).
 - [Trade deficit in China's](#) favour (electronics, machinery, chemicals).
 - India restricts Chinese apps and FDI in sensitive sectors post-2020.
- **Multilateral Engagements**
 - Common members in BRICS, SCO, G20.
 - Divergences on **UNSC reforms**, climate negotiations, and global governance.
- **Strategic Concerns**
 - China's [Belt and Road Initiative \(BRI\)](#) vs India's opposition (esp. CPEC through PoK).
 - India's engagement in **Quad and Indo-Pacific strategy** seen as counterbalance.
 - Competition for influence in South Asia, Indian Ocean, and Africa.
- **People-to-People Ties**
 - Shared cultural exchanges in yoga, Buddhism, education.
 - Tourism, student mobility, and exchanges affected by pandemic and tensions.

India's Reform Deficit:

1. **Investment Stagnation**
 - Despite [PLI](#) schemes, **lower corporate tax rates, and public capital expenditure**, private investment has not picked up.
 - Manufacturing remains geographically concentrated in Gujarat, Maharashtra, Tamil Nadu, and Karnataka.
2. **Manufacturing Plateau**
 - [Share of manufacturing in GDP](#) has remained around 15–17% for decades despite ambitious targets of 25%.
 - Informality, low productivity, and limited job creation continue.
3. **Policy Shift towards Consumption**
 - Tax cuts, [GST](#) reductions, and rising cash transfers (close to 1% of GDP) are fueling consumption.
 - However, this reduces fiscal space for **public goods** like education, health, and infrastructure.

China's Reform Deficit:

1. **Over-investment & Excess Capacity**
 - Investment-to-GDP ratio remains ~40%.
 - Traditional industries like steel and cement are plagued by overcapacity.
2. **Weak Household Consumption**
 - Household spending forms a smaller share of GDP compared to peers.
 - Consumer confidence is near historic lows,

worsened by ageing demographics and high household savings.

3. Debt-Led Growth

- Heavy reliance on corporate and local government debt fuels unsustainable investments.
- Exports (\$3.58 trillion in 2024) and a trade surplus nearing \$1 trillion hide underlying vulnerabilities.

Comparative Analysis:

Factor	India	China
Growth Driver	Consumption & services	Investment & exports
Structural Issue	Low investment, weak manufacturing	Low consumption, excess investment
Political Economy	Populism shaped by elections	Centralised leadership, avoids welfarism
Currency Strategy	Stabilised rupee (import-friendly)	Undervalued yuan (export-friendly)

Broader Implications:

- **India:** Reliance on consumption without parallel investment risks jobless growth and fiscal fragility.
- **China:** Persisting with debt-fuelled, export-heavy growth risks a **middle-income trap**, overcapacity, and external backlash.

Way Forward:

- **For India**
 - Reform [factor markets](#) (land, labour, capital).
 - Expand manufacturing beyond four states.
 - Strengthen household savings and deepen financial markets.
 - Redirect fiscal space from populism to public infrastructure and human capital.
- **For China**
 - Shift decisively towards **domestic consumption** via social security and income redistribution.
 - Control debt accumulation and rationalise overcapacity.
 - Support household purchasing power instead of suppressing it through undervalued currency.

Conclusion:

[India and China](#) stand at distinct junctures but face the same fundamental truth: **without structural reforms, growth momentum is unsustainable**. India's consumption-driven populism and China's debt-led investment are both temporary fixes. Durable prosperity requires bold reforms — even if politically costly — because the longer reform deficit persists, the heavier the eventual adjustment costs will be.

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

INDIA–MIDDLE EAST–EUROPE ECONOMIC CORRIDOR & GAZA WAR

Context:

India hosted envoys from partner nations to discuss progress on the India-Middle East-Europe Economic Corridor (IMEC). Talks focused on trade, energy, and digital connectivity despite delays caused by the [Gaza conflict](#).



About [India–Middle East–Europe Economic Corridor & Gaza War](#):

Genesis and Objectives of IMEC

- **Launched:** [G20](#) Summit, New Delhi (Sept 2023).
- **Partners:** India, Saudi Arabia, UAE, EU, France, Italy, Germany, US, Israel, Jordan.
- **Structure:**
 - **Eastern Leg** – India's western ports → UAE (sea) → Saudi Arabia, Jordan (rail) → Haifa, Israel (port).
 - **Western Leg** – Haifa → Greece/Italy (sea) → onward into Europe via existing rail network.
- **Key Components:**
 - High-speed freight rail across the Arabian Peninsula.
 - **Energy pipelines** for clean hydrogen.
 - **Digital infrastructure** (subsea cables, e.g., Blue Raman project: Mumbai–Genoa).
 - Trade facilitation measures to boost efficiency and lower costs.

Strategic Significance for India:

- **Trade and Economic Integration:**
 - EU is India's largest trading partner (\$137.41 bn in FY 2023-24).
 - Enhanced connectivity can **diversify trade routes** away from chokepoints like the [Suez Canal](#) and Red Sea.
- **Energy Security:**

- Opportunity to participate in **green hydrogen** supply chains.
- Integration with Gulf energy infrastructure supports India's **clean energy transition**.

- **Digital & Data Connectivity:**

- India's role as a **technology hub** strengthens via subsea cable projects.
- Digital corridors can complement **AI and fintech growth**.

- **Strategic Leverage:**

- Positions India as a **central actor** linking three geostrategic theatres — Asia, Middle East, and Europe.
- Counters [China's BRI](#) by offering an **alternative connectivity architecture**.

Opportunities for India:

- **Expanded Market Access** – IMEC enables faster, cheaper access to the EU, reducing reliance on the Suez Canal and boosting export competitiveness.
- **Energy Transition Leadership** – Green hydrogen pipelines allow India to become a clean energy supplier to Europe and Gulf partners.
- **Digital Infrastructure Hub** – The Blue Raman subsea cable positions India as the central node for Asia-Europe data connectivity.
- **Supply Chain Diversification** – Alternate routes reduce risks from Red Sea or Hormuz disruptions, attracting global manufacturing investments.
- **Strategic Geopolitical Leverage** – As IMEC's eastern anchor, India gains influence in setting trade norms and countering China's BRI.

Challenges:

- **Geopolitical Instability:**
 - Israel's war in Gaza has derailed regional normalisation efforts (e.g., Saudi-Israeli rapprochement).
 - [Jordan-Israel relations](#) at a **significant low** and Gulf states cautious on integration with Israel.
- **Economic Rivalries in the Gulf:**
 - **Saudi-UAE competition** for logistics hub dominance can delay alignment on IMEC's operational design.
- **Infrastructure Gaps:**
 - Cross-Saudi/UAE high-speed freight railway remains underdeveloped.
 - Lack of corridor-wide **tariff harmonisation, insurance mechanisms, and port capacity parity**.
- **Security Risks:**
 - Expansion of regional conflicts (Yemen, Lebanon, Syria) could increase **insurance premiums** and discourage private investment.

Current Status:

- **Eastern Leg:** Strong potential due to India-Gulf

partnerships; UPI adoption in UAE and Saudi enhances digital trade readiness.

- **Western Leg:** Uncertain until Middle East conflict de-escalates; implementation contingent on [Palestinian issue resolution](#).
- August 2025 Delhi meeting of partner envoys focused on **modalities and trade facilitation**, not full-scale implementation.

Way Forward for India:

- **Prioritise Eastern Leg Development:** Strengthen maritime and rail linkages with Gulf partners independent of Israel leg.
- **Enhance Energy Diplomacy:** Fast-track **green hydrogen cooperation** with Gulf for exports to Europe.
- **Invest in Digital Infrastructure:** Lead in subsea cable networks and digital corridor architecture.
- **Diversify Port Linkages:** Explore multiple Indian and European terminal points to avoid bottlenecks.
- **Diplomatic Balancing:** Engage all stakeholders while maintaining neutrality on regional conflicts to safeguard corridor viability.

Conclusion:

The IMEC holds immense potential to transform trade, energy, and digital connectivity between Asia, the Middle East, and Europe. However, its success hinges on regional stability and diplomatic consensus among all stakeholders. For India, strategic patience and focused development of the eastern leg could secure long-term gains despite current challenges.

INDIA-U.S. TARIFFS 2025

Context:

U.S. President Donald Trump imposed a 25% tariff and penalty on Indian imports, citing India's defence and energy ties with Russia, prompting India's MEA to reaffirm the resilience of [India-U.S. strategic partnership](#).

About India-U.S. tariffs 2025:

Current Nature of India-U.S. Ties

- Described as a **comprehensive global strategic partnership**, built on **shared democratic values**, trade, defence, and people-to-people ties.
- Yet, rising **strategic divergences**—on Russia, [BRICS](#), market access, and regional alliances—are resurfacing.

TRADE TIFF

Trump's statement signals a hardening of US stance, linking trade directly with foreign policy positions, particularly India's continued engagement with Russia.

India's top export categories to the US

Goods	Exports by India to US (in \$ billion), 2024	US's share in total exports (in %)	Weighted-average tariff on India (in %), old
Smartphones, electronic products	14.4	35.8	0.4
Pharmaceuticals	12.7	54.5	0.0
Diamonds, gold and products	11.9	40	2.1
Machinery & mechanical appliances	7.1	21.8	1.3
Organic chemicals	3.6	17.3	4.0
Petroleum products	3.2	4.3	6.9
Textiles	3.1	51.3	9.0
Iron or steel articles	2.8	28.1	1.7
Vehicles and parts	2.8	12.7	1.0
Fish and crustaceans	2.0	32.6	0.0

Source: Global Trade Research Initiative

India-U.S. Trade Snapshot (2024-25)

Total Bilateral Trade: \$186 billion

India's Exports to U.S.: \$86.5 billion

Imports from U.S.: \$45.3 billion

India's Trade Surplus:
\$41 billion (goods)
+\$3.2 billion (services)

Key Structural Faultlines in India-U.S. Relations:

- **Divergence on Russia and Strategic Autonomy:**
 - India continues defence and energy engagement with Russia.
 - U.S. penalised India under new tariffs and indirectly through [CAATSA](#)-style pressure.
 - India's '**strategic autonomy**' clashes with U.S.'s demand for alignment in great power rivalries.
E.g., India continues importing S-400s and Russian crude despite Western sanctions.
- **U.S. Tariffs and Market Access Dispute:**
 - Trump's new **25% import duty** targets sectors like **textiles, telecom, autos, gems**.
 - U.S. argues India's **high average tariff (17%)** and NTBs hinder fair access.
 - However, U.S. imposes **steeper tariffs** on **agriculture, dairy, and metals**.
E.g., Indian garments, leather, gems now face 30–38% import duties in the U.S.

- **BRICS Membership & Global South Alignment:**
 - Trump equated BRICS with “anti-U.S.” sentiment, naming India’s presence problematic.
 - India, however, sees BRICS as **complementary to its Global South leadership** and QUAD ties.
E.g., India participates in BRICS and I2U2, demonstrating multipolar alignment.
- **U.S.–Pakistan Rapprochement vs. Indian Interests:**
 - Renewed U.S. engagement with Pakistan as a **counter-terror partner** contradicts India’s diplomatic efforts to isolate it globally.
E.g., U.S.–Pakistan oil deal announcement triggered strategic unease in Delhi.
- **Competing Nationalisms: ‘America First’ vs. ‘India First’:**
 - India’s assertive diplomacy (‘**Sabka Saath, Sabka Vikas**’ globally) collides with U.S. fears of **nuclear assertiveness** and a **non-aligned India**.
 - There’s a perception shift in Washington — from strategic altruism to **scepticism** of India’s ambitions.
E.g., Think-tanks like Carnegie and Tellis have criticized India’s “great-power delusion.”

Economic Impact of U.S. Tariffs on India:

- **Reduced Export Competitiveness:** Tariff hikes on textiles, telecom, gems, and agri-exports make Indian goods costlier, reducing their edge over Vietnam and Bangladesh.
- **Strain on Labour-Intensive Industries:** MSMEs in garments, footwear, and handicrafts may see falling demand and margins, risking employment and income loss.
- **Disruption in Global Value Chains:** Higher duties hinder India’s role in U.S.-led supply chains, discouraging global firms from sourcing from India.
- **Shrinking Bilateral Trade Surplus:** India’s trade surplus with the U.S. could narrow, weakening forex inflows and bargaining power in future negotiations.
- **Dip in FDI and Investor Confidence:** Uncertain trade outlook could deter investment in export-heavy sectors and undercut “Make in India” goals.

Strategic Implications Beyond Trade:

- **From Strategic Altruism to Transactionalism:** Tariffs reflect a shift in U.S. policy—prioritising interests over values—weakening the strategic depth of ties.
- **Pressure on India’s Multipolar Strategy:** India’s ties with BRICS, Russia, and Iran face growing U.S. scrutiny, complicating its balancing diplomacy.
- **Revival of Trust Deficit:** Trump’s criticism of India’s alliances may revive old Cold War divisions, challenging India’s autonomous posture.
- **Strains on People-to-People and Tech Links:** Mistrust could spill into education, visas, and technology—undermining long-term convergence.
- **Energy Sovereignty under Pressure:** Linking tariffs

to defence and oil imports from Russia signals U.S. attempts to influence India’s strategic autonomy.

Conclusion:

India–U.S. relations, though resilient, are now being tested by deep-seated structural mismatches—on global alliances, economic expectations, and nationalist assertions. Balancing [India’s multipolar vision](#) with a pragmatic bilateral approach remains the key to salvaging this defining partnership of the 21st century.

INDIA–PHILIPPINES STRATEGIC PARTNERSHIP

Context:

During the state visit of President Ferdinand Marcos Jr. to India in August 2025, both nations signed a Joint Declaration on Strategic Partnership, expanding cooperation in defence, maritime security, and [space technology](#).



About India–Philippines Strategic Partnership:

1. Strategic Partnership Upgrade:

- India and the Philippines officially upgraded their bilateral ties to the level of a **Strategic Partnership**.

2. Defence and Maritime Cooperation:

- **Finalisation of Terms of Reference (ToR)** between the two countries’ **Armies, Navies, and Air Forces** for structured defence engagement.
- ToR also signed for [India–Philippines Coast Guard cooperation](#), covering joint maritime activities and information exchange.
- Indian naval ships participated for the **first time in a naval exercise in the Philippines** during the visit.
- India’s **hydrography ship** took part in joint engagements, indicating deeper naval mapping and domain awareness cooperation.

3. Trade and Economic Engagement:

- India and the Philippines commenced formal negotiations for a [Preferential Trade Agreement \(PTA\)](#) to boost bilateral trade.

4. Connectivity and Tourism:

- **Direct flights between India and the Philippines** to begin by end of 2025.
- India announced a **free e-tourist visa facility for Filipino nationals** for one year starting August 2025.

5. Legal and Institutional Agreements:

- Signed [Mutual Legal Assistance Treaty in Criminal Matters](#).
- Signed **Treaty on Transfer of Sentenced Persons** for consular cooperation and legal integration.

6. Digital Infrastructure Cooperation:

- India to support a **pilot project for the Philippines Sovereign Data Cloud**, expanding cooperation in data governance and digital public infrastructure.
- Philippines invited to join India's **Information Fusion Centre–Indian Ocean Region (IFC–IOR)** to enhance maritime security intelligence.

7. Regional and Global Outlook:

- Both countries reaffirmed support for **freedom of navigation and overflight in the South China Sea**, consistent with [UNCLOS 1982](#).
- India highlighted the **South China Sea as global commons**, advocating a rules-based Indo-Pacific order.

Historical Evolution of Bilateral Ties:

- Diplomatic ties established** in 1949, among the earliest in India's post-Independence foreign policy.
- The year **2024 marked 75 years** of diplomatic relations, with a renewed focus on high-level exchanges, institutional dialogues, and capacity-building projects.

Areas of Bilateral Cooperation:

1. Defence and Security:

- BrahMos missile system** delivered in 2024, making Philippines the first foreign recipient.
- Joint Defence Cooperation Committee (JDCC)** and **Service-to-Service (STS)** dialogues institutionalised.

2. Maritime Cooperation:

- Track-1 Maritime Dialogue** and agreements on hydrographic data sharing and coastal surveillance.
- Cooperation in **multilateral exercises** like [ADMM-Plus](#), [MILAN](#), and [ASEAN–India Maritime drills](#).

3. Space Technology:

- ISRO to assist Philippines in **satellite launches, capacity building, and weather/agriculture monitoring**.
- Collaboration with **PhilSA** reflects India's rising soft power in the global space sector.

4. Trade and Economic Engagement:

- Bilateral trade reached **USD 3.5 billion in 2023–24**.
- India exports **pharma, electronics, rice, engineering goods** and imports **semiconductors, ores, machinery**.
- Indian FDI stands at **USD 5 billion**, while PTA negotiations are ongoing.

5. Health and Education:

- Philippines was the first ASEAN country to approve **Covaxin**.
- ~9,800 Indian students' study in the Philippines, mainly in medicine.

6. Development and Fintech:

- India funded **Quick Impact Projects (QIPs)** in disaster management and agriculture.

- MoU on **fintech cooperation** to expand digital payments and inclusion.

Key Challenges

- FDI Asymmetry:** Philippines' investment in India remains modest despite trade growth.
- Under-implementation of MoUs:** Several agreements (hydrography, space, tourism) pending operationalisation.
- China Factor in Maritime Policy:** Philippines' tightrope walks between Chinese pressure and strategic alignment with India/US/ASEAN.
- Connectivity Lag:** Direct air links still pending; tourism and education exchanges remain under-leveraged.

Significance of the Relationship:

- Act East Policy Anchor:** Enhances India's diplomatic footprint in ASEAN and strengthens Indo-Pacific vision.
- Maritime Balancing Role:** Strategic convergence in South China Sea ensures regional balance against Chinese aggression.
- Boost to Defence Exports:** Opens market for Indian weapons systems, logistics, and naval platforms in Southeast Asia.
- Space & Tech Diplomacy:** Positions India as a development partner in space, digital governance, and climate resilience.
- People-to-People Bridge:** Large Indian diaspora and student population foster long-term goodwill and grassroots engagement.

Way Forward:

- Finalise Preferential Trade Agreement (PTA)** to diversify trade and reduce tariff barriers.
- Operationalise Defence Co-production** under Atmanirbhar Bharat framework in shipbuilding and missile components.
- Launch Joint Satellite Missions** focused on weather, disaster relief, and agriculture monitoring.
- Institutionalise Track-1.5 Dialogues** involving think tanks, universities, and maritime institutions.
- Promote Academic & Medical Tourism** using new air routes and cross-recognition of degrees.

Conclusion:

India–Philippines relations are transitioning from symbolic diplomacy to substantive strategic engagement. As maritime democracies, their synergy in defence, space, and digital cooperation holds long-term regional significance. With greater institutional follow-through, this partnership can emerge as a **pillar of India's Indo-Pacific outreach**.

GENERAL STUDIES – 3

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

SYSTEM OF NATIONAL ACCOUNTS 2025

Context:

The United Nations Statistical Commission has adopted the System of National Accounts 2025 (SNA 2025), a revised global framework for measuring economies. It integrates concerns of inequality, environment, and unpaid work into national accounts, going beyond GDP.



About System of National Accounts 2025:

What it is?

- A **comprehensive international framework** for compiling national accounts, replacing the earlier SNA 2008.
- Moves beyond GDP to capture **sustainability, distribution, and non-market activities**.

Key Features:

- **Natural Capital Accounting:** Depletion of minerals, coal, oil, and gas treated as production cost; renewables like solar, wind, hydro recognised as assets.
- **Distributional Accounts:** Income, wealth, consumption, and savings shown by household groups to highlight inequality.
- **Unpaid Work Inclusion:** Household and care work included in extended accounts to recognise women's contribution.
- **Broader Policy Relevance:** Links national growth with fairness, ecological balance, and inclusiveness.

India's Preparedness:

- **Green National Accounts & EnviStats:** India has already started publishing annual *EnviStats* reports (since 2018), tracking forests, water, minerals, and energy as recommended by the Dasgupta

Committee (2013).

- **Time Use Surveys (2019, 2024):** These surveys provide evidence of unpaid household and care work, crucial for integrating women's invisible labour into national accounts.
- **PLFS, AIDIS, Consumption Surveys:** Together, these databases capture employment, household earnings, wealth distribution, and consumption patterns that can be aligned with SNA 2025's distributional accounts.
- **Base Revision Exercise:** The ongoing revision of India's National Accounts offers a timely chance to integrate natural resource depletion, inequality, and unpaid work into the GDP framework.

Opportunities:

- **Sustainable resource use:** Accounting for depletion strengthens the case for using mining royalties and resource revenues to build sustainability or future generation funds.
- **Renewable energy as wealth:** Recognising solar, wind, and hydro as assets redefines clean energy not only as climate action but also as economic capital.
- **Gender-sensitive data:** Inclusion of unpaid work helps policymakers design labour and social policies that better reflect women's contribution to the economy.
- **Targeted welfare:** Linking inequality analysis with national accounts allows governments to identify "who benefits from growth" and design sharper welfare schemes.

Challenges Ahead:

- **Data integration:** Combining survey micro-data (PLFS, NSS, consumption) with national aggregates is complex but essential for accuracy.
- **Institutional capacity:** Statistical divisions at the Centre and states need training, tools, and manpower to adopt green and distributional accounting.
- **Political resistance:** Resource-rich states may object if their reported GSDP falls once natural resource depletion is counted as a cost.
- **Communication gap:** Despite innovations, India's statistical progress is poorly communicated, leading to outdated criticism in public debates.

Way Forward:

- **Roadmap for base revision:** A clear timeline and methodology should be drawn to fully adopt SNA 2025 in India's next GDP base revision.
- **Build state capacity:** Resource and training support must be given to states for preparing natural capital and distributional accounts.
- **Institutionalise new data:** Regularly include time-use, unpaid care work, and household inequality statistics into national accounts.
- **Communicate innovations:** Proactive outreach and

publications are needed to highlight India's advances in global statistical practices.

Conclusion

SNA 2025 marks a shift from GDP-centric measurement to **sustainability and inclusiveness**. India, with its groundwork in green accounts and social surveys, is well-placed to adapt. As we march toward **Viksit Bharat 2047**, adopting SNA 2025 ensures that our growth story is not just about economic size but also about **equity, environment, and dignity for all**.

FROM 2017 TO 2025: INDIA'S GST JOURNEY

Context:

The Government has announced "[next-generation GST reforms](#)" to be rolled out by Diwali 2025, focusing on simplifying tax slabs, reducing burden on households, and easing compliance for MSMEs.

Global Comparison

New Zealand	Flat 15% GST, minimal exemptions
Singapore	Single 9% GST
EU Nations	VAT ~20% standard rate with reduced rates

About From 2017 to 2025: India's GST Journey:

What it is?

- The **Goods and Services Tax (GST)**, introduced on **1st July 2017** through the **101st Constitutional Amendment**, is a **destination-based indirect tax**.
- It replaced multiple central and state-level indirect taxes like excise, VAT, service tax, entry tax, luxury tax etc.
- GST is administered in a **dual structure**:
 - **CGST (Central GST)**
 - **SGST (State GST)**
 - **IGST (Integrated GST)** for interstate trade.
- The system is guided by the **GST Council (Art. 279A)**, ensuring cooperative federalism in tax decisions.

Evolution of GST (2017–2025):

- **2017 Launch:** GST introduced with **7 slabs (0.25%, 3%, 5%, 12%, 18%, 28% + cess)**; a **5-year compensation law** assured states 14% annual revenue growth.

- **2017–2019:** Rates on over 200 items reduced; FMCG products and restaurants shifted to lower brackets to reduce consumer burden.
- **2020–22:** Compliance improved with **e-way bills, e-invoicing, analytics**; however, the **state compensation scheme ended in June 2022**, creating fiscal stress.
- **2023–24:** Group of Ministers on **rate rationalisation** set up; discussions on reducing slabs intensified.
- **2025:** Proposed reforms → move to **4 slabs (special <1%, 5%, 18%, 40% for sin goods)**, focusing on simplification and lower burden on essentials.

Rationale Behind GST:

- **Simplification:** GST replaced the complex web of central and state indirect taxes with one uniform tax, making compliance easier.
- **Eliminate cascading:** By allowing seamless input tax credit, GST prevents "tax on tax," lowering overall costs.
- **Efficiency:** It created a unified national market, reducing barriers in interstate trade and boosting competitiveness.
- **Digital governance:** Online return filing, e-way bills, and e-invoicing have reduced corruption and improved accountability.
- **Equity:** Since GST is consumption-based, states with higher consumption contribute more, ensuring fairness across regions.

Achievements:

- **Revenue Mobilisation:** GST consistently generates robust revenues, with average monthly collections reaching ₹1.84 lakh crore in FY25.
- **Market Integration:** Interstate check-posts were abolished, reducing transport delays and cutting logistics costs.
- **Transparency:** Digital tools like e-invoicing and data analytics have curbed fake billing and improved compliance.
- **Consumer Relief:** Rates on many daily-use goods were slashed, directly lowering costs for households.
- **Federal Cooperation:** The GST Council has become a model of cooperative federalism, where states and the Centre jointly decide.

Challenges:

- **Complexity:** Too many slabs and frequent changes create confusion and disputes among taxpayers.
- **State Finances:** With the end of compensation in 2022, many states face fiscal stress and demand new revenue safeguards.
- **Compliance Burden:** MSMEs struggle with filing multiple returns, refund delays, and classification issues.
- **Exclusions:** Petroleum and alcohol remain outside GST, leading to continued cascading of taxes in these sectors.

- **Revenue Sustainability:** The effective tax rate has steadily declined, threatening fiscal stability unless the base is widened.

Way Ahead:

- **Rationalisation:** Moving to fewer slabs will make GST simpler, predictable, and business-friendly.
- **Expand Base:** Including petroleum and alcohol will enhance revenues and reduce cascading in critical sectors.
- **Support States:** A new stabilisation fund is needed to protect states' finances and maintain federal trust.
- **Ease Compliance:** MSMEs need simplified filing, faster refunds, and reduced litigation to improve ease of doing business.
- **Equity Focus:** Essentials should remain in lower slabs, while luxury and sin goods should bear higher taxes for fairness.
- **Technology:** AI-driven monitoring and data integration can further reduce tax evasion and improve collections.

Conclusion:

The GST journey from **2017 to 2025** reflects both **transformative success** and **structural challenges**. It unified India's tax market, boosted transparency, and simplified the system to an extent, but multiple slabs, state revenue concerns, and compliance burdens remain bottlenecks.

RBI HAS RELEASED A REPORT ON THE FRAMEWORK FOR RESPONSIBLE AND ETHICAL ENABLEMENT OF ARTIFICIAL INTELLIGENCE (FREE-AI)

Context:

The Reserve Bank of India ([RBI](#)) has released a report prepared by a committee on the Framework for Responsible and Ethical Enablement of Artificial Intelligence ([FREE-AI](#)) in the financial sector.

- The report prescribes seven guiding "sutras" for AI adoption and makes 26 recommendations under six strategic pillars to balance innovation with risk mitigation.

About [RBI has released a report on the Framework for Responsible and Ethical Enablement of Artificial Intelligence \(FREE-AI\):](#)

RBI Committee on Responsible & Ethical AI Use in Financial Sector:

- The Reserve Bank of India, in its December 6, 2024 policy statement, constituted the Framework for Responsible and Ethical Enablement of AI in the Financial Sector (FREEAI) Committee to promote

innovation while safeguarding consumer interests.

• **Key Details:**

- **Objective:** Develop a framework for responsible and ethical AI adoption in banking and finance.
- **Chairperson:** [Dr. Pushpak Bhattacharyya](#).
- **Mandate:** Balance technological advancement with transparency, accountability, fairness, and customer protection.

Need for AI in the Financial Sector:

- **Efficiency & Automation** – AI enables faster processing of transactions, loan approvals, fraud detection, and compliance checks, reducing manual errors.
- **Data-Driven Decisions** – Advanced analytics help in better risk assessment, credit scoring, and investment strategies.
- **Customer Experience** – Chatbots, voice assistants, and personalized recommendations improve service quality.
- **Fraud Prevention & Security** – AI models detect anomalies in real-time, enhancing cybersecurity.
- **Regulatory Compliance** – Automated monitoring ensures adherence to [RBI](#), SEBI, and other regulatory norms.

Initiatives Taken for AI Adoption:

- **Formation of RBI Committee on FREE-AI** – Tasked with framing a responsible and [ethical AI adoption](#) framework.
- **Innovation Sandboxes** – Pilot testing AI-driven solutions in controlled environments.
- **Bhashini Integration** – Language translation support for inclusivity in financial services.
- **Capacity Building Programs** – Training financial sector workforce in AI and data analytics.
- **Industry Collaborations** – Partnerships with fintechs and research institutions for AI model development.

Challenges in AI Adoption:

- **Data Privacy & Security Risks** – Sensitive [financial data](#) could be misused or breached.
- **Bias in AI Models** – Inaccurate or biased data can lead to discriminatory outcomes.
- **High Implementation Costs** – AI infrastructure and skilled talent are expensive.
- **Regulatory Uncertainty** – Lack of clear global and national AI governance frameworks.
- **Cybersecurity Threats** – AI systems themselves may be targeted for manipulation.
- **Explainability Issues** – Complex models reduce transparency in decision-making.

RBI Recommendations:

1. [RBI's 7 Sutras for AI Adoption in the Financial Sector](#)

- **Trust is the Foundation** – AI systems must build and maintain trust among stakeholders through transparency and reliability.
- **People First** – AI should enhance human decision-making, not replace it, ensuring customer interests remain central.
- **Innovation over Restraint** – Encourage responsible innovation while avoiding excessive regulatory barriers that stifle progress.
- **Fairness and Equity** – Ensure AI outcomes are free from bias, promoting equitable access and treatment for all.
- **Accountability** – Institutions must take full responsibility for AI-driven decisions and their consequences.
- **Understandable by Design** – AI models must be explainable to stakeholders, avoiding “black box” decision-making.
- **Safety, Resilience, and Sustainability** – AI systems should be secure, adaptable to shocks, and sustainable in the long term.



2. **Shared Infrastructure** – Common data and compute facilities for regulated entities to reduce entry barriers.
3. **AI Innovation Sandbox** – Controlled space for experimenting with AI applications in finance.
4. **Indigenous AI Models** – Development of sector-specific AI tools tailored for Indian financial needs.
5. **Board-Approved AI Policy** – Each regulated entity to frame [governance](#) and operational guidelines for AI use.
6. **Expanded Product Approval** – Include AI-specific risk assessments before launching financial products.
7. **Consumer Protection & Audit** – Integrate AI-related considerations into [customer grievance](#) and compliance audits.
8. **Enhanced Cybersecurity & Reporting** – Stronger AI-related cyber incident response mechanisms.

Conclusion:

AI can transform [India's financial sector](#) by boosting efficiency, security, and customer trust. However, its adoption must balance innovation with strong safeguards for fairness, transparency, and accountability.

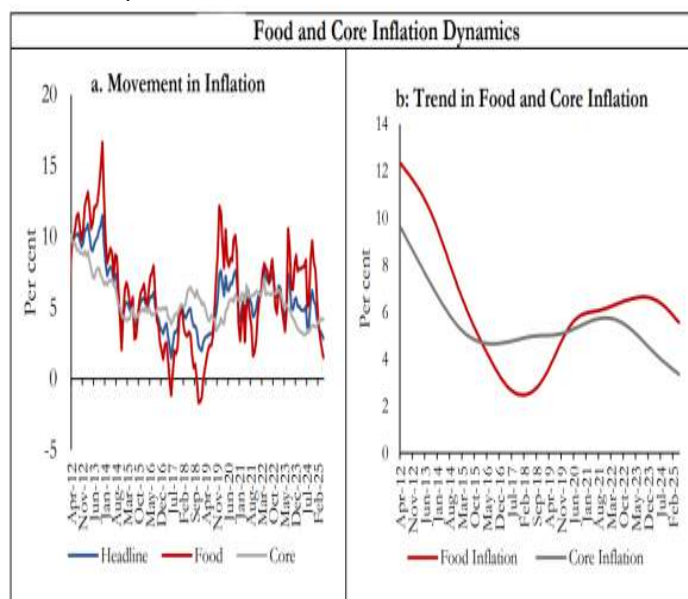
INFLATION TARGETING AND THE TEST OF CREDIBILITY

Context

The [Reserve Bank of India \(RBI\)](#) released its discussion paper (August 2025) on reviewing the **flexible inflation targeting (FIT)** framework. With the current **4% CPI target within a 2–6% tolerance band** expiring in March 2026, the RBI has cautioned that raising the target could dilute credibility and reverse policy gains.

Rationale for Retaining the 4% Target

- **Credibility with Global Investors:** Raising the target could be read as tolerance for higher inflation, weakening policy reputation. The recent **S&P Global upgrade to BBB** highlighted RBI's inflation management as a pillar of investor confidence.
- **Institutional Stability:** The framework has built confidence in the MPC process and fiscal responsibility norms.
- **Domestic Outcomes:** Headline [CPI inflation](#) has largely stayed within the 2–6% band since 2016, reflecting policy success. The July 2025 figure of **1.55%**, the second-lowest since the series began, is evidence of stability.
- **External Balance:** Low and stable inflation protects the rupee, maintains external competitiveness, and prevents erosion of capital inflows.



Headline vs. Core Inflation Debate

- **Survey Argument (2023–24):** Suggested targeting **core inflation** (excluding food and fuel), since food inflation is mostly supply-driven and outside the RBI's control.
- **RBI's Counter:** Persistent food price shocks spill into wages, rents, and mark-ups, affecting core inflation in the long run. Hence, headline CPI cannot be ignored.
- **Global Norm:** Nearly all inflation-targeting countries (advanced and emerging) use **headline CPI**; Uganda is the only one using core inflation.
- **Indian Reality:** With food accounting for almost **50% of the CPI basket**, excluding it would weaken policy relevance for households and workers.

Key Issues in the Framework

1. **Target Level:** Lowering below 4% is unsuitable for India's growth needs; raising above 4% could erode institutional credibility.
2. **Tolerance Band:** Debate exists on whether to keep the 2–6% band, narrow it, or remove it altogether. A band offers flexibility but can reduce accountability.
3. **Volatility in Inflation:** Between 2014–2025, CPI inflation ranged between **1.5% and 8.6%**, largely due to food price swings, while core inflation remained more stable.
4. **Policy Certainty:** The framework has provided consistency, helping India withstand shocks like the pandemic and oil price surges without runaway inflation.

Positive Outcomes of the Framework

1. **Anchored Inflation Expectations:** Households and firms have adapted decisions around a credible 4% anchor, reducing uncertainty.
2. **Improved Sovereign Ratings:** Agencies like **S&P Global** have upgraded India, citing RBI's success in keeping inflation broadly within the 2–6% band.
3. **External Stability:** Low inflation has strengthened the rupee, stabilised foreign capital inflows, and supported current account management.
4. **Investor Confidence:** Predictable inflation management reduces risk premiums on Indian assets, encouraging FDI and portfolio inflows.
5. **Resilience to Shocks:** Despite global supply

disruptions, India avoided runaway inflation, showing the framework's effectiveness in turbulent times.

Way Forward

1. **Retain 4% Target:** Raising above this could be viewed as dilution of policy; RBI stresses keeping it unchanged to preserve credibility.
2. **Do Not Lower Below 4%:** A lower target could unnecessarily constrain growth in a developing economy like India.
3. **Continue Headline CPI:** Food inflation has long-run spill overs into core; targeting only core would ignore household realities.
4. **Review Tolerance Band:** Debate on whether to maintain, revise, or drop the 2–6% band continues; RBI advises caution against disrupting tested elements.
5. **Preserve Policy Certainty:** Continuity in the framework is crucial in a time of **geopolitical and economic uncertainty**, ensuring India's gains in fiscal responsibility and external stability are not eroded.

Conclusion

The inflation targeting framework has anchored prices and strengthened India's economic credibility since 2016. RBI's paper makes clear that the **4% anchor, headline CPI focus, and tolerance band** remain essential. Fine-tuning may be considered, but continuity and credibility must guide the framework's renewal in 2026.

Topics: Government Budgeting.

SHOULD STATES BE COMPENSATED FOR REVENUE LOSS FROM GST REFORMS?

Context:

The Union government's proposal to shift GST into a two-tier structure of **5% and 18%** is aimed at simplification and competitiveness, but it may cause a **short-term revenue loss of ₹60,000–1,00,000 crore**. With the five-year compensation scheme (2017–22) having ended, the debate over whether States should be compensated has resurfaced.



What is it about?

1. **The Centre has proposed rationalising GST into two slabs (5% and 18%),** retaining a higher ~40% rate for sin and luxury goods.
2. **The reform will bring down the average GST rate to ~10%,** from 11.5% currently, aligning India with advanced economies and improving competitiveness.
3. **The short-term revenue loss** is estimated at **₹60,000–1,00,000 crore annually** (~0.2–0.3% of GDP), and about ₹45,000 crore in FY2025–26 (first partial year of implementation).
4. **States will not be equally affected:** industrialised States like Maharashtra, Karnataka, and Tamil Nadu may see revenue falls in appliances and electronics, while agrarian States like Bihar or Uttar Pradesh, where essentials dominate consumption, face little impact.
5. **The five-year GST compensation scheme (2017–22),** leaving no automatic cushion for States during this reform phase.

Why it matters

1. **Unequal fiscal impact:** In the 2018 GST rate cuts, Maharashtra and Karnataka saw a **3–4% dip in monthly collections**, while north-eastern States barely felt any change — showing asymmetry in outcomes.
2. **Federal trust deficit:** GST was adopted only after Centre's promise of 14% annual revenue growth compensation for 5 years; breaking these precedent risks weakening confidence in the GST Council.
3. **Developmental consequences:** Revenue stress could limit States' spending on health, education, and infrastructure — for example, Karnataka's urban tax dependence makes it vulnerable to

shortfalls.

4. **Competitiveness boost:** At ~10%, India's average GST rate matches developed economies, strengthening "[Make in India](#)" and attracting global manufacturing investments.
5. **Political economy factor:** The Prime Minister's Independence Day announcement signals strong political backing; States may debate **timing and product classification**, but reforms are unlikely to be stalled.

State Compensation

Case for Compensation

1. **Fairness in transition:** States like Tamil Nadu and Maharashtra, with broader tax bases, should not disproportionately bear reform costs while smaller States remain insulated.
2. **Fiscal stability protection:** In FY2026, expected losses of ~₹45,000 crore could undermine States' fiscal positions without transitional aid.
3. **Asymmetric exposure:** Manufacturing-heavy States depend on higher-tax slabs (e.g., appliances at 28% moving to 18%), making them more exposed to shortfalls.
4. **Global precedent:** Developed economies implementing GST often used **dual mechanisms** — GST-linked compensation and central packages — to smoothen the transition.
5. **Reform acceptance:** In 2017, compensation was the "political glue" for GST adoption; repeating it now would ensure smoother acceptance of slab rationalisation.

Case against Compensation

1. **Unsustainable burden:** Annual shortfall estimates (₹60,000–1,00,000 crore) make perpetual compensation fiscally unviable for the Centre.
2. **Moral hazard:** Guaranteed revenue may disincentivise States from plugging GST leakages — despite e-invoicing and digital compliance gains reducing losses elsewhere.
3. **Transition period over:** The **five-year compensation window (2017–22)** was designed as a one-time cushion; extending it risks setting a precedent of permanent bailouts.
4. **Growth dividend offset:** Lower rates on essentials/durables will expand consumption and compliance — e.g., higher demand for appliances shifts transactions into the formal tax net.
5. **Alternative models exist:** Kerala's **flood cess (2019)** is an example of a State-specific stabilisation tool that reduces reliance on Centre-led compensation.

What can be done

1. **Time-bound support:** Provide short-duration relief, especially in FY2026, when the revenue dip is estimated at ~₹45,000 crore.
2. **Selective assistance:** Focus aid on industrialised States facing sharper shocks, not uniform across all States.
3. **Stabilisation fund:** A portion of GST could be channelled into a contingency pool under the GST Council, similar to **compensation cess but more flexible**.
4. **Performance-linked aid:** Tie assistance to reforms in **e-invoicing, compliance monitoring, and tax base expansion** to reduce moral hazard.
5. **Strengthening GST Council dialogue:** Maintain transparency in **revenue projections and product reclassification debates** to preserve consensus-based decision-making.

Conclusion

GST rationalisation promises **simplicity, competitiveness, and long-term buoyancy**, but its uneven short-term shocks could destabilise State finances. While **permanent compensation is fiscally unsustainable**, transitional, targeted, and reform-linked support can balance **fiscal responsibility with cooperative federalism**, ensuring that reforms succeed without undermining State stability.

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

ENERGY SOVEREIGNTY IS THE NEW OIL



Context: Energy is no longer a passive growth input but the foundation of sovereignty and security. For India, with **85% crude and 50% natural gas** dependence, energy shocks directly hit trade balance, inflation, and national resilience.

Global Context: Lessons from Energy Flashpoints

1. **1973 Oil Embargo** – The Arab embargo quadrupled oil prices, compelling Western economies to create strategic reserves and efficiency mandates to cut OPEC dependence.
2. **2011 Fukushima Disaster** – The meltdown eroded nuclear confidence, but its absence led to coal/gas resurgence, showing that abandoning zero-carbon baseload has climate costs.
3. **2021 Texas Freeze** – Gas pipelines froze and wind turbines stalled, revealing how over-optimisation for cost weakens resilience in extreme weather events.
4. **2022 Russia-Ukraine War** – Europe's 40% gas dependence on Russia turned into a weapon, forcing LNG diversification and short-term coal revival.

India's Current Energy Vulnerabilities

1. **Import Bill Burden** – **Crude oil and gas imports** worth \$170 bn in FY24 formed 25% of merchandise imports, straining foreign exchange and widening CAD.
2. **Overconcentration on Russia** – Post-Ukraine war, Russian share rose to 35–40% of imports, exposing India to geopolitical risk and sanctions vulnerability.
3. **Macro Instability** – Import spikes depreciate the rupee, fuel inflation, and undermine fiscal space for welfare and infrastructure spending.
4. **Geopolitical Flashpoints** – West Asian conflicts like **Israel-Iran** could disrupt 20 mb/d flows, pushing crude above \$100 and destabilising India's supply chains.

Key Challenges to Energy Sovereignty

1. **Technology Gaps** – India lacks indigenous SMR designs, advanced coal-gasification, and imports 80% of electrolyser parts from China/EU, weakening self-reliance.
2. **Financing Deficit** – Energy transition requires \$10 trillion till 2070 (CII estimate), but India's green finance inflows remain far below this target.
3. **Infrastructure Bottlenecks** – Weak transmission networks, storage scarcity, and low-voltage stability hinder large-scale renewable integration.
4. **Policy Fragmentation** – Overlapping mandates of MoP, MNRE, and MoPNG slow decisions, creating incoherence in long-term energy planning.
5. **Environmental-Social Costs** – Coal gasification raises emissions, nuclear projects face land protests, and large hydro risks ecological displacement.
6. **Global Market Volatility** – LNG price shocks, carbon

border taxes like EU's CBAM, and OPEC supply curbs disrupt India's external balance.

7. **Critical Mineral Dependence** – Lithium, cobalt, and nickel imports for batteries and hydrogen systems create new strategic dependencies.

Five Pillars of India's Energy Sovereignty

1. **Coal Gasification with Carbon Capture** – India's 150 bn tonnes of reserves can produce syngas, methanol, and hydrogen if ash-barriers are overcome via advanced technology.
Eg: NITI Aayog's pilot coal-to-chemicals projects aim at commercialisation.
2. **Biofuels for Rural Empowerment** – **Ethanol blending** and SATAT CBG plants reduce crude imports while bio-manure enriches degraded soils and improves water retention.
Eg: Ethanol blending transferred ₹92,000 cr to farmers by 2024.
3. **Nuclear Backbone** – Reviving thorium roadmap, expanding uranium tie-ups, and adopting SMRs will create stable, zero-carbon baseload for a renewable-heavy grid.
Eg: Nuclear stuck at 8.8 GW, far below India's 100 GW target.
4. **Green Hydrogen Leadership** – Target of 5 MMT/year by 2030 requires local electrolyser, catalyst, and storage ecosystems to cut external dependence.
Eg: National Green Hydrogen Mission launched in 2023 focuses on supply chain localisation.
5. **Pumped Hydro Storage** – Using India's topography, pumped hydro can provide inertia and backup to balance intermittent solar and wind.
Eg: New pumped storage projects in Maharashtra and Andhra Pradesh underway.

Way Forward

1. **Diversify Sources** – Beyond Russia and West Asia, India must secure crude and LNG ties with Africa, Central Asia, and Latin America.
2. **Expand Strategic Reserves** – **India's 77-days cover must** scale to IEA's 90-day benchmark for true buffer security.
3. **Balanced Transition** – Maintain a fossil-renewable mix till 2040 to avoid disruptions while scaling clean tech.
4. **Institutionalise Sovereignty Doctrine** – A National Energy Sovereignty Council should integrate energy, climate, and security policy.
5. **Technology Partnerships** – Use Quad, BRICS+, and I2U2 platforms for SMRs, hydrogen tech, and carbon capture collaborations.

Conclusion

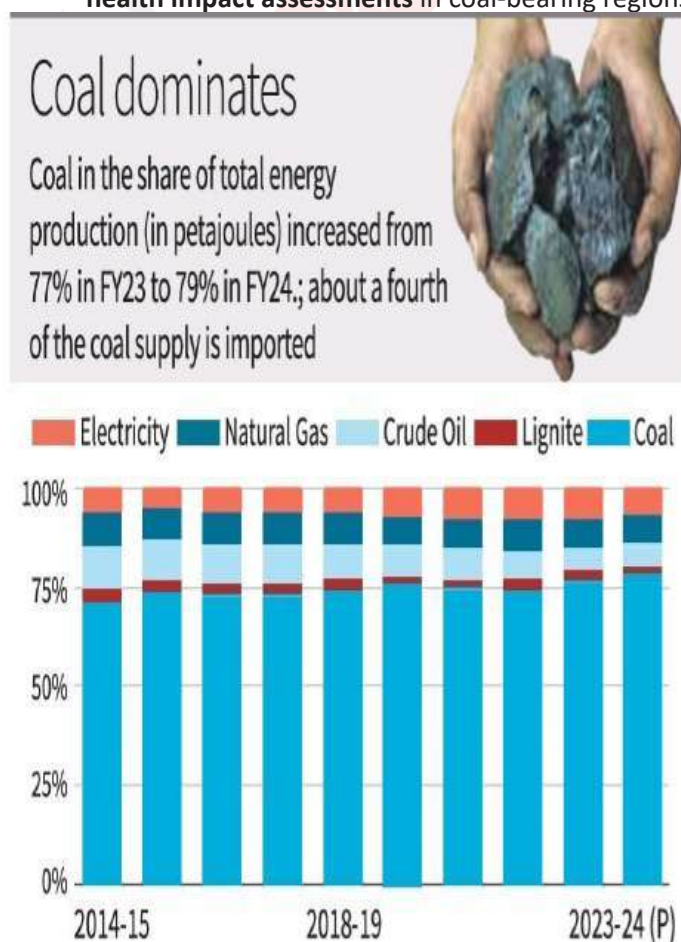
Energy sovereignty is the survival doctrine of the 21st century. By addressing structural challenges and leveraging its five-pillar roadmap, India can insulate itself from global shocks, secure affordable energy, and emerge as a resilient energy power.

REGULATING COAL OPERATIONS

Context:

A new report titled "[*Regulating Coal Operations: Environmental and Social Impacts through the Lens of the NGT*](#)" was released on **26 August 2025** in New Delhi.

- It highlights that **coal will remain central to India's energy system for decades**, making environmental and health challenges inevitable, and stresses the need to involve **local communities** and conduct **health impact assessments** in coal-bearing regions.



Source: Energy Statistics of India 2025, MoSPI

About India's reliance on Coal

Why India Relies Heavily on Coal

1. **Energy Security Imperative:** Coal constitutes over **70% of India's power generation capacity** (2022–23). Unlike imported oil and gas, coal provides relative **energy sovereignty** due to large domestic reserves (~350 billion tonnes).

2. **Industrial Backbone:** Thermal power supports **steel, cement, aluminium, fertiliser and railways**. The cost-competitiveness of coal-based power keeps industry running amidst global energy volatility.
3. **Affordability & Infrastructure Lock-In:** Coal-fired plants are cheaper to build and have long operational lifespans. Existing investments in **railway transport, coal-handling infrastructure, and state utilities** create “path dependency”.
4. **Employment Dependence:** Coal mining sustains livelihoods for **millions of workers** in Jharkhand, Chhattisgarh, Odisha, and West Bengal. Political economy considerations make sudden exits difficult.
5. **Intermittency of Renewables:** Solar and wind, while growing, face issues of **grid integration, storage, and round-the-clock reliability**. Coal continues as the “baseload” provider.
6. **Transition Challenges:** Lack of adequate **financing, technology transfer, and adaptation plans** for workers and communities hinders rapid decarbonisation.

Environmental & Health Impacts

- **Air Pollution:** PM10 levels five times above permissible limit (e.g., Jharia, Ennore).
- **Water Contamination:** Fly ash leaks poison rivers and soil fertility.
- **Biodiversity Loss:** Mining destroys forests and wildlife corridors.
- **Public Health Burden:** Cases of **silicosis, respiratory disorders, neurological damage** linked to fly ash and heavy metals.
- **Livelihood Disruptions:** Agriculture, fisheries, and cattle grazing severely impacted, leading to poverty and out-migration.

Governance & Regulatory Concerns

- **Weak Enforcement:** Emission manipulation (e.g., Ennore plant).
- **Inconsistent Compensation:** Farmers in Mejia and Chandrapur received inadequate or delayed payouts.
- **Neglect of FRA Rights:** Tribal and forest dwellers often excluded from consent processes under [Forest Rights Act \(2006\)](#).
- **Tokenistic Participation:** Communities rarely represented in decision-making bodies.

Recommendations from Report

1. **Health Impact Assessments (HIAs):** Must accompany Environmental Impact Assessments (EIAs) in coal regions.
2. **Community Participation:** Local committees of villagers, NGOs, and experts to oversee restoration and monitoring.

3. **Continuous Monitoring:** Independent audits of air, water, soil, and health indicators.
4. **Mission-Mode Restoration:** Mandate MoEFCC and states to treat clean-up as priority.
5. **Just Transition Strategy:** Incorporate **social equity, livelihood diversification, and skill training** into coal-phase-out plans.

Way Forward

1. **Diversify Energy Mix:** Aggressive push for solar, offshore wind, and green hydrogen to reduce baseload coal reliance.
2. **Just Transition Fund:** Dedicated financing to rehabilitate coal workers and support alternative livelihoods in mining states.
3. **Health-Centric Planning:** Institutionalise **Health Impact Assessments** in project approvals.
4. **Stronger Accountability:** Empower NGT and Pollution Control Boards with **community oversight powers**.
5. **Circular Economy of Coal Waste:** Promote **fly ash utilisation** in cement, bricks, and road construction.
6. **International Climate Finance:** Leverage G-20, Green Climate Fund, and Just Energy Transition Partnerships (JETP) to fund India's transition.

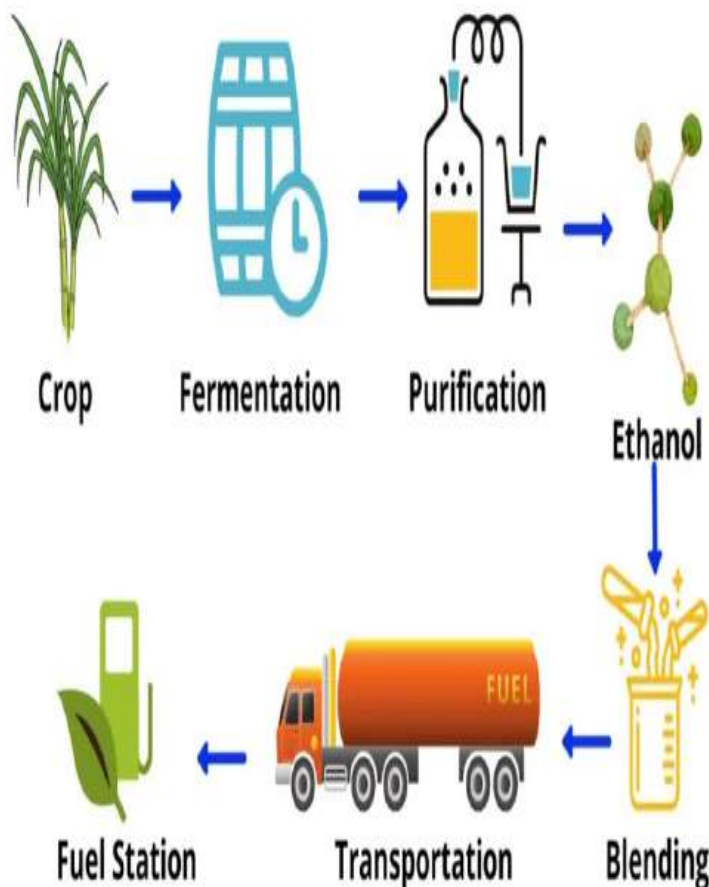
Conclusion

Coal will remain a **pillar of India's energy architecture** for the coming decades, but without community involvement, strict enforcement, and a just transition framework, its **environmental and human costs will outweigh economic benefits**. India must craft a strategy that simultaneously ensures **energy security, social justice, and climate responsibility**.

ETHANOL BLENDED PETROL (EBP) PROGRAMME.

Context:

India has announced plans for **27% ethanol blending in petrol (E27) by 2030**, extending its successful [Ethanol Blended Petrol \(EBP\) programme](#).



About Ethanol Blending

- **What it is:** Ethanol, an alcohol derived mainly from **sugarcane, maize, and surplus foodgrains**, is blended with petrol to create a cleaner, renewable transport fuel.
- **Started in:** The **Ethanol Blended Petrol (EBP) Programme** was launched in **2003**, beginning with 5% blending.
- **Objectives:**
 1. Reduce India's dependence on imported crude oil.
 2. Conserve foreign exchange reserves.
 3. Lower vehicular emissions to support environmental commitments.
 4. Provide farmers with assured markets for crops, stabilising incomes.
 5. Encourage second-generation ethanol from crop residues, reducing stubble burning.

Benefits of Ethanol Blending

1. **Energy Security** – India imports nearly **88% of its crude oil**, making the economy highly vulnerable to global price shocks. Ethanol blending substitutes imported crude, thereby reducing dependence on foreign oil.
2. **Environmental Gains** – Ethanol blends cut **carbon monoxide and hydrocarbon emissions**, contributing to India's **Net Zero 2070 pledge** and reducing urban air pollution.

3. **Farmer Welfare** – Farmers benefit from steady demand for sugarcane and maize; over **₹1.2 lakh crore** has flowed to them in the past decade through ethanol procurement.
4. **Rural Development** – Distilleries in rural areas create jobs, promote agro-based industries, and reduce distress migration.
5. **Circular Economy Link** – Initiatives like **PM-JI-VAN Yojana** promote second-generation ethanol from crop residues, turning waste into energy while tackling stubble burning.

Concerns and Challenges

1. **Food Security Risks** – Rising ethanol demand has already strained maize availability, leading to imports and higher prices, potentially affecting poultry and starch industries.
2. **Water Stress** – Sugarcane, the dominant ethanol feedstock, consumes **1,500–2,000 litres of water per kg of sugar**, threatening groundwater in states like UP and Maharashtra.
3. **Vehicle Compatibility** – Higher ethanol blends reduce fuel efficiency by **6–7%** unless engines are specially designed. Flex Fuel Vehicles remain costly and consumer adoption uncertain.
4. **Supply Gaps** – India produced ~700 crore litres of ethanol in 2023, but E27 will require **>1,200 crore litres by 2030**; much of the capacity is linked to stressed sugar mills.
5. **Financial & Infrastructure Bottlenecks** – Banks are hesitant to fund distilleries, and retail infrastructure (storage tanks, pumps, blending facilities) is still inadequate for a nationwide rollout.

Way Forward

1. **Diversify Feedstocks:** Promote second-generation ethanol from residues, forestry waste, and municipal solid waste to reduce reliance on food crops.
2. **Encourage Smart Farmer Practices:** Boost maize productivity through improved seeds and cultivation methods, and restrict sugarcane expansion in water-scarce zones.
3. **Consumer Incentives:** Subsidise Flex Fuel Vehicles, support retrofitting, and run awareness campaigns to ease transition for consumers.
4. **Strengthen Infrastructure:** Invest in ethanol storage, blending, transport, and dispensing networks to avoid supply chain bottlenecks.
5. **Balanced Energy Transition:** Treat ethanol as a **bridge fuel**—complementary to EVs and green hydrogen, not a substitute.

Conclusion

India's ethanol blending strategy represents a **bold leap toward energy independence, cleaner fuels, and farmer empowerment**. A **diversified, sustainable, and integrated approach** can ensure that India's ethanol revolution remains a story of innovation and resilience, rather than a cautionary tale of overreach.

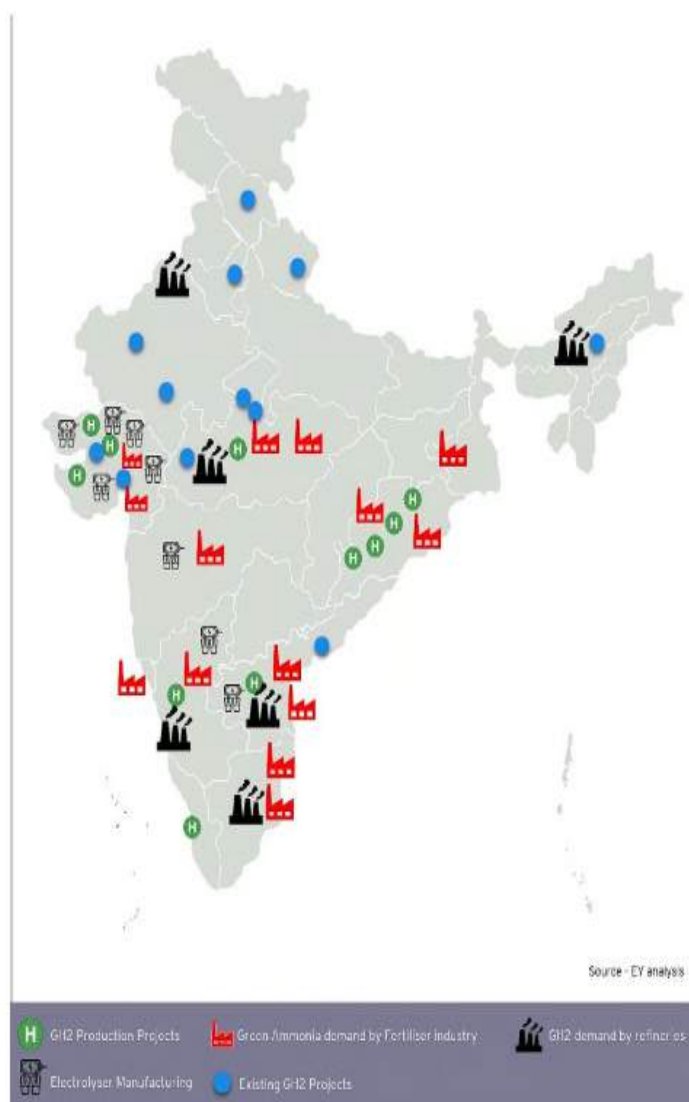
INDIA'S GREEN HYDROGEN POTENTIAL: FICCI-EY 2025 REPORT

Context:

A recent joint report by **FICCI & EY** highlighted that India can capture **10% of the global green hydrogen market** by addressing economic and infrastructural challenges.

- The report urges **redirecting fossil fuel subsidies** and introducing an **industry use mandate** to create reliable domestic demand.

Green hydrogen projects in India



About Green Hydrogen

What is Green Hydrogen?

- Produced by **electrolysis of water using renewable energy** → hydrogen + oxygen.
- Zero-emission fuel** with applications in steel, mobility, fertilisers, and shipping.
- Crucial for reducing greenhouse gas emissions and achieving **net-zero goals**.

India's Current Efforts

1. National Green Hydrogen Mission (2023)

- Outlay: **₹19,744 crore**.
- Target: **5 million tonnes (MMT) production capacity annually by 2030**.
- Requires **125 GW renewable capacity**, electrolyser manufacturing, and water logistics.

2. Pilot Projects

- Five pilot projects funded with **₹208 crore**.
- Deployment of **37 hydrogen-powered vehicles** (15 fuel cell, 22 hydrogen ICE).
- 9 refuelling stations to be operational in 18–24 months.

3. Cost Trends

- Current cost: **\$4–4.5/kg**.
- Projected by 2030: **\$3–3.75/kg** (due to cheap renewable power, tax incentives, and efficiency gains).

Challenges

- High Early-Stage Costs:** Green hydrogen costs are **~2x grey hydrogen**, due to transmission losses, capex gaps, and efficiency issues.
- Fossil Fuel Incentives:** Subsidies for carbon-intensive fuels distort markets, making hydrogen adoption less competitive.
- Infrastructure Deficit:** Need for large-scale renewable integration, water logistics, storage, and pipelines.
- Demand Uncertainty:** Industry adoption is limited; investors hesitate without guaranteed offtake.
- Global Competition:** EU, Japan, South Korea already investing heavily in hydrogen import corridors.

Recommendations from Report

- Redirect Subsidies:** Shift financial incentives from fossil fuels **to renewables and hydrogen** projects.
- Industry Use Mandate:** Introduce **green hydrogen purchase obligations** across industrial sectors (steel, fertiliser, shipping).
- Carbon Pricing Mechanism:** Implement carbon tax to make green hydrogen more competitive against fossil fuels.
- Demand Aggregation:** Structured procurement + payment security mechanisms to ensure competitive prices and reliable contracts.
- Export Strategy:** Position India to export **10 MMT annually** to EU, Japan, South Korea.
- Innovation & Research:** Boost domestic electrolyser production, scale startups, and incentivise private sector R&D.

Global Context

- **Market Size:** \$8.78 bn (2024) → projected \$199.22 bn (2034) at 41.5% CAGR.
- **India's Market Projection:** \$2.81 bn by 2030, CAGR 56% (2024–30).
- Global concern: **14.3 million zero-dose children (2024)** indicate immunity gaps, but for hydrogen, analogy is **adoption gaps across developing nations**.

Conclusion

India has the strategic potential to emerge as a **green hydrogen leader**, leveraging its vast renewable base, low-cost power, and geographic advantages. But success will depend on **redirecting fossil fuel subsidies, creating domestic demand mandates, scaling infrastructure, and ensuring global partnerships**. With timely reforms, India could secure a **10% global market share by 2030**, becoming a cornerstone in the global clean energy transition.

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

BIOCHAR IN INDIA

Context:

India is set to launch its carbon credit trading market in 2026, and biochar is emerging as a promising CO₂ removal technology with applications in agriculture, construction, and energy.



About Biochar in India:

What is Biochar?

Biochar is a carbon-rich byproduct formed by pyrolysis (burning biomass without oxygen) of agricultural residue or organic municipal waste. It is porous, stable, and long-lasting, making it a natural carbon sink when added to soil.

India's Untapped Biochar Potential

- **Agricultural and waste resource base:** India produces over **600 million tonnes** of agri-residue and **60 million tonnes** of municipal solid waste annually.
- **Carbon removal:** Using 30–50% of this waste, **15–26 million tonnes of biochar** can be generated, removing **0.1 gigatonnes of CO₂-eq per year**.
- **Job creation:** Decentralised production at village level could create up to **5.2 lakh rural jobs**.

Example: Punjab's **stubble burning crisis** can be addressed by converting crop residue into biochar, reducing air pollution and creating rural livelihoods.

Multisectoral Benefits of Biochar:

- **Byproducts and Energy Potential:**
 - **Syngas (20–30 MT)** and **bio-oil (24–40 MT)** can generate **8–13 TWh** electricity annually.
 - Can replace **0.4–0.7 million tonnes of coal**, reducing fossil fuel dependence.
 - **Bio-oil** can offset **8% of India's diesel/kerosene use**, cutting 2% of fossil-fuel emissions.
 - **Example:** Maharashtra pilot projects have used pyrolysis gas for rural micro-grids, reducing diesel generator use.
- **Agriculture and Soil Health:**
 - **Improves water retention** and reduces **fertilizer needs by 10–20%**.
 - Enhances **crop yields by 10–25%**, especially in semi-arid, nutrient-depleted soils.
 - Reduces **N₂O emissions** by 30–50%, a gas 273x more potent than CO₂.
 - **Example:** Andhra Pradesh Community Managed **Natural Farming** uses biochar to improve soil organic carbon content.
- **Construction Sector Use:**
 - Adding **2–5% biochar to concrete:**
 - ☐ Boosts mechanical strength
 - ☐ Increases heat resistance by 20%
 - ☐ Sequesters **~115 kg CO₂/m³**
 - Offers **green alternative to cement** in India's booming infrastructure sector.
 - **Example:** IIT-Madras research shows biochar-concrete mix reduces embodied carbon in buildings.
- **Wastewater Treatment:**
 - **1 kg of biochar** can treat **200–500 litres** of wastewater.
 - India generates **70 billion litres/day**, with 72% untreated — huge demand potential for biochar.
 - Ideal for decentralised wastewater solutions in **urban slums and rural areas**.

Challenges to Large-Scale Adoption of Biochar:

- **Absence of Standardised Feedstock Markets:** Lack of uniform pricing and quality standards for agricultural residue and biomass feedstock makes large-scale procurement and processing commercially unviable.
- **Weak Carbon Accounting and MRV Frameworks:** Inadequate monitoring, reporting, and verification systems undermine credibility in international carbon markets, discouraging investor participation.
- **Limited R&D and Localisation:** Insufficient region-specific research on pyrolysis technologies and biomass optimisation hampers productivity and suitability across agro-climatic zones.
- **Fragmented Policy and Institutional Coordination:** Biochar remains excluded from mainstream agriculture, waste, energy, and climate policies, creating policy silos that block integrated solutions.
- **Lack of Scalable Business Models:** Absence of financial incentives, start-up incubation, or private sector participation has prevented the emergence of commercially viable biochar enterprises at scale.

Way Forward:

- **Policy Integration:**
 - Include biochar in:
 - ❑ Crop Residue Management programs
 - ❑ [State Action Plans on Climate Change](#) (SAPCCs)
 - ❑ National Bio-Energy and Waste Management Policies
- **Carbon Market Recognition:**
 - Recognise biochar as an **eligible carbon removal pathway** under the **Indian Carbon Market**, enabling credit-based income for farmers and entrepreneurs.
- **Strengthen R&D:**
 - Develop **agro-climatic zone-wise** standards.
 - Promote **indigenous pyrolysis technologies** for decentralised, low-cost deployment.
- **Awareness and Training:**
 - Farmer extension services, agri-tech platforms, and local panchayats must be sensitised to biochar benefits and production.

Conclusion:

Biochar is not a silver bullet, but a scientifically validated, multi-sectoral tool to meet India's dual goals of climate action and inclusive development. With strategic policy integration, market recognition, and community-driven implementation, biochar can become central to India's [carbon-neutral growth](#) narrative.

Topics: [Awareness in space.](#)

WHY INDIA NEEDS A NATIONAL SPACE LAW

Context:

India is preparing to celebrate its **second [National Space Day \(23 August\)](#)** amid ambitious projects like Chandrayaan-3 follow-ups and Gaganyaan, but lacks a **comprehensive national space law** to regulate and support private and commercial activities in outer space.



About Space Laws

What is it?

- Space law refers to the **legal framework governing activities in outer space**, covering exploration, commercialisation, safety, liability, and peaceful use.
- It balances **international commitments (treaty obligations)** with **domestic regulation** for government and private actors.

[Outer Space Treaty \(OST\) 1967 and its Principles](#)

1. **Common Heritage:** Space is the province of all mankind, no national ownership.
2. **Peaceful Use:** Outer space must not be weaponised.
3. **State Responsibility:** States are responsible for all activities of both government and private entities.
4. **Liability Clause:** Nations bear liability for damage caused by space objects launched from their territory.
5. **International Cooperation:** Mandates scientific exchange and sustainable exploration.

[Why National Space Legislation is Crucial](#)

1. **Legal Clarity & Predictability**
 - Provides a **stable regulatory framework** for

government and private players.

- o Reduces bureaucratic hurdles and overlapping ministerial clearances.

2. Safety & Compliance

- o Establishes **technical standards, licensing, accident investigation, and debris management rules**.
- o Ensures India's compliance with **international liability obligations** under OST.

3. Boost to Private Sector & FDI

- o Clear rules on **licensing, IP rights, insurance, and FDI** can attract capital and prevent startups from relocating abroad.
- o Example: U.S., Luxembourg, Japan have laws enabling private mining/launch services.

4. Insurance & Liability Framework

- o Space activities involve **high-value assets** with huge risk.
- o Affordable third-party insurance frameworks protect startups and ensure India isn't solely liable internationally.

5. Promotion of Innovation & Talent Retention

- o Protects **IP rights**, encourages industry-academia partnerships, and builds investor trust.
- o Prevents talent migration to more IP-friendly jurisdictions.

India's Current Approach

- **Incremental Strategy:** India has ratified UN treaties but has not passed a single umbrella space law.
- **Policy Frameworks:**
 - o Indian Space Policy 2023 → Encourages private sector participation.
 - o IN-SPACe Norms and Guidelines → Provides authorisation for non-governmental entities.
 - o Catalogue of Indian Standards for Space Industry → Ensures safety and quality.
- **Pending Gap:** Lack of **statutory space activities law**; **IN-SPACe** currently lacks full legal authority.

Challenges in Enacting a National Space Law

1. Regulatory Fragmentation

- o Multiple ministries (Defence, Telecom, Commerce, DoS) are involved in approvals, creating duplication and delays.
- o Example: Satellite communication ventures face clearance from DoT, DoS, and Defence simultaneously.

2. Absence of Statutory Backing for IN-SPACe

- o IN-SPACe, the nodal agency, functions on executive orders without legislative authority.

- o This weakens investor confidence as regulatory decisions can be challenged.

3. Liability and Insurance Concerns

- o Under OST, India is internationally liable for all space activities, including private launches.
- o Startups face high entry barriers due to expensive liability coverage.

4. Foreign Direct Investment (FDI) Uncertainty

- o India allows limited FDI in satellite manufacturing; unclear automatic routes deter foreign capital.
- o Competitor nations like Luxembourg and UAE attract startups with liberal investment rules.

5. Intellectual Property (IP) and Innovation Protection

- o Overregulation risks discouraging innovation; under-protection risks loss of talent to IP-friendly nations.
- o A balance is lacking between state oversight and private ownership of space technologies.

Way Forward

1. Enact a Comprehensive Space Activities Law

- o Provide a statutory framework aligning with OST obligations.
- o Clearly define roles of government, private actors, and liability-sharing norms.

2. Empower IN-SPACe through Statute

- o Grant IN-SPACe full legal authority as a single-window regulator.
- o Establish time-bound licensing, transparent fee structures, and clear denial criteria.

3. Create Affordable Insurance Frameworks

- o Develop government-backed reinsurance or pooled risk models for startups.
- o Example: France provides subsidised insurance for space debris liability.

4. Liberalise FDI Norms

- o Permit 100% FDI under the automatic route in satellite components and services.
- o This would attract global capital while ensuring strategic oversight.

5. Strengthen IP and Innovation Ecosystem

- o Protect patents and copyrights of private players.
- o Encourage industry-academia-government collaborations for innovation retention in India.

Conclusion

India's space programme is transitioning from **state-led exploration to private-sector-driven commercialisation**. But without a **comprehensive space law**, this growth risks being stifled by uncertainty, liability concerns, and regulatory gaps. Enacting a national space law will ensure India meets its **international obligations**, fosters a **competitive space economy**, and positions itself as a **trusted global leader in space governance**.

INDIA'S PRIVATE SPACE TALENT CRISIS

Context:

India's [private space](#) startups are facing a severe shortage of specialised talent in fields like rocketry, propulsion, photonics, and sensors, forcing them to rely on cross-industry hires and extended in-house training.

- Despite rising demand, limited academic courses and lower salaries compared to overseas markets are pushing skilled candidates abroad.

About India's Private Space Talent Crisis:

What It Is?

- A shortage of highly [skilled engineers](#) and scientists trained in niche space technologies, impacting the growth and competitiveness of India's private space sector.
- Most companies are forced to recruit from unrelated engineering streams and invest 6–12 months in on-job training.

Data Points

- 175 Indian institutions offer aerospace engineering at undergraduate level and 75 at postgraduate level.
- Only 8,000 [aerospace engineers](#) graduate annually — 0.5% of India's total engineering graduates.
- About 30% of hires are fresh graduates and the rest are lateral hires from sectors like automotive or metallurgy.

Significance of Private Sector in India's Space Ecosystem:

- Innovation Driver** — Develops cutting-edge technologies in rocketry, propulsion, satellite systems, and sensors.
- Economic Growth** — Contributes to India's \$9 billion space economy target by 2030.
- Global Competitiveness** — Enhances India's position in the global launch and satellite services market.
- Diversification** — Reduces dependence on [ISRO](#) for all space-related R&D and launches.
- Employment Creation** — Generates high-skilled jobs in aerospace, materials science, and advanced manufacturing.

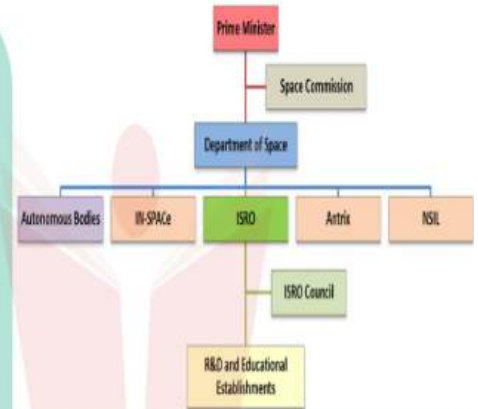


Private sector Participation in Space sector

Presently, the global space Industry is worth \$400 billion and is set to touch \$1 trillion by 2040. And, India's participation is just 2% of this mammoth share. Hence, the imperative for the private sector to play a bigger role.

Examples of Private sector participation:

- Skyroot Aerospace:** Recently, it launched Vikram-S, India's first private rocket.
- Airtel-backed OneWeb** is in the process of launching 648 small satellites in LEO mode to provide its high-speed satellite internet service.
- Chennai's SRM University** has built the **SRMSat** (for monitoring carbon dioxide and water vapour)
- Dhruva Space:** The company launched Thybolt-1 and Thybolt-2.
- Agnikul Cosmos:** It develops rockets (using 3-D printing) fuelled by its patented semi-cryogenic engines
- Digantara:** For addressing space junk.
- Pixxel:** It will build a constellation of 24 hyper spectral micro satellites which will act as an "MRI scanner" of Earth.



Benefits of Private sector participation in Space

- Reforms to help India leapfrog to next stages of space activities; to become a **Global technology powerhouse**
- To enhance socio-economic use of space assets & activities; **Large-scale employment opportunity in technology sector**
- IN-SPACE** to provide level playing field for private companies to use Indian space infrastructure
*Indian National Space Promotion and Authorization Centre
- NSIL** to reorient space activity models from 'supply driven' to a 'demand driven'
*New Space India Limited
- Allow ISRO to focus more on R&D activities, exploration missions & human spaceflight programs



Skyroot Aerospace Private (HQ: Hyderabad) was founded by former engineers and scientists from ISRO

Existing Crisis in Space Sector Talent:

- Limited Academic Exposure** — Very few institutes offer deep specialisation in space-specific domains like photonics, optical engineering, and cryogenics.
- Brain Drain** — Skilled graduates often opt for higher-paying overseas jobs.
- Training Burden** — Startups spend months to years upskilling recruits before they contribute to projects.
- Low Awareness** — Students rarely consider space sciences due to perceived limited job prospects.
- Fragmented Ecosystem** — Lack of industry-academia partnerships for curriculum design.

Government Initiatives Taken:

- **IN-SPaCE Engagement** – Collaborations with AICTE to introduce space-focused curricula in engineering colleges.
- **Skill Development Programs** – Short-term certification courses, such as “Space Technology in Agriculture” with Amity University.
- **Policy Support** – Liberalised [FDI norms](#) in the space sector to attract investments and encourage private R&D.
- **Make in India Push** – Incentives for manufacturing space components domestically to create a skilled supply chain.

Way Ahead:

- **Specialised Academic Programs** – Introduce dedicated degrees and research tracks in niche space technologies at IITs, NITs, and private universities.
- **Industry-Led Training** – Create apprenticeship models linking students directly with startups for hands-on learning.
- **Competitive Pay Structures** – Offer salaries closer to global benchmarks to retain talent.
- **International Collaboration** – Partner with global space agencies and firms for knowledge exchange.
- **Long-Term Talent Pipeline** – Integrate space science modules into school-level [STEM curricula](#).

Conclusion:

India’s private space sector stands at the cusp of major global breakthroughs, but the talent gap threatens to slow its ascent. Bridging this divide will require coordinated action between academia, industry, and government. Only with a robust, well-trained workforce can India’s space ambitions truly take flight.

Topics: Awareness in the fields of IT, Computers, robotics, nano-technology, bio-technology and issues relating to intellectual property rights.

SATELLITE INTERNET

Context:

Starlink, Elon Musk’s satellite internet service, is set to enter India, marking a major shift in digital connectivity and strategic communication capabilities.

About Satellite Internet:

What is Satellite Internet?

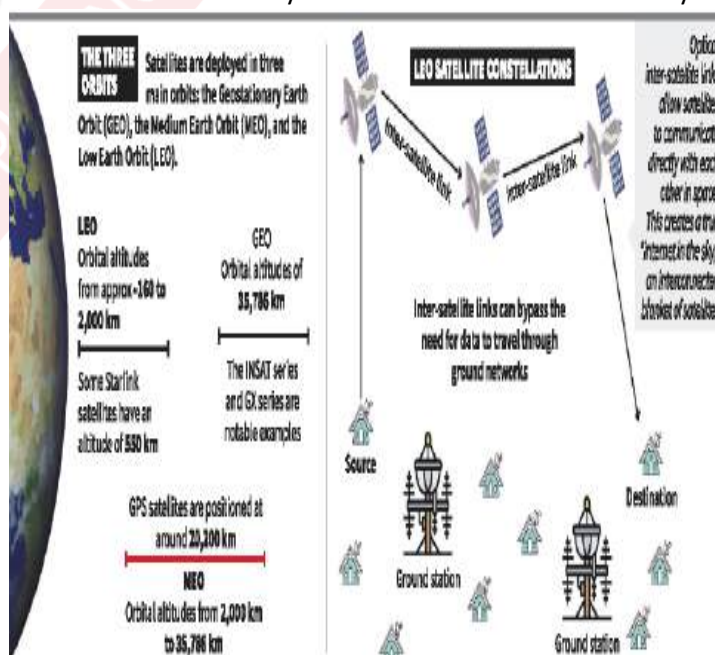
Satellite internet is a **wireless communication technology** that delivers internet access via satellites in space, instead of traditional cables or [fiber-optic lines](#). It consists of satellites in orbit, ground stations, and user terminals.

Need for Satellite Internet:

- **Bridging Digital Divide** – Delivers internet to remote, rural, and island communities where building terrestrial networks is costly and slow.
- **Disaster Resilience** – Restores communication quickly after floods, earthquakes, or cyclones disrupt ground-based infrastructure.
- **On-the-Move Connectivity** – Provides stable internet to moving ships, aircraft, and defence convoys in any terrain.
- **Strategic Security** – Maintains secure links in high-altitude conflict zones like Siachen, enhancing military readiness.
- **Economic Inclusion** – Boosts e-governance, e-commerce, and telemedicine for underserved populations.

Key Features:

- **Global Coverage** – Operates seamlessly across oceans, deserts, mountains, and polar regions.
- **Dual-Use Technology** – Serves both civilian needs and sensitive military operations.
- **Rapid Deployment** – Can be activated within hours to meet urgent connectivity demands.
- **Resilience** – Functions independently of local cables and towers, avoiding physical damage risks.
- **Mega-Constellations** – Uses thousands of satellites to lower latency and ensure network redundancy.



How it works?

- **Space Segment:** Satellites equipped with communication payloads orbit the Earth, capturing signals from the ground and transmitting them to other satellites or down-to-Earth stations. The payload includes antennas, transponders, and onboard processors that handle data routing.
- **Ground Segment:** This includes user terminals, antennas, and ground stations that link devices

to the satellites. User terminals can be fixed or portable, enabling households, vehicles, or ships to connect without [traditional telecom towers](#).

- **Data Flow:** When a user sends a request (like loading a webpage), the signal travels from the terminal to the satellite, which relays it to a ground station connected to the internet backbone. The return signal follows the same path in reverse, ensuring global data exchange.
- **Seamless Handover:** Low Earth Orbit ([LEO](#)) satellites move quickly, staying over a user's location for only a few minutes. As one satellite moves out of range, the system automatically hands over the connection to the next satellite in line, ensuring uninterrupted service without user intervention.

Differences Between Satellite Orbits:

<u>Orbit Type</u>	<u>Altitude</u>	<u>Advantages</u>	<u>Limitations</u>	<u>Example</u>
GEO	~35,786 km	Large coverage; stable position	High latency; no polar reach	Viasat Global Xpress
MEO	2,000–35,786 km	Balanced coverage & latency	Needs multiple satellites	O3b Network
LEO	<2,000 km	Low latency ; cheaper satellites	Small footprint; needs mega-constellation	Starlink

Applications:

- **Civilian** – Extends broadband to villages, aids smart farming, and supports environmental monitoring.
- **Disaster Management** – Coordinates rescue and relief in hurricane, flood, and earthquake zones.
- **Defence** – Enables secure battlefield communication, [drone operations](#), and intelligence sharing.
- **Transport** – Improves safety and navigation in aviation, shipping, and autonomous vehicles.
- **Healthcare** – Facilitates telemedicine and real-time health monitoring in remote areas.
- **Space Economy** – Strengthens global trade, tourism, and exploration capabilities.

Conclusion:

Satellite internet is not just a technological upgrade—it's a strategic enabler for national security, economic growth, and digital equity. India must integrate it into national resilience plans while strengthening indigenous capabilities to ensure autonomy in this emerging domain.

AI AND THE RESTRUCTURING OF INDIA'S INFOTECH SECTOR

Context:

India's IT sector is undergoing major restructuring as AI adoption accelerates, driving changes in business models, workforce strategies, and client services. Recent [TCS moves](#), including hiring freezes and job cuts, reflect the industry's shift towards AI-first, efficiency-driven operations.



About AI and the Restructuring of India's Infotech Sector: Drivers of the Shake-Up:

- **Productivity Surge** – AI tools for coding, debugging, and testing speed up software development, improving efficiency by over 30% and reducing delivery timelines.
- **Shift in Business Models** – Traditional manpower-heavy outsourcing is giving way to AI-driven, high-value, outcome-focused service delivery.
- **Global Client Demands** – International clients seek partners to modernise outdated systems, clean vast datasets, and comply with evolving [AI regulations](#).
- **Cost Optimisation Pressure** – AI reduces operational costs by automating repetitive tasks, aligning with investor demands for better margins.
- **Technology Maturity** – Generative AI, low-code platforms, and automation are now stable, scalable, and ready for enterprise-level deployment.

Opportunities for Indian IT Firms:

- **Global AI Adoption Partners** – Indian firms can help global companies implement AI responsibly, ensuring compliance and seamless integration.
- **Niche Specialisation** – Targeting AI solutions for specific sectors like healthcare, defence, and climate science opens high-value markets.
- **Data Governance Expertise** – Building AI models that prioritise privacy, fairness, and security to meet global data protection laws.
- **Innovation Hubs** – Leveraging India's [STEM talent](#)

to create AI-driven intellectual property and commercial products.

- **SME Advantage** – Agile, AI-native small firms can deliver innovative solutions faster than large bureaucratic organisations.

Challenges in the AI Transition:

- **Workforce Displacement** – Routine coding, maintenance, and back-office roles risk automation, affecting mid-level IT jobs.
- **Skill Shortage** – There is a mismatch between demand for AI-skilled professionals and current workforce capabilities.
- **Cultural Shift Resistance** – Firms and employees may struggle to adapt from billable-hour models to IP-led value creation.
- **Regulatory Compliance** – Meeting international [AI ethics](#), transparency, and data privacy standards adds operational complexity.
- **Infrastructure Gaps** – Limited high-performance computing and research facilities slow AI innovation and scalability.

Policy & Government Role:

- **National AI Mission** – Promotes AI research, infrastructure creation, and workforce skill development at a national scale.
- **Digital India & Data Governance** – Strengthens secure and responsible AI adoption through robust digital policies and privacy frameworks.
- **Higher Education Reform** – Integrates AI, ML, and ethics into academic curricula to prepare future-ready professionals.
- **Incentives for AI Startups** – Offers tax breaks, funding, and IP support to encourage deep-tech entrepreneurship.
- **Global Tech Alliances** – Builds strategic partnerships for AI research, product co-development, and international market entry.

Way Forward:

- **AI Reskilling Programmes** – Launch mass-scale training to upskill existing IT talent for AI-centric roles.
- **Ethical AI Leadership** – Establish India as a global hub for certifying responsible and fair AI practices.
- **Encouraging IP Creation** – Promote AI innovation through patent support for algorithms, applications, and platforms.
- **Support AI Clusters** – Develop specialised AI hubs in major and emerging tech cities to spur innovation.
- **Client-Centric Transformation** – Shift positioning from outsourced vendor to strategic AI solutions partner for global clients.

Conclusion:

AI is redefining India's infotech sector, shifting from the "back office of the world" to an AI-first innovation economy. Agility, niche expertise, and ethical leadership will drive success, requiring a move from scale-driven services to [value-driven solutions](#) that make Indian IT indispensable for global AI adoption.

[Topics: Conservation related issues, environmental pollution and degradation, environmental impact assessment.](#)

EXTREME HEAT AND THE FUTURE OF WORK

Context



The WHO–WMO report **Climate Change and Workplace Heat Stress (2025)** highlights how rising global temperatures are creating a severe occupational health and productivity crisis. With **2024 the warmest year on record (1.45°C above pre-industrial levels)**, both outdoor and indoor workers face growing risks.

1. Key Findings of the WHO–WMO Report

1. **Productivity Losses** – Each 1°C rise in WBGT above 20°C reduces productivity by 2–3%; sun exposure adds another 2–3°C risk.
2. **Scale of Exposure** – Over 2.4 billion workers affected; annually 22.85 million injuries, 18,970 deaths, and 2.09 million DALYs linked to heat stress.
3. **Geographical Hotspots** – 30% of the world's population faces heat stress as an everyday or seasonal problem, with South Asia, Middle East, and Sub-Saharan Africa worst hit.
4. **Health Impacts** – Over one-third of workers in hot conditions report physiological heat strain. [WHO guidance](#) (1969) states that core body temperature should not exceed 38°C during an 8-hour shift, but this is increasingly breached.

5. **Climate Change Dimension – 40–50°C daytime peaks** now frequent, spreading risks beyond tropics; worker fatalities recorded in **Europe’s 2023 heatwaves**.

2. Implications

1. **Public Health Strain** – Heat stress raises risks of heat stroke, kidney disease, and cardiovascular collapse. India's **brick kiln workers, who often start before sunrise to avoid peak heat, still suffer dehydration, dizziness, and lost wages due to shortened work hours.**
 2. **Economic Productivity Loss** – ILO projects **34 million jobs equivalent could be lost in India by 2030** in agriculture and construction; developing economies face GDP shrinkage.
 3. **Social Inequality** – The poor, migrant labourers, and women workers disproportionately bear the risks due to lack of safeguards, e.g., Gulf migrant construction deaths.
 4. **Climate Justice Challenge** – [Countries contributing least](#) to emissions, like Bangladesh and Sub-Saharan Africa, endure the harshest impacts, worsening global inequity.
 5. **Food Security Risks** – Declining agricultural labour productivity threatens crop cycles and farmer incomes, compounding hunger and malnutrition in vulnerable regions.
 6. **Legal and Institutional Burden** – Rising cases of occupational illness may overwhelm compensation systems and labour courts, exposing gaps in occupational safety laws.
- ### 3. What can be done?
1. **Occupational Heat Action Plans:** Cities should adopt early warning systems, reschedule work timings, and train communities.
Example: The **Ahmedabad Heat Action Plan (India)** provides heat alerts, shaded shelters, and worker training, reducing mortality during heatwaves.
 2. **Infrastructure & Technology:** Cooling shelters, shaded work zones, hydration points, and mechanisation can reduce manual strain.
Example: **Bangladesh garment sector pilots** introduced low-cost ventilation and cooling fans in factories, cutting worker fatigue.
 3. **Labour Policy Reforms:** Enforce heat-index-based work-hour regulations, paid rest breaks, and compensation for heat-linked illnesses.
Example: **Qatar's labour law** bans outdoor work from **10 am–3:30 pm during peak summer**, ensuring rest breaks in shaded areas.
 4. **Public Health Measures:** Regular health screenings, hydration protocols, and recognition of heat stress as an occupational disease.
Example: **US OSHA's "Water–Rest–Shade" campaign** institutionalises mandatory hydration and rest periods in outdoor industries.

5. **Global & National Coordination:** Mainstream heat stress into ILO conventions, COP climate talks, and SDG frameworks, with adaptation finance for vulnerable economies.

Example: **Australia's workplace safety standards** integrate climate projections for mining and agriculture, making them future-ready.

Conclusion

Extreme heat is no longer only an environmental challenge but a core labour rights and economic resilience issue. Safeguarding workers through heat-adaptive policies and best practices is vital to protect health, productivity, and dignity in a warming world.

REVIVAL OF REEFS IN THE GULF OF MANNAR

Context:

Coral reefs in the Gulf of Mannar, Tamil Nadu, are witnessing revival through two decades of scientific restoration efforts.



About Revival of Reefs in the Gulf of Mannar:

Coral Reefs:

- Coral reefs are **marine ecosystems** formed by calcium carbonate structures secreted by corals.
- Known as “**rainforests of the sea**”, they:
 - Support ~25% of marine biodiversity.
 - Protect coastlines from erosion.
 - Provide livelihood through fisheries and eco-tourism.
- **Gulf of Mannar reefs:** Spread across **21 islands**, rich in **Acropora, Montipora, Porites** and other species.

Causes of [Coral Degradation](#):

1. **Anthropogenic Causes:**

- o Coral mining (1960s–1990s).
- o Overfishing, destructive fishing gear, pollution.
- o Coastal development, sedimentation.

2. **Climate Change Causes:**

- o Rising sea surface temperatures → **mass bleaching (2010, 2016)**.
- o Ocean acidification reducing resilience.

[Coral Restoration Efforts in Gulf of Mannar](#):

- Led by SDMRI & Tamil Nadu Forest Department (since 2002).
- **Methods:**
 - o **Artificial substrates** – concrete frames, clay pots, cement slabs.
 - o **Artificial Reef Modules** – Triangular (TARs) & Perforated Trapezoidal (PTARs).
 - o 20 coral species transplanted; fast-growing *Acropora* showed highest survival.
- **Scale:**
 - o **51,183 coral fragments transplanted on 5,550 substrates.**
 - o Restored ~**40,000 sq. m** of degraded reefs.

Outcomes:

- **Survival Rate:** 55–79%, with some species showing **89% survival**.
- **Biodiversity:** Coral recruits in TARs rose from 1.23 (2004) to 24.77 (2020).
- **Fish Density:** Rose from 14.5 (2006) to 310 (2020) per 250 m².

Challenges to Coral Reefs:

- **Repeated bleaching due to global warming** – Rising sea surface temperatures stress corals, expelling symbiotic algae and leading to large-scale mortality events.
- **High cost and labour intensity of restoration** – Coral transplantation and artificial reef deployment require trained divers, resources, and long-term monitoring, making it expensive.
- **Dependence on fast-growing species risks genetic imbalance** – Overuse of *Acropora* corals in restoration increases vulnerability to diseases and reduces ecosystem stability.
- **Ongoing pressures – plastic pollution, coastal projects, tourism** – Marine debris, unregulated coastal development, and mass tourism degrade coral habitats and disrupt natural recovery.

Way Ahead:

- **Scale up restoration across [Gulf of Mannar](#) and other reef sites in India** – Expand successful models to Andaman, Lakshadweep, and Lakpat reefs to cover more degraded zones.

- **Train local fishing communities as reef guardians** – Empowering coastal communities ensures stewardship, sustainable fishing, and long-term coral monitoring.
- **Use technology – AI, drones, remote sensing for monitoring** – Advanced tools enable large-scale reef mapping, bleaching alerts, and real-time tracking of coral health.
- **Develop heat-resistant coral strains via assisted evolution** – Breeding or genetically enhancing corals for higher thermal tolerance can reduce bleaching vulnerability.
- **Strengthen global partnerships under SDG-14 & Paris Agreement** – International cooperation provides funding, technology, and shared best practices for reef conservation.

Conclusion:

The revival of corals in the [Gulf of Mannar](#) proves that **scientific innovation, policy support, and community participation** can bring marine ecosystems back from the brink. It is a **model for climate adaptation and biodiversity conservation**. Sustained efforts will ensure that India's reefs remain both an **ecological treasure and a livelihood source**.

GENEVA DEADLOCK: GLOBAL PLASTIC TREATY TALKS FAIL AGAIN

Context:

The latest round of [Global Plastic Treaty](#) negotiations in Geneva ended in a deadlock for the second time in eight months, with fundamental disagreements over scope, ambition, and legally binding measures against plastic pollution.



About [Geneva Deadlock: Global Plastic Treaty Talks Fail Again](#)

- **What it is?**
 - o A proposed **legally binding international agreement** to tackle plastic pollution across its full life cycle — from production to disposal — including impacts on the marine environment.
- **Organised by:** Intergovernmental Negotiating

Committee (INC) under the **United Nations Environment Programme (UNEP)**.

- **Objective:** To create a comprehensive global framework addressing plastic pollution, including production cuts, toxic chemical control, waste management, and support for developing countries through finance and technology transfer.

Need for a Plastic Pact:

- **Environmental Urgency** – Plastic waste persists for centuries, harming marine life, contaminating soils, and disrupting ecosystems across borders.
- **Health Impact** – Microplastics enter [food chains](#) and water systems, while toxic additives in plastics pose risks to human organs and hormonal balance.
- **Climate Link** – Plastic production is [fossil fuel-intensive](#), contributing significantly to greenhouse gas emissions and accelerating climate change.
- **Economic Burden** – Managing plastic waste strains public budgets and causes losses in fisheries, tourism, and agriculture due to pollution damage.
- **Global Nature** – [Plastic debris](#) travels through oceans and trade routes, making pollution a shared global challenge that needs coordinated solutions.

Reasons Behind Failure:

- **Scope Disagreement** – No consensus on whether to include production cuts and full life-cycle measures.
- **Divergent Blocs** –
 - **High-Ambition Coalition** (Norway, EU, UK, etc.): Push for binding production cuts, chemical restrictions, and health safeguards.
 - **Like-Minded Group** (oil-producing nations incl. Kuwait, Saudi Arabia, Iran, Russia, supported by China & India): Oppose production caps, emphasise development needs.
- **Contentious Provisions** – Opposition to global phase-out lists for single-use plastics and to binding rules on polymer production.
- **Financial Mechanism Disputes** – Lack of agreement on equity-based financing, technology transfer, and historical responsibility principles.
- **Consensus Deadlock** – Reliance on full consensus allowed a small group to veto progress.
- **Draft Weaknesses** – Initial draft seen as diluted, focusing on voluntary measures rather than strong binding commitments.

Way Ahead:

- **Decision-Making Reform:** Shift to hybrid models – consensus as default, but allow majority voting to break stalemates.
- **Balanced Treaty Design:** Address both environmental goals and development concerns through flexible timelines, [differentiated responsibilities](#), and just transition measures.

- **Science-Based Targets:** Set global caps on harmful plastics and chemicals, supported by mandatory product design standards.
- **Implementation Support:** Ensure adequate finance, [technology transfer](#), and capacity building for developing countries.
- **Health Focus:** Include dedicated provisions on health impacts of plastics.
- **Integration:** Align treaty provisions with existing global environmental agreements to avoid overlap.

Conclusion:

The Geneva deadlock highlights the fragility of consensus-based global negotiations in addressing urgent environmental crises. Without balancing ambition with equity and introducing decision-making reforms, the treaty risks becoming ineffective. The world cannot afford further delays — the costs of inaction on [plastic pollution](#) will far outweigh the challenges of forging agreement.

GROUNDWATER CONTAMINATION IN INDIA

Context:

The 2024 [Annual Groundwater Quality Report](#) by the Central Ground Water Board (CGWB) has revealed widespread contamination by nitrates, fluoride, arsenic, uranium, heavy metals, and pathogens in over 440 districts across India, threatening the health of millions and undermining water security.



About Groundwater Contamination in India:

What it is?

- Groundwater is the lifeline of India's water economy—**over 85%** of rural drinking water and **65%** of irrigation needs come from aquifers.
- Once regarded as a pure and safe source, groundwater is increasingly tainted by **industrial waste, agricultural chemicals, and geogenic toxins**, creating a silent crisis.
- Unlike droughts or floods, groundwater contamination is **invisible, cumulative, and**

irreversible—making it one of India's gravest environmental and health challenges.

Sources of Contamination

- **Anthropogenic (Human-Induced) Sources**
 - **Agricultural Runoff** – Overuse of chemical fertilisers and pesticides causing nitrate and phosphate leaching.
 - **Industrial Discharge** – Heavy metals (lead, cadmium, mercury) and chemicals from factories entering aquifers.
 - **Sewage and Septic Leaks** – Pathogen-rich wastewater infiltrating groundwater in peri-urban and rural areas.
 - **Underground Fuel Leakage** – Petroleum seepage contaminating drinking water sources.
- **Geogenic (Natural) Sources**
 - **Fluoride** – Naturally occurring in certain rocks; worsened by over-extraction.
 - **Arsenic** – Mobilised in Gangetic aquifers due to groundwater pumping.
 - **Uranium** – Present in certain geological formations, aggravated by phosphate fertilisers.

Key Contaminants and Health Impacts:

Contaminant	Source	Health Impacts	Hotspot States/Districts
Nitrates	Fertilisers, sewage	Blue Baby Syndrome, cancer risk	Punjab, Haryana, Karnataka
Fluoride	Geogenic, fertilisers	Dental & skeletal fluorosis	Rajasthan, Andhra Pradesh, Telangana
Arsenic	Geogenic, mining, over-pumping	Skin lesions, cancer, gangrene	Bihar, West Bengal, U.P.
Uranium	Geogenic, fertilisers	Kidney damage, organ toxicity	Punjab (Malwa region)
Heavy Metals	Industrial waste	Neurological damage, anaemia	Kanpur, Vapi
Pathogens	Sewage leaks	Cholera, dysentery, hepatitis	Odisha, U.P.

Structural and Governance Issues:

- **Fragmented Institutional Framework** – [CGWB](#), [CPCB](#), [SPCBs](#), and [MoJS](#) work in silos without integrated water quality governance.
- **Weak Legal Enforcement** – The Water (Prevention and Control of Pollution) Act, 1974 scarcely covers groundwater; compliance is poor.
- **Poor Monitoring** – Limited frequency, outdated

equipment, and lack of real-time public data.

- **Over-Extraction** – Lowering water tables concentrates pollutants and draws in deeper geogenic toxins.
- **Industrial & Urban Waste Mismanagement** – Ineffective waste treatment, illegal discharges, and minimal penalties.

Policy and Reform Recommendations:

- **Legal & Institutional Strengthening:**
 - Empower **CGWB** with statutory powers to regulate quality and extraction.
 - Establish a **National Groundwater Pollution Control Framework** for coordinated action.
- **Monitoring & Early Warning:**
 - Deploy **real-time water quality sensors** and remote sensing tools.
 - Integrate water quality with **public health surveillance** ([HMIS](#), [IHIP](#)).
- **Targeted Mitigation:**
 - Install **arsenic and fluoride removal plants** in hotspot areas.
 - Expand **pipd drinking water** under [Jal Jeevan Mission](#) to reduce dependence on contaminated wells.
- **Waste & Industrial Control:**
 - Mandate **Zero Liquid Discharge (ZLD)** for industries.
 - Strict regulation of landfills and industrial clusters.
- **Agricultural Reforms:**
 - Promote **organic farming** and integrated nutrient management.
 - Regulate nitrogen-based fertiliser use through pricing and awareness.
- **Community Engagement:**
 - Involve **panchayats and water user groups** in testing and reporting.
 - School-based water literacy campaigns for behavioural change.

Conclusion:

Groundwater contamination in India is no longer a hidden problem—it is a **public health emergency**. The crisis demands **urgent, multi-sectoral action** that combines science, governance, and citizen participation. Without immediate intervention, the cost will be paid in **lives lost, ecosystems damaged, and futures compromised**.

UNLOCKING A \$200 BILLION OPPORTUNITY: ELECTRIC VEHICLES IN INDIA REPORT

Context:

[NITI Aayog](#) launched a new report outlining India's pathway to unlocking a \$200 billion EV market opportunity. It highlights key reforms and investment strategies needed to achieve accelerated EV adoption by 2035.

Figure 2: EV Penetration Rate – Global & India

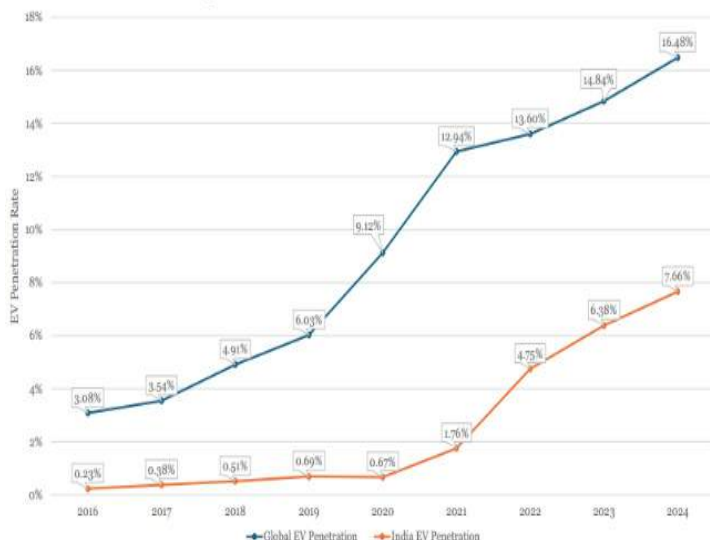
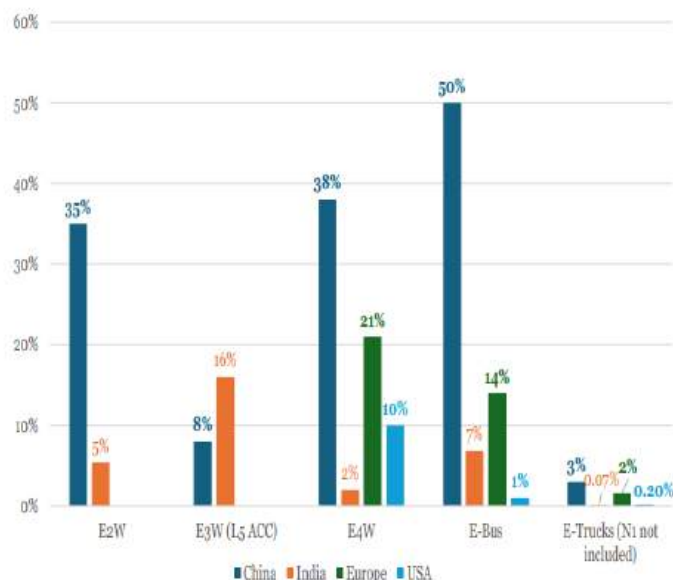


Figure 7: EV penetration rate across China, India, Europe & US in different vehicle segments in 2023²



About Unlocking a \$200 Billion Opportunity: Electric Vehicles in India Report:

Key Summary:

- **\$200 Billion EV Market Potential:** India's EV market could generate a \$200 billion opportunity by 2035 through jobs, manufacturing, and clean mobility.
 - This growth can avoid 1 gigatonne of CO₂ and save ₹3.7 lakh crore in oil imports.
- **EV Sales Growth Trend:** EV share in total vehicle sales rose from 0.5% in 2018 to 7.7% in 2024, reflecting

rising affordability and awareness.

- Over **6.5 million EVs** now run on Indian roads, with **12 lakh EVs** registered in 2024 alone.
- **Public Charging Gaps:** India had **25,000 public EV chargers** as of October 2024, with a projected need of **2.9 million** by 2035.
- **Policy Progress at State Level:** 29 States/UTs have notified EV policies, and 4 more are in the draft stage.
- **Battery Demand & Localisation:** India will need 250+ GWh of annual battery demand by 2035 to meet EV targets.
- **Job Creation Potential:** EV sector can generate over **10 million direct and indirect jobs** in manufacturing, servicing, recycling, and charging.
- **Carbon Emission & Energy Benefits:** A rapid EV shift could save 474 million tonnes of oil equivalent (MTOE) and cut 839 MtCO₂e emissions by 2035.

Opportunities from EV Transition

- **Energy Resilience:** India can significantly reduce dependence on crude oil imports, saving foreign exchange and enhancing energy security.
- **Green Manufacturing:** EV transition fuels domestic production of batteries, components, and vehicles under the [Atmanirbhar Bharat vision](#).
- **Urban Mobility Reform:** EVs facilitate a shift towards clean, efficient, and shared public transport systems in cities.
- **Innovation Ecosystem:** The sector promotes R&D in battery tech, software, and platform-based mobility startups.
- **Sustainable Infrastructure:** EV adoption pushes the development of smart grids, charging networks, and energy-efficient urban planning.

Five Unlocks for Accelerated EV Transition:

- **Stable Policy Architecture:** Long-term, coherent [EV policies](#) across central and state levels reduce investor uncertainty.
- **Low-cost Financing:** EV buyers, especially in informal sectors, need access to affordable green loans and credit insurance.
- **EV Ecosystem Development:** India must build full value chains for batteries, motors, and electronics, including recycling and reuse.
- **Public Charging Expansion:** India needs 2.9 million public chargers by 2035 to support wide-scale EV deployment.
- **Incentivising Adoption:** Demand-side measures like subsidies, tax cuts, and carbon credits can offset high upfront EV costs.

Challenges Highlighted

- **High Upfront EV Cost:** Battery costs make EVs costlier than ICE vehicles, deterring mass adoption.
- **Limited Financing Access:** Low credit penetration

and risk-averse lenders restrict EV loans for MSMEs and individual buyers.

- **Patchy Charging Infra:** Charging stations are concentrated in metros, leaving rural and Tier-2 areas underserved.
- **Low R&D in Recycling:** [Battery recycling](#) technologies and local EV component manufacturing remain underdeveloped.
- **Policy Fragmentation:** EV policies vary widely across states, lacking national coordination or data interoperability.

Way Forward:

- **Green Mobility Missions:** National-level coordination can unify and strengthen EV policies across states.
 - **Codify Mission EV@30** under Cabinet with cross-ministry representation.
- **Battery Localization:** India must [localise battery cell](#) production and secure critical minerals for long-term cost efficiency.
- **Unified Green Transport Fund:** A pooled fund can finance EV infra, vehicle subsidies, retrofitting, and public transit electrification.
- **EV Readiness Index for States:** Expanding [IEMI 2024](#) into a dynamic tracking tool can drive state-wise competition.
- **Just Transition:** ICE sector workers should be retrained in EV servicing, manufacturing, and R&D.

Conclusion:

India's EV transition is not merely a climate imperative but a multi-sectoral opportunity. If the country acts decisively on financing, localisation, and infrastructure, it can lead the world in affordable, inclusive electric mobility while advancing energy security, job creation, and technological self-reliance.

ETHANOL BLENDING IN INDIA: PROMISE OF CLEANER FUEL VS RISKS TO ENGINE EFFICIENCY

Context:

India achieved its [E20](#) (20% ethanol-blended petrol) target by early 2025, ahead of schedule under the Ethanol Blended Petrol Programme. However, growing concerns over engine wear, fuel efficiency loss, and lack of consumer readiness are raising new challenges.

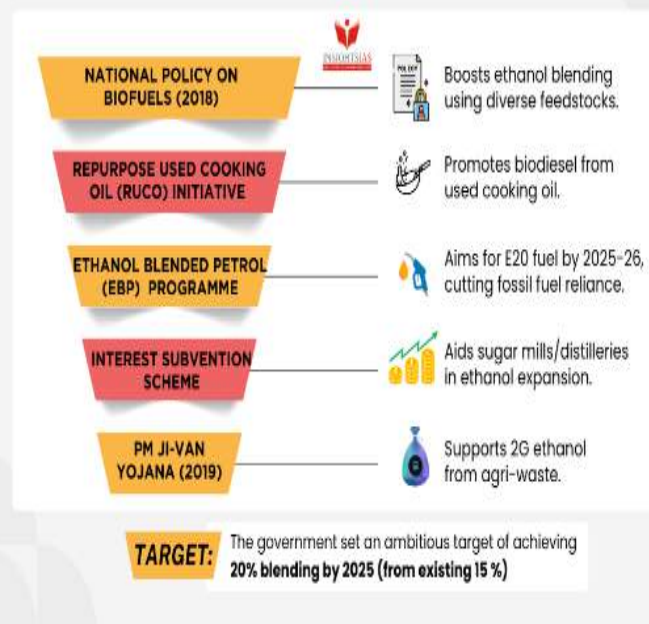
About [Ethanol Blending in India: Promise of Cleaner Fuel vs Risks to Engine Efficiency](#):

What is Ethanol Blending?

- **Definition:** Ethanol blending refers to mixing ethanol (biofuel derived from biomass like sugarcane, corn, or rice) with petrol in ratios like E10, E20, etc.
- **Benefits:**

- Reduces greenhouse gas emissions and urban air pollution.
- Saves forex by cutting oil imports (estimated ₹1–1.5 lakh crore annually).
- Promotes renewable energy and supports rural agro-industries.

GOVERNMENT SCHEMES PROMOTING ETHANOL PRODUCTION



India's Policy Trajectory:

- **E10 target** achieved by 2022.
- **E20 achieved** by March 2025 (ahead of ESY 2025–26 deadline).
- **New target:** E30 blending by 2030, with food grain and 2G bioethanol as feedstocks.

Initiatives taken for ethanol blending:

- **Ethanol Blended Petrol (EBP) Programme:**
 - Launched in 2003 to blend ethanol with petrol for cleaner, sustainable fuel.
 - Achieved 20% blending ahead of the 2025–26 target, rising from 1.53% in 2014 to 20% in 2025.
- **National Policy on Biofuels (2018):**
 - Expanded feedstock base beyond molasses to include sugarcane juice, corn, rotten potatoes, etc.
 - Allowed use of FCI surplus grains, offering income avenues to farmers and managing excess stock.
- **Financial and Regulatory Measures:**
 - Introduced **fixed ethanol pricing** by OMCs to ensure stable returns for producers.
 - Offered interest subvention and capital aid for setting up molasses- and grain-based distilleries.

- **Reduced GST** on ethanol (EBP) from 18% to 5% to promote cost-efficiency.
- Signed **Long-Term Offtake Agreements (LTOAs)** to provide assured demand and revenue certainty.
- **Infrastructure and Technology Development:**
 - **PM-JI-VAN Yojana** promotes 2G ethanol from agri-waste like rice straw, reducing crop burning.
 - Norms for E20 and **draft rules for E100 vehicles** released, OEMs now produce E20-compliant models.
 - Over 17,000 outlets now retail E20 fuel and dedicated E100 pumps are being deployed.
- **Roadmap and Global Alliances:**
 - **"Ethanol Blending Roadmap 2020–25"** guides blending targets and policy alignment.
 - India-led **Global Biofuels Alliance (GBA)** aims to harmonise global biofuel efforts and standards.

Technical & Environmental Concerns:

1. **Corrosion & Engine Wear:**
 - Ethanol absorbs moisture (hygroscopic), leading to:
 - Corrosion of metal parts.
 - Breakdown of plastic/rubber hoses and seals.
 - Fuel system clogging due to deposit stripping.
2. **Fuel Efficiency Drop:**

According to the NITI Aayog–MoPNG report:

 - E20 causes **6–7% mileage loss** in 4-wheelers and **3–4% in 2-wheelers**.
 - No parallel drop in fuel prices → user pays more per km.
3. **Cold Start and Performance:**
 - Higher blends like E20–E85 affect engine ignition in cold weather.
 - Rough idling, stalling, or lower acceleration observed in older engines.
4. **Limited Vehicle Compatibility:**
 - Most Indian two-wheelers are calibrated only for E10.
 - Absence of **flex-fuel vehicles** or retrofit regulations for E20+ in mass segments.

Industry Readiness and Infrastructural Challenges:

- **Automakers:** SIAM calls for tech upgrades and regulatory clarity.
- **Fuel Retailers:** Need ethanol-compatible storage, pipeline, and pump systems.
- **Feedstock Risks:** Reliance on sugarcane and maize may hurt food security unless 2G bioethanol scales up.

Policy Recommendations:

1. **Engine Compatibility:** Notify clear certification standards and incentivise rollout of flex-fuel vehicles designed for E20 and above.
2. **Mileage Loss:** Provide tax rebates (e.g., GST reductions or mileage-linked incentives) to offset consumer costs from reduced fuel efficiency.
3. **Fuel Pricing:** Consider differentiated pricing for blended fuels to reflect lower mileage and ensure consumer fairness.
4. **Infrastructure Upgrade:** Modernize fuel retail systems with ethanol-resistant pipelines, storage tanks, and dispensing units nationwide.
5. **Feedstock Diversification:** Promote second-generation (2G) ethanol using agricultural waste to avoid food security concerns and ensure supply stability.

Conclusion:

India's ethanol blending program holds promise for energy security and climate goals. But to make it sustainable, the transition must be consumer-centric, technically compatible, and backed by robust vehicle, fuel, and infrastructure reforms. Ethanol must not become a green solution that corrodes public trust.

CHANGING TRENDS IN INDIA'S PESTICIDE MARKET

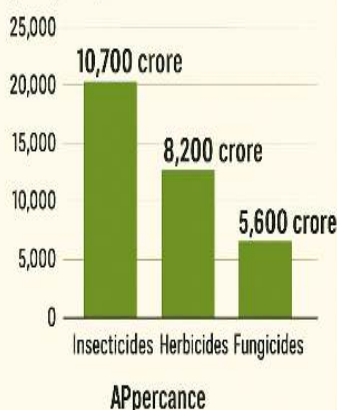
Context:

India's crop protection market is witnessing a structural shift, with herbicides emerging as the fastest-growing segment. This transformation is driven by farm labour shortages and increasing mechanisation, particularly in **paddy cultivation**.

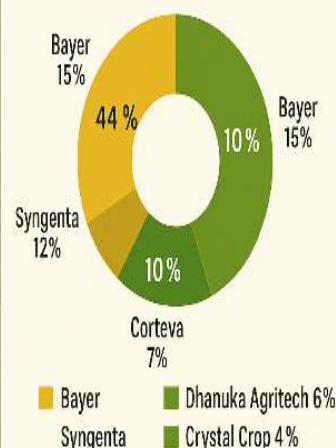
CHANGING PESTICIDE TRENDS IN INDIA

MARKET SIZE AND GROWTH

Total organized crop protection market (2025): ₹24,500 crore



MARKET CONCENTRATION



About Changing Trends in India's Pesticide Market:

- **Definition:** Crop protection chemicals (pesticides) include insecticides (against pests), fungicides (against fungal infections), and herbicides (against weeds).
- **Market Size:** India's organised pesticide market is valued at ₹24,500 crore.
- **Segment Share (2025):**
 - **Insecticides:** ₹10,700 crore
 - **Herbicides:** ₹8,200 crore
 - **Fungicides:** ₹5,600 crore

Drivers Behind Herbicide Boom:

1. Rural Labour Shortage:

- Manual weeding is time-consuming and physically taxing, with rising wage rates (₹447/day in 2024 vs ₹326 in 2019).
- Labour unavailability during peak weeding season leads to productivity loss.
- Herbicides have become substitutes for physical weeding, akin to mechanisation.

2. Cost-Efficiency and Timeliness:

- Manual weeding takes 8–10 hours/acre and herbicide application takes 1–2 hours.
- Pre-emergent and early post-emergent [herbicides](#) allow preventive weed control, improving yield and reducing effort.

3. Rise of Preventive Agriculture:

- Farmers increasingly adopt “pre-emergent” sprays at or before sowing (₹550 crore in paddy, ₹200 crore in wheat).
- Smart application techniques reduce nutrient loss to weeds and ensure optimal fertiliser use.

Multinational Dominance and Indian Response:

1. MNC Monopoly in Agrochemicals

- Top players include Bayer (15%), Syngenta (12%), ADAMA (10%), and Corteva (7%), mostly owned or backed by Chinese or Western firms.
- Indian companies like Dhanuka (6%) and Crystal Crop Protection Ltd (4%) are entering the fray through acquisitions and R&D.

2. Indian Innovation Examples:

- Crystal Crop's acquisitions:
 - [Ethoxysulfuron](#) rights from Bayer (2025)
 - *Gramoxone* (Paraquat-based) from Syngenta (2023)
- Launch of *Sikosa* (a proprietary blend with Mitsui) reduces costs by over 50% compared to manual weeding.

Structural and Economic Implications:

Aspect	Implications
Labour Market	Reduction in demand for seasonal weeding labour and accelerates rural job shift.
Cost of Cultivation	Lowers input costs per acre despite initial investment in herbicides.
Yield and Productivity	Increases efficiency of fertiliser and irrigation inputs and prevents yield loss.
Food Security	Helps maintain food output amid rural-urban migration and demographic transition.
Environmental Concerns	Overuse may trigger resistance, biodiversity loss, and residue in food chains.

Policy and Governance Challenges:

- **Over-Reliance on Chemicals:** Potential rise in herbicide resistance and ecological imbalance.
- **Pricing and Access:** Smallholders may face affordability issues and demand for subsidies or bulk-buying models.
- **Domestic R&D Gap:** India lacks a Sinochem-like state-backed agrochemical giant and more incentives needed for public-private innovation.
- **Regulatory Standards:** Need for stronger safety norms, usage guidelines, and awareness campaigns among farmers.

Way Forward:

1. **Strengthen Indian R&D and IPR:** Establish national herbicide research hubs; incentivise indigenous formulation patents.
2. **Balance Labour and Mechanisation:** Promote [integrated weed management](#) (IWM) that blends manual, mechanical, and chemical techniques.
3. **Public Sector Entry:** Encourage PSUs to invest in herbicide manufacturing and formulation to counter MNC dominance.
4. **Sustainable Use Practices:** Mandate pre- and post-emergent usage training through KVKs, [FPOs](#), and digital apps.
5. **Inclusive Pricing Model:** Launch [DBT schemes](#) for marginal farmers and promote cooperative procurement.

Conclusion:

The rise of India's herbicide market signals a structural shift in agriculture, driven by labour shortages and the push for timely operations. While it boosts productivity and private investment, a balanced policy is vital to ensure sustainable, inclusive growth. Empowering Indian firms and farmers is key to making weed control effective without harming long-term agricultural health.

BIRD DEATHS AND WIND ENERGY IN INDIA

Context:

India added 3.5 GW of wind power in early 2025, marking 82% annual growth, but a Wildlife Institute of India study raised concerns over rising bird deaths near turbines in [Rajasthan's Thar Desert](#), sparking debate on the ecological impact of renewables.

About [Bird Deaths and Wind Energy in India](#):



Findings from the WII Study (Thar Desert):

- Conducted over a **3,000 sq. km area** in Jaisalmer, Rajasthan.
- Studied **90 wind turbines** and found **124 bird carcasses**.
- Estimated **4,464 bird deaths per 1,000 sq. km per year**.
- In control sites with no turbines, **no bird deaths were recorded**.
- Critically endangered species like the [Great Indian Bustard](#) are at risk.
- The study found **raptors** to be the most affected bird group.
- Collisions with both **wind turbine blades** and associated **power lines** were major causes.

Why Bird Mortality is a Serious Issue?

1. **Migratory Disruption:** Thar Desert lies on a key migratory flyway, and turbine installations disrupt bird movement and breeding.
2. **Raptor Vulnerability:** Raptors' slow reproduction makes them highly sensitive to even minor mortality increases.

3. **Biodiversity Hotspot:** Wind zones like Jaisalmer host rich birdlife, including endangered species like the Great Indian Bustard.
4. **Past Underestimation:** Previous studies underestimated risks due to lower bird densities and limited turbine coverage.
5. **Ecological Imbalance:** Bird loss affects trophic balance, increasing pests and harming agriculture.

Key Gaps in Policy:

- **No Onshore EIAs:** Onshore wind farms are exempt from mandatory environmental assessments.
- **Weak Wildlife Review:** Clearance processes often ignore biodiversity impacts in sensitive areas.
- **Shallow Offshore EIAs:** Offshore wind projects rely on limited, rapid environmental assessments.
- **Cumulative Impact Ignored:** Current [EIAs](#) neglect regional and long-term ecological consequences.
- **Poor Ministry Coordination:** Lack of synergy between MNRE and MoEFCC delays ecological safeguards.

Mitigation Measures and Tools:

- **Blade Painting:** Painting one blade black enhances visibility and reduces bird collisions.
- **Timed Shutdowns:** Turbines can be paused during peak migration to prevent strikes.
- **Smart Layout Design:** Reorienting turbines away from flyways minimizes risks.
- **Use of AVISTEP:** Mapping tool identifies [bird-sensitive zones](#) for better site selection.
- **Ground Surveys:** Field studies are essential to validate remote avian sensitivity data.

What Needs to be Done:

- **Mandate All EIAs:** Require full environmental assessments for both onshore and offshore projects.
- **Zoning-Based Siting:** Allocate wind sites based on [ecological sensitivity](#) and avian flyways.
- **Adopt Tech Tools:** Use radars and AI systems to monitor bird activity and shut down turbines when needed.
- **Include Local Input:** Engage ecologists and communities in planning and clearance decisions.
- **Fund Long-Term Research:** Support multi-year studies to assess biodiversity risks of wind energy.

Conclusion:

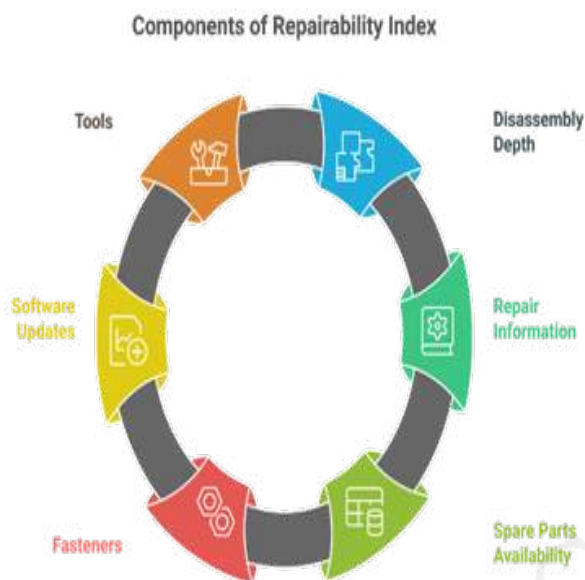
India's shift to renewable energy is essential for climate goals, but it must not compromise biodiversity. Unplanned wind projects can threaten birds, especially in ecologically rich areas like the Thar Desert or [coastal flyways](#). A sustainable approach must integrate ecological science, policy safeguards, and environmental planning to ensure that renewable energy does not come at the cost of wildlife.

RIGHT TO REPAIR IN INDIA

Context:

India accepted a proposal to introduce a Repairability Index for electronics. This marks a key step towards making the Right to Repair a consumer right.

- However, experts warn that India's informal repair economy—rich in tacit, generational knowledge—is being neglected in digital and [AI policy frameworks](#).



About Right to Repair in India:

Understanding the 'Right to Repair':

- Definition:** It refers to the legal right of consumers to repair and modify their own products or access affordable third-party services.
- Global Trend:** EU mandates access to spare parts and manuals; U.S. states and the UN SDG 12 also push for repair-based sustainability.
- Indian Framework:** Department of Consumer Affairs launched a Right to Repair portal (2023), covering electronics, autos, and farm tools.

Why Repair Must Be More Than a Consumer Right?

- Tacit Knowledge Economy:** Informal repairers acquire skills through observation and mentorship, not certifications, making repair an intergenerational knowledge system. E.g. Karol Bagh (Delhi), Ritchie Street (Chennai)
- Sustainability through Jugaad:** Repair culture reflects India's frugality and resourcefulness by extending product life and reducing e-waste.
- Unorganised, Yet Critical Workforce:** Informal repairers are excluded from labour policies, despite being central to India's circular economy.
- Cultural Identity of Repair:** Local repair practices carry regional innovation, intuition, and adaptive reuse — a form of indigenous technological heritage.
- Loss of Repair Literacy:** Shift towards disposable goods and sealed designs threatens this ecosystem

and the social value of reuse.

Digital Policy Gaps:

- Narrow Scope of E-Waste Rules 2022:** Rules emphasize recycling but overlook repair as a first-line defence against e-waste.
- PMKVY's Mismatch:** Skill India programs offer rigid modules, which don't suit improvisational, diagnostic repair work.
- NSAI & DPI Oversight:** AI and DPI policy frameworks focus on structured data but neglect informal, human-led knowledge inputs.
- NEP 2020 Gaps:** While the NEP values experiential learning, it fails to recognize repair work as a form of skill education.
- No Legal Support for Repairers:** Informal workers lack formal rights, certification pathways, or recognition in the digital economy roadmap.

Towards Inclusive and Sustainable Repair Ecosystems:

- AI & DPI Standards:** Embed repairability norms in AI systems, hardware standards, and public procurement policies.
- Expanded Right to Repair:** Classify products by repairability, ensure access to parts/manuals, and promote community-led repair hubs.
- Skilling Through Recognition:** Create recognition and reskilling pathways for informal repairers via e-Shram and custom training modules.
- Knowledge Preservation via AI:** Use LLMs and decision trees to translate tacit repair insights into shareable digital formats.
- Policy Convergence:** Integrate MoLE, MeitY, and MoRD efforts to create a unified framework valuing repair as both labour and knowledge.

Significance for India's Development Trajectory:

- Sustainability & SDGs:** Supports SDG-12 and [Mission LiFE](#) by extending product life, reducing waste, and promoting reuse.
- Labour Empowerment:** Recognizes the dignity of informal repairers as skilled contributors to digital and material resilience.
- Digital Justice:** Aligns AI growth with inclusion by acknowledging the human inputs behind machine learning and diagnostics.
- Economic Inclusion:** Bridges the gap between India's digital vision and grassroots innovation, creating livelihood security.
- Circular Economy Leadership:** Positions India as a global example in integrating repair culture into sustainable economic models.

Conclusion:

As India advances in AI and [digital public infrastructure](#), repair must be seen as both a right and a responsibility. Policies must integrate the silent wisdom of its repair workforce to build a just, inclusive, and sustainable tech future. As Michael Polanyi aptly said, “We know more than we can tell.” It’s time India remembers what it cannot afford to forget.

WHY THE WORLD NEEDS BETTER GREEN TECHNOLOGIES IN 2025?

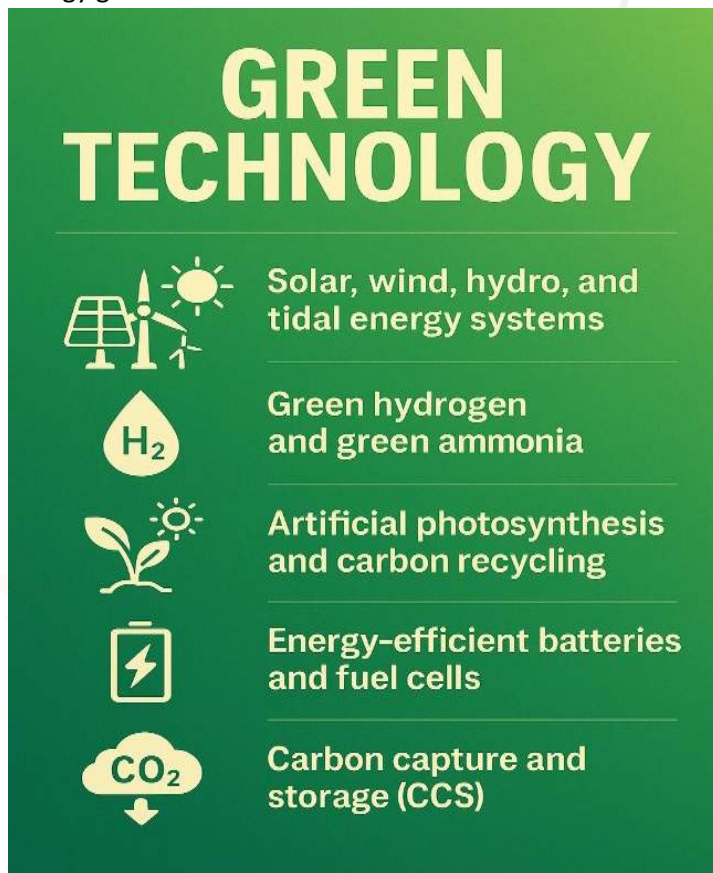
Context:

Amid climate pressures, geopolitical tensions, and India’s push for energy self-reliance, experts urge a shift from conventional solar tech to next-gen, efficient alternatives.

About [Why the World Needs Better Green Technologies in 2025:](#)

What Are Green Technologies?

Green technologies refer to scientific innovations and engineering systems designed to reduce environmental harm, minimize [carbon emissions](#), and promote sustainable energy generation and resource use.



Why the World Needs Better Green Technologies:

- **Low Efficiency of Conventional Solar Panels:**
 - o Silicon photovoltaics dominate global markets but deliver only **15–18% field efficiency**.

- o More efficient alternatives (e.g., **gallium arsenide-based panels at ~47%**) exist but lack large-scale deployment.

E.g. Doubling efficiency would halve the land requirement — a crucial factor as urbanization and conservation pressures rise.

- **Land Scarcity and Energy Density Trade-offs**

- o Solar plants require vast land areas due to low energy density.
- o Competing needs: urban sprawl, agriculture, biodiversity conservation vs. solar expansion.

E.g. In countries like India, with high population density and rising per capita energy needs, efficient land use becomes critical.

- **Questionable Sustainability of Green Hydrogen:**

- o Green hydrogen production via **electrolysis** consumes more energy than it returns.
- o Hydrogen is difficult to **store and transport** due to leakage and low density.

E.g. Converting green hydrogen to ammonia/methanol for transport adds another energy-intensive step, making the process less “green.”

- **Carbon Dioxide Still Rising Despite Renewable Growth:**

- o Global CO₂ levels increased from **350 ppm (1990) to 425 ppm (2025)** despite exponential solar installations.
- o Suggests renewable growth isn’t outpacing demand or emissions.

E.g. India’s 6 GW silicon solar cell capacity isn’t sufficient to make a dent without efficiency upgrades or technology diversification.

- **Need for Disruptive Innovation: Artificial Photosynthesis & RFNBO:**

- o **Artificial Photosynthesis (APS)** mimics plants to convert water + CO₂ → fuel.
 - o **Renewable Fuels of Non-Biological Origin (RFNBO):** EU push to create carbon-neutral fuels directly from sunlight and air.
- E.g.** Such technologies could bypass multi-step conversion processes, cut emissions at source, and enable **energy independence**.

Challenges to Realising Better Green Technologies:

1. **High R&D Costs and Long Gestation Periods:** Developing advanced green technologies like gallium arsenide cells or APS demands large upfront investments.
2. **Overdependence on China for Solar Supply Chains:** India relies on China for over 80% of its solar panel components, creating geopolitical and trade risks.
3. **Lack of Large-Scale Validation of Emerging Tech:** Technologies like Artificial Photosynthesis or multi-

junction photovoltaics remain lab-proven.

4. **Private Sector Hesitation Due to Market Uncertainty:** Investors are reluctant to fund futuristic innovations without guaranteed returns or proven viability.

Way Forward:

1. **Prioritise R&D Funding:** Allocate a larger share of climate budget to disruptive innovations like APS and RFNBOs.
2. **Public-Private Partnerships (PPP):** Encourage Indian startups and industries to collaborate with national labs.
3. **Technology Diversification:** Avoid over-reliance on one tech. Build an ecosystem of solar, wind, hydrogen, waste-to-energy, and nuclear innovation.
4. **Land-Efficient Designs:** Promote **floating solar, solar rooftops**, and building-integrated PVs to address land issues.
5. **Global Collaboration:** Engage in tech transfer, joint ventures, and climate innovation missions (e.g., Mission Innovation, [India-EU Green Deal](#)).

Conclusion:

In a world battling geopolitical shocks, ecological fragility, and rising energy demands, today's green technologies — while crucial — are not enough. **Energy innovation must outpace energy demand**, and "green" must not just be a label but a measurable standard of efficiency, sustainability, and independence. India must lead with **technology foresight**, not just technology deployment.

RESTORING MANGROVES TO SECURE INDIA'S COASTS

Context:

India has launched major mangrove restoration drives across Tamil Nadu, Gujarat, and Mumbai to fight climate risks. These efforts enhance coastal security, biodiversity, and climate resilience amid rising ecological threats.

About [Restoring Mangroves to Secure India's Coasts](#):

- **What Are Mangroves?**
 - Mangroves are salt-tolerant coastal forests that grow in tidal, tropical, and subtropical intertidal zones.
- **Distribution in India:** India's mangroves cover about 4,900 sq. km, mainly found in Sundarbans, Mahanadi, Godavari, Pichavaram, and [Gulf of Kutch](#).
- **Ecological Role:** They act as bio-shields during cyclones and floods, reducing wave energy and protecting inland life and property.
- **Climate Role:** Mangroves store vast amounts of "blue carbon" in their roots and soils, helping mitigate climate change.

Features of Mangroves



Salt Tolerance

Excrete salt via leaf glands or shed salt-laden leaves.



Aerial Roots (Pneumatophores)

Enable oxygen intake in waterlogged, low-oxygen soil.



Prop & Stilt Roots

Anchor trees in soft, unstable coastal mud.



Vivipary

Seeds germinate on the parent tree and disperse via tides



Coastal Shield

Reduce storm impact, tidal surges, and shoreline erosion.



Biodiversity Habitat

Support fish nurseries, migratory birds, reptiles, and crustaceans.



Key Threats to [Mangroves](#):

- **Urbanisation:** City expansion leads to mangrove clearance for roads, ports, and real estate, destroying natural buffers.
- **Pollution & Plastics:** Rivers and drains dump waste into mangrove zones, reducing regeneration and harming aquatic life.
- **Aquaculture:** Shrimp farms in coastal areas have replaced native mangrove habitats, especially in Tamil Nadu and Andhra Pradesh.
- **Climate Change:** Sea-level rise and erratic rainfall alter tidal patterns and increase salinity, damaging delicate mangrove systems.
- **Invasive Species:** Invasive weeds like [Prosopis juliflora](#) outcompete native flora and degrade mangrove ecosystems.

Notable Indian Restoration Efforts

- **Tamil Nadu – Green Tamil Nadu Mission:** Mangrove cover doubled from 4,500 to 9,000 ha (2021–24) via canal reworking and native seed planting.
- **MSSRF–Muthupettai Estuary:** 115 ha restored with 4.3 lakh Avicennia seeds by collaborating with village committees and forest officers.
- **Mumbai – Thane Creek Project:** ₹10.3 crore project to plant 3.75 lakh mangrove saplings and intercept

150 tonnes of plastic over 3 years.

- **Women Empowerment through Restoration:** Local women are employed in seedling planting and upkeep, linking biodiversity with livelihoods.
- **Gujarat – MISHTI Scheme Leader:** Over 19,000 ha of mangroves planted in 2 years, exceeding national targets under [the MISHTI initiative](#).

Strategic Role in Coastal Security

- **Disaster Shield:** During the 2004 tsunami and recent cyclones, mangroves absorbed wind and wave energy, reducing destruction.
- **Livelihood Support:** Fisherfolk, crab catchers, and honey gatherers depend on mangroves for income and cultural practices.
- **Biodiversity Hotspots:** They support species like flamingos, mudskippers, and mangrove herons by providing nesting and breeding grounds.
- **Carbon Sink:** Mangroves trap CO₂ more efficiently than tropical forests, aiding India's Nationally Determined Contributions.
- **Eco-Tourism and Coastal Identity:** Restored mangroves in Gujarat and Sundarbans have become hubs for nature tourism and heritage education.

Way Forward:

- **Policy Integration:** MISHTI should be merged with Smart Cities and [CRZ norms](#) to protect mangroves from unregulated construction.
- **Community Stewardship:** Involve locals in mapping, seed collection, and canal maintenance to ensure ownership and continuity.
- **Technological Monitoring:** Use drones, satellite imagery, and AI to track mangrove health, growth, and degradation patterns in real time.
- **Urban Eco-Planning:** Coastal cities must integrate mangrove buffers into urban flood plans, especially in cyclone-prone zones.
- **International Partnerships:** Collaborate with other tropical nations for joint mangrove research, blue carbon trade, and coastal innovation.

Conclusion:

Mangroves are nature's frontline defense for coastal India, blending ecology with economy. Their restoration secures biodiversity, climate resilience, and community livelihoods. India must scale scientific, community-led models to protect these green sentinels.

ICJ RULING REVIVES LEGAL STATUS OF KYOTO PROTOCOL

Context:

In a landmark advisory opinion, the [International Court of Justice](#) (ICJ) has clarified that the Kyoto Protocol (1997) remains legally valid and binding, even after the Paris Agreement (2015) came into effect.

About ICJ Ruling Revives Legal Status of Kyoto Protocol: What is the Kyoto Protocol?

- **Adopted in 1997**, entered into force in 2005 under the **UN Framework Convention on Climate Change (UNFCCC)**.
- It was the **first binding international treaty** mandating emission reductions by developed nations (Annex-I countries).
- Based on the principle of Common but Differentiated Responsibilities and Respective Capabilities (CBDR–RC).
- Had two commitment periods: **2008–2012** and **2012–2020**.

Key Obligations:

- Emission reductions by Annex-I countries (from 1990 baseline).
- Finance and technology transfer to developing nations.
- Creation of mechanisms like [Clean Development Mechanism](#) (CDM).

Why Was the Kyoto Protocol Considered Obsolete?

- The **Paris Agreement (2015)**, with a universal and bottom-up structure, replaced Kyoto's **top-down, binding** targets with voluntary NDCs (Nationally Determined Contributions).
- The US never ratified the Kyoto Protocol; Canada, Japan and others exited or stopped complying.
- No third commitment period was adopted post-2020.
- Post-Paris, the protocol was considered **defunct in operational and legal terms**, though never formally repealed.

Significance of the ICJ Ruling:

- **Legal Continuity Reaffirmed:** The ICJ ruled that lack of new commitment periods does not mean termination. Kyoto remains part of international climate law.
- **States Can Be Held Legally Accountable:** Non-compliance with Kyoto targets may now constitute an **"internationally wrongful act"**, reviving the possibility of state responsibility under international law.
- **Retroactive Assessment Permitted:** Even past obligations (e.g., first commitment period targets) are open for review and compliance assessment.
- **Scope for Climate Litigation Expanded:** Though the opinion is **non-binding**, it empowers civil society and states to pursue stronger climate litigation and demand accountability.

Implications for Global Climate Governance:

IMPLICATIONS FOR GLOBAL CLIMATE GOVERNANCE

Treaty	Key Nature	Legal Status (Post-ICJ)
UNFCCC (1992)	Foundational climate framework	Still in force
Kyoto Protocol	Binding emission cuts for developed nations	Remains valid and applicable
Paris Agreement	Voluntary, universal commitments	Complementary, not replacement

- The **ruling underscores treaty coexistence**, not substitution.
- It revives **CBDR-RC principle**, often diluted under Paris structure.
- Developed nations may face **renewed legal scrutiny** for historical emissions.

Challenges in Implementation

- **US non-ratification:** The US never ratified Kyoto, weakening global adherence and setting a precedent for other developed nations.
- **No enforcement mechanism:** Kyoto lacked penalties for non-compliance, making targets non-binding in practice.
- **Paris vs Kyoto conflict:** Paris allows voluntary pledges, undermining Kyoto's binding legal obligations and accountability.
- **Geopolitical rivalry:** Tensions like [US-China mistrust](#) hinder consensus on global climate obligations and reforms.

Way Forward:

- **Reactivate Kyoto monitoring:** Track and assess past commitments to reinforce legal climate accountability.
- **Strengthen Paris transparency:** Apply Kyoto-style reporting rigor to improve trust and target comparability.
- **Expand climate jurisprudence:** Use ICJ rulings and tribunals to build legal clarity on state climate obligations.
- **Revive North-South equity:** Ensure finance, tech transfers, and burden-sharing aligned with CBDR principles.

- **Merge legal and voluntary models:** Create a hybrid system combining Kyoto's obligations with Paris flexibility for effective governance.

Conclusion:

The ICJ's ruling has **resurrected the Kyoto Protocol's legal relevance**, transforming it from a forgotten relic to an active instrument of climate accountability. It signals that historical emissions, past obligations, and the [principle of equity](#) cannot be brushed aside in the climate fight. While not binding, this ruling adds moral and legal pressure on developed nations to deliver on their long-pending climate promises.

[Topics: Challenges to internal security through communication networks, role of media and social networking sites in internal security challenges, basics of cyber security; money-laundering and its prevention](#)

INDIA'S JOINT DOCTRINES FOR CYBERSPACE OPERATIONS

Context:

The Chief of Defence Staff (CDS) has declassified and released India's Joint Doctrines for Cyberspace Operations and Amphibious Operations to enhance interoperability, strengthen national defence strategy, and guide integrated multi-domain warfare.



About India's Joint Doctrines for Cyberspace Operations: What is Cyberspace?

- A **global domain** comprising interconnected information systems, networks, and data infrastructures, including the internet, intranets, communication satellites, and control systems.
- Functions as a **critical operational environment** where information is created, transmitted, manipulated, and stored.

Features of Cyberspace:

1. **Borderless Domain** – Operates beyond physical boundaries.
2. **Dual-use Nature** – Serves both civilian and military purposes.
3. **Real-time Impact** – Actions can produce immediate global effects.
4. **Anonymity & Attribution Challenges** – Difficulty in tracing actors.
5. **Constantly Evolving Threats** – Adapts with technological change.

About Amphibious Operations:

What are Amphibious Operations?

- **Coordinated military actions** launched from the sea by naval, air, and land forces to achieve a mission ashore.
- Used in warfare, humanitarian assistance, disaster relief (HADR), and force projection in contested zones.

Features of Amphibious Operations:

1. **Tri-service Integration** – Combines maritime, aerial, and ground forces.
2. **Rapid Response** – Quick mobilisation from sea to shore.
3. **Flexible Mission Profiles** – Ranges from combat to [HADR](#).
4. **Strategic Reach** – Extends influence over island territories and coastal areas.
5. **Maritime–Land Linkage** – Bridges sea-based capabilities with on-ground objectives.

Components of Cyberspace Operations:

- **Defensive Cyber Operations** – Involves shielding military and national networks from hacking, malware, and data breaches through proactive monitoring and security protocols.
- **Offensive Cyber Operations** – Focuses on penetrating enemy systems to disable communications, disrupt command structures, or damage critical infrastructure.

- **Cyber Intelligence & Reconnaissance** – Collects and analyses cyber threat data to identify vulnerabilities, anticipate attacks, and inform operational planning.
- **Cyber Support Operations** – Provides technical assistance and digital tools to enhance capabilities in land, air, maritime, and space operations.
- **Resilience & Recovery Systems** – Establishes backup systems, redundancies, and rapid restoration measures to maintain mission continuity during cyber crises.

Operational Principles of Cyberspace Operations:

- **Threat-informed Planning** – Relies on current and accurate intelligence to design effective, targeted cyber strategies.
- **Interoperability** – Ensures smooth coordination between armed services and civil agencies for unified cyber responses.
- **Layered Defence** – Employs multiple security layers, from firewalls to advanced intrusion detection, to neutralise threats early.
- **Legal & Ethical Compliance** – Operates within domestic laws and international cyber norms to maintain legitimacy and credibility.
- **Real-time Response** – Enables immediate identification and counteraction to cyber incidents, minimising damage.

Significance:

- **National Security** – Protects critical infrastructure like power grids, defence networks, and communication systems from hostile actors.
- **Force Multiplier** – Amplifies the effectiveness of military operations by integrating cyber tools with traditional [warfare tactics](#).
- **Maritime Superiority** – Amphibious operations ensure dominance in littoral zones, safeguarding India's maritime interests.
- **Jointness in Armed Forces** – Promotes synergy among Army, Navy, and Air Force, eliminating duplication of efforts.

- **Preparedness for Hybrid Warfare** – Equips forces to tackle blended threats involving cyber-attacks, sea control, and land combat simultaneously.
- **Diplomatic Signalling** – Sends a clear message to the world about India's capability and determination in defending its [multi-domain interests](#).

Conclusion:

The declassified doctrines on **Cyberspace** and **Amphibious Operations** mark a strategic leap in India's defence preparedness. They strengthen [tri-service integration](#), safeguard **national security interests**, and prepare the forces for **hybrid, multi-domain conflicts**.

MONEY LAUNDERING VIA CRYPTOCURRENCY

Context:

The Enforcement Directorate (ED) has raided 11 locations in Delhi-NCR and Dehradun in a ₹260 crore global cyber fraud case, where scammers posed as fake police and laundered extorted funds using cryptocurrencies and hawala networks.

About Money Laundering via Cryptocurrency:

What is Money Laundering via Cryptocurrency?

Money laundering through cryptocurrency involves **routing illegally obtained funds** via **digital currencies** like Bitcoin, Monero, or USDT to **obscure the origin**, convert to fiat, and reintegrate into the financial system.

Key Features:

- **Anonymity at source:** No physical identity is required to create crypto wallets.
- **High speed & scale:** Transactions can be automated and executed globally within seconds.
- **Low cost:** Thousands of transfers can occur using simple computer scripts.
- **Cross-border ease:** Crypto easily bypasses national jurisdictions and capital controls.
- **Lack of central oversight:** [Decentralised exchanges](#) (DEXs) and privacy coins evade scrutiny.

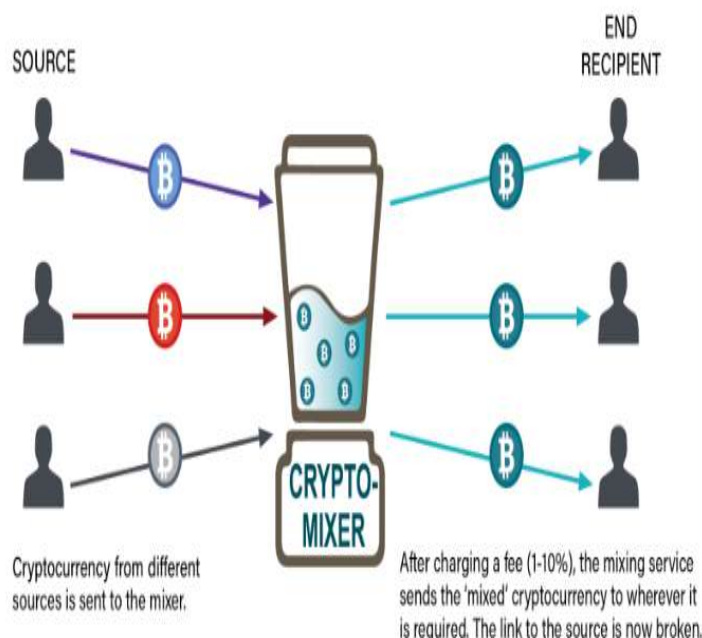
How Cryptocurrency Enables Money Laundering?

1. Placement:

- **What Happens:** This is the first stage where **illegally obtained "black" money** enters the financial system.
- **Crypto Route:** Criminals use illicit cash or unaccounted funds to purchase cryptocurrencies through **unregulated or low-compliance crypto exchanges**, often located in countries with poor KYC/[AML enforcement](#).
- **Key Risk:** These exchanges may not ask for identity proof or source of funds, making it easy to anonymize large volumes of cash.
- **E.g.:** Use of shell accounts to buy Bitcoin or [Ethereum](#) via offshore exchanges without traceability.

Crypto-mixers

Crypto-mixers: services that take in identifiable cryptocurrency tokens from one wallet and output unidentifiable 'clean' tokens to a different wallet (or wallets). Crypto-mixing is similar to money laundering. However, due to the distributed nature of cryptocurrencies, creating unidentifiable tokens is almost impossible.



2. Layering:

- **What Happens:** The goal here is to **obscure the origin** of the money through complex transactions.
- **Crypto Route:**

- The purchased crypto is **split across thousands of wallets** (via automation tools/scripts).
- It is then routed through “**mixers**” (like Tornado Cash) or exchanged for **privacy coins** (like Monero or Zcash) that hide sender/receiver details.
- **Gambling platforms**, [NFT marketplaces](#), and **peer-to-peer (P2P)** networks are also used to confuse audit trails.
- **Key Risk:** The decentralized and pseudonymous nature of [blockchain](#) makes it very hard for law enforcement to follow the money trail.
- **E.g.:** A single Bitcoin is split into hundreds of microtransactions across wallets on the dark web, then re-aggregated under a new identity.

3. **Integration:**

- **What Happens:** The laundered money is now **reintroduced as legitimate assets**.
- **Crypto Route:**
 - Converted back into **fiat currency** via crypto ATMs or high-risk exchanges.
 - Used to buy **real estate**, [luxury goods](#), or invested in **offshore shell companies**.
 - Some use **Initial Coin Offerings (ICOs)** and fake startups as fronts to channel these funds.
- **Key Risk:** The converted assets now appear legitimate, making them almost impossible to trace back to their criminal origins.
- **E.g.:** A criminal use cleaned Bitcoin to buy property in Dubai or expensive NFTs which are later sold as “clean” capital gains.

Challenges Associated:

- **Weak KYC/AML Compliance:** Many crypto exchanges, especially decentralised ones, do not

enforce stringent [Know Your Customer \(KYC\)](#) or **Anti-Money Laundering (AML)** norms.

- **Use of Privacy Coins & Mixers:** **Privacy coins like Monero** and tools like **crypto mixers** hide transaction histories and wallet identities.
- **Jurisdictional Conflicts:** Crypto regulations differ widely across countries, with some jurisdictions lacking crypto-specific AML laws.
- **Low Conviction Rates:** In India, only **15 convictions out of 5,892** money laundering cases filed under PMLA till 2025.
- **Use of ATMs and P2P Platforms:** Crypto ATMs and **peer-to-peer (P2P)** systems allow direct, unmonitored conversion between cash and crypto.

Way Forward:

- **Strengthen AML Laws:** Amend PMLA to explicitly include crypto-related offences with actionable guidelines.
- **Global Regulatory Coordination:** Leverage **Double Taxation Avoidance Agreements (DTAAs)** and [FATF standards](#) to enable cross-border monitoring.
- **Real-time Blockchain Surveillance:** Use AI-powered **blockchain analytics** for anomaly detection and smart contract screening.
- **Mandatory KYC for Exchanges:** Enforce strict KYC/AML compliance across all crypto platforms and wallets.
- **Regulate Crypto Mixers and Privacy Coins:** Bring under legal supervision with mandatory audit trails.

Conclusion:

The rise of crypto-linked frauds like the ₹260 crore case shows how digital currencies are being weaponised for [financial crime](#). To protect economic sovereignty and prevent terror financing, India must adopt a proactive regulatory and technological approach, aligned with global best practices. Cryptocurrency can either become a tool for progress or a channel for crime — regulation will decide which.

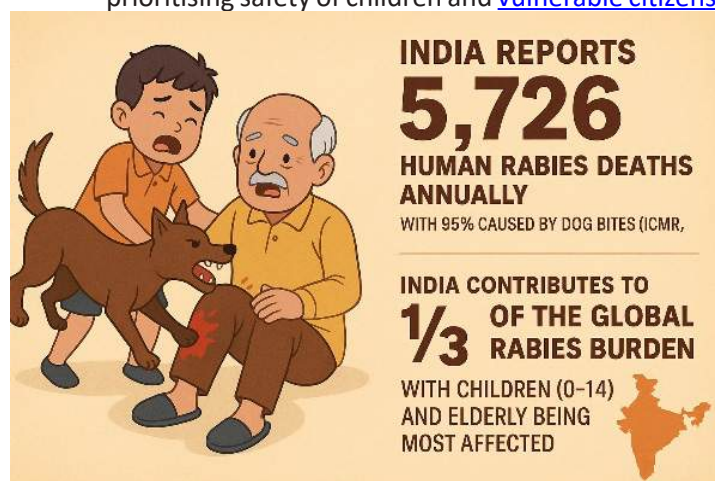
GENERAL STUDIES – 4

SC ORDERS REMOVAL OF FREE-RANGING DOGS FROM DELHI-NCR LOCALITIES

Context:

The Supreme Court of India, directed immediate removal of all free-ranging dogs from Delhi, Noida, Gurugram, and Ghaziabad.

- The apex court ordered their permanent relocation to shelters to curb rabies cases and dog-bite incidents, prioritising safety of children and [vulnerable citizens](#).



About SC Orders Removal of Free-Ranging Dogs from Delhi-NCR Localities:

SC Order on Stray Dogs:

- Complete Removal:** Authorities must capture all stray dogs in Delhi, Noida, Gurugram, and Ghaziabad, ensuring none are left roaming in public areas. This is aimed at creating stray-free streets in both core and peripheral urban zones.
- No Release Policy:** Captured dogs will be kept in shelters permanently, ending the earlier practice under [ABC rules](#) of releasing them back into their original localities. This intends to permanently break the cycle of repeated attacks.
- Shelter Expansion:** The SC mandated building facilities with capacity for 5,000 dogs within eight weeks, starting with the most vulnerable localities. This ensures adequate housing and avoids [overcrowding of captured animals](#).
- Rapid Response Helpline:** A 24x7 helpline must be set up so that any reported dog bite case is acted upon within four hours. This provides immediate

intervention to protect public health and safety.

- Strict Compliance:** Any person or organisation obstructing the removal process will face contempt of court. This gives the order enforceability and deters interference from interest groups.

Rationale Behind the Order:

- Public Safety Priority:** Rabies kills around 5,700 people annually in India, with over 95% of cases linked to dog bites. The order is meant to directly reduce this preventable mortality.
- Child Protection:** Children under 14 and the elderly over 60 face higher attack risks due to limited defence capacity. The court prioritised their safety as a moral and legal obligation.
- Policy Ineffectiveness:** The Animal Birth Control model focuses on sterilisation but doesn't stop already aggressive or rabies-carrying dogs from harming people. Hence, immediate removal was deemed necessary.
- Right to Safe Mobility:** [Article 21](#) of the Constitution guarantees citizens the right to life and personal liberty. Stray attacks violate this right by creating fear in public spaces.
- Permanent Structural Reform:** The court's directive shifts from temporary containment to permanent removal from public areas. This aims to create a long-term, [sustainable solution](#) rather than periodic crackdowns.

Arguments in Favour:

- Life-Saving Measure:** Upholds the ethical principle of beneficence by preventing avoidable rabies deaths, fulfilling the State's moral duty of care to its citizens.
- Safer Public Spaces:** Reinforces the right to security under Article 21, fostering public trust and enabling citizens to exercise their freedom of movement without fear.
- Accountability System:** Use of CCTV and records reflects transparency and procedural fairness, key pillars of good governance ethics.
- Closing Loopholes:** Eliminates the ABC return-to-locality gap, embodying the [principle of consequentialism](#) by focusing on effective outcomes rather than procedural symbolism.
- Urban Governance Boost:** Aligns with public health ethics and the common good approach, integrating safety and sanitation into urban policy priorities.

Arguments Against:

- **Possible Law Conflict:** Risks violating the rule of law and legal certainty by potentially conflicting with existing ABC Rules under the Prevention of Cruelty to Animals Act.
- **Shelter Overcrowding Risk:** May compromise animal welfare ethics if infrastructure lags, leading to inhumane living conditions and moral negligence.
- **Animal Welfare Concerns:** Could be perceived as infringing on the intrinsic rights of animals, raising questions under environmental and [compassion ethics](#).
- **Ecological Impact:** Sudden removal might breach the principle of ecological balance, as strays contribute to rodent control and waste reduction.
- **Risk of Abuse:** Without robust oversight, this policy risks moral hazard, enabling [covert culling or cruelty](#) under the guise of enforcement.

Way Ahead:

- **Humane Shelters:** Design with adequate space, nutrition, and medical care to respect the dignity of sentient beings in line with animal ethics.
- **Mass Vaccination:** Implement large-scale drives as part of the preventive ethics approach to eliminate rabies without mass displacement alone.
- **Controlled Adoption:** Encourage adoption with strict vetting to balance compassion ethics with [responsible stewardship](#).
- **Policy Reform:** Amend ABC Rules to align with SC directions, ensuring coherence between legal mandates and ethical imperatives.
- **Awareness Drives:** Promote community understanding of rabies prevention, invoking civic responsibility and the [ethics of care](#).

Conclusion:

The Supreme Court's order shifts urban governance towards prevention, prioritising safety while balancing public health with humane animal care. Success depends on legal clarity, strong infrastructure, and public engagement.

ALGORITHMS OF THE MIND

Context:

Smartphone and AI overuse, particularly among India's youth, is raising concerns about declining cognitive abilities, [mental health issues](#), and social disconnection, prompting calls for targeted policy action and awareness programmes.



About Algorithms of the Mind:

What it is?

- A conceptual framework describing how the human brain processes information — including **memory, attention, reasoning, creativity, and decision-making** — in structured and patterned ways, akin to computational algorithms.
- These “mental algorithms” are shaped by learning, [environment](#), and experience, but can be influenced or disrupted by external tools like smartphones and AI.

Current Scenario in India:

- **Widespread Usage:**
 - **Annual Status of Education Report (2024):** 90% of rural adolescents (14–16 years) have smartphone access; 82% can use them.
 - **EY Report (2024):** Average Indian spends 5 hours/day on phones, with 69% on entertainment and social media.
 - **AIIMS Study (2025):** Children under 5 have 2.2 hrs/day screen time — double [WHO recommendation](#).
- **Addiction Indicators:**
 - **LocalCircles Survey (2024):** 50% of urban parents say children (9–17 yrs) are addicted to videos, gaming, and social media.
 - Rising aggression, impatience, and lethargy linked to overuse.

The Cognitive Impact:

- **Brain Drain Effect:**

- McCombs School of Business (2017) study: Even the **mere presence** of a smartphone reduces attention span, working memory, and information retention.
- **Academic Decline:**
 - Over-reliance on quick AI searches undermines reasoning and [deep reading](#).
 - **Zhang & Zeng (2024):** Smartphone addiction linked to poorer academic performance and anxiety.
- **Behavioural Changes:**
 - Reward-driven design of apps triggers impulsiveness and compulsive use.
 - Associated with low self-esteem, shyness, and emotional regulation issues (Wacks & Weinstein, 2021).
- **Cognitive Offloading & Miserliness:**
 - GenAI tools handle problem-solving and research, leading to dependency and reduced [critical thinking](#).

Societal & Ethical Dimensions:

- **Erosion of Social Skills:** Digital connections replacing face-to-face interactions.
- **Health Implications:** Sedentary lifestyles, sleep disturbances, and increased anxiety.
- **Ethics in AI & Tech Design:** Attention-capturing algorithms exploit human psychology.
- **Cultural Dimension:** Displacement of traditional learning methods and reading habits.

Challenges:

- **Policy Lag** – No comprehensive national digital well-being policy for youth.
- **Parental Awareness Gaps** – Limited understanding of early signs of digital addiction.
- **Educational Overlap** – EdTech and entertainment apps competing for attention on the same device.
- **Inequity** – Digital overexposure in urban areas vs. [digital deprivation](#) in certain rural belts.
- **Technology-Capital Trade-off** – Innovation push without mental health safeguards.

Way Forward:

- **Individual & Family Level:**
 - **Digital hygiene:** “Phone-off” times, device-free meals, physical activities.
 - Parental controls and delayed smartphone access for children.
 - Role modelling [healthy digital habits](#).
- **Education System:**
 - Integrate **device-free hours** in schools.
 - Encourage deep learning via debates, quizzes, reading clubs.
 - Promote problem-solving without AI reliance.
- **Policy Measures:**
 - Launch **National Digital Well-being Mission**.
 - Age-appropriate regulations on app design and addictive features.
 - Awareness campaigns targeting schools, colleges, and workplaces.
- **Community Engagement:**
 - Create tech-free community spaces.
 - Promote offline cultural and sports activities.
 - Establish “buddy programmes” for peer support.
- **Long-Term National Perspective:**
 - Link mental and physical health goals with **demographic dividend strategy**.
 - Treat **digital well-being** as a public health priority.
 - Invest in research on [neurocognitive impacts of technology](#) in Indian contexts.

Conclusion:

India’s sustained growth needs not just education, skills, and technology, but also the mental resilience of its youth. [Smartphones](#) and AI, if unchecked, can weaken our ability to think, connect, and create. The challenge is to use them wisely, with regulation and cultural safeguards, to keep society intellectually agile and emotionally strong.

FACTS FOR PRELIMS

GENERAL STUDIES – I

ART & CULTURE

Religion and Festivals

CHHATH FESTIVAL

Context:

The Bihar art and culture department has nominated INTACH as its knowledge partner to prepare the dossier for the inclusion of Chhath festival in [UNESCO's Intangible Cultural Heritage list](#).



About Chhath festival:

What it is?

- A **Hindu Vedic festival** dedicated to the **Sun God (Surya)** and **Chhathi Maiya** (goddess said to be Surya's sister).
- Celebrated twice a year — in **Chaitra (March–April)** and more prominently in **Kartika (October–November)**.

Where it is Celebrated:

- Primarily in **Bihar, Jharkhand, Eastern Uttar Pradesh**, and parts of **Nepal**.
- In recent decades, it has spread to Indian diasporas abroad.

History:

- Considered one of the **oldest Vedic rituals**, with references to sun worship found in the **Rig Veda** and in stories related to **Karna (Mahabharata)**.
- The practice emphasizes austerities, purity, and deep ecological consciousness.

Features:

- A **4-day long festival** with strict rituals:
 1. **Nahay Khay (Chaturthi)**: Ritual bathing and vegetarian meal.

2. **Lohanda/Kharna**: Day-long fast, broken with kheer and jaggery roti.
3. **Sandhya Arghya**: Offering of evening prayers to the setting sun.
4. **Usha Arghya**: Dawn prayers to the rising sun, marking completion.

- Devotees observe **fasting, abstinence, holy dips, and offering prasad** such as Thekua, Kasar, Kheer, and seasonal fruits.
- Deeply community-driven, celebrated on riverbanks, ponds, and water bodies.

Significance:

- Symbolises **gratitude to the Sun God** for sustaining life and promoting prosperity, health, and longevity.
- Encourages **discipline, simplicity, and ecological harmony** through frugal rituals.

Music

1ST-EVER BIMSTEC TRADITIONAL MUSIC FESTIVAL

Context:

The first-ever [BIMSTEC](#) Traditional Music Festival is being held in New Delhi at Bharat Mandapam, showcasing the rich musical heritage of all seven BIMSTEC countries.



About 1st-ever BIMSTEC Traditional Music Festival:

- **What it is?**
 - A regional cultural event featuring traditional music performances by artists from **Bangladesh, Bhutan, India, Myanmar, Nepal, Sri Lanka, and Thailand** under the BIMSTEC framework.
- **Hosted in:** New Delhi, at Bharat Mandapam, symbolizing India's role as a cultural anchor in the region.
- **Theme:** "SaptaSur: Seven Nations, One Melody" — celebrating unity in diversity through musical traditions.
- **Organised by:** [Indian Council for Cultural Relations](#)

(ICCR) under the Ministry of External Affairs.

- **Aim:** To promote regional integration, foster cultural dialogue, and deepen people-to-people ties among BIMSTEC member countries.
- **Key Features of the Festival:**
 - **Multinational Participation:** Artists from all **seven BIMSTEC nations** present their indigenous music, building regional camaraderie.
 - **Open Cultural Access:** The festival is **free and open to all**, encouraging inclusive public participation and awareness.
 - **Soft Power Diplomacy:** Reinforces India's use of **cultural diplomacy** to lead BIMSTEC's cultural cooperation track.
 - **Follow-up to BIMSTEC Summit Commitment:** Implements Prime Minister of India announcement at the April [2025 BIMSTEC Summit](#) in Thailand.
 - **Symbol of BIMSTEC Cultural Integration:** Marks a shift from economic focus to a holistic regional identity, integrating art, music, and heritage.
- **Significance of the Festival:**
 - **Cultural Diplomacy:** Enhances India's leadership in BIMSTEC through soft power engagement.
 - **Regional Cohesion:** Encourages mutual respect and shared values among South and Southeast Asian neighbours.
 - **India's Global Role:** Aligns with [Vasudhaiva Kutumbakam](#)—India's vision of a connected, harmonious world.

MEDIEVAL HISTORY

Important Terminologies and Miscellaneous Medieval History

GURU TEGH BAHADUR

Context:

Indian Railways will commemorate the [350th Martyrdom Day of Guru Tegh Bahadur Ji](#) with special trains, cultural programs, and heritage initiatives.



About Guru Tegh Bahadur:

Who he was?

- **Ninth Guru of Sikhism (1621–1675)**, remembered as *Hind Di Chadar* (Protector of India).
- Martyred in Delhi in 1675 for opposing forced conversions under Mughal rule.
- Symbol of **spiritual courage, human rights, and freedom of conscience**.

Early Life and Education

- Born on **April 1, 1621**, in **Amritsar**, youngest son of Guru Hargobind Ji.
- Trained in **martial skills, scriptures, music, and meditation** from a young age.
- Participated in battles alongside his father, which instilled values of bravery and service.
- Later settled in **Bakala (Punjab)**, leading a life of simplicity, deep meditation, and spiritual teaching.

Key Contributions

1. Religious Freedom

- Opposed the Mughal policy of forced conversions of Kashmiri Pandits.
- Offered his own life to uphold the right to practice one's faith.

2. Teachings and Philosophy

- Emphasised **spiritual strength over material wealth**.
- Advocated compassion, humility, and equality of all humans.

3. Community Development

- Founded several towns including **Anandpur Sahib**, which later became a Sikh spiritual and military centre.
- Strengthened Sikh institutions and spread teachings through *hymns* later included in the [Guru Granth Sahib](#).

Legacy

- Remembered as a **champion of human rights** and defender of oppressed communities.
- His sacrifice laid the foundation for Sikh militarisation under his son, Guru Gobind Singh.
- Today, he is honoured across India as a symbol of **religious tolerance, justice, and moral courage**.

MODERN HISTORY

Socio-Religious Reform Movements

SHIROMANI GURDWARA PARBANDHAK COMMITTEE (SGPC)

Context:

The Shiromani Gurdwara Parbandhak Committee (SGPC) has urged the Central Government to regulate AI platforms disseminating misinformation about Sikh teachings, history, and Gurbani.



About Shiromani Gurdwara Parbandhak Committee

(SGPC):

What it is?

SGPC is the **apex elected body of Sikhs** that manages historical gurdwaras and religious affairs in India and abroad, acting under the spiritual guidance of **Sri Akal Takht Sahib**.

Year of Establishment:

- Founded in **1920** as part of the **Gurdwara Reform Movement**, and legally recognised under the **Sikh Gurdwaras Act, 1925** after British-era religious mismanagement.

Historical Context:

- Emerged during the **Sikh struggle** against Udasi mahants and British control of Sikh shrines.
- Played a pivotal role in movements like **Nankana Sahib Massacre (1921)**, **Guru Ka Bagh Morcha**, and **Jaito Morcha**.
- Became a symbol of religious autonomy and community self-governance for Sikhs.

Key Functions:

- Administers over 200 gurdwaras under Sections 85 & 87 of the Sikh Gurdwaras Act.
- Conducts elections for 191-member house, ensuring

representation from across India.

- Manages educational institutions, medical centres, publications, and religious awareness campaigns.
- Acts on sacrilege, **misinformation**, and challenges to Sikh spiritual and cultural heritage.

About Gurbani:

What is Gurbani?

- Gurbani refers to the sacred hymns and verses composed by the Gurus of Sikhism, primarily found in the **Guru Granth Sahib**, the central scripture of the Sikh faith. It is considered the divine word revealed by the Gurus, and is the spiritual and moral guide for Sikhs.

Key Features of Gurbani:

- Divinely Inspired Revelation:** Sikhs believe Gurbani is the **eternal voice of the divine**, revealed through the Gurus, not man-made literature.
- Compiled in Guru Granth Sahib:** All authenticated Gurbani is preserved in the **Guru Granth Sahib**, which contains hymns by **six Sikh Gurus** and **15+ saints** (Bhagats) from diverse social and religious backgrounds.
- Written in Gurmukhi Script:** The language is primarily **Sant Bhasha** and **Punjabi dialects**, written in **Gurmukhi**, and uses poetic meters called **Raags** (musical modes).
- Musical and Poetic Structure:** Most Gurbani verses are composed in **31 Raags**, and are intended to be sung. This enhances **devotional engagement** and memory.
- Universal Ethical Message:** Gurbani emphasizes truth, humility, service (seva), compassion, and remembrance of God (Naam Simran) — transcending caste, religion, and gender.
- Authority in Sikhism:** It is considered the **living Guru** after Guru Gobind Singh Ji's declaration, and no one is allowed to alter or reinterpret Gurbani arbitrarily.
- Daily Recitation and Practice:** Sikhs recite Gurbani (Nitnem) daily, including verses like **Japji Sahib**, **Rehras Sahib**, and **Kirtan Sohila**, as part of spiritual discipline.

Freedom Movement

KAKORI CONSPIRACY CASE

Context:

Prime Minister of India paid tribute to the revolutionaries of the Kakori incident on its 100th anniversary, honouring their courage and sacrifice in **India's freedom struggle**.



About Kakori Train Robbery (Kakori Conspiracy Case):

- **What It Is?**
 - A daring armed action carried out by members of the [Hindustan Republican Association](#) (HRA) on **9 August 1925** to seize British government treasury funds from a train, aiming to fund the revolutionary movement and send a political message against colonial exploitation.
- **Key Personalities Involved:**
 - Ram Prasad Bismil
 - Ashfaqulla Khan
 - [Chandrashekhar Azad](#)
 - Rajendra Lahiri
 - Roshan Singh
 - Manmathnath Gupta
- **Background:**
 - The **HRA** believed verbal protests and petitions were insufficient against British imperialism.
 - Funding was urgently required for [revolutionary activities](#).
 - The target chosen was a train carrying government treasury money between **Saharanpur and Lucknow**.
- **The Incident:**
 - **Date:** 9 August 1925
 - **Location:** Near **Kakori railway station**, Uttar Pradesh.
 - **Action:** Revolutionaries stopped the **8-Down train** and seized cash from the guard's coach.
- **Outcome:**
 - Massive British crackdown followed.
 - **Arrests:** Most participants caught within months.
 - **Sentences:**
 - **Hanged (1927)** – [Ram Prasad Bismil](#), Ashfaqulla Khan, Rajendra Lahiri, Roshan Singh.
 - Others received long-term imprisonment.
 - Chandrashekhar Azad evaded

capture and continued the struggle until 1931.

- **Subsequent Developments (Later Phase):**
 - The HRA, weakened after the incident, reorganised in 1927–1928.
 - Leaders like [Bhagat Singh](#), Sukhdev, and **Shiv Verma** infused socialist ideology into the movement.
 - The organisation was renamed **Hindustan Socialist Republican Association (HSRA)** in 1928, marking a shift towards a revolutionary socialist programme.

Post-Independence

COMMON WEALTH GAMES

Context: The Union Cabinet has approved India's bid to host the [2030 Commonwealth Games](#), naming Ahmedabad as the proposed host city with world-class stadiums and infrastructure. India is also positioning Ahmedabad as a frontrunner for the 2036 Olympics.



About Commonwealth Games:

What it is?

- An **international multi-sport event** held every four years, featuring athletes from the [Commonwealth of Nations](#) (72 nations and territories).
- Often seen as a platform to promote friendship, cultural ties, and sporting excellence among member countries.

Origin:

- First held in **1930 at Hamilton, Canada**, known then as the *British Empire Games*.
- Renamed *British Empire and Commonwealth Games* (1954), *British Commonwealth Games* (1970), and finally *Commonwealth Games* (from 1978).

History:

- Includes a wide range of Olympic-style sports, along with traditional Commonwealth sports like **lawn bowls, squash, netball**.
- Unique feature → inclusion of **para-sports** events integrated into the main program.

India & the Commonwealth Games:

- First participated in **1934 London Games**; wrestler Rashid Anwar won India's first medal (bronze in wrestling).
- Milestones: Milkha Singh (first Indian gold, Cardiff 1958), rise of wrestling, shooting, weightlifting and badminton in later decades.
- **Best performance: 2010 Delhi Games** → India won **101 medals (39 golds)**, finishing **2nd overall**.
- Till date, India has won **564 medals (203 golds)** at the Commonwealth Games.

India as Host:

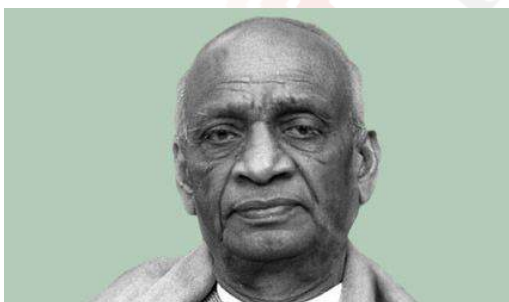
- Hosted once in **2010, New Delhi** — remembered for India's historic medal tally and large-scale organisation.
- Now bidding for **2030 Games** with **Ahmedabad** as the proposed venue (Narendra Modi Stadium, Sardar Vallabhbhai Patel Sports Enclave).
- Plan includes inclusion of all major sports, along with traditional Indian games like **kabaddi** and **kho-kho**.

Important Personalities

SARDAR VALLABHBHAI PATEL

Context:

The Government of India has constituted a high-level committee chaired by PM to commemorate the 150th birth anniversary of Sardar Vallabhbhai Patel, the Iron Man of India.



About Sardar Vallabhbhai Patel:

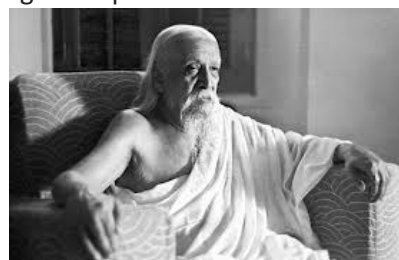
- **Who he was?**
 - Freedom fighter, statesman, India's **first Deputy Prime Minister and Home Minister**.
 - Known as the *"Iron Man of India"* for his role in uniting princely states.
- **Born in:**
 - **October 31, 1875**, in **Nadiad, Gujarat**, into a humble Lewa Patidar agricultural family.
- **Background:**
 - Initially worked as a **lawyer**, later studied at **Middle Temple, London**.

- Deeply influenced by **Mahatma Gandhi** during Kheda Satyagraha (1918).
- Rose as a mass leader through **Bardoli Satyagraha (1928)**, earning the title *Sardar*.
- **Contribution to Freedom Movement:**
 - Key organiser of **Kheda and Bardoli Satyagrahas**, mobilising peasants against unjust taxation.
 - Active role in **Civil Disobedience and Quit India Movements**, enduring multiple imprisonments.
 - Presided over the **1931 Karachi Session of Congress** that endorsed the Gandhi-Irwin Pact.
- **Works in Post-Independence India:**
 - Architect of **Integration of 562 princely states** into the Union of India, reducing them to 26 administrative units.
 - Played a crucial role in handling **Partition violence** and refugee rehabilitation.
 - Strengthened Indian administration by creating the **Indian Administrative Service (IAS)**.
 - Known for his efficiency in restoring law and order and building the **framework of a unified India**.

SRI AUROBINDO

Context:

Prime Minister of India paid tribute to Sri Aurobindo on his birth anniversary (15 August 1872), highlighting his role as a philosopher, spiritual leader, and **freedom fighter** who linked nation-building with spiritual evolution.



About Sri Aurobindo:

- **Who He Was?**
 - Yogi, philosopher, poet, and nationalist leader.
 - Propounded the philosophy of Integral Yoga, aiming at spiritual transformation of life on Earth.
- **Early Life:**
- **Born:** 15 August 1872, Calcutta (now Kolkata).
 - Educated in **England** at St. Paul's School, London, and King's College, Cambridge.
 - Mastered multiple **European languages** and

developed interest in Indian culture.

- **Contribution to Freedom Movement:**

- **Radical Nationalism** – First Indian leader to demand complete independence through his paper *Bande Mataram*.
- **Revolutionary Role** – Member of [Anushilan Samiti](#) and involved in armed resistance against British rule.
- **Alipore Bomb Case (1908)** – Arrested but acquitted and transformed spiritually during imprisonment.
- Advocated **direct action** over moderate politics.

- **Literary Contributions:**

- **Philosophical Works** – *The Life Divine*, *The Synthesis of Yoga*, *Essays on the Gita*.
- **Poetry and Epics** – *Savitri: A Legend and a Symbol*.
- **Political and Cultural Writings** – *The Human Cycle*, *The Ideal of Human Unity*.

- **Other Contributions:**

- Founded **Sri Aurobindo Ashram** in 1926 with Mirra Alfassa ("The Mother").
- Developed **Integral Yoga**, blending material progress with spiritual growth.
- Advocated **spiritual nationalism**, linking India's freedom with cultural renaissance.

- Received early education despite caste barriers, later influenced by reformist and revolutionary ideas.

- **Contributions in Social Reform & Freedom Movement:**

- **Women's Education Pioneer** –

- Opened India's first school for girls (1848) in Pune.
- Educated his wife, Savitribai Phule, who became India's first female teacher.

- **Caste Equality Champion** –

- Founded **Satyashodhak Samaj** (1873) to promote social justice, oppose Brahmanical dominance, and unite oppressed communities.
- Opened his well to all castes, symbolising social inclusivity.

- **Abolition of Social Evils** –

- Opposed child marriage and supported [widow remarriage](#).
- Established shelters for widows and orphaned children.

- **Advocate of Rights through Literature** –

- Authored [Gulamgiri](#) (Slavery, 1873) drawing parallels between caste oppression in India and racial slavery in America.

- **Influence on Later Leaders** –

- Inspired [B.R. Ambedkar](#) and several anti-caste and social justice movements in India.

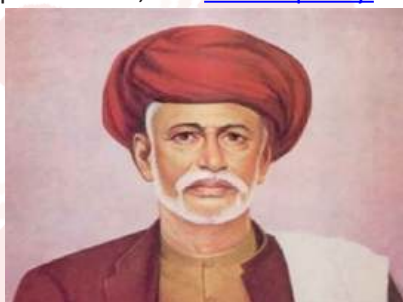
- **Significance:**

- **Social Justice Legacy** – Laid the foundation for anti-caste and gender equality movements.
- **Educational Revolution** – Championed [universal education](#) as the tool for empowerment.

MAHATMA JYOTIBA PHULE

Context:

Prime Minister of India announced a year-long series of events to mark the 200th birth anniversary of Mahatma Jyotiba Phule, celebrating his legacy in social reform, women's empowerment, and [caste equality](#).



About Mahatma Jyotiba Phule:

- **Full Name:** Jyotirao Govindrao Phule
- **Born:** 11 April 1827, Satara (now in Maharashtra)
- **Died:** 28 November 1890, Pune
 - Indian social reformer, thinker, writer, and activist who fought caste discrimination and gender inequality.
- **Background:**
 - Born into the [Mali caste](#) (classified as Shudra), traditionally engaged in farming.

LOKMANYA BAL GANGADHAR TILAK

Context: On the death anniversary of Lokmanya Bal Gangadhar Tilak, Union Home Minister paid tribute, highlighting his role in transforming [Swaraj](#) into a mass movement.



About Bal Gangadhar Tilak:

Who He Was?

- Known as **Lokmanya Tilak**, he was a **revolutionary nationalist, journalist, scholar, and freedom fighter**.
- Famously called the “**Father of Indian Unrest**” by British colonial authorities.

Background:

- **Born:** July 23, 1856, in Ratnagiri, Maharashtra.
- **Education:** Studied at Deccan College, Pune. Graduated with a **B.A. and LL.B.**
- Co-founded **Deccan Education Society** and **Fergusson College** to promote Indian-run education.

Contributions to the Freedom Movement:

1. **Swaraj as Birthright:** Popularised the slogan “**Swaraj is my birthright and I shall have it.**”
2. **Newspapers:** Founded **Kesari (Marathi)** and **The Mahratta (English)** to educate and mobilise the public.
3. **Cultural Nationalism:** Revived **Ganesh Utsav (1893)** and **Shivaji Jayanti** as tools of mass mobilisation and Hindu unity.
4. **Extremist Phase Leader:** Led the **Lal-Bal-Pal trio** (with Lala Lajpat Rai and Bipin Chandra Pal) during the assertive phase of nationalism.
5. **Writings and Scholarship:** Authored ‘**Gita Rahasya**’, ‘**Arctic Home in the Vedas**’, and ‘**Orion**’, showcasing his command over history, religion, and astronomy.
6. **Home Rule Movement (1916):** Collaborated with Annie Besant to launch the **Home Rule League**, demanding self-governance within the British Empire.

Controversies and Imprisonment:

- **Sedition Charges:**
 - Imprisoned multiple times for writings that incited resistance against British rule.
 - Most notably jailed in **1897 and 1908** for inciting rebellion through his journalistic work.
- **Differences with Moderates:**
 - Advocated **direct action** and opposed the moderate methods of prayer and petition during the split in the **Surat session (1907)** of INC.

Death:

- **Died:** August 1, 1920, in Mumbai.
- His death marked the end of an era, but his ideals continued to inspire the **non-cooperation and civil disobedience movements**.

GEOGRAPHY

Geomorphology

THE MINES AND MINERALS (DEVELOPMENT AND REGULATION) AMENDMENT BILL, 2025

Context:

Parliament has passed the [Mines and Minerals \(Development and Regulation\) Amendment Bill, 2025](#), aiming to liberalise and modernise India’s mineral sector.



About The Mines and Minerals (Development and Regulation) Amendment Bill, 2025:

What it is?

- A legislation amending the [Mines and Minerals \(Development and Regulation\) Act, 1957](#).
- Focuses on critical and strategic minerals essential for India’s economic security and green transition.

Aim:

- To liberalise and modernise India’s mining framework.
- Ensure domestic availability of critical and strategic minerals.
- Promote transparency, sustainability, and global competitiveness in the mining sector.

Key Features:

- **Inclusion of multiple minerals in a lease** – Leaseholders can add other minerals, including lithium, cobalt, and gold, with relaxed payment rules for critical minerals.
- **National Mineral Exploration and Development Trust (NMEDT)** – Expanded mandate to fund exploration and development both **domestically and overseas**; contribution rate raised to **3% of royalty**.
- **Removal of sale cap for captive mines** – Captive mines can now sell **100% of production** after

meeting end-use requirements.

- **Extension for deep-seated minerals** – Allows expansion of mining lease area (10–30%) for minerals found deeper than 200 metres.
- **Mineral exchanges** – Enables creation of **regulated electronic trading platforms** for transparent mineral and metal trading.
- **Community participation** – Ensures local welfare, balancing **development with sustainability**.

Significance of the MMDR Amendment Bill, 2025

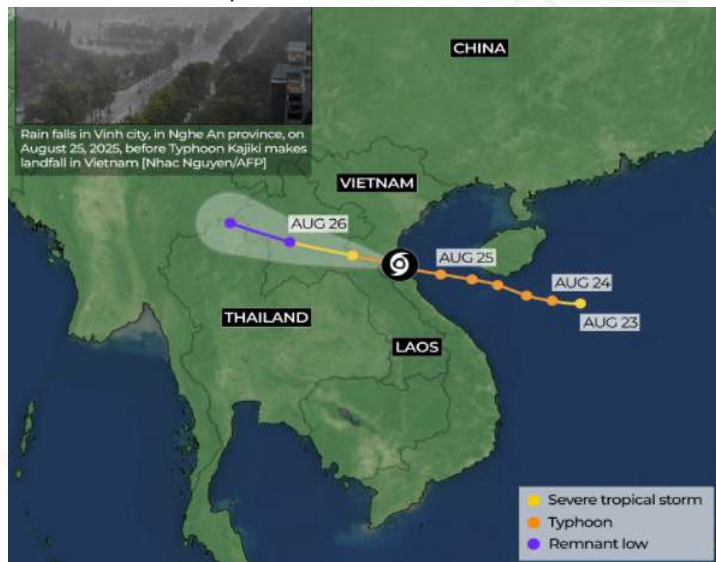
- **Securing Critical Minerals** – Reduces import dependence on lithium, cobalt, nickel, and other strategic minerals vital for EVs, batteries, and clean energy.
- **Boost to Mining & Economy** – Liberalised norms, mineral exchanges, and expanded lease options improve transparency, attract investments, and create jobs.

Climatology

TYPHOON KAJIKI

Context:

Vietnam has begun mass evacuations, shut airports, and cancelled flights as [Typhoon Kajiki](#) approaches its central coast with winds up to 166 km/h.



About Typhoon Kajiki:

- **What it is?**
 - A powerful [tropical cyclone](#) forming in the West Pacific Ocean.
- **Struck in:** Approaching central Vietnam, expected landfall between **Thanh Hoa and Nghe An province**.
- **Features:**
 - Wind speeds up to **166 km/h**.
 - Brings heavy rains, floods, and landslides.

- Considered as powerful as **Typhoon Yagi (2024)**, which killed ~300 people and caused \$3.3 bn in damages.
- Over **500,000 people evacuated**, airports closed, boats ordered ashore

About Typhoon:

- **Definition:** A **tropical cyclone** formed over the **West Pacific Ocean**, powered by heat and moisture from warm ocean waters.
- **Regional Naming:**
 - **Hurricane** → Atlantic & East Pacific.
 - **Typhoon** → West Pacific.
 - **Cyclone** → Indian Ocean & Australia.
- **Features:**
 - Rotating, low-pressure storm with strong winds and heavy rainfall.
 - **Energy source:** latent heat from warm seawater, unlike synoptic cyclones which depend on weather fronts.
 - Causes flooding, storm surges, mudslides, and large-scale destruction in coastal regions.

River System

MAHANADI RIVER

Context: After years of litigation before the [Mahanadi Water Disputes Tribunal](#), Odisha and Chhattisgarh have agreed to explore an amicable settlement over the Mahanadi River water-sharing dispute.



About Mahanadi River:

- **What It Is?**
 - The **Mahanadi** is a major east-flowing river of [peninsular India](#), known for its high silt load, historical floods, and agricultural importance. The name comes from Sanskrit: “Maha” (great) + “Nadi” (river).
- **States it Flows Through:**

TAWI RIVER

Context:

India has alerted Pakistan of a [flood threat](#) in the Tawi River on humanitarian grounds, even though the Indus Waters Treaty remains suspended after the Pahalgam terror attack.



About Tawi River:

- **Chhattisgarh** (upper and middle basin)
- **Odisha** (lower basin and delta)
- Minor portions in **Jharkhand, Maharashtra, and Madhya Pradesh**
- **Origin and Course:**
 - **Origin:** Near **Pharsiya village**, Dhamtari district, **Chhattisgarh** (Nagri Sihawa Hills, ~442m altitude)
 - **Total Length:** ~900 km (560 miles)
 - **Drains into:** [Bay of Bengal](#) via several distributaries near **Paradip**, Odisha
 - **Total Basin Area:** ~1.32 lakh sq. km
- **Major Tributaries:**
 - **Left Bank:** Seonath (Shivnath), Hasdeo, Mand, Ib
 - **Right Bank:** Ong, Tel, Jonk
- **Key Features:**
 - **Hirakud Dam (Odisha):** World's longest earthen dam and built for flood control, irrigation, and hydropower.
 - **Satkosia Gorge:** A scenic and ecologically sensitive zone cutting through the Eastern Ghats.
 - **Delta System:** One of India's largest, shared with the Brahmani River and supports agriculture, fisheries, and ports.
 - **Rich Biodiversity:** Home to over 130 bird species, fish populations, and key tiger reserve zones.
- **Significance of the Recent Announcement:**
 - **Shift from Legal Confrontation to Dialogue:** Opens space for cooperative federalism over natural resource sharing.
 - **Union Government's Role:** A [CWC-led Joint Committee](#) has been proposed to guide a technical and fair resolution.
 - **Model for Other River Disputes:** Sets a precedent for inter-state coordination over contentious river-sharing issues.

What it is?

- A major river of the Jammu region in J&K, considered sacred and often called *Surya Putri* (Daughter of the Sun) in ancient texts.

Origin:

- Rises from **Kalpas Kund** at **Seo Dhar** in the **Bhaderwah area of Doda district (Himalayas, J&K)**.
- Flows southwest through **Sudh Mahadev** before entering Jammu plains.

Flows Through:

- Passes through the **city of Jammu**, bisecting it into **old city** and **new city**.
- Provides scenic beauty and serves as the **lifeline of Jammu city**.

Tributary of:

- Joins the **Chenab River** in Pakistan after crossing the international boundary.
- Ultimately part of the [Indus river system](#)

governed historically by the IWT.

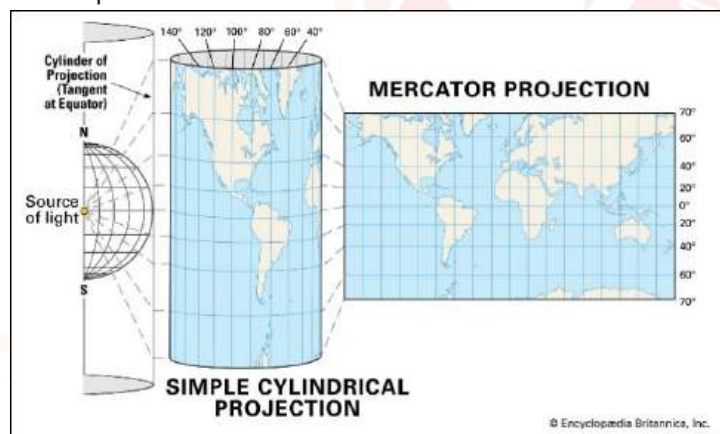
- **Key Features & Significance:**

- **Water Source:** Main source of drinking water and daily use for Jammu residents.
- **Bridges:** Three major bridges—
 - Gumat to Vikram Chowk.
 - Gujjar Nagar to Bahu Fort.
 - [Nagrota bypass bridge](#).
- **Economic Role:** Supports agriculture and small-scale irrigation in Jammu region.
- **Cultural/Religious Role:** Revered in local traditions, with rituals performed on its ghats.
- **Strategic Relevance:** As a tributary of the Chenab, flows into Pakistan, making it geopolitically significant under the [Indus Waters Treaty](#).

Map Based Questions from World

MERCATOR PROJECTION MAP

Context: The African Union (AU) has endorsed a global campaign to replace the [Mercator projection map](#) with one that depicts Africa's true size.



About Mercator Projection Map:

- **What it is?**

- A **cylindrical map projection**, introduced in 1569.
- Designed for **navigation** — allows sailors to follow a straight line of constant compass bearing.

- **Developed by:** Gerardus Mercator (1512–1594), Flemish mathematician and cartographer.

- **Key Features:**

- **Type:** **Acyindrical projection** mathematically derived to project the spherical Earth on a flat surface.
- **Straight-line Navigation (Rhumb Lines):**
 - Any straight line drawn represents a **line of constant compass bearing** (loxodrome).
 - Made it ideal for **maritime navigation** in the Age of Exploration.
- **Grid Structure:**
 - **Meridians:** Equally spaced, parallel, vertical lines.
 - **Parallels of Latitude:** Horizontal, straight lines — spacing increases with distance from the Equator.
 - Grid intersections form perfect right angles.
- **Scale:**
 - True scale only along the **Equator**.
 - Distortion **increases with latitude**, especially near the poles.
- **Conformality:**
 - Preserves **shapes and angles**, making it useful for navigators.
 - But **area (size) is highly distorted**.
- **Issues & Distortions:**
 - **Africa & South America** appear much smaller than reality.
 - **Europe, North America, and [Greenland](#)** look disproportionately larger.

FACTS FOR PRELIMS

GENERAL STUDIES – 2

POLITY

Salient Features, Schedules and Preamble

THE 130TH CONSTITUTION (AMENDMENT) BILL, 2025

Context:

The 130th Constitution (Amendment) Bill, 2025 has been introduced in the Lok Sabha and referred to a [Joint Parliamentary Committee](#) (JPC).



About The 130th Constitution (Amendment) Bill, 2025:

What it is?

- A Bill seeking to amend **Article 75 (Union Ministers)**, **Article 164 (State Ministers)**, and **Article 239AA (NCT of Delhi)**.
- Also proposes amendments in the Government of Union Territories Act, 1963 and the Jammu & Kashmir Reorganisation Act, 2019.

Objective:

- To ensure that Ministers holding high constitutional offices remain **beyond suspicion**.
- To protect **constitutional morality, good governance, and public trust**.
- To prevent misuse of office by Ministers under custody for **serious criminal charges**.

Key Features of the Bill:

1. Automatic Removal:

- If a Minister (including PM/CM) is **arrested and detained for 30 consecutive days** for an offence punishable with **5 years or more**, they must vacate office.

2. Role of President/Governor/LG:

- Removal shall be effected by the **President (at Centre), Governor (in States), or**

Lieutenant Governor (in UTs), based on procedure.

3. Prime Minister's Advice Clause:

- The **PM must advise** the President to remove such a Minister by the 31st day.
- If not, the Minister **automatically ceases to hold office** from the following day.

4. Reappointment Clause:

- The provision does **not bar reappointment** of the Minister after release from custody.

5. Extension to States & UTs:

- Similar provisions proposed for **State Cabinets** and **Union Territories** through amendments in corresponding laws.

6. Justification in Objects & Reasons:

- Ministers facing serious charges may **thwart constitutional morality** and **erode public faith** in governance.
- Aim is to keep executive positions free from "any ray of suspicion".

OVERSEAS CITIZENS OF INDIA (OCI) SCHEME

Context:

MHA has amended [Citizenship Act](#) rules to allow cancellation of OCI registration if the cardholder is convicted for two years or more, or charge-sheeted for offences punishable with seven years or more, regardless of where the offence occurred.



सत्यमेव जयते
 Ministry of Home Affairs
 (government of india)

About Overseas Citizens of India (OCI) Scheme:

• What it is?

- A legal status allowing foreign nationals of Indian origin to live, work, and travel in India without repeatedly applying for a visa.

• Launched in: 2005

• Nodal Ministry: Ministry of Home Affairs (MHA)

• Aim:

- Strengthen engagement between India and its diaspora.
- Provide long-term residency and travel benefits to [persons of Indian origin](#).

• Key Features:

- **Eligibility:** Persons who were citizens of India on or after 26 January 1950, or their descendants (excluding those with Pakistani/Bangladeshi citizenship in self or

ancestry).

- **Visa Benefits:** Lifelong, multiple-entry, multi-purpose visa for visiting India.
- **Economic & Educational Rights:** Right to own property (except agricultural/plantation land), pursue education, and invest in India.
- **No Political Rights:** Not entitled to vote or hold constitutional posts.

About New Rules under MHA Notification:

- **Grounds for Cancellation of OCI Registration** (as per clause (da) of Section 7D, Citizenship Act, 1955):
 - **Conviction-Based:** Sentenced to imprisonment of **two years or more**.
 - **Charge-Sheet Based:** Charge-sheeted for offences punishable with **seven years or more**.
 - **Irrespective of Jurisdiction:** Applicable whether conviction/charge-sheet is in India or abroad, provided offence is recognised under Indian law.
 - **Other Existing Grounds** (already under law):
 - Fraud or concealment in obtaining OCI.
 - Disaffection towards the Constitution.
 - Unlawful trade/communication with the enemy during war.
 - Acts against sovereignty, integrity, security of India, friendly foreign relations, or public interest.

Emergency Provisions

EXTENSION OF PRESIDENT'S RULE IN MANIPUR

Context:

Parliament has approved a six-month extension of President's Rule in Manipur, following its initial imposition in February 2025.



About Extension of President's Rule in Manipur:

- **What is President's Rule?**
 - President's Rule refers to **direct central governance** in a state under **Article 356** of

the Constitution when the **constitutional machinery fails** or the elected government cannot function as per constitutional norms.

- **Constitutional Article Involved:**
 - **Article 356:** Authorises the President to assume control of a state's administration upon the Governor's report or otherwise.
 - **Article 365:** Supports Article 356 when a State fails to comply with directions of the Union Government.
 - **How is it Imposed?**
 - A **proclamation** is issued by the President.
 - Must be **approved by both Houses of Parliament** within **2 months** by a **simple majority**.
 - Once approved, the rule remains for **6 months**, extendable up to **3 years** in **six-month blocks** with Parliamentary approval.
 - **Conditions for Renewal:**
 - **Continued breakdown** of constitutional machinery.
 - Approval by **both Lok Sabha and Rajya Sabha** every 6 months.
 - For extensions beyond 1-year, National Emergency must be in operation or the Election Commission must certify inability to hold elections.
 - **Procedure for Revocation:**
 - Can be revoked anytime by the President.
 - Usually withdrawn when a new government is elected or a viable legislative majority is formed.
 - **Implications of President's Rule:**
 - Governance shifts to the Centre, administered by the Governor on behalf of the President.
 - State Assembly may be kept in suspended animation or dissolved.
 - Often used during violent unrest, political deadlock, or collapse of majority.
- Judicial oversight post S.R. Bommai Case (1994) ensures it is not misused for political motives

Parliament and State Legislature

LOK SABHA PASSES ONLINE GAMING REGULATION BILL, 2025

Context:

The Lok Sabha has passed the Promotion and Regulation of Online Gaming Bill, 2025, banning real money gaming such as fantasy sports and card games. The Bill aims to address **financial, psychological, and social harms** caused by addictive platforms.



[About Online Gaming Regulation Bill, 2025](#)

What it is?

- The Bill seeks to **prohibit online real money games** where users deposit money for monetary returns.
- It aims to balance prohibition of harmful money games with the **promotion of e-sports** as a creative and recreational sector.
- It establishes a **statutory authority** for structured development and regulation of safe gaming.

[Key Provisions of the Bill](#)

1. **Ban on Real Money Gaming**
 - Prohibits the *offering, facilitation, promotion, advertisement, and participation* in online games involving **monetary deposits and returns**.
 - Directly targets platforms offering fantasy leagues, card games, or gambling-like models.
2. **Authority for E-Sports**
 - Establishes a **statutory authority** to promote e-sports as a creative and recreational sector.
 - Differentiates **skill-based e-sports** from **gambling-oriented money games**.
3. **Rationale Behind the Bill**
 - Addresses **social and economic harms**: addiction, suicides, fraud, and financial losses.
 - Seeks to curb **fraudulent algorithms** and **cheating mechanisms** used by gaming companies.
4. **No Draft Consultation**
 - The government skipped pre-legislative consultation, arguing prohibition laws do not require open industry feedback.
 - However, IT Minister cited years of prior engagement with the gaming sector.

NOMINATIONS TO UNION TERRITORY ASSEMBLIES

[Context:](#)

The Union Home Ministry recently informed the [J&K and Ladakh](#) High Court that the Lieutenant Governor (LG) can nominate five members to the [Jammu & Kashmir Legislative Assembly](#) without requiring the aid and advice of the Council of Ministers.



[About Nominations to Union Territory \(UT\) Assemblies](#)

What it is?

- **Nomination to UT Assemblies** refers to the constitutional and statutory provisions by which certain members are appointed, not elected, to serve in the legislature.
 - These members usually represent **specific communities, migrants, women, or expert domains**.

[Constitutional Context](#)

- **Parliament & States:** The Constitution earlier allowed Anglo-Indian nominations (discontinued in 2020). **Rajya Sabha has 12 nominated members by the President**. State Legislative Councils allow 1/6th nominated members by the Governor.
- **Union Territories:** As UTs are directly administered by the Union, their Assemblies are governed by Parliamentary statutes rather than constitutional provisions applicable to States.

[Nomination Procedure](#)

- **Jammu & Kashmir:**
 - Under **Section 14, J&K Reorganisation Act, 2019 (amended 2023)**:
 - 90 elected seats.
 - LG may nominate up to five members — two women, two Kashmiri migrants, and one displaced person from PoK.
- **Puducherry:**
 - Under **Section 3, Government of Union Territories Act, 1963**:
 - 30 elected members.
 - Central Government may nominate

up to three members.

- **Delhi:**
 - Under **Section 3, GNCTD Act, 1991:**
 - 70 elected members only.
 - No provision for nominated MLAs.

Judicial Interpretation

- **Puducherry Case (K. Lakshminarayanan, 2018):** Madras High Court upheld Centre's power to nominate MLAs; no need for UT Government's advice. Supreme Court later upheld this.
- **Delhi Case (NCT of Delhi v. Union, 2023):** SC articulated the "triple chain of command"—civil servants → ministers → legislature → electorate; emphasised LG must act on the aid and advice of Council of Ministers, except where legislature lacks power.

How UT Nominations Differ from States

1. **Authority:** In States, Governors act on the advice of the elected Council of Ministers. In UTs, nominations often flow directly from the Union Government or LG.
2. **Autonomy:** States enjoy constitutional status; UT Assemblies derive powers from Acts of Parliament.
3. **Democratic Balance:** In smaller UT Assemblies like Puducherry or J&K, nominated members may tilt legislative majority — unlike in larger State legislatures.
4. **Judicial Stance:** Courts have upheld the Centre's primacy in UT nominations, limiting the role of local elected governments.

LADAKH STATEHOOD & SIXTH SCHEDULE

Context:

A massive protest was held in [Kargil](#), Ladakh, led by climate activist Sonam Wangchuk, demanding statehood for Ladakh and its inclusion under the Sixth Schedule of the Constitution.



About Ladakh Statehood & Sixth Schedule:

- **Ladakh Statehood:**

- After the **abrogation of Article 370** and bifurcation of Jammu & Kashmir on 5 August 2019, Ladakh became a Union Territory without a legislature.
- **Demand:** Full statehood to provide a democratically elected legislature and greater legislative autonomy.
- **Rationale:** To ensure [local representation](#), control over resources, and safeguard cultural & environmental heritage.

• Sixth Schedule:

- **Constitutional Basis:** Provided under **Articles 244(2) and 275(1)**.
- **Applicability:** Currently applies to certain tribal areas of **Assam, Meghalaya, Tripura, and Mizoram**.
- **Purpose:** To protect the rights, culture, and land of tribal communities by granting them autonomy through [Autonomous District and Regional Councils](#).

• Aims of the Sixth Schedule:

- Preserve tribal identity, culture, and traditions.
- Provide self-governance in certain legislative and administrative matters.
- Protect land and resource rights of tribal communities.

• Key Features:

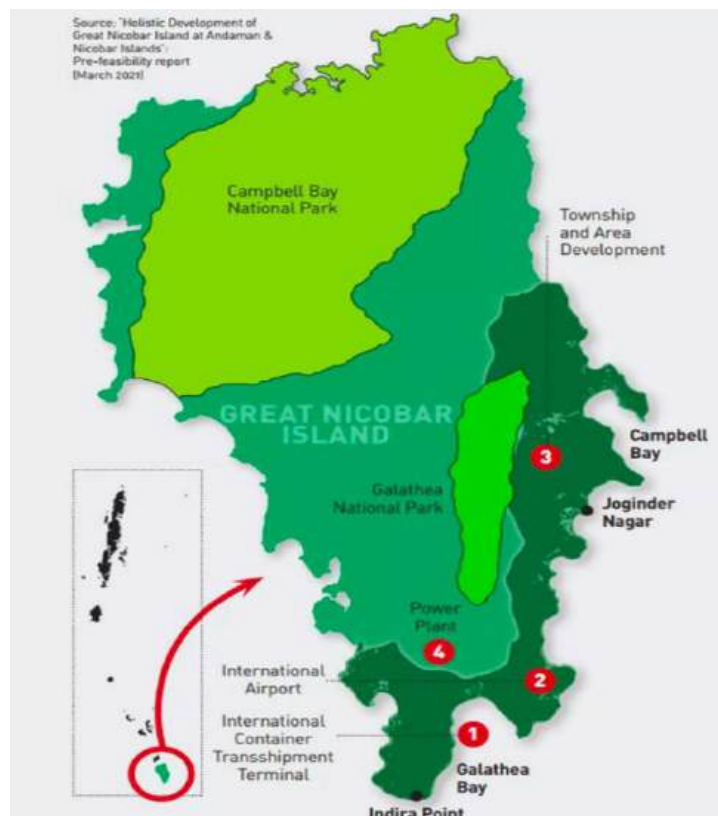
- **Autonomous Councils:** Elected bodies with legislative, judicial, and executive powers in specified subjects (e.g., land, forests, agriculture, village administration).
- **Governor's Role:** Power to include/exclude areas, alter boundaries, and approve council laws.
- **Legislative Powers:** Councils can make laws on land use, forests, water, agriculture, public health, social customs, and village administration.
- **Judicial Powers:** Village councils/courts for disputes within tribal communities.
- **Revenue & Taxation:** Power to levy taxes on land, trade, professions, and markets.
- **Financial Provisions:** Grants from the [Consolidated Fund of India](#) under Article 275(1).
- **Cultural Protection:** Safeguards against alienation of tribal land and exploitation by non-tribals.

Union and State Executive

GREAT NICOBAR PROJECT

Context:

The **Tribal Council of Great Nicobar** has complained that the **forest rights of Nicobarese tribals under FRA, 2006 have not been settled** for the ₹72,000-crore [Great Nicobar Project](#).



About Great Nicobar Project

What it is

- A **mega infrastructure project** proposed on Great Nicobar Island, Andaman & Nicobar.
- Implemented by **NITI Aayog and A&N Administration**, with strategic backing from the Government of India.

Started in

- Conceptualised in **2015**, formally cleared in **2022** with environmental and forest clearances.

Aims and Objectives

- Enhance **India's maritime security** in the Bay of Bengal and Indo-Pacific.
- Boost **trade, connectivity, and regional development**.
- Create **employment opportunities** for local population.
- Strengthen **India's presence in global shipping and logistics chains**.

Key Features

1. **Transshipment Port** at Galathea Bay to handle international cargo.
2. **International Airport** with dual civil–military use.
3. **Gas-based Power Plant** for energy security.
4. **Integrated Township** with housing and social infrastructure.
5. Total **13,000+ hectares of forest land** proposed for diversion.

Forest Rights Act (FRA), 2006

- Recognises **individual and community rights of Scheduled Tribes and traditional forest dwellers** over forest land and produce.
- Rights include **habitation, cultivation, grazing, fishing, minor forest produce, and community resource rights**.
- Any **diversion of forest land** for non-forest use requires **Gram Sabha consent after rights are settled**.
- Empowers local communities to participate in **forest governance and conservation**.

Protection of Aboriginal Tribes Regulation (PAT), 1956

- Special legislation for **safeguarding indigenous tribes** of the Andaman & Nicobar Islands.
- Provides **exclusive rights to land and forest** to tribes like Nicobarese, Shompens, and Onges.
- Prohibits outsiders from settling or acquiring land in tribal areas.
- Grants the **Administrator of A&N Islands overriding powers** to divert forest land for projects in notified areas.
- Creates tension with FRA, 2006 as PAT56 allows diversion without Gram Sabha consent, while FRA mandates settlement of rights first.

KARTAVYA BHAVAN

Context:

Prime Minister inaugurated Kartavya Bhavan-03, the first of ten planned Common Central Secretariat buildings under the Central Vista redevelopment project.



About Kartavya Bhavan:

- **What It Is?**
 - A newly constructed **Common Central Secretariat (CCS)** building, designed as a **green, smart, and centralised headquarters** for key Union ministries under the Central Vista redevelopment plan.
- **Located In:** New Delhi.
- **Aim:**
 - Consolidate **over 50 scattered central ministry offices** into ten modern CCS buildings.
 - Improve administrative efficiency, reduce rental/maintenance costs, and integrate **sustainable and digital infrastructure** into governance.
- **Key Features:**
 - **Size & Structure:** 150,000 sq. m., 7 floors + 2 basements.
 - **Green Infrastructure:**
 - Rooftop solar panels generating ~5.34 lakh units annually.
 - Rainwater harvesting, **zero-discharge waste** processing.
 - Energy-efficient **HVAC systems** and noise-insulated glass.
 - **Smart Systems:**
 - Digital workspaces, sensor-controlled lighting, CCTV, smart ID-based access.
 - Centralised command centre for building operations.
 - **Ministries Housed:** Home Affairs, External Affairs, Rural Development, Petroleum & Natural Gas, **MSME**, DoPT, Principal Scientific Adviser.
- **Significance:**
 - **Governance Efficiency:** Brings key ministries under one roof, enhancing coordination.
 - **Cost Savings:** Expected to save ₹1,500 crore annually in rent and maintenance once all CCS buildings are completed.
 - **Sustainability:** Aims for **GRIHA-4 green rating**, reducing energy use by 30%.

FRAMEWORK AGREEMENT

Context:

On the 10th anniversary of the Framework Agreement (2015), the **NSCN-IM** reaffirmed its commitment to defend the accord, criticising attempts by the Government of India and rival Naga groups (NNPGs) to dilute its essence and political significance.



About Framework Agreement:

- **What is the Framework Agreement?**
 - The Framework Agreement is a landmark peace accord signed on 3rd August 2015 between the Government of India and the National Socialist Council of Nagalim–Isak-Muivah (NSCN-IM).
- **Parties Involved:**
 - **Government of India**, represented by PM of India and interlocutor RN Ravi.
 - **NSCN-IM**, representing dominant Naga political interests.
- **Core Objectives of the FA:**
 - Recognize the **distinct political identity and unique history** of the Nagas.
 - Lay the foundation for a **new political relationship** based on mutual respect and coexistence.
 - Establish **shared sovereignty** with clear areas of jurisdiction.
 - Frame an **execution plan** for inclusive and democratic self-governance in Nagalim.
- **Salient Features of the Framework Agreement:**
 - **Recognition of Political Conflict:** Acknowledges the Indo-Naga issue as a six-decade-old political struggle, not merely an administrative problem.
 - **Unique Naga History:** Recognizes Nagas as a distinct political entity with a unique historical and cultural identity.
 - **Shared Sovereignty Model:** Proposes clearly defined divisions of power between India and Nagalim to ensure cooperative coexistence.

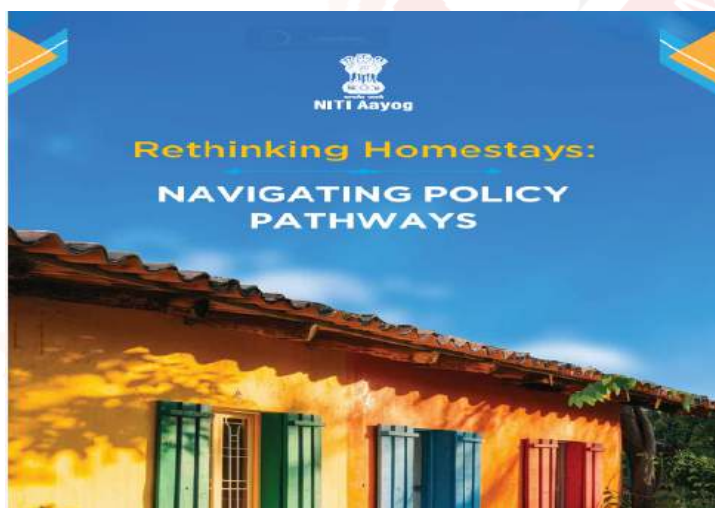
- **Mutual Respect for Institutions:** Recognizes both parties' political systems as distinct, fostering equal dialogue rather than subordination.
- **People-Centric Governance:** Embeds the idea that sovereignty resides with the people, reinforcing Naga aspirations for democratic self-rule.
- **Commitment to Peace and Inclusivity:** Seeks lasting peace by involving all Naga factions and encouraging broad-based public support.
- **Implementation Plan:** Promises a time-bound and actionable roadmap, signalling intent to move beyond rhetoric to real autonomy.

Bodies (Constitutional, Statutory, Regulatory Bodies)

RETHINKING HOMESTAYS: NAVIGATING POLICY PATHWAYS REPORT BY NITI AAYOG

Context:

NITI Aayog released the report "[Rethinking Homestays: Navigating Policy Pathways](#)" on 22 August 2025 in collaboration with IAMAI. The report aims to provide a strategic roadmap for strengthening India's homestay and BnB sector.



About the Report – "Rethinking Homestays: Navigating Policy Pathways":

What it is

- It is a **policy-oriented document** highlighting opportunities and challenges in India's homestay ecosystem.
- Developed through **consultations with policymakers, hosts, and aggregators.**

About NITI Aayog

- **What it is:** [National Institution for Transforming India](#), a policy think-tank of the Government of India.
- **Established in:** 1 January 2015, replacing the Planning Commission.
- **Organisation:**
 - Chairperson: Prime Minister of India.
 - Vice-Chairperson: Appointed by PM.
 - Members: Full-time, part-time (experts), and ex-officio (Union Ministers).
 - Governing Council: CM of states and LGs of UTs.
- **Functions:**
 1. Acts as the **premier policy think tank** for cooperative federalism.
 2. Provides **strategic and long-term policy frameworks.**
 3. Monitors implementation of development programmes.
 4. Encourages **innovation, entrepreneurship, and technology adoption.**
 5. Coordinates between **Centre, States, and global stakeholders.**
- **Powers:**
 - Advisory in nature, but **influential in shaping national policies.**
 - Plays key role in flagship missions like **Aspirational Districts Programme, Atal Innovation Mission, SDG localization.**

MACHINE READABLE ELECTORAL ROLLS IN INDIA

Context:

The Opposition have demanded [machine-readable electoral rolls](#) from the Election Commission (EC), arguing that searchable formats are vital to detect duplicate or fraudulent entries.



About Electoral Rolls

What it is?

- **Definition:** An electoral roll is the official list of citizens eligible to vote in a constituency.
- **Authority:** Prepared and updated under the supervision of the [Election Commission of India \(ECI\)](#) through district-level officials.
- **Dynamic Nature:** Updated regularly to include new voters, remove deceased or shifted individuals, and correct errors.
- **Access:** Publicly available through the EC's website in the form of **PDFs split into hundreds of constituency "parts."**

About Machine-Readable Electoral Rolls

What It Is

- Rolls provided in **text-searchable format (text-PDF or Excel/CSV)** instead of **image-only PDF**.
- Allows computers to **index, search, and analyse voter data** quickly.

Working Mechanism

- **Image PDF** = Cannot be searched digitally; only human scrutiny works.
- **Text PDF/CSV** = Enables computer-based matching, duplicate detection, and large-scale verification.
- **OCR (Optical Character Recognition)** = Converts scanned image PDFs into machine-readable text, but this is **costly and resource-intensive** (millions of pages nationwide).

Why EC Stopped Providing Machine-Readable Rolls

1. **Data Privacy Concerns** – Names and addresses could be misused by foreign entities.
2. **2018 SC Case (Kamal Nath v. EC)** – Supreme Court refused to compel EC to share text-based rolls.
3. **Internal EC Order (2018)** – Directed States to upload only image-PDFs to protect voter identity.
4. **Security Risks** – Potential misuse of searchable data for profiling, surveillance, or targeted political manipulation.
5. **Alternative Given** – Political parties can convert PDFs themselves via OCR, though costly and cumbersome.

CEC REMOVAL PROCESS

Context:

The Opposition is considering an impeachment motion against [Chief Election Commissioner \(CEC\)](#) Gyanesh Kumar.



About CEC Removal Process:

What it is?

- The [CEC](#) is a constitutional authority under Article 324 of the Indian Constitution.
- Removal safeguards are designed to ensure independence and neutrality of the Election Commission.
- CEC can only be removed in the same manner and on the same grounds as a Supreme Court Judge.

Procedure of Removal:

- **Grounds:**
 - *Proved misbehaviour* → includes corruption, abuse of office, or failure to discharge duties.
 - *Incapacity* → inability to perform constitutional functions.
- **Initiation:**
 - A **motion alleging misbehaviour/incapacity** is introduced in either House of Parliament.
 - Requires **support of at least 50 MPs** for admission.
- **Inquiry:** A **judicial inquiry committee** examines the evidence and validates the charges.
- **Voting in Parliament:** Motion must be passed by a **two-thirds majority of members present and voting** in both Houses.
- **Presidential Action:** Once Parliament approves, the **President orders removal**; no discretion remains.
- **Other Election Commissioners:** Can only be removed on **recommendation of the CEC**, further strengthening institutional independence.

History of Removal:

- No [CEC](#) has ever been removed since independence.
- The high constitutional threshold has worked as a protective shield against political interference.

TRAI LAUNCHES INDIA'S FIRST PROPERTY RATING FRAMEWORK FOR DIGITAL CONNECTIVITY

Context:

The Telecom Regulatory Authority of India ([TRAI](#)) has unveiled the country's first Property Rating Framework for [Digital Connectivity](#), aimed at standardising how buildings are assessed for high-speed, reliable internet access.



About TRAI launches India's first property rating framework for digital connectivity:

- **What it is?**
 - A standardised national framework to evaluate and rate properties based on their digital connectivity readiness and performance.
- **How it Works?**
 - Created under the Rating of Properties for Digital Connectivity Regulations, 2024.
 - Manual serves as a **uniform guide** for [Digital Connectivity Rating Agencies](#).
 - Uses measurable criteria for **fibre readiness, indoor mobile coverage, Wi-Fi access, broadband speeds, and overall user experience**.
 - Ratings help buyers, tenants, and businesses make informed property decisions.
- **Key Features:**
 - **Indoor Network Focus:** Addresses signal loss due to building materials, especially for high-frequency 4G/5G.
 - **Inclusive Growth:** Ensures buildings support digital work, education, healthcare, and services.
 - **Developer Incentive:** Encourages integrating digital infrastructure in early design stages.

About Telecom Regulatory Authority of India (TRAI):

- **What it is?**
 - Statutory regulatory body overseeing telecom services, tariffs, and service quality in India.
- **Established:** 20 February 1997, under the Telecom Regulatory Authority of India Act, 1997.
- **Headquarters:** New Delhi, India.
- **Objective:**
 - Foster telecom sector growth to make India a leader in the global digital economy.
 - Maintain a **fair, transparent policy environment** ensuring healthy competition.
- **Functions:**
 - **Regulatory Oversight:** Issue regulations, orders, and directions on tariffs, interconnection, and service quality.
 - **Market Development:** Facilitate transition

from monopoly to multi-operator, competitive telecom market.

- **Dispute Mechanism:** Recommendations led to the creation of Telecommunications Dispute Settlement and Appellate Tribunal ([TDSAT](#)) in 2000.
- **Consumer Protection:** Safeguard user interests through quality-of-service benchmarks and fair pricing.

UPSC MARKING 100 YEARS OF COMMITMENT TO MERIT AND PUBLIC SERVICE

Context:

The Union Public Service Commission ([UPSC](#)) will mark its centenary year from 1 October 2025 to 1 October 2026, celebrating 100 years of transparent, merit-based recruitment for India's civil services.



UPSC

About UPSC Marking 100 Years of Commitment to Merit and Public Service:

- **What it is?**
 - The UPSC is India's premier constitutional authority for recruiting top-level government officers through a fair, competitive examination process.
- **Established in:** 1 October 1926, following the recommendations of the **Lee Commission (1924)** and provisions of the **Government of India Act, 1919**.
- **Objective:**
 - Ensure **meritocracy** and fairness in public service recruitment.
 - Select candidates through **rigorous, impartial, and transparent** examinations and interviews.
 - Maintain the **highest standards of integrity and competence** in public administration.

Historical Evolution of Civil Services in India

- **Pre-1854 – Patronage System**
 - East India Company civil servants were nominated, trained at **Haileybury College (London)**, and sent to India.
- **1854 – Macaulay Reforms**
 - Introduction of **competitive exams** for the Indian Civil Service (ICS) held in London (from 1855).
 - **First Indian to succeed:** Satyendranath Tagore (1864).
- **1922 – Exams in India**
 - Civil Service exams began in **Allahabad and later Delhi**, alongside London exams.
- **1926 – Public Service Commission Established**
 - **First Chairman:** Sir Ross Barker.
 - Initially had 4 members + chairman and functions under **Public Service Commission (Functions) Rules, 1926**.
- **1937 – Federal Public Service Commission**
 - Created under **Government of India Act, 1935** for the Federation of India.
- **1950 – Union Public Service Commission**
 - Came into existence with the **Constitution of India**; powers defined in **Articles 315–323**.

Local Government

AI-POWERED ‘SABHASAAR’

Context:

The Union [Ministry of Panchayati Raj](#) will launch the AI-powered ‘SabhaSaar’ tool to automatically generate structured minutes of Gram Sabha meetings.



About AI-Powered ‘SabhaSaar’:

- **What it is?**
 - A government-developed [Artificial Intelligence](#) (AI) tool that transcribes and generates structured minutes from Gram Sabha meeting videos and audio recordings.
- **Developed by:** Union Ministry of Panchayati Raj, integrated with [Bhashini](#) – the National Language Translation Mission.
- **Objective:**

- Streamline and standardize [Gram Sabha](#) documentation.
- Enhance governance efficiency by reducing manual workload.
- Promote transparency and timely record-keeping in Panchayat functioning.

Key Features:

- **AI & NLP Integration:** Uses Natural Language Processing to transcribe spoken content into accurate text.
- **Multi-Language Support:** Currently supports **13 Indian languages** including Kannada and English.
- **Automated Summarization:** Identifies key decisions, resolutions, and action points.
- **Structured Output:** Produces well-formatted, official-ready minutes.
- **Scalable Deployment:** Starting in Tripura, with plans for nationwide adoption.
- **Event Integration:** To be used in [Special Gram Sabhas](#) held on national days.

Significance:

- **Governance Efficiency:** Saves officials hours of manual transcription work.
- **Transparency:** Ensures accurate, tamper-proof meeting records.
- **Inclusivity:** [Multi-language support](#) improves accessibility for Panchayat functionaries.

Welfare schemes

PRADHAN MANTRI UJJWALA YOJANA (PMUY)

Context:

The Government has approved the continuation of a ₹300 per LPG cylinder subsidy for Pradhan Mantri Ujjwala Yojana ([PMUY](#)) beneficiaries in FY 2025–26.



About Pradhan Mantri Ujjwala Yojana (PMUY):

What It Is?

- A flagship social welfare scheme to provide **deposit-free LPG connections** to women from economically weaker households.
- Aims to **replace hazardous traditional cooking fuels** with clean energy for health, environment, and gender empowerment.

Launched In: May 2016, Ballia (Uttar Pradesh).

Nodal Ministry: Ministry of Petroleum and Natural Gas (MoPNG).

Objectives:

- Ensure **universal access** to clean cooking fuel.
- Reduce **indoor air pollution** and related health hazards.
- Empower rural women by reducing drudgery and improving quality of life.
- Promote environmental conservation by reducing deforestation and carbon emissions.

Eligibility Criteria:

- Adult women from **Below Poverty Line (BPL)** households.
- Identified through **Socio-Economic Caste Census (SECC) 2011** data.
- Special provision for **migrant families** without address proof under PMUY 2.0.

Achievements:

- **PMUY 1.0:** Target of 8 crore connections by March 2020 – achieved ahead of schedule.
- **PMUY 2.0:** Additional 1.6 crore connections for migrant households.
- **Latest Expansion:** Additional 75 lakh connections, taking total target to 10.35 crore beneficiaries.

Key Features of PMUY:

- **Deposit-free LPG connection to eligible households** – Beneficiaries receive an **LPG connection** without paying the initial security deposit, reducing entry barriers for poor households.
- **Financial support for stove purchase** – The government provides monetary assistance for buying a cooking stove, ensuring the connection is ready for immediate use.
- **Targeted subsidy of ₹300 per cylinder** – PMUY families get a ₹300 subsidy per 14.2 kg cylinder (proportionately for 5 kg cylinders) for up to nine refills annually, making clean fuel more affordable.
- **Direct Benefit Transfer (DBT) to beneficiaries' accounts** – Subsidy amounts are directly credited to beneficiaries' bank accounts, ensuring transparency and eliminating leakages.
- **Swachh Indhan Behtar Jeevan** – The scheme promotes cleaner fuel to improve women's health, reduce indoor air pollution, and encourage sustainable cooking practices.

Miscellaneous

NATIONAL SPORTS DAY

Context:

India is celebrating **National Sports Day** (29th August) to mark the **birth anniversary of hockey legend Major Dhyan Chand**, with nationwide events under the theme *"Ek Ghanta, Khel ke Maidan Main"*.



About National Sports Day

What it is

- A **national observance** dedicated to promoting sports, fitness, and well-being.
- Held annually to celebrate the **birth anniversary of Major Dhyan Chand**.

Celebrated Since

- Officially observed from **2012 onwards** across India.

Objectives

1. **Promote fitness and health** through sports participation.
2. **Honour legendary sportspersons** who have contributed to India's sporting legacy.
3. **Encourage youth participation** in grassroots sports.
4. Serve as a reminder that sports are linked to **national integration, discipline, and pride**.

Theme 2025

- *"Ek Ghanta, Khel ke Maidan Main"* — one hour of play daily for health and vitality.

About Major Dhyan Chand:

- **Early Life:** Born on **29 August 1905** in Allahabad (now Prayagraj), Uttar Pradesh.
- **Nickname:** Known as the *"Hockey Wizard"* for his unmatched skills.
- **Olympic Legacy:** Won **three Olympic gold medals** for India (1928, 1932, 1936).
- **Playing Style:** Renowned for his **ball control, goal-scoring ability, and sportsmanship**.
- **Honours:**
 - Awarded **Padma Bhushan** in 1956.
 - India's highest sporting honour was renamed as **Major Dhyan Chand Khel Ratna Award** in 2021.

- **Legacy:** His birthday immortalised as **National Sports Day**, symbolising excellence and dedication in Indian sports.

UMEED PORTAL

Context:

The **Ministry of Minority Affairs** has launched an [additional module on the UMEED Portal](#) to allow widows, divorced women, and orphans to apply for maintenance support from **Waqf-alal-aulad properties**.



About UMEED Portal

What it is ?

- **UMEED** stands for Unified Waqf Management, Empowerment, Efficiency, and Development. It is a **centralized digital platform** for registering and regulating Waqf properties across India.
- **Nodal Ministry:** Ministry of Minority Affairs, in coordination with **State Waqf Boards** and judicial authorities.
- **Objectives of the Portal:**
 - Ensure **transparent and time-bound registration** of Waqf properties.
 - Empower beneficiaries with **digital access to rights, obligations, and legal safeguards**.
 - Resolve **long-standing property disputes** and [enhance accountability](#).
 - Facilitate **policy-level insights** through real-time data and geotagged mapping.
- **Key Features of UMEED Portal:**
 - **Time-Bound Registration:** All Waqf properties must be registered within 6 months of launch.
 - **Geotagging and Digitization:** Properties must include precise measurements and geolocation data during registration.
 - **Dispute Resolution Trigger:** Unregistered properties after deadline will be declared

disputed and sent to Waqf Tribunal.

- **User Support Services:** Provides legal awareness tools and clarifies rights under amended law.
- **Women-Centric Provision:** Properties under women's names cannot be designated as Waqf, but women, children, and EWS will remain eligible beneficiaries.
- **Legal Basis:**
 - Rule 8(2) of the [Unified Waqf Management, Empowerment, Efficiency and Development Rules, 2025](#).
 - Section 3(r)(iv) of the [Unified Waqf Management, Empowerment, Efficiency and Development Act, 1995](#).
- **Waqf-alal-aulad:**
 - A special category of Waqf endowment created primarily for the benefit of family members and other deserving individuals.
 - Income generated is used for maintenance of widows, divorced women, and orphans.

Key Features of the New Module

1. **Aadhaar-based authentication** – ensures beneficiary verification.
2. **Online application & approval process** – managed by State/UT Waqf Boards.
3. **Direct Benefit Transfer (DBT)** – financial support directly into beneficiaries' bank accounts.
4. **Transparency & Accountability** – reduces administrative delays and leakages.

OPEN-BOOK ASSESSMENTS (OBE)

Context:

The CBSE will introduce Open-Book Assessments (OBE) in Class 9 from 2026–27 after pilot studies showed strong teacher support, aiming to move away from rote learning towards competency-based evaluation.



About Open-Book Assessments (**OBE**):

- **What It Is?**
 - An exam format that allows students to refer to approved materials (textbooks, notes, resource sheets) during the assessment,

focusing on [application of knowledge rather](#) than memory recall.

- **Announced By:** Central Board of Secondary Education (CBSE), approved by its Governing Body in June 2025 after a 2023–24 pilot.
- **Objective:**
 - Reduce dependence on [rote memorisation](#).
 - Promote analytical thinking, problem-solving, and real-life application of concepts.
 - Align assessments with [National Education Policy \(NEP\) 2020](#) vision for competency-based learning.
- **How It Works?**
 - Students may use pre-approved books or reference material during exams.
 - Questions test the ability to interpret, connect, and apply concepts to given problems.
 - Requires skills in quick referencing, conceptual clarity, and synthesis of ideas.
- **Features:**
 - **Resource Access:** Textbooks, class notes, teacher-provided materials.
 - **Application-Oriented:** Focus on linking facts to solutions, not direct recall.
 - **Pilot-tested:** Conducted for English, Mathematics, Science, and Biology in 2023–24.
 - **Flexible Design:** Can be adapted for multiple subjects and grades.
 - **Stress Reduction:** Early studies show lower exam anxiety compared to closed-book tests.
- **Significance:**
 - **Pedagogical Shift:** Encourages deeper learning and critical analysis.
 - **Alignment with Global Practices:** Similar to higher education formats used internationally.
 - **Inclusivity in Learning:** Supports students with varied learning styles.



About [National Anubhav Awards](#):

- **What is it?**
 - The **National Anubhav Awards** are annual honours recognizing outstanding memoirs by retiring or recently retired Central Government employees, highlighting their experiences and contributions to [governance](#).
- **Awarded by:**
 - **Department of Pension & Pensioners' Welfare (DoPPW)**, Ministry of Personnel, Public Grievances and Pensions, Government of India.
- **Launched in:**
 - **2015**, as envisioned by the Prime Minister, Shri Narendra Modi.
 - Part of the [Anubhav Portal](#) initiative to document institutional memory through personal narratives.
- **Aim:**
 - Preserve institutional memory for better governance.
 - Encourage knowledge-sharing and replication of good practices.
 - Recognize valuable feedback, innovation, and service excellence.
- **Eligibility:**
 - **Central Government employees**, employees of **Central Public Sector Undertakings (CPSUs)**, and [Public Sector Banks](#).
 - Must be retiring within 8 months or retired within the last 3 years.
 - Write-ups must be published on the **Anubhav Portal** between 1 April 2024 and 31 March 2025.
- **Features**
 - **Categories covered:** Accounts, administration, governance reforms, IT, research, procedural simplification, public dealing, valor, feedback, and more.
 - **Awards structure:** 5 Best Write-ups + 10

NATIONAL ANUBHAV AWARDS

Context:

The National Anubhav Awards 2025 will be held on 18 August 2025 at Vigyan Bhawan, New Delhi, marking the 10th anniversary of the awards.

Jury Certificates for other exceptional submissions.

- **Diversity:** One-third of awardees in 2025 are women.
- **Recognition expansion:** Includes employees from PSBs and [CPSUs](#) since 2024.
- **Assessment:** Objective marking system introduced for [transparency](#).
- **Capacity building:** “Anubhav Awardees’ Speak” webinar series for sharing experiences with soon-to-retire employees.

International Relations

SHANGHAI COOPERATION ORGANIZATION (SCO)

Context:

Prime Minister **Narendra Modi** will attend the **25th SCO Heads of State Council Summit** in Tianjin, China, on **August 31, 2025**.



About Shanghai Cooperation Organization (SCO)

What it is?

- A regional intergovernmental organisation focusing on political, economic, and security cooperation.

Established in

- **2001** at Shanghai, evolving from the “[Shanghai Five](#)” grouping (1996).

Headquarters

- Beijing, China.

Membership

- **8 Permanent Members:** China, Russia, India, Pakistan, Kazakhstan, Kyrgyzstan, Tajikistan, Uzbekistan.
- **Observers:** Afghanistan, Belarus, Mongolia, Iran (now moving towards full membership).
- **Dialogue Partners:** Turkey, Sri Lanka, Nepal, Egypt, Saudi Arabia, Qatar, etc.

Objectives

1. Promote **regional peace and stability**.
2. Strengthen cooperation against **terrorism, separatism, and extremism**.
3. Enhance **economic connectivity and trade integration**.
4. Encourage **cultural exchange and people-to-people contact**.
5. Uphold the **principle of multipolarity and non-interference** in internal affairs.

Major Initiatives

- **Regional Anti-Terrorist Structure (RATS)** headquartered in Tashkent.
- **SCO Development Bank** proposal for financial cooperation.
- Initiatives in **energy security, transport corridors, agriculture, digital economy, and cultural exchanges**.
- Annual joint military exercises (**Peace Mission series**).

2025 SCO Summit Highlights (Tianjin, China)

- **Hosted by:** China (its 5th time hosting).
- **Theme:** “[Upholding the Shanghai Spirit: SCO on the Move](#)”.
- **Focus Areas:**
 - Adoption of a **ten-year development strategy (2025–2035)**.
 - Review of **25 years of SCO achievements**.
 - Regional **security and counter-terrorism cooperation**.
 - Strengthening **trade, energy, and connectivity projects**.
 - Push for **sustainable development and climate action**.
- **Participation:** 20+ world leaders and 10 heads of international organisations.
- **India’s Role:** To advance **regional connectivity, anti-terror collaboration, energy cooperation, and sustainable growth**, balancing ties with Russia, China, and Central Asia.

Current Affairs

UN DECLARES FAMINE IN GAZA

Context:

The **United Nations** has declared a [famine in Gaza](#), affecting nearly **500,000 people**, citing *systematic obstruction of humanitarian aid by Israel*.



About Famine Declaration

What it is

- A **formal global classification** used by the UN and partners to signal catastrophic food insecurity.
- Declared through the [Integrated Food Security Phase Classification \(IPC\)](#) framework, jointly managed by UN agencies and humanitarian organisations.

Criteria for Declaration

- A famine is declared when all three thresholds are met:
 - At least 20% of households** face extreme food shortages.
 - Acute malnutrition exceeds 30%** in children.
 - Mortality rate is over 2 deaths per 10,000 people per day.**

Procedure for Declaration

- Data collection** by humanitarian agencies on food security, nutrition, and mortality.
- Technical review** by the IPC Global Support Unit.
- Validation by UN agencies** such as FAO, WFP, UNICEF, and OCHA.
- Public declaration** made jointly by the UN and IPC to alert the world community.

Significance of Declaration

- Mobilises **global attention** and urgent humanitarian response.
- Unlocks **international funding and aid pledges**.
- Provides legal and moral ground for **calling ceasefires** and securing humanitarian corridors.
- Strengthens pressure on states and armed groups under **international humanitarian law**.

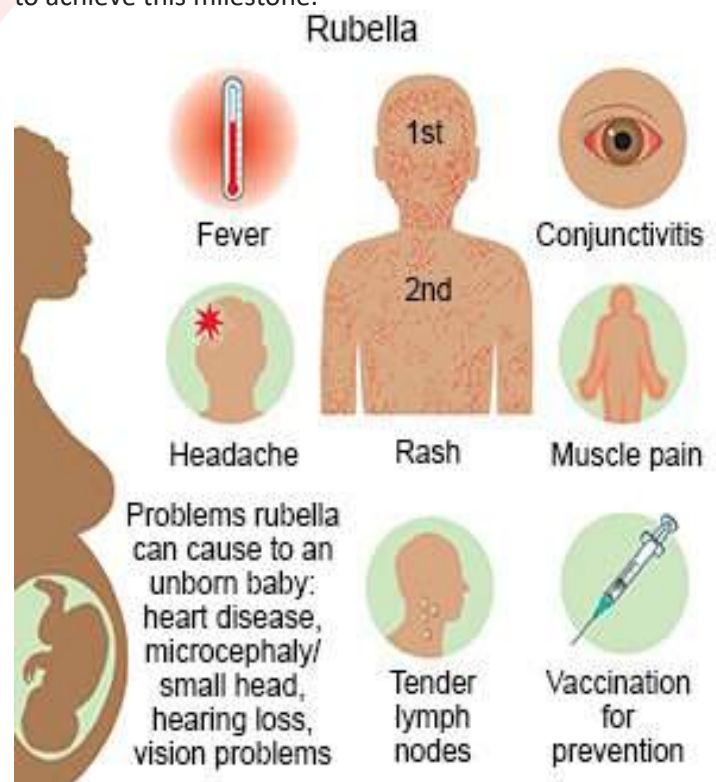
Countries/Places with Famine Declarations

- Somalia (2011, 2022)** – severe drought and conflict.
- South Sudan (2017)** – civil war and displacement.
- Yemen (2018–ongoing risk)** – conflict-driven blockade.
- Ethiopia's Tigray (2021)** – war-induced famine conditions.
- Sudan (2024)** – Sudanese civil war beginning in 2023
- [Gaza \(2025\)](#) – current crisis declared by UN.

NEPAL DECLARED FREE OF RUBELLA

Context:

The [World Health Organization \(WHO\)](#) declared **Nepal free of rubella as a public health problem** on August 18, 2025, making it [the first country in WHO's Southeast Asia Region](#) to achieve this milestone.



About Rubella

What It Is?

- Also called **German measles**, rubella is a **highly contagious viral disease** caused by the rubella virus.
- It spreads through **respiratory droplets** when an infected person coughs or sneezes.
- Particularly dangerous during **pregnancy**, as it can cause miscarriage, stillbirth, or **congenital rubella syndrome (CRS)** in infants.

Symptoms

- Mild fever, rashes starting on the face and spreading across the body.
- Swollen lymph nodes, joint pain, conjunctivitis, and general malaise.
- Many infections are **asymptomatic**, complicating detection.

Treatment

- No specific antiviral treatment** is available.
- Supportive care** includes rest, hydration, and fever management.
- Prevention** is through immunisation with **MMR vaccine** (Measles, Mumps, Rubella).

India's Status

- India still reports sporadic rubella cases but has made elimination a **national health priority**.
- The **Measles-Rubella (MR) campaign**, launched in 2017, aims to vaccinate **all children aged 9 months to 15 years**.
- Target:** Elimination of measles and rubella by **2023–24**, aligned with **WHO's South-East Asia Regional goals**.

UNITED NATIONS HIGH COMMISSIONER FOR REFUGEES (UNHCR)

Context:

The **UNHCR** suspended the repatriation of Sri Lankan Tamil refugees from India after some returnees were arrested in Sri Lanka for alleged violations of immigration laws.



About United Nations High Commissioner for Refugees (UNHCR)

What it is?

- UNHCR** is a **UN agency** mandated to **protect and support refugees, stateless persons, and internally displaced people** worldwide.
- It promotes durable solutions like **voluntary repatriation, local integration, or resettlement in third countries**.

Establishment

- Created in **1950** by the UN General Assembly in the aftermath of World War II.
- Began operations in **1951** with an initial three-year mandate, later made permanent.

Leadership

- Headed by the **United Nations High Commissioner for Refugees**, elected by the UN General Assembly.
- Current High Commissioner: **Filippo Grandi (Italy)**, serving since 2016.

Organisational Structure

- Executive Committee (ExCom)** – Provides policy guidance, composed of 100+ member states.
- Secretariat** – Led by the High Commissioner, with regional and field offices worldwide.
- Funding** – Entirely voluntary, contributed by governments, private donors, and organisations.

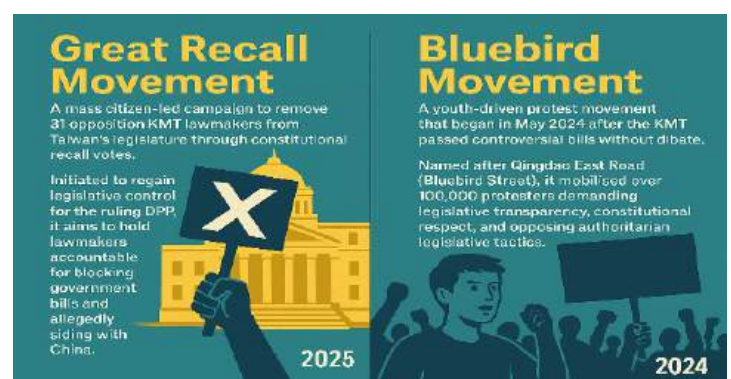
Functions and Powers

- Protection of Refugees:** Ensure non-refoulement (no forced return to danger).
- Humanitarian Assistance:** Provide shelter, food, health, and education to displaced populations.
- Repatriation & Resettlement:** Facilitate voluntary return or integration.
- Advocacy:** Work with governments for refugee rights and asylum policies.
- Statelessness Reduction:** Lead efforts to eliminate statelessness globally.

GREAT RECALL VOTE

Context:

Taiwan has launched the largest recall vote in its history against 31 opposition lawmakers from the Kuomintang (KMT) party.



About Great Recall Vote:

What is the "Great Recall" Vote?

- A **mass legislative recall referendum** targeting KMT lawmakers in Taiwan.
- Citizens are voting to remove 31 KMT legislators in **two phases** (July and August 2025).
- It is the **largest recall exercise** under [Taiwan's constitutional](#) provision allowing removal of elected officials.

Nation Involved:

- **Taiwan**, officially the Republic of China (ROC), with deepening democratic processes.
- **Democratic Progressive Party (DPP)** vs **Kuomintang (KMT)** rivalry is at the heart of this political conflict.

Objective of the Recall:

- To remove KMT legislators accused of:
 - Blocking important government bills.
 - Passing laws violating democratic norms.
 - Allegedly colluding with the Chinese Communist Party.

Key Features of Taiwan's Recall Mechanism:

1. **Three-Stage Process:**
 - 1% signatures to initiate.
 - 10% electorate support for holding vote.
 - 25% district participation and majority votes for successful recall.
2. **Constitutional Tool:** Governed under [Taiwan's](#) Public Officials Election and Recall Act.
3. **Voter Empowerment:** Empowers citizens to **directly remove legislators** they feel betrayed public trust.
4. **Referendum-Linked Accountability:** Adds participatory depth to Taiwan's democracy but also risks misuse.

Political Context and Crisis:

- DPP won **Presidency in 2024** but lost legislative control (only 51/113 seats).
- KMT with allies holds 62 seats, blocking many executive policies.
- The **Bluebird Movement**, a civil resistance protest in May 2024, emerged after KMT passed reform bills bypassing standard legislative procedures.
- DPP-backed recall viewed as **attempt to regain majority**, but opponents claim it's politically motivated.



About July Declaration:

What is the July Declaration?

- The July Declaration is a proposed constitutional document drafted by Bangladesh's interim government to officially recognize the 2024 student-led uprising, aiming to symbolise a political break from authoritarianism and affirm democratic renewal.

Historical Context:

- The **July Uprising (2024)** was led by [Students Against Discrimination \(SAD\)](#).
- It triggered mass protests across Bangladesh, leading to the **fall of the Awami League regime** on **August 5, 2024**.
- Public calls for the declaration intensified, branding the movement as a push for a **"Second Republic"**.

Objectives of the July Declaration:

- To grant constitutional recognition to the July Uprising.
- To unify the nation under the ideals of anti-fascism, democratic resurgence, and inclusive governance.
- To chart a transitional roadmap for political reforms and [citizen participation](#) in governance.

Key Features:

- **Recognition of Civic Mobilisation:** Grants official status to one of South Asia's largest student-led movements, signalling a shift toward people-driven political legitimacy.
- **Symbol of a Second Republic:** Viewed as the foundation of a new democratic order, echoing transitions like South Africa's post-apartheid charter.
- **Focus on Anti-Fascism & Reform:** Seeks to reject authoritarian models, promoting civil rights, institutional accountability, and transparent governance.
- **Contested Legitimacy:** Faces criticism over the legality of embedding a protest movement into the constitution outside formal [parliamentary channels](#).
- **Mass Public Backing:** Captures broad grassroots support, especially among youth, reshaping political participation across social and regional lines.

JULY DECLARATION

Context:

Bangladesh's interim government under [Muhammad Yunus](#) will unveil the "July Declaration" on August 5, 2025, marking one year since the student-led uprising that ousted Prime Minister Sheikh Hasina.

FACTS FOR PRELIMS

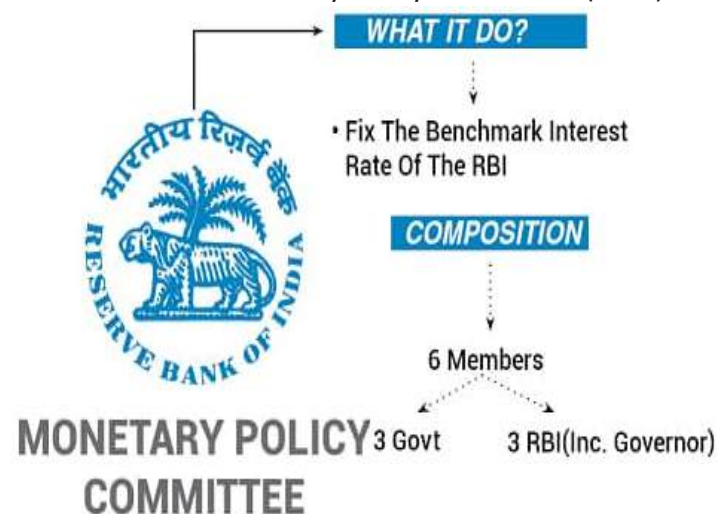
ECONOMY

Banking and Money (Monetary Policy)

MONETARY POLICY COMMITTEE (MPC)

Context:

The Reserve Bank of India (RBI) nominated its Executive Director [Indranil Bhattacharyya](#) as an **ex-officio member** of the Monetary Policy Committee (MPC).



About Monetary Policy Committee (MPC)

What it is

- The **Monetary Policy Committee (MPC)** is a statutory body established to set India's **benchmark policy interest rate (repo rate)**.
- It ensures that monetary policy decisions are **transparent, credible, and data-driven**.

Established in

- Formed in **2016** under the provisions of the [RBI Act, 1934](#) (amended in 2016).
- Institutionalised **inflation targeting** framework in India.

Chaired by

- The **Governor of RBI** serves as the **ex-officio Chairperson** of the [MPC](#).

Structure of Organisation

- 6 members in total:**
 - 3 members** from the RBI (Governor, Deputy Governor in charge of monetary policy, and one Executive Director).

- 3 external members** nominated by the Central Government.

- External members have a **four-year term**, not eligible for reappointment.
- Decisions are taken by **majority vote**, with Governor having a **casting vote** in case of a tie.

Functions

- Fixes the **repo rate** to achieve the inflation target (currently $4\% \pm 2\%$).
- Balances **price stability with economic growth**.
- Reviews monetary policy **bi-monthly** (six times a year).
- Anchors inflation expectations to boost investment confidence.

Powers

- Decisions of the MPC are **binding on RBI**.
- Has authority to adjust monetary policy instruments like repo, reverse repo, CRR, and SLR indirectly.
- Strengthens **institutional accountability** by publishing minutes and voting patterns of each meeting.

NPCI HAS ROLLED OUT REVISED UPI OPERATIONAL RULES

Context:

The National Payments Corporation of India ([NPCI](#)) has rolled out revised UPI operational rules from August 1, 2025, aimed at reducing transaction lags and system overloads during peak hours.



About NPCI has rolled out revised UPI operational rules:

- What it is?**
 - [Unified Payments Interface](#) (UPI) is India's flagship [digital payment](#) platform facilitating seamless peer-to-peer and peer-to-merchant transfers.
- Effective From:** The **new regulations** take effect

from **August 1, 2025**, across all UPI apps including PhonePe, Google Pay, and Paytm.

- **Aim:** To ensure faster processing, prevent fraud, and balance system load by optimizing user behaviour during peak hours.
- **Key New UPI Rules:**
 - **Balance Check Limit:** Users can check balance up to 50 times per day per app; advised to avoid during peak hours.
 - **Auto-Pay Restriction:** Auto-debit mandates will now be executed only during non-peak hours: before 10 AM, 1–5 PM, or after 9:30 PM.
 - **Transaction Status Check:** Limited to 3 status checks per transaction with a minimum 90-second gap between each attempt.
 - **Linked Account Enquiries:** Capped at 25 account-checks per day per app to curb unnecessary server load.
 - **Beneficiary Name Preview:** The [registered bank](#) name of recipient will appear before final confirmation to reduce errors and fraud.

Financial Markets (Capital Market, Money Market)

SEBI MOOTS 'REGULATED VENUE' FOR PRE-LISTING COMPANIES

Context:

The [Securities and Exchange Board of India \(SEBI\)](#) has proposed creating a “regulated venue” for trading shares of pre-listing companies.



About Regulated Venue for Pre-Listing Companies

What it is

- A formalised platform under [SEBI](#) oversight where unlisted companies' shares can be traded before their [Initial Public Offering \(IPO\)](#).

- Will function as a **transparent alternative** to the unregulated grey market.

Objective

- Promote **fair price discovery** before IPO.
- Ensure **government receives taxes and revenue** from such transactions.
- Protect investors by bringing **informal trades under legal scrutiny**.
- Strengthen **market integrity and transparency** in capital markets.

About Grey Market

What it is?

- **Definition:** An **informal market** where shares of companies that are about to be listed trade between buyers and sellers based on mutual agreement.
- Operates **outside regulatory purview**, lacking transparency and investor protection.

Issues with Grey Market

- Encourages **unofficial pricing** → distorts IPO valuations.
- Exposes investors to **risks of fraud and manipulation**.
- Leads to **tax leakages** as trades remain undocumented.

Significance of SEBI's Move

1. Fair Price Discovery

- A regulated venue will reflect the **true demand and supply** before [IPOs](#), avoiding artificial overvaluation.

2. Revenue & Tax Compliance

- Formalising the trades ensures **government earns its due share** of taxes.

3. Investor Protection

- SEBI oversight safeguards investors from **misleading practices, manipulation, and fraud**.

4. Market Efficiency

- Creates a **structured mechanism** for price formation in pre-listing shares.

5. Global Alignment

- Many advanced economies have **secondary private markets** regulated under law, making India's step globally

relevant.

S&P GLOBAL UPGRADES INDIA'S SOVEREIGN CREDIT RATING TO 'BBB'

Context:

S&P Global has upgraded India's long-term unsolicited [sovereign credit rating to 'BBB' from 'BBB-'](#) after 18 years, citing strong economic resilience, fiscal consolidation, and stable policy outlook.



About S&P Global Upgrades India's Sovereign Credit Rating to 'BBB' After 18 Years:

[Credit Rating Agency – S&P Global:](#)

- **What it is?**
 - S&P Global Ratings is one of the world's leading credit rating agencies, providing independent opinions on credit risk.
- **Headquarters:** New York City, USA.
- **Aim:** To offer transparent, credible, and independent assessments of the ability and willingness of borrowers to meet their [financial commitments](#).
- **Functions:**
 - Assigns **Public Ratings** for issuers of securities and loans.
 - Provides **Private & Confidential Ratings** for internal benchmarking.
 - Delivers analytical reports on [credit risk](#) for corporates, governments, infrastructure, insurance, and public finance sectors.
 - Enhances corporate transparency and investor confidence by making creditworthiness visible in financial markets.

[About India Rating Increase by S&P:](#)

- **What it is?**
 - Upgrade from **BBB- to BBB** in long-term [sovereign rating](#).
 - Short-term rating raised from **A-3 to A-2**.

- Transfer and convertibility assessment upgraded from **BBB+ to A-**.
- First sovereign upgrade for India by S&P since January 2007.

- **Criteria Used:**

- Strong GDP growth and robust macroeconomic fundamentals.
- Sustained [fiscal consolidation](#) and improved quality of public spending.
- Stable monetary policy anchoring inflation expectations.

- **Significance:**

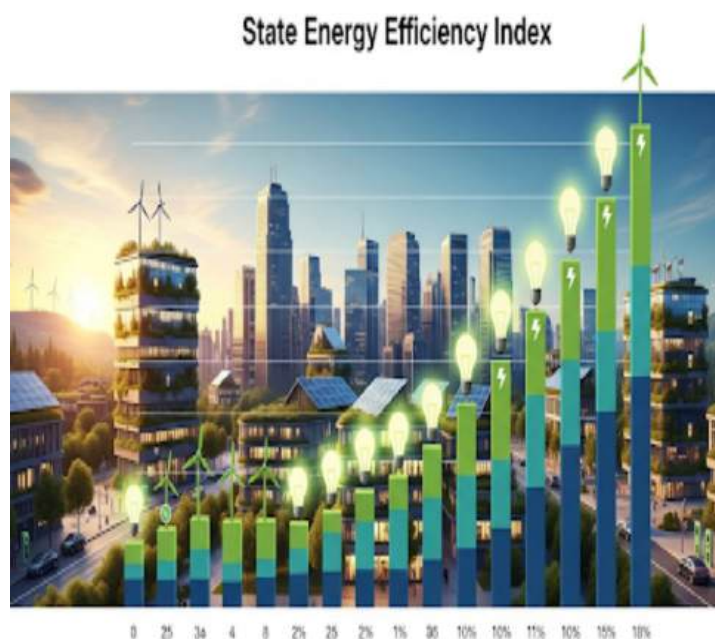
- Enhances India's position within the investment-grade category, improving **global investor confidence**.
- Likely to **attract higher foreign portfolio inflows**, particularly into bond markets.
- Expected to **reduce borrowing costs** for the government and corporates.
- Positions India as a leading emerging market economy with improved market sentiment.
- Opens pathway for **future upgrades** if fiscal deficit and [debt-to-GDP ratios](#) improve further.

[Industry and Infrastructure](#)

STATE ENERGY EFFICIENCY INDEX (SEEI) 2024 RELEASED

Context:

The **Bureau of Energy Efficiency (BEE)** released the [State Energy Efficiency Index \(SEEI\) 2024](#) on 29 August 2025.



About State Energy Efficiency Index (SEEI)

What it is?

- **Definition:** A composite index to track and compare the energy efficiency progress of Indian states and Union Territories.
- **Developed by:** Bureau of Energy Efficiency (BEE) in collaboration with the Alliance for an Energy Efficient Economy (AEEE).
- **First Launched:** 2018, with SEEI 2024 being the **sixth edition**.
- **Purpose:**
 - Promote **data-driven monitoring** of energy efficiency.
 - Encourage **healthy competition** and **policy innovation** among states.
 - Align state actions with India's **net-zero by 2070 vision**.

Key Findings of SEEI 2024

1. **Coverage:** Assessed **36 States/UTs** for FY 2023–24 using **66 indicators**.
2. **Sectors Covered:** Buildings, Industry, Transport, Agriculture, DISCOMs, Municipal Services, Cross-sector initiatives.
3. **Performance Categories:**
 - Front Runners (>60%)
 - Achievers (50–60%)
 - Contenders (30–50%)
 - Aspirants (<30%)
4. **Top Performers:**
 - Maharashtra (>15 MToE group)
 - Andhra Pradesh (5–15 MToE group)
 - Assam (1–5 MToE group)
 - Tripura (<1 MToE group)
5. **Sectoral Progress:**
 - 24 states notified **Energy Conservation Building Code (ECBC) 2017**.
 - 31 states adopted **electric mobility policies**.
 - 13 states promoted **solar agricultural pumps**, with Kerala leading at 74% adoption.
 - All 36 States/UTs prepared **State Energy Efficiency Action Plans (SEEAPs)**.

About Bureau of Energy Efficiency (BEE)

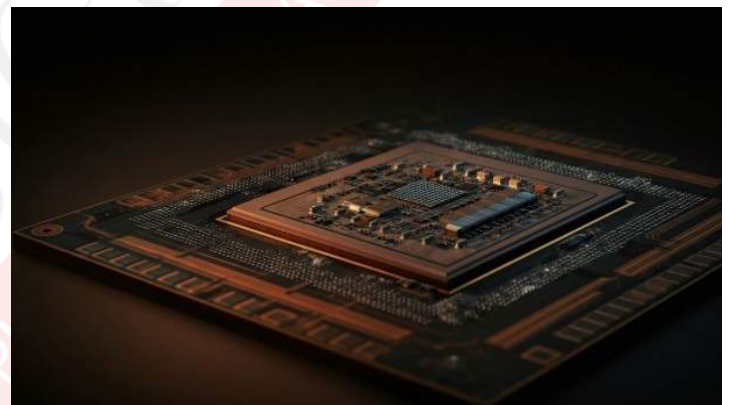
- **Established:** March 2002 under the **Energy Conservation Act, 2001**.
- **Nodal Ministry:** Ministry of Power, Government of India.
- **Objective:** Promote **energy efficiency and conservation** across sectors.
- **Key Roles:**

- Implement **Star Rating programme** for appliances.
- Develop **policies, codes, and building regulations** for energy conservation.
- Guide states through the **State Energy Efficiency Index** and action plans.
- Support India's commitments to **climate goals and energy transition**.

INDIA SEMICONDUCTOR MISSION (ISM)

Context:

The Union Cabinet has approved ₹4,600 crore for four new semiconductor manufacturing projects in Odisha, Punjab, and Andhra Pradesh, under the India Semiconductor Mission (ISM).



About New Semiconductor Plants:

1. **SiCSem Pvt. Ltd. (Odisha):**
 - In collaboration with *Clas-SiC Wafer Fab Ltd.*, UK.
 - India's **first commercial Silicon Carbide (SiC) compound semiconductor fab**.
2. **3D Glass Solutions Inc. (Odisha):**
 - Vertically integrated advanced packaging & embedded glass substrate unit.
 - **Technology:** 3D Heterogeneous Integration modules.
3. **ASIP Technologies (Andhra Pradesh):** Joint venture with *APACT Co. Ltd.*, South Korea.
4. **Continental Device India Pvt. Ltd. (Punjab):** Brownfield expansion in Mohali.

About India Semiconductor Mission (ISM):

- **What it is?**
 - A government initiative to develop a robust semiconductor and display manufacturing ecosystem in India.
- **Launched in:** 2021

- **Nodal Ministry:** Ministry of Electronics and Information Technology (MeitY)
- **Key Features:**
 - **Vision:** Make India a global hub for semiconductor design, manufacturing, and innovation.
 - **Investment Incentives:** Financial support for fabs, compound semiconductors, ATMP/OSAT units, and [display fabs](#).
 - **Design Ecosystem Support:** Assistance to startups, [MSMEs](#), and academia in chip design.
 - **Talent Development:** Training over **60,000 skilled professionals**.
 - **Strategic Importance:** Reduces import dependency, supports self-reliance under [Atmanirbhar Bharat](#).

ASIA'S LONGEST FREIGHT TRAIN – RUDRASTRA

Context:

[Indian Railways](#) has successfully conducted the trial run of 'Rudrastra', Asia's longest freight train measuring 4.5 km, marking a significant milestone in freight logistics efficiency.

- The trial was conducted between Ganjkhawa (Uttar Pradesh) and Garhwa (Jharkhand).



About [Asia's Longest Freight Train – Rudrastra](#):

- **What it is?**
 - Rudrastra is a 4.5 km-long freight train created by combining **six standard rakes** into one operational unit.
 - It is India's longest [freight train](#) and among the longest in Asia.
- **Organisation Involved:**
 - Developed and operated by **Indian Railways**, specifically the **Pandit Deendayal Upadhyaya (DDU) Division** of the East Central Railway.
 - Trial run coordinated with the **Dhanbad**

Division for operational integration.

- **Objective:**
 - Enhance freight efficiency by transporting larger cargo volumes in a single run.
 - Reduce operational duplication in crew management, scheduling, and routing.
 - Minimise time and resource usage in [goods transportation](#).
- **Features:**
 - **Length:** 4.5 km.
 - **Wagons:** 354 (carrying capacity of ~72 tonnes per wagon).
 - **Locomotives:** 7 engines (two at the front, others positioned between rakes).
 - **Speed:** Average of 40 km/h over a **209 km** route.
 - **Configuration:** Formed by attaching three long-haul combinations of two freight trains each.
 - **Route:** Partly on the [Dedicated Freight Corridor](#) (DFC), partly on conventional tracks.
- **Significance:**
 - **Economic Efficiency:** Saves manpower, fuel, and operational costs by reducing multiple train operations.
 - **Faster Freight Movement:** Cuts down loading, unloading, and transit times.
 - **Global Benchmarking:** Places India among nations with advanced **long-haul freight technology**, though still behind Australia's 7.3 km record.

CARRIAGE OF GOODS BY SEA BILL, 2025

Context:

Parliament has passed the Carriage of Goods by Sea Bill, 2025, replacing the outdated [Carriage of Goods by Sea Act, 1925](#).



About [Carriage of Goods by Sea Bill, 2025](#):

- **What Is It?**

- A new legislation passed to modernise India's maritime trade laws.
- It repeals the nearly **100-year-old Indian Carriage of Goods by Sea Act, 1925**, a colonial-era law.
- **Objectives:**
 - Align India's shipping laws with global best practices such as the Hague–Visby Rules.
 - Promote ease of doing business by simplifying legal language and reducing ambiguities.
 - Enhance India's competitiveness as a maritime trade hub.
 - Empower India to swiftly adopt future international maritime conventions.
- **Key Features:**
 - **Repeals Outdated Law:** Replaces the Indian Carriage of Goods by Sea Act, 1925 to eliminate colonial-era legal remnants and modernize maritime law.
 - **Adopts Hague–Visby Rules:** Aligns Indian law with international maritime standards for bills of lading and cargo liability.
 - **Codifies Carrier Responsibilities:** Establishes clear rules on carrier liabilities, rights, and immunities to reduce disputes in cargo movement.
 - **Empowers Government for Global Alignment:** Grants the Centre powers to quickly adopt emerging international maritime conventions via notifications.
 - **Supports Ease of Doing Business:** Promotes legal simplicity and rationalization, facilitating maritime contracts and reducing compliance burdens.
 - **Parliamentary Oversight:** Ensures executive decisions related to international adoption are accountable through legislative review.
 - **Future-Ready Legal Framework:** Helps India adapt swiftly to global shipping trends and strengthens its position as a maritime trade hub.

About Hague–Visby Rules:

- A set of international rules governing the carriage of goods by sea, framed under the 1924 Hague Rules, later updated in 1968 (Visby Protocol) and 1979 (SDR Protocol).

- **Formally titled:** “International Convention for the Unification of Certain Rules of Law Relating to Bills of Lading.”

APNA GHAR INITIATIVE

Context:

The Ministry of Petroleum and Natural Gas has launched 'Apna Ghar', a national initiative providing resting facilities for truck drivers along highways.



About Apna Ghar Initiative:

- **What It Is?**
 - A **resting infrastructure scheme** for truck drivers, launched to address fatigue, hygiene, and well-being during long-haul journeys.
 - Operated at **fuel retail outlets** along **national and state highways** by Public Sector Oil Marketing Companies (OMCs).
- **Nodal Ministry:** Ministry of Petroleum and Natural Gas
- **Launched in:** 2025
- **Aim:**
 - To **enhance road safety**, reduce driver fatigue, and improve **living conditions** for truckers, who are crucial to India's logistics sector.
 - Supports inclusive infrastructure development and social welfare in the transport ecosystem.
- **Key Features:**
 - **Widespread Coverage:** 368 rest houses with 4,611 beds operational across major highways.
 - **Facilities Offered:**

- ❑ Dormitories (10–30 beds each)
- ❑ Clean toilets and bathing areas (Houdas)
- ❑ Self-cooking and dining zones
- ❑ Restaurants/Dhabas
- ❑ Purified drinking water access
- **Tech Integration:** ‘Apna Ghar’ mobile app launched for booking, feedback, and driver engagement.
- **Public-Private Implementation:** Built and managed by **OMCs** at retail fuel stations.
- **User-Centric Design:** Customised to **truckers’ needs**, informed by feedback and mobile app data analytics.
- **Significance:**
 - Promotes driver health, hygiene, and road safety.
 - A step towards dignified working conditions for the informal transport sector.
 - Aligns with [supply chain resilience](#), labour rights, and SDG 8 (Decent Work).

Public Finance (Fiscal Policy and Budget, Taxation)

DIGITAL SERVICES TAXES (DSTS)

Context:

Former US President Donald Trump has threatened additional tariffs on countries imposing [Digital Services Taxes \(DSTs\)](#) on American tech giants, calling them discriminatory.



About Digital Services Taxes (DSTs):

What it is?

- A **gross-revenue tax** (not corporate income tax) levied on specific digital services like online advertising, digital marketplaces, intermediation, and sale of user data.
- Applied on the **revenues generated from users in the taxing country**, irrespective of where the company is headquartered.

Aim:

- To ensure **fair taxation** of global digital companies that earn significant revenue from a country’s users without having a physical presence there.

- To address tax base erosion and ensure that **value created by user participation** is taxed locally.

Features:

- **Destination-based** → tax liability is tied to the **user’s location**, not the firm’s HQ.
- Targets **large companies** exceeding global and domestic revenue thresholds (e.g., €750 million worldwide + local threshold).
- Generally imposed at **2–7.5% rates** on in-scope services.
- Criticised as discriminatory, since most large affected platforms (Google, Amazon, Meta, Apple) are **US-based**.

India and Digital Services Tax:

- **Equalisation Levy (2016):** 6% tax on online advertising services provided by non-resident companies.
- **Expanded (2020):** 2% levy on e-commerce supplies/services by foreign digital firms.
- **Withdrawal:**
 - 2% e-commerce levy removed in **August 2024**.
 - 6% online ad levy withdrawn from **April 2025** (via Finance Act, 2025).
- India aligned its policy with the **OECD global tax framework**, moving away from unilateral DSTs.

GST REVAMP – NEXT-GEN REFORM

Context:

Prime Minister of India announced a “next-generation” GST reform to be implemented by Diwali 2025, aiming to simplify tax slabs and reduce the burden on common citizens.

- The proposal includes two main [GST rates](#) (5% and 18%) and a special 40% rate for select sin and luxury goods.



About GST Revamp – Next-Gen Reform:

- **What It Is?**
 - A major restructuring of the Goods and Services Tax ([GST](#)) [system](#) to **replace the current multi-slab structure** with a simplified, two-slab regime plus a special high rate for certain goods.

- **Objective:**
 - o Reduce the tax burden on essential and standard goods.
 - o Boost consumption by making everyday items cheaper.
 - o Simplify compliance for [MSMEs](#) and small businesses.
 - o Enhance economic growth by stimulating demand.
- **Proposed Features:**
 - o **Two Core Rates** – 5% (merit goods, essential items) and 18% (standard goods & services).
 - o **Special 40% Rate** – For 7 items, including tobacco, alcohol, pan masala, online betting.
 - o **Slab Adjustments** –
 - 99% of items in the current 12% slab to shift to 5%.
 - ~90% of items in the 28% slab to shift to 18%.
 - o **Continued Zero Rate** – For essential food items.
 - o **Sectoral Considerations** – Labour-intensive exports (like diamonds) to retain current rates.
 - o **GST Council Review** – Proposal sent to states and GoM for approval before rollout.
- **Significance:**
 - o **Direct Relief to Consumers** – Prices of soaps, toothpaste, mobiles, garments, and packaged foods likely to drop.
 - o **MSME Boost** – Lower tax rates and simplified compliance will reduce operational costs.

About Revised Income Tax Bill, 2025:

- **What it is?**
 - o A new legislation to **consolidate, streamline, and modernise** India's direct tax framework, replacing the six-decade-old Income Tax Act, 1961.
- **Aim:**
 - o Simplify compliance by removing outdated provisions and improving drafting clarity.
 - o Enhance transparency in [tax administration](#).
 - o Incorporate stakeholder inputs for fairer tax practices.
 - o Facilitate [ease of doing](#) business through clear, consistent, and modern legal language.
- **Key Features of the Revised Bill:**
 - o **Single 'Tax Year' Concept:** Replaces "Previous Year" and "[Assessment Year](#)" with a uniform term to simplify understanding and compliance.
 - o **Simplified Refund Provisions:** Refunds allowed even if ITR is filed after the due date, reducing taxpayer grievances.
 - o **Corporate & MSME Relief:** Rs 80M deduction for inter-corporate dividends restored and MSME definition aligned with MSME Act for uniformity.
 - o **Rationalised Property Taxation:** Notional rent on vacant property removed; clear deductions for municipal tax and interest on rented property.
 - o **Compliance & Governance Reform:** Unnecessary provisions removed, [CBDT](#) empowered for **digital-era rule-making** and NIL-TDS option for zero-liability taxpayers.
 - o **Charitable Trust & LLP Relief:** Relaxation in transfer pricing rules and removal of [Alternate Minimum Tax on LLPs](#).
 - o **Enhanced Digital Alignment:** Structured section numbering, improved terminology, and cross-referencing for easier navigation and reduced ambiguity.

REVISED INCOME TAX BILL, 2025

Context:

Finance Minister has tabled the revised Income Tax Bill, 2025 in the Lok Sabha, incorporating most of the 566 recommendations made by the [Parliamentary Select Committee](#).



Schemes

PROJECT AAROHAAN

Context: The [National Highways Authority of India](#) (NHAI) has launched [Project Aarohan](#) to support the education of children of toll plaza workers.



About Project Aarohan:

- **What it is?**
 - A scholarship and mentorship program to support the educational aspirations of toll plaza employees' children, especially from economically weaker sections.
- **Launched by:** [National Highways Authority of India \(NHAI\)](#) in collaboration with Vertis Infrastructure Trust.
- **Implemented by:** SMEC Trust's *Bharat Cares*.
- **Aim:**
 - To remove financial barriers to education.
 - To provide equal access to quality education.
 - To nurture talent among children of toll plaza staff and bridge socio-economic divides.
- **Features:**
 - **Coverage:** 500 students (Class 11 to final year of graduation).
 - **Scholarships:** ₹12,000 annually (FY 2025–26) for each selected student.
 - **Higher Studies Support:** 50 bright students aspiring for PG and above to get ₹50,000 each.
 - **Beyond Finance:** Mentorship, career guidance, skill-building workshops, and structured progress tracking.
 - **Fund Allocation:** ₹1 crore for first phase (July 2025–March 2026).
 - **Application Process:** Online portal; requires academic records, income proof, caste certificate, ID proof, etc.
 - **Inclusivity:** Priority to girls, first-generation learners, and students from EWS, SC, ST, OBC, and minority communities.

PM SVANIDHI SCHEME

Context:

The Union Cabinet has approved restructuring of the [PM SVANidhi Scheme](#) with an extension of the lending period till 31 March 2030.



About PM SVANidhi Scheme:

What it is?

- [PM Street Vendor's Atma Nirbhar Nidhi \(PM SVANidhi\)](#) is a **micro-credit scheme** for urban street vendors.
- It provides affordable working capital loans to restore livelihoods disrupted during COVID-19.

Launched in

- **June 1, 2020** by the **Ministry of Housing and Urban Affairs (MoHUA)**.

Aims and Objectives

1. Provide **collateral-free working capital loans** to street vendors.
2. Promote **digital payments** and financial inclusion.
3. Help vendors **resume businesses** post-pandemic and integrate with the formal economy.
4. Encourage **credit discipline** by incentivising timely repayments.

Nodal Agency

- Implemented by the **Ministry of Housing and Urban Affairs (MoHUA)** with **State/UT governments, Urban Local Bodies, and lending institutions**.

Key Features (Original Framework)

- **Initial Loan:** ₹10,000 collateral-free loan (first tranche).
- **Interest Subsidy:** 7% per annum subsidy on timely repayment.
- **Digital Incentives:** Cashback of up to ₹100 per month for digital transactions.
- **Credit Linkage:** Higher loan tranches available on

successful repayment.

- **Target Beneficiaries:** Street vendors in statutory towns, including those operating through carts, stalls, and footpaths.

Recent Restructuring (2025)

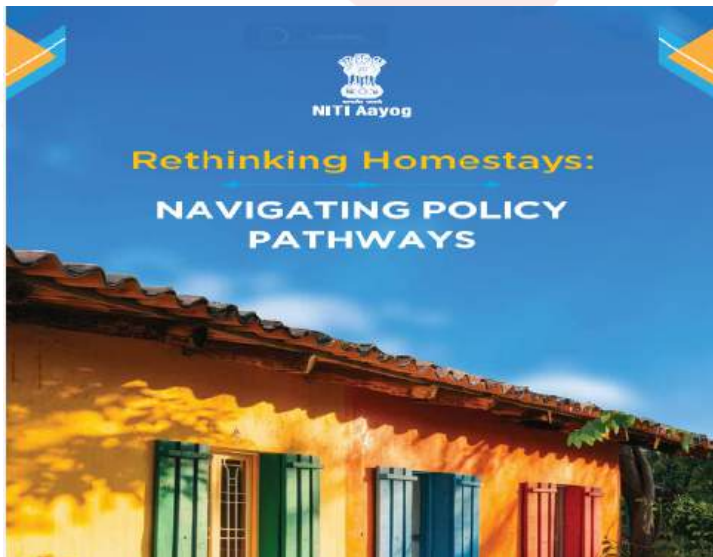
1. **Extended Lending Period:** Now valid till **31 March 2030** (earlier 31 Dec 2024).
2. **Enhanced Loan Amounts:**
 - o 1st tranche: **₹15,000** (earlier ₹10,000).
 - o 2nd tranche: **₹25,000** (earlier ₹20,000).
 - o 3rd tranche: **₹50,000** (unchanged).
3. **UPI-linked RuPay Credit Card:** For vendors repaying second tranche, providing instant access to credit for business and personal needs.
4. **Cashback Incentives:** Vendors can earn up to **₹1,600 annually** on retail/wholesale digital transactions.
5. **Expanded Coverage:** Beyond statutory towns, now includes **census towns and peri-urban areas**.
6. **Scale of Beneficiaries:** Aims to benefit **1.15 crore vendors**, including **50 lakh new entrants**.

Miscellaneous

RETHINKING HOMESTAYS: NAVIGATING POLICY PATHWAYS REPORT BY NITI AAYOG

Context:

NITI Aayog released the report "[Rethinking Homestays: Navigating Policy Pathways](#)" on 22 August 2025 in collaboration with IMAI. The report aims to provide a strategic roadmap for strengthening India's homestay and BnB sector.



About the Report – "Rethinking Homestays: Navigating Policy Pathways":

What it is

- It is a **policy-oriented document** highlighting opportunities and challenges in India's homestay ecosystem.
- Developed through **consultations with policymakers, hosts, and aggregators**.

About NITI Aayog

- **What it is:** [National Institution for Transforming India](#), a policy think-tank of the Government of India.
- **Established in:** 1 January 2015, replacing the Planning Commission.
- **Organisation:**
 - o Chairperson: Prime Minister of India.
 - o Vice-Chairperson: Appointed by PM.
 - o Members: Full-time, part-time (experts), and ex-officio (Union Ministers).
 - o Governing Council: CM of states and LGs of UTs.
- **Functions:**
 1. Acts as the **premier policy think tank** for cooperative federalism.
 2. Provides **strategic and long-term policy frameworks**.
 3. Monitors implementation of development programmes.
 4. Encourages **innovation, entrepreneurship, and technology adoption**.
 5. Coordinates between **Centre, States, and global stakeholders**.
- **Powers:**
 - o Advisory in nature, but **influential in shaping national policies**.
 - o Plays key role in flagship missions like **Aspirational Districts Programme, Atal Innovation Mission, SDG localization**.

CCPA PENALTY ON RAPIDO FOR MISLEADING ADVERTISEMENTS

Context:

The [Central Consumer Protection Authority \(CCPA\)](#) has imposed a **penalty of ₹10 lakh on Rapido** for misleading advertisements promising "Auto in 5 min or get ₹50". It also directed Rapido to **compensate affected consumers** and discontinue deceptive claims.

PENALTIES FOR MISLEADING ADVERTISEMENT

MANUFACTURER

Jail up to two years with fine of up to

₹10 lakh
for first offence

Consequent offence to attract jail up to five years with fine up to ₹50 lakh

ENDORSER

Up to

₹10 lakh

fine & one year ban on future endorsement for first offence

Repeat offence to attract fine up to ₹50 lakh & ban on future endorsement up to three years

PUBLISHER/ADVERTISER

Fine up to

₹10 lakh

if Central Consumer Protection Authority finds the publisher or advertiser guilty



- **Conduct investigations** into violations through its Investigation Wing.
- **Pass orders** for withdrawal/discontinuation of misleading advertisements.
- **Impose penalties** on companies and celebrities endorsing false claims.
- **Initiate class action suits** in cases of large-scale consumer harm.
- **Coordinate with National Consumer Helpline (1915)** for grievance redressal.
- **Promote consumer awareness** through campaigns and advisories.

Legal Authority

- Empowered under **Sections 10, 20, and 21** of the [Consumer Protection Act, 2019](#).
- Can impose fines, order discontinuation of ads, and recommend prosecution where necessary.

NEW EXPORT PROMOTION MISSION

Context:

The Government of India is preparing to launch a ₹2,250 crore Export Promotion Mission to safeguard Indian industries from global trade shocks, including recent [US tariff hikes](#).



About Central Consumer Protection Authority (CCPA)

What it is

- A **statutory regulatory body** established under the **Consumer Protection Act, 2019**.
- Functions as the **apex authority for safeguarding consumer rights** and curbing unfair trade practices.

Established in

- Formed in **July 2020**, under **Section 10 of the Consumer Protection Act, 2019**.

Chaired by

- Headed by the **Chief Commissioner**, assisted by **two Commissioners** (one for goods, one for services).

Structure of Organisation

1. **Chief Commissioner** – overall leadership and decision-making.
2. **Two Commissioners** – focus areas: goods and services.
3. **Investigation Wing** – headed by a **Director-General**, responsible for inquiries and evidence collection.
4. **Regional & District Networks** – linked with consumer helplines and grievance redressal systems.

Functions & Powers

- **Protect and enforce consumer rights** against misleading ads and unfair practices.

About New Export Promotion Mission:

What it is?

A comprehensive government initiative to enhance India's export resilience by providing financial support, market diversification, and global branding opportunities for Indian industries, particularly [MSMEs](#).

Background:

- Announced in the Union Budget on **1 February 2025** with an outlay of ₹2,250 crore.
- [Directorate General of Foreign Trade](#) (DGFT) presented the mission to export councils.

- Developed in response to high US tariffs (50%) on Indian goods, impacting sectors like textiles, chemicals, leather, and footwear.

Nodal Ministry: Ministry of Commerce and Industry, Government of India.

Aim:

- Shield Indian exports from global market volatility and protectionist measures.
- Expand India's footprint in new markets and strengthen supply chains.
- Enhance competitiveness of MSMEs and [e-commerce exporters](#).

Key Features:

- Two Broad Components:**
 - [NIRYAT PROSAHAN](#) – Trade Finance Support for exporters.
 - [NIRYAT DISHA](#) – Driving International Holistic Market Access.
- Financial Support:** Easy credit schemes for MSMEs and e-commerce exporters.
- Market Expansion:** Assistance for exploring untapped markets and product diversification.
- Overseas Warehousing:** Facilitation of storage facilities abroad to improve supply efficiency.
- Global Branding:** International promotion campaigns for [Indian goods](#).
- Ease of Doing Business:** Simplification of trade procedures and [GST rationalisation](#).

JUTE

Context:

India has banned imports of certain [jute products](#) and ropes from Bangladesh through all land routes with immediate effect. These items can now only enter via the Nhava Sheva Seaport in Maharashtra to ensure quality control and safeguard domestic industry.



About Jute:

- What it is?**
 - A **long, soft, shiny vegetable fiber** that can be spun into coarse, strong threads.
 - Known as the "[Golden Fibre](#)" for its color, versatility, and eco-friendly qualities.
 - Belongs to the genus *Corchorus* in the family *Malvaceae*.
- Regions of Cultivation:**
 - India** is the world's largest producer, contributing ~70% of global output.
 - Major producing states: **West Bengal (dominates production), Assam, Bihar, Odisha, Andhra Pradesh.**
 - Requires warm, humid climate, [alluvial soil](#), and heavy rainfall—ideal in Ganga–Brahmaputra delta.
- Historical Context:**
 - In India, jute cultivation dates back to the [Indus Valley Civilization](#) for making ropes, mats, and cloth.
 - Commercial production flourished during the **British colonial era**, with mills concentrated in West Bengal.
 - Post-independence, jute remained a key industry for rural employment and exports.
- Key Characteristics:**
 - Biodegradable & Renewable:** Environmentally safe and sustainable.
 - High Tensile Strength:** Ideal for sacking, ropes, and industrial use.
 - Versatile Uses:** Packaging, handicrafts, geotextiles, and home décor.
 - Export-Oriented:** India exports to USA, UK, Germany, France, and other major markets.

WORLD TRADE ORGANIZATION (WTO)

Context:

Brazil has lodged a formal complaint with the World Trade Organization (WTO) against the United States' 50% tariff on Brazilian imports.



About World Trade Organization (**WTO**):

- **What It Is?**
 - The WTO is the **sole global body** governing international trade rules, acting as a forum for negotiations, [dispute resolution](#), and ensuring fair trade practices among member nations.
- **Headquarters:** Geneva, Switzerland
- **Established In:** 1 January 1995 – replacing the **General Agreement on Tariffs and Trade (GATT)**, which had operated since 1948.
- **Historical Background:**
 - Origin traces back to **post-World War II** efforts to create a fair, rules-based global trade system.
 - **GATT (1947)** provided initial tariff-reduction frameworks.
 - The **Uruguay Round (1986–94)** expanded trade rules to services and intellectual property, leading to the WTO's creation.
- **Objectives:**
 - Promote **free, predictable, and transparent** trade flows.
 - Reduce **tariffs and non-tariff barriers**.
 - Provide a platform for **negotiation and cooperation**.
 - Ensure **dispute settlement** through agreed legal processes.
 - Support **developing and least-developed countries** in global trade participation.
- **Core Functions:**
 - **Administer Trade Agreements** – Uphold commitments signed by members.
 - **Forum for Negotiations** – Facilitate trade talks in goods, services, and IP rights.
 - **Settle Disputes** – Operate a formal dispute resolution mechanism.
 - **Review Trade Policies** – Promote transparency via the [Trade Policy Review Mechanism](#).
 - **Capacity Building** – Provide training, technical assistance, and infrastructure support to developing members.
 - **Cooperation** – Collaborate with IMF, [World Bank](#), and other global economic institutions.



About Haat on Wheels Initiative:

- **What it is?**
 - A mobile retail platform designed to take authentic [handloom products](#) directly to urban consumers, launched as part of a national campaign to promote handloom heritage.
- **Ministry Involved:** Ministry of Textiles
 - Implemented in partnership with the **National Handloom Development Corporation (NHDC)**
- **Aim:**
 - To promote indigenous handlooms, improve market accessibility for weavers, and bring sustainable fashion to mainstream retail channels.
- **Key Features:**
 - **Showcases 116 weaves** from different Indian regions.
 - **Mobile vans** travel across [Delhi NCR](#), visiting markets, residential zones, and cultural spaces.
 - Promotes **“My Handloom, My Pride; My Product, My Pride”** theme.
 - **Direct-to-consumer model** connects weavers with urban buyers.
- **Significance:**
 - Enhances [livelihood security](#) of weavers by cutting out middlemen.
 - Fosters **vocal for local, self-reliance, and sustainable consumption**.
 - Boosts **awareness** of regional weaves and **cultural preservation**.

Agri-finance

HAAT ON WHEELS INITIATIVE

Context:

The Ministry of Textiles launched the “Haat on Wheels” mobile handloom marketplace during the 11th [National Handloom Day](#) celebrations on August 5, 2025, in New Delhi.

NATIONAL COOPERATIVE DEVELOPMENT CORPORATION (NCDC)

Context:

The Union Cabinet has approved a ₹2,000 crore grant to the National Cooperative Development Corporation (NCDC) over four years.



About [National Cooperative Development Corporation \(NCDC\)](#):

- **What it is?**
 - NCDC is a statutory body that promotes and finances cooperative development in agriculture, rural industries, and allied sectors.
- **Established in:** Set up in **1963** under an Act of Parliament and functions under the **Ministry of Cooperation**.
- **Headquarters:** Based in **New Delhi**, with 18 regional and state offices across India.
- **Objective:**
 - Promote **self-reliant and sustainable cooperatives** in agriculture and rural industries.
 - Enable cooperatives to access **long-term credit, working capital**, and modern infrastructure.
- **Key Functions:**
 - Finance **production, processing, marketing, and storage** of agricultural produce.
 - Support **import and export** of notified commodities such as fertilizers, machinery, rubber, textiles, etc.
 - Fund **income-generating activities** like dairy, poultry, fisheries, handloom, and sericulture.
 - Extend financial assistance to cooperatives for **rural infrastructure** such as irrigation, sanitation, and animal health.
 - Provide both **grants and loans** to State Governments and directly to eligible cooperative societies.
 - Offer **technical guidance and project preparation** support through its regional offices.

• **Significance of NCDC:**

- Serves over 13,000 cooperative societies with 2.9 crore members.
- Enables [inclusive rural growth](#) through job creation, especially in women-led and labour cooperatives.
- Supports cooperatives in cold storage, food processing, fisheries, dairy, and textiles, enhancing value chains.

[Agri-practices and New Technologies](#)

ICAR'S AI-POWERED AGROMET ADVISORY

Context:

ICRISAT and [ICAR](#) have launched an AI-powered, context-specific Agromet Advisory Service for climate-resilient agriculture.



About [ICAR's AI-Powered Agromet Advisory](#):

- **What it is?**
 - It is a **real-time, personalised climate advisory system** developed using Artificial Intelligence (AI) and [Machine Learning](#) (ML) to assist **smallholder farmers** in making informed agricultural decisions amid rising climate risks.
- **Developed by:** Jointly launched by ICRISAT and ICAR, with support from the Government of India's [Monsoon Mission-III](#) and partners like IMD, [IITM](#), and CGIAR's AI4CRA.
- **Objective:** To provide real-time, hyper-local, and personalised weather and climate advisories to smallholder farmers for adaptive decision-making.
- **Pilot Implementation:** The project is being piloted in Maharashtra through ICAR's Agro-Meteorological Field Units (AMFUs) before scaling nationwide and internationally.
- **Key Features:**
 - AI & ML-based dynamic models for [crop-weather analytics](#).
 - AI-powered WhatsApp bot for easy delivery in regional languages.

- o Personalised insights based on crop cycle, soil, location, and socio-economic profile.
- o Real-time integration of IMD data and satellite observations.
- o Multi-channel dissemination including IVRS, mobile apps, and village resource centres.
- **Significance:**
 - o Enhances climate resilience of over 120 million small and marginal farmers.
 - o Boosts productivity by reducing climate-related uncertainties.
 - o Bridges last-mile delivery gap in [agri-tech advisory](#).

Crops

APRICOT

Context:

Fresh apricots from Kargil, Ladakh, have been introduced to Saudi Arabia for the first time during India's [79th Independence Day celebrations](#) in Riyadh, under the One District One Product initiative.



About Apricot:

- **What it is?**
 - o Apricot (*Prunus armeniaca*) is a temperate fruit tree belonging to the Rosaceae family, closely related to peaches, plums, almonds, and cherries.
 - o Produces small, smooth, yellow-orange drupes with a large seed (kernel) inside.
- **Region Grown In:**
 - o **Globally:** Cultivated across temperate regions, especially in the [Mediterranean](#), Central Asia, and North America.
 - o **In India:** Grown in Ladakh, Himachal Pradesh, Jammu & Kashmir, Uttarakhand, and other dry temperate and mid-hill regions.
 - o Ladakh is particularly known for its high-quality, flavorful apricots.

- **Features:**
 - o Trees are small and spreading with bright green leaves; flowers are white and self-pollinated.
 - o Drought-resistant and long-lived (some up to 100 years).
 - o Rich in vitamin A, [natural sugars](#), and iron (especially dried apricots).
 - o Distinct varieties in India include wild "Zardalu" and cultivated "Khubani."
- **Uses:**
 - o Consumed fresh, dried, or processed into jams, juices, pickles, and sweets.
 - o Used in traditional Kashmiri and [Ladakhi cuisine](#).
 - o Kernels (once roasted) used for oils and flavoring.
 - o Dried apricots are a major export product.
- **Significance:**
 - o **Economic:** Important cash crop for Ladakh, boosting farmer incomes and regional exports.
 - o **Cultural:** Part of traditional diets in Himalayan regions.
 - o **Trade Potential:** Increasing exports to [Gulf nations](#) strengthens India's agri-trade footprint.
 - o **Nutritional:** High in [antioxidants](#), vitamins, and minerals, contributing to dietary health.

Schemes and Organizations

FAO FOOD PRICE INDEX (FFPI)

Context:

The FAO Food Price Index ([FFPI](#)) for July 2025 rose to 130.1 points, its highest in over two years, driven by record meat prices and a surge in [vegetable oil prices](#), despite declines in cereals, dairy, and sugar.

Categories of FAO Food Price Index (FFPI)

1. Cereal Price Index



2. Vegetable Oil Price Index



3. Meat Price Index



4. Dairy Price Index



5. Sugar Price Index



About FAO Food Price Index (FFPI):

- **What it is?**
 - A **monthly measure** of changes in international prices of a basket of key food commodities.
 - Published by the **Food and Agriculture Organization (FAO)** of the United Nations.
- **Launched in:** First introduced in **1996**
- Methodology revised in **July 2020** to update the base period and expand coverage.
- **Aim:**
 - To serve as a **global benchmark** for monitoring food price trends and market volatility.
 - Supports policymakers, researchers, and market participants in **agricultural planning** and **food security** assessments.
- **Criteria Used:**
 - **Tracks five commodity groups:** cereals, vegetable oils, dairy, meat, and sugar.
 - Uses **average export shares** from **2014–2016** as weights in the composite index.
- **Methodology:**
 - Based on **international export prices** rather than domestic retail/wholesale prices.
 - Combines nominal and real price indices for comparative analysis over time.
 - Prices are sourced from global trade data and updated monthly.
- **Key Features:**
 - **Commodity-Specific Indices** – Separate indices for cereals, vegetable oils, dairy, meat, and sugar.
 - **Global Benchmark** – Widely used by governments, **financial institutions**, and food security agencies.
 - **Market Insight** – Highlights drivers such as weather, policy changes, global demand-supply dynamics, and geopolitical events.
 - **Policy Relevance** – Helps assess **inflationary pressures**, trade policy needs, and humanitarian response strategies.

NOTE:

Don't worry about the data in this report, as it's a monthly report and keeps changing. From an exam perspective, focus on understanding the basics of the index.

Miscellaneous

FORTIFIED RICE SCHEME EXTENDED

TILL 2028

Context:

The Union Cabinet has approved the **continuation of universal supply of fortified rice** under all government schemes till **December 2028** with **100% central funding** of ₹17,082 crore.



WHAT IS FORTIFIED RICE?

Fortification is the practice of deliberately increasing the content of an essential micronutrient, i.e. vitamins and minerals (including trace elements) in food to improve its nutritional quality and provide a public health benefit with minimal risk to health

➤ The fortification factor does not last for more than 45 days, so it isn't advisable to store fortified rice for long	➤ According to National Family Health Survey, 78.7% children and 75% in the district are anaemic and suffer from malnutrition	➤ In the first phase, fortified rice will be distributed in Badangi, Bobbili, Ramabhadrapuram and Terlam mandals
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About Fortified Rice Scheme:

What it is

- A **nutrition intervention programme** to supply rice fortified with **Iron, Folic Acid, and Vitamin B12** through government food safety nets.
- Aims to combat **anaemia**, **malnutrition**, and **hidden hunger** in India.

Started in

- **Pilot phase launched in 2019.**
- **National scale-up approved in 2022** for universal coverage.

Nodal Ministry & Agency

- **Department of Food and Public Distribution (DFPD)** under the **Ministry of Consumer Affairs, Food and Public Distribution.**

- Technical standards framed by **FSSAI (Food Safety and Standards Authority of India)**.

Components of the Scheme

1. **Public Distribution System (PDS)** – fortified rice distributed through ration shops.
2. **PM POSHAN (Mid-Day Meal)** – fortified staples in school meals to address child anaemia.
3. **Integrated Child Development Services (ICDS)** – supply for children and women beneficiaries.
4. **Special Nutrition Initiatives** – distribution under Wheat-Based Nutrition Programme (WBNP) and Scheme for Adolescent Girls (SAG).

Key Features

- **Universal Coverage:** By March 2024, fortified rice replaced normal rice in all central schemes.
- **Nutritional Focus:** Added Iron, Folic Acid, and Vitamin B12 to address anaemia, neurological, and cognitive deficiencies.
- **Cost Coverage:** Entire fortification cost borne by Government of India.
- **Complementary Fortified Foods:** Guidelines promote use of **Double Fortified Salt (DFS)** and **fortified edible oil** in PM POSHAN.
- **Multi-Sectoral Convergence:** Linked with **Anemia Mukt Bharat (2018)** and nutrition awareness drives.
- **Monitoring:** States and UTs to ensure quality, compliance, and proper distribution.
- **Partnerships:** Supported by **NDDB Foundation for Nutrition (Gift Milk Programme)** to enhance complementary nutrition in schools.

Ecology and Functions of an Ecosystem

SUNFLOWER SEA STARS

Context:

Scientists have finally identified *Vibrio pectenicida* as the bacterium causing sea star wasting disease (SSWD), which led to the loss of over 5.8 billion sunflower sea stars across [North America](#) since 2013.



About Sunflower Sea Star (*Pycnopodia helianthoides*)

- **What It Is?**
 - A large, fast-moving marine predator with up to 24 arms; vital in regulating underwater ecosystems by preying on sea urchins.
- **Habitat:** Native to the [Pacific Ocean](#), ranging from **Alaska to Baja California**, dwelling on kelp beds and rocky seabeds.
- **IUCN Status:** Listed as **Critically Endangered** due to mass mortality from SSWD.
- **Key Features of the Sunflower Sea Star:**
 - **Size:** Can grow up to **1 meter (3.3 feet) in diameter**, making it one of the largest known sea stars.
 - **Mobility:** Capable of moving at a speed of **up to 1 meter per minute** using thousands of tube feet.
 - **Arms:** Possesses **16 to 24 soft, flexible arms**, aiding rapid movement and predation.
 - **Feeding Habits:** Acts as a **top predator**, feeding on sea urchins, clams, and other invertebrates.
 - **Habitat Range:** Found in [temperate coastal waters](#) from Alaska to California, primarily on rocky reefs and kelp beds.
 - **Coloration:** Exhibits vibrant hues—**orange, purple, red, or brown**, aiding in camouflage and predator avoidance.
 - **Respiration & Circulation:** Uses a water vascular system and **coelomic fluid** (analogous to blood) for nutrient transport and gas exchange.

About *Vibrio pectenicida*:

- **What Is It?**
 - A **pathogenic marine bacterium**, also known to affect shellfish, now linked conclusively to [sea star wasting disease](#) (SSWD).

- **Where It Was Found?**
 - Detected in **high abundance** within the **coelomic fluid** (internal fluid akin to blood) of infected sea stars.
- **Features & Effects:**
 - **Strain FHCF-3** of *V. pectenica* initiates with external lesions, leading to twisted arms, tissue decay, and death.
 - Transforms sea stars into **mucus-like goo** within days, disrupting marine trophic chains.
 - Thrives in **warmer ocean conditions**, raising alarm over climate-linked outbreaks.
- **Ecological Significance & Broader Impact**
 - **Keystone Species Loss:** Sunflower sea stars kept urchin populations in check; their decline led to exploding urchin numbers.
 - **Kelp Forest Collapse:** Northern California lost 95% of kelp cover, impacting fisheries, biodiversity, and coastal protection.
 - **Cultural & Economic Damage:** Affects First Nations' traditions, recreational diving, and carbon sequestration potential of kelp.

Biodiversity

SAMUDRAYAAN PROJECT

Context:

Two Indian **aquanauts** recently dived over **5,000 metres** in the **Atlantic Ocean** aboard the French submersible *Nautilie*, as part of training for India's **Samudrayaan Project**.



About Samudrayaan Project

What it is

- India's **first manned deep-sea mission** under the **Deep Ocean Mission (DOM)** approved in 2021.
- It seeks to explore the ocean at depths up to 6,000 metres for resources, biodiversity, and scientific research.

Established in

- Approved by the **Union Cabinet in 2021**, with an outlay of ₹4,077 crore for five years.

Aims and Objectives

1. **Develop deep-sea technologies** – crewed submersibles, mining tools, and robotic vehicles.
2. **Survey ocean resources** – locate polymetallic nodules rich in manganese, cobalt, nickel, and rare earths.
3. **Advance climate research** – create ocean climate advisory models for projections.
4. **Strengthen blue economy** – support sustainable harnessing of marine resources.
5. **Enhance biodiversity conservation** – study and protect fragile deep-sea ecosystems.

Features

- Vehicle: **Matsya-6000**, a crewed submersible resembling a large fish.
- Capacity: **Three aquanauts**, 12-hour missions (96 hours in emergency).
- Personnel sphere: 2.1 m diameter, built from **80 mm titanium alloy**, fabricated via **electron beam welding** by ISRO.
- Communication: Special **acoustic telephone system** developed indigenously.
- Life-support: Oxygen scrubbers and re-breather systems to recycle air.
- Depth capability: **6,000 metres**, pressure resistance ~600 times sea level.

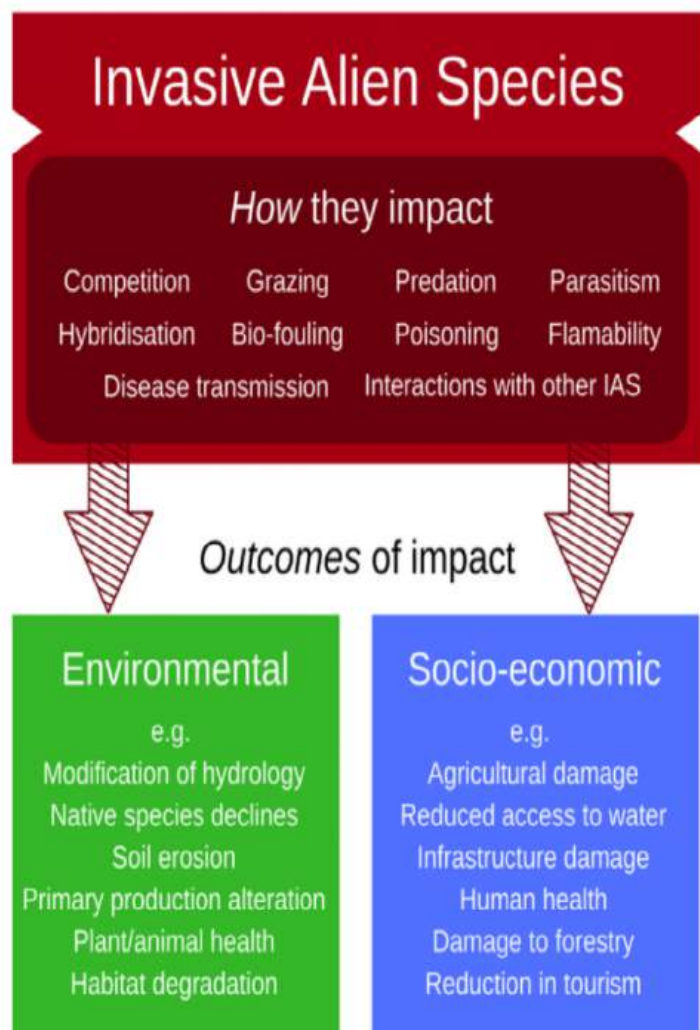
Other Related Initiatives

- **Deep Ocean Mission (DOM)** – umbrella scheme with six components including Samudrayaan.
- **Polymetallic Nodule Programme** – India holds mining rights in the Central Indian Ocean Basin from the **International Seabed Authority**.
- **National Institute of Ocean Technology (NIOT)** – nodal agency for developing Matsya-6000.
- **Blue Economy Policy** – integrates ocean resources for economic and environmental goals.

INVASIVE ALIEN SPECIES

Context:

A new study published in *Nature Ecology & Evolution* has revealed that **India is massively underestimating the economic cost of invasive alien species**, with management costs underreported by over **1.16 billion percent** — the highest global discrepancy.



About Invasive Alien Species (IAS)

What it is?

- As per the Convention on Biological Diversity (CBD) and Indian law, an invasive alien species is a non-native organism whose introduction and spread threaten biodiversity, ecosystem services, or human well-being.
- The Indian National Biodiversity Authority (NBA) defines them as species outside their natural range that establish and proliferate, causing ecological or economic harm.

Characteristics of IAS

- High adaptability** – thrive in disturbed or new ecosystems.
- Aggressive growth** – outcompete native species for light, water, and nutrients.
- Reproductive advantage** – rapid breeding or vegetative propagation.
- Absence of predators** – flourish unchecked in new habitats.
- Economic and ecological impact** – alter soil chemistry, hydrology, and crop yields.

Global Impact

- Global cost of invasive species since 1960 exceeds **\$2.2 trillion**.
- Non-native plants account for the **highest management cost (\$926 billion)**.
- Arthropods (\$830 billion) and mammals (\$263 billion) follow.
- Europe reported the highest cost (\$1.5 trillion).

India's Case

- Lantana camara**, **Parthenium hysterophorus**, **Prosopis juliflora**, and **Water Hyacinth** dominate forests, rangelands, and wetlands.
- Large swathes of **Bandipur, Mudumalai, and other reserves** are overrun by lantana.
- Agriculture suffers due to weeds like **parthenium** reducing crop yields.
- Aquatic invasives clog waterways, impacting irrigation and fisheries.

Threats Posed

- Biodiversity loss** – displacement of native flora and fauna.
- Agricultural losses** – reduced productivity and higher input costs.
- Health hazards** – allergenic weeds cause respiratory and skin diseases.
- Forest fire risks** – highly combustible species like lantana increase wildfire incidents.
- Economic drain** – hidden management costs undermine development goals.

Initiatives for Management

- National Biodiversity Action Plan (NBAP)** emphasises IAS management.
- Convention on Biological Diversity (CBD), 1992** – India is a party and obligated to control IAS.
- National Biodiversity Authority (NBA)** – coordinates IAS prevention and awareness.
- Ballast Water Management Convention** – to prevent marine invasions.
- State-level eradication drives** – manual removal, biocontrol measures, controlled grazing, and afforestation.

SALTWATER CROCODILE

Context:

The population of saltwater crocodiles in the Sundarban Biosphere Reserve (SBR) has risen in 2025, with **213 direct sightings** recorded, showing growth across all age groups, especially hatchlings — a rare occurrence in this terrain.

Species of crocodilians

There are **three species of crocodilians**—saltwater, Mugger and Gharial. Latest Saltie census 2023 have estimated higher count of estuarine crocodiles in Bhitarkanika



Saltwater Crocodile (estuarine crocodile)

- It is the **largest** of all living reptiles. It is found throughout the east coast of India - **Bhitarkanika mangroves and Sunderbans National Parks**.
- Males are much larger than females, weighing even upto 1000Kg.
- **Habitat:** They inhabit coastal brackish mangrove swamps and river deltas.
- **IUCN:** Least concern

Mugger:

The mugger crocodile (Indian crocodile) is found throughout the Indian subcontinent.

- The mugger is mainly a **freshwater species**, and found in lakes, rivers and marshes.
- They have **broadest snout of all**, they are keystone species of their habitat.
- **IUCN:** Vulnerable



Gharial:

The Gharial or fish-eating crocodile is native to the Indian subcontinent.

- Small released populations are present and increasing in the rivers of the **National Chambal Sanctuary**, Katarniaghat Wildlife Sanctuary, Son River Sanctuary and the rainforest biome of Mahanadi in Satkosia Gorge Sanctuary, Orissa.
- They are easily distinguishable due to their **long snouts (nose)**
- **IUCN:** Critically Endangered



Bhitarkanika National Park (Kendrapara district in Odisha):

The park is **second-largest mangrove forest (after Sunderbans)** and is lying in the estuarial region of **Brahmani, Baitarni, Dharma and Patasala River**. It is also a Ramsar Site.

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About Saltwater Crocodile (Crocodylus porosus)

What It Is

- The **largest living reptile and apex predator** in aquatic ecosystems.
- Known as a **hypercarnivorous species**, crucial for maintaining ecological balance by consuming carcasses and regulating prey populations.

Habitat & Distribution in India

- Found in the **Sunderbans (West Bengal)**, swamplands and rivers of **Odisha**, and coastal areas of the **Andaman & Nicobar Islands**.
- Adaptable to both **freshwater and saline water**, though rising salinity from climate change poses a threat.

Unique Features

- **Size:** Largest of all crocodilians, males can exceed 6 metres.
- **Apex predator:** Can prey on fish, birds, and mammals, including large ungulates.
- **Tolerant species:** Survives across varying salinity levels and tidal environments.

Population in Sunderbans (2025 Survey)

- **Estimated Range:** 220–242 individuals.
- **Direct Sightings:** 213 (125 adults, 88 juveniles, 23 hatchlings).
- **Comparison with 2024:** Significant increase (from 71 adults, 41 juveniles, 2 hatchlings).
- **Encounter Rate:** 0.18 per km (≈1 crocodile per 5.5 km).
- **Preferred Habitat:** Creeks/rivers with tide widths below 180 metres.

Conservation Efforts

- **Bhagabatpur Crocodile Project (1976–2022):** A pioneering conservation and breeding centre in South 24 Parganas.
 - Released **577 crocodiles into the wild** over four decades.
- **Systematic surveys, GPS mapping, habitat studies** to monitor populations.
- Continued conservation is critical, as **climate change and rising salinity** may threaten habitats.

WORLD ORANGUTAN DAY 2025

Context:

August 19 is observed as **World Orangutan Day** to raise awareness on the conservation of orangutans threatened by habitat loss and the illegal pet trade.



About World Orangutan Day

- **Celebrated since:** 2013, initiated by conservation groups.
- **Date:** 19th August every year.
- **Message (2025 focus):** save the orangutans, save the rainforest, save the planet.
- **Objective:** Raise awareness about threats like logging, palm oil plantations, poaching, and the illegal pet trade.

About Orangutans

What They Are?

- **Great apes** found in Asia, closest living relatives of humans after chimpanzees, bonobos, and gorillas.
- Share **97% DNA with humans**.
- Name derived from Malay: *Orang* = person, *Hutan* = forest → "person of the forest."

Types

1. Bornean Orangutan (*Pongo pygmaeus*)
2. Sumatran Orangutan (*Pongo abelii*)
3. Tapanuli Orangutan (*Pongo tapanuliensis*) – discovered in 2017, the rarest with <1,000 individuals.

Habitat Distribution

- Present only on the islands of **Sumatra (Indonesia)** and **Borneo (shared by Indonesia, Malaysia, and Brunei)**.
- Live in **tropical rainforests**, mostly arboreal, spending majority of life on trees.

Unique Features

- **Arboreal lifestyle** – longest arms among [primates](#) for swinging through trees.
- **Tool use** – use sticks to extract insects or honey.
- **Intelligence & emotions** – exhibit memory, planning, empathy, and jealousy.
- **Slow reproduction** – females give birth only once every 6–8 years, making population recovery very slow.

Diet

- Primarily **frugivorous** (fruits make up 60–90% of diet).
- Also eat leaves, bark, insects, and occasionally bird eggs.

Conservation Status

- **Bornean Orangutan** – [Critically Endangered](#) (IUCN).
- **Sumatran Orangutan** – [Critically Endangered](#) (IUCN).
- **Tapanuli Orangutan** – [Critically Endangered](#) (IUCN, fewer than 1,000 left).
- Major threats: **deforestation, palm oil plantations, illegal hunting, pet trade, climate change**.

What It Is

- **Scientific Names:** *Rangifer tarandus* (Eurasia: Reindeer; North America: Caribou).
- **Mammal Type:** Large herbivorous ungulate adapted to Arctic and sub-Arctic environments.
- **Adaptations:** Thick fur, wide hooves for snow, ability to feed on lichens in winter.



Habitat Distribution

- Found across the **Arctic tundra and boreal forests** of North America (Canada, Alaska, Greenland) and Eurasia (Scandinavia, Russia).
- Migratory herds travel hundreds of kilometers annually, making them one of the most wide-ranging terrestrial mammals.

Ecological Role

1. **Plant Regulation:** Grazing maintains balance in tundra vegetation, preventing shrub overgrowth.
2. **Carbon Cycle Influence:** Their feeding reduces plant dominance and indirectly regulates soil carbon release.
3. **Biodiversity Support:** Influence plant diversity, benefiting other Arctic species like birds and small mammals.
4. **Human Linkages:** Vital for Indigenous Arctic communities for food, clothing, and cultural practices.

Conservation Status

- **IUCN Red List:** *Vulnerable*.
- Major threats include **climate change, habitat degradation, industrial development, and over-hunting**.
- North American caribou populations most at risk, with severe declines forecast without urgent mitigation.

ARCTIC REINDEER COULD DECLINE SHARPLY BY 2100

Context:

A new international study warns that **Arctic reindeer (caribou) populations could decline by up to 80% by 2100** due to climate change, especially in North America.

About Arctic Reindeer

JELLYFISH

Context:

France's Gravelines [Nuclear Power Station](#) temporarily shut down three reactors after a massive jellyfish swarm clogged its cooling system.



About Jellyfish:

- **What it is?**
 - Jellyfish are free-swimming marine invertebrates belonging to the phylum *Cnidaria* and class *Scyphozoa*.
 - They are ancient species, existing for over 500 million years.
- **Scientific Name:** While “jellyfish” is a common term, most belong to *Aurelia aurita* (Moon Jellyfish) and related species.
- **Habitat:** Found in oceans worldwide, from surface waters to deep seas, often concentrated near [coastal zones](#).
- **Key Features:**
 - Gelatinous, umbrella-shaped bell with tentacles containing stinging cells (nematocysts).
 - Lacks bones, brain, or heart; body is ~95% water.
 - Moves passively with currents, occasionally pulsating for mobility.
 - Can form blooms — rapid population explosions under favourable conditions.

About Gravelines Nuclear Power Station:

- **What it is?**
 - Gravelines Nuclear Power Station is one of the largest nuclear power plants in Europe, producing electricity through controlled nuclear fission.
 - It uses [pressurised water reactors](#) (PWRs) to generate power.
- **Location:** Situated in **Northern France**, on the coast of the [North Sea](#), between Calais and Dunkirk in the Hauts-de-France region.

OPERATION FALCON

Context:

The [Assam](#) government's Operation Falcon has successfully arrested 42 rhino poachers, dismantled six major poaching gangs, and foiled nine poaching attempts, ensuring zero rhino killings in the state so far in 2025.



About Operation Falcon:

- **What it is?**
 - A joint anti-poaching initiative launched in 2024 by the Assam Police and Assam Forest Department to eliminate [rhino poaching](#) networks and curb illegal wildlife trade.
- **Organisations Involved:**
 - **Assam Police** — Law enforcement, intelligence gathering, and operations.
 - **Assam Forest Department** — Habitat monitoring, patrolling, and wildlife protection.
- **Key Features:**
 - **Integrated Intelligence Operations:** Combines digital tracking and on-ground surveillance to locate and apprehend poachers swiftly.
 - **Rapid Response & Coordination:** High-speed deployment teams ensured nine foiled [poaching](#) attempts in multiple districts.
 - **Positive Conservation Impact:** Zero rhino killings reported in 2025 and poaching down by **86% since 2016**, boosting Assam's wildlife conservation record.
- **Significance:**
 - **Biodiversity Conservation:** Protects the greater [one-horned rhinoceros](#)—an endangered species.
 - **Global Image:** Strengthens India's standing in international wildlife protection efforts.
 - **Eco-Tourism Boost:** Ensures safety in national parks like [Kaziranga](#), attracting global visitors.

16TH LION POPULATION ESTIMATION REPORT

Context:

The 16th Lion Population Estimation report (2025) revealed that India's [Asiatic lion population](#) has risen from 674 in 2020 to 891 in 2025.



Asiatic Lions



Context: The Gujarat government has planned to translocate 40 adult and sub-adult lions to the Barda Wildlife Sanctuary (Gujarat).

The Asiatic Lion (also known as the Persian Lion or Indian Lion) is a member of the *Panthera Leo Leo* subspecies that is restricted to India.

Its previous habitats consisted of West Asia and the Middle East before it became extinct in these regions.

Protection Status:

IUCN Red List: Endangered

CITES: Appendix I

Wildlife (Protection) Act 1972: Schedule I



Barda Wildlife Sanctuary



DIFFERENCE BETWEEN ASIATIC AND AFRICAN LION

Asiatic lions are slightly smaller than African lions.

The most striking morphological character, which is always seen in Asiatic lions, and rarely in African lions, is a longitudinal fold of skin running along its belly.

About 16th Lion Population Estimation Report:

- **What It Is?**
 - A periodic **wildlife census** that assesses the population, distribution, and demographic trends of the **Asiatic lion** (*Panthera leo persica*).
- **Conducted By:** Gujarat Forest Department
 - Supported by the Ministry of Environment, Forest and Climate Change (MoEFCC) under [Project Lion](#).
- **Key Estimations (2025):**
 - **Total Population** – 891 lions (rise of 32.2% from 2020).
 - **Adult Females** – Increased from 260 to 330 (rise of 26.9%), enhancing reproductive potential.
 - **Satellite Populations** – 497 lions across **nine locations** including [Barda WLS](#), Jetpur, Babra-Jasdan.
 - **Corridor Records** – First-time sighting of 22

lions in wildlife corridors.

Regional Trends –

- ❑ **Highest population:** Amreli district – 82 adult males, 117 adult females, 79 cubs.
- ❑ **Highest growth:** Mitiyala WLS (rise of 100%), Bhavnagar Mainland (rise of 84%), South Eastern Coast (rise of 40%).
- ❑ **Declines:** [Girnar WLS](#) (loss of 4%), Bhavnagar Coast (loss of 12%).

Significance:

- **Conservation Success** – Population grew by 70.36% in the last decade, range expanded by nearly 60%.
- **Ecological Importance** – Asiatic lions are [keystone species](#) maintaining grassland and scrubland balance.
- **Cultural Heritage** – Sole surviving wild population in the world, confined to Saurashtra region of Gujarat.

NILGIRI TAHR POPULATION SEES 21% RISE

Context:

The population of [Nilgiri Tahr](#), Tamil Nadu's state animal, recorded a 21% increase in 2025 compared to the previous year, as per a synchronized survey conducted in Tamil Nadu and Kerala.

NILGIRI TAHR CENSUS DATA

1,303
Total Nilgiri Tahr (2025)

Previous Count
1,031



TOP LOCATIONS (2025)

Akkamalai Grass Hills (Anamalai TR) 334

Mukurthi National Park 282

↑ +21% Increase in one year

About Nilgiri Tahr Population Sees 21% Rise:

- **What it is?**
 - A **synchronized bi-annual survey** to assess the population of Nilgiri Tahr across their habitat range.
- **Conducted by:** Tamil Nadu and Kerala Forest Departments, involving **786 frontline staff** covering 3,126 km on foot across **177 blocks** in 14 forest divisions.
- **Key Findings:**
 - **Population rose from 1,031 (2024) to 1,303 (2025).**
 - **Akkamalai Grass Hills** (Anamalai Tiger Reserve) recorded 334 individuals.
 - **Mukurthi National Park** recorded 282 individuals (approx. 50% of total in TN).
- **Scientific Milestones:**
 - Use of **drone surveillance**, radio-collaring, and **community participation**.
 - Part of the broader Nilgiri Tahr Recovery Project launched in 2022.

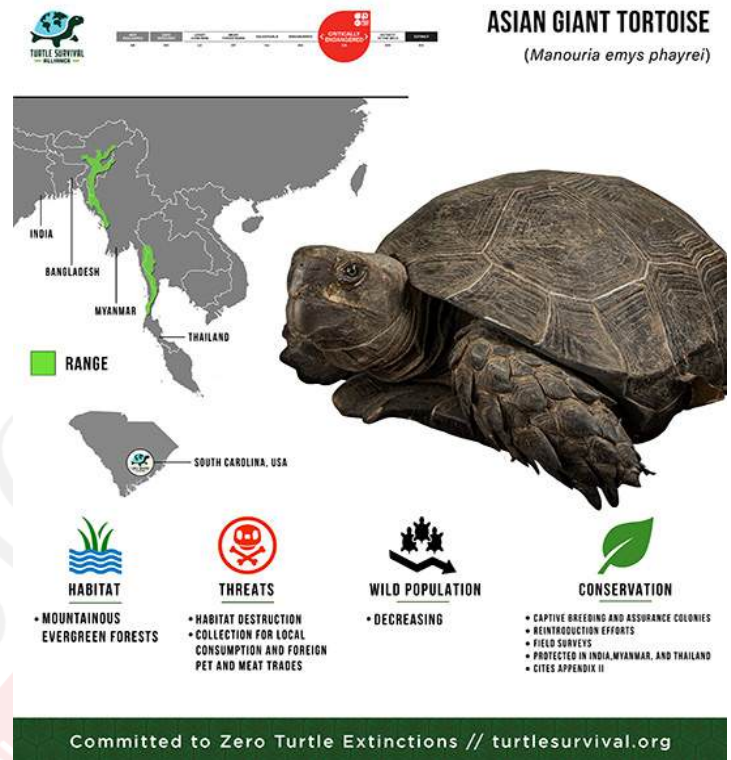
About Nilgiri Tahr:

- **Scientific Name:** *Nilgiritragus hylocrius*
- **IUCN Status:** Endangered
- **Legal Protection:** Schedule I, Wildlife Protection Act, 1972
- **Common Names:** Varaiaadu (Tamil), Varayadu (Malayalam)
- **Habitat:**
 - Endemic to **Southern Western Ghats** (Tamil Nadu and Kerala)
 - Occupies steep **montane grasslands** and **shola forest edges** at elevations between **1,200 to 2,600 m**
 - Current distribution confined to a **400 km stretch** from Nilgiris to Kanyakumari
- **Physical Features:**
 - **Stocky build**, short, coarse fur; males have a distinct **silver saddle patch** on back
 - **Sure-footed climbers** adapted to rugged cliffs
 - **Closest relatives:** Himalayan and **Arabian tahrs** (but adapted to tropical wet climates)
- **Biological Aspects:**
 - **Gestation period:** ~180 days and births occur Jan–Feb
 - **Average wild lifespan:** ~3–3.5 years (can live up to 9 years)
 - **Sexual maturity:** ~3 years
 - Diurnal grazers – most active in **early morning and late evening**.

ASIAN GIANT TORTOISE REINTRODUCTION IN NAGALAND

Context:

Ten critically endangered Asian giant tortoises were reintroduced into the Zeliang Community Reserve, Nagaland, under a joint initiative by the Nagaland Forest Department and [India Turtle Conservation Programme \(ITCP\)](#).



About Asian Giant Tortoise Reintroduction in Nagaland:

- **What It Is?**
 - The Asian Giant Tortoise is the largest land tortoise in mainland Asia, known for its ecological role in forest ecosystems. It is a slow-moving herbivore, crucial for seed dispersal, soil turnover, and maintaining forest health.
- **Scientific Name:** *Manouria emys*
- **Habitat:**
 - Found in **tropical and subtropical forests** of India, Bangladesh, Myanmar, Thailand, Malaysia, and Indonesia.
 - Prefers **dense, moist lowland and hill forests**, especially with abundant leaf litter and undergrowth.
 - In India, it was historically widespread in **Northeast India**, including **Nagaland and Arunachal Pradesh**.
- **Conservation Status:**
 - **IUCN Red List:** Critically Endangered.
 - Listed under **Schedule IV** of the **Wildlife Protection Act, 1972 (India)**
- **Key Features:**

- **Physical Characteristics:**
 - **Size:** Can grow up to **60 cm in length** and weigh over **35 kg**.
 - **Shell:** Dark brown to black, heavily domed, with prominent growth rings on each scute.
 - **Limbs:** Thick, scaly forelimbs with **elephant-like feet**, used for digging.
 - **Head:** Flattened with a sharp beak, used for tearing vegetation.
- **Biological Traits:**
 - **Longevity:** Can live up to **80–100 years**.
 - **Diet:** Herbivorous—feeds on **leaves, fruits, mushrooms**, and **decomposing plant matter**.
 - **Reproduction:** Females build **nest mounds** and lay eggs in leaf litter; known to guard the nest—a **rare trait among tortoises**.
 - **Activity:** Mostly diurnal and solitary and thrives in humid conditions.
- **Unique Features:**
 - Known as the *“small elephant of the forest”* due to its role in seed dispersal and floor scavenging.
 - One of the **few tortoise species that builds above-ground nests and exhibits maternal care**.
 - Plays a **keystone ecological role**—its disappearance can disrupt forest regeneration cycles.

- **Habitat and Distribution:**
 - Found in **tropical and subtropical forests** of **South and Southeast Asia** (India, [Vietnam](#), Thailand, Sri Lanka).
 - African cousin (*Hyemoschus aquaticus*) resides in West and Central African rainforests.
 - Often inhabit **dense undergrowth**, lowland forests, and remain **nocturnal** and **elusive**.

PHYSICAL CHARACTERISTICS OF MOUSE DEER



MOUSE DEER

Context:

The elusive Silver-backed Chevrotain (mouse deer), thought extinct for over 30 years, has been rediscovered in the forests of southern Vietnam, sparking global conservation optimism.

About Mouse Deer:

- **What is the Mouse Deer?**
 - The mouse deer, also called chevrotain, is the **world’s smallest hoofed mammal**, belonging to the family **Tragulidae**. Though it resembles both a mouse and a deer, it is unrelated to either and represents a primitive ruminant lineage.
- **Scientific Name & Taxonomy:**
 - **Scientific Names:**
 - ☐ *Tragulus kanchil* (Lesser Mouse Deer)
 - ☐ *Tragulus napu* (Greater Mouse Deer)
 - ☐ *Tragulus versicolor* (Silver-backed Chevrotain – rediscovered species)

- **Biological and Behavioural Traits:**
 - Lack modern **thermoregulation** mechanisms found in advanced artiodactyls.
 - Known for their ability to **submerge underwater for minutes** to evade predators.
- **Feeding Habits:**
 - **Primarily herbivorous:** feed on fruits, leaves, and soft plant parts.
 - The **African chevrotain** occasionally consumes insects, crabs, and scavenged meat—an unusual trait for ruminants.
- **Social and Reproductive Behaviour:**
 - Prefer **solitary or paired existence**; territorial with small home ranges (13–24 hectares).
 - Males use **chin and preputial glands** for marking.
- **Reproduction:**
 - One offspring per birth.
 - Weaning at 3 months and maturity between 5–10 months.
- **Unique Adaptations:**
 - **Drumming with hooves:** Emits rhythmic beats to signal distress or warn off threats.
 - **Underwater hiding:** Known to stay submerged for over 5 minutes—key **survival trait**.

ASIATIC LION

Context:

Three Asiatic lion cubs died in Amreli district of Gujarat, with six more under veterinary observation, raising fresh alarms about rising cub mortality amid overall population growth in the [Gir landscape](#).



About Asiatic Lion:

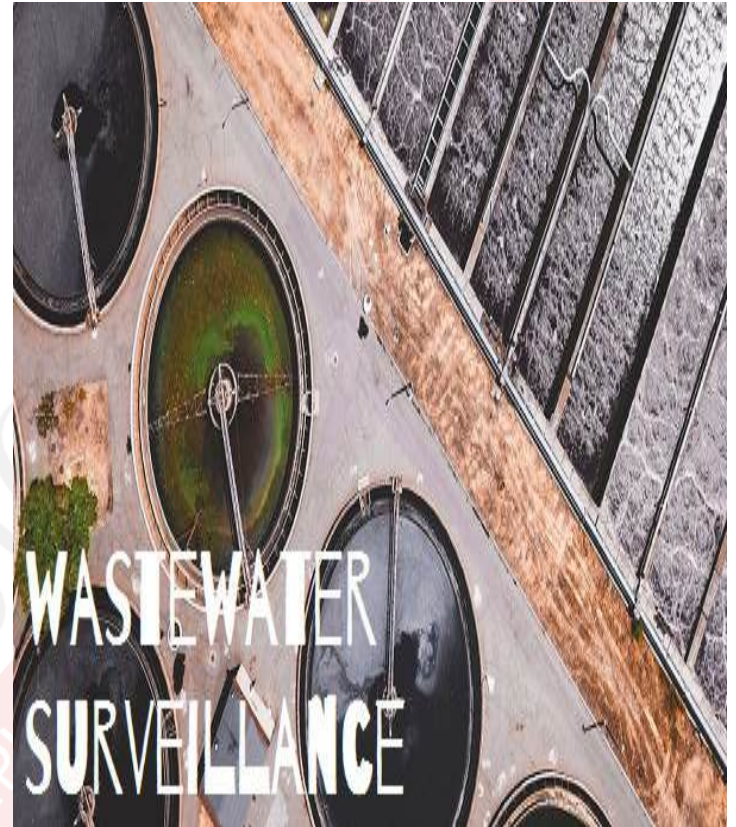
- **What It Is?**
 - The Asiatic lion is a subspecies of lion found only in India, recognized for its restricted range and distinct physical traits compared to its African cousin.
- **Scientific Name:** *Panthera leo persica*
- **IUCN Status**
 - **Vulnerable** on the IUCN Red List
 - **Schedule I** under Wildlife Protection Act, 1972
 - **Appendix I** of [CITES](#) (international trade ban)
- **Habitat:** Primarily found in the [Gir National Park](#) and adjoining areas in **Gujarat** such as Amreli, Junagadh, Bhavnagar, and coastal zones; over 200 lions now live outside protected areas.
- **History:**
 - Once ranging from eastern India to the [Mediterranean](#), the species was reduced to a handful in Gir by early 1900s.
 - Conservation efforts have revived its numbers, but it still exists as a **single wild population**.
- **Features:**
 - Males have a sparse mane, with ears **visible**, unlike [African lions](#)
 - A distinctive **long belly fold** is always present
 - Coat is **sandy to buff-grey**, sometimes silvery
 - Shoulder height: ~110 cm and **length:** up to 280 cm
 - Weight: Males (160–190 kg), Females (110–120 kg)

Environmental Pollution

WASTEWATER SURVEILLANCE

Context:

The [Indian Council of Medical Research \(ICMR\)](#) is set to expand **wastewater surveillance** for **10 viruses** across **50 Indian cities** within the next six months.



About Wastewater Surveillance

What it is

- [Wastewater Surveillance](#), also called **Wastewater-Based Epidemiology (WBE)**, is a method of tracking pathogens excreted by humans into sewage systems.
- It provides **community-level insights** into disease prevalence, even before clinical symptoms appear.

Objective

- To establish an **early warning system** for viral outbreaks.
- To monitor **emerging and re-emerging pathogens** in a cost-effective and non-invasive way.
- To help policymakers design **timely interventions, vaccination drives, and containment strategies**.

Viruses under Watch

- Currently: **COVID-19 virus, Polio virus**.
- Planned expansion: [Avian Influenza Virus \(AIV\)](#).

and pathogens linked to **fever, diarrhoea, acute encephalitis syndrome, and respiratory illnesses.**

- In total: **10 viruses** will be tracked.

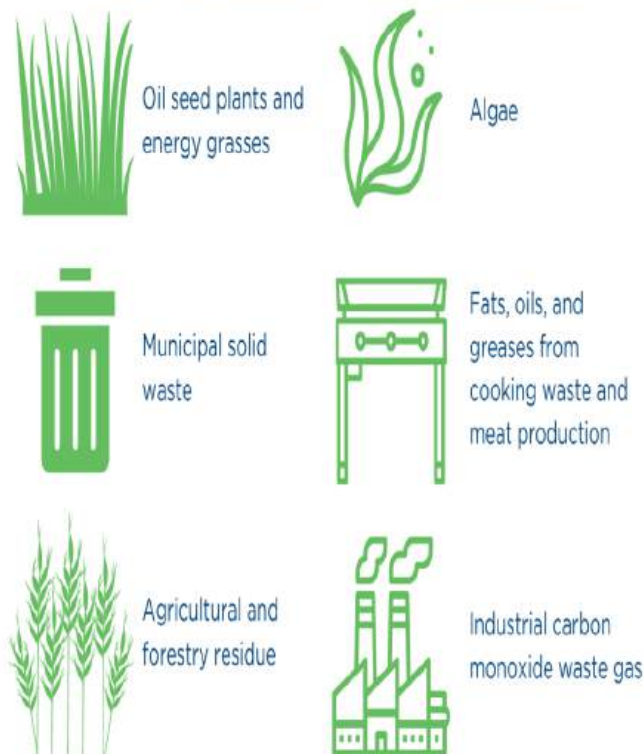
Coverage

- Present coverage: **5 cities.**
- Planned expansion: **50 cities over six months.**
- National scaling up will strengthen India's **epidemic preparedness and pandemic prevention capacity.**

Process of Wastewater Surveillance

1. **Shedding of Pathogens** – Infected individuals release virus particles through urine, stool, or while washing.
2. **Sewage Collection** – Samples are taken from sewage before treatment.
3. **Laboratory Testing** – Samples are tested for viral RNA/DNA fragments.
4. **Data Analysis** – Trends in infection spread are identified within 5–7 days.
5. **Public Health Action** – Authorities use results for outbreak warnings, vaccination, and resource allocation.

Feedstocks suitable for SAF production:



Graphic by Emma Johnson, EESI

INDIA'S FIRST SUSTAINABLE AVIATION FUEL (SAF) PLANT FROM USED COOKING OIL

Context:

Indian Oil Corporation (IOC) will begin **commercial production of Sustainable Aviation Fuel (SAF)** from used cooking oil at its Panipat refinery by December 2025.

About Sustainable Aviation Fuel (SAF)

- **Definition:** SAF is a biofuel derived from renewable feedstocks like used cooking oil, ethanol, and agricultural residues.
- **Chemistry:** Similar to conventional Aviation Turbine Fuel (ATF); can be blended and used in existing aircraft engines.
- **Global Significance:** Accounts for **60% of projected aviation decarbonisation**; reduces lifecycle carbon emissions by up to **80%** compared to fossil jet fuel.
- **Compatibility:** Airbus and other major aircraft makers approve up to **50% SAF blends.**

Benefits of SAF

1. **Carbon Reduction** – Cuts lifecycle greenhouse gas emissions by up to 80% compared to fossil-based ATF.
2. **Compatibility** – Works in existing aircraft with blends up to 50%, as certified by Airbus and others.
3. **Energy Security** – Utilises waste streams like used cooking oil, reducing import dependency.
4. **Global Compliance** – Helps airlines meet **CORSIA (Carbon Offsetting and Reduction Scheme for International Aviation)** requirements.
5. **Export Potential** – Europe already has blending mandates, making India a potential supplier.

India's First SAF Plant – Panipat Refinery

1. **Capacity:** 35,000 tonnes/year by end-2025.
2. **Feedstock:** Used cooking oil collected from hotels, restaurants, and large food businesses (e.g., Haldiram's).
3. **Certification:** Received **ISCC CORSIA certification**, allowing compliance with ICAO's global carbon offsetting scheme.
4. **Potential Buyers:** European airlines operating in India, given EU blending mandates.
5. **Future Pathways:** IOC also working on **alcohol-to-jet technology** using ethanol.

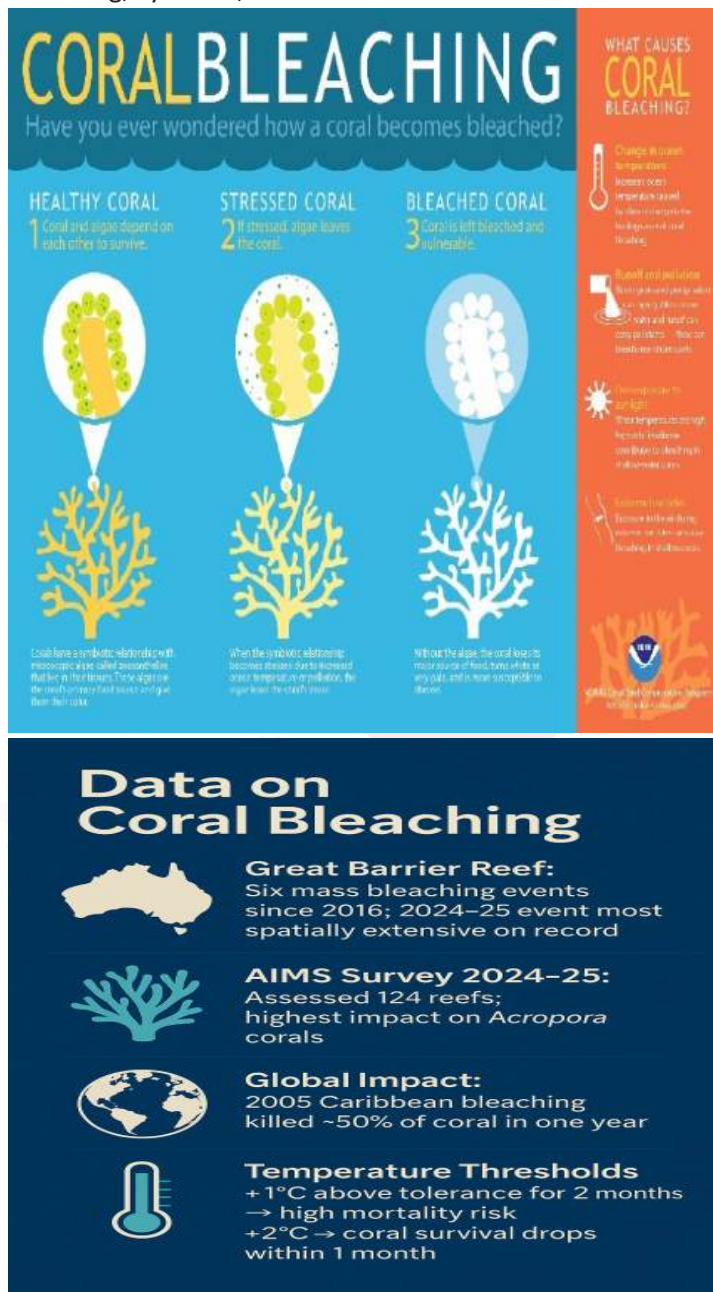
Challenges

- **High Cost:** [SAF](#) is nearly **three times costlier** than conventional jet fuel.
- **Collection of Feedstock:** Easy from large hotels, but difficult from small eateries and households.
- **Industry Resistance:** Airlines fear fuel cost escalation.
- **Scale-Up Needs:** Current capacity meets initial blending target but must expand for long-term sustainability.

GREAT BARRIER REEF HAS RECORDED ITS LARGEST CORAL BLEACH

Context:

The [Great Barrier Reef](#) has recorded its largest annual coral cover decline in nearly 40 years, driven by severe coral bleaching, cyclones, and crown-of-thorns starfish outbreaks.



About [Great Barrier Reef has recorded its largest Coral Bleach](#):

- **What is Coral Bleaching?**
 - A stress response in corals when [symbiotic algae](#) (zooxanthellae) are expelled from coral tissues.
 - Loss of algae removes the coral's main food source and colour, leaving it pale or white.
 - Bleaching does not always kill coral, but prolonged stress can lead to mortality.
- **Causes of Coral Bleaching:**
 - **Increased Sea Temperatures** – Often from climate change and El Niño events.
 - **Pollution & Runoff** – Nutrient-rich runoff from agriculture promotes harmful algal blooms and reduces water quality.
 - **Overexposure to Sunlight** – High [solar irradiance](#) during heat events.
 - **Extreme Low Tides** – Exposes shallow corals to air and heat stress.
 - **Cold Stress Events** – Rare but possible, such as Florida Keys (2010).
- **Process of Coral Bleaching:**
 - **Healthy State** – Coral and algae ([zooxanthellae](#)) coexist in a symbiotic relationship, with algae providing most of the coral's energy and colour through photosynthesis.
 - **Stress Trigger** – Environmental changes like warmer sea temperatures, pollution, or extreme sunlight disturb this balance, causing physiological stress to the coral.
 - **Algae Expulsion** – In response to stress, coral ejects the algae from its tissues, losing its primary food source and vibrant colour.
 - **Bleached Stage** – The coral's transparent tissue exposes its white skeleton, leaving it weak, energy-deprived, and prone to disease.
 - **Outcome** – If stress is short-lived, algae return and the coral recovers; if prolonged, the coral dies and reef ecosystems degrade.
- **Implications:**
 - **Ecosystem Collapse** – Coral reefs host ~25% of marine species.
 - **Economic Loss** – Impacts fishing, [coastal protection](#), and tourism.
 - **Biodiversity Decline** – Loss of breeding grounds for marine life.
 - **Climate Feedback Loop** – Dead reefs store less carbon and lose their role as natural wave barriers.

RESTITUTIONARY DAMAGES

Context:

The Supreme Court has empowered Pollution Control Boards to impose restitutionary damages under the Water and Air Acts, marking a major shift toward preventive and [restorative environmental governance](#) in India.



About Restitutionary Damages:

- **What it is?**
 - Restitutionary damages refer to [compensatory payments](#) or financial guarantees imposed on polluting entities to restore environmental damage or prevent potential harm, even before actual damage occurs.
- **Objective:** To repair polluted ecosystems and ensure restoration of air and water to their original state, going beyond punishment to promote ecological recovery and sustainability.
- **Key Features:**
 - Can be imposed **ex-ante** (before damage) or **ex-post** (after damage).
 - Not punitive fines, but **restorative in nature**.
 - Can be in the form of **fixed monetary sums or bank guarantees**.
 - Based on the [polluter pays principle](#) and **precautionary approach**.
 - Aims to uphold [Articles 48A](#) (State duty to protect the environment) and [51A\(g\)](#) (citizens' duty to protect nature).

Supreme Court Verdict on Restitutionary Damages:

- **Name of Case:** *Delhi Pollution Control Committee vs. Splendor Landbase Limited*
- **Legal Validation:** The SC ruled that [Pollution Control Boards](#) (PCBs) are empowered under Section 33A of the Water Act and Section 31A of the Air Act to impose restitutionary and compensatory damages.
- **Broadened Scope:** PCBs can impose such damages proactively, even without proven legal violations, based on risk or likelihood of harm.
- **Subordinate Legislation Required:** The court mandated that these powers must be exercised

only through formal rules and regulations, [ensuring transparency](#), fairness, and natural justice.

- **Public Participation:** The court stressed inclusion of citizen complaints and community oversight in environmental decision-making and enforcement.
- **Implementation Support:** Recognized importance of civil penalties in mobilizing funds for pollution control.

Climate Change

INDIA COMMISSIONED ITS FIRST INDIGENOUSLY DEVELOPED 1 MW GREEN HYDROGEN PLANT

Context:

India commissioned its first indigenously developed 1 MW green hydrogen plant at Deendayal Port, Kandla — a milestone under the National Green Hydrogen Mission and Maritime India Vision 2030.



About India commissioned its first indigenously developed 1 MW green hydrogen plant:

What it is?

- A 1-megawatt green hydrogen facility, part of a planned 10 MW project to support India's clean maritime operations.
- Located at **Deendayal Port Authority (DPA), Kandla, Gujarat** — the first such facility at an Indian port.

Developed By:

- Fully [Make-in-India initiative](#) led by Indian engineers.
- Executed by DPA in collaboration with engineering partner **Larsen & Toubro (L&T)**.

Technology Used:

- Uses **indigenously manufactured electrolyzers** to produce green hydrogen via electrolysis using

renewable energy sources.

- Demonstrates indigenous capacity for **complex clean energy systems**.

Aim:

- To support India's Net Zero goals and transition to clean fuel in maritime transport.
- Aligns with [National Green Hydrogen Mission](#) (2023) and Maritime India Vision 2030.

Key Features:

1. **Fast Execution:** Constructed within **4 months** — a model for speed, scale, and skill.
2. **Capacity:** Will produce **~140 metric tonnes of green hydrogen annually**.
3. **Phase-wise Expansion:** First phase (1 MW) commissioned and **5 MW to be added by FY-end**, full 10 MW by mid-next fiscal.
4. **Pilot Use:** Powers **11 hydrogen buses** and port street lighting initially.
5. **Scalable Model:** Aims to run entire port operations on green hydrogen in future.

Significance:

- First port-based hydrogen plant in India, pushing [maritime decarbonisation](#).
- Reduces dependence on fossil fuels in logistics and transport.
- Boosts [Aatma-Nirbhar Bharat](#) through indigenous tech and execution.

Renewable Energy

REMOVABLE SOLAR PANEL SYSTEM

Context:

Indian Railways has commissioned the country's [first removable solar panel system](#) installed between railway tracks.



About Removable Solar Panel System between Tracks:

What it is?

- A **70-metre-long solar installation** with **28 removable panels** generating **15 KWp power**.
- Placed **between railway tracks**, ensuring efficient use of space.

- **Launched in:** **August 2025** at [Banaras Locomotive Works, Varanasi](#) by the Ministry of Railways.

Objective:

- Promote **green and sustainable rail transport**.
- Generate **clean energy** using underutilised track space.
- Reduce dependence on fossil fuels and cut **carbon footprint**.

Features:

- **Removable design** → panels can be lifted for maintenance or emergencies.
- **Compact installation** → no need for large [land acquisition](#).
- **15 KWp capacity** → supports auxiliary power needs at railway units.
- **Pilot project** → model for replication across India.

Significance:

- **Environmental Impact:** Reduces [greenhouse gas](#) emissions.
- **Economic Efficiency:** Lowers operational costs by using renewable energy.
- **Innovative Use of Space:** Utilises unused railway track areas for power generation.

Indian Laws/Schemes/Acts

STATE ENERGY EFFICIENCY INDEX (SEEI) 2024 RELEASED

Context:

The **Bureau of Energy Efficiency (BEE)** released the [State Energy Efficiency Index \(SEEI\) 2024](#) on 29 August 2025.

State Energy Efficiency Index



About [State Energy Efficiency Index \(SEEI\)](#)

What it is?

- **Definition:** A composite index to track and compare the energy efficiency progress of Indian states and Union Territories.
- **Developed by:** [Bureau of Energy Efficiency \(BEE\)](#) in collaboration with the Alliance for an Energy Efficient Economy (AEEE).
- **First Launched:** 2018, with SEEI 2024 being the sixth edition.
- **Purpose:**
 - Promote **data-driven monitoring** of energy efficiency.
 - Encourage **healthy competition** and **policy innovation** among states.
 - Align state actions with India's **net-zero by 2070 vision**.

[Key Findings of SEEI 2024](#)

6. **Coverage:** Assessed **36 States/UTs** for FY 2023–24 using **66 indicators**.
7. **Sectors Covered:** Buildings, Industry, Transport, Agriculture, DISCOMs, Municipal Services, Cross-sector initiatives.
8. **Performance Categories:**
 - Front Runners (>60%)
 - Achievers (50–60%)
 - Contenders (30–50%)
 - Aspirants (<30%)

9. Top Performers:

- Maharashtra (>15 MToE group)
- Andhra Pradesh (5–15 MToE group)
- Assam (1–5 MToE group)
- Tripura (<1 MToE group)

10. Sectoral Progress:

- 24 states notified **Energy Conservation Building Code (ECBC) 2017**.
- 31 states adopted **electric mobility policies**.
- 13 states promoted **solar agricultural pumps**, with Kerala leading at 74% adoption.
- All 36 States/UTs prepared **State Energy Efficiency Action Plans (SEEAPs)**.

About [Bureau of Energy Efficiency \(BEE\)](#)

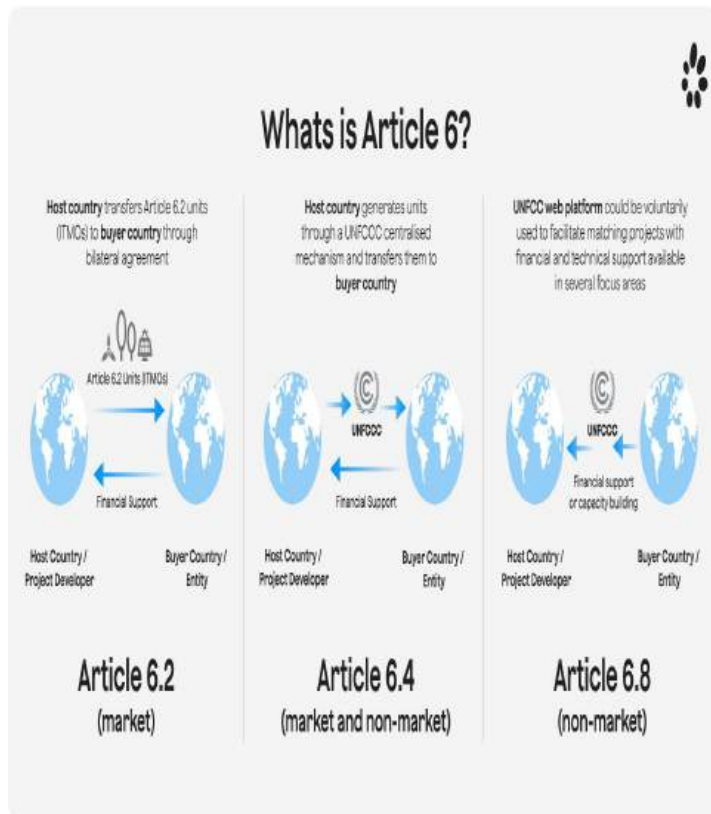
- **Established:** March 2002 under the **Energy Conservation Act, 2001**.
- **Nodal Ministry:** Ministry of Power, Government of India.
- **Objective:** Promote **energy efficiency** and **conservation** across sectors.
- **Key Roles:**
 - Implement **Star Rating programme** for appliances.
 - Develop **policies, codes, and building regulations** for energy conservation.
 - Guide states through the **State Energy Efficiency Index** and action plans.
 - Support India's commitments to **climate goals and energy transition**.

NATIONAL DESIGNATED AUTHORITY FOR CARBON MARKETS

[Context:](#)

The Centre has finalised a **21-member National Designated Authority (NDA)** to enable India's carbon market.

- This is a mandatory step under [Article 6 of the Paris Agreement \(2015\)](#).



About National Designated Authority for Carbon Markets

What it is

- A statutory requirement under Article 6, created by the **Environment Ministry**.
- Serves as the nodal body to regulate, approve, and monitor carbon market activities in India.

Composition

- **21-member committee**, chaired by the **Environment Secretary**.
- Includes representatives from **External Affairs, Steel, Renewable Energy, Power, and NITI Aayog**.
- Multi-sectoral structure ensures alignment with both domestic priorities and international obligations.

Functions of the NDA

1. **Project Approval**: Evaluate and authorise projects generating emission reduction units (ERUs).
2. **National Criteria**: Recommend activities eligible for trading, aligned with India's sustainability goals.
3. **Monitoring**: Update and revise eligible activities in line with **national priorities and climate commitments**.
4. **Carbon Credit Use**: Authorise the use of ERUs for meeting India's **NDC targets**.
5. **International Role**: Represent India in Article 6 frameworks, facilitating credit transfers with other nations.

Significance of NDA for India

- **Supports NDCs**: Helps India meet its pledge to reduce **emission intensity by 45% by 2030** (from 2005 levels).
- **Boosts Clean Energy**: Encourages investment in renewable and low-carbon projects.

Article 6 of the Paris Agreement

- **What it is**: Article 6 sets rules for **international carbon markets** allowing countries to trade emission reduction credits.
- **Established in**: Finalised at **COP29 in Baku (2024)** after years of negotiation.
- **Purpose**: Helps nations meet their **Nationally Determined Contributions (NDCs)** by reducing emissions cost-effectively through market-based mechanisms.
- It creates frameworks for **bilateral trading, credit authorisation, and sustainable development goals**.

SUNDARBANS TIGER RESERVE

Context:

The **Sundarbans Tiger Reserve (STR)** has become India's **second-largest tiger reserve** after the [National Board for Wildlife](#) approved West Bengal's proposal to add 1,044.68 sq km. The reserve now covers **3,629.57 sq km**, up from the earlier seventh rank.



About Sundarbans Tiger Reserve

What it is

- The [Sundarbans Tiger Reserve](#) is a **UNESCO World Heritage Site** and part of the world's largest **mangrove ecosystem**, located in West Bengal.
- It forms a crucial part of India's **Project Tiger network** and is globally renowned for its unique

mangrove–tiger ecosystem.

Establishment

- Declared a **Tiger Reserve** in **1973**, under the first phase of [Project Tiger](#).
- Became a [Biosphere Reserve](#) in **1989**, recognized by UNESCO in 2001.

Flora

- Dominated by **mangrove vegetation**—notably **Sundari** (*Heritiera fomes*), **Gewa** (*Excoecaria agallocha*), and **Golpata** (*Nypa fruticans*).
- Adapted to saline, tidal conditions, with pneumatophores (breathing roots).

Fauna

- Home to the [Royal Bengal Tiger](#) (noted for its ability to swim across estuaries).
- Also shelters **estuarine crocodiles**, **fishing cats**, **water monitor lizards**, **olive ridley turtles**, **spotted deer**, and **numerous bird species** like kingfishers and herons.
- Known for rich **aquatic biodiversity**—including Hilsa and other fish crucial to local livelihoods.

Unique Features

- Only mangrove habitat of the tiger** in the world.
- Shared transboundary ecosystem with **Bangladesh Sundarbans Reserve Forest**.
- Provides natural **barrier against cyclones** for coastal West Bengal.
- Rich **cultural-human interface** with local communities like fisherfolk and honey collectors.

Declared a [Ramsar Wetland](#) Site in **2019**, adding global conservation significance

NTCA LIMITS DEFINITION OF TIGER CORRIDORS

Context:

The [National Tiger Conservation Authority \(NTCA\)](#) has restricted the definition of tiger corridors to only **32 “least cost pathways” (2014 report)** and those in Tiger Conservation Plans, excluding newer scientific studies.



About National Tiger Conservation Authority (NTCA)

What it is

- A **statutory body** under the [Ministry of Environment, Forest and Climate Change \(MoEFCC\)](#).
- Apex authority for **tiger conservation and management of tiger reserves** in India.

Established in

- Created in **2005** under the [Wildlife \(Protection\) Act, 1972](#) through its 2006 amendment.

Chaired by

- Headed by the **Union Minister of Environment, Forest and Climate Change**.
- Vice-Chairperson: **Minister of State for Environment**.
- Member Secretary: a senior official from MoEFCC (generally Additional DG, Wildlife).

Structure of Organisation

- Chairperson** – Union Environment Minister.
- Members** – Experts in ecology, wildlife, tribal welfare, NGOs, and MPs.
- Member Secretary** – senior MoEFCC officer handling administration.
- Field interface** – works closely with State Forest Departments, Tiger Reserves, and the Wildlife Institute of India (WII).

Functions & Powers

- Approve **Tiger Conservation Plans (TCPs)** prepared by states.
- Lay down **guidelines for tourism, coexistence, and protection of buffer areas**.
- Ensure **ecological connectivity** by notifying and managing tiger corridors.
- Provide **financial assistance** for tiger conservation projects.
- Conduct **periodic appraisals** of tiger status and

habitat.

- Use powers under **Section 38(O) of Wildlife Protection Act** to regulate projects in tiger reserves and corridors.
- Oversee implementation of [Project Tiger](#) and maintain national tiger estimation through [All-India Tiger Estimation \(AITE\)](#).

Significance of the Current Issue

- **Conservation setback:** Excluding WII studies and AITE data narrows corridor protection.
- **Industrial benefit:** Mining and infrastructure projects may now bypass stricter scrutiny.
- **Legal implications:** The Bombay HC case may decide whether NTCA's volte-face aligns with statutory obligations.
- **Ecological risk:** Limiting corridors to minimal routes threatens long-term **tiger gene flow and survival**.
- **Policy contradiction:** NTCA itself admitted in 2014 that "alternative connectivities do exist and must be conserved".

INDIA'S DRAFT CLIMATE FINANCE TAXONOMY

Context:

In May 2025, the Ministry of Finance released India's draft [Climate Finance Taxonomy](#) for public consultation.



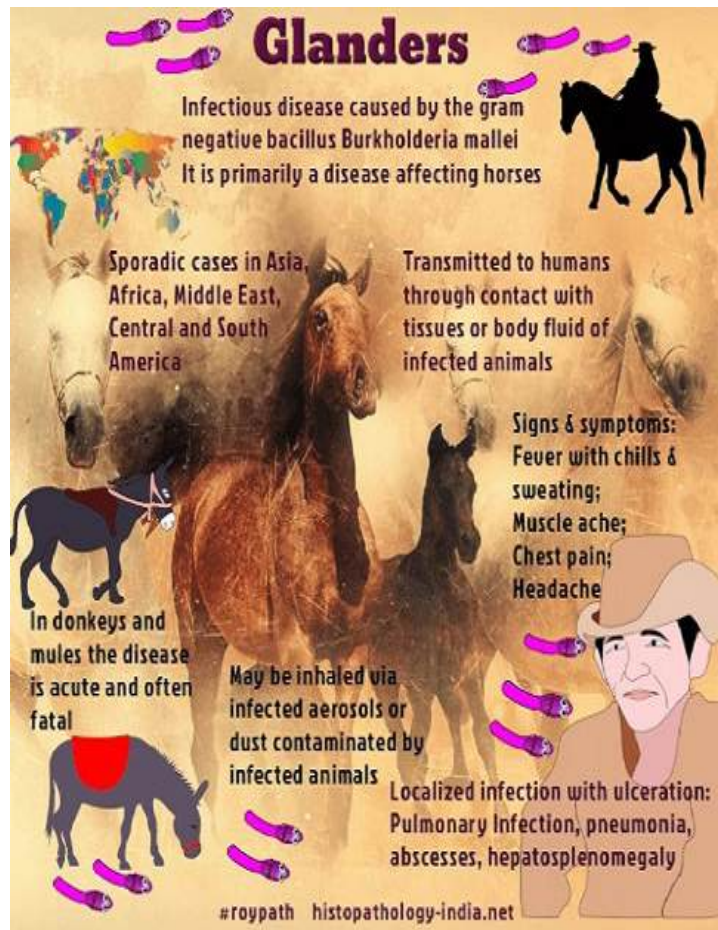
About [India's draft Climate Finance Taxonomy](#):

- **What it is?**
 - A **classification framework** that defines which sectors, technologies, and practices qualify as **climate-aligned investments**.
 - Called a "**living document**", designed to evolve with India's domestic priorities and global climate commitments.
- **Ministry:** Prepared by the **Ministry of Finance**, Department of Economic Affairs.
- **Aim:**
 - To **mobilise climate finance** from public and private sources.
 - To **differentiate genuine green projects** from greenwashing.
 - To ensure **clarity** and [confidence for investors](#).
- **Key Features:**
 - **Scope** – Covers activities contributing to mitigation, adaptation, and transition.
 - **Review Mechanism** – Proposes annual reviews (short-term course correction) and five-year reviews (aligned with NDCs and global stocktake).
 - **Legal Coherence** – Aligns with Indian laws like Energy Conservation Act, SEBI norms, Carbon Credit Trading Scheme, and global standards.
 - **Substantive Clarity** – Ensures definitions are precise, updated with data, and easy to understand for both experts and non-experts.
 - **Inclusivity** – Provides simplified compliance and staggered timelines for MSMEs, informal sector, and vulnerable communities.
 - **Institutional Accountability** – Suggests creation of a standing review unit/expert committee and public dashboards for [transparency](#).
- **Significance:**
 - Strengthens investor confidence in India's green economy.
 - Ensures predictable, transparent, and science-based climate finance flows.
 - Supports India's net-zero targets and complements instruments like green bonds and [carbon credit trading](#).

REVISED NATIONAL ACTION PLAN ON GLANDERS

Context:

The Department of Animal Husbandry & Dairying (DAHD) has rolled out a [Revised National Action Plan on Glanders](#) to strengthen surveillance, prevention, control, and eradication of the equine disease.



About Revised National Action Plan (2025) on Glanders

1. Zoning & Surveillance

- Infected zone reduced from **5 km** → **2 km**.
- Surveillance zone redefined as **2–10 km** (earlier 5–25 km).
- Restrictions apply only up to 10 km.

2. Enhanced Surveillance & Reporting

- Mandatory equine testing in endemic/high-risk areas.
- Use of advanced lab diagnostics and frequent field inspections.

3. Quarantine & Movement Control

- Rigorous **quarantine measures** in affected areas.
- Certification for movement in fairs, yatras, and interstate transport.

4. Rapid Response

- SOPs for **containment, isolation, and humane**

handling of positive cases.

- Coordination with **State Animal Husbandry Departments**.

5. Capacity Building

- Training for veterinarians, para-vets, and field staff on recognition, reporting, and biosafety.

6. Public Awareness

- Outreach for **horse owners, breeders, and communities** for cooperation in surveillance.

7. Research & Laboratory Support

- Collaboration with **ICAR–National Research Centre on Equines (NRCE), Hissar** for diagnostics and epidemiology.

About Glanders

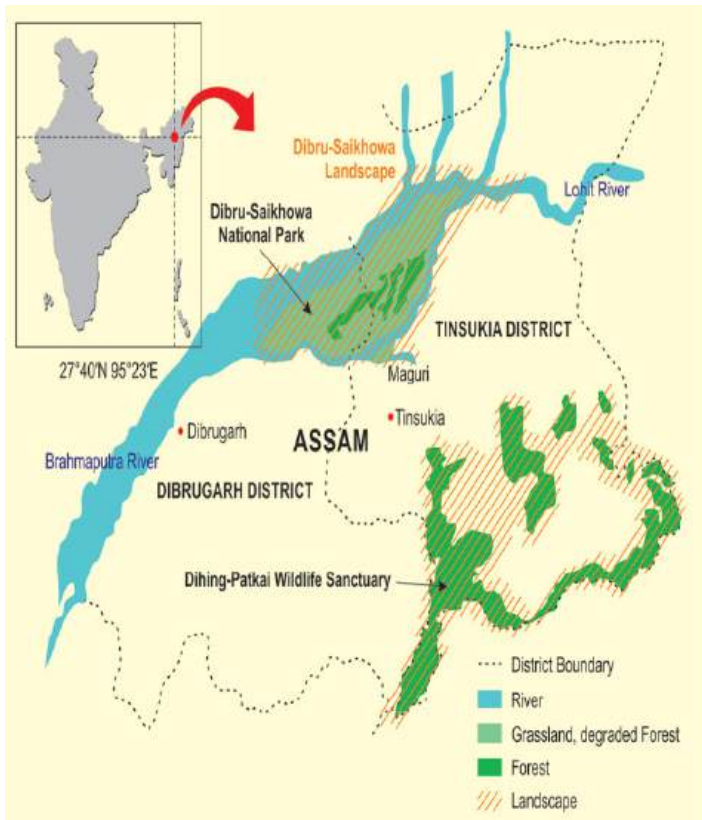
- **Cause:** Bacterial infection caused by [Burkholderia mallei](#).
- **Host animals:** Primarily affects **horses, mules, and donkeys**; can infect other animals and humans (zoonotic disease).
- **Transmission:** Spread through direct contact with nasal discharge, contaminated feed, water, or equipment.
- **Risks:** High fatality if untreated; a **notifiable disease** under the [Prevention and Control of Infectious and Contagious Diseases in Animals \(PCICDA\) Act, 2009](#).
- **Global context:** Eradicated in many countries, but still reported sporadically in parts of Asia, Africa, and the Middle East.

DIBRU–SAIKHOWA NATIONAL PARK

Context:

A new peer-reviewed study (*Earth Journal*, 2024) found that native and invasive plants are altering grasslands in Assam's [Dibru–Saikhowa National Park](#).

- The park, home to India's only feral horses and endangered grassland species, faces rapid habitat loss due to invasive growth, floods, and anthropogenic pressure.



About Dibru-Saikhowa National Park (DSNP)

- A **riverine protected area** in eastern Assam, located between the Brahmaputra and Dibru rivers.
- Declared a **National Park in 1999** and a **Biosphere Reserve in 1997**.
- Area: **425 sq. km**.

Key Features

- **Unique Landscape:** Island-like formation dominated by wetlands, grasslands, and semi-evergreen forests.
- **Feral Horses:** Only known habitat of around 200 wild horses, descendants of animals abandoned during World War II.
- **Flora:** Grassland ecosystems alongside semi-evergreen forests; now under threat from both native trees (*Bombax ceiba*, *Lagerstroemia speciosa*) and invasive species (*Chromolaena*, *Parthenium*, *Mikania*).
- **Fauna:**
 - Critically endangered Bengal Florican (*Houbaropsis bengalensis*).
 - Hog deer (*Axis porcinus*) and swamp grass babbler (*Prinia cinerascens*).
 - Rich avian diversity due to its floodplain location.
- **Hydrology:** Subject to recurring floods of the Brahmaputra, shaping its dynamic ecosystem.

Conservation Challenges

- **Habitat Loss:** Grassland area shrinking due to shrubland expansion and forest degradation.
- **Invasive Growth:** Both native trees and exotic species altering ecosystem balance.
- **Biodiversity Threat:** Endemic grassland birds and ungulates face declining populations.
- **Anthropogenic Pressure:** Villages inside the park increase human-wildlife conflict and resource stress.

WORLD ELEPHANT DAY 2025

Context:

World Elephant Day 2025 will be celebrated on August 12 in Coimbatore, Tamil Nadu, focusing on [human-elephant conflict mitigation](#), hosted by the MoEF&CC in collaboration with the Tamil Nadu Forest Department.



About World Elephant Day 2025:

- **What it is?**
 - An **annual global event** dedicated to the conservation and protection of elephants.
 - Aims to raise awareness about threats to elephants, including habitat loss, poaching, and human-elephant conflict.
- **History:**
 - Established in **2012** by Canadian filmmaker Patricia Sims and the [Elephant Reintroduction Foundation of Thailand](#).

- **Aim:**
 - Promote the preservation and protection of elephants and their habitats.
 - Encourage sustainable coexistence between humans and elephants.

About Elephant:

- **What it is:**
 - The largest terrestrial mammals, belonging to the family *Elephantidae*.
 - Known for their intelligence, social bonding, and ecological importance as a keystone species.
- **IUCN Status:**
 - **Asian Elephant** (*Elephas maximus*): Endangered.
 - **African Savanna Elephant** (*Loxodonta africana*): Endangered.
 - **African Forest Elephant** (*Loxodonta cyclotis*): Critically Endangered.
- **Features:**
 - **Physical Traits:** Massive body, long trunk, large ears (larger in African species, smaller in Asian species).
 - **Tusks:** Modified incisors used for foraging, digging, and defence; both male and female African elephants have tusks, but in Asian elephants, only some males do.
 - **Social Structure:** Led by a **matriarch** - females live in herds with calves, males live solitarily or in small groups.
 - **Reproduction:** Long gestation (22 months), one calf every 4–5 years and young are cared for by the entire herd.
 - **Ecological Role:** Shape ecosystems by dispersing seeds, creating water holes, and maintaining **grasslands**.

PM E-DRIVE SUBSIDY SCHEME

Context:

The Central Government has extended the ₹10,900 crore PM E-Drive subsidy scheme by two years until 2027-28, as nearly half of its allocated funds remain unused. [Subsidies](#) for electric two- and three-wheelers will end on March 31, 2026.

PM E-DRIVE Scheme: Eligible Categories



- e-2 Wheelers (e-2Ws)
- e-3 Wheelers (e-3Ws) including registered e-rickshaws & e-carts and L5
- e-Ambulances
- e-Trucks
- e-Buses
- Charging infra
- Upgradation of Testing Agencies



About PM E-Drive Subsidy Scheme:

- **What It Is?**
 - A national incentive programme to promote [electric vehicle](#) (EV) adoption, manufacturing, and charging infrastructure, with a special focus on electric buses and heavy EVs.
- **Launched In:** 1 October 2024, replacing the [Electric Mobility Promotion Scheme](#) (EMPS-2024).
- **Ministry:** Ministry of Heavy Industries
- **Period:** Till March 31, 2028 or until funds are exhausted.
- **Budget:**
 - ₹10,900 crore total outlay
 - ₹3,679 crore – Demand incentives for EVs.
 - ₹7,171 crore – E-buses, [charging infra](#), and testing facilities.
- **Objective:**
 - Accelerate EV penetration in public transport and logistics.
 - Reduce upfront cost of EVs for consumers.
 - Strengthen charging network to address range anxiety.
 - Support domestic manufacturing under [Atmanirbhar Bharat](#).
- **Key Features:**
 - **Demand Incentives:**
 - **2-wheelers:** ₹5,000/kWh in FY25 (max ₹10,000/vehicle), halved in FY26.
 - **E-rickshaws & passenger/cargo e-autos:** ₹5,000/kWh in FY25 (max

₹25,000–₹50,000), halved in FY26.

- ❑ **Electric trucks (3.5–55 tonnes):** ₹5,000/kWh or 10% of ex-factory price.
- ❑ **Electric ambulances:** ₹500 crore allocation, guidelines by 2026.
- **Focus on E-Buses:** Deployment in 9 cities with over 40 lakh population.
- **Charging Infrastructure:**
 - ❑ 22,100 fast chargers for four-wheelers.
 - ❑ 1,800 for buses.
 - ❑ 48,400 for two- and three-wheelers.
 - ❑ Backed by ₹2,000 crore funding.
- **Testing Upgrades** – Strengthening EV testing and certification facilities.
- **Integration with EV Policy** – Complements [GST cuts](#), income tax benefits under Sec 80EEB, and [PLI schemes](#) for batteries and EV manufacturing.
- **Coverage:**
 - Electric 2-wheelers, 3-wheelers, trucks, ambulances, and buses.
 - Charging infrastructure in **urban areas and highways**.

STRATEGIC INTERVENTIONS FOR GREEN HYDROGEN TRANSITION (SIGHT) SCHEME

Context:

India has achieved a record-low price of ₹55.75/kg for Green Ammonia in the first SECI auction under the Strategic Interventions for Green Hydrogen Transition (SIGHT) Scheme, marking a major step in the [National Green Hydrogen Mission](#).



About Strategic Interventions for Green Hydrogen Transition (SIGHT) Scheme:

- **What it is?**
 - A flagship financial component under the **National Green Hydrogen Mission**, aimed at catalyzing India's transition to green hydrogen.
- **Ministry:** Implemented by **Ministry of New and Renewable Energy (MNRE)** along with Ministry of Petroleum and Natural Gas (MoPNG).
- **Objectives:**
 - Scale up **Green Hydrogen production and use** in India.
 - Make green hydrogen **cost-competitive** with fossil alternatives.
 - Create domestic demand across key sectors.
- **Modes of Implementation:**
 - **Mode 1:** Incentives awarded to lowest incentive seeker.
 - **Mode 2A:** Aggregated demand for [Green Ammonia](#) (fixed incentive).
 - **Mode 2B:** Aggregated demand for Green Hydrogen (fixed incentive)
- **Key Features of SIGHT Scheme:**
 - **Outlay:** ₹17,490 crore allocated under SIGHT out of ₹19,744 crore total mission budget, focused on incentives and infrastructure support.
 - **Incentive Rates (Mode 2B):** ₹50/kg (Year 1), ₹40/kg (Year 2), ₹30/kg (Year 3) to promote early adoption and gradual market shift.
 - **Bidding Process:** SECI and [Oil PSUs](#) conduct competitive reverse auctions to select lowest bidders and aggregate demand.
 - **Standard Compliance:** Only hydrogen meeting notified "Green Hydrogen" standards is eligible for incentives.
 - **Monitoring:** A joint MNRE–MoPNG committee oversees implementation, ensures compliance, and resolves issues.

About Green Ammonia in First SECI Auction (Mode-2A):

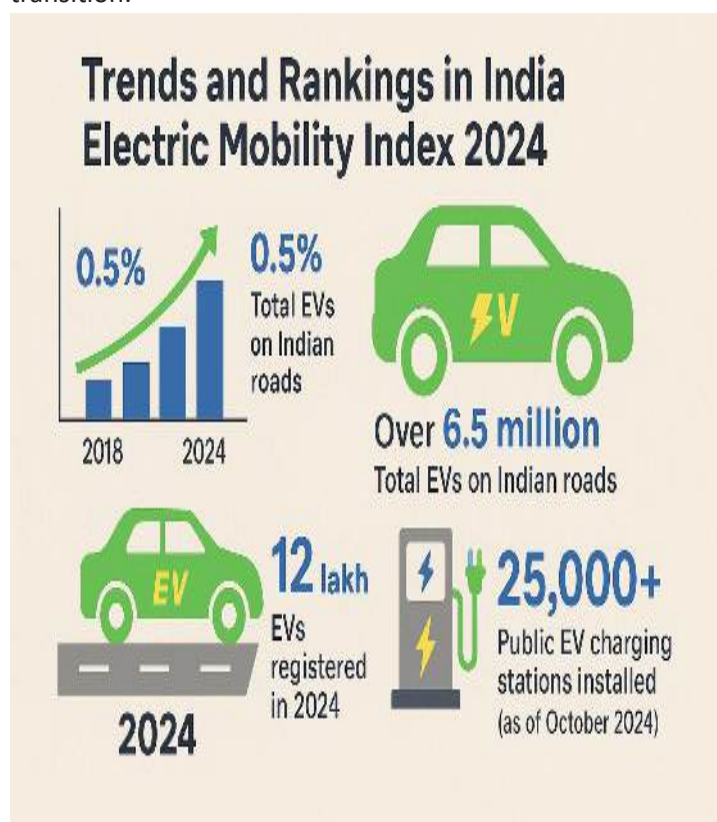
- **What is Green Ammonia?**
 - Green Ammonia is ammonia (NH₃) produced from green hydrogen (via electrolysis using [renewable power](#)), a key derivative used in fertilisers, shipping fuel, and chemical manufacturing.
- **Auction Highlights:**
 - **Winning price:** ₹55.75/kg (USD 641/MT).
 - **Offtaker:** Paradeep Phosphates Ltd., Odisha.
 - **Quantity:** 75,000 MTPA out of 7.24 lakh MTPA total tender.
 - **Term:** Fixed 10-year supply, improving affordability and supply chain reliability.
- **Significance:**
 - Boosts India's clean fertiliser transition and import substitution.

- o Encourages long-term private investment in [green hydrogen derivatives](#).
- o Positions India as a competitive green ammonia exporter.

INDIA ELECTRIC MOBILITY INDEX (IEMI)

Context:

[NITI Aayog](#) has launched the India Electric Mobility Index (IEMI) 2024, a first-of-its-kind national tool to track and rank the performance of States/UTs in the electric vehicle (EV) transition.



About India Electric Mobility Index (IEMI):

- **What it is?**
 - o The **India Electric Mobility Index (IEMI)** is a national benchmarking framework that scores all **States and Union Territories** out of 100 based on their progress in e-mobility adoption, infrastructure readiness, and innovation efforts.
- **Launched By:** NITI Aayog.
- **Objective:** To evaluate, compare, and guide States/UTs on [their EV transition](#) journey and help align them with national decarbonisation targets by **2070**.
- **Core Themes & Evaluation Criteria:**
- IEMI assesses states on **16 indicators** under **3 broad categories**:
 - o **Transport Electrification Progress:** Tracks adoption of electric vehicles across

passenger, freight, and public transport segments.

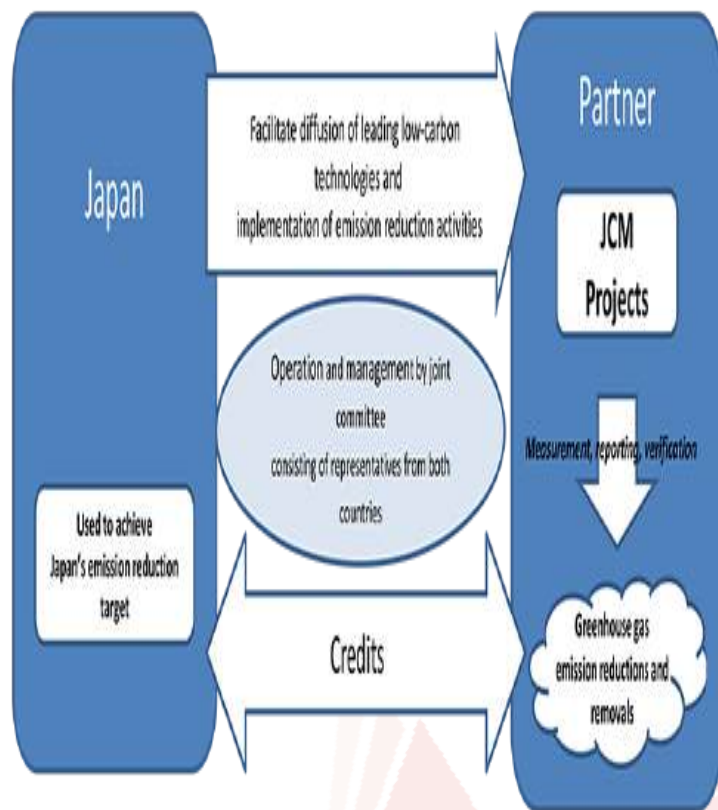
- o **Charging Infrastructure Readiness:** Assesses deployment of public and private charging stations and policy frameworks supporting EV infra.
- o **EV Research and Innovation Ecosystem:** Evaluates R&D ecosystem, manufacturing capacity, and technological advancements in EV components.
- **Key Features:**
 - o **Comparative Scoring:** All states are scored on a **0–100 scale**, offering transparent and data-backed performance tracking.
 - o **Dashboard Access:** An interactive **IEMI dashboard** allows real-time comparison, ranking, and insights across states.
 - o **Encourages Competition:** Promotes healthy federal competition and peer learning among states.
 - o **Policy Guidance Tool:** Helps identify gaps and best practices to guide future interventions and fund allocations.
 - o **Cross-Sectoral Utility:** Supports inter-ministerial coordination, investment planning, and capacity building.
- **Trends and Rankings in India Electric Mobility Index 2024:**
 - o **Top Performers:**
 - ▣ **Delhi, Maharashtra, and Chandigarh** emerged as the **top three states/UTs** overall in electric mobility readiness and innovation.
 - o **Key National Trends:**
 - ▣ **EV Share in Total Vehicle Sales:** Rose from **0.5% in 2018 to 7.7% in 2024**, marking exponential adoption.
 - ▣ **Total EVs on Road:** Surpassed **6.5 million** by June 2025, with 12 lakh EVs registered in 2024 alone.
 - ▣ **EV Charging Infrastructure:** Over **25,000 public charging stations** were installed by October 2024.
 - **Karnataka** has the **highest number of installations**.
 - ▣ **Policy Spread:** **29 states/UTs** have notified EV policies and **4 more** are in the draft stage, ensuring pan-India policy coverage.
- **Significance of IEMI:**
 - o **Promotes Green Mobility:** Aligns sub-national efforts with India's net-zero by 2070 roadmap.
 - o **Enhances Infrastructure Planning:** Highlights gaps in charging networks, guiding state-level infrastructure rollouts.
 - o **Supports Make in India & R&D:** Boosts [EV manufacturing ecosystems](#) and supports domestic innovation clusters.

International Policies/Efforts

JOINT CREDITING MECHANISM (JCM)

Context:

India and Japan have signed a **Memorandum of Cooperation (MoC)** to implement a **Joint Crediting Mechanism (JCM)**, advancing low-carbon technology projects.



Features of the Indo-Japan Pact

- First-of-its-kind MoC on low-carbon cooperation.
- Covers **equipment, machinery, systems, and infrastructure** localisation.
- Overseen by India's **National Designated Authority** for Carbon Markets.
- Aligns with India's NDC goals:
 - Cut emission intensity by **45% by 2030** (from 2005 levels).
 - Achieve **50% installed power capacity from non-fossil fuels** by 2030.
 - Create **2.5–3 billion tonnes CO₂ sink** through afforestation.

Importance

- **Diplomatic Value** – Enhances Indo-Japan climate and technology partnership.
- **Economic Benefit** – Attracts investment, creates jobs in green industries.
- **Environmental Impact** – Supports India's renewable push and climate commitments.
- **Global Leadership** – Positions India as a key player in carbon markets.

RIO EARTH SUMMIT (1992)

Context:

The year 2025 marks **33 years** since the 1992 **Rio Earth Summit**, a landmark event that shaped global climate governance.

About Joint Crediting Mechanism (JCM)

What it is?

- A **Japanese initiative** that invests in low-carbon technologies in developing nations.
- Emission reductions achieved are credited partly to Japan's account, helping it meet its **emission-reduction commitments**.

Objectives

1. **Promote Technology Transfer** – Facilitate flow of Japanese low-carbon technologies to India.
2. **Mobilise Investment** – Encourage financial flows for green projects and infrastructure.
3. **Capacity Building** – Strengthen domestic skills in handling advanced climate technologies.
4. **Carbon Credit Trading** – Enable India to trade credits with Japan under Article 6.2 of Paris Agreement.
5. **Sustainable Development** – Support India's shift towards clean energy and climate resilience.



About Rio Earth Summit (1992)

What it is?

- The **United Nations Conference on Environment**

and Development (UNCED) held at **Rio de Janeiro, Brazil** in June 1992.

- Popularly known as the **Rio Earth Summit**, it was the largest global gathering of leaders to discuss environment and sustainable development.

Established in

- **1992**, attended by 172 countries, including 108 heads of state and over 2,400 NGOs.

Key Features

1. Introduced **sustainable development** as the guiding framework for global action.
2. Adopted the principle of **Common but Differentiated Responsibilities (CBDR)**.
3. Recognised **sovereign rights over natural resources**.
4. Linked environment with **trade, development, and equity**.
5. Pushed for cooperation in biodiversity, desertification, and climate action.

Major Outcomes

1. **Rio Declaration on Environment and Development** – 27 principles guiding global environmental law.
2. **Agenda 21** – A comprehensive action plan for sustainable development.
3. **United Nations Framework Convention on Climate Change (UNFCCC)** – Framework for global climate governance.
4. **Convention on Biological Diversity (CBD)** – Treaty to conserve biodiversity.
5. **UN Convention to Combat Desertification (UNCCD)** – International cooperation on land degradation.

Importance

- Marked the **beginning of multilateral climate cooperation**.
- Brought **equity and justice** into the climate discourse through CBDR.
- Elevated **Global South's voice**, with India and G77 shaping negotiations.
- Created foundations for **subsequent treaties** like the Kyoto Protocol (1997) and Paris Agreement (2015).
- Despite challenges, it remains a **symbol of global environmental solidarity**.

Miscellaneous

VANATARA ZOO

Context:

Maharashtra CM held a meeting with the Vantara team over public outrage on the relocation of **elephant Madhuri** (Mahadevi) from Kolhapur to Jamnagar.



About **Vanatarara Zoo**:

- **Vantara** (meaning *Star of the Forest*) is a private, non-commercial **wildlife rescue and rehabilitation centre**.
- Developed by the **Reliance Foundation**, it is led by **Anant Ambani** as a philanthropic initiative under Reliance Industries.
- **Location**: Located inside the **Jamnagar Refinery Township**, Gujarat, spanning **3,500 acres** in Motikhavdi village, Jamnagar district.
- **Inaugurated**: March 2025
- **Mission**: To provide **care, conservation, and rehabilitation** for injured, abandoned, and rescued animals.
- **Key Features of Vantara**:
 - **Greens Zoological Rescue and Rehabilitation Centre (GZRRC)**: Covers around **650 acres** with dedicated enclosures for big cats, reptiles, birds, and herbivores.
 - **Specialised Elephant Centre**: Equipped with hydrotherapy pools, imaging systems, and recovery zones.
 - **In-House Infrastructure**: On-campus animal transport systems, quarantine zones, and CCTV-monitored enclosures for species-specific care.
 - **No Public Access**: Not a zoo or safari park. Designed for **rescue, not recreation**. Future limited educational tours may be considered.
 - **Species Diversity**: Houses **1.5 lakh+ animals** across **2,000 species**, including elephants, rhinos, crocodiles, **leopards**, and exotic birds.
- **Conservation Significance**:
 - **First-of-its-Kind in India**: Largest privately managed facility for animal welfare and biodiversity rescue.
 - **Corporate Animal Welfare Model**: Received **Prani Mitra Award** from the Animal Welfare Board of India

Chemistry

SOAPS AND DETERGENTS

Context:

[Soaps and detergents](#) are back in discussion due to growing focus on eco-friendly cleaning products and concerns over the environmental impact of synthetic surfactants.



About Soap and Detergents:

- **What They Are?**
 - **Soap:** Sodium (Na) or potassium (K) salts of fatty acids, derived from vegetable oils or animal fats. Formula: RCOONa / RCOOK .
 - **Detergents:** Synthetic cleaning agents made mainly from [petrochemicals](#), with added surfactants, bleaches, and fragrances.
- **Chemicals Used:**
 - **For Soap:**
 - ☐ Vegetable oils/fats (coconut, palm, olive, soybean)
 - ☐ Caustic soda (NaOH) or caustic potash (KOH)
 - ☐ Additives: perfumes (sandalwood oil, synthetic scents), colours, fillers (talc, sodium silicate), surfactants (sodium lauryl sulphate), antibacterial/antifungal agents (neem oil, triclosan).
 - **For Detergents:**
 - ☐ Surfactants (linear alkyl benzene sulphonate, sodium lauryl sulphate)
 - ☐ Builders (sodium carbonate, phosphates)
 - ☐ Enzymes, bleaches, dyes, perfumes
- **How They Are Manufactured?**
 - **Soap-making (modern process):**

- **Conversion:** Vegetable oils $\rightarrow$ fatty acids (using high-temp hydrolysis).
- **Reaction:** Fatty acids + [NaOH](#) $\rightarrow$ soap + water.
- **Drying:** Excess water removed, producing soap “noodles.”
- **Blending:** Noodles mixed with perfume, colours, fillers, surfactants, additives.
- **Shaping:** Extruded, cut, stamped into bars/cakes.
- **Packaging:** Wrapped and shipped.
- **Detergent-making:**
 - **Sulphonation:** Hydrocarbons treated with [sulphuric acid](#) $\rightarrow$ surfactant base.
 - **Neutralisation:** Surfactant neutralised with alkali (NaOH).
 - **Mixing:** Builders (phosphates, carbonates), enzymes, perfumes, dyes added.
 - **Spray-drying / agglomeration:** Powder detergents formed.
 - **Packaging:** Packed into sachets, boxes, or bottles.

Difference Between Soaps and Detergents:

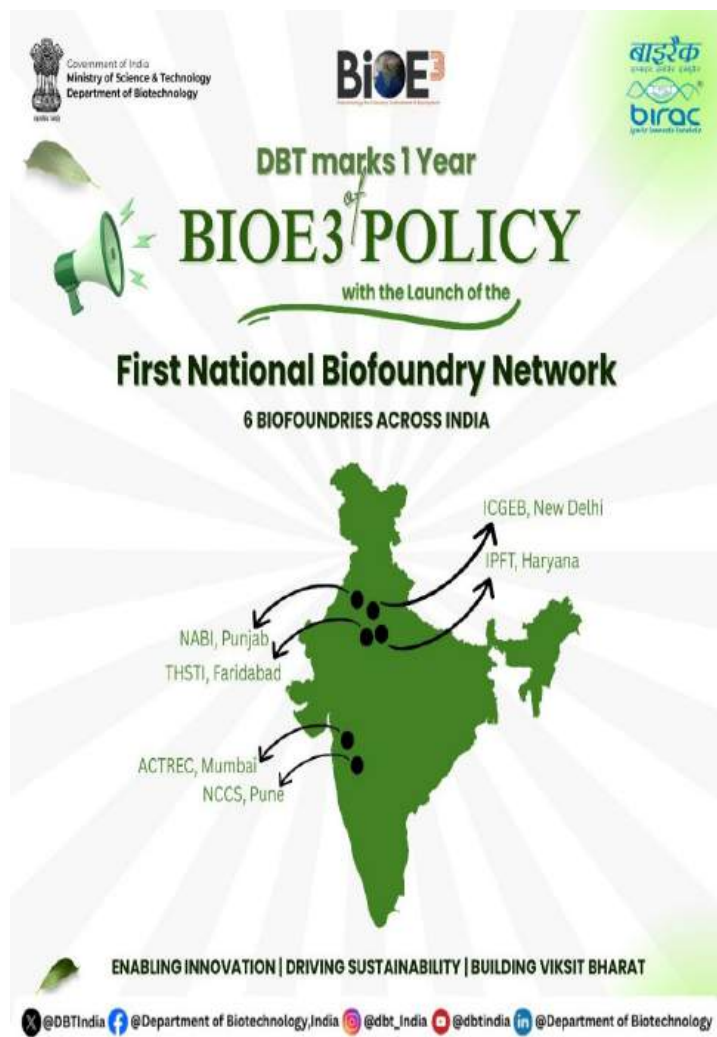
Feature	Soap	Detergent
Base material	Natural oils/fats (animal/plant)	Synthetic petrochemicals
Key chemical	Sodium or potassium salt of fatty acid	Surfactants (sulphonates, sulphates)
Cleaning efficiency	Works best in soft water	Works in both soft & hard water
Eco-impact	Biodegradable, environment-friendly	Some surfactants cause water pollution
Forms	Bars, liquid soaps	Powder, liquid, gels

Biotechnology

NATIONAL BIOFOUNDRY NETWORK

Context:

India launched its [first National Biofoundry Network](#) under the [BioE3 Policy](#), marking a step towards indigenous biomanufacturing and a projected **bioeconomy target of \$300 billion by 2030**.



Features of the National Biofoundry Network

- **Integrated Network:** Six institutions working as a single national platform.
- **End-to-End Facility:** Covers design, prototyping, testing, and scaling up of biotech solutions.
- **Cutting-Edge Focus:** Works on synthetic biology, gene editing, climate-smart agriculture, and green biotech.
- **Innovation Funding:** Linked to BioE3 Challenge to support youth-led biotech innovations.
- **Global Linkages:** Collaborates with international biofoundry networks for knowledge exchange.
- **Employment & Start-up Boost:** Creates biotech jobs and supports start-up incubation.
- **Sustainability Lens:** Focuses on climate resilience, waste reduction, and bio-based economy.
- **Open Access Ecosystem:** Provides infrastructure access to researchers, academia, and industry.

About BioE3 Challenge for Youth

- Theme: “Design Microbes, Molecules & More”.
- Open to: **School students (Classes 6–12), university students, researchers, startups, Indian nationals.**
- **Awards:**
 - ₹1 lakh cash award to top 10 monthly winners.
 - Funding up to ₹25 lakh for 100 selected innovators via BIRAC.
- **DESIGN framework:** Define needs → Evidence-first → Sustainability → Integration → Go-to-market → Net-positive impact.

About India's First National Biofoundry Network

What it is?

- A national-level collaborative platform of six premier institutions.
- Designed to scale up biotechnology research into deployable solutions.
- Functions as an ecosystem for advanced biomanufacturing, synthetic biology, and product prototyping.

Established in

- 2025, launched by the **Union Minister of Science & Technology, Dr. Jitendra Singh.**

Nodal Ministry

- **Department of Biotechnology (DBT), Ministry of Science & Technology.**

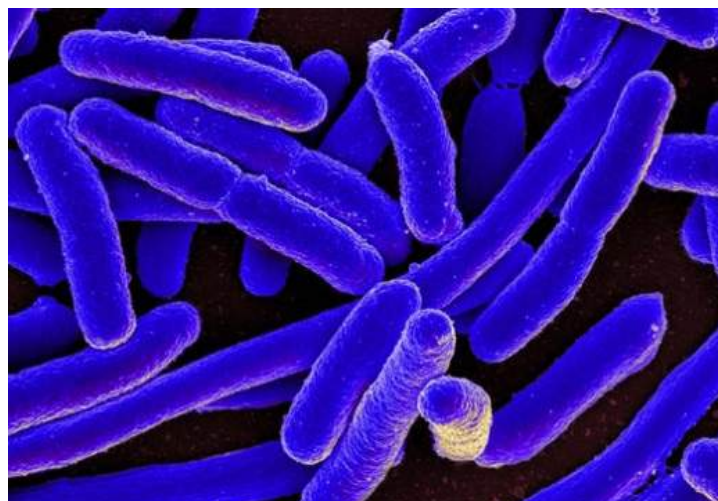
Aims and Objectives

1. Strengthen indigenous **biomanufacturing capacity.**
2. Support **BioE3 Policy** goals of economy, environment, and employment.
3. Enable **research-to-market translation** for biotech solutions.
4. Promote **youth innovation, start-ups, and entrepreneurship.**
5. Position India as a **global hub in sustainable biotechnology.**

E. COLI TURNED INTO MERCURY SENSOR

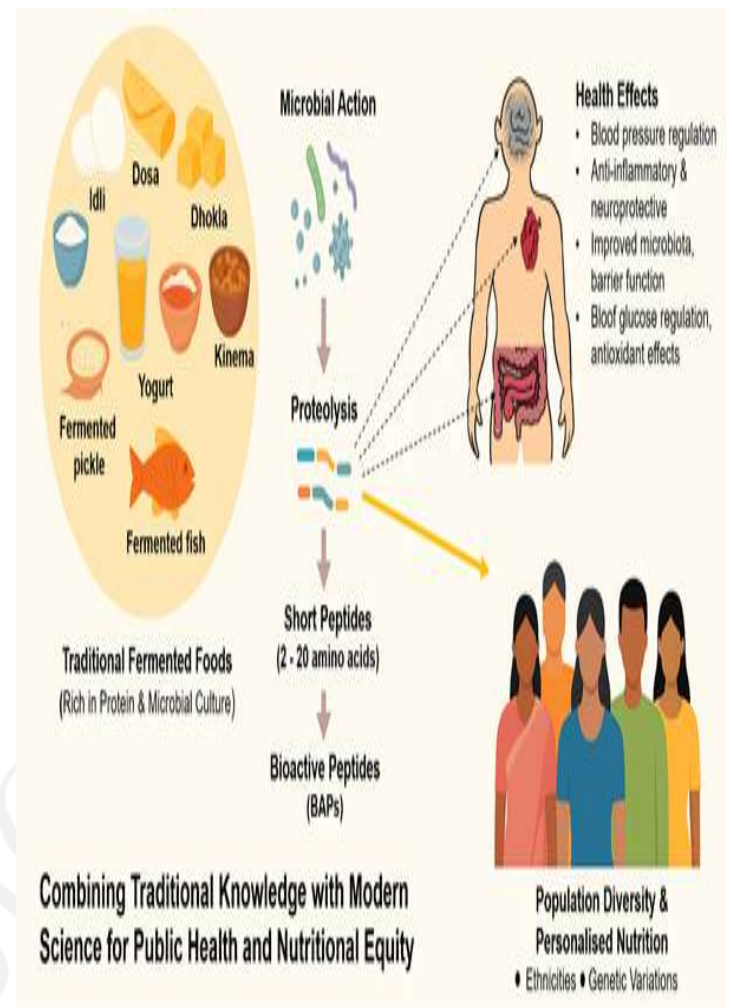
Context:

Researchers have engineered E. coli bacteria into a mercury sensor, capable of detecting toxic metals in water.



About E. coli Turned into Mercury Sensor:

- **What it is?**
 - A **living biosensor** built using genetically modified [Escherichia coli bacteria](#).
 - Converts the presence of mercury into an **electrical signal** readable by simple electronic devices.
- **Developed by:** Imperial College London and Zhejiang University researchers.
- **Aim:**
 - To design **cheap, self-powered, and programmable biosensors**.
 - Enable **real-time detection** of harmful compounds like heavy metals in water.
- **How It Works?**
 - Scientists engineer [E. coli bacteria](#) to act like tiny “detectors.”
 - When the bacteria sense mercury in water, a special protein (MerR) switches on.
 - This switch tells the bacteria to make certain molecules (phenazines).
 - These molecules touch an electrode and create an electric current.
 - The stronger the mercury presence → the stronger the current.
 - The signal can be read directly by simple electronic devices.
- **Applications:**
 - **Water Safety:** Detects **toxic heavy metals** like mercury in drinking water.
 - **Environmental Monitoring:** Tracks pollution in rivers, lakes, and industrial discharge.
 - **Public Health:** Early warning system for communities exposed to contaminated water.
 - **Low-cost Electronics:** Compatible with **portable devices** for field use.
 - **Synthetic Biology Research:** Opens pathways for **programmable bioelectronics** and smart diagnostics.



About Bioactive Peptides:

- **What it is?**
 - Short protein fragments (2–20 amino acids) formed during fermentation of foods such as [yogurt](#), idli, miso, kimchi, natto, and fermented fish.
 - Known for antimicrobial, antihypertensive, [antioxidant](#), and immune-modulatory properties.
- **Aim:**
 - To assess the health benefits of BAPs in regulating blood pressure, blood sugar, immunity, and inflammation.
 - To explore [precision nutrition](#) solutions tailored to India's genetically and culturally diverse population.
- **Key Features:**
 - **Mechanism:** Interact with biomolecules via electrostatic forces, hydrogen bonds, and hydrophobic interactions.
 - **Health Impact:** Influence cardiac function, [metabolic health](#), and immune response.
 - **Personalised Response:** Effectiveness varies due to genetic polymorphisms (e.g., ACE, IL-6), gut microbiota differences, and dietary habits.
 - **Research Tools:** Encourages use of *omics*-based approaches for deeper analysis.

BIOACTIVE PEPTIDES

Context:

A study by the Institute of Advanced Study in Science and Technology (IASST), Guwahati, has shown that bioactive peptides in [fermented foods](#) can have population-specific health benefits, paving the way for personalised nutrition in India.

- **Significance:**
 - **Public Health Potential:** Can be integrated into dietary guidelines to address hypertension, diabetes, and immunity-related disorders.
 - **Cultural Relevance:** Promotes India's traditional fermented foods in global nutrition science.

INDIA'S FIRST STATE-OF-THE-ART ANIMAL STEM CELL BIOBANK AND LABORATORY

Context:

Union Minister inaugurated India's first State-of-the-Art Animal Stem Cell Biobank and Laboratory at the [National Institute of Animal Biotechnology](#) (NIAB), Hyderabad.

FIVE VETERINARY TECHNOLOGIES LAUNCHED



Rapid Brucellosis Detection Kit
Field-deployable, DIVA-capable



Mastitis Detection Technology
On-site, cost-effective diagnosis for dairy cattle



Antimicrobial Sensitivity Testing Device
Portable tool giving results in 2 hours



Toxoplasmosis Detection Kit
Accurate testing for *Toxoplasma gondii*



Japanese Encephalitis Detection Kit
Rapid strip for animal and human surveillance

About India's first State-of-the-Art Animal Stem Cell Biobank and Laboratory:

- **What It Is?**
 - A cutting-edge facility dedicated to preserving, researching, and utilising animal stem cells for regenerative medicine, disease modelling, and reproductive [biotechnology](#) in livestock.

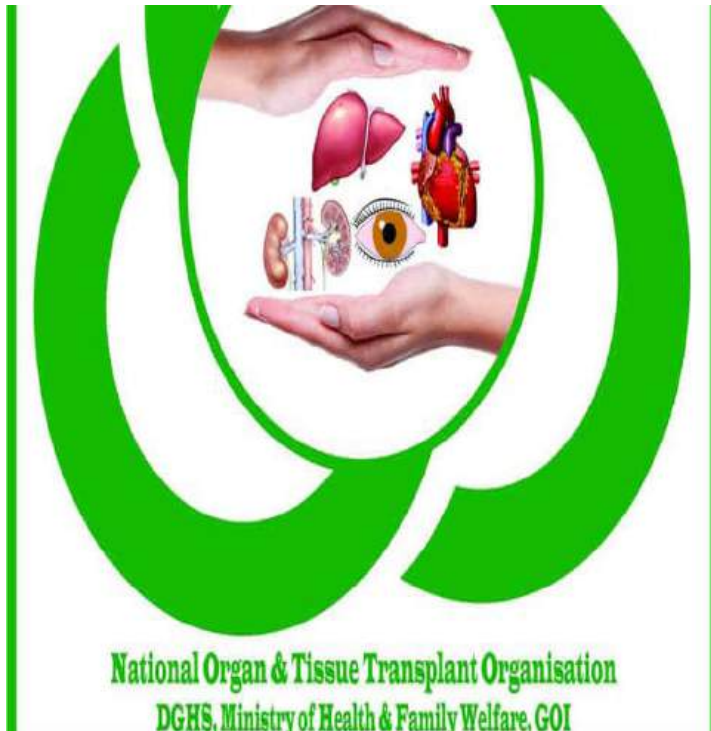
- **Location:** Hyderabad, Telangana
 - Situated at the **National Institute of Animal Biotechnology (NIAB)**
- **Organisation Involved:**
 - **National Institute of Animal Biotechnology (NIAB)** – under the Department of Biotechnology (DBT)
 - Supported by [National Biopharma Mission \(NBM\)](#) of DBT-BIRAC
- **Aim:**
 - Enhance **veterinary health innovation** through regenerative medicine and cellular therapies.
 - Support [One Health approach](#) by linking human, animal, and environmental health.
 - Strengthen India's capacity in **biotechnology-based agricultural productivity**.
- **Key Features:**
 - **Advanced Infrastructure** – Stem cell culture unit, [3D bioprinter](#), bacterial culture lab, cryostorage, autoclave rooms.
 - **Support Systems** – Modern air handling units and uninterrupted power backup.
 - **Research Areas** –
 - Regenerative medicine for livestock
 - Disease modelling for brucellosis, mastitis, and other diseases
 - [Tissue engineering](#) & reproductive biotech
 - **Expansion Plans** – Will store and manage stem cells & derivatives for long-term research and clinical use.
- **Significance:**
 - Boosts livestock productivity and farmer incomes.
 - Supports [Evergreen Revolution in](#) animal husbandry.
 - Strengthens India's position as an early mover in biotechnology-led agriculture.

Health

NATIONAL ORGAN AND TISSUE TRANSPLANT ORGANISATION (NOTTO)

Context:

The [National Organ and Tissue Transplant Organisation \(NOTTO\)](#) has issued a direction giving **priority in organ allocation to women patients and female relatives of deceased donors**, addressing long-standing gender disparity.



About [National Organ and Tissue Transplant Organisation \(NOTTO\)](#)

What it is?

- **Apex government body** under the **Ministry of Health and Family Welfare**.
- Functions as the **national coordination centre** for organ and tissue donation/transplantation.

Headquarters: Located on the Institute of Pathology (ICMR) Building, Safdarjung Hospital, New Delhi.

Aim:

- To **coordinate, regulate, and promote organ and tissue donation** and transplantation in India.
- Facilitate the **safe and efficient allocation and utilization of organs** and tissues.

Established in

- Formed in **2014**, under the mandate of the [Transplantation of Human Organs and Tissues Act, 1994 \(amended 2011\)](#).

Chaired by

- Operates under the **Director General of Health Services (DGHS)**, MoHFW.

Structure of Organisation

1. **National Network Division** – maintains a central registry of donors and recipients.
2. **National Biomaterial Centre** – tissue banking for corneas, bones, skin, etc.
3. **Coordination with ROTTOS & SOTTOs** – Regional and State-level bodies.

Functions & Powers

- Maintain **national database** of organ and tissue

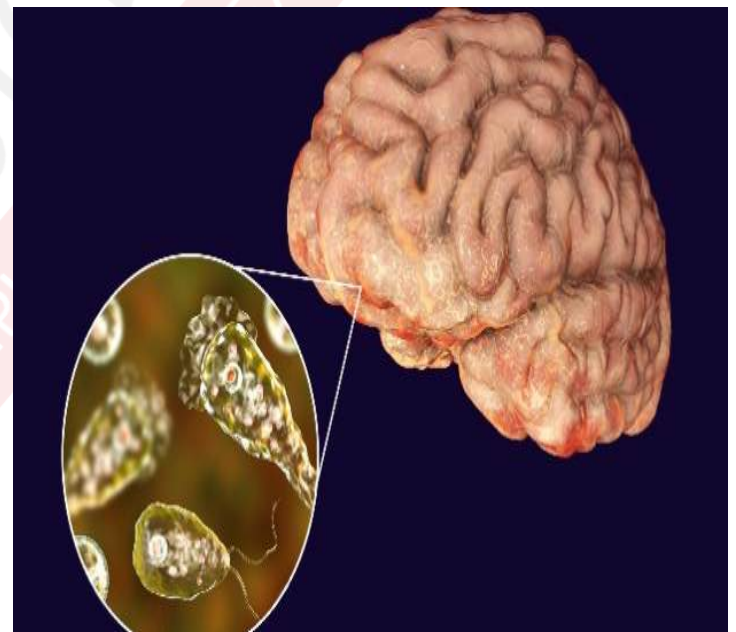
donations.

- Ensure **transparent allocation** through waiting lists.
- Issue **guidelines & protocols** for ethical transplantation.
- Train **transplant coordinators & medical staff**.
- Run **awareness campaigns** to increase voluntary donation.
- Support hospitals in setting up **retrieval centres** and trauma-linked donor facilities.
- Monitor compliance with **THOA, 1994** to prevent **organ trafficking or commercial trade**.

BRAIN-EATING AMOEBA

Context:

Three new cases of the rare and deadly [brain-eating amoeba \(Primary Amoebic Meningoencephalitis – PAM\)](#) have been reported in Kerala, including the death of a nine-year-old child, raising public health concerns.



About Brain-Eating Amoeba:

What it is?

- A free-living, single-celled organism ([Naegleria fowleri](#)) that causes Primary Amoebic Meningoencephalitis (PAM), a rare but fatal brain infection.

Vector & Transmission:

- It enters the body through the nose while swimming or bathing in contaminated freshwater.
- It then migrates to the brain, destroying brain tissue.
- Not spread by drinking water and not person-to-person contagious.

- **Where it is Found:**
 - **Warm freshwater bodies:** lakes, rivers, poorly maintained swimming pools, splash pads.
 - Survives in warm environments up to **46°C (115°F)**.
 - Also detected in [soil and dust](#) in some cases.
- **Symptoms:**
 - **Early stage:** Headache, fever, nausea, vomiting.
 - **Later stage:** Stiff neck, confusion, seizures, hallucinations, coma.
 - Rapid progression often leads to death within **5–18 days** of symptom onset.
- **Treatment:**
 - No single effective cure identified.
 - **Current treatment:** Combination therapy with [antifungals](#) and antibiotics (e.g., Amphotericin B, Miltefosine, Fluconazole, Azithromycin).
 - Survival rate is extremely low worldwide (around **3%**), though [Kerala](#) has reported better outcomes due to early detection.

- **Objective:**
 - Provide a **broad-spectrum antidote** to reduce fatalities from snakebites.
 - Ensure one treatment can be used across most of India.
- **Features:**
 - Neutralizes venom of Indian cobra, common krait, Russell's viper, and saw-scaled viper.
 - Widely available at government and private hospitals.
 - Affordable compared to region-specific alternatives.
 - Forms the backbone of India's snakebite treatment strategy.
- **Issues:**
 - Limited efficacy in Northeast India where other venomous species dominate.
 - Causes delayed recovery, long-term complications, or death despite administration.
 - Over-dependence on a one-size-fits-all approach, ignoring regional diversity of snakes.

INDIAN POLYVALENT ANTIVENOM

Context:

Experts at the Assam Snake Symposium 2025 in Guwahati called for region-specific [antivenoms](#), highlighting the ineffectiveness of the current polyvalent serum in Northeast India.



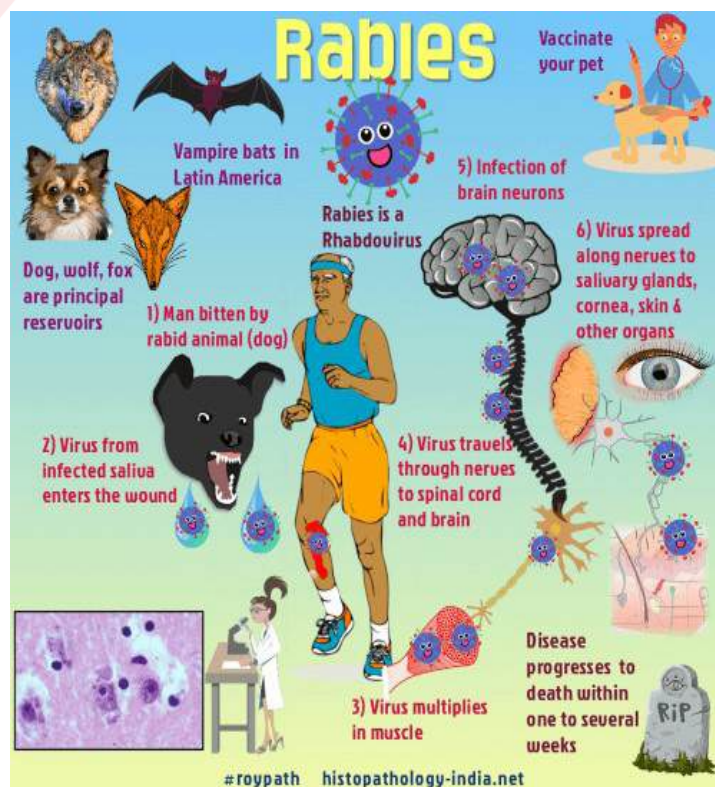
About **Polyvalent Antivenom**:

- **What it is?**
 - A life-saving **serum therapy** used to neutralize venom from snakebites.
 - Covers multiple snake species with a single antidote.
- **Developed by:**
 - **Indian manufacturers** in collaboration with research institutes like **Haffkine Institute, Madras Crocodile Bank Trust, and others**.
 - Traditionally derived from the venom of the **"Big Four" snakes**.

RABIES

Context:

The Supreme Court has ordered the immediate capture and permanent confinement of [stray dogs](#) in Delhi amid rising [rabies-related deaths](#), bringing renewed focus to this preventable yet fatal disease that kills thousands in India each year.



About Rabies:

- **What it is?**
 - A **fatal zoonotic viral disease** caused by the Rabies virus (RABV).
 - Classified by WHO as a **Neglected Tropical Disease (NTD)**.
- **Vector & Transmission:**
 - **Primary vector:** Dogs (responsible for ~99% of human cases).
 - **Other carriers:** Cats, bats, raccoons, foxes, skunks, livestock.
 - Spread through **bites, scratches, or saliva** contact with broken skin/[mucous membranes](#).
- **Infection & Spread:**
 - **Incubation stage** – [Virus](#) remains dormant for days to months (commonly 1–3 months).
 - **Nervous system invasion** – Virus travels via peripheral nerves to the brain.
 - **Fatal outcome** – Once symptoms appear, death is almost certain without intervention.
- **Symptoms:**
 - **Early:** Fever, headache, malaise, pain/tingling at wound site.
 - **Advanced:**
 - **Furious rabies:** Hyperactivity, hallucinations, hydrophobia, aerophobia, excessive salivation.
 - **Paralytic rabies:** Gradual muscle paralysis, coma, eventual death.
- **Distinctive Features:**
 - 100% preventable with timely vaccination.
 - Once symptoms appear, mortality is nearly 100%.
 - Children (5–14 years) are most vulnerable in endemic regions.
- **Treatment:** Rabies prevention involves PEP (4-dose vaccine + RIG for unvaccinated) after exposure and PrEP for high-risk groups.
 - WHO-approved vaccines include [RABIVAX-S](#), VaxiRab N, and VERORAB, with immediate wound washing being essential before vaccination.



NASHA MUKT BHARAT ABHIYAAN (NMBA)

Context:

The Nasha Mukta Bharat Abhiyaan ([NMBA](#)) has completed five years since its launch in 2020, with a special anniversary event scheduled in New Delhi.

About Nasha Mukta Bharat Abhiyaan (NMBA):

- **What it is?**
 - A nationwide [anti-drug initiative](#) aimed at reducing substance abuse through prevention, awareness, treatment, and rehabilitation, focusing on India's most vulnerable districts.
- **Launched in:** 15 August 2020
- **Organisation:** Ministry of Social Justice & Empowerment (MoSJE).
- **Objectives:**
 - **Curb Drug Demand:** Reduce substance use through prevention, education, and outreach.
 - **Strengthen Community Response:** Involve youth, women, and local institutions in anti-drug campaigns.
 - **Rehabilitation & Treatment:** Ensure timely support for victims of addiction.
- **Key Features:**
 - **Targeted Districts:** Implementation in **272 high-risk districts** identified via national surveys and NCB data.
 - **Three-Pronged Approach:** Supply reduction ([NCB](#)), demand reduction (MoSJE outreach), and treatment (Health Department).
 - **Community-Based Implementation:** District and state-level committees headed by senior officials.
 - **Technology Integration:** NMBA app, website, and active social media campaigns.

for outreach.

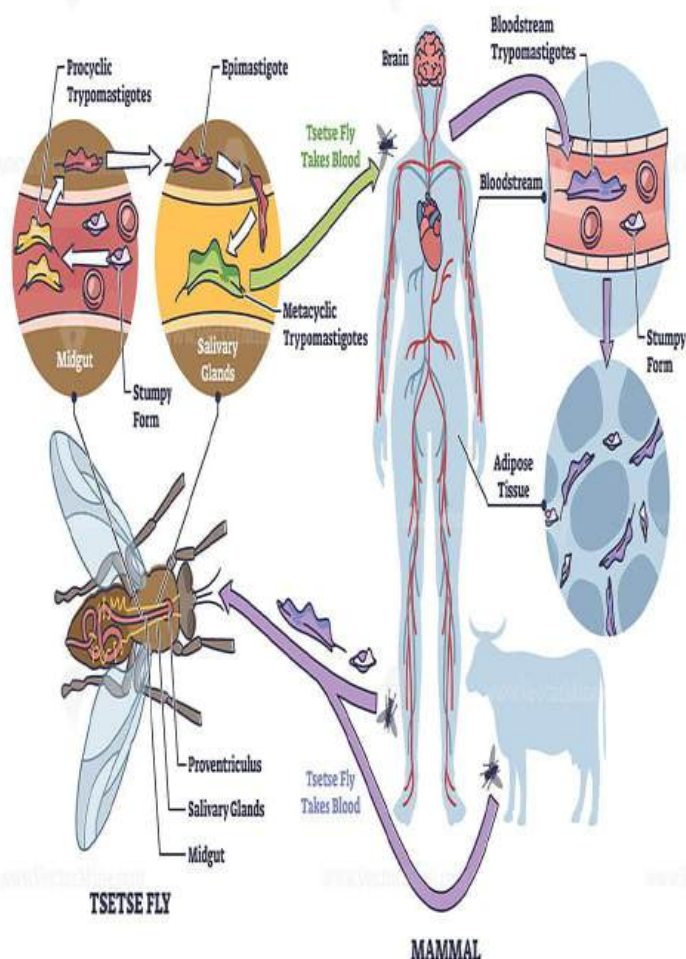
- o **Mass Mobilisation:** Partnerships with organisations like Art of Living, Brahma Kumaris, and [ISKCON](#) for public awareness.
- **Significance:**
 - o **Public Health Impact:** Sensitised over 18 crore citizens, including youth and women.
 - o **Capacity Building:** Trained 20,000+ Master Volunteers nationwide.
 - o **Social Stability:** Reduced drug-related crime and strengthened [social fabric](#).

AFRICAN TRYPANOSOMIASIS (SLEEPING SICKNESS)

Context:

Kenya has been certified by the [World Health Organization](#) (WHO) as free from human African trypanosomiasis (sleeping sickness), becoming the 10th African nation to eliminate the disease as a public health problem.

AFRICAN SLEEPING SICKNESS



About African trypanosomiasis (sleeping sickness):

What it is?

- A **vector-borne parasitic disease** caused by *Trypanosoma brucei* protozoa.
- Occurs only in [sub-Saharan Africa](#), mainly in rural communities dependent on farming, fishing, and livestock.
- Fatal if untreated.

Vector:

- Transmitted by the **bite of infected tsetse flies** (*Glossina* species).
- Flies acquire the [parasite](#) from infected humans or animals and pass it on through their bites.

How it Works?

- Parasites enter the bloodstream and lymphatic system (first stage).
- Without treatment, they cross into the [central nervous system](#), damaging the brain (second stage).
- The name “sleeping sickness” comes from **disrupted sleep patterns** caused in later stages.

Symptoms:

- **First Stage (Haemo-lymphatic):**
 - o Fever, headaches, joint pains, enlarged lymph nodes, itching.
- **Second Stage (Neurological):**
 - o Confusion, behaviour changes, poor coordination.
 - o Disturbed sleep cycle (daytime sleepiness, nighttime insomnia).
 - o Without treatment, it is usually fatal.

Spread:

- Found in 24 countries (gambiense form) in West & [Central Africa](#), and 13 countries (rhodesiense form) in East & Southern Africa.
- [Rhodesiense](#) form is acute and progresses rapidly (weeks–months).
- Gambiense form is chronic, often lasting years without major symptoms.

Treatment:

Drugs exist such as pentamidine, suramin, fexinidazole, nifurtimox–eflornithine, eflornithine, and melarsoprol — provided free by WHO.

SHRESTH – STATE HEALTH REGULATORY EXCELLENCE INDEX

Context:

The Union Health Ministry launched SHRESTH – State Health Regulatory Excellence Index, the first national framework to benchmark and strengthen state drug regulatory systems through transparent, [data-driven evaluation](#).



About SHRESTH – State Health Regulatory Excellence Index:

- **What it is?**
 - A **virtual gap assessment tool** to evaluate, rank, and improve state drug regulatory authorities, ensuring medicine safety, quality, and efficacy.
- **Ministry:** Union Ministry of Health & Family Welfare (Implemented by [CDSCO](#) – Central Drugs Standard Control Organization)
- **Objective:**
 - Benchmark state/UT drug regulatory systems.
 - Drive targeted improvements in [human resources](#), [infrastructure](#), and [digitisation](#).
 - Strengthen public trust in medicines manufactured and distributed in India.
- **Criteria for Evaluation:**
 - **Manufacturing States:** 27 indicators under **5 themes** – Human Resources, Infrastructure, Licensing, Surveillance, Responsiveness.
 - **Distribution States/UTs:** 23 indicators under the same thematic areas.
 - Monthly data submission to CDSCO; monthly scoring and feedback loop.
- **Key Features:**
 - **Two-tier categorisation** – Manufacturing States and Distribution States/UTs.
 - **Data-driven ranking** with monthly updates for continuous improvement.
 - **WHO-aligned standards** to move medicines to global benchmark status (ML3-equivalent).
 - **Cross-learning platform** – sharing success stories from top performers.
 - **Regulatory harmonisation** – uniform implementation of the [Drugs and Cosmetics Act](#) across states.

ENVELOPE DIMER EPIOTOPE (EDE)

Context:

A new study published in Science Translational Medicine has identified Envelope Dimer Epitope (EDE)-like [antibodies](#) as a major driver of cross-serotype immunity against dengue.



About Envelope Dimer Epitope (EDE):

What it is?

- **Definition:** A **quaternary epitope** found on the envelope (E) protein of the dengue virus surface, formed when two E proteins pair together.
- **Function:** A key immune target capable of generating broad, cross-serotype protection.
- **Uniqueness:** Present only in mature [virus particles](#), making it a precise target for neutralising antibodies.

Existing Vaccines:

- **Dengvaxia:** Licensed in some countries; recommended only for people with confirmed prior dengue exposure due [to Antibody-Dependent Enhancement \(ADE\)](#) risk.
- **QDenga:** Effective in pre-exposed individuals; currently approved in some regions.
- **Limitation:** Both require prior infection for optimal protection and cannot fully eliminate ADE risk.

How it Works?

- **Recognition:** The **Envelope Dimer Epitope (EDE)** is a unique structure on the outer covering of the dengue virus, formed when two envelope (E) proteins pair up.
- **Antibody Binding:** Special **EDE-like antibodies** can identify and attach to this structure on the virus.
- **Blocking Infection:** Once these antibodies bind, they physically prevent the virus from attaching to and entering human cells — a necessary step for the virus to multiply.
- **Cross-Serotype Protection:** Because the EDE structure is similar across all four dengue [virus types](#) (serotypes), these antibodies can neutralise multiple serotypes instead of just one.

Key Characteristics:

- **Broadly Neutralising** – Capable of inactivating all four dengue virus serotypes.
- **High Protective Value** – Strongly associated with reduced severity of disease and fewer hospitalisations.
- **Induced by Multiple Exposures** – Common in individuals who have had dengue more than once or in vaccinated individuals with prior infection.
- **Low in Primary Infection** – Rarely produced in significant amounts during the first infection.
- **Biomarker Role** – Presence of high EDE-like antibody levels can indicate strong and broad dengue immunity, useful in evaluating [vaccine efficacy](#).

Implications:

- **Vaccine Development:** Designing vaccines to target EDE could provide cross-serotype immunity without ADE.
- **Public Health Strategy:** Potential for broader dengue immunisation policies in endemic regions like India.
- **Therapeutic Innovation:** [Monoclonal antibody](#) therapies could be developed to deliver rapid immunity during outbreaks.

S.H.I.N.E. INITIATIVE

Context:

The Indian Council of Medical Research ([ICMR](#)) and the Department of Health Research (DHR) organised a nationwide open day under the SHINE initiative, engaging over 13,000 students in health and science outreach activities.



About SHINE Initiative:

- **What it is?**
 - **SHINE** stands for Science, Health and Innovation for Nextgen Explorers.
 - It is a **nationwide [science outreach programme](#)** designed to inspire school students towards careers in health and biomedical research.
- **Launched in:** 2024
- **Organised by:** Indian Council of Medical Research (ICMR) in collaboration with Department of Health Research (DHR).
- **Aim:**
 - To spark curiosity, [foster innovation](#), and inspire future health researchers.
 - To familiarise students with the real-world applications of medical science in improving public health.
- **Key Features:**
 - **Nationwide Participation** – Reached 13,150 students from grades 9–12, across 300+ schools in 39 districts and 16 states/UTs.
 - **Immersive Learning** – Included lab tours, research exhibitions, poster walks, and live demonstrations of ongoing projects.
 - **Career Guidance** – Direct interaction with ICMR scientists, sharing career journeys and research experiences.
 - **Mascot for Engagement** – Introduction of Dr. Curio as a student-friendly guide for science activities.
 - **Showcasing Flagship Initiatives** – Screened short films on Covaxin, [iDRONE](#) healthcare delivery, [TB elimination mission](#), and pandemic preparedness drills.
- **Significance:**
 - **Youth Engagement in Science** – Bridges the gap between school education and real-world research.
 - **Strengthening Public Health Awareness** – Educates students about pressing health challenges and research-based solutions.

WHO OFFICIALLY CLASSIFIED HEPATITIS D VIRUS AS CARCINOGENIC

Context:

The World Health Organization ([WHO](#)) and the International Agency for Research on Cancer (IARC) have officially classified Hepatitis D virus (HDV) as carcinogenic, placing it in Group 1 — known causes of liver cancer, alongside Hepatitis B and C.

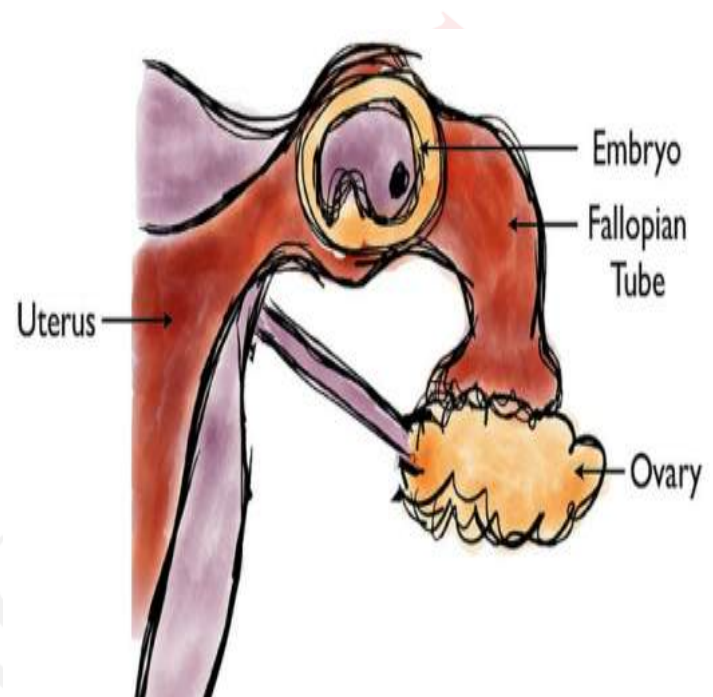
About WHO officially classified Hepatitis D virus as carcinogenic:

- **What is Hepatitis D Virus (HDV)?**
 - Hepatitis D is a blood-borne viral infection that requires the presence of [Hepatitis B virus](#) (HBV) to replicate.
 - HDV cannot exist independently and occurs as co-infection (simultaneous with HBV) or superinfection (after existing HBV).
- **Who Classified It as Carcinogenic?**
 - **Classified by:**
 - ☐ **WHO** (World Health Organization)
 - ☐ **IARC** (International Agency for Research on Cancer)
- **Group 1 Category:** Proven carcinogens in humans.
 - **Key Features of Hepatitis D and HBV Infection:**
 - Affects nearly **12 million people**, i.e., ~5% of **chronic HBV carriers globally**.
 - High prevalence in **Asia, Africa**, and the **Amazon Basin**. It also affects **injection drug users** and **dialysis patients**.
 - **Symptoms:** Fatigue, jaundice, nausea, abdominal pain, dark urine — often ignored or misdiagnosed.
 - **Transmission:** Through infected blood, unprotected sex, unsafe injections, and vertical transmission (mother-to-child).
- **Why HDV is Classified as Cancer-Causing?**
 - **Worsens HBV Outcomes:** Co-infection increases liver cancer risk by 2–6 times vs. HBV alone.
 - **Rapid Liver Damage:** Up to 75% develop cirrhosis in 15 years, compared to 50% in HBV-only cases.
 - **Aggressive Progression:** Fast-tracked development of [fibrosis](#) and liver failure in younger populations.
 - HDV hijacks HBV's replication machinery, amplifying viral and oncogenic load.
- **Treatment Landscape:**
 - **No HDV-specific vaccine** and **HBV vaccine** is the only preventive measure for both.
 - **Bulevirtide** (approved in Europe) shows promise, used alongside **pegylated interferon**.
 - HBV managed with [lifelong antivirals](#) and HDV therapies are still **limited and expensive**.
 - WHO reports **critical gaps in testing:**
 - ☐ Only 13% of HBV and 36% of HCV cases diagnosed.
 - ☐ Treatment rates remain as low as 3% for HBV and 20% for HCV (2022 data).

ECTOPIC PREGNANCIES

Context:

A rare case of an intrahepatic ectopic pregnancy was reported in Bulandshahr, Uttar Pradesh, where a foetus was found growing inside the [liver](#).



About Ectopic Pregnancies:

- **What Is an Ectopic Pregnancy?**
 - An ectopic pregnancy occurs when a fertilised egg implants outside the uterus, most often in the fallopian tube.
 - Since only the uterus can support a growing foetus, such pregnancies **cannot proceed normally** and require urgent medical attention.
- **How Does It Occur?**
 - Normally, the fertilised egg travels from the **ovary to the uterus** via the fallopian tube.
 - If the **egg's path is blocked**—due to inflammation, scarring, surgery, or structural abnormalities—it may implant in other areas like:
 - ☐ [Fallopian tube](#) (tubal pregnancy)
 - ☐ Ovary
 - ☐ Abdominal cavity
 - ☐ Cervix
- **Symptoms:**
 - Early signs may mimic normal pregnancy (missed period, breast tenderness)
 - Danger signs include: Sharp abdominal or pelvic pain, Vaginal bleeding, Dizziness or fainting, Shoulder pain, and Low blood pressure.
 - A ruptured fallopian tube is a life-threatening emergency.

- **Prevalence:**
 - A 2023 Indian study noted **0.91–2.3% incidence** in hospitals.
 - Globally, ectopic pregnancies have declined (1990–2019) but remain high in **low- socio-demographic index (SDI) countries**, as per a 2025 global study.
- **Diagnosis and Treatment:**
 - Diagnosed through **blood tests, urine tests, and [transvaginal ultrasound](#)**.
 - Most are identified in **early pregnancy stages**.
- **Treatment Options:**
 - **Medical Management:**
 - ❑ **Methotrexate** halts cell growth and dissolves embryonic tissue.
 - ❑ Only effective in unruptured, early-stage ectopic pregnancies.
 - **Surgical Intervention:**
 - ❑ **Laparoscopic surgery** removes the [embryo](#) or the affected fallopian tube.
 - ❑ Emergency surgery may be needed in the event of a rupture.

About [Definitive list of Ayurveda Aahara Products](#):

- **What is Ayurveda Aahara?**
 - Ayurveda Aahara refers to food products formulated as per the dietary principles of Ayurveda, focusing on balance, seasonality, and the use of natural and therapeutic ingredients for holistic wellness.
- **Launched by:**
 - **Food Safety and Standards Authority of India (FSSAI)**
 - In collaboration with the **Ministry of Ayush**
 - Under the [Food Safety and Standards \(Ayurveda Aahara\) Regulations, 2022](#)
- **Objective:**
 - To mainstream traditional dietary knowledge rooted in Ayurveda.
 - To offer clarity and regulatory support to Food Business Operators (FBOs).
 - To enhance public trust and adoption of Ayurveda-based nutrition for preventive healthcare.
- **Key Features:**
 - **Authenticity Through Textual Validation:** The definitive list is based on recipes and methods sourced from classical Ayurvedic texts listed in Schedule A.
 - **Clarity for Food Businesses:** Provides a **credible regulatory guide** for FBOs to manufacture Ayurveda Aahara products within a defined framework.
 - **Public Health Focus:** Encourages use of time-tested dietary practices that support digestion, immunity, and long-term wellness.
 - **Structured Addition Mechanism:** FBOs can request inclusion of new products with valid references from classical Ayurvedic scriptures.
 - **Guidance by National Institute of Ayurveda (NIA):** The nodal agency curated and validated formulations to ensure **scientific rigour and traditional fidelity**.
- **Significance:**
 - **Bridges Tradition and Regulation:** Aligns India's ancient food wisdom with modern food safety standards, enhancing public credibility.
 - **Empowers FBOs and Startups:** Boosts the Ayurveda food sector by reducing regulatory ambiguity and facilitating product innovation.
 - **Promotes Preventive Healthcare:** Supports balanced, sustainable living by reviving herbal and seasonal eating practices.

DEFINITIVE LIST OF AYURVEDA AAHARA PRODUCTS

Context:

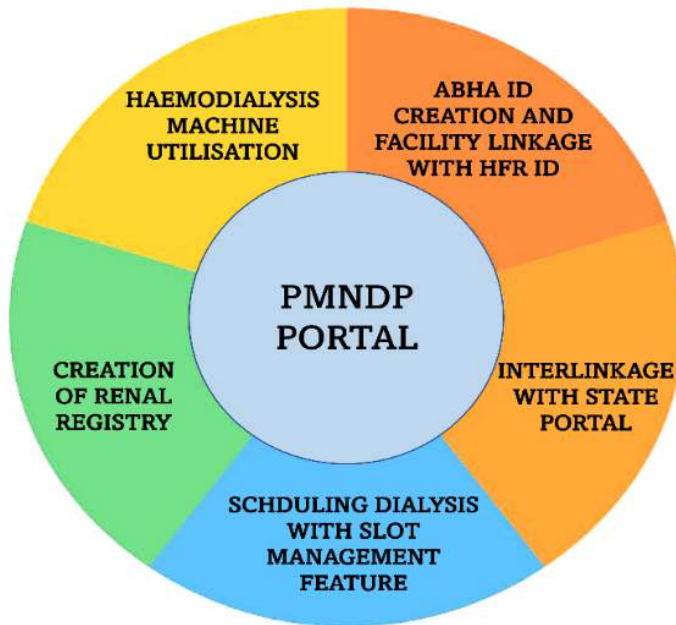
The [FSSAI](#), in collaboration with the Ministry of Ayush, released a definitive list of Ayurveda Aahara products to standardize traditional Ayurvedic food formulations under modern food safety regulations.



PM NATIONAL DIALYSIS PROGRAMME

Context:

The Government of India has extended the Pradhan Mantri National Dialysis Programme (PMNDP) to 751 districts across all 36 States and Union Territories, with over 1,700 functional dialysis centres as of June 30, 2025.



About PM National Dialysis Programme (PMNDP):

- **What It Is?**
 - A flagship scheme under [National Health Mission](#) (NHM) launched to provide free dialysis services to economically vulnerable patients suffering from end-stage [renal disease](#) (ESRD).
- **Launched In:**
 - Initiated in April 2016 under Union Budget 2016–17
 - Implemented via Public-Private Partnership (PPP) and hybrid models
- **Ministry:** Implemented by the Ministry of Health and Family Welfare
- **Objectives:**
 - Provide **equitable, affordable dialysis care** across India
 - Reduce **financial burden** on Below Poverty Line (BPL) families
 - Strengthen **renal-care infrastructure** in district hospitals and beyond
- **Coverage and Reach:**
 - Functional in **751 districts** across **36 States/UTs**
 - **1,704 dialysis centres** operational as of June 2025

- Services extended to **Community Health Centres** in tribal and remote areas
- **Key Features:**
 - **Types of Dialysis Offered:**
 - ☐ **Haemodialysis (HD) and Peritoneal Dialysis (PD)** services covered
 - **Implementation Models:**
 - ☐ **PPP mode** in 14 States/UTs
 - ☐ **In-house model** in 16 States/UTs
 - ☐ **Hybrid model** in 6 States/UTs
 - **PMNDP IT Portal:**
 - ☐ Launched in **May 2022** for real-time integration of dialysis centres
 - ☐ Enables **One Nation–One Dialysis** portability with real-time slot availability
 - **ABHA Number Integration:**
 - ☐ **14-digit [Ayushman Bharat Health Account](#) (ABHA)** ensures seamless patient data linkage and identification
 - ☐ Facilitates **Personal Health Record (PHR)** access and insurance scheme integration
 - **Health Facility Registry (HFR):**
 - ☐ National repository of public and private health institutions
 - ☐ Enables transparent, searchable database to **improve healthcare access**
 - **Target Group:**
 - ☐ Primarily caters to **BPL patients**, but infrastructure benefits all ESRD patients

Emerging Technologies

NATIONAL DEEP WATER EXPLORATION MISSION

Context:

Prime Minister of India announced the National Deep Water Exploration Mission on the 79th Independence Day to boost offshore oil and gas discovery, targeting areas like the [Andaman Sea](#) and deep waters off the Andhra coast to achieve energy self-reliance.



About National Deep Water Exploration Mission:

- **What it is?**
 - A **flagship energy security initiative** to explore untapped oil and gas reserves beneath India's seabed.
 - Designed to operate in **mission mode** for accelerated offshore exploration.
- **Nodal Ministry:** Ministry of Petroleum and [Natural Gas](#).
 - Supported by **Directorate General of Hydrocarbons (DGH)** and allied research institutions.
- **Objective:**
 - Reduce dependence on crude oil and natural gas imports.
 - Enhance domestic hydrocarbon production capacity.
 - Strengthen India's long-term **energy security**.
 - Promote [Aatmanirbhar Bharat](#) in the energy sector.
- **Key Features:**
 - **Deep-Water Focus:** Target unexplored offshore zones like the Andaman-Nicobar basin and Andhra coast.
 - **Policy Reforms Backing:** Linked with [Open Acreage Licensing Policy](#) (OALP) and recent exploration-friendly legislative changes.
 - **Large-Scale Bidding:** Opening over 1 million sq km of erstwhile 'No-Go' areas for exploration.
 - **Advanced Technology:** Use of seismic surveys, modern drilling techniques, and [AI-enabled exploration](#) tools.
 - **Public-Private Collaboration:** Encouraging both domestic and global players to invest.

• **Significance:**

- **Energy Independence** – Reduces India's current 88% crude oil import reliance and 50% gas import dependence.
- **Economic Gains** – Saves billions in import bills; redirects funds to social welfare and infrastructure.
- **Strategic Security** – Strengthens control over [domestic energy](#) resources amid volatile global markets.

INDIA'S FIRST 5G CAPTIVE NON-PUBLIC NETWORK IN REFINERY SECTOR

Context:

BSNL and NRL have signed a landmark MoU to deploy India's first [5G](#) Captive Non-Public Network (CNPN) in the refinery sector, marking a significant step in industrial digitalisation under [Industry 4.0](#).



About India's First 5G Captive Non-Public Network in Refinery Sector:

- **What It Is?**
 - It is India's first industrial-grade 5G private network, to be installed at Numaligarh Refinery Limited (NRL), enabling real-time, secure, and ultra-reliable digital operations.
- **MoU Between:**
 - Bharat Sanchar Nigam Limited ([BSNL](#))
 - Numaligarh Refinery Limited (NRL)
 - Announced at "**Industry 4.0 Workshop for CPSEs**", Ministry of Finance
- **Aim:**
 - To pioneer 5G-enabled digital transformation in India's refinery sector.
 - To boost operational efficiency, automation, cybersecurity, and workforce skilling.
 - To build a replicable model for other core industries.

- **Key Features:**

- **Indigenous 5G Infrastructure:** Fully India-built and secure network architecture.
- **Ultra-Reliable Low Latency Communication (URLLC):** Supports real-time process control and monitoring.
- **Integration with AR/VR, IoT, and Digital Twins** for immersive training and predictive maintenance.
- **Cyber-Resilient Architecture:** Secures mission-critical refinery systems.
- **Boost to North-East Industry:** Promotes digital jobs and smart infrastructure in Assam.

About Captive Non-Public Network (CNPN):

- **What It Is?**

- A CNPN is a dedicated, secure private 5G network deployed for use by a single enterprise, such as a factory, refinery, or port, to handle its internal communication and operational needs.

- **How It Works?**

- Uses licensed spectrum or BSNL's allocated 5G bands.
- Operates in isolation from [public networks](#), ensuring zero interference.
- Enables device-to-device communication, automation, and data processing within a localised setting.

- **Key Features:**

- **Ultra-low Latency:** Enables real-time analytics and process automation.
- **High Throughput:** Handles large volumes of industrial [IoT data](#).
- **Enhanced Privacy:** Keeps sensitive operational data within enterprise boundaries.
- **Customised Architecture:** Tailored to specific industrial requirements.
- **Network Slicing Ready:** Supports separation of operations like safety, monitoring, and logistics.

About Global Artificial Intelligence (AI) City Index 2025:

- **What it is?**

- A global benchmarking report that evaluates cities on their capacity, investment, and innovation in artificial intelligence.

- **Published by:** Market research firm **Counterpoint Research**.

- **Objective:** To identify and rank leading global urban centres driving AI development across R&D, infrastructure, governance, and real-world [AI use](#) cases.

- **Criteria Used:**

- AI research & development ecosystem
- Number of startups and tech hubs
- Investment inflows and [public-private partnerships](#)
- AI applications in sectors like transport, healthcare, education
- Data centre expansion and digital infrastructure

- **Key Features:**

- Tracks **fastest-growing AI cities** globally (e.g., Bengaluru, Riyadh, Hangzhou)
- Highlights AI-led urban innovation in traffic, safety, healthcare, and education
- Evaluates collaboration, infrastructure readiness, and education programmes
- Shows regional trends in AI supercomputing and public policy frameworks

- **India's Performance in AI City Index 2025:**

- **Bengaluru** ranked **26th globally**; India's top AI city with a vibrant startup and data ecosystem.
- **Mumbai** and **Delhi** leverage AI in **traffic** and **public security**, with growth potential.
- Other Indian cities in top national ranks include **Chennai** and **Kolkata**.
- Report flags need for **stronger [AI roadmap](#)** and **regulatory frameworks** in India.

- **Top Global Rankings Global AI City Index:**

- Singapore
- Seoul
- Beijing
- Dubai
- San Francisco

GLOBAL ARTIFICIAL INTELLIGENCE (AI) CITY INDEX 2025

Context:

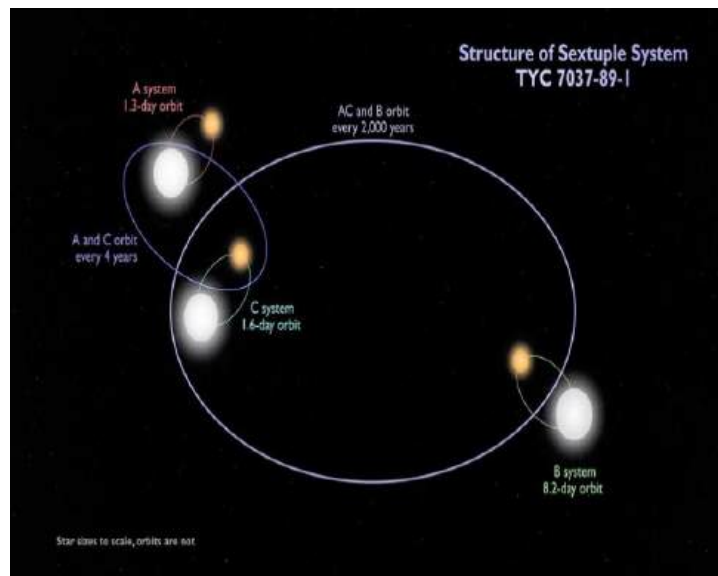
Bengaluru has secured the 26th rank in the Global Artificial Intelligence (AI) City Index 2025, emerging as India's top AI R&D and data centre hub.

Space:

UPM J1040-3551 AABAB

Context:

Scientists have discovered a rare quadruple star system in our [Milky Way galaxy](#) called UPM J1040-3551 AabBab. It is the first known system where two brown dwarfs orbit around two red dwarf stars.



About UPM J1040-3551 AabBab:

- **What it is?**
 - A unique **4-star system**:
 - 2 **Red dwarf stars** (small, common stars that shine faintly but live very long).
 - 2 **Brown dwarfs** (objects between stars and planets, called “failed stars” because they cannot fuse hydrogen like stars).
- **Key Features:**
 - **Red dwarfs** are bright enough to be studied → scientists can estimate the properties of the faint brown dwarfs.
 - Brown dwarfs are about the **size of Jupiter**, but much heavier.
 - Such systems are **extremely rare** → chances of low-mass brown dwarfs having companions is **less than 5%**.
- **Significance:**
 - **First of its kind** → never before seen configuration.
 - Helps study **brown dwarfs**, which are very hard to detect because they are cold and faint.
 - Provides insight into **how stars and planets form** in space.
 - Improves knowledge about the **distribution of mass in the universe** (important in studying dark matter).

- Acts as a **natural laboratory** → since all 4 formed together, scientists can compare their age, temperature, and composition accurately.

LUNAR MODULE LAUNCH VEHICLE (LMLV)

Context:

The **Indian Space Research Organisation (ISRO)** has announced the development of its **heaviest rocket ever** — the [Lunar Module Launch Vehicle \(LMLV\)](#), expected to be ready by 2035.



About Lunar Module Launch Vehicle (LMLV)

What it is

- The **LMLV** is ISRO's next-generation heavy-lift launch vehicle.
- It will be the **most powerful rocket built by India**, designed specifically for lunar and interplanetary missions.

Objective

- To enable **crewed lunar missions** by 2040.
- To carry **larger payloads** to the Moon and support deep space exploration.
- To enhance India's self-reliance in **human spaceflight technology**.

Specifications

- **Payload to Moon:** ~27 tonnes.
- **Payload to Low Earth Orbit (LEO):** ~80 tonnes (200–2,000 km).
- **Timeline:** Planned readiness by **2035**.
- **Propulsion:** Advanced **cryogenic and semi-cryogenic engines** expected.

Evolution of ISRO's Launch Vehicles

1. Sounding Rockets (1963)

- First Nike Apache sounding rocket launched from **Thumba, Kerala**.
- Used for atmospheric experiments, not capable of orbital flight.

2. Satellite Launch Vehicle (SLV-3) – 1980

- India's **first indigenous rocket**.
- Led by **A.P.J. Abdul Kalam**, placed **Rohini satellite** in orbit.

3. Augmented Satellite Launch Vehicle (ASLV) – 1987-94

- Improved SLV with strap-on boosters.
- Limited success, carried payloads up to **150 kg**.

4. Polar Satellite Launch Vehicle (PSLV) – 1994 onwards

- India's **workhorse rocket**, highly reliable.
- Payload: ~1,000–1,750 kg to LEO.
- Key missions: **Chandrayaan-1 (2008)**, **Mangalyaan (2013)**.

5. Geosynchronous Satellite Launch Vehicle (GSLV)

- Introduced **cryogenic engines** after US denied transfer in 1990s.
- Payload to GTO: ~2,000–2,500 kg.

6. Launch Vehicle Mark-3 (LVM-3 / GSLV Mk-III) – 2017

- India's **heaviest operational rocket** today.
- Payload: ~4,000 kg to GTO.
- Major missions: **Chandrayaan-2 (2019)**, **Chandrayaan-3 (2023)**.

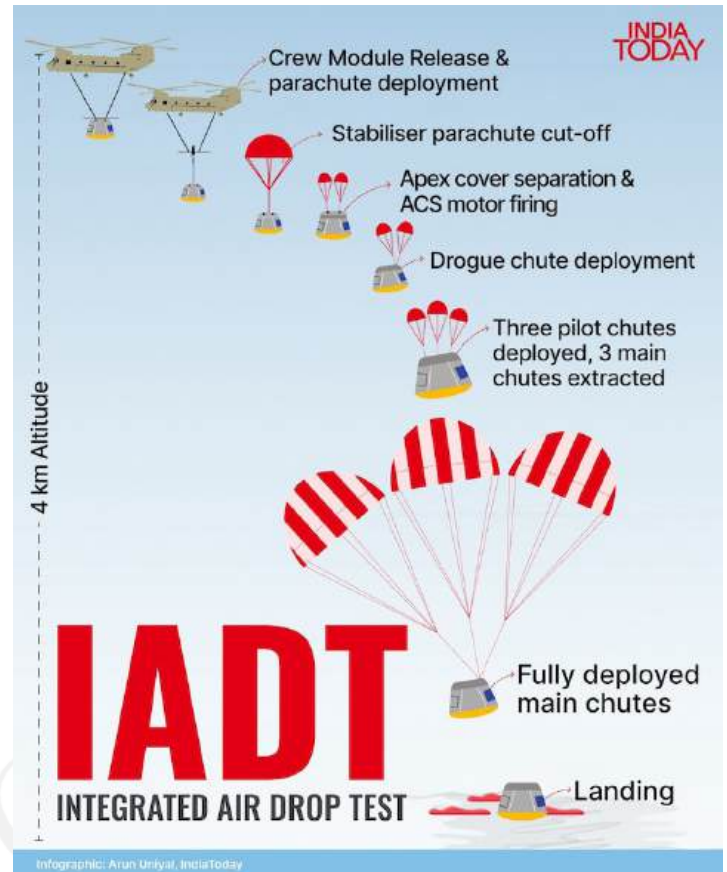
7. Lunar Module Launch Vehicle (LMLV) – 2035 (planned)

- Will surpass all previous rockets.
- Designed for **human spaceflight to the Moon** and beyond.

ISRO INTEGRATED AIR DROP TEST (IADT-01)

Context:

ISRO has successfully conducted its first Integrated [Air Drop Test \(IADT-01\)](#) for the [Gaganyaan mission](#).



About ISRO Integrated Air Drop Test (IADT-01):

- **What it is?**
 - o A specialised **air-drop experiment** to test the **end-to-end parachute recovery system** of the [Gaganyaan](#) crew module.
 - o Conducted with a **dummy crew capsule** (~5 tonnes) released from an Indian Air Force Chinook helicopter.
- **Developed by:** Indian Space Research Organisation (ISRO)
- **Aim:**
 - o To demonstrate the **reliability and sequencing** of parachutes for slowing and stabilising the crew module during **re-entry and splashdown**.
 - o Ensure astronaut **safety in descent and landing phases**, the riskiest part of human spaceflight.
- **How the IADT System Works?**
 - o **Air Drop Release:**
 - ❑ A **dummy crew module (~5 tonnes)** is lifted by an IAF Chinook helicopter to a designated altitude.
 - ❑ The capsule is then **air-dropped** into free fall.
 - o **Initial Deceleration – Drogue Parachutes:**
 - ❑ Two **drogue parachutes** (conical, funnel-shaped) open first.
 - ❑ They stabilise the tumbling capsule and begin slowing it down.

- o **Trigger Mechanism – Pilot Chutes:**
 - Smaller **pilot parachutes** are deployed.
 - Their role is to **pull out and activate the larger main parachutes**.
- o **Final Deceleration – Main Parachutes:**
 - Three large **main parachutes** deploy sequentially.
 - They reduce the descent speed to a safe level for splashdown.
 - Built with **redundancy**: even if one fails, the rest can ensure safe descent.
- o **Splashdown & Recovery:**
 - The slowed capsule splashes down in water at a survivable speed.
 - **Indian Navy & Coast Guard teams** conduct recovery operations.
- **Significance:**
 - o Critical milestone in human-rating India's space systems.
 - o Boosts confidence ahead of upcoming missions: Test Vehicle-D2 (TV-D2) and first uncrewed Gaganyaan mission (G1).
 - o Enhances India's progress towards Gaganyaan crewed mission (target ~2027).

About India's Moon Mission

What it is?

- India's proposed **crewed lunar mission by 2040** is part of a long-term vision to position India as a global space power and align the space programme with the goal of *Viksit Bharat by 2047*.

Objective

- To demonstrate **human space exploration capability** beyond Earth orbit.
- To build indigenous capacity for **lunar habitation, exploration, and resource utilisation**.
- To integrate India's space programme with its economic, scientific, and security ambitions.

Key Features

- **Human landing:** An Indian astronaut will step on the Moon by 2040.
- **Indigenous development:** Reliance on Indian-built launch vehicles, life support systems, and surface technologies.
- **Global collaboration:** Scope for joint missions with advanced space agencies for technology sharing.
- **Economic vision:** The mission will strengthen India's share in the projected **\$45 billion space economy**.

Other Planned Milestones in India's Space Programme

1. **2026 – Vyommitra Mission:** Launch of an uncrewed mission with humanoid robot Vyommitra to test systems.
2. **2027 – Gaganyaan Mission:** India's first human spaceflight with astronauts in low Earth orbit.
3. **2035 – Bharat Antariksh Station:** Establishment of India's own space station for long-duration experiments.
4. **2040 – Crewed Moon Landing:** An Indian astronaut to step on the lunar surface, marking a historic leap.

INDIAN ASTRONAUT TO LAND ON MOON IN 2040

Context:

Union Minister Jitendra Singh announced in the Lok Sabha that an **Indian astronaut will land on the Moon by 2040**, while also outlining India's broader space roadmap.



NEW TYPE OF SUPERNOVA DETECTED

Context:

Astronomers have discovered a new type of supernova triggered when a massive star interacted with a black hole in a **binary system**, leading to a rare and powerful stellar explosion about 700 million light-years away.



About New type of supernova detected:

- **What It Is?**
 - A previously unobserved **stellar explosion caused by a black hole companion** siphoning material from a massive star until it collapses.
 - Occurred in a **binary system** where both the star and black hole had similar masses (~10 times the Sun).
- **Identified Through:**
 - **Artificial Intelligence algorithms** that scanned for unusual cosmic explosions in real time.
 - Follow-up observations by **multiple ground-based and space-based telescopes** immediately after detection.
- **Key Features:**
 - **Binary Interaction** – Star distorted and stripped by **black hole's gravity** over years before explosion.
 - **Extreme Energy Release** – Explosion emitted more energy in a second than the Sun will in its entire lifetime.
 - **Mass Loss Before Explosion** – Hydrogen layer ripped away, exposing helium core.
 - **Post-Supernova Feeding** – **Black hole** consumed remaining stellar debris, increasing in mass and power.
 - **AI-Enabled Early Observation** – Rare opportunity to capture full pre- and post-explosion timeline.
- **Significance:**
 - **New Stellar Death Mechanism** – Shows that black hole companions can directly trigger supernovae.
 - **Advances Astrophysics** – Improves understanding of massive star evolution in binary systems.

INDIA'S FIRST PRIVATE EO SATELLITE CONSTELLATION UNDER PPP MODEL

Context:

The [IN-SPACE](#) has selected the PixxelSpace India-led consortium to design, build, and operate India's first fully indigenous commercial [Earth Observation \(EO\) satellite](#) constellation under the Public-Private Partnership (PPP) model.



About India's First Private EO Satellite Constellation under PPP Model:

- **What It Is?**
 - A landmark space initiative to deploy **12 advanced Earth Observation satellites** built and operated by the **private sector** in collaboration with the government.
- **Companies Involved:**
 - **Lead Partner:** PixxelSpace India
 - **Consortium Members:**
 - Piersight Space
 - Satsure Analytics India
 - Dhruva Space
- **Aim:**
 - To provide **high-resolution, indigenous satellite data** for national and global applications.
 - To strengthen India's **space-based monitoring capabilities** in key sectors.
 - To reduce reliance on foreign EO data and ensure **data security** and **sovereignty**.
- **Key Features:**
 - **Investment:** ₹1,200 crore private sector investment over five years.
 - **Constellation Size:** 12 state-of-the-art EO satellites.
 - **Applications:**
 - Climate change monitoring
 - Disaster management

- Agriculture analytics
- [Marine surveillance](#)
- National security
- Urban planning
- **Global Reach:** Will cater to international demand for geospatial intelligence.
- **Data Output:** Provides **Analysis Ready Data (ARD)** and **Value-Added Services (VAS)**.
- **PPP Model:** First of its kind in India's space history under **IN-SPACE's** private sector promotion framework.

About PixxelSpace India:

- **What It Is?**
 - A Bengaluru-based [space technology startup](#) specializing in hyperspectral imaging satellites.
- **Headquarters:** Bengaluru, Karnataka, India.
- **Established:** 2019.
- **Core Focus:** Building a global constellation of hyperspectral EO satellites to offer precise, high-quality [geospatial insights](#).

18TH INTERNATIONAL OLYMPIAD ON ASTRONOMY AND ASTROPHYSICS

Context:

India is hosting the 18th International Olympiad on Astronomy and Astrophysics (IOAA) in 2025, welcoming over 300 young [astronomers](#) from 64 countries.



About 18th International Olympiad on Astronomy and Astrophysics:

- **What it is?**
 - The IOAA is a premier global competition for high-school students in the fields of **astronomy, astrophysics, and observational sciences**.

- It tests theoretical knowledge, data [analysis skills](#), and practical observational abilities.
- **Host Country:** Mumbai, Maharashtra.
- **Organised by:** Homi Bhabha Centre for Science Education (HBCSE) and Tata Institute of Fundamental Research (TIFR), in collaboration with the Union Ministry of Education.
- **Objectives:**
 - Promote scientific thinking and problem-solving skills in astronomy and astrophysics.
 - Foster international cooperation and [cultural exchange](#) among young scientists.
 - Inspire careers in space sciences and research.
 - Showcase India's advancements in space missions, observatories, and [STEM](#) initiatives.
- **Features of the 18th IOAA:**
 - **Largest Edition Yet** – Over 300 students from **64 nations**.
 - **Blend of Theory & Practice** – Written exams, data analysis, and night-sky observations.
 - **Highlighting India's Legacy** – From [Aryabhata's theories](#) to modern missions like Chandrayaan-3 and Aditya-L1.
 - **STEM Empowerment** – Showcasing initiatives like Atal Tinkering Labs and One Nation One Subscription.
 - **Global Science Partnerships** – Collaboration in mega-projects like the Square Kilometre Array and [LIGO-India](#).

INDIA'S 3RD LAUNCH PAD IN SRIHARIKOTA BY 2029

Context:

The [Department of Space](#) announced that India's third satellite launch pad at Sriharikota will be fully operational by March 2029.



About India's 3rd Launch Pad in Sriharikota by 2029:

- **What It Is?**
 - A new **Third Launch Pad (TLP)** at the **Satish Dhawan Space Centre (SDSC), Sriharikota**.
 - Designed for **next-generation rockets** and to enhance India's launch capacity for heavy-lift and human spaceflight missions.
- **Objectives:**
 - **Support NGLV Operations** – Provide infrastructure for the 91m-tall Next Generation Launch Vehicle.
 - **Backup for LVM3** – Prevent launch disruptions in case of single-pad failure.
 - **Enable Human Spaceflight** – Critical for **Gaganyaan** and future astronaut missions.
 - **Support Deep Space Goals** – Facilitate lunar landings, space station assembly, and **interplanetary missions**.
- **Key Features:**
 - **Completion Timeline** – Civil works by May 2028, fluid and propellant systems by July 2028, launch systems by Sept 2028, and commissioning in March 2029.
 - **Advanced Propellant Systems** – Designed for cryogenic and semi-cryogenic fuels with high thrust.
 - **Make in India Push** – Involvement of private players and **MSMEs** in infrastructure development.
 - **Increased Height & Capacity** – NGLV twice the height of LVM3 with higher thrust and new jet deflection systems.
 - **Multiple Work Packages** – Modular construction approach for efficiency.
- **Significance:**
 - **Strategic Redundancy** – Eliminates risk of mission delays from single-pad dependency.
 - **Future-Proof Infrastructure** – Built for next-gen rockets, advanced fuels, and higher payload capacities.
 - **Boost to Space Economy** – Supports commercial launches, Make in India, and private sector participation.

LEAP-1 MISSION

Context:

Indian space tech firm Dhruva Space is set to launch its first commercial satellite mission, LEAP-1, aboard [SpaceX's Falcon 9 rocket](#).



About LEAP-1 Mission:

- **What it is?**
 - LEAP-1 (Launch, Experiment, Analyze, Progress) is **Dhruva Space's debut commercial satellite mission**, carrying international payloads for AI and Earth observation.
- **Developed by:** Hyderabad-based **Dhruva Space Pvt Ltd**, in collaboration with Akula Tech (Australia) and Esper Satellites (Australia).
- **Objectives:**
 - Demonstrate **real-time geospatial AI processing** in space.
 - Enable **low-cost, hosted payload missions** for defense, agriculture, and disaster monitoring.
 - Showcase Dhruva's **P-30 satellite platform** for commercial deployment.
- **Key Features:**
 - Two Payloads:
 - **Nexus-01** (Akula Tech): An in-orbit **AI/ML module** with self-retraining capabilities.
 - **OTR-2** (Esper Satellites): A **hyperspectral imaging sensor** for

high-resolution Earth observation.

- o **Platform:** Built on Dhruva's **P-30 satellite bus**, qualified earlier via ISRO's PSLV-C58 mission.
- o **Operations:** Managed via Dhruva's **ISOCS (Integrated Space Operations & Command Suite)**.
- o **Symbolism:** LEAP-1 patch highlights India–Australia–US trilateral strategic partnership in space.

About Dhruva Space:

- **What it is?**
 - o An award-winning private Indian spacetechnology firm offering full-stack space engineering solutions.
- **Founded in:** 2012, with the vision to lead the privatization of India's space sector.
- **Headquartered in:** Hyderabad, Telangana.
- **Key Achievements:**
 - o Successfully **qualified satellite buses** on ISRO launch missions.
 - o First Indian firm to host **foreign commercial payloads** via private platform.
 - o Building a **280,000 sq. ft facility** in Shamshabad for satellites up to 500 kg.
 - o Recognized and supported by ISRO, [IN-SPACe](#), and Australian Space Agency.

HUMAN OUTER PLANETARY EXPLORATION (HOPE)

Context:

Bengaluru-based space company *Protoplanet* has launched the Human Outer Planetary Exploration (HOPE) station in [Ladakh's Tso Kar region](#) to simulate lunar and Martian conditions.



About Human Outer Planetary Exploration (HOPE):

- **What It Is?**
 - o HOPE is a **moon and Mars simulation research station** located in Ladakh's high-altitude Tso Kar basin, mimicking off-Earth terrain and environmental conditions.
- **Developed By:** The project is spearheaded by Protoplanet, a Bengaluru-based space outreach organisation, with technical and financial assistance from ISRO.
- **Aim of the Project:**
 - o To examine **psychological, physiological, and epigenetic responses** of humans in extreme isolation.
 - o To support India's long-term goals of a **crewed lunar mission (by 2040)** and a **space station (by 2035)**.
- **Key Features:**
 - o Located at high-altitude, cold-desert terrain resembling lunar and Martian environments.
 - o Two scientists will live in isolation for 10 days to test deep space stress resilience.
 - o Research includes studies on mental health, biological adaptation, and mission planning.
 - o [ISRO](#) guided the selection criteria for crew participants.
 - o Periodic crew rotation planned to test individual variability in confined conditions.
- **Significance:**
 - o Marks a vital step towards India's crewed spaceflight capability and [interplanetary mission](#) readiness.
 - o Enhances India's presence in the global space research ecosystem, alongside facilities in the US, Canada, and Russia.
 - o Provides actionable data for future [Bharatiya Antariksh Station](#) and Gaganyaan-type missions.

Nuclear Technology

TRITIUM

Context:

A global ocean model study by the University of Tokyo and Fukushima University has confirmed that the Fukushima Daiichi Nuclear Power Plant's tritium wastewater release poses negligible risk.



About Tritium:

- **What It Is?**
 - Tritium (^3H or T) – Radioactive isotope of hydrogen.
 - **Nucleus:** 1 proton + 2 [neutrons](#) (heaviest bound isotope of hydrogen).
 - **Half-life:** 12.32 years.
- **Sources:**
 - **Natural** – Formed in the atmosphere by cosmic ray interactions.
 - **Artificial** – Produced in [nuclear reactors](#) (lithium irradiation, fission byproduct).
- **Features:**
 - Emits low-energy beta radiation.
 - Cannot penetrate human skin; harmful only if inhaled or ingested.
 - Exists mostly as **tritiated water (HTO)** in the environment.
- **Harm:**
 - Low external hazard.
 - Internal exposure can increase cancer risk in large doses.
 - Dilution in oceans drastically reduces impact.

About Fukushima Daiichi Nuclear Power Plant:

- **What It Is?**
 - A nuclear power facility in **Ōkuma, Fukushima Prefecture, Japan**, operated by Tokyo Electric Power Company (TEPCO).
- **History:**
 - **Commissioned:** 1971.
 - **2011 Tōhoku earthquake & tsunami** caused reactor meltdowns, hydrogen explosions, and radioactive leaks.
 - Led to one of the worst nuclear accidents since [Chernobyl](#) (1986).
- **Features:**
 - **Multiple Reactors** – Six boiling water

reactors (BWRs).

- **Containment Tanks** – Store treated wastewater containing trace radionuclides.
- **Tritium Management** – Treated water released gradually into the Pacific after ALPS filtration removes other [radionuclides](#).
- **30-Year Release Plan** – Discharge at low concentrations, meeting safety standards.

TRI-STRUCTURAL ISOTROPIC PARTICLE FUEL (TRISO)

Context:

The US Department of Energy (DOE) has selected Standard Nuclear as the first company to develop next-gen TRISO nuclear fuel, reducing reliance on Russian uranium and boosting domestic supply chains.



About TRi-structural ISOtropic Particle Fuel (TRISO):

- **What is TRISO?**
 - A **high-performance nuclear fuel** designed for **advanced reactors**, offering enhanced **safety and efficiency**.
 - Developed by **US DOE and private firms** like BWX Technologies.
- **How is it Formed?**
 - Consists of a [uranium](#), carbon, and **oxygen** fuel kernel.
 - Encased in **three protective layers** of **carbon-ceramic materials** to prevent radiation leaks.
 - Particles are **tiny (seed-sized)** but can be shaped into **pellets or pebbles** for reactors.
- **Key Features:**
 - **Extreme Durability** – Resists [neutron irradiation](#), corrosion, oxidation, and high temperatures.
 - **Self-Contained Safety** – Each particle acts as its own containment system, minimizing radiation risks.
 - **Versatile Use** – Compatible with molten salt and high-temperature gas-cooled reactors.

- **Significance:**
 - Supports next-gen [small modular reactors \(SMRs\)](#) and **Gen-IV reactors**.
 - Reduces US dependence on Russian uranium.
 - Enhances clean energy security and nuclear innovation.

Defence and Security

EXERCISE BRIGHT STAR 2025

Context:

Over 700 Indian Armed Forces personnel will participate in Exercise Bright Star 2025 in Egypt, showcasing tri-service operational capabilities.



About Exercise Bright Star 2025:

What it is?

- A **multilateral military exercise**, one of the largest **tri-service drills** in the Middle East–North Africa (MENA) region.
- Conducted **biennially since 1980**.

Nations Involved:

- Primarily hosted by **Egypt and the United States**.
- Participation from **India** and several friendly foreign nations across Asia, Africa, Europe, and the Middle East.

Host: Egypt, in partnership with the United States.

Aim:

- To enhance **jointness and interoperability** among participating nations.
- To promote **regional peace, security, and stability**.
- To prepare forces for **modern, multi-domain warfare** through joint training.

Key Features of 2025 Edition:

- **Live Firing** by Army, Navy, and Air Force to showcase combat capabilities.

MIG-21

Context:

The Indian Air Force (IAF) will retire the iconic [MiG-21 fighter jet](#) from operational service on 26 September 2025, after more than six decades of service.



About MiG-21:

What it is?

- The [MiG-21](#) is a **supersonic jet fighter aircraft** that became the backbone of the Indian Air Force for over 60 years.
- Known for its speed, agility, and delta-wing design, it is also the **world's most produced supersonic jet fighter**.

Developed by:

- Designed by the [Mikoyan-Gurevich Design Bureau \(Soviet Union\)](#).
- First prototype flew in **1955**, formally inducted into the IAF in **1963**.

History in India:

- First squadron: **No. 28 Squadron, Chandigarh**, earned the title "*The First Supersonics*".
- Played decisive roles in major wars:
 - **1965 war** – frontline interceptor.
 - **1971 war** – executed Dhaka strikes, turning

point in victory.

- o [Kargil War \(1999\)](#) – limited ground attack/air defence.
- o **2019 Balakot aftermath** – MiG-21 Bison shot down a Pakistani F-16 (Gp. Capt. Abhinandan Varthaman).
- Nearly **900 MiG-21s** served in India, with around **660 built in India** under license.

Key Features:

- **Delta wing design** and **shock cone nose intake** for supersonic performance.
- Maximum speed: over **Mach 2 (2,175 km/h)**.
- Operated as **interceptor, ground attack, reconnaissance, and training aircraft**.
- The **MiG-21 Bison** variant (2000s) upgraded with: Israeli jammers, Russian R-77 and R-73 missiles, partial glass cockpit, and helmet-mounted sight.
- Despite being called the “*Flying Coffin*” due to crash record, it remained a **symbol of courage, Indo-Russian defence ties, and India’s aerospace self-reliance**.

SUPER GARUDA SHIELD 2025

Context:

Indonesia, along with the United States and allied nations, has launched the annual military exercise “[Super Garuda Shield](#) 2025”, aimed at enhancing regional security amid rising Indo-Pacific tensions.



About Super Garuda Shield 2025:

- **What it is?**
 - o A large-scale **multinational military exercise** conducted annually since 2009.
 - o Focused on **combat readiness, interoperability, and regional security cooperation**.
- **Launched by:**
 - o Jointly hosted by the [Indonesian National Armed Forces](#) and the **U.S. Indo-Pacific Command**.

Members/Participants (2025):

- o **Core:** Indonesia & United States.
- o Expanded to include: **Australia, Japan, Singapore, UK, France, Canada, Germany, Netherlands, New Zealand, Brazil, and South Korea**.

Features:

- o Held in [Jakarta and Sumatra](#), running for 11 days.
- o Includes **joint combat training, interoperability drills, and a combined live-fire exercise**.
- o Strengthens **coordination in air, land, and maritime operations**.
- o Reflects principles of **sovereignty, territorial integrity, and collective deterrence**.

Significance:

- o Enhances **regional defence ties** in an [Indo-Pacific](#) marked by rising China-U.S. rivalry.
- o Demonstrates **unity against coercion or forceful status-quo changes** (esp. in South China Sea).
- o Symbolises an “**arc of alliances**” ensuring Indo-Pacific stability.

INS UDAYGIRI AND INS HIMGIRI

Context:

The [Indian Navy](#) is commissioning two Nilgiri-class stealth guided-missile frigates, INS Udaygiri and INS Himgiri, at Visakhapatnam — the first time two major surface combatants from different Indian shipyards are inducted simultaneously.



About INS Udaygiri:

- **What it is?**
 - Second ship of [Project 17A](#) Nilgiri-class frigates.
 - A modern, stealth-capable multi-mission warship designed for anti-surface, anti-air, and anti-submarine warfare.
- **Developed by:**
 - Built by [Mazagon Dock Shipbuilders Limited \(MDL\)](#), Mumbai.
 - Designed by Indian Navy's **Warship Design Bureau**.
- **Features:**
 - Displacement ~6,670 tonnes, length 149 m, speed 28 knots.
 - **Weapons:** [Long-Range Surface-to-Air Missiles](#) (LRSAM), 8 BrahMos supersonic cruise missiles, Barak-8, lightweight torpedoes, rocket launchers, 127 mm main gun, AK-630 rapid fire guns.
 - Equipped with modern radars, sonar (Humsa-NG), and Shakti Electronic Warfare suite.
 - Propulsion: Combined Diesel or Gas (CODOG).
- **Significance:**
 - Part of Eastern Naval Command (*Sunrise Fleet*).
 - **Motto:** *Sanyuktaha Paramojayaha – In togetherness there is great victory.*

About INS Himgiri:

- **What it is?**
 - First **Project 17A** frigate built at GRSE.
 - Stealth guided-missile frigate with advanced weaponry and sensors.
- **Developed by:**
 - Built by [Garden Reach Shipbuilders & Engineers](#) (GRSE), Kolkata.
 - Designed by Indian Navy's **Warship Design Bureau**.
- **Features:**
 - Similar displacement and size to [INS Udaygiri](#) (~6,670 tonnes, 149 m).
 - Equipped with LRSAM, [BrahMos missiles](#), Barak-8 system, torpedoes, rocket launchers, 127 mm gun, AK-630 guns.
 - Integrated stealth design with reduced radar cross-section.
 - **Propulsion:** CODOG, endurance 5,500 NM at economical speed.
- **Significance:**
 - Part of Western Naval Command.
 - **Motto:** *Adrushyam Ajayam – Invisible and invincible.*

INTEGRATED AIR DEFENCE WEAPON SYSTEM (IADWS)

Context:

India successfully conducted the maiden flight-tests of [the Integrated Air Defence Weapon System \(IADWS\)](#) off the coast of Odisha.



About Integrated Air Defence Weapon System (IADWS):

- **What it is?**
 - A multi-layered, network-centric air defence system developed by DRDO under Project Sudarshan Chakra.
 - Integrates [Quick Reaction Surface-to-Air Missile \(QRSAM\)](#), Very Short Range Air Defence System (VSHORADS), and Directed Energy Weapon (DEW) into a unified command system.
- **Developed by:** [Defence Research & Development Organisation \(DRDO\)](#).
- **Aim:**
 - To provide **comprehensive protection** for military and national assets (airbases, radar sites, command centres, nuclear and space installations, power plants).
 - To **counter modern aerial threats** – from high-speed aircraft and cruise missiles to drones, swarm UAVs, and loitering munitions.
- **How it Works?**
 - **Centralised Command & Control Centre (C2C2):** Integrates radar + electro-optical

sensor feeds to generate a real-time air picture.

- o **Threat Allocation:** Based on target speed, altitude, and trajectory, C2C2 assigns the most effective weapon.

- **QRSAM (outer layer):** Engages fast jets, helicopters, and cruise missiles at 25–30 km range, ~10 km altitude.
 - **VSHORADS (middle layer):** Infrared-seeker based, effective against low-flying UAVs/helis within 6 km range, 4 km altitude.
 - **Directed Energy Weapon (inner layer):** High-power laser neutralises drones and loitering munitions at close range; cost-effective with unlimited firing capacity.

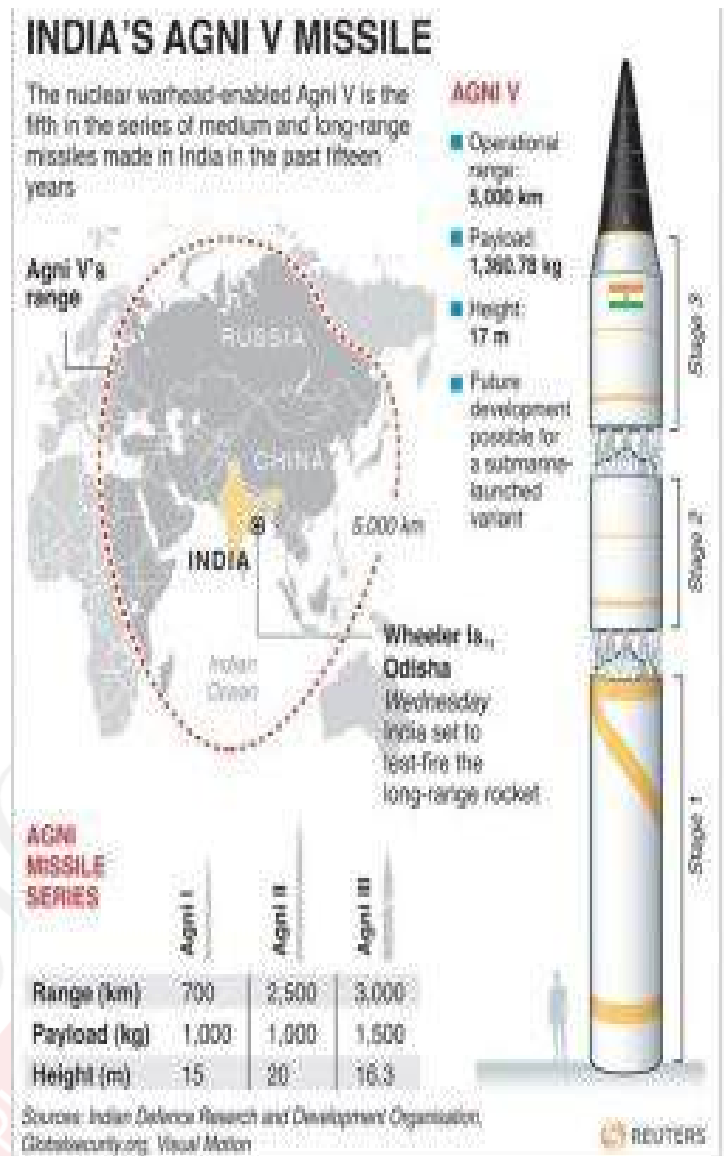
- **Features:**

- o **Indigenous design** with advanced radars, sensors, and communication systems.
- o **Multi-layered shield** combining kinetic interceptors (missiles) and non-kinetic weapons (laser).
- o **Real-time coordination** ensures simultaneous tracking and engagement of multiple targets.
- o **Rapid reaction & mobility** for deployment in forward areas.
- o **Area Defence** for high-value facilities against diverse aerial threats.

INDIA SUCCESSFULLY TEST-FIRES AGNI-5 INTERMEDIATE-RANGE BALLISTIC MISSILE

Context:

India **successfully test-fired the [Agni-5 intermediate-range ballistic missile](#)** from Chandipur, Odisha, validating its operational and technical parameters under the Strategic Forces Command.



About Agni-V

What it is

- **Agni-V** is India's **longest-range ballistic missile**, classified as an **intercontinental ballistic missile (ICBM) class system** though officially described as intermediate-range.
- Developed by the **Defence Research and Development Organisation (DRDO)** for India's nuclear deterrence strategy.

Category & Type

- **Category:** Surface-to-surface, nuclear-capable ballistic missile.
- **Type:** Three-stage, solid-fuelled missile with road/rail mobile launch capability.

Range & Payload

- **Range:** About **5,000–5,500 km**, covering all of Asia and parts of Europe & Africa.
- **Payload:** Can carry a **1.5-tonne nuclear warhead** (single or Multiple Independently Targetable Re-

entry Vehicle – [MIRV](#)).

Technology Features

1. **Solid Fuel Technology** – All stages are solid-fuel based, enhancing readiness.
2. **MIRV Capability** – Tested in March 2024, allows striking multiple targets with one launch.
3. **Ring Laser Gyro Navigation & Micro Inertial Systems** – Provides high accuracy.
4. **Composite Materials** – Reduce weight while improving structural strength.
5. **Canisterised Launch System** – Ensures faster deployment and longer shelf life.

Agni Missile Series



Agni-I

- o Range: ~700–1,200 km
- o Type: Short-range, single-stage, solid-fuel missile.



Agni-II

- o Range: ~2,000–2,500 km
- o Type: Two-stage, solid-fuel missile; road/rail mobile.



Agni-III

- o Range: ~3,000–3,500 km
- o Type: Two-stage, nuclear-capable missile; designed for deeper penetration.



Agni-IV

- o Range: ~3,500–4,000 km
- o Features: Advanced composite materials, improved navigation systems.



Agni-V

- o Range: 5,000+ km; MIRV capable.
- o Canister-based, most advanced in service.

SARVOTTAM YUDH SEVA MEDALS (SYSM)

Context:

On the eve of the 79th Independence Day (2025), President Droupadi Murmu awarded seven Sarvottam Yudh Seva Medals (SYSM) for the first time since the [Kargil War](#), honouring top military leaders of Operation Sindoor.



About Sarvottam Yudh Seva Medals (**SYSM**):

- **What It Is?**
 - o India's **highest wartime distinguished service decoration**.
 - o Awarded for "distinguished service of the most exceptional order during war, conflict or hostilities."
- **Origin:**
 - o Instituted in **1980**, but awarded rarely.
 - o Till 2025, only **three officers** had received it ([Operation Pawan](#), Kargil War).
- **Awarded By:** Conferred by the **President of India**.
- **Eligibility:**
 - o Open to all ranks of the **Army, Navy, Air Force**, including Territorial Army, Auxiliary/ Reserve Forces, and Nursing Services.
 - o May be awarded **posthumously**.
- **Features:**
 - o **Design:** Circular, gold gilt, 35 mm diameter.
 - o **Obverse:** State Emblem with inscription "SARVOTTAM YUDH SEVA MEDAL".
 - o **Reverse:** Five-pointed star.
 - o **Ribbon:** Golden with a central red stripe.
 - o **Repeat Awards:** Represented by a bar and miniature insignia.
- **Significance**
 - o **National Honour** – Recognises extraordinary wartime leadership, equivalent to [Param Vishisht Seva Medal \(PVSM\)](#) in peacetime.
 - o **Military Morale** – Encourages highest standards of operational planning and joint service coordination.
 - o **Rarity** – With only **10 recipients till date**, it remains one of the **rarest and most prestigious** Indian military decorations.
- **Recipient of award:**
 - o **Before 2025** → Only **3 officers** had received the **Sarvottam Yudh Seva Medal (SYSM)**:
 - ❑ Lt Gen Amarjit Singh Kalkat (Operation Pawan, 1989)
 - ❑ Air Marshal Vinod Patney (Kargil War, 1999)
 - ❑ Lt Gen Hari Mohan Khanna (Kargil War, 2000)
 - o **Sarvottam Yudh Seva Medal Awardees – 2025 ([Operation Sindoor](#))**
 - ❑ **Air Marshal Narmadeshwar Tiwari** – Indian Air Force
 - ❑ **Air Marshal Nagesh Kapoor** – Indian Air Force
 - ❑ **Air Marshal Jeetendra Mishra** – Indian Air Force
 - ❑ **Air Marshal A.K. Bharti** – Indian Air Force
 - ❑ **Lt Gen Rajiv Ghai** – Indian Army
 - ❑ **Lt Gen Pratik Sharma** – Indian Army
 - ❑ **Vice Admiral Sanjay Jasjit Singh (Retd.)** – Indian Navy

GOLDEN DOME MISSILE DEFENSE SYSTEM

Context:

U.S. President has unveiled the Golden Dome Missile Defense System design and appointed a leader for the \$175 billion project, aiming to shield the U.S. from foreign missile threats.



About Golden Dome Missile Defense System:

- **What It Is?**
 - A **next-generation U.S. missile defense program** using space-based and land-based intercept layers to neutralise missile threats.
 - Envisioned as a technological leap beyond [Israel's Iron Dome](#) and Reagan's Strategic Defense Initiative (SDI).
- **Aim:**
 - To eliminate the threat of enemy ballistic, [hypersonic](#), and cruise missiles before they reach U.S. territory.
 - Enhance national security by integrating space, land, and advanced sensor networks.
- **How It Will Work?**
 - **Space-Based Intercept Layer** – Hundreds of satellites detect and destroy missiles during the **boost phase** using interceptors or lasers.
 - **Enhanced Ground-Based Midcourse Defense** – Upgraded interceptors in California and Alaska engage missiles mid-flight.
 - **Five Additional Launch Sites** – Intercept threats in space; three in mainland U.S., two in Hawaii and Alaska.

- **Limited Area Defense Layer** – Protect key population centres with radars, common launchers, and systems like Patriot.
- **Key Features:**
 - **Multi-layered defense:** space-based, midcourse, boost-phase, and terminal protection.
 - Capable of engaging [ICBMs](#), hypersonic weapons, and cruise missiles.
 - Global detection via advanced Hypersonic and Ballistic Tracking Space Sensor Satellites.
 - Collaboration with private sector firms like [SpaceX](#), Palantir, Anduril, L3Harris, Lockheed Martin, RTX.
- **Significance:**
 - **National Security Shield** – Offers comprehensive protection against emerging missile threats.
 - **Technological Advancement** – Builds on [Iron Dome](#) success but extends to global, multi-threat defense.

MISSION SUDARSHAN CHAKRA

Context:

On India's [79th Independence Day](#), Prime Minister of India announced the launch of Mission Sudarshan Chakra, a multi-layered indigenous defence initiative to protect India's strategic, civilian, and religious sites from enemy attacks.



About Mission Sudarshan Chakra:

- **What it is?**
 - A **national security mission** aimed at creating an advanced, multi-layered shield around critical installations across India.
 - Inspired by the mythological *Sudarshan Chakra* of Lord Krishna, blending cultural ethos with modern strategic defence.
- **Nodal Ministry:** Ministry of Defence.
- **Objective:**
 - To develop an **indigenous, research-based security system** to neutralise threats from air, land, sea, and cyber domains.
 - Ensure **self-reliance (Aatmanirbhar Bharat)** in critical defence technology.
 - Provide proactive, integrated protection for vital infrastructure, cities, and sacred places.
- **Features:**
 - **Multi-Layered Defence:** Integrates surveillance, interception, and counter-attack capabilities.
 - **Comprehensive Coverage:** Protects strategic, civilian, and religious sites.
 - **Advanced Technology:** Combines radar, AI-enabled tracking, cyber defence, and physical security systems.
 - **Indigenous Development:** Entirely designed, developed, and produced in India.
 - **Long-Term Plan:** Expansion, modernisation, and strengthening of the system by 2035.
- **Significance:**
 - **Strategic Deterrence:** Comparable in vision to Israel's Iron Dome, adapted for India's diverse threat landscape.
 - **National Sovereignty:** Reduces dependence on foreign defence systems.
 - **Comprehensive Security:** Shields against conventional, hybrid, and cyber threats.

INTERMEDIATE-RANGE NUCLEAR FORCES (INF) TREATY

Context:

Russia has officially declared its withdrawal from the Intermediate-Range Nuclear Forces (INF) Treaty, stating that Western missile deployments now directly threaten its security.

About Intermediate-Range Nuclear Forces (INF) Treaty:

- **What is the INF Treaty?**
 - The Intermediate-Range Nuclear Forces (INF) Treaty was a landmark arms control agreement signed on 8 December 1987 between the United States and the Soviet

Union, during the Reagan-Gorbachev era.

- **Objective:** To eliminate an entire category of nuclear and conventional missiles that posed an immediate threat to Europe and reduce the risk of nuclear escalation.
- **Key Features of the INF Treaty:**
 - **Scope of Weapons Banned:**
 - Banned all ground-launched ballistic and cruise missiles with ranges between **500 and 5,500 km**.
 - Included both nuclear and conventional warheads.
 - **First-of-its-Kind Elimination:** First arms treaty to eliminate an entire class of weapons, not just limit them.
 - **Global Coverage:** Treaty applied to missiles deployed globally, not just in Europe.
 - **Verification Measures:** Introduced on-site inspections, enhancing transparency and trust.
 - **Mutual Disarmament:** Nearly two-thirds of the dismantled missiles were Soviet, rest were American.



- **Implications of Russia's Exit:**
 - **Arms Race Risk:** Removes constraints on missile development in Europe and Asia.
 - **Erosion of Trust:** Weakens arms control dialogue between nuclear powers.
 - **Last Arms Treaty Left:** Only New START Treaty (expires 2026) remains; its future is also uncertain.

BRAHMOS SUPERSONIC CRUISE MISSILE

Context:

Following the success of [Operation Sindoor](#), the Indian Navy and Air Force are preparing large-scale procurement of BrahMos supersonic cruise missiles, citing their precision and combat performance against Pakistani targets.



About BrahMos Supersonic Cruise Missile:

- **What is BrahMos?**
 - BrahMos is a **two-stage supersonic cruise missile**, jointly developed by **India's DRDO** and **Russia's NPOM**.
 - It is the world's fastest operational cruise missile, operating at speeds of Mach 2.8–3.0.
- **Key Specifications:**
 - **Range:** ~290 km (extended-range versions under development).
 - **Warhead:** 200–300 kg (conventional explosive).
 - **Speed:** **Supersonic** throughout flight; significantly reduces enemy response time.
 - **Platforms:** Can be launched from **land, air, sea, and sub-sea** platforms.
- **Special Features:**
 - **Fire-and-Forget system:** Requires no further guidance post-launch.
 - **Stealth features:** Low radar cross-section enhances survivability.
 - **Multiple flight trajectories:** High, low, or mixed profiles for tactical flexibility.
 - **Kinetic punch:** 9x more kinetic energy than subsonic missiles at impact.
 - **Pinpoint accuracy:** High kill probability even against moving targets.
- **Strategic Significance:**
 - Used extensively during **Operation Sindoor**, neutralising critical terrorist infrastructure and military assets inside Pakistan.

- Enhances India's **precision-strike capabilities** and **deterrence posture** against regional threats.
- Supports the goals of '[Atmanirbhar Bharat](#)' by relying on indigenous systems for national security.

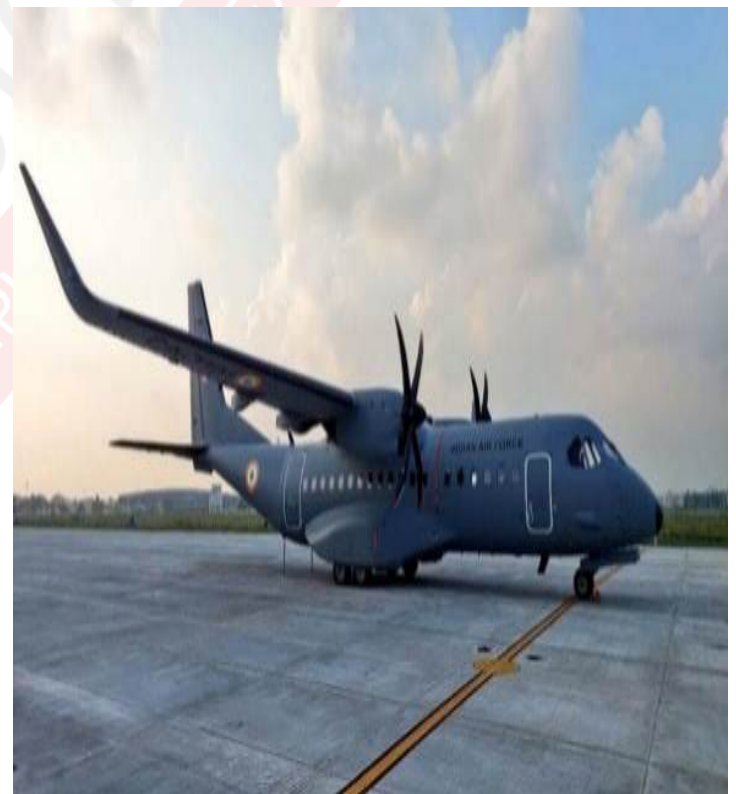
- **Operational Status:**

- **Navy:** Equipped on **Rajput** and **Visakhapatnam-class destroyers** and **Veer-class corvettes**.
- **Army:** Multiple regiments operational with mobile launchers.
- **Air Force:** Integrated with **Su-30 MKI**, extending strike range over land and sea.

AIRBUS C-295 AIRCRAFT

Context:

India received the final unit of 16 Airbus C-295 transport aircraft from Spain two months ahead of schedule, marking a milestone in its [strategic airlift modernization](#).



About Airbus C-295 Aircraft:

- **What It Is?**
 - A **medium tactical transport aircraft** designed for troop movement, logistics, MEDEVAC, and maritime surveillance.
- **Developed By:** Initially developed by **Spanish aerospace firm CASA** in the 1990s and now under Airbus Defence & Space.

- **Objective:** To replace the ageing HS-748 Avro fleet and enhance India's tactical airlift and mission capabilities across varied terrains.
- **Key Features:**
 - **Multirole Capability:** Can perform troop transport, paratroop drops, disaster relief, MEDEVAC, and maritime patrol.
 - **Advanced Mission Suite:** Equipped with **FITS system**, bubble windows, rear ramp, and touchscreen navigation for real-time situational awareness.
 - **Long Endurance:** Offers **11+ hours** of [persistent surveillance](#) and can operate from short and semi-prepared runways.
 - **Customisation & Cabin Space:** Long cabin allows installation of consoles while retaining cargo/troop space.
- **Indian Significance:**
 - **Total Order:** 56 aircraft – 16 from Spain, 40 to be [Made in India](#) by Tata Advanced Systems (Vadodara).
 - **First Indigenous Military Aircraft Project by Private Sector:** Involves 90% technology transfer and indigenisation of over 13,000 parts.

Strategic Deployment: Enhances airlift in forward areas (e.g., North East, Ladakh, Andaman) and enables quick troop movement during crises

[Miscellaneous](#)

SCI-HUB BAN AND THE 'ONE NATION, ONE SUBSCRIPTION' SCHEME

[Context:](#)

The **Delhi High Court** banned Sci-Hub and its mirror sites following a copyright case by global publishers.

- This has revived the debate on **access to research papers** and the role of the government's [One Nation, One Subscription \(ONOS\)](#) scheme.



TOPIC: ONE NATION ONE SUBSCRIPTION

Why in news?

The Union Cabinet has approved the One Nation One Subscription (ONOS) scheme to provide universal access to international scholarly research articles and journals.



About One Nation One Subscription:

- **Ministry:** Department of Higher Education, Ministry of Education.
- **Central Sector Scheme:** ₹6,000 crore allocated for 2025–2027.
- **Aim:** To provide access to top-quality international research journals to government higher education institutions (HEIs) and central government R&D institutions.
- **Key Features:**
 - Coverage of 30 major international publishers and nearly 13,000 e-journals.
 - Access for 6,300 government HEIs and R&D institutions benefiting 8 crore students, faculty, and researchers.
 - Entirely digital process coordinated by INFLIBNET under UGC.
 - Promotes interdisciplinary and core research, especially in tier-2 and tier-3 cities.
 - Aligned with NEP 2020 and supported by Anusandhan National Research Foundation (ANRF).

www.insightsonindia.com | instacourses.insightsonindia.com

[About Sci-Hub](#)

What it is?

- Founded in 2011 by **Alexandra Elbakyan**, Sci-Hub is a free online repository of millions of research papers.
- It bypasses paywalls, offering access to academic journals without subscriptions.
- Hugely popular among students, researchers, and independent scholars in developing countries.

The Sci-Hub Case

- **Legal challenge:** Elsevier, Wiley, and ACS sued Sci-Hub for copyright infringement. The Delhi HC held Elbakyan in contempt for breaching earlier undertakings.
- **Outcome:** Internet Service Providers were directed to block Sci-Hub and related portals.
- **Significance:** While the verdict upheld intellectual property rights, it left unresolved the larger question of **how ordinary researchers can afford access** in India.

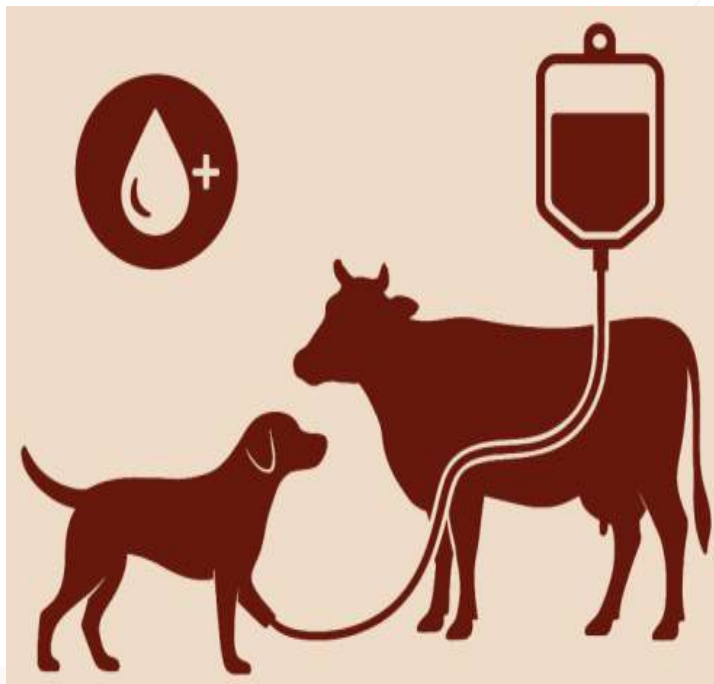
One Nation, One Subscription (ONOS) Scheme

- **Launched in 2024**, with an outlay of ₹6,000 crore for the first phase (2023–26).
- Negotiates **bulk deals with 30 publishers** to give access to **13,000 journals**.
- **Phase I:** Covers public institutions and universities.
- **Phase II:** To include private institutes and colleges.
- Objective: Ensure **universal and legal access to research material** across India, reducing reliance on piracy.

INDIA LAUNCHES FIRST VETERINARY BLOOD TRANSFUSION GUIDELINES 2025

Context:

The Government of India has released the country's first comprehensive guidelines for veterinary blood transfusion services, addressing a major gap in emergency animal healthcare.



About India Launches First Veterinary Blood Transfusion Guidelines 2025:

- **What it is?**
 - A national framework providing **scientific protocols for animal blood donation, storage, and transfusion**, ensuring safety, biosafety, and animal welfare.
- **Launched by:** The **Department of Animal Husbandry and Dairying (DAHD)**, Government of India.
- **Need:**
 - Until now, most animal transfusions in India were done **in emergencies without standardised protocols**.

- No national system for **donor screening, blood typing, storage, or registry**.
- Required for managing **trauma, anaemia, surgical blood loss, infectious diseases, and bleeding disorders** in animals.
- **Key Features:**
 - **Blood typing & cross-matching** mandatory to prevent adverse reactions.
 - **Donor eligibility criteria:** health checks, vaccination requirements.
 - **Voluntary donation** encouraged through a *Donor Rights Charter*.
 - **Veterinary blood banks:** state-regulated, biosafety-compliant infrastructure.
 - **One Health integration** to manage zoonotic disease risks.
 - **Digital National Veterinary Blood Bank Network:** real-time inventory tracking, digital registries, emergency helpline.
 - **Reporting mechanism** for adverse reactions.
 - **Training modules** for veterinary students and professionals.
 - Future innovations: **mobile blood collection units**, preservation of rare blood types, donor–recipient matching apps.

NATIONAL ANUBHAV AWARDS

Context:

The National Anubhav Awards 2025 will be held on 18 August 2025 at Vigyan Bhawan, New Delhi, marking the 10th anniversary of the awards.



About National Anubhav Awards:

- **What is it?**
 - The **National Anubhav Awards** are annual honours recognizing outstanding memoirs by retiring or recently retired Central Government employees, highlighting their experiences and contributions to **governance**.

- **Awarded by:**
 - **Department of Pension & Pensioners' Welfare (DoPPW)**, Ministry of Personnel, Public Grievances and Pensions, Government of India.
- **Launched in:**
 - **2015**, as envisioned by the Prime Minister, Shri Narendra Modi.
 - Part of the [Anubhav Portal](#) initiative to document institutional memory through personal narratives.
- **Aim:**
 - Preserve institutional memory for better governance.
 - Encourage knowledge-sharing and replication of good practices.
 - Recognize valuable feedback, innovation, and service excellence.
- **Eligibility:**
 - **Central Government employees**, employees of **Central Public Sector Undertakings (CPSUs)**, and [Public Sector Banks](#).
 - Must be retiring within 8 months or retired within the last 3 years.
 - Write-ups must be published on the **Anubhav Portal** between 1 April 2024 and 31 March 2025.
- **Features**
 - **Categories covered:** Accounts, administration, governance reforms, IT, research, procedural simplification, public dealing, valor, feedback, and more.
 - **Awards structure:** 5 Best Write-ups + 10 Jury Certificates for other exceptional submissions.
 - **Diversity:** One-third of awardees in 2025 are women.
 - **Recognition expansion:** Includes employees from PSBs and [CPSUs](#) since 2024.
 - **Assessment:** Objective marking system introduced for [transparency](#).

Capacity building:

"Anubhav Awardees' Speak" webinar series for sharing experiences with soon-to- retire employees

KHELO INDIA ASMITA

Context:

The Khelo India [ASMITA Football League 2025-26](#) was inaugurated in Jalgaon, Maharashtra, marking a major step towards affirmative action in sports to boost women's participation.



About Khelo India ASMITA:

- **What It Is?**
 - A dedicated affirmative action sports initiative under the Khelo India programme to increase [women's participation in sports](#), focusing on grassroots talent development, especially among underrepresented communities.
- **Launched In:** 2025–26, with the inaugural football league in Jalgaon, Maharashtra.
- **Ministry:**
 - Ministry of Youth Affairs and Sports
 - Supported by the [Sports Authority of India](#) (SAI), All India Football Federation (AIFF), and Western India Football Association (WIFA).
- **Aim:**
 - Provide a dedicated platform for young girls to showcase and develop sporting skills.
 - Address historical gender imbalances in sports participation.
 - Foster [social inclusion](#) by engaging talent from tribal, rural, and minority backgrounds.
 - Contribute to nation-building through women's empowerment in sports.
- **Key Features:**
 - **Target Group** – Girls aged 13 and under, including first-time players and hidden talent.
 - **Affirmative Action** – Special focus on [marginalised communities](#) to ensure inclusivity.
 - **Platform for Exposure** – Competitive leagues to enhance visibility and scouting opportunities.
 - **Integration with Khelo Bharat Niti** – Aligns with India's long-term sports development and empowerment agenda.
 - **Institutional Support** – Backed by national and state sports bodies for structured development.
 - **Breaking Stereotypes** – Encourages girls to challenge societal norms and become role models.

MAPPING

US SANCTIONS 6 INDIAN COMPANIES OVER IRAN TRADE

Context:

The US Department of State sanctioned 20 global firms, including 6 Indian companies, for engaging in petrochemical trade with Iran.



About US Sanctions 6 Indian Companies Over Iran Trade: What Are the Sanctions?

- The United States imposed sanctions under **Executive Order 13846**.
- Six Indian companies were identified among the 20 entities globally.

Reason for Sanctions:

- These firms **knowingly engaged** in trade of Iranian petrochemical products.
- The US accuses Iran of using oil revenue to fund **terrorist groups**, **oppress its citizens**, and **destabilize** the Middle East.
- The US policy aims to **cut off economic flows** to the Iranian regime.

Implications:

- All **assets under US jurisdiction** belonging to these companies are now frozen.
- US individuals and companies are **barred from doing business** with them.
- Secondary sanctions risk applies to others trading with these firms.
- The move strains **India-US economic diplomacy** and raises compliance risks for Indian exporters.

About Iran:

- **Location:** Southwestern Asia
- **Capital:** Tehran
- **Borders:** Armenia, Azerbaijan, Turkmenistan, Afghanistan, Pakistan, Iraq, Turkey, Persian Gulf, and [Gulf of Oman](#).
- **Geographical Features:**
 - **Mountains:**
 - Zagros Mountains (west-southwest)
 - Alborz Mountains (north, includes [Mt. Damavand](#), Iran's highest peak at 5,671 m)
 - **Plateaus and Deserts:**
 - **Central Plateau** bordered by high mountains
 - **Dasht-e Kavir** and **Lut Desert** dominate the interior
 - **Rivers:**
 - **Karun River** – only navigable river, flows into the Persian Gulf
 - **Zayandeh River** – vital to Isfahan but heavily depleted
 - **Sefid River** – flows into the Caspian Sea

SLOVENIA

Context:

Slovenia has become the first Europe Union (EU) country to impose a total arms embargo on Israel over the [Gaza conflict](#).



About Slovenia:

- **Located in:**
 - A **Central European democratic republic**, formerly part of Yugoslavia.
 - Known for its **Alpine terrain, karst topography, and coastal access**.
 - Joined the **EU and NATO** in 2004, adopting the **Euro** as its currency.
- **Capital:** Ljubljana
- **Neighbours:** Austria, Hungary, Croatia, Italy, and Adriatic Sea (Gulf of Venice)

- **Key Physical Features:**

- **Alpine Highlands (≈40% of land)**
 - **Ranges:** Julian Alps, Karavanke, Kamnik-Savinja Alps
 - **Highest Peak:** Mount Triglav (2,864 m)
 - **Notable Lakes:** Lake Bled, Lake Bohinj
- **Karst Plateau:**
 - Globally known for its [karstic landforms](#): sinkholes, caves, underground rivers
 - Water-scarce, thin soils and low population density
- **Subpannonian Plains:**
 - Rich **alluvial soils** supporting agriculture
 - **Rivers:** Sava, Drava, Mura
 - Most rivers flow toward the **Danube basin**
- **Slovene Littoral:**
 - 47-km coastline on **Gulf of Venice**
 - **Major port:** Koper
 - Known for [Mediterranean influence](#) and river valleys.

About [Krasheninnikov Volcano](#):

- **What It Is?**

- Krasheninnikov is a complex stratovolcano system composed of two overlapping cones within a large caldera. It is named after Russian explorer Stepan Krasheninnikov.

- **Location:**

- Situated on the **eastern coast** of the **Kamchatka Peninsula**, Russia.
- Lies within the **Kronotsky Nature Reserve**, south of **Lake Kronotskoye**.
- Part of the [Pacific Ring of Fire](#), a seismically active zone.

- **Key Features:**

- **Caldera Formation:** Created by a massive eruption approximately **39,000 years ago**.
- **Twin Cones:**
 - **Southern cone** began forming ~11,000 years ago over a period of 4,500 years.
 - **Northern cone** formed afterward, over a similar duration.
- **Lava Type:** Eruptive products include **dacite**, a silica-rich volcanic rock.
- **Elevation:** 1,856 meters above sea level.
- **Historical Dormancy:** Last eruption estimated around **1463–1550 CE** based on [tephrochronology](#).
- **Current Status:** Issued **orange aviation alert** due to 6,000 m-high ash plumes.

About [Dacite](#):

- **What is Dacite?**

- Dacite is an [extrusive igneous](#) (volcanic) rock that forms from the rapid cooling of silica-rich lava on or near the Earth's surface.
- It is compositionally intermediate between andesite and rhyolite, and is commonly found in [subduction zone](#) environments.

- **Key Features of Dacite:**

- **Silica Content:** High in silica (~63–69% SiO₂), contributing to its viscous nature and explosive eruption potential.
- **Mineral Composition:** Dominated by plagioclase [feldspar and quartz](#), with minor biotite, hornblende, or pyroxene.
- **Texture:** Usually fine-grained to porphyritic, with larger crystals (phenocrysts) embedded in a fine matrix.
- **Formation Environment:** Forms in subduction zones where oceanic plates sink beneath continental crust, producing magma through partial melting.

- **Geological Significance:**

- Indicates viscous lava flows and explosive volcanic behavior.
- Acts as a marker for [volcanic arc tectonics](#)

KRASHENINNIKOV VOLCANO

Context:

Russia's Krasheninnikov Volcano in [Kamchatka Peninsula](#) erupted for the first time in over 600 years, days after a major earthquake, raising concerns of earthquake-induced volcanic activity.

RUSSIA VOLCANO

Volcano erupts for the first time in 600 years



and continental crust evolution.

- Presence of dacite is a key signal in volcanic hazard assessment.

INDIA-PHILIPPINES NAVAL EXERCISE

Context:

India and the [Philippines](#) conducted their first-ever bilateral joint naval drill in the South China Sea, marking a significant step in maritime cooperation amid rising tensions in the region.



About India-Philippines Naval Exercise:

- **Purpose:** To enhance maritime cooperation and interoperability between the two navies, and to assert freedom of navigation in contested waters.
- **Location:** Conducted **within the Philippine Exclusive Economic Zone (EEZ)** in the South China Sea over two days.
- **Indian Naval Assets:**
 - INS Delhi (guided missile destroyer)
 - INS Shakti (fleet tanker)
 - INS Kiltan (anti-submarine warfare corvette)
- **Significance:**
 - A symbolic counter to China's assertive nine-dash line claim.
 - Reinforces India's [Act East Policy](#) and regional partnerships under the "**Necklace of Diamonds**" strategy.
 - Boosts defence diplomacy and [freedom of navigation operations](#) (FONOPs).

About South China Sea:

- **What it is?**
 - A marginal sea of the western Pacific Ocean, the South China Sea is one of the world's busiest and most contested maritime

regions.

- **Located in:** South of mainland China; stretches from the [Taiwan Strait](#) in the northeast to the Strait of Malacca in the southwest.
- **Neighbouring Nations:**
 - China, Taiwan, Philippines, Vietnam, Malaysia, Brunei, Indonesia.
 - Subject of overlapping EEZ claims, especially due to **China's controversial "Nine-Dash Line"**.
- **Physical Features:**
 - **Area:** ~3.68 million sq. km
 - **Depth:** Max depth of 5,016 m at the **China Sea Basin**
 - **Prominent Islands/Shoals:** Paracel Islands, [Spratly Islands](#), Macclesfield Bank, Scarborough Shoal
 - **Major Rivers Draining into the Sea:**
 - Pearl River (China)
 - Red River (Vietnam)
 - Mekong River (Vietnam)

UTTARKASHI DISTRICT

Context:

At least four people died and several others went missing after a [cloudburst](#) triggered flash floods in Uttarkashi's Dharali area.



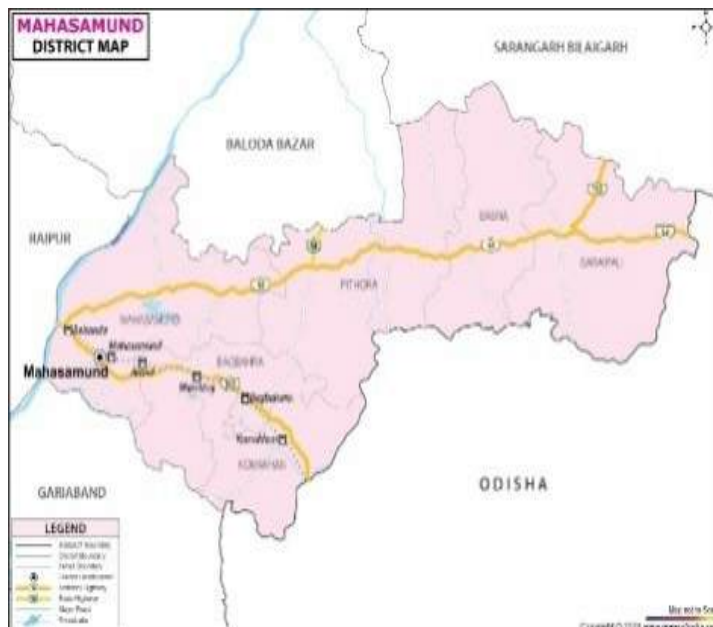
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About Uttarkashi District:

- **What It Is?**
 - Uttarkashi is a **northern Himalayan district**

in Uttarakhand and part of the **Garhwal division**, created on **February 24, 1960**.

- **Location:** Located in the **north-western corner of Uttarakhand**, it borders **Himachal Pradesh, Tibet (China)**, and Indian districts Chamoli, Rudraprayag, Tehri Garhwal, and Dehradun.
- **Historical Significance:**
 - Nicknamed “**Kashi of the North**”, Uttarkashi shares spiritual similarities with **Varanasi**, lying between the rivers **Varuna (Syalam Gad)** and **Asi (Kaligad)**.
 - The region finds mention in the **Mahabharata**, with references to sages like **Jada Bharatha**, and ancient tribes such as **Kiratas, Khasas, and Kunindas**.
 - Uttarkashi district, Uttarakhand — a region known as the “**Water Tower of India**”



Key Rivers from Uttarkashi

River	Origin	Type	Joins
Bhagirathi	Gaumukh Glacier, Gangotri	Glacier-fed	Becomes Ganga at Devprayag
Yamuna	Yamunotri Glacier	Glacier-fed	Joins Ganga at Allahabad
Tons (Tamas)	Bandarpunch Glacier	Glacier-fed	Joins Yamuna near Dehradun
Jadh Ganga	Nelang Valley / Mana region	Glacier-fed	Joins Bhagirathi
Asi Ganga	Near Dodi Tal	Hill stream	Joins Bhagirathi

Cultural and Religious Importance:

- Uttarkashi hosts **Gangotri** and **Yamunotri**, sources of the **Ganga (Bhagirathi)** and **Yamuna**, making it a key pilgrimage destination.
- The **Manikarnika Ghat** and **Vishwanath Temple** here reflect deep religious parallels with Varanasi.

BHALUKONA–JAMNIDIH BLOCK

Context:

A potential Nickel–Copper–Platinum Group Elements (Ni–Cu–PGE) mineral zone has been discovered in the Bhalukona–Jamnidih block, Chhattisgarh, marking a breakthrough in India’s [strategic mineral exploration](#).

About Bhalukona–Jamnidih block:

- **What It Is?**
 - A geologically rich block containing **Ni–Cu–PGE sulphide mineralisation**, recently licensed to **Deccan Gold Mining Ltd. (DGML)**.
- **Location:** Located in **Mahasamund district, Chhattisgarh**, 70 km from Raipur, and part of the **Neo-Archaean** Sonakhan Greenstone Belt in the Bastar Craton.
- **Key Features:**
 - Hosts **mafic-ultramafic intrusives** like gabbro, pyroxenite, and meta-olivine websterite.
 - Sulphide mineralisation found up to **300 metres deep**
 - Mineralisation is **disseminated and bleb-type**, with **pyrite, chalcopyrite, and pyrrhotite**
 - Adjacent to **Kelwardabri block** held by Vedanta, forming a future **critical mineral hub**
- **Scientific Significance:**
 - G4-level exploration by Geological Survey of India confirmed mineral potential
 - IP and drone-based magnetic surveys revealed a **700-metre-long mineralised zone**
 - High-potential zone for **Ni–PGE–Cr–Cu**
 - Represents **volcano-sedimentary evolution** and **complex magmatic history**

About Ni–Cu–PGE (Nickel–Copper–Platinum Group Elements):

- **What They Are?**
 - A group of **critical and strategic metals** found in sulphide-rich mafic-ultramafic

rocks. They often occur together in complex geological formations.

- **Applications:**
 - **Nickel (Ni):** Used in [EV batteries](#), stainless steel, aerospace components.
 - **Copper (Cu):** Essential for electric wires, renewable energy systems, electronics.
 - **PGE (Pt, Pd, Rh):** Used in [catalytic converters](#), fuel cells, and green hydrogen production.
 - Strategic for clean energy transition, defence, and advanced electronics.
- **National Relevance:**
 - India's import-dependent sectors (EVs, electronics) rely heavily on these minerals.
 - Supports India's [Critical Minerals Strategy](#) and [net-zero carbon goals](#).

SUDAN CIVIL WAR

Context:

A Sudanese airstrike hit Nyala Airport in Darfur, killing 40 Colombian mercenaries and destroying a suspected UAE-supplied aircraft linked to RSF.



About Sudan:

- **What It Is?**
 - Sudan is a **northeastern African country** currently undergoing a **civil war** between the Sudanese Armed Forces (SAF) and the paramilitary [Rapid Support Forces](#) (RSF) since April 2023.
- **Capital:** Khartoum – Located at the confluence of the Blue Nile and White Nile, forming the world's longest river system.
- **Neighbouring Nations:** Egypt, Eritrea, Ethiopia, Red Sea, South Sudan, Chad, Central African Republic and Libya.

Key Geographical Features:

- **Rivers:**
 - **White Nile** and **Blue Nile** converge in Khartoum, forming the **Nile River** that flows north into Egypt.
 - **Seasonal rivers** in western Sudan (Darfur) often dry up before reaching the Nile.
- **Mountains:**
 - **Marrah Mountains (Darfur):** Volcanic highlands, ~3,000 m elevation, form the **Nile–Congo watershed**.
 - **Red Sea Hills:** Uplifted escarpment with rugged terrain.
 - **Nuba Mountains:** Inselbergs rising from clay plains.
- **Desert & Plains:**
 - **Nubian Desert** and **Qawz Region:** Rock deserts and sand dunes in the north.
 - **Clay Plains:** Fertile black soils in central Sudan, especially the **Gezira Plain**.
 - **Alluvial Soils:** Along the Nile and seasonal streams.
- **Region in News: South Darfur (Nyala):**
 - **Nyala:** Capital of **South Darfur**, currently controlled by RSF.
 - Strategically important for its **airstrip**, **gold smuggling routes**, and **proximity to Chad**.

SEA OF GALILEE

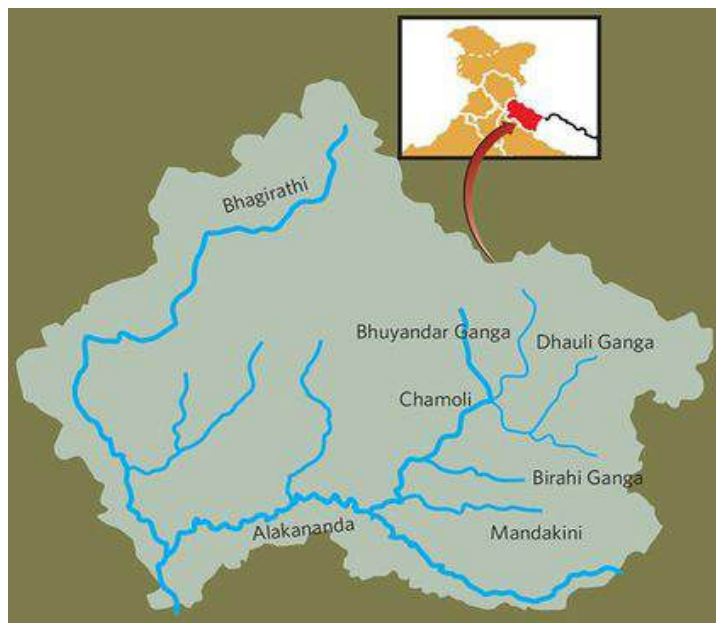
Context:

The Sea of Galilee in [Israel](#) has mysteriously turned red, alarming locals and tourists. Investigations revealed the cause to be algae blooms of [Botryococcus braunii](#), linked to climate change and rising global temperatures.



About Sea of Galilee:

- **What it is?**
 - A **freshwater lake** in northern Israel, historically significant in Christianity and Judaism.
 - Known as **Lake of Gennesaret** in the New Testament and **Sea of Chinnereth** in the Old Testament.
- **Location:**
 - Situated in the **Jordan Rift Valley**, fed mainly by the **Jordan River**.
 - Bordered by **Lower Galilee hills** (west & southwest) and **Golan Heights** (east).
- **Neighbouring Areas:**
 - Plain of Gennesaret to the northwest.
 - Plain of Bet Zayda (Syria) to the northeast.
 - Valley of the **Yarmūk River** to the southeast.
- **Key Features:**
 - **Geographical Stats** – Surface area of 166 sq. km, depth up to 48 metres, 13 miles long, 7 miles wide.
 - **Climate** – Mild winters (~14°C) and hot summers (~31°C), supporting agriculture like bananas, dates, citrus, and vegetables.
 - **Economic Role** – Source for fishing, irrigation, tourism, and Israel's **National Water Carrier project**.
 - **Cultural Significance** – Site of biblical events including the **Sermon on the Mount**, home to ancient cities like Tiberias and Capernaum.
- **Issue:**
 - **Cause** – Bloom of *Botryococcus braunii*, a green algae producing **red carotenoid pigments** when exposed to sunlight.
 - **Trigger** – Climate change-induced warming and nutrient-rich waters (phosphorus, nitrogen) creating ideal conditions for bloom.
 - **Impact** – While not harmful to humans, blooms can block sunlight underwater, cause **hypoxia** upon decomposition, and disrupt aquatic ecosystems.
 - **Past Incidents** – Similar colouration observed in **Dead Sea sinkholes (2022)** due to algae growth.



About Bhagirathi River:

- **What It Is?**
 - A major **Himalayan River** and one of the two headstreams of the Ganga.
 - Holds mythological significance in Hinduism as the river brought to earth by King Bhagiratha.
- **Origin:**
 - Emerges from the **Gaumukh glacier** at an elevation of **3,892 m** in Uttarakhand's Gangotri region.
- **States Flow Through:**
 - **Uttarakhand** (primary state) — flows through towns such as Gangotri, Harsil, Uttarkashi, Tehri, and **Devprayag**.
- **Tributaries:**
 - **Kedar Ganga** – at Gangotri.
 - **Jadh Ganga** – at Bhaironghati.
 - **Kakora Gad, Jalandhari Gad, Siyan Gad** – near Harsil and Jhala.
 - **Asi Ganga** – near Uttarkashi.
 - **Bhilangna River** – near Old Tehri (originates from Khatling Glacier).
- **It Is Tributary Of:** Joins Alaknanda River at Devprayag, after which the river is known as the **Ganga**.
- **Key Features:**
 - **Hydrological Significance** – Although mythologically considered the Ganga's source, hydrologically the **Alaknanda** has greater length and discharge.
 - **Cultural Importance** – Sacred to Hindus and linked with legends from the Ramayana and Puranas.
 - **Dynamic Morphology** – Prone to course changes due to landslides, floods, and high sediment load in the tectonically active Himalayas.
 - **Strategic Infrastructure** – **Tehri Dam** built at

BHAGIRATHI RIVER

Context:

A recent flash flood in Dharali, Uttarakhand altered the course of the Bhagirathi River, forcing the **Kheer Gad tributary** back to its old channel and significantly reshaping the river's morphology, as confirmed by ISRO satellite imagery.

the confluence with Bhilangna River.

- **Environmental Sensitivity** – Originates in an ecologically fragile zone, prone to glacial meltwater surges and [flash floods](#).

DARDANELLES STRAIT

Context:

The Dardanelles Strait in northwestern [Turkey](#) has been temporarily closed to maritime traffic due to wildfires near Çanakkale, prompting evacuations and firefighting operations.



About Dardanelles Strait:

- **What it is?**
 - A narrow, natural sea channel connecting the [Aegean Sea](#) to the [Sea of Marmara](#).
 - Historically known as the **Hellespont**, it has been a key passageway since ancient times for trade and military strategy.
- **Location:**
 - Situated in **northwestern Turkey**, separating **Europe's Gallipoli Peninsula** (northwest) from **Asia Minor** (southeast).
 - Lies entirely within **Turkey's territorial waters**.
- **Features:**
 - **Length & Width:** 61 km long, width ranges from 1.2 km to 6.5 km.
 - **Depth:** Average depth ~55 m, maximum ~90 m in central narrow sections.
 - **Currents:** Surface current flows from the [Sea of Marmara](#) to the Aegean; an undercurrent carries saline water in the opposite direction.
 - **Ports & Settlements:** Major ports include Gallipoli, Eceabat, and Çanakkale.
 - **Historical Significance:** Key battleground in ancient wars, the Persian invasion (480 BCE), [Alexander's expedition](#) (334 BCE), and WWI's Gallipoli Campaign.
- **Implications:**

- **Global Trade:** Closure disrupts shipping between Europe, Asia, and the Black Sea via the Bosphorus.
- **Geopolitical Importance:** Acts as a maritime chokepoint crucial for Turkey's strategic influence and [NATO security](#) interests.

NEPAL

Context:

Nepal has waived climbing fees for 97 lesser-known mountains in the western **Karnali** and [Sudurpaschim provinces](#) to boost tourism, attract climbers beyond [Everest](#), and support local economies.



About Nepal:

- **What It Is?**
 - A **landlocked country** in [South Asia](#), known for its rugged Himalayan terrain and rich cultural heritage.
 - One of the least developed nations but strategically important due to its position between India and China.
- **Neighbouring Nations:** India and [Tibet Autonomous Region](#) of China.
- **Capital:** Kathmandu
- **Key Features**
 - **Mountains:**
 - Home to **8 of the world's 10 highest peaks**, including:
 - **Mount Everest** (8,849 m) – highest in the world.
 - [Kanchenjunga](#), Lhotse, Makalu, Cho Oyu, Dhaulagiri, Manaslu, [Annapurna](#).
 - **Rivers:**
 - Major river systems flowing southwards into India: [Kosi](#), Narayani (Gandak) and [Karnali](#).
 - High hydropower potential due to steep gradients and [glacial origins](#).

KISHTWAR DISTRICT

Context:

A massive cloudburst struck Chosoti village in Kishtwar district, Jammu & Kashmir, killing at least 12 people. The [Machail Mata Yatra](#) has been suspended as rescue and relief operations continue.



About Kishtwar District:

- **What it is?**
 - A town, [municipality](#), and administrative headquarters of Kishtwar district in Jammu & Kashmir.
- **Location:** Situated in the Jammu division, ~209 km from Srinagar and ~211 km from Jammu.
- **Region & Geography:**
 - Mountainous terrain, comparable to Himachal and [Ladakh regions](#).
 - Borders Himachal Pradesh (SE) and Doda district (SW).
 - Receives significant snowfall in winter and habitation found at altitudes up to 9,500 ft.
- **Features:**
 - Known as the “Land of [Saffron](#), Sapphire, and Shrines.”
 - Rich in forests, tourist spots, health resorts, and historical monuments.

About Machail Mata:

- **What it is?**
 - A revered Hindu shrine dedicated to Goddess Durga, located in Machail village, Sub Division Paddar, Kishtwar district.
- **Location:** Situated near tributaries of the [Chenab River](#) and area also inhabited by Buddhist and

Thakur communities ([serpent worshippers](#)).

- **History:**

- First visited in 1981 by Thakur Kulveer Singh of Bhaderwah.
- Since 1987, the annual ‘Chhadi Yatra’ (holy mace procession) has been conducted, starting from Chinote in Bhaderwah to Machail in Paddar.

CAUVERY WILDLIFE SANCTUARY (CWS)

Context:

Two tiger cubs were found dead in Cauvery Wildlife Sanctuary (CWS), Karnataka, while their mother tigress has gone missing.



About Cauvery Wildlife Sanctuary (CWS):

- **What It Is?**
 - A **protected area in Karnataka**, declared in **1987** under the Wildlife Protection Act, later expanded to over **1,027 km²** in 2013. It acts as a vital tiger and elephant habitat.
- **Location:**
 - Spread across **Mandya, Chamarajanagar, and Ramanagara** districts of Karnataka.
 - Lies along the [Cauvery River](#) and shares boundaries with **Tamil Nadu’s Dharmapuri forests**.
 - Serves as a wildlife corridor linking **Bannerghatta NP, BRT Tiger Reserve, and MM Hills WS**.
- **Key Features:**
 - **Climate:** Semi-arid, with rainfall from both SW and NE monsoons.
 - **Landscape:** Dry deciduous, thorn forests, riverine patches, and [evergreen sholas](#).
 - **Tourist sites:** Hogenakkal Falls, Mekedatu, Sangam.
- **Flora:**
 - **Dominant trees:** Terminalia arjuna,

Syzygium cumini, Hardwickia binata, Albizia amara, Tamarindus indica.

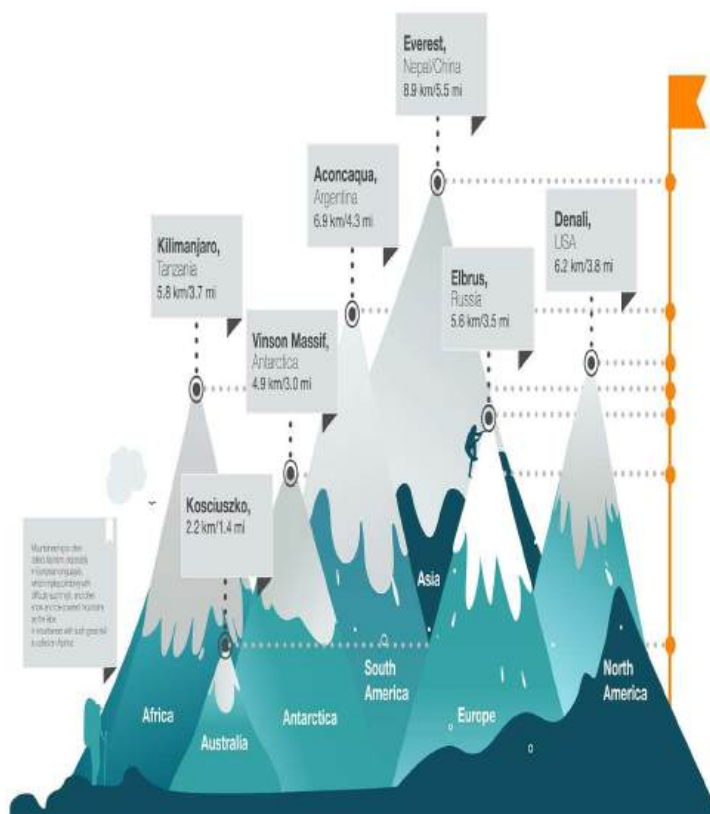
- Mix of deciduous and evergreen vegetation ensures **biodiversity resilience**.

• **Fauna:**

- **Flagship species:** Tiger, [Asian elephant](#), leopard, dhole, sloth bear.
- **Other mammals:** Sambar, spotted deer, barking deer, wild boar, chevrotain, macaques.
- **Endangered fauna:** Grizzled giant squirrel, smooth-coated otter, hump-backed mahseer fish.
- **Birds:** Over 280 species, including [white-rumped vulture](#), Nilgiri wood-pigeon, yellow-throated bulbul.

• **Significance:**

- **Ecological Role** – Maintains genetic connectivity for large carnivores in the Western & Eastern Ghats.
- **Water Security** – Protects the Cauvery River catchment, vital for South India's drinking and irrigation needs.



MOUNT ELBRUS

Context:

Arunachal Pradesh Governor hailed Kabak Yano for successfully scaling Mount Elbrus, the highest peak in Russia and Europe.

About Mount Elbrus:

- **What it is?**
 - A dormant stratovolcano and the highest peak in Europe.
 - Recognised as part of the Seven Summits Challenge.
- **Location:** Situated in the **Caucasus Mountains**, southwestern Russia, near the **Georgia border**.
- **Nations Spread Across:** Lies entirely in **Russia**, but close to **Georgia** and the wider **Caucasus region**.
- **Features:**
 - **Height:** 5,642 metres (18,510 feet) above sea level.
 - **Form:** Twin-coned extinct volcano formed 2.5 million years ago.
 - **Glaciers:** **22 glaciers** cover ~138 sq km, feeding rivers like Kuban and Terek.
 - **Recognition:** Among the **world's top ten most prominent peaks**.

About **Seven Summits Challenge:**

What it is?

- A prestigious mountaineering feat of climbing the **highest peak in each continent**.
- First proposed and completed by **Richard Bass (1985)**.
- Represents physical endurance, mental toughness, and global adventure spirit.

Mountains Involved (Messner Version):

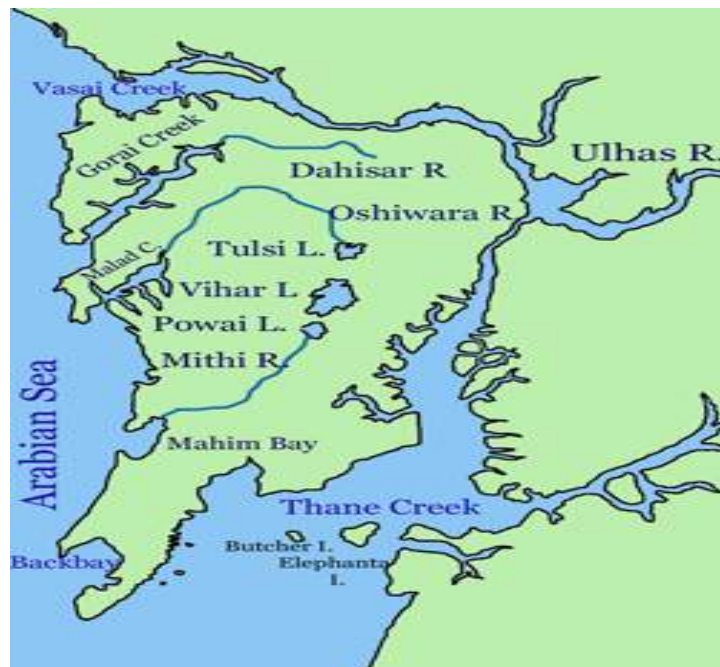
1. **Asia** – Mount Everest (8,848 m)
2. **South America** – Aconcagua (6,962 m)
3. **North America** – Denali / Mt. McKinley (6,194 m)
4. **Africa** – Mount Kilimanjaro (5,895 m)
5. **Europe** – Mount Elbrus (5,642 m)
6. **Antarctica** – Vinson Massif (4,892 m)

Oceania (Australasia) – Puncak Jaya / Carstensz Pyramid (4,884 m)

RANTHAMBORE NATIONAL PARK

Context:

Twenty tourists were left stranded during a [tiger safari](#) in Ranthambore National Park after their canter broke down and the guide abandoned them.



About Ranthambore National Park:

Location:

- Situated in **Sawai Madhopur district, Rajasthan**, at the junction of the **Aravalli and Vindhya ranges**.
- Spread over **1,334 sq. km** (core area ~275 sq. km).

History:

- Declared **Sawai Madhopur Game Sanctuary in 1955**.
- Became a **Project Tiger Reserve in 1973**.
- Upgraded to **National Park in 1980**.
- Surrounding forests designated as **Sawai Mansingh & Kailadevi Sanctuaries**.

Features:

- **Terrain:** Dry deciduous forests, rocky outcrops, grassy meadows, interspersed with lakes.
- **Fort Heritage:** 10th-century **Ranthambore Fort** (UNESCO tentative list), with temples of Ganesh, Shiva, and Jain shrines.
- **Water Bodies:** Padam Talao (largest lake), Jogi Mahal on its edge.
- **Flora:** Over **300 plant species**, many with medicinal value.
- **Fauna:** Known for **Royal Bengal Tigers** often sighted in daylight; also leopards, hyenas, jackals, nilgai, sambar, chital, langurs, sloth bears, and over **270 bird species**.

MITHI RIVER

Context:

Mumbai witnessed 300 mm of rainfall in 24 hours, causing severe waterlogging. The **Mithi River** swelled to 3.9 metres, forcing evacuation of 400 residents from low-lying areas.

About Mithi River:

• **What it is?**

- A seasonal river in Mumbai, acting as a natural stormwater drain, but heavily degraded due to pollution and encroachment.

- **Location:** Flows through Mumbai's suburbs including Powai, Saki Naka, Kurla, Kalina, Vakola, Bandra Kurla Complex, Dharavi, and Mahim.

- **Origin:** Begins from the **overflow of Vihar Lake** and also receives water from **Powai Lake** about 2 km downstream.

- **Mouth:** Empties into the **Arabian Sea at Mahim Creek**, after a stretch of ~18 km.

• **Features:**

- Average width: 5 m in upper reaches, widened up to 70 m near Mahim after the 2005 floods.
- Pollution hotspot due to raw sewage, industrial effluents, garbage dumping, and encroachments.
- Ecologically degraded, reducing its flood-carrying capacity and increasing flood risks during heavy rainfall.

NIGERIA

Context:

At least 50 people were killed and 60 abducted after gunmen attacked a mosque and homes in Katsina state, northwest Nigeria during dawn prayers.



About Nigeria:

- **Location:** Situated on the [western coast of Africa](#).
- **Capital:** Abuja (since 1991).
- **Neighbouring Nations:** Niger, Chad, Cameroon, Gulf of Guinea (Atlantic Ocean) and Benin.
- **Key Geographical Features:**
 - **Rivers & Basins:**
 - **Niger River** and its tributary [Benue River](#) form the main drainage system.
 - **Niger Delta** is one of the world's largest wetlands.
 - **Mountains & Plateaus:**
 - **Jos Plateau** in central Nigeria with extinct volcanoes.
 - **Chappal Waddi (2,419 m)** – highest peak, part of the **Cameroon Highlands**.
 - Other ranges: **Shebshi Mountains**, **Udi-Nsukka Escarpment**.
 - **Plains & Soils:**
 - **Sokoto Plains** (northwest) and **Borno Plains** (northeast).
 - Fertile [savanna soils](#) in central regions, forest soils in the south.
 - **Climate:** Ranges from **arid (north)** to **humid equatorial (south)**.
 - **Natural Resources:** Abundant **petroleum** and [natural gas](#) deposits – backbone of Nigeria's economy.

UGANDA

Context:

On **21 August 2025**, [Uganda](#) announced that it had agreed in principle to a deal with the **United States** to accept deported migrants, provided they **do not have criminal records** and are **not unaccompanied minors**.



About Uganda:

- **Location:** Landlocked country in **East Africa**, straddling the equator.
- **Capital:** **Kampala** (economic hub).
- **Neighbouring Nations:** Kenya (E), South Sudan (N), DRC (W), Rwanda (SW), Tanzania (S).

Key Geographical Features

Rivers & Basins:

- **White Nile** rises from [Lake Victoria](#) at Jinja; flows north via **Victoria Nile** to Lakes **Kyoga** and **Albert**, then into South Sudan.
- Extensive lake system: **Victoria**, **Albert**, **Edward**, **Kyoga** — fisheries and inland transport lifelines.

Mountains & Plateaus:

- **Rwenzori Mountains** (W) with **Mount Stanley / Margherita Peak (5,109 m)** — Africa's 3rd highest.
- **Mount Elgon (4,321 m)** on the Kenya border; extinct volcanic massif.
- Western arm of the [East African Rift](#) shapes the **Albertine Graben**.

Plains & Soils:

- Central **Uganda Plateau** (~1,000–1,300 m).
- **Volcanic and ferrallitic soils** in the east and southwest; **savanna soils** in central and north support banana, coffee, maize.

Climate:

- **Tropical but altitude-moderated**; bimodal rains in most areas (**Mar–May**, **Sep–Nov**).
- **More arid** toward the north and northeast; humid around the Lake Victoria basin.

Natural Resources:

- **Agriculture:** Coffee (major export), tea, cotton, fish (Lake Victoria), matooke (bananas).
- **Minerals:** Gold, copper, cobalt, iron ore, phosphates, limestone.
- **Energy:** **Crude oil** in the **Albertine Graben** (Lake

Albert basin); growing **hydropower** on the Nile.

ALGERIA

Context: On **21 August 2025**, the Indian Army announced that **Chief of the Army Staff (COAS) General Upendra Dwivedi** will visit **Algeria** next week.



About Algeria:

Location

- **North Africa**, along the **Mediterranean Sea**.
- Largest country in Africa by area.

Capital

- **Algiers**, located on the Mediterranean coast; political and economic hub.

Neighbouring Nations

- Tunisia and Libya (NE), Niger (SE), Mali and Mauritania (S), Western Sahara (SW), Morocco (W).
- Northern coastline borders the **Mediterranean Sea**.

Key Geographical Features

Mountains & Highlands

- **Tell Atlas** along the north, parallel to the Mediterranean coast.
- **Saharan Atlas** further south, merging into the desert.
- **Ahaggar (Hoggar) Mountains** in southern Algeria; includes Mount Tahat (3,003 m), the highest peak.

Deserts & Plains

- Nearly **80% of Algeria** is **Sahara Desert**—rocky plateaus, sand dunes, and oases.
- **M'zab Valley** – UNESCO World Heritage site, known for fortified settlements.
- **Northern fertile plains** (Mitidja Plain) support agriculture.

Rivers & Water Systems

- No permanent rivers; mostly **wadis** (seasonal rivers).
- Important wadis: **Chelif (longest river)** and Soummam.
- Reliance on aquifers and oases in desert regions.

Climate

- **Mediterranean climate** along the north coast (wet winters, dry summers).
- **Steppe climate** in high plateaus.
- **Arid desert climate** in the Sahara (extreme diurnal temperatures, scarce rainfall).

FIJI

Context: **Fiji Prime Minister Sitiveni Rabuka** is on a three-day visit to India, his first in the current capacity, to strengthen bilateral relations and deepen people-to-people ties.



About Fiji:

- **What it is?**
 - Sovereign island nation in **Melanesia, Oceania**, officially known as the **Republic of Fiji**.
 - Known for strategic location in the South Pacific and rich natural resources.
- **Location:**
 - Lies in the **South Pacific Ocean**, about

2,000 km northeast of New Zealand.

- Surrounded by the **Koro Sea**, part of Oceania's Pacific archipelago.
- **Capital:** Suva – situated on the island of Viti Levu.
- **Key Features:**
 - **Archipelago:** 330+ islands, ~110 permanently inhabited, along with 500 islets.
 - **Major Islands:** Viti Levu & Vanua Levu (home to 87% of the population).
 - **Geography:** Volcanic origin with geothermal activity (notably on Vanua Levu & Taveuni).
 - **Demography:** Austronesian & Melanesian ancestry with Polynesian influences.
 - **Currency:** Fijian Dollar (FJD).

OMAN

Context: [Oman](#) has set a target to attract one million Indian tourists annually, up from 7 lakh visitors in 2024, as part of its tourism diversification strategy supported by better connectivity and liberal visa policies.



About **Oman**:

- **What it is?**
 - A country on the southeastern coast of the [Arabian Peninsula](#) at the confluence of the Persian Gulf and Arabian Sea.
- **Capital:** Muscat.
- **Borders:** Yemen, Saudi Arabia, UAE, Gulf of Oman and Arabian Sea
- **Key Features:**
 - Rugged [Hajar Mountains](#) and fertile coastal plains (Al-Bāṭinah, Dhofar).
 - Desert interior forming part of **Rub' al-Khali (Empty Quarter)**.
 - Strategic location near the [Strait of Hormuz](#).
 - Known historically for **frankincense and seafaring trade**.
 - **Climate:** Hot & dry interior, humid coasts and Dhofar influenced by monsoon.

EAST CHINA SEA

Context: China rejected Japan's protest over its development of gas fields in the **disputed East China Sea**, where both nations' [Exclusive Economic Zone \(EEZ\)](#) claims overlap.



About the [East China Sea](#)

What it is?

- A marginal sea of the **Western Pacific Ocean**, bounded by China, Japan, Taiwan, and South Korea.
- Known for its **geopolitical disputes**, rich **fisheries**, and potential **oil & natural gas reserves**.
- Plays a central role in **maritime security and freedom of navigation in Asia**.

Location

- Lies **east of China's coast** and **south of Japan's Kyushu & Ryukyu Islands**.
- Connected to:
 - **Yellow Sea** (to the north) via the Korea Strait.
 - **South China Sea** (to the south) via the Taiwan Strait.
 - **Pacific Ocean** (to the east).

Key Features

- **Area:** ~1,249,000 sq. km.
- **Depth:** Generally shallow; average depth ~350 m.
- **Borders:**
 - West → China (Shanghai, Zhejiang, Fujian provinces).
 - East → Japan (Kyushu, Okinawa/Ryukyu Islands).
 - South → Taiwan.
- **Important Islands:** Senkaku/Diaoyu Islands (contested by China, Japan, Taiwan).
- **Seas & Straits:** Korea Strait, Taiwan Strait, Miyako Strait.

Geopolitical Disputes

- **China vs. Japan:** Over EEZ boundaries; Japan

advocates the **median line principle**, while China claims the **continental shelf** extending to the Okinawa Trough.

- **Senkaku/Diaoyu dispute:** Uninhabited islands, administered by Japan but claimed by China and Taiwan.
- **Gas & oil exploration:** Both countries seek rights to exploit undersea hydrocarbons.

GANGOTRI GLACIER

Context:

A new study by IIT Indore, ICIMOD (Nepal), and U.S. researchers has found that the **Gangotri Glacier** system has lost about 10% of its snowmelt flow in the last four decades (1980–2020).



About Gangotri Glacier

What it is?

- The **largest glacier in the Garhwal Himalayas**, source of the Bhagirathi river (headstream of the Ganga).
- Length ~30 km, covering an area of ~143 sq. km.
- Considered sacred in Hinduism, with its snout at **Gaumukh cave** revered as the origin of the Ganga.

Location

- Situated in **Uttarkashi district, Uttarakhand**, within **Gangotri National Park**.
- Lies in the central Himalaya, part of the Greater Himalayan ranges.
- Surrounded by peaks like **Shivling, Thalay Sagar, Meru, and Bhagirathi group**.

Key Features

- **Fed by snowmelt, glacier melt, rainfall, and base flow.**
- Supplies ~25% of Ganga's water in non-monsoon months.
- Flow composition (1980–2020):
 - Snowmelt – 64%
 - Glacier melt – 21%

- Rainfall-runoff – 11%
- Base flow – 4%

Climate Change Impact

- **Snowmelt share declining:** from 73% (1980–90) to 63% (2010–20).
- **Temperature rise:** +0.5°C in 2001–2020 vs. 1980–2000.
- **Peak flow shift:** from **August → July**, due to earlier summer melting.
- Increased role of rainfall-runoff and base flow, showing **warming-induced hydrological changes**.
- Glacier snout retreating steadily — corroborated by other Himalayan studies showing **46 cm annual thickness loss** on average.

Strategic Importance

- **Water security:** Vital for millions dependent on Ganga basin.
- **Hydropower:** Changes in seasonal discharge affect electricity generation.
- **Agriculture:** Altered flow patterns risk irrigation shortages.
- **Cultural significance:** Sacred river source, central to Hindu faith.

JAPAN

Context:

Prime Minister of India is on an official visit to Japan for the 15th **India–Japan Annual Summit**, his first meeting with Japanese PM Shigeru Ishiba, to strengthen the Special Strategic and Global Partnership.



About Japan:

- **Location:** An island nation in **East Asia**, lying in the **North Pacific Ocean**, east of China, Korea, and Russia.
- **Capital:** **Tokyo**, one of the world's most populous and modern cities.
- **Neighbouring Nations:** Bordered by the **Sea of Japan (East Sea)** to the west (separating it from Korea, China, and Russia), **Pacific Ocean** to the east and south, and the **East China Sea** to the southwest.

Geographical Features:

- **Islands:** Japan comprises four main islands — Honshu (largest), Hokkaido, Kyushu, and Shikoku — along with smaller island groups like Ryukyu, Izu, Bonin, and Volcano Islands.
- **Mountains:** Nearly 80% of the land is mountainous, with frequent volcanic activity. Mount Fuji (3,776 m) is the highest and most iconic peak.
- **Rivers & Valleys:** Rivers are generally short, fast-flowing, and form narrow valleys and fertile deltaic plains (Kantō, Nōbi, Osaka).
- **Climate & Vegetation:** Abundant rainfall and mild climate support lush forests, rice fields, and fruit orchards, despite limited arable land.
- **Geology:** Located on the Pacific "**Ring of Fire**", Japan is prone to earthquakes, tsunamis, and volcanic eruptions.

RAVI RIVER

Context:

Recently, floodwaters from the **Ravi River** submerged the **Kartarpur Corridor** complex in **Pakistan's Narowal district**, including Gurdwara Darbar Sahib, stranding over 100 people and forcing large-scale evacuations.



About River Ravi

Location & System

- One of the **three eastern rivers** of the Indus basin allocated to India under the **Indus Waters Treaty (1960)**.
- Flows through **India (Himachal Pradesh, Punjab, J&K)** and **Pakistan Punjab**, before joining the **Chenab**.

Source & Course

- **Origin:** Near Bara Bhangal, in the **Chamba region (Himachal Pradesh)**.
- Passes through **deep gorges in HP**, then into **Punjab plains** via Madhopur.
- Forms a short **India–Pakistan boundary stretch**, enters Pakistan near **Narowal**, passes **Shahdara (Lahore)**, and finally joins the **Chenab** near Ahmadpur Sial.

Tributaries

- **Right bank:** Budhil, Baira, Siul.
- **Left bank:** Ujh (J&K), Basantar, Sewa.

Key Infrastructure (India)

- **Ranjit Sagar (Thein) Dam** – hydropower + irrigation.
- **Shahpur Kandi Project** – downstream storage & irrigation.
- **Madhopur Headworks** – off-take for **Upper Bari Doab Canal (UBDC)**.
- **Chamera Hydropower Projects (HP)**.
- **Proposed Ujh Multipurpose Project (J&K)**.

Physiography & Soil

- Upper gorges in Himalayas; fertile **Doab plains** downstream.
- Alluvial soils in Punjab; **savanna and ferrallitic soils** in sub-mountain tracts.

Climate & Hydrology

- **Snowmelt-fed + monsoonal river**.
- Seasonal floods in Pakistan Punjab (Narowal, Shahdara, Lahore).
- Peak flows during **July–September monsoon**.

Economic & Cultural Significance

- Irrigation lifeline for **Doab tracts** in Punjab.
- Hydropower generation (Chamera, Thein).
- Religious importance – **Kartarpur Sahib** and Sikh heritage.