

## INDEX

### ECONOMIC DEVELOPMENTS

- [India-EFTA Trade and Economic Partnership Agreement](#)
- [Extension of RoDTEP Export Incentive Scheme](#)
- [Sugarcane Production in India](#)
- [Updated Rangarajan Poverty Line](#)
- [Govt Raises MSP for Six Rabi Crops](#)
- [Chinese Dominance in the Electrolyser Market](#)
- [Safeguarding India's Digital Economy](#)
- [Rise in Private Sector Project Announcements](#)
- [Government's Borrowing Plan for Second Half of FY 2025-26](#)
- [Payments Regulatory Board](#)
- [PM-SETU Scheme](#)
- [NITI Aayog Proposes Presumptive Tax Regime](#)
- [Critical Mineral Recycling Incentive Scheme \(CMRIS\)](#)
- [Low Altitude Economy](#)
- [RBI Measures to Boost Rupee Internationalisation](#)
- [Policy Push for Cooperative and Agricultural Self-Reliance](#)
- [CIL-IRCON MoU for Coal Transportation](#)
- [Expansion of RBI's Integrated Ombudsman Scheme](#)
- [India-Brazil Bilateral Trade Target USD 20 Billion](#)
- [India-UK Bilateral Talks](#)
- [India-Qatar Joint Meetings 2025](#)
- [UAE Introduces Sugar Tax](#)
- [Navi Mumbai International Airport Inaugurated](#)
- [Foreign Currency Settlement System at GIFT City](#)
- [India's Growth Forecast](#)
- [CII Seeks Reforms to Strengthen ITAT Efficiency](#)
- [G20 Likely to Miss 2027 Cross-Border Payment Targets](#)
- [Securities Transaction Tax](#)
- [RBI Proposals for Revising Credit Risk Rules](#)
- [Global Fintech Fest 2025](#)
- [Paradox of Women in Indian Farms](#)
- [India's Rising Computer Services Exports and AI Integration](#)
- [Small Farms Driving Higher Productivity](#)

- [PM Modi Launches Two Landmark Schemes for Farmers' Welfare](#)
- [US Imposes 100% Additional Tariff on Chinese Imports](#)
- [Nobel Memorial Prize in Economic Sciences 2025](#)
- [World Economic Outlook by the IMF](#)
- [PM GatiShakti Public Platform](#)
- [Google AI Hub in Visakhapatnam](#)
- [MERCOSUR](#)
- [China's WTO Complaint Against India](#)
- [Future Prospects of India-Middle East-Europe Economic Corridor \(IMEC\)](#)
- [Central Bank Digital Currencies](#)
- [India's Gold Reserves Cross \\$100 Billion](#)
- [Global Multidimensional Poverty Index 2024](#)
- [Lighthouse Tourism](#)
- [Demographic shift and India](#)
- [Global Family Farming Forum \(GFFF\)](#)
- [All India Rural Financial Inclusion Survey](#)
- [NAFED](#)
- [Sevilla Forum on Debt launched at UNCTAD16](#)
- [Liberalised Remittances Scheme](#)
- [RBI Warns Geopolitical Tensions Could Disrupt Cross-Border Payment Flows](#)
- [Kafala System](#)
- [Payment Systems Report by RBI](#)
- [Farmers' Training and Common Facility Centre](#)
- [Indian Railways Door-to-Door Freight & Parcel Services](#)
- [Hybrid Non-Basmati Paddy in Punjab](#)
- [State Mining Readiness Index](#)
- [13th Edition of "India Chem 2024" in Mumbai](#)
- ['eShram-One Stop Solution'](#)
- [Specialty Fertilizers](#)
- [Real Effective Exchange Rate \(REER\)](#)
- [Vegetable Oil Products, Production and Availability \(Regulation\) Order, 2011](#)
- [AI Playbook for Agriculture](#)
- [Duty-Free Tariff Preference \(DFTP\) scheme](#)
- [RBI Warns State Governments against Pre-Election Populist Spending](#)
- [Emerging Jobs Crisis in Asia](#)
- [SWAMIH](#)
- [Makhananomics](#)
- [India to Install 100 Million Smart Meters](#)
- [RBI Proposes Limits on Banks Capital Market Exposure and Acquisition Financing](#)
- [RBI Cautions States on Fiscal Discipline](#)

- [India's Forex Reserves](#)
- [Global Finance Stability Report \(GFSR\)](#)
- [National Household Income Survey](#)
- [Indian Coffee Gaining Global Popularity](#)
- [Stablecoin](#)
- [Turning Urban Challenges into Engines of Growth](#)
- [Electronics Component Manufacturing Scheme](#)
- [8th Central Pay Commission](#)
- [Sustainable Food Systems report highlights India's soil health](#)
- [NITI Aayog Reports on the Service Sector](#)
- [Nutrient Based Subsidy Scheme \(NBS\)](#)
- [Workforce Challenges in India's Primary Healthcare System](#)
- [Export of GI-Tagged Indi and Puliyankudi Limes](#)
- [China files complaint in WTO over subsidies under PLI scheme](#)
- [Integrated Cold Chain and Value Addition Infrastructure \(ICCVAI\) Scheme](#)
- [NITI Aayog's 'Reimagining Manufacturing' Report](#)
- [World Inequality Report 2025](#)
- [Legal Metrology \(Packaged Commodities\) Amendment Rules, 2025](#)
- [KOYLA SHAKTI Dashboard and CLAMP Portal](#)
- [Modernising Cross-Border Payments](#)
- [Madras High Court, becomes first to recognise Cryptocurrency as Property](#)
- [Declining Interest in Soybean Cultivation](#)
- [Chabahar port](#)
- [Consumer Price Index \(CPI\)](#)
- [Foreign Rush for Indian Banks](#)
- [Digi Bandar](#)
- [Secondary Sanctions](#)

## CONSTITUTION, POLITY AND GOVERNANCE

- [PNGRB Proposes LPG Interoperability Framework](#)
- [India's Re-Election to the ICAO Council](#)
- [Jal Sanchay Jan Bhagidari](#)
- [UPSC Enters 100th Year of Service](#)
- [Internet Shutdown in India](#)
- [International Health Regulations Amendment](#)

- [Bihar's Final Electoral Roll After SIR](#)
- [Draft Promotion & Regulation of Online Gaming Rules 2025](#)
- [Health Ministry Advisory on Cough Syrups for Children](#)
- [Government Shutdown in the United States](#)
- [Resumption of India-China Direct Flights](#)
- [Model Youth Gram Sabha Initiative](#)
- [President's Bodyguard](#)
- [Tamil Nadu Challenges Governor's Referral of University Bill to President](#)
- [India Proposes New International Governance Index](#)
- [PM Dhan-Dhaanya Krishi Yojana \(PMDDKY\)](#)
- [TRAI Recommendations on Digital Radio Broadcast Policy](#)
- [Enhancing Alternative Dispute Resolution in India](#)
- [ECI Measures for Bihar Elections](#)
- [SC Issues Nationwide Directions for Road Safety](#)
- [PM-KUSUM and Pradhan Mantri Surya Ghar Muft Bijli Yojana](#)
- [AgriEnIcs Programme](#)
- [SC Upholds Reproductive Autonomy in Surrogacy Cases](#)
- [Shram Shakti Niti 2025](#)
- [Workplace Safety in India](#)
- [SC Allows Direct Recruitment for District Judges](#)
- [India Upgrades Medical Device Standards](#)
- [SPARK 4.0 Initiative](#)
- [Experts Call for National Strategy on Alzheimer's & Ageing Health](#)
- [Satark Nagrik Report Flags Gaps in RTI](#)
- [Govt Panel Proposes Reforms to Boost Nuclear Energy](#)
- [India-AI Impact Summit 2026](#)
- [Fare Se Fursat Scheme](#)
- [Bharat Taxi Initiative](#)
- [Civil Registration System \(CRS\) Report 2023](#)
- [Limestone Reclassification as a Complete Major Mineral](#)
- [SC Allows Green Firecrackers in Delhi-NCR](#)
- [Legal Information Management and Briefing System](#)
- [Hike in Welfare Grants for Ex-Servicemen and Dependents](#)
- [National Security Guard Hub](#)
- [Codex Committee on Spices and Culinary Herbs](#)
- [Nodal Officers to Trace Missing Children](#)
- [UIDAI launches SITAA to Combat Deepfakes](#)
- [Henley Passport Index 2025](#)
- [SC Expands Scope of Public Trust Doctrine](#)
- [Shiromani Gurdwara Parbandhak Committee \(SGPC\)](#)

- [8 years of Regional Connectivity Scheme \(RCS\) - UDAN](#)
- [MHA issues advisory to states & UTs to implement Section 479 BNSS for relief of Undertrial Prisoners](#)
- [International Telecommunication Union \(ITU\)](#)
- [Indian Railway and its Challenges](#)
- [Kartarpur Corridor Agreement](#)
- [MeitY proposed amendments to the IT Rules, 2021 to regulate AI-generated Content](#)
- [Armed Forces Special Powers Act \(AFSPA\) 1958](#)
- [Patna Sahib Gurudwara](#)
- [9 Years of UDAN Scheme](#)
- [India's Renewable Energy Transition](#)
- [Chief Justice of India \(CJI\) to recommend a successor](#)
- [SC Judgement on Preventive Detention](#)
- [Inadequate Laws to Protect Domestic Workers in India](#)
- [Responsible Use of AI during Elections](#)
- [Doctrine of Lis Pendens](#)
- [Conference for the Chief Electoral Officers](#)
- [Freedom of Religion & Right to Privacy are interlinked](#)
- [Strengthening Governance through Blockchain Technology](#)
- [SC on Transgender Equality](#)
- [National Crisis Management Committee \(NCMC\)](#)
- [Deep-Sea Fishing Vessels](#)
- [MoRTH Flags Poor DPRs Behind Tunnel Project Delays](#)
- [Network Survey Vehicles by NHAI](#)
- [E-Passports for Indian Nationals in the UAE](#)
- [NCERT Signs MoU with IIT-Madras](#)
- [Moving Forest Dwellers from Tiger Reserves Must Be Voluntary](#)
- [Kerala to Implement the PM-SHRI Scheme](#)
- [United Nations Convention against Cybercrime](#)
- [SC Directs NHRC to Monitor Mental Health Authorities](#)
- [Doctrine of Merger](#)
- [Rashtriya Ekta Diwas](#)
- [India-Nepal Power Transmission Agreements](#)
- [Model Youth Gram Sabha \(MYGS\)](#)

## INTERNATIONAL RELATIONS AND SECURITY

- [Israel-Hamas Conflict](#)
- [South-South and Triangular Cooperation \(SSTC\)](#)
- [Bagram Air Base](#)
- [Sir Creek](#)
- [Britain to Introduce Compulsory Digital ID for Workers](#)
- [Operation Sindoor and Emerging Maritime Dimensions](#)
- [Defence Exports Target ₹50,000 Crore by 2029](#)
- [Exercise Konkan 2025](#)
- [Defence Manufacturing Target of ₹3 Lakh Crore by 2029](#)
- [India's Policy on Recognising the Taliban](#)
- [India-UK Bilateral Talks 2025](#)
- [Russia Withdraws from Plutonium Agreement with US](#)
- [US to Supply Advanced AMRAAM Missiles to Pakistan](#)
- [Saksham Counter-UAS Grid](#)
- [India to Restore Diplomatic Ties with Afghanistan](#)
- [India-UK Connectivity and Innovation Centre](#)
- [India to Host UNTCC 2025](#)
- [Gaza Peace Summit 2025](#)
- [Maitri II Research Station](#)
- [India-Mongolia Diplomatic Relation](#)
- [India-Canada to Strengthen Cooperation](#)
- [Pakistan-Afghanistan Border Clashes](#)
- [Astra Mark 2](#)
- [Military Exercises – Samudra Shakti](#)
- [Global Hunger Index Report 2025](#)
- [India Elected to UNHRC](#)
- [India-Australia Renewable Energy Partnership](#)
- [US-China Rare Earth Tensions](#)
- [India Elected Co-Chair of UN-GGIM Asia-Pacific Committee](#)
- [DRDO's Military Combat Parachute System](#)
- [Expansion of LCA Tejas and HTT-40 Production Lines](#)
- [IN-RoKN Exercise](#)
- [India and FAO Celebrate 80 Years of Partnership](#)
- [India-Egypt Strategic Dialogue](#)
- [India-Central Asia Security Dialogue](#)
- [Yunus Declares a 'New Bangladesh' Through National Charter](#)
- [ACTCM Barge LSAM 25](#)

- [Bipolar World and India](#)
- [European Sky Shield Initiative \(ESSI\)](#)
- [Naseem Al Bahr](#)
- [Japan Elects First Female Prime Minister](#)
- [Strategic EU-India Agenda](#)
- [Z-Morh Tunnel](#)
- [Shadow Fleet](#)
- [JAIMEX -25](#)
- [Nuclear powered ballistic Submarine \(S4\)](#)
- [International Convention for the Suppression of the Financing of Terrorism](#)
- [Defence Acquisition Council \(DAC\)](#)
- [International Convention against Doping in Sport](#)
- [Exercise Ocean Sky](#)
- [Storm Shadow Cruise Missile](#)
- [Mahe Water Crafts](#)
- [Weakening of Multilateralism](#)
- [PM Modi to Attend ASEAN Summit Virtually](#)
- [State of Emergency in Peru](#)
- [Indo-Tibetan Border Police \(ITBP\) Raising Day](#)
- [Defence Procurement Manual 2025](#)
- [Project Arunank](#)
- [ICGS Ajit and ICGS Aparajit](#)
- [Asia Pacific Accident Investigation Group](#)
- [India Maritime Week 2025](#)
- [72 nations signed the UN Convention against Cybercrime in Hanoi, Việt Nam](#)
- [22<sup>nd</sup> ASEAN-India Summit](#)
- [Burevestnik Cruise Missile](#)
- [Evolving Geopolitical Centrality of the Western Indian Ocean Region \(WIOR\)](#)
- [Panda Diplomacy](#)
- [INS Mahe](#)
- [Eighth Session of the International Solar Alliance \(ISA\) Assembly Held in New Delhi](#)
- [South Korea, US, Japan to Hold Trilateral Diplomatic Talks at APEC](#)
- [20<sup>th</sup> East Asia Summit](#)
- [SI-100 Civil Aircraft](#)
- [US and Chinese president met on the sidelines of APEC summit in Busan](#)
- [Exercise Trishul](#)

## SOCIETY AND SOCIAL JUSTICE

- [NITI Aayog AI Roadmap for Inclusive Societal Development](#)
- [E-Cigarettes and the Rising Health Risks](#)
- [Tobacco Free Youth Campaign 3.0](#)
- [Unified Mental Health Response](#)
- [Nobel Prize in Literature 2025](#)
- [Nobel Peace Prize 2025](#)
- [Fiji's National Child Safeguarding Policy](#)
- [Decline of the Maoist Movement](#)
- [Siddi Community](#)
- [Inequality in Pre-Primary Education](#)
- [Natural Farming and Gender Inequality](#)
- [Skilling for AI Readiness \(SOAR\) Programme](#)
- [Kerala's Extreme Poverty Eradication Programme](#)
- [Ollo Tribe](#)
- [Garbage Café Initiative](#)
- [69<sup>th</sup> National School Games 2025](#)
- [Rehabilitation Council of India](#)
- [Introducing Artificial Intelligence in Schools](#)
- [Curriculum on Artificial Intelligence and Computational Thinking \(AI & CT\)](#)

## GEOGRAPHY, ENVIRONMENT, BIODIVERSITY AND DISASTER MANAGEMENT

- [NBA Sanctions Funds for Red Sanders Conservation](#)
- [Environmental Surveillance](#)
- [Philippines](#)
- [Building Self-Reliance in Natural Resources](#)
- [Odonate Census in Delhi](#)
- [Increasing Tree Size in the Amazon Rainforest](#)
- [Polar Geoengineering Projects](#)
- [Government Restricts Animal-Based Bio-Stimulants](#)
- [Global Uranium Reserves](#)
- [Govt Approves Mitigation Projects Across Nine States](#)
- [Urban Tree Plantation and Air Pollution](#)
- [Cyclone Shakti](#)

- [Landslides in West Bengal and Himachal Pradesh](#)
- [India's First Cooperative Compressed Biogas \(CBG\) Plant](#)
- [India to Release Its First Red List at IUCN World Congress](#)
- [Philippines Coral Larvae Cryobank](#)
- [National Camel Sustainability Initiative](#)
- [World's Highest Motorable Pass](#)
- [Arunachal Pradesh's 1<sup>st</sup> commercial coal mine](#)
- [Wildfire Smoke & Rising Mortality](#)
- [Nesolynx banabitanæ Wasp Species](#)
- [Supermoon](#)
- [National Red List Assessment \(NRLA\) Initiative](#)
- [Four New Plant Species in Karnataka](#)
- [Fungus \*Bridgeoporus kanadii\*](#)
- [Fungal Pathogen Discovered in Western Ghats Plant](#)
- [Wild Life Protection \(Kerala Amendment\) Bill, 2025](#)
- [Small Island Developing States](#)
- [Sri Lanka's Landmass as a Natural Barrier to Ocean Swells](#)
- [India's Clean Energy and Climate Finance](#)
- [Understanding Nightshades](#)
- [Sawalkote Hydropower Project](#)
- [Greenhouse Gas Emission Intensity \(GEI\) Target Rules, 2025](#)
- [Chowna Buku Chulu](#)
- [Kabad Se Kalakriti Initiative](#)
- [IUCN World Heritage Outlook Report](#)
- [Green Sea Turtle \(\*Chelonia mydas\*\)](#)
- [Ozone Pollution in Indian Cities](#)
- [Synchronous All India Elephant Estimation 2021-25](#)
- [First IUCN Green Status of Species assessment for the Tiger Released](#)
- [Five Maharashtra Beaches Get Blue Flag Certification](#)
- [Global Land Outlook on Ecological Connectivity](#)
- [Forest Declaration Assessment 2025](#)
- [World Meteorological Organisation Greenhouse Gas Bulletin](#)
- [Sundarbans Aquaculture Model Wins FAO Global Recognition](#)
- [Indian Wolf as a Distinct Species](#)
- [Snow Leopard is the Least Genetically Diverse Cat Species](#)
- [Global Push for Fossil Fuels Phase-Out Treaty](#)
- [Taftan Volcano](#)
- [Godda Thermal Power Plant](#)
- [E-Waste Recycling Through Urban Mining](#)
- [Dinosaur Superhighway](#)

- [Emissions from Rocket and satellite launches pose growing environmental threat](#)
- [Ramgarh Vishdhari Tiger Reserve](#)
- [Pyromes](#)
- [Basaltic Dust to enhance carbon capture](#)
- [Spotted Locust](#)
- [African Baobab](#)
- [India's \\$1 Trillion "Just Energy" Coal Transition](#)
- [Azores Island](#)
- [Saranda Forest](#)
- [Climate Financing to Developing Nations](#)
- [Kurinji Flowers](#)
- [Global Commission On The Economics Of Water](#)
- [CAQM invokes Stage-II of Graded Response Action Plan \(GRAP\) in entire NCR](#)
- [Emissions from Forest Fires](#)
- [Nilgiri Tit Butterfly](#)
- [Anguiculus dicaprio](#)
- [Barberton Greenstone Belt](#)
- [Early Warnings for All \(EW4All\) - WMO](#)
- [Eye on Methane](#)
- [Diamond dust to cool Earth](#)
- [Clean energy accelerates for BRICS grouping](#)
- [Global Forest Resources Assessment \(GFRA\) 2025](#)
- [Gondwanax paraisensis](#)
- [Jumping spiders 'Tenkana'](#)
- [Cloud Chamber](#)
- [Tapioca](#)
- [State of Global Air \(SoGA\) 2025](#)
- [Carbide Beetles as Bioindicators for Microplastics](#)
- [Anagyris lopezi](#)
- [A trial test on Cloud Seeding in Delhi](#)
- [Triple Whammy Situation in South India](#)
- [Kunar River](#)
- [Barnawapara Wildlife Sanctuary](#)
- [Intrusion Detection System](#)
- [Central Asian Mammal Initiative](#)
- [Pilot Whales](#)
- [IUCN World Heritage Outlook 4 report categorises Western Ghats](#)
- [Cyclone Montha](#)
- [Kashmir's First Chrysanthemum Garden](#)
- [Indian Scops Owl \(Otus bakkamoena\)](#)

- [Government Releases Draft Guidelines for Underground Coal Gasification \(UCG\)](#)
- [UAE Consensus](#)
- [Keibul Lamjao National Park](#)
- [Taal Volcano](#)
- [Bhimgad Wildlife Sanctuary](#)
- [Nationally Determined Contributions \(NDCs\) under the Paris Agreement Synthesis report by UNFCCC](#)
- [Movement of the Cyclones](#)
- [Sunni Dam Hydroelectric Project](#)
- [AmazonFACE Project](#)
- [Hurricane Melissa](#)
- [India's total installed electricity capacity crosses 500 GW](#)
- [UNEP'S Adaptation Gap Report 2025](#)
- [New Strategic EU-India Agenda](#)
- [Microbial Link to Arsenic Contamination in Rice](#)
- [Loktak Hydroelectric Project](#)
- [Early Triassic Species of Coelacanth](#)
- [Negative Effects of Antibiotic Combination Therapy](#)
- [Five Indian megacities face Land Subsidence threat due to Excessive Groundwater Extraction](#)
- [Kunming Biodiversity Fund \(KBF\)](#)
- [Venkatadri slender gecko \(Hemiphyllodactylus venkatadri\)](#)
- [Ecological Droughts](#)
- [Ocean- Based Carbon Capture, Utilisation, and Storage \(CCUS\)](#)
- [National Crisis Management Committee](#)

## SCIENCE AND TECHNOLOGY

- [Laser Interferometer Lunar Antenna \(LILA\)](#)
- [Agnikul Cosmos Unveils Fully Reusable Rockets](#)
- [SARAL Tool by ANRF](#)
- [Biomedical Research Career Programme](#)
- [Raksha-IBR Vaccine](#)
- [Li-Fi Internet System](#)
- [Nobel Prize for 2025 in Medicine or Physiology](#)
- [National Centre for Vector Borne Diseases Control](#)
- [Viridans Streptococci Causing Heart Attacks](#)

- [Nobel Prize in Physics 2025](#)
- [Nobel Prize in Chemistry 2025](#)
- [Crohn's Disease](#)
- [NASA Confirms Safe Passage of Asteroid 2025 TF](#)
- [First-Ever Image of Two Orbiting Black Holes](#)
- [Quantum Breakthrough in Digital Security](#)
- [WHO Issues Alert on Contaminated Cough Syrups](#)
- [Crew Escape System in Gaganyaan Mission](#)
- [Xenobiology](#)
- [Google's AI Model Finds New Approach for Cancer Treatment](#)
- [India Sends Prussian Blue Capsules to Indonesia](#)
- [FSSAI Bans Misuse of 'ORS' Label](#)
- [Evidence for Dark Matter](#)
- [First Local Transmission of Mpox Strain in the US](#)
- [Rising Antibiotic Resistance](#)
- [Time Rondeau Crystal \(TRC\)](#)
- [Rotavirus Vaccine Effectiveness](#)
- [Kala Aazar and its status in India](#)
- [Gliese 229B](#)
- [Trojan asteroids](#)
- [UV Photodetectors](#)
- [Gaucher Disease](#)
- [Vitiligo](#)
- [Egypt Declared Malaria-Free](#)
- [Chandrayaan-2 lunar orbiter has made first-ever observation of Sun's Coronal CME on Moon](#)
- [Trachoma](#)
- [Star Formation](#)
- [Intelsat 33e Communications Satellite](#)
- [Caenorhabditis elegans](#)
- [Quantum Echoes and Quantum Advantage](#)
- [Chang'e-6 Lunar Samples](#)
- [Human Immunodeficiency virus \(HIV\)](#)
- [Decline of Lab-Grown Diamonds](#)
- [GSAT-7R Satellite](#)
- [CRYODIL](#)
- [Maha MedTech Mission](#)
- [Hanle Dark Sky Reserve](#)
- [Google's 'Willow' quantum processor](#)
- [Rashtriya Vigyan Puraskar 2025](#)
- [Large Magellanic Cloud \(LMC\)](#)

- [Interstellar Comet 3I/ATLAS](#)
- [Quantum information Scrambling](#)

## HISTORY, HERITAGE AND CULTURE

- [Monument Conservation Opens to the Private Sector](#)
- [150 Years of the National Song Vande Mataram](#)
- [Banni Festival](#)
- [Lord Ayyappa Temple in Sabarimala](#)
- [Sree Narayana Guru](#)
- [Ningol Chakouba Festival](#)
- [Rani Chennamma](#)
- [Gyan Bharatam Mission](#)
- [Vaikunthbhai Mehta \(1891-1964\)](#)
- [India Advocates for UNESCO Recognition of Chhath Puja](#)
- [Discovery of Dilmun Temple](#)
- [International Aryan Summit 2025](#)
- [Pasumpon Muthuramalinga Thevar](#)

## FACTS FOR PRELIMS

- [M.S. Swaminathan Award 2025](#)
- [AI Adoption in Indian Healthcare](#)
- [Bharat Mata on Currency](#)
- [World Para Athletics Championships 2025](#)
- [World Cotton Day 2025](#)
- [International Day for DRR 2025](#)
- [National Students' Day](#)
- [Left-Wing Extremism Shrinks to 11 Districts](#)
- [Governance Laws - Section 163 of BNSS](#)
- [Divya Deepawali Mela](#)
- [Ahmedabad to Host 2030 Commonwealth Games](#)
- [Indian Air Force \(IAF\) Day](#)
- [Interim President of Madagascar](#)
- [Mongolian PM Resigned](#)
- [Kancha Sherpa](#)
- [World Menopause Day](#)

- [M.F Husain museum in Doha](#)
- [Defence - President on Rafale](#)
- [Asian Youth Games 2025](#)
- [Huajiang Grand Canyon Bridge](#)

## ECONOMIC DEVELOPMENTS

### India-EFTA Trade and Economic Partnership Agreement

- The **India-EFTA** Trade and Economic Partnership Agreement (TEPA) was signed in March 2024 and is scheduled to come into effect from **1 October 2025**.
- The European Free Trade Association (EFTA) is an intergovernmental organisation consisting of **four major non-EU countries: Switzerland, Norway, Iceland, and Liechtenstein**.

### India-EFTA Trade and Economic Partnership Agreement (TEPA)

- The Trade and Economic Partnership Agreement (TEPA) is a comprehensive free trade agreement aimed at enhancing market access and simplifying customs procedures to improve trade facilitation.
- **FDI Commitment:** EFTA nations pledged a **binding commitment** of **\$100 billion** in FDI over 15 years, aiming to generate **one million direct jobs** in India.
- **Tariff Reduction:** Tariffs will be **eliminated on 92.2%** of product categories, covering **99.6% of Indian exports**, ensuring broader and more competitive market access.
- **Sector Protection:** India excluded sensitive sectors such as **dairy, soya, coal**, and certain farm products to protect domestic livelihoods and reduce trade imbalances.
- **Service Mobility:** TEPA promotes Indian service exports, while **Mutual Recognition Agreements (MRAs)** facilitate professional mobility in **nursing, architecture, and accountancy**.
- **IPR Safeguards:** Intellectual property provisions under TEPA align with TRIPS standards but **prohibit patent evergreening**, safeguarding India's generic medicines industry.
- **India Welcomes the US's Plan for Gaza Peace**
- PM Modi welcomed US President **Trump's 20-point peace plan** aimed at ending the Israel-Hamas conflict in Gaza.

### Key Provisions of the Peace Plan

- Gaza to become a **deradicalised, terror-free zone** without threats to its neighbours.
- **Immediate ceasefire** and **suspension** of all military operations.
- **Hostage (living or dead) release** within 72 hours of Israel's acceptance.
- An **interfaith dialogue** will be launched to promote **tolerance** and **reconciliation**.
- Creation of a **special economic zone**, an international investment drive, and job creation.

### Extension of RoDTEP Export Incentive Scheme

The Government of India has extended the Remission of Duties and Taxes on Exported Products (RoDTEP) incentive scheme for exporters until March 31, 2026.

### Remission of Duties and Taxes on Exported Products (RoDTEP) Scheme

- RoDTEP is an export incentive scheme launched in **2021** by the **Ministry of Commerce and Industry**.
- **Objective:** It seeks to eliminate **hidden domestic taxes on exports**, thereby enhancing global competitiveness and encouraging sustained export growth.
- **Nodal:** The Directorate General of Foreign Trade, under MoCI, notifies eligible items, rebate rates, and guidelines. The **Department of Revenue**, under the Ministry of Finance, implements the scheme.
- **WTO Ruling:** It replaces the previous **Merchandise Exports from India Scheme (MEIS)**, which a WTO dispute panel ruled an unlawful subsidy.
- **Rebate Mechanism:** Exporters receive reimbursements for central, state, and local duties that were not refunded. This ensures that exported products are **zero-rated** (0% domestic tax) in international markets.
- **Tax Coverage:** It compensates for hidden taxes and levies, such as VAT on fuel, electricity duty, mandi taxes, municipal fees, and stamp duties on exports.
- **Digital Refunds:** Rebates are issued as **transferable digital duty scrips (e-scrips)** in automated ledgers, making the process transparent and efficient.
- **Sector Scope:** The scheme covers all sectors but **focuses on labour-intensive** ones. It prohibits overlapping claims from other schemes.
- **Eligibility Base:** Benefits also extend to Advance Authorization holders, Export-Oriented Units, and Special Economic Zone units, broadening access for diverse categories of exporters.
- **Rate Formula:** Rebates are granted based on **product-specific rates**, usually calculated as a percentage of the Freight on Board (FOB) value or a fixed per-unit amount.
- **Fund Allocation:** As of FY 2024-25, total disbursements under RoDTEP have exceeded ₹57,976 crore, showcasing a substantial fiscal commitment.

### Sugarcane Production in India

The Union Minister for Agriculture & Farmers Welfare announced that a **dedicated team** will be set up within the **ICAR** for **sugarcane research** and **policy development**.

*The Indian Council of Agricultural Research (ICAR), established in 1929, is India's apex autonomous body for **agricultural research and education**, under the Department of Agricultural Research and Education (DARE) within the Ministry of Agriculture and Farmers Welfare.*

#### Sugarcane

Sugarcane is a **kharif-season cash crop**, classified as a **large perennial grass** (Saccharum species), grown mainly in hot and humid regions.

**Climatic Condition:** Optimal growth requires a temperature of 21–27°C and 75–150 cm annual rainfall.

**Soil & Harvest:** Thrives on **deep loamy soils**; it is a **long-duration crop** harvested from October

to March in tropical regions and from February to May in the subtropical areas.

**Cultivation Methods:** Primarily through **stem cuttings** (called **setts**), traditional methods include **flatbed** or **trench planting**, **ratooning**, and intercropping with pulses or oilseeds.

*Ratooning involves growing a new crop from the **stubble of the previous crop** without replanting.*

### Sugarcane Production in India

- India is the world's **2<sup>nd</sup> largest producer of sugarcane** after Brazil; it is also the world's **largest producer and consumer of sugar**. (PIB)
- **Major States: Uttar Pradesh** is the leading producer, followed by Maharashtra and Karnataka.
- **Uses:** Sugarcane is used for producing sugar, jaggery (gur), **khandsari** (unrefined sugar), ethanol (as a biofuel), molasses, animal feed, bagasse-based paper, and electricity cogeneration.
- **Varieties:** Include the **sugarcane variety 0238** among others, which has a high sugar content but is susceptible to **red rot** disease.
- *Red rot is a **fungal disease** that destroys cane stalks internally, resulting in significant crop losses.*
- **Key Challenges:** Production suffers from **high water demand**, fertiliser overuse, red rot disease, soil fertility loss due to **monocropping**, labour shortages, delayed payments, and climate risks.
- **Potential Solutions:** Include intercropping, **drip irrigation** under "Per Drop More Crop," disease-resistant varieties, mechanisation, and new value-added products to boost farmers' profits.

### Updated Rangarajan Poverty Line

Recently, economists from the RBI **updated the Rangarajan poverty line** for **20 major states** using the **2022-23 Household Consumption Expenditure Survey (HCES)**.

The **Rangarajan Committee** (2014) set the poverty line at **₹972 (rural)** and **₹1,407 (urban)** monthly per capita expenditure, placing 29.5% of the population below the poverty line (BPL).

*HCES is conducted by the National Sample Survey Office (NSSO), **Ministry of Statistics and Programme Implementation**, every **five years** (quinquennial).*

### Key Findings of the Survey

- **Odisha** and **Bihar** showed the **sharpest improvement** in poverty reduction over the last decade.
  - **Rural Odisha:** Poverty declined from 47.8% (2011-12) to 8.6% (2022-23), the **steepest fall** in the country.
  - **Urban Bihar:** Poverty fell from 50.8% to 9.1% in the same period.
- The **least decline** was recorded in **Kerala** and **Himachal Pradesh**, though both already had low poverty levels.
- **Rural Poverty:** In 2022-23, the **lowest poverty rate** was in **Himachal Pradesh (0.4%)**, and the **highest** was in **Chhattisgarh (25.1%)**.
- **Urban Poverty:** The **lowest poverty rate** was in Tamil Nadu (1.9%), and the **highest** was

in Chhattisgarh (13.3%).

- **Methodology Adopted**
- RBI economists did not simply inflate Rangarajan's line with the Consumer Price Index (CPI) because **consumption baskets differ**.
- Instead, they constructed a **new price index** reflecting the **Rangarajan poverty line basket (PLB)** weights (food, non-food). This was then applied to update the 2011-12 poverty lines to 2022-23.

### Shift to Multidimensional Poverty

- The Government now focuses more on the Multidimensional Poverty Index (MPI) than **income/expenditure**-based poverty lines.
- MPI measures **deprivation** across health, education, and living standards using **12 indicators** (nutrition, child mortality, sanitation, electricity, etc.).
- According to **NITI Aayog** (Jan 2024), **24.82 crore** people **exited** multidimensional poverty between 2013-14 and 2022-23.
  - Also, MPI fell from **29.17% to 11.28%** in this period.
- According to the **World Bank**, India's poverty headcount ratio stood at **23.9% in 2022** at the international poverty line of \$4.2/day.

### NITI Aayog's Suggestions to Combat Poverty

- **Smart Targeting:** Improve targeting using technology (**JAM trinity**) to minimise inclusion and exclusion.
- **Capability enhancement:** Invest in education and skills following **Amartya Sen's "Development as Freedom,"** enabling empowerment and entrepreneurship, especially among the urban poor.
- **Digital Push:** Strengthen rural digital infrastructure, expand awareness campaigns, and securely integrate Jan Dhan accounts with digital payments.
- **State Competition:** Use outcome-based indices in health, water, and education to deepen cooperative and competitive federalism.
- **Knowledge Sharing:** Scale up the **Transforming India Lecture Series** to share **global best practices**, innovation, and governance models with policymakers.

### Govt Raises MSP for Six Rabi Crops

- The **Union Cabinet approved** significant **hikes** in Minimum Support Prices (MSPs) for **six rabi crops** for the 2026-27 marketing season.
- *MSP is the **minimum guaranteed price** at which the **government procures crops from farmers**, ensuring protection from distress sales. It covers 23 crops (7 cereals, 5 pulses, 7 oilseeds, 4 commercial crops).*

**Key Highlights**

- **Coverage:** Includes Wheat, jowar, barley, gram, and lentil.
- **Wheat Hike:** MSP raised by ₹160 per quintal to ₹2,585/quintal (6.6% increase), giving farmers the **highest gain** over cost of production (**109%**).
- **Safflower:** Recorded the **highest absolute** and **percentage increase** (Rs 600 per quintal), reflecting government efforts to **promote oilseed cultivation** and crop diversification.

**Process to Determine Minimum Support Price (MSP)**

Commission for Agricultural Costs and Prices (CACP) **recommends MSPs twice a year** (kharif & rabi).

The CACP, a **statutory body** formed in **1965**, is attached to the **Ministry of Agriculture and Farmers Welfare**. Its suggestions are **not binding** on the Government.

**Factors Considered:** Cost of cultivation (**A2+FL, C2**), demand-supply, market trends, price parity, inter-crop parity, terms of trade for farmers, and global prices.

**Cost Concept:**

A2 = Paid-out costs,

A2+FL = Paid-out costs + imputed family labour,

C2 = Comprehensive cost (A2+FL + rental value of land + interest on capital).

**CACP uses A2+FL as the base cost**, with a **margin (currently 50%)** for MSP.

**Cabinet Committee on Economic Affairs (CCEA)** gives **final approval** to CACP recommendations, ensuring MSP aligns with overall policy goals (inflation, fiscal burden, food security).

Kharif/Rainy/Monsoon crops	Rabi/winter/cold seasons crops	Summer/Zaid crops
The crops grown in monsoon months	The crops grown in winter season	Crops grown in summer
They are sown before monsoon and harvested at the end of the monsoon.	They are sown before retreating monsoon and harvested before summer.	They are sown and harvested in summer
The period of growth is from June to Oct-Nov	The period of growth is from Oct to March	The period of growth is from March to June
They require warm, wet weather at major period of crop growth	Crops grow well in cold and dry weather	They require warm dry weather for major growth period.
E.g. Cotton, Rice, Jowar, Bajara etc.	E.g. Wheat, gram, sunflower etc.	E.g. Groundnuts, Watermelon, Pumpkin, Gourds etc.

## Chinese Dominance in the Electrolyser Market

**Electrolysers**, vital for **green hydrogen production**, are witnessing rising Chinese dominance, creating supply chain and strategic concerns for India.

### Electrolysers

**Definition:** An electrolyser is a device that uses electricity to split water into hydrogen and oxygen.

**Working:** When an electric current (preferably from renewable sources) passes through water, it breaks the bond between hydrogen and oxygen atoms.

**Significance:** The hydrogen produced is called **green hydrogen** if renewable electricity is used, making it a clean fuel alternative.

### Significance of Electrolysers for India

- **Green Hydrogen Mission:** India aims to produce 5 MMT of green hydrogen by 2030, which necessitates the use of electrolysers.
- **Energy Security:** Electrolysers reduce dependence on 85% oil imports and costly Liquefied Natural Gas.
- **Industrial Decarbonisation:** Green hydrogen can cut 20% of emissions from hard-to-abate sectors.
- **Export Potential:** EU's CBAM creates a market for India to be a green hydrogen export hub.
- **Climate Goals:** Supports India's pledge to net-zero by 2070 (Panchamrit Goals).
- **Challenges Faced by India in the Electrolyser Market**
- **Cost Barriers:** Current cost of green hydrogen is ₹300-400/kg, compared to ₹150/kg for grey hydrogen.
- **Raw Material Dependence:** Electrolysers need iridium & platinum (global supply <10 tonnes/year), with India importing >90% of such critical minerals.
- **Technology Gap:** India's domestic manufacturing capacity is <1 GW, compared to China's >20 GW electrolyser capacity (2024).

**Supply Chain Risks:** China supplies 85% of global electrolysers, creating energy security risks.

### Way Forward for Boosting Electrolyser Market in India

- **Domestic Manufacturing:** Expand electrolyser capacity under the PLI scheme for green hydrogen.
- **Critical Mineral Strategy:** Secure supply chains via Australia (lithium), Africa (platinum group metals), the Middle East (nickel, cobalt).
- **Integrated Ecosystem:** Hydrogen Corridors & Industrial Hubs connecting producers and

consumers.

- **Best Practice: EU Hydrogen Valleys model** – local clusters linking production, storage, and end-use.

### Safeguarding India's Digital Economy

India's rapid digital transformation has **boosted inclusion and convenience** but also exposed citizens to **growing cyber frauds**, threatening trust in the digital economy.

#### Key Achievements in the Digital Economy

- **Digital Connectivity:** Internet, broadband, and 5G expansion connect over **96.96 crore** users.
- **UPI Adoption:** **460 million** people and **65 million** merchants use UPI globally.
- **Aadhaar Integration:** **142 crore IDs** simplify verification, banking, and public service delivery.
- **Direct Transfers:** DBT has transferred **₹44 lakh crore**, significantly reducing fraud.
- **Strategic AI:** India's AI Mission Boosts Computing Power with Over 34,000 GPUs.
- **E-Governance:** Platforms like DigiLocker, UMANG, and BHASHINI enhance digital citizen services.

#### Challenges Within the Digital Economy

- **Rise of Cyber Frauds:** Phishing, OTP/UPI scams, digital arrests, and identity theft are rising. E.g. **Aadhaar data breach of 81.5 crore citizens (Global Risk Report)**.
- **Social Engineering Vulnerability:** Fraudsters manipulate emotions like fear, greed, and urgency. CERT-In flagged that **70% of reported online financial frauds in 2023** involved social engineering tactics.
- **Institutional Gaps:** **RBI audit (2023)** revealed **15% of small banks** still had **incomplete e-KYC records, enabling mule accounts** and cyber police to remain undertrained and underequipped.
- **Weak Monitoring:** In **2023**, the **RBI** flagged that **only 38% of banks had AI-based anomaly detection systems** in place. Large-value anomalies go unchecked while smaller spends often invite verification.
- **Erosion of Trust:** **NCRB** noted **over 40% under-reporting of cyber frauds in 2023** due to low awareness and fear of harassment.
- *A **mule account** is a bank account used to facilitate illegal activities, and a **money mule** is someone who transfers or moves illegally acquired money on behalf of someone else.*

#### Global Best Practices

- **United Kingdom:** **Centralised fraud reporting hub** enabling real-time payment fraud detection.
- **Singapore:** **Public-private collaboration** to set up scam response centres.
- **European Union:** General Data Protection Regulation (**GDPR**) ensures robust data privacy and safety.

#### Way Forward

- **Protection-First Framework:** Place **citizen safety** and **digital trust** at the core of financial

stability.

- **Technology Driven Monitoring:** Build **personalised transaction profiles** using AI and Machine Learning to flag anomalies like sudden high-value transfers or frequent debits.
- **Stronger Cyber Policing:** Equip police with global data-sharing and **24/7 rapid-response units**.
- **Bank Accountability:** Enforce **stricter KYC norms**, audit mule accounts, secure customer data with Blockchain, and ensure quick victim compensation.

### Rise in Private Sector Project Announcements

Recent data from the Centre for Monitoring Indian Economy (CMIE) show **private sector project announcements** reached a **15-year high** in the **first half** of FY 2025–26, while government and foreign companies' announcements declined sharply.

*The CMIE is a **Mumbai**-based independent think tank founded in **1976** that **conducts independent surveys** on employment, consumption, and business activity to provide insights into the Indian economy.*

#### Key Trends from CMIE Data

- **Private Investment:** Private sector projects totalling ₹9.95 lakh crore were announced, showing a **30.4% increase** compared to last year, marking the **second-highest** investment level for a half-year in 15 years.
- **Domestic Share:** Indian firms accounted for **94% of the total project value**, indicating strong confidence and capital mobilisation among domestic investors.
- **Government Slowdown:** Central and State government project proposals declined to ₹1.51 lakh crore, a **71% drop**, reaching their **lowest in at least 15 years**.
- **Foreign Investment:** Foreign announcements fell to ₹0.6 lakh crore, a **28% year-on-year decline** and a five-year low. This also signifies the third consecutive half-year decline in foreign investment proposals.
- **Global Contrast:** According to UNCTAD, **global FDI increased by 11%** in 2024, indicating that the decline in India's foreign initiatives is due to country-specific investor caution.

### Government's Borrowing Plan for Second Half of FY 2025-26

- The Government of India, in consultation with the Reserve Bank of India, has finalised its **borrowing plan** for the second half of FY 2025-26.
- The government will borrow **₹6.77 lakh crore** in the second half of FY 2025-26 through **dated securities**, including ₹10,000 crore via Sovereign Green Bonds.
- This will bring the **total borrowing to ₹14.72 lakh crore**, which is below the budgeted ₹14.82 lakh crore.

The government will continue **switching/buybacks of securities** to smooth repayment obligations and will utilise a **greenshoe option** for an additional subscription of up to ₹2,000 crore for each security type.

### Key Terms Explained

- **Dated Securities:** Long-term government debt instruments with fixed maturity periods.
- **Sovereign Green Bonds:** Government bonds where proceeds are **solely allocated** to environmentally beneficial projects like renewable energy or clean transportation.
- **Switching/Buyback:** Buyback means the government **redeems securities before maturity**, while switching involves exchanging one security for another; both methods help manage debt.
- **Greenshoe Option:** In government borrowings, it is the government's right to retain an extra subscription beyond the initial amount during a bond auction.

### Payments Regulatory Board

The Reserve Bank of India has constituted a **six-member Payments Regulatory Board (PRB)** to oversee the functioning of payment systems in the country.

- **Composition:** The PRB is **chaired by the RBI Governor** and includes the Deputy Governor, the Executive Director of RBI, and three representatives nominated by the Central government.
- **Predecessor Body:** It replaces the Board for Regulation and Supervision of Payment and Settlement Systems (**BPSS**), which was a five-member RBI committee with no government representatives.
- **Legal Authority:** PRB derives its statutory powers from the **Payment and Settlement Systems Act 2007**.

### Regulation of Payment Systems in India

- Payments and Settlement Systems Act, 2007, **empowers RBI** as the **apex regulator** to license operators, like National Payments Corporation of India (NPCI), to establish and operate payment systems.
- The NPCI functions as the umbrella organisation for **retail payment systems**, overseeing UPI and **RuPay platforms**.

### PM-SETU Scheme

- PM Modi launched the **Pradhan Mantri Skilling and Employability Transformation through Upgraded ITIs (PM-SETU)** to enhance youth employability.
- PM-SETU is a **centrally sponsored scheme** aimed at **upgrading 1,000 Government Industrial Training Institutes (ITIs)** under a hub-and-spoke model for inclusive skill development.
- **Objective:** It seeks to make **Indian youth job-ready by aligning ITI courses** with current and emerging industry skill demands.

- **Nodal Ministry:** The **Ministry of Skill Development and Entrepreneurship** (MSDE) implements the scheme with support from state governments and industry partners.
- **Financing Structure:** With a total outlay of ₹60,000 crore, the project is co-financed by the World Bank and the Asian Development Bank.
- **Hub-and-Spoke Model:** This model includes **200 advanced "hub" ITIs** functioning as innovation and placement centres, connected to **800 "spoke" ITIs** for broader access.
- **Cluster Network:** Each **hub** will connect to an average of **four spokes**, creating a **cluster** with advanced infrastructure and incubation facilities.
  - A cluster will be managed by a **Special Purpose Vehicle (SPV)** with an '**anchor industry partner**'.
- **Centres of Excellence:** **Five National Skill Training Institutes** at Bhubaneswar, Chennai, Hyderabad, Kanpur, and Ludhiana are being upgraded to Centres of Excellence.

### **NITI Aayog Proposes Presumptive Tax Regime**

NITI Aayog has proposed a **presumptive taxation scheme** for **foreign companies** to **simplify compliance**, reduce litigation, and provide **tax certainty** in India.

#### **Presumptive Taxation**

- It is a simplified method of taxation where **income is calculated** on the basis of a **fixed percentage of turnover or receipts**, instead of maintaining detailed accounts.
- **India** already applies presumptive taxation in sectors like **electronics manufacturing** (25% of gross payments) and non-resident cruise operators (20% of receipts).
- Under Sections 44AD and 44ADA of the **Income Tax Act**, Small businesses can declare 8% (6% for digital transactions) of turnover as income while professionals can declare 50% of gross receipts as income.

#### **Key Highlights of the Proposal**

- Introduction of an **optional presumptive taxation** regime with **sector-specific** benchmarks.
- **Objective:** The scheme aims to resolve long-standing tax disputes around **Permanent Establishment (PE)**, offer clarity to foreign investors, and protect India's revenue interests.
- *A Permanent Establishment (PE) refers to a fixed place of business through which a foreign company carries out its operations in another country, and becomes liable to pay taxes there.*
- **Suggested attribution:**
  - **5%** of gross receipts for **offshore supply** in the technology/equipment sector.
  - **20%** of gross receipts for **onshore services**.
- Once opted, tax authorities would **not litigate the existence** of PE for that activity.

### Economic Implications Expected

- **For investors:** Current PE and profit attribution disputes take **6-12 years** to resolve, raising compliance costs; a predictable compliance will lower the risk and cost of doing business.
- **For India:** A Greater ability to attract genuine **economic FDI**, prevent tax arbitrage, and secure a domestic tax base will eventually improve **ease of doing business** and financial stability.

### Critical Mineral Recycling Incentive Scheme (CMRIS)

- The **Ministry of Mines** has issued guidelines for implementing the ₹1,500 crore **Critical Mineral Recycling Incentive Scheme (CMRIS)** under the National Critical Minerals Mission (NCMM).
- **Critical Mineral Recycling Incentive Scheme (CMRIS)**
- CMRIS is a **central sector scheme** under the National Critical Minerals Mission (NCMM) to promote **recycling** of critical minerals **from secondary sources** (e.g., e-waste, spent lithium-ion batteries, etc).

**Nodal Agency:** The **Ministry of Mines** serves as the implementing body.

- **Objective:** It aims to establish a **secondary domestic supply chain** for critical minerals, thereby reducing India's dependence on imports.
- **Output Target:** An annual **recycling capacity** of **270 kilotons**, along with **40 kilotons** of **recovered** critical minerals each year by FY 2031.
- **Scheme Tenure:** It will operate for six financial years, from **FY 2025-26** to **FY 2030-31**, with a total outlay of **₹1,500 crore**.
- **Incentive Structure:** Incentives are provided on a **reimbursement basis** for both capital expenditure (**Capex**) and operational expenditure (**Opex**) components.
- **Coverage Focus:** CMRIS covers **all stages of recycling**, from collection and processing to extraction and purification, ensuring full and transparent mineral recovery.
- **Feedstock Sources:** Eligible raw materials include e-waste, spent lithium-ion batteries, **catalytic converters**, and other secondary metal waste.
- **Process Eligibility:** The scheme is open to entities engaged in the extraction, separation, and purification of critical minerals; Those engaged **solely** in black-mass production are **excluded**.
- It applies to **both new investments** and the expansion, modernisation, or diversification of **existing recycling operations**.

### Classification of Beneficiaries

- **Beneficiary Group A:** Large recyclers with **annual revenues above ₹200 crore**, investing at least ₹100 crore, and maintaining **10,000-tonne capacity**.
- **Beneficiary Group B:** Smaller recyclers and startups with revenues **under ₹200 crore**, investing at least ₹25 crore, and maintaining **5,000-tonne capacity**.
- **Incentive Caps:** Financial assistance is capped at **₹50 crore** for **Group A** entities and **₹25 crore** for **Group B** entities, covering both Capex and Opex.

- **Outlay Reservation:** One-third of the total ₹1,500 crore outlay is reserved exclusively for **Group B startups** and smaller recyclers.

## Low Altitude Economy

**Tamil Nadu** is preparing a roadmap to become **India's low-altitude economy hub**, leveraging drone technology, advanced air mobility, and liberalised regulations.

*Tamil Nadu is known as the "Detroit of Asia" due to its status as a major automotive manufacturing hub.*

### Low Altitude Economy (LAE)

- The low-altitude economy (LAE) is an emerging economic sector that utilises the **airspace below 3,000 metres** for **commercial and industrial purposes**.
- **Component Ecosystem:** It is driven by an interconnected ecosystem involving **drones, eVTOLs, vertiports, charging stations, and digital Unmanned Traffic Management (UTM) systems**.
- **Market Outlook:** The global LAE market is projected to reach **\$150-200 billion** by **2030**; India's market is projected to reach **\$5 billion** by **2030**, growing annually at about 30%.
- **Key Applications of the Low Altitude Economy**
- **Logistics:** Employing UAVs for **last-mile** and long-distance **cargo deliveries**.
- **Urban Mobility:** eVTOL air taxis offering quicker, **congestion-free** passenger transportation.
- **Agriculture:** Using drones for **precision spraying**, crop monitoring, and livestock management.
- **Emergency Response:** Drones supporting disaster response, firefighting, search, and medical missions.
- **Critical Infrastructure:** Deploying UAVs to **inspect power lines**, bridges, and other vital infrastructure.

## RBI Measures to Boost Rupee Internationalisation

The Reserve Bank of India (RBI) announced **reforms to deepen financial markets**, expand banks' role in corporate growth, and strengthen the rupee's global standing.

### Key Measures Taken by RBI

#### Financing Corporate Acquisitions

- Banks will be allowed to finance **mergers and acquisitions (M&As)** for the first time.
- Previously, **takeover financing** was **restricted** to Non-Banking Financial Companies (NBFC) and **bond markets**, making acquisitions cumbersome.
- **Aim:** To help corporates access structured, **low-cost funding** and scale globally.
- **Safeguards:** RBI will take risk-control measures to ensure that takeover funds are used

productively.

### Rupee Lending to Neighbouring Countries

- Indian banks and their overseas branches are **permitted to lend in rupees** to residents and institutions in **Nepal, Bhutan, Sri Lanka** and other select neighbours.
- **Aim:** This is a step towards rupee internationalisation, **reducing dollar dependence** in regional trade and settlement.
- **IPO and Share Financing**
- Initial Public Offer (IPO) financing limit **raised to ₹25 lakh** from ₹10 lakh.
- Loan against shares limit **hiked to ₹1 crore** from ₹20 lakh (last revised in 1998).
- RBI has also proposed removing the **cap on lending** against **listed debt securities**, giving banks **greater flexibility** to offer larger loans using corporate bonds.

### Wider Currency Benchmarking

- **Financial Benchmarks India Limited (FBIL)** will expand currency coverage beyond USD, Euro, & Yen.
- **Aim:** To **reduce transaction costs**, deepen **forex markets**, and gradually strengthen the rupee's role in regional trade.
- **Context:** This announcement comes amid the US President's warnings against BRICS **currency plans** and the global debate on **dollar dominance**.
- *FBIL is an independent, non-governmental organisation established to **create and regulate financial benchmarks** nationwide.*

### Special Rupee Vostro Accounts (SRVA)

- **Surplus balances in SRVAs** can now be invested in **corporate bonds** and **commercial papers**, not just government securities.
- **Aim:** To **enhance liquidity options** for foreign partners and strengthen **corporate bond markets**.
- *SRVAs, introduced in 2022, are accounts opened by **foreign entities** with **Indian banks** to facilitate the settlement of international trade transactions directly in Indian Rupees.*
- **Implications**
- **For Corporations:** Easier access to **structured takeover financing**; faster consolidation and competitiveness.
- **For Rupee:** A step towards being a **settlement** and **investment currency** in **South Asia**.
- **For Financial Markets:** Strengthened IPO and bond markets; increased liquidity and depth.
- **Risks:** Potential for reckless borrowing in M&As, exposure to external shocks if rupee credibility weakens.

### Policy Push for Cooperative and Agricultural Self-Reliance

### Mission for Aatmanirbharta in Pulses

- The government launched the ₹11,340 crore **Mission for Aatmanirbharta in Pulses** to boost domestic pulse production and cut import dependence.
- Farmers registered with NAFED and the **National Cooperative Consumers Federation (NCCF)** will have their pulses procured at **100% of MSP**.
- **Recently**, the govt announced a moderate hike in MSPs for key rabi crops. Also, over the past decade, MSPs for major crops such as jowar, bajra, tur, and moong have **nearly doubled**.
- **Farmer Support and Cooperative Strengthening**
- **GST** on key farm inputs, including tractors, sprinklers, drip systems, and organic pesticides, has been **reduced to 5%** to lower production costs.
- The **Ministry of Cooperation**, established in 2021, has revived confidence in India's cooperative sector, now emerging as a key pillar of the **rural economy**.
- The **Sanjeevani Group model**, a successful cooperative initiative in **Maharashtra**, includes:
  - Integration of 100 Primary Agricultural Credit Societies (PACS).
  - Sanjeevani University, training 20,000 students in agri-cooperative management.

### CIL-IRCON MoU for Coal Transportation

- **Coal India Limited (CIL)** and *IRCON International Limited* signed a non-binding MoU to develop rail infrastructure for coal transportation.
- The objective is to enhance the *efficiency* and **speed** of moving coal from mining clusters to power plants and industrial centers.
- This collaboration supports India's *integrated logistics framework*, aligning with initiatives like **PM Gati Shakti** and the *National Logistics Policy*.
- *Coal* accounts for **55% of India's total energy** and **74% of electricity generation**, with rail transport contributing nearly half of Indian Railways' freight earnings.
- India produced over **1 billion tonnes** of coal in FY 2024–25 and aims to reach **1.5 billion tonnes by 2030**.

### Expansion of RBI's Integrated Ombudsman Scheme

- The *Reserve Bank of India (RBI)* has extended the **Reserve Bank – Integrated Ombudsman Scheme (RB-IOS), 2021** to include *state and central cooperative banks* from **November 2025**.
- RB-IOS is a *free, single-window grievance redressal system* under the **Alternate Grievance Redressal (AGR) Framework**, merging ombudsman schemes for banks, NBFCs, and digital transactions.
- It aims to simplify complaint filing, *standardize procedures*, and ensure **faster, transparent, and fair resolution**.

- The scheme covers *commercial banks, RRBs*, urban cooperative banks, NBFCs (with assets  $\geq$  ₹100 crore), and credit information companies.
- The *AGR Framework* strengthens **dispute resolution** across the financial sector.

### India-Brazil Bilateral Trade Target USD 20 Billion

- India and Brazil aim to increase *bilateral trade* to **USD 20 billion** within five years, as agreed during the **7th Trade Monitoring Mechanism (TMM)** meeting.
- Both nations discussed *visa facilitation*, expansion of the **India-MERCOSUR Preferential Trade Agreement (PTA)**, and diversification into *healthcare, renewables, and digital services*.
- The PTA, in effect since **2009**, provides tariff concessions on **450 Indian and 452 MERCOSUR tariff lines**.
- Brazil is India's *largest trading partner* in Latin America, with bilateral merchandise trade at **USD 12.19 billion** in FY 2024–25.
- India exports *coconuts and mangoes*; Brazil supplies **cashews** and *Nelore cattle*.

### India-UK Bilateral Talks

UK Prime Minister Keir Starmer visited India with a **125-member business delegation** to strengthen trade, investment, and technological cooperation.

- Bilateral talks reaffirmed commitment to the *India-UK Comprehensive Economic and Trade Agreement (CETA)*, signed in **July 2025**, which eliminates tariffs on **99% of Indian exports**.
- Bilateral trade reached **£44.1 billion** in early 2025, making India the UK's *11th largest trading partner*.
- A **10-year Defence Industrial Roadmap** was adopted in 2025 to promote *co-design, co-development, and co-production* of advanced defence technologies.
- The UK is India's **6th largest source of FDI**, while India is the *2nd largest investor in the UK*.

### India-Qatar Joint Meetings 2025

The Indian Union Minister of Commerce and Industry, Piyush Goyal, co-chaired the **Qatar-India Joint Commission on Economic and Commercial Cooperation** and addressed the **Joint Business Council** meeting in **Doha** with his Qatari counterpart.

#### Key Highlights

- **Trade Expansion:** Both sides recognised untapped trade potential and agreed to **double bilateral trade** (USD 14 billion in FY25) by **2030**.
- **CEPA Progress:** They reaffirmed the establishment of a **Comprehensive Economic Partnership Agreement (CEPA)** to enhance trade and investment flows.

- **Energy Partnership:** India acknowledged Qatar's long-term agreement for **LNG supply of 7.5 million tonnes** per year from 2028.
- **Digital Cooperation:** India launched the Unified Payments Interface (**UPI**) in **Doha**, making it the **eighth country** to accept UPI.
- **Objectives:** The measure aims to **lower the burden of sugar-related illnesses** (e.g., obesity, diabetes, etc.) while raising funds for public health programs.
- **India Policy:** India **imposes a 40% sin tax** on sugary drinks, in addition to 28% GST and 12% compensation cess, making the overall tax burden among the highest worldwide.

### UAE Introduces Sugar Tax

- The **United Arab Emirates (UAE)** will implement a **sugar tax on sweetened beverages** beginning January 1, 2026, to decrease high sugar consumption and promote public health.
- The new legislation aligns with the **Gulf Cooperation Council (GCC)**'s regional framework for a **tiered volumetric excise** on sugar-sweetened beverages (SSBs).
- **Sugar Tax**
- A sugar tax is a fiscal policy that **raises the price of sweetened beverages** through taxation to decrease excessive sugar consumption and promote healthier lifestyles.

### Gulf Cooperation Council (GCC)

- The Gulf Cooperation Council (GCC) is a **regional political and economic alliance** established to promote political, financial, and security cooperation among member nations.
- **Formation:** Founded in **1981**, as a response to the Iran-Iraq War and the 1979 Iranian Revolution, it comprises **six Arab states**: Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, and the United Arab Emirates.
- **Security Arm:** The **Peninsula Shield Force**, established in **1984**, serves as the GCC's joint military force.

*India's trade with the GCC reached approximately **\$178.56 billion** (15.4% of global trade) in FY2025, with the **UAE and Saudi Arabia** as its top partners. The region supplies around **35% of India's crude oil** and **70% of its imported natural gas**, thereby supporting India's energy security.*

*Around **8.9 million Indians** live in GCC countries, contributing significantly to remittances (38% of total in FY2024).*

### Navi Mumbai International Airport Inaugurated

- *Prime Minister Modi* inaugurated the **Navi Mumbai International Airport (NMIA)**, a **₹19,650-crore greenfield project** designed to handle **90 million passengers annually** upon full

completion in 2036.

- It is India's *first airport* with **water taxi connectivity** and an *Automated People Mover (APM)* linking terminals.
- The airport aims to *decongest Mumbai's existing airport*, enhance **regional air connectivity**, and boost *national aviation capacity*. It marks a significant step in modernizing India's **aviation infrastructure** and improving *multimodal transport integration*.

### Foreign Currency Settlement System at GIFT City

- The Union Finance Minister launched the **Foreign Currency Settlement System (FCSS)** at **Gujarat International Finance Tec-City (GIFT City)** to boost international trade and investment.

### Foreign Currency Settlement System (FCSS)

- The FCSS is a **payment infrastructure** within **GIFT-International Financial Services Centre (IFSC)**, enabling instant or **near real-time settlement** of foreign currency trades and payments.
- **Mechanism:** It replaces the traditional method of routing payments through multiple foreign banks, reducing settlement time from 36–48 hours to almost immediately.
- **Regulatory Oversight:** It operates under the supervision of the **International Financial Services Centres Authority (IFSCA)** and is governed by the Payment and Settlement Systems (PSS) Act, 2007.

- *The IFSCA is a **statutory regulatory body** established under the **International Financial Services Centres Authority Act** to develop and regulate financial products, services, and institutions in India's IFSCs.*

- **Current Scope:** Initially, the system supports settlements in **U.S. Dollar (USD)**, **British Pound (GBP)**, and **Euro (EUR)**, with plans to add more global currencies.
- **Significance:** The launch positions GIFT City alongside **major financial centres** like Hong Kong, Tokyo, and Manila, which are capable of local foreign currency settlements.

### GIFT City

- GIFT City is a planned **greenfield smart city** and business district in **Gandhinagar, Gujarat**.
- It aims to create a world-class **financial and technology hub** that relocates offshore financial services to India and attracts global investment.
- The city has **two zones** — the Special Economic Zone (**SEZ**), which hosts **India's first IFSC**, and the **Domestic Tariff Area (DTA)**, which supports complementary businesses and infrastructure.

### India's Growth Forecast

The World Bank's South Asia Development Update revised India's growth forecast for **FY26 to 6.5%** (from 6.3%), while **lowering FY27 to 6.3%** due to higher U.S. tariffs on Indian exports.

### Key Highlights of the Report

- **FY26 Growth:** Upgraded to **6.5%** due to **strong domestic demand** and **GST simplification**.
- **FY27 Growth:** Downgraded to **6.3%**, due to **50%** U.S. tariffs on nearly three-fourths of Indian exports.
- **South Asia:** Region projected to grow **6.6% (2025)**; **India** accounts for **~70% of South Asia's output**.

### Reasons for Upgraded FY26 Outlook

- **Public Investment:** Continued push through **PM Gati Shakti** and National Infrastructure Pipeline (NIP).
- **Domestic Consumption:** Boosted by **rural wage growth** and strong agricultural output.
- **GST Reform:** Simplification of compliance and **rationalisation** of tax slabs in 2025.
- **Monetary Easing:** RBI's **accommodative stance** promotes liquidity and private investment.

- *An **accommodative stance** focuses on economic growth by lowering interest rates. It supports growth by signalling further rate cuts, unlike a neutral stance that balances between inflation & growth.*

### Challenges Ahead for India

- **U.S. Tariffs:** **50% duty** on major exports (~2% of GDP exposure) will impact **textiles** and **pharma** exports.
- **Global Slowdown:** The World Bank projects South Asia's growth will **decelerate from 6.6% in 2025 to 5.8% in 2026**, citing spillovers from a global slowdown and **trade headwinds**
- **Weak Urban Demand:** Slower growth in car sales and personal credit demand indicates urban consumption fatigue. In June 2025, car wholesales to dealers **dropped 7.4% YoY, an 18-month low. (FADA)**
- **AI Disruption Risks:** **~23% of jobs are exposed** to AI, especially mid-skill service roles.

### Way Forward

- **Diversify Export:** Reduce overdependence on the U.S. by exploring **ASEAN, Africa, and GCC**. E.g. **India-UAE CEPA** to expand export base.
- **Domestic Manufacturing:** Strengthen Make in India 2.0, PLI Schemes, and logistics competitiveness.
- **Boost AI Integration:** Promote AI-human complementarity in high-skill sectors. E.g. National AI Mission and **Skill India Digital Platform** for upskilling.
- **Infrastructure Push:** Continue capital expenditure momentum to drive employment and demand. **PM Gati Shakti & NaBFID Infra Bonds** to deepen infra financing.

**Agriculture Demand:** Support through **MSP reforms**, irrigation projects, and digital agri-tech platforms. E.g. **Digital Public Infrastructure for Agriculture (DPIA) model**.

### CJI Seeks Reforms to Strengthen ITAT Efficiency

- The Chief Justice of India highlighted **rising case pendency** as a major challenge while **praising** the **Income Tax Appellate Tribunal (ITAT)** for substantially cutting its backlog.

### Key Highlights

- **Case Pendency:** The CJI noted that disputes worth **₹6.85 trillion**, constituting over **2% of India's GDP**, remain pending before the ITAT.
- **ITAT's Achievement:** Despite the high pendency value, ITAT has reduced the number of pending cases from **85,000 to 24,000** in just **five years**.
- **Conflicting Rulings:** The CJI cautioned that **inconsistent decisions** across benches can undermine public trust, create uncertainty, and weaken the authority of judicial institutions.
- **Structural Gaps:** He identified issues in **appointments, tenure, training**, case management, and technology as interlinked concerns.

### Institutional and Structural Reforms Proposed by CJI

- **Transparent Appointments:** Credibility of tribunals depends on **transparency** and **objectivity** in appointments, avoiding administrative arbitrariness.
- **Tenure Reforms:** Suggested **restructuring** eligibility criteria to attract **experienced practitioners** earlier in their careers, allowing them to develop **institutional expertise**.
- **Capacity Building:** Called for **systematic induction** and continuing education programmes to enhance adjudicatory skills and minimise judgment inconsistencies.

#### Income Tax Appellate Tribunal (ITAT)

- It is a **quasi-judicial statutory body** set up in **1941** under the Income Tax Act, 1961, to adjudicate appeals in **direct tax** matters.
- It functions under **Ministry of Law & Justice, ensuring independence** from income Tax Department.
- Orders passed by ITAT are **binding** unless overturned by a higher court; it also has powers like a **civil court** (summoning, evidence review, rectification).

### G20 Likely to Miss 2027 Cross-Border Payment Targets

- The Financial Stability Board (FSB) has warned that the G20's **2027 target to improve international** cross-border payments is unlikely to be met due to infrastructure challenges.
- The **G20 Roadmap (2021)** aims to make cross-border transactions faster, cheaper, and transparent, targeting a 1% retail payment cost and settlement of 75% of transactions **within 1 hour**.

### Persistent Infrastructure Challenges

- **High Cost:** Global average costs for person-to-person remittances are well **above 1%**, with **sub-Saharan Africa** seeing the highest rates, **4% in 2025**, up from **3.2% in 2023**.
- **Limited Transparency:** End-users still face **uncertainty** in tracking payments and final settlement times.

- **Fragmented Systems:** Many countries **lack 24/7 payment** infrastructure and standardised data formats, hampering **interoperability** and **compliance checks**.

#### Financial Stability Board (FSB)

- It is an international body, established in **2009 by the G20**, that monitors and makes recommendations to strengthen global financial stability.
- **Key Functions:** Assessment of **vulnerabilities**, regulatory cooperation, **crisis management**, and monitoring implementation of financial sector reforms.
- Its decisions are **not legally binding** on the members.
- **India** is an **active member**, represented in the FSB Plenary by **three officials:** the Secretary (Department of Economic Affairs), the Deputy Governor of RBI, and the Chairman of SEBI.

#### Securities Transaction Tax

- The Supreme Court of India is currently reviewing a petition challenging the **constitutional validity** of the Securities Transaction Tax (STT).

#### Securities Transaction Tax (STT)

- Securities Transaction Tax (STT) is a **direct tax** levied on the buying and selling of securities listed on recognised stock exchanges.
- **Mandatory:** It is a **non-refundable**, mandatory charge applied regardless of trading profits or losses.
- **Legal Basis:** Introduced in **2004** via the **Finance Act**, the STT is governed by the **Securities Transaction Tax Act 2004**.
- **Purpose:** Simplify capital gains taxation, reduce **tax evasion**, and ensure a transparent, automated tax collection process.
- **Collection:** The tax is automatically **collected at source** by stock exchanges, mutual fund houses, or IPO merchant bankers.
- **Scope:** It applies to equity shares, derivatives (futures and options), and equity-oriented mutual funds.
  - **Exemptions:** **Off-market** deals and specific debt instruments.
- **Variable Rates:** Different rates apply to **various security types** and trade modes, such as 0.1% on delivery-based equity trades, 0.02% on futures, and 0.1% on options.

#### Arguments Against STT

- **Trading Costs:** STT increases transaction costs and **reduces profitability** for small and retail investors.
- **Market Liquidity:** Higher costs limit trading frequency, **widen bid-ask spreads**, and slow price discovery.
- **Tax Fairness:** The levy applies uniformly, **even to losses**, making it punitive and unrelated to income.
- **Double Taxation:** Investors pay both STT and capital gains tax **without any refund** or

adjustment.

- **Derivative Bias:** Lower STT on derivatives compared to equities **encourages speculative trades.**

#### Arguments in Favour of STT

- **Revenue Stability:** STT provides steady government revenue for welfare and infrastructure programmes.
- **Transparency:** Source deduction **prevents tax evasion** & ensures transparency in the capital market.
- **Regulatory Oversight:** STT records help detect suspicious trades and strengthen **market surveillance.**
- **Speculative Control:** Higher costs discourage **frequent speculation** and promote genuine investments.

#### Way Forward

- **Cash STT:** Remove the levy on cash equities to prevent double taxation and revive equity volumes.
- **Rate Harmonisation:** **Equalise rates** on equities and derivatives to ensure fairness and curb speculation.
- **Allow Deduction:** Permit **STT deduction** against capital gains tax to promote equitable tax treatment.
- **Gradual Phaseout:** Abolish STT alongside fiscal reforms to maintain stability and revenue predictability.

#### RBI Proposals for Revising Credit Risk Rules

- **The Reserve Bank of India (RBI)** has proposed key reforms in **how banks assess and manage credit risk** to align India's banking regulatory framework with global standards.
- **Loan Provisioning:** A transition from the current **incurred-loss model** to an **Expected Credit Loss (ECL)** framework (from April 1, 2027) while maintaining existing NPA identification rules.
- **Differentiated Risk Weights:** Different capital requirements for various loan categories, with **lower risk weights** for Micro, Small, and Medium Enterprises (MSMEs) and the **real estate sectors.**

*The incurred-loss model requires provisioning for loan losses after default, whereas the ECL model mandates **advance provisioning** for potential losses based on credit risk, ensuring financial stability.*

- **Significance:** The proposed reforms align with the **Basel III norms** by lowering banks' minimum regulatory capital requirements and benefit the MSMEs, the real estate sector, and responsible credit card users.

*Basel III Norms are **international banking standards** developed by the **Basel Committee** to strengthen bank capital, improve risk management, and ensure financial stability.*

#### Global Fintech Fest 2025

- Recently, the **6<sup>th</sup> edition** of the **Global Fintech Fest (GFF)** is taking place at the **Jio World Centre in Mumbai**, with the theme "*Empowering Finance for a Better World Powered by AI*".
- It is a global conference organised by National Payment Corporation of India (NPCI), PCI, and FCC to promote innovation, collaboration, and financial inclusion in digital finance.
- The event features the **Bharat AI Experience Zone** by the NPCI and NVIDIA, showcasing AI-driven solutions for secure, efficient, and inclusive digital payments.
- **Participation:** Over one lakh visitors are participating along with the **Ministry of Statistics and Programme Implementation (MoSPI)**.

*The Payments Council of India (PCI) operates under the Internet and Mobile Association of India (IAMAI) and advocates for secure and inclusive digital payment systems in India.*

*The Fintech Convergence Council (FCC) is an IMAI body focusing on the broader fintech ecosystem.*

### Paradox of Women in Indian Farms

- Women constitute **over 42% of India's agricultural workforce**, yet nearly half remain unpaid family workers, highlighting wage and land inequities despite feminisation of agriculture.

- **Rising Female Participation:** As per the **Periodic Labour Force Survey (PLFS) 2023-24**, **76.95% of rural women are engaged in agriculture**.
- **Low Land Ownership:** Only **12.8% of operational land holdings** are owned by women, which constitutes 10.34% of the area of holdings.
- **Rural Female Labour Force Participation Rate (FLPR):** FLPR rose from 41.5% in 2022-23 to 47.6% in 2023-24, largely due to **male out-migration**.
- **Shift in Women's Roles:** In Andhra Pradesh, women-led Self-Help Groups (SHGs) are engaging in organic farming and direct marketing, indicating a move from labourers to farm managers.

### Key Drivers of Feminisation of Agriculture

- **Male Out-Migration:** The **2011 Census** indicated **33.7% of rural males migrate** for better job opportunities, leaving women to manage farms.
- **Economic Transformation:** Decline of agricultural employment and **growth in industry/services** has drawn men away, as seen in **Punjab** with mechanisation and contract farming.
- **Economic Distress:** In **Odisha**, women turn to subsistence farming and animal husbandry due to a **lack of alternative jobs** and income sources.
- **Rural Distress:** Declining agricultural production, higher input costs, and **climate change** have worsened rural economic conditions, forcing women to step into agriculture.

### Significance of Women in Agriculture

- **Growing Workforce Share:** Women's participation in agriculture rose **135% in the last decade**, with 2 out of 3 working women employed in the sector.

- **Climate-Resilient Agriculture:** Women's **traditional knowledge** enhances adaptation to climate stress and biodiversity preservation.
- **Role in Food Security:** Women contribute to **60–80% of food production** in developing countries. Nearly half of the global food supply depends on women farmers.
- **Improved Livelihoods:** Access to land and credit can help women secure a better livelihood, **reducing poverty** and economic dependency.

### Challenges Faced

- **Unpaid Labour:** Nearly **50% of women** in agriculture are unpaid, often in family farms. (PLFS 2023–24)
- **Land Inequality:** Women own **only 13–14% of land holdings**, limiting access to credit and schemes.
- **Gender Wage Gap:** Women earn **20–30% less than** men for similar work. (PLFS 2023–24)
- **Low Digital Access:** Only **one-third of rural women** own a smartphone. (Pew Research Centre 2023)
- **Falling Agricultural Share:** Despite feminisation, agriculture's GVA share fell from **15.3% (2017–18) to 14.4% (2024–25)**, indicating growth without empowerment. (Economic Survey 2024–25)

### Government Initiatives for Women's Security in Agriculture

- **Mahila Kisan Sashaktikaran Pariyojana (MKSP):** A sub-scheme under **DAY-NRLM** to empower women in agriculture. Recognises women as '**Kisan**', providing training in sustainable agriculture.
- **Budgetary Support:** **30%** allocation under the **National Food Security Mission** reserved for women farmers in several states.
- **Green Agriculture Project:** (FAO + Government of India) To focus on climate resilience and gender mainstreaming.
- **Climate Adaptation Projects:** **ENACT Project** in Assam (WFP + Government of Norway) to promote flood-resistant rice, digital advisories, and women-led seed banks.

### Way Forward

- **Financial Inclusion:** Expand access to **microcredit, crop insurance**, and **formal banking** for women farmers and secure women's **rights to land ownership**.
- **Value Chain Integration:** Train women for roles in **processing, packaging, branding**, and exports.
- **Leverage Digital Tools:** Expand AI-enabled multilingual access via **Digital Sakhi** and **BHASHINI**.
- **Targeted Policies:** Embed **gender-sensitive clauses in FTAs** and climate finance schemes.
- **Institutional Support:** Strengthen women-led FPOs as **engines of rural entrepreneurship**.

- **BHASHINI:** AI-based platform offering **real-time translation in 22 Indian languages**, promoting multilingual digital inclusion.

- **Global Best Practice:** **Bangladesh's Grameen model** and **Kenya's Women in Coffee initiative** showcase **scalable women-led agricultural enterprises**.

### India's Rising Computer Services Exports and AI Integration

- According to the World Bank's Chief Economist for the South Asia Region, India has seen a **30% increase** in the **export of computer services** since 2022.
- Computer services refer to a broad category of Information and Communication Technology (ICT) and IT-enabled Services (ITES), making up India's **largest service export category**.
  - According to recent RBI data, software services exports totalled \$47.32 billion in April-June 2025, reflecting a **13% year-on-year increase**.
- **AI Integration:** The Business Process Outsourcing (BPO) sector is increasingly adopting AI, with **12%** of job postings now demanding related skills.
- **Institutional Readiness:** India ranked **46<sup>th</sup>** in Oxford Insights' **2024 Government AI Readiness Index**, outperforming most emerging economies, which reflects progress in policy preparedness.

### Small Farms Driving Higher Productivity

- A joint study by **IIT Bombay** and the **University of Hyderabad** challenges conventional assumptions on the **farm size-productivity link** in **India's semi-arid tropics**.

### Key Findings of the Study

- The study analysed agricultural data from 1975–2014 using ICRISAT's long-term datasets on India's semi-arid tropics.
- In the early years (1975-84), **small farms recorded higher productivity** due to intensive family labour, efficient management, and greater fertiliser use per unit area.
- Between 2009 & 2014, this advantage declined owing to **agrarian distress, monocropping, & rising input costs**.
- The traditional **inverse relationship** between **farm size and productivity** has weakened and become context-dependent.
- The study concluded that access to affordable credit, modern inputs, and strong market linkages emerged as the **main determinants of productivity**, rather than **land size**.

### Policy Recommendations to Increase Productivity

- Strengthen smallholders' **access to technology, credit, and extension services** to enhance productivity and resilience.
- Promote farmer **collectives** and **producer organisations** to improve bargaining power, enable resource pooling, and facilitate market access.
- Encourage **agroecological practices** and **diversification** to reduce vulnerability to market shocks.

### PM Modi Launches Two Landmark Schemes for Farmers' Welfare

- PM Narendra Modi launched the PM Dhan-Dhaanya Krishi Yojana and Mission for Aatmanirbharta in Pulses to enhance farm productivity, agricultural self-reliance, and food security.

### Mission for Aatmanirbharta in Pulses (Pulse Self-Reliance Mission)

- The 'Mission for Aatmanirbharta in Pulses' is a ₹11,440 crore **Central Sector Scheme** aimed at achieving self-sufficiency in pulses production.
- **Objective: Reduce pulse imports (4.6 million metric tons in FY 2024)**, enhance farmers' income, and ensure India's nutritional security.
- **Nodal Ministry:** The **Ministry of Agriculture and Farmers' Welfare** is implementing the scheme over **six years (FY 2025-31)**.

#### Targets of the Mission

- **Production:** Increase total pulse production to **35 MMT** by FY 2030–31, up from 24 MMT in 2023-24.
- **Expansion:** Expand pulse cultivation area to **310 lakh hectares**, compared to 275 lakh ha in 2024-25.
  - Of this expansion, **35 lakh hectares** will be derived from **rice fallow** and other diversifiable lands.
- **Yield:** The average yield is projected to rise to **1,130 kg per hectare** from 881 kg/ha in 2023-24.

#### Interventions and Strategies

- **Procurement:** Guarantees 100% MSP procurement of **Tur, Urad, and Masoor** for the initial **four years**.
  - NAFED & NCCF will jointly oversee procurement under the Price Support Scheme of PM-AASHA.
- **Seed Distribution:** Plans to supply 126 lakh quintals of certified, high-yield, climate-resilient seeds and distribute 88 lakh free seed kits.
- **Infrastructure:** Provides for **1,000 new processing units** with subsidies of up to ₹25 lakh each to strengthen post-harvest value chains.
- **Price Monitoring:** Introduces a system to monitor **international pulse prices**, ensuring domestic price stability and farmer protection.

#### PM Dhan-Dhaanya Krishi Yojana (PMDDKY)

- PMDDKY is a **central sector umbrella programme** under the **Ministry of Agriculture and Farmers' Welfare** aimed at modernising farming in India.
- **Governance Model:** Modelled on NITI Aayog's Aspirational Districts Programme, it emphasises **data-driven** and result-oriented agricultural governance.
- **Aspirational Districts:** It designates **100 Aspirational Agriculture Districts** nationwide based on (a) **low productivity**, (b) **moderate crop intensity**, and (c) below-average **agricultural credit access**.
- **Scheme Integration:** PMDDKY consolidates **36 Central schemes** from 11 departments to streamline agricultural support delivery.
- **Implementation Mechanism:** Each district will formulate a **District Agriculture Development Plan** overseen by **local committees** and monitored by a **Central Nodal Officer**.

### US Imposes 100% Additional Tariff on Chinese Imports

- US President Donald Trump announced a **100% additional tariff** on Chinese imports effective **November 1, 2025**, as a countermeasure to China's export controls on rare earth minerals.
- **Tariff Scale:** The decision raises cumulative tariffs on some Chinese goods to **nearly 130%**.
- **Export Control:** China recently increased export restrictions on five more rare earth elements, citing concerns over **national security** and the safeguarding of strategic resources.
  - Beijing has also banned the export of several advanced **refining and separation technologies**
- **Global Implication:** These reciprocal actions intensify the US-China trade conflict, disrupting global supply chains and inflating the costs of critical minerals.

### Nobel Memorial Prize in Economic Sciences 2025

- The Nobel Memorial Prize in Economic Sciences 2025 was awarded to **Joel Mokyr, Philippe Aghion, and Peter Howitt** for explaining **how innovation shapes long-term prosperity**.

#### Contribution of the Nobel Laureates

##### Joel Mokyr (Northwestern University, US)

- **Historical Foundations:** Mokyr highlighted **how Europe's Scientific Revolution fostered sustained economic growth** by combining technological progress with intellectual development.
- **Knowledge Fusion:** He explained that blending **practical "prescriptive"** knowledge (knowing how) with theoretical **"propositional" knowledge** (knowing why) created a self-sustaining innovation ecosystem.
- **Industrial Enlightenment:** Mokyr coined the term (**Industrial Enlightenment**) to describe a period when **openness to new ideas** and **scientific curiosity** fuelled cycles of innovation and productivity.

##### Phillipe Aghion (Collège de France, INSEAD, and LSE) and Peter Howitt (Brown University, US)

- **Model Development:** Aghion and Howitt created mathematical models based on **Joseph Schumpeter's theory of "Creative Destruction."**
- **Creative Destruction:** Their model shows how new technologies, firms, and ideas **replace outdated ones**, keeping economies competitive and productive.
- **Policy Implication:** They emphasised that strong **competition, education, & research investment** are crucial for sustaining innovation-driven growth.

### World Economic Outlook by the IMF

- The **October 2025 World Economic Outlook (WEO)** released by the **International Monetary Fund (IMF)** predicts a slowing yet resilient global economy.
- The WEO is a **biannual report** that analyses and projects global economic trends and policy challenges.

### Key Highlights

- **Global Growth:** Revised upward to **3.2% for 2025**, reflecting **economic resilience** despite trade shocks and rising protectionism.
- **India's Outlook:** Growth forecast increased to **6.6% for 2025** but lowered to **6.2% for 2026**, due to strong first quarter performance but waning momentum.
- **US Tariff Impact:** The initial effect of U.S.-led tariff measures on India was **less severe** than expected, with the growth rate reaching **7.8% in April-June 2025**.

### International Monetary Fund (IMF)

- The IMF is an **international financial organisation** established to promote global **monetary cooperation** and secure **economic stability**.
- It is a specialised agency of the United Nations headquartered in **Washington, D.C., USA**.
- **Establishment:** Conceived at the **1944 Bretton Woods Conference**, it was formally established in **December 1945** with 29 founding members; **India** is a founding member of the IMF.
- **Membership:** Currently includes **190 member** countries; **Liechtenstein** joined most recently in 2024.
- **Structure:** Includes the **Board of Governors** (the highest decision-making body), the **Executive Board**, and **ministerial committees**.

### PM GatiShakti Public Platform

- On the **4<sup>th</sup> anniversary** of the PM GatiShakti National Master Plan (NMP), the government launched '**PM GatiShakti Public**'.

### Key Features of the Platform

- It is a **digital platform** designed to help **private players**, consultants, and researchers make **data-driven infrastructure planning**.
- Developed by the **Bhaskaracharya National Institute for Space Applications and Geoinformatics (BISAG-N)** and the **National Geospatial Data Registry (NGDR)**.

### PM GatiShakti – Offshore

- The Govt. also launched PM GatiShakti – Offshore, a dedicated **digital platform** for **integrated planning of offshore infrastructure**, such as wind farms, marine exploration, and **coastal development**.
- It combines key datasets from multiple ministries on a unified geospatial interface to strengthen India's Blue Economy, promote green energy, and support sustainable coastal growth.

### Google AI Hub in Visakhapatnam

- **Google** will invest \$15 billion over five years (2026–2030) to establish its **largest Artificial Intelligence (AI) hub outside the United States**, located in **Visakhapatnam, Andhra Pradesh**.
- The project infrastructure will be developed in partnership with the Adani Group and Airtel.
- **Key Feature:** It will include a large-scale **AI data centre** supported by renewable energy, and a

new international **subsea cable landing station** to strengthen global digital connectivity.

- **Significance:** The investment aligns with India's **Viksit Bharat 2047 vision** and represents **Google's biggest financial commitment** in India so far.

## MERCOSUR

- India and Brazil agreed to expand the 2004 **Preferential Trade Agreement (PTA)** with the **Mercosur bloc** to strengthen trade and economic cooperation.
- Mercosur, or the **Southern Common Market**, is a **South American trade bloc** created to promote free trade and economic integration.
- **Framework:** It was established under the **Treaty of Asunción (1991)**. The **Protocol of Ouro Preto (1994)** granted it legal status and defined it as a **customs union**.
- **Membership:** The bloc includes **five full members** (Argentina, Bolivia, Brazil, Paraguay, and Uruguay) and **six associate members**.
  - **Venezuela's** membership has been **suspended** indefinitely since 2016 due to non-compliance.
- **Economic Significance:** Mercosur contributes **over 60%** of South America's GDP, making it among the largest trade blocs after the EU, USMCA, and ASEAN.
- **Governance:** The **Common Market Council (CMC)** is the highest decision-making body. It comprises foreign and economic ministers from each member state.
  - The bloc's presidency **rotates every six months** among full members.
- **Trade Agreement:** India signed a Preferential Trade Agreement with Mercosur in **2004** to expand market access, and it came into effect in 2009.
  - India-Mercosur trade reached **\$17.9 billion** in 2024-25, with **Brazil** accounting for **\$12.19 billion**.

## China's WTO Complaint Against India

- China has filed a complaint at the **WTO** alleging that **India's EV and battery subsidies** violate trade rules, claiming they discriminate against foreign manufacturers.

*WTO's Agreement on Subsidies and Countervailing Measures (ASCM) prohibits subsidies contingent on export performance or import substitution.*

### Allegations by China

- **National Treatment Violation:** India's subsidies and local-content rules allegedly favour domestic producers (**Tata, Ola**) over foreign firms (**WTO Article III**).
- **Import-Substitution Subsidy:** Claimed as a prohibited subsidy under **ASCM Article 3**, as benefits are tied to using domestic inputs.
- **Market Access Barrier:** **70-100 % import duty** on fully built EVs deters Chinese automakers.

### Consequences for India

- **Trade Deficit Concern:** India's **\$99.2 billion trade deficit** with China (2024-25) could widen.
- **WTO Risk:** May lead to a **dispute panel** and potential adverse ruling on **India's PLI scheme**.

- **Diplomatic Strain:** Could undermine recent India–China thaw post-Ladakh standoff.

#### Way Forward

- **Transparent Subsidy Design:** Restructure EV incentives as R&D or green-tech support permissible under **ASCM Article 8** (WTO Secretariat Guidelines 2024).
- **Bilateral Consultation:** Use the Dispute Settlement **Article 4** consultation stage to negotiate a compromise before formal panel review.
- **Strategic Alliances:** Strengthen EV partnerships via the **Indo-Pacific Economic Framework (IPEF)** Clean Economy Pillar and **Global Biofuels Alliance** to diversify sources.
- **Technology Localisation:** Encourage domestic innovation through **Atmanirbhar EV Mission 2030** and public-private R&D grants instead of restrictive sourcing mandates.

- **Most-Favoured-Nation (MFN):** Equal treatment to all WTO members (Article I, GATT).
- **National Treatment (NT):** Imported and domestic goods must be treated equally after entry.
- **Countervailing Measures:** Allowed when subsidies distort trade (Article VI, GATT).
- **Dispute Resolution:** Three-tier dispute resolution under **Articles 4–17**. (Consultation → Panel → Appellate Body)

#### Future Prospects of India–Middle East–Europe Economic Corridor (IMEC)

- The **West Asian conflict** post-October 2023 and shifting global trade routes (like the Arctic passage) have raised concerns about IMEC's viability and strategic direction.

#### IMEC

- The IMEC, announced during the **G20 Summit 2023 (New Delhi)**, aims to link **India** with **Europe** via the **Middle East** through a mix of **rail, port, digital, and energy** infrastructure.
- It will span from India to Europe through **India, the UAE, Saudi Arabia, Jordan, Israel, and Greece**.
- Indian ports that will be connected to IMEC are **Mundra (Gujarat), Kandla or Deendayal Port (Gujarat), and Jawaharlal Nehru Port Trust (Navi Mumbai)**.
- It is a counter to **China's Belt and Road Initiative (BRI)**. The corridor is estimated to cut **the time from India to Europe by 40%** and **slash transit costs by 30%**.

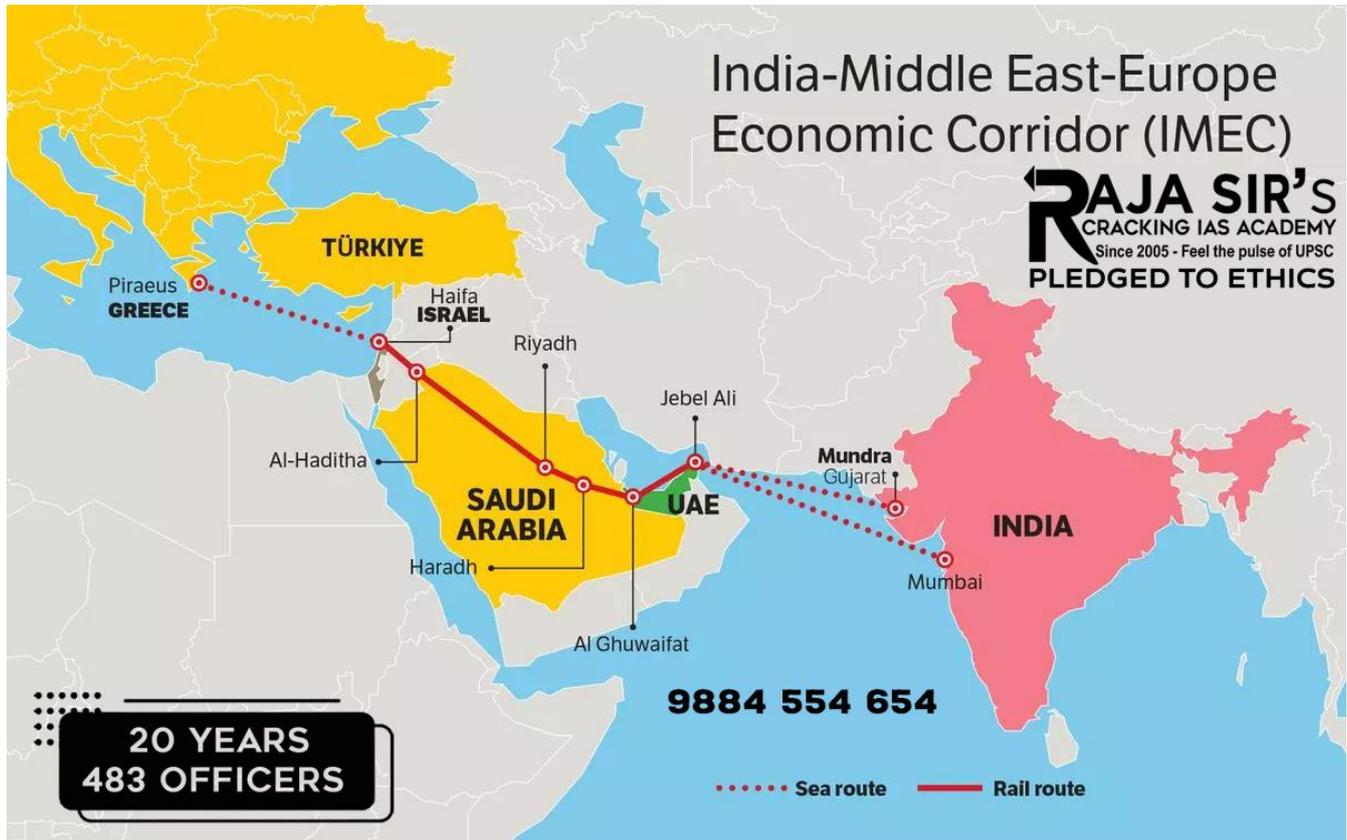
#### Challenges Faced by the IMEC Project

- **West Asia Conflict:** **Gaza war** and **Israel–Arab tensions** disrupt project timelines and trust.
- **Security Risks:** **Houthi attacks** in the **Red Sea** raise maritime vulnerability.
- **Infrastructure Gaps:** Missing multimodal links across the **Saudi Arabia–Jordan–Israel** route.
- **Funding & Implementation:** Absence of a dedicated financing framework like **AIIB** or **NDB**.

#### Way Forward

- **Adaptive Routing:** Explore **alternate ports (Jeddah, Dammam, Suez)** to bypass conflict zones (align with **IMO safety routes 2025**).
- **Multilateral Financing:** Establish **IMEC Fund** under **G20 India–EU Partnership**.

- **Green Corridor Development:** Link with the EU's Global Gateway Green Energy Projects and India's National Green Hydrogen Mission.
- **Institutional Mechanism:** Formalise IMEC Secretariat under G20's Connectivity Agenda 2030.



### Central Bank Digital Currencies

- At the IMF-World Bank Annual Meeting, RBI Governor Sanjay Malhotra urged central banks to promote CBDCs instead of stablecoins for cross-border payments.

*CBDC is a sovereign, digital form of fiat money issued and regulated by a central bank, whereas **Stablecoins** are private cryptocurrencies pegged to assets like the US dollar to maintain price stability.*

### Significance of Promoting CBDCs Over Stablecoins

- **Monetary Sovereignty:** CBDCs protect domestic control over money supply; RBI warns US-dollar stablecoins could trigger rupee dollarisation (RBI Report 2024).
- **Cross-Border Efficiency:** CBDCs can cut remittance costs by 50% compared to SWIFT (BIS 2025).
- **Regulatory Transparency:** Unlike \$285 bn volatile stablecoin market, CBDCs ensure KYC compliance and legal tender backing.
- **Technological Edge:** Tokenised CBDCs retain stablecoin-like benefits (programmability, low latency) but with state-backed security and legal tender status.

Tokenised CBDC refers to a digital form of central bank money represented as secure blockchain-based tokens, enabling instant, programmable, and traceable transactions.

### Challenges of Replacing Stablecoins

- **Limited Global Adoption:** CBDC systems still lack standardisation and coordination among central banks. **Only 19 central banks** have pilot-stage CBDCs (IMF Tracker 2025).
- **Cybersecurity:** Increased digitalisation raises cybersecurity vulnerabilities. **Over 60% of central banks** cite cyberattacks and surveillance risks as major CBDC concerns (BIS 2025).
- **Dominant Stablecoin Market:** Private stablecoins like **Tether (USDT)** and **USDC** dominate **90% of the \$285 bn market**, influencing policymakers globally (IMF, 2025).

### Way Forward

- **Global CBDC Corridors:** India should join the **BIS mBridge project (UAE-China-Thailand-Hong Kong)** to enable real-time, low-cost, and secure cross-border CBDC settlements.
- **Tech-Policy Convergence:** Adopting the **IMF's XC platform** will help establish **common standards** and **interoperability** for CBDCs across jurisdictions.
- **Cyber Resilience:** Implement the **FSB 2025 Cyber Resilience Framework** and deploy AI-driven fraud detection and encryption systems to safeguard digital currency infrastructure.
- **Awareness & Trust:** Under the **RBI Digital Rupee Mission**, enhance **financial literacy** and user adoption. Currently, **only 26% of Indians** understand the basics of CBDCs (FIS Survey 2024).

### India's Gold Reserves Cross \$100 Billion

- India's gold reserves exceeded **\$100 billion** for the first time in history, driven by a **65% rise in global gold prices** during 2025.
- **Reserve Share:** Gold's share in India's total forex reserves **rose to 14.7%**, marking its **highest proportion** since **1996-97**.
- **RBI Purchases:** Despite rising valuations, the RBI added **only 4 tonnes** of gold from January to September 2025, compared to 50 tonnes in 2024.
- **Global Drivers:** Record-high gold prices reflect central banks' diversification away from the U.S. dollar amid geopolitical tensions and increasing de-dollarisation.
- **Reserve Composition:** As of October 2025, India's reserves consisted of **82% foreign currency assets**, **14.7% gold**, **2.7% Special Drawing Rights**, and **0.7% IMF Reserve Tranche Position**.

### Global Multidimensional Poverty Index 2024

2024 Global MPI was on the theme "Poverty Amid Conflict." It is published **annually** by the **UN Development Programme (UNDP)**, **Oxford Poverty and Human Development Initiative**.

- Uses ten indicators across **three dimensions: health, education, and living standards**.
- Households are "**multidimensionally poor**" if they are deprived in **at least one-third** of these indicators.

### Key Findings

- Across 112 countries, **18.3 percent** live in **acute multidimensional poverty**. Nearly **40%** of the 1.1

billion people living in poverty, approximately 455 million, are situated in countries experiencing conflict.

- The **five countries** with the **largest** number of people living in **poverty** are **India (234 million)**, **Pakistan** (93 million), **Ethiopia** (86 million), **Nigeria** (74 million), and the **Democratic Republic of the Congo** (66 million). These five countries account for **nearly half** (48.1%) of the 1.1 billion poor people.
- Around 584 million people under the age of 18 are living in extreme poverty, making up 27.9% of all children globally, compared to 13.5 % of adults. Most poor people (**83.7 %**) reside in **rural** areas.
- It noted that 2023 witnessed more conflicts than ever since WWII, displacing over 117 million people.

#### Factors Contributing to India's Poverty

- **Geographical Inequalities:** Rural poverty rates remain high due to inadequate infrastructure, poor service delivery, and limited economic opportunities outside agriculture.
- **Educational Standards:** The quality of education in many government-run schools is poor, leading to insufficient learning outcomes.
- **Hygiene and Sanitation:** Poor access to safe drinking water and inadequate sanitation, particularly in rural areas, continues to push many households into multidimensional poverty.
- **Malnutrition Issues:** India struggles with severe malnutrition, particularly among children.
- **Economic Challenges:** The COVID-19 pandemic severely disrupted India's economy, leading to job losses, reduced incomes, and increased vulnerabilities for millions of households.

#### India's Government Steps for Poverty Alleviation

- National Food Security Act (NFSA), 2013
- National Nutrition Mission (POSHAN Abhiyaan)
- Pradhan Mantri Ujjwala Yojana (PMUY)
- Ayushman Bharat scheme
- Right to Education Act (RTE)
- Swachh Bharat Mission

#### Lighthouse Tourism

**2nd National Lighthouse Festival** with first of its kind 'Lighthouse Tourism Conclave 2024' began in Puri, Odisha.

- It is an initiative of **Ministry of Ports, Shipping, and Waterways** that aims to **explore the vast potential of lighthouse tourism**.
- **Leveraging India's maritime heritage:** Lighthouses have played a **crucial role in guiding ships safely through treacherous waters for centuries**.
- **Align with Maritime India Vision 2030:** Strives to **repurpose lighthouses into multifunctional facilities**, including maritime museums and cultural centers.
- **Current Status:** **75** iconic lighthouses across **10 coastal states and union territory** have been

developed.

### Demographic shift and India

- India's **elderly population** (60+) is rapidly increasing, from **149 million** in 2023 (10.5% of the population) to an estimated **347 million** by 2050 (20.8%).

### Challenges of an Ageing Population

- **Rising Dependency Ratio:** India's old-age **dependency ratio** is **15.7** per 100 (2023), increasing economic pressure on public resources.
- **Healthcare Burden:** **30%** of elderly women and **28%** of elderly men suffer from **chronic conditions** like diabetes and hypertension, especially in rural areas (Longitudinal Ageing Study of India, LASI 2017-18).
- **Financial Insecurity:** According to **India Ageing Report 2023**, **40%** of India's elderly are in the poorest quintile, with **18.7%** lacking income.
- **Inadequate Pension & Insurance Coverage:** Less than **20%** of elderly Indians have health insurance, leading to significant **out-of-pocket health expenses**.
- **Social Isolation: Migration** of younger family members leaves many elderly, especially in Kerala (**16.5%** elderly), facing loneliness and depression.
- **Labour Force Shrinkage:** The growing elderly population in states like **Kerala** and **Tamil Nadu** threatens economic productivity due to a shrinking workforce.
- **Caregiving Pressures:** **58%** of elderly men and **68%** of elderly women need **daily assistance**, burdening family caregivers (LASI, 2017-18).
- **North-South Demographic Divide:** Southern states are ageing rapidly due to lower fertility and better healthcare, which leads to uneven pressure on southern states.

### Government Initiatives for the Aging Population

- **National Policy on Older Persons (NPOP), 1999:** Promotes senior citizens' health, safety, and well-being through financial security, healthcare, and shelter. It also focuses on **family** as a support system.
- **Indira Gandhi National Old Age Pension Scheme (IGNOAPS):** This scheme provides monthly pensions to **BPL elderly** (60+) to ensure basic financial security.
- **Rashtriya Vayoshri Yojana (RVY):** Provides physical aids (vision, hearing, mobility devices) to elderly BPL citizens with age-related disabilities.
- **Pradhan Mantri Vaya Vandana Yojana (PMVVY):** Pension scheme offering guaranteed returns for senior citizens, ensuring post-retirement financial security.
- **Varishtha Pension Bima Yojana (VPBY):** Monthly pension scheme for citizens aged 60+, offering **regular income** as a social security measure.
- **Atal Vayo Abhyuday Yojana (AVYAY):** Consolidates elderly welfare programs, focusing on helplines, healthcare access, and reducing social isolation.
- **National Programme for Health Care of the Elderly (NPHCE), 2010:** Provides specialised healthcare for the elderly, focusing on chronic disease management and geriatric healthcare units.

- **Integrated Programme for Senior Citizens (IPSrC):** Offers financial aid to NGOs for old-age homes, daycare centers, and mobile healthcare for the elderly in underserved areas.
- Ayushman Bharat (PM-JAY) Provides free **secondary and tertiary healthcare services** for senior citizens.

#### Way Forward

- **Promoting Older Worker Employment:** Offer tax incentives for companies hiring older workers.
- **Leveraging Experience:** Establish mentorship programs for older adults to share expertise. Singapore's "SkillsFuture" initiative encourages this knowledge transfer.
- **Flexible Work Opportunities:** Create part-time jobs for older adults without compromising health. Australia's "Workplace Gender Equality Agency" promotes such flexible arrangements.
- **Investing in Age-Friendly Infrastructure:** Develop accessible public spaces and transportation.
- **Strengthening Healthcare Infrastructure:** Invest in geriatric care, especially in rural areas, where 79.9% of Community Health Centers lack specialists.
- **Developing Long-term Care Systems:** Create care facilities and home-based support for chronic conditions like dementia. Norway's comprehensive home care model supports seniors with chronic illnesses.
- **Promoting Age-Friendly Environments:** Implement urban planning policies that enhance mobility and social engagement. New Zealand's "Age-Friendly Cities" initiative aims for inclusive environments.
- **Expanding Social Security Coverage:** Strengthen pension schemes like PMVVY and IGNOPS for financial stability, similar to Denmark's flexible pension system.
- **Leveraging Technology for Elderly Care:** Expand telemedicine services and promote digital literacy.

#### Global Family Farming Forum (GFFF)

- The **Global Family Farming Forum (GFFF)** was launched at the **World Food Forum**.
- It is a Joint initiative between **FAO** and the **International Fund for Agricultural Development (IFAD)**.
- It highlights the contribution of **family farmers** in creating sustainable agrifood systems and addressing the challenges posed by the **climate crisis**.
- GFFF also commemorated the **United Nations Decade of Family Farming 2019-2028** halfway point.
- Family farms comprise over 90% of farms globally, with 550 million farms worldwide. They produce 70-80% of the world's food in value terms. They are critical in maintaining **crop biodiversity** and responsibly managing **natural resources**.

#### World Food Forum (WFF)

- Launched by the **FAO Youth Committee** in 2021, it aims to shape agrifood systems for a better

future and accelerate the achievement of the Sustainable Development Goals (SDGs).

- It is an **annual Flagship Event** held at the FAO headquarters in **Rome, Italy**.
- **2024 Theme:** "Good food for all, for today and tomorrow"
- **Activities and Initiatives:**
  - **World Food Day:** Celebrated annually during the flagship event.
  - **Rome Water Dialogue:** Addressing water scarcity in agriculture.
  - **Global Family Farming Forum:** Highlighting the role of family farmers in food security.

*Food and Agriculture Organization (FAO) and the Global Framework on Water Scarcity in Agriculture (WASAG) jointly adopted the Rome Declaration to combat water scarcity in agriculture.*

### International Fund for Agricultural Development (IFAD)

- It is a **specialised United Nations** agency dedicated to eliminating rural poverty in developing countries.
- **Established:** Created in 1977 following the **1974 World Food Conference**. **HQ:** Rome, Italy.
- **Primary Functions:**
  - It is providing low-interest loans and grants to developing nations.
  - Supporting agricultural and rural development projects.
  - It is empowering rural poor populations, especially smallholder farmers.

### All India Rural Financial Inclusion Survey

- The **All India Rural Financial Inclusion Survey** for 2021-22 was released by **NABARD**.

### Key Findings

- **Average monthly income of households** saw a substantial rise of 57.6% over five years, increasing from Rs. 8,059 in 2016-17 to Rs. 12,698 in 2021-22.
- **Sources of Livelihood:** Self-employment, including farming, government/ private service, and casual wage labour, were three prominent income-generating activities.
- **Increase in Savings:** 66% of households reported saving in 2021-22, compared to 50.6% in 2016-17.
- **Insurance Coverage:** About 86% of agricultural households and 73% of non-agricultural households reported being covered under any routine type of insurance.
- **Financial literacy:** Overall, only 10% of individuals from rural areas and close to 13% from semi-urban areas reported having been exposed to any session on financial education or training

### Agriculture related findings

- 57% of rural households in the country were "**agricultural**".
- **Average size of land** possessed by agricultural households works out to **0.7 ha**.
- **All-India average monthly income of agricultural households**, at Rs 13,661 in 2021-22, was more than the Rs 11,438 for non-agricultural rural households. The contribution of **cultivation** and **animal husbandry** to total income was over 45% in 2021-22, up from 43.1% in

2016-17.

- **Kisan Credit Card (KCC):** 44% of agricultural households possessed a valid KCC.

“Agricultural household” is defined as one that:

- Total value of produce from farming exceeding **Rs 6,500** (includes cultivation of field and horticulture crops, livestock and poultry rearing, or aquaculture, sericulture and apiculture); and
- At least one member was **self-employed in such activities** during the reference year. In the 2016-17 survey, the threshold cut-off value of produce was Rs 5,000.

### NAFED

- Appointments Committee of the Cabinet (ACC) changed the MD of National Agricultural Cooperative Marketing Federation of India (**NAFED**).
- **Established: October 2, 1958**, on the birthday of Mahatma Gandhi.
- **Registration:** Registered under the **Multi-State Co-operative Societies Act**.
- **Headquarters:** New Delhi.
- **Key Functions:**
  - Facilitate the marketing and trade of agricultural produce and forest resources.
  - Implement **price stabilisation** measures under schemes like **Operation Greens**.
  - Procure oilseeds, pulses, and copra under the **Price Support Scheme (PSS)** in collaboration with the Food Corporation of India (FCI) and state governments like **PM-AASHA**.

### Sevilla Forum on Debt launched at UNCTAD16 to tackle the entrenched debt crisis in developing countries

The forum is launched at the 16th session of the **United Nations Conference on Trade and Development (UNCTAD16)** to tackle the **entrenched debt crisis in developing countries**.

- It is led by Spain, supported by the **UNCTAD** and **United Nations Department of Economic and Social Affairs (UN DESA)**.
- It will bring together all stakeholders, creditors, borrowers, international financial institutions and academia on debt sustainability, management and innovative solutions.
- It is one of the **outcomes** of the **Fourth International Conference on Financing for Development (FfD4)** and part of **Sevilla Platform for Action**.
  - The other three outcomes are **Debt Swaps for Development Hub**, **Debt-for-Development Swap Programme**, and **Debt “Pause Clause” Alliance**.
- This initiative will complement the **Sevilla Commitment**.
  - **Sevilla Commitment** lays out a path to close the \$4 trillion annual SDG financing gap in developing countries.
  - It is the **first inter-governmentally agreed** financing for development framework since

2015.

### Debt Crisis

- **Global public debt:** In 2024, global public debt reached \$102 trillion (**developing countries burden**-US\$ 31 trillion)
  - Developing countries spend \$1.4 trillion on annual debt service.
- Over **3.4 billion people** live in nations spending more on debt servicing than on health or education.

### Liberalised Remittances Scheme

India's outward remittances for overseas education fell to an eight-year low under the Liberalised Remittance Scheme (LRS).

- **Genesis:** Introduced in 2004
- It intended to simplify and streamline the process of remitting funds outside India.
- **Benefit:** All resident individuals, including minors, are allowed to freely remit up to **USD 2,50,000 per financial year** for any permissible current or capital account transaction or a combination of both.
- There are **no restrictions on the frequency** of remittances under it.
- The Scheme is not available to corporates, partnership firms, Hindu Undivided Family (HUF), Trusts etc.

### RBI Warns Geopolitical Tensions Could Disrupt Cross-Border Payment Flows

In its **bi-annual Payment Systems Report**, RBI cautions that **sanctions, currency restrictions, and other operational barriers** could disrupt seamless international transactions.

### Cross Border Payments

- **Definition:** These are financial transactions where the payer and the recipient are based in **separate countries**.
  - They cover both wholesale and retail payments, including remittances.
- **Two Main Types:**
  - **Wholesale cross-border payments:** Typically **between financial institutions**.
  - **Retail cross-border payments:** Typically **between individuals and businesses**.  
E.g. person-to-person, person-to-business etc.
- **Significance:** Increased **International mobility of goods and services, capital and people** has contributed to its growing economic importance.
- **Status in India:** India remains the **top recipient of global foreign remittances**, with a record **\$137.7 billion inflow in 2024**.

### Initiatives to facilitate Effective Cross Border Payments

- **Global**
  - **G20 Roadmap:** Addressing challenges like **high cost, slow speed, limited access, and**

insufficient transparency, etc.

- **Bank for International Settlements (BIS) Innovation Hub Projects:** Like Project Hertha, Project Rialto, Project Agora etc.
- **Others:** Recommendations of **Financial Stability Board (FSB)** and the **Committee on Payments and Market Infrastructure (CPMI)**, etc.
- **India**
  - **Bilateral/Multilateral collaboration: Linking UPI with foreign Fast Payment Systems (FPSs)** of other countries via **QR code acceptance of UPI** at merchant locations abroad.
    - **E.g. UPI and PayNow (Singapore) Linkage, Project Nexus** (a multilateral international initiative), etc.

### Kafala System

Recently, Saudi Arabia has abolished the Kafala system.

- It is expected to benefit around 13 million foreign workers, including over **2.6 million Indians**.
- **It is a worker sponsorship programme** which gave employers full control over their employees' legal status, residencies, when or if they could leave the country, seeks legal help, or even changes jobs.
  - The system tied each sponsor or 'Kafeel' to a migrant worker.
- **Concern associated with System:** It is criticized as modern day slavery as Employers started to abuse this system to exploit employees. E.g., they would restrict their movement, seize passport, etc.

### Payment Systems Report by RBI

- The **Reserve Bank of India (RBI)** released its **Payment Systems Report**, highlighting **India's rapid digital payment growth** from 2019 to 2025.

#### Key Insights from the Report

- **Surge in Digital Payment:** Total payment transactions rose from **3,248 crore (2019) to 20,849 crore (2024)**, with value increasing from **₹1,775 lakh crore to ₹2,830 lakh crore**.
- **UPI Dominance:** UPI transactions grew **16-fold in five years** from **1,079 crore (₹18.4 lakh crore)** in 2019 to **17,221 crore (₹246.8 lakh crore)** in 2024.
- **Card-Based Payments:** **Debit Cards Volume** fell from 495 crore (₹6.83 lakh crore) in 2019 to 173 crore (₹5.15 lakh crore) in 2024, while **Credit Cards Volume** doubled to 447 crore (₹20.4 lakh crore) in 2024.
- **RTGS Leads in Value:** Value increased from **₹1,388.7 lakh crore (2019) to ₹1,938.2 lakh crore (2024)**.
- **Other Systems Growth:**
  - **NEFT volume tripled to 926.8 crore (₹432.8 lakh crore) by 2024**, and **IMPS volume doubled to 593.8 crore (₹70.7 lakh crore) by 2024**.

- BBPS grew from 12.6 crore to 217.5 crore transactions (value ↑41x), and NACH Transactions doubled to 677.1 crore (₹42.2 lakh crore) by 2024.
- Toll plazas increased from 505 (2019) to 1,782 (2025); FASTags issued rose to 11.11 crore.

#### Important Payment Systems

- **RTGS (Real-Time Gross Settlement):** High-value interbank fund transfer system that settles transactions instantly on a gross basis, operated by the Reserve Bank of India (RBI).
- **NEFT (National Electronic Funds Transfer):** Nationwide electronic payment system for one-to-one bank transfers, developed and maintained by the Reserve Bank of India (RBI).
- **IMPS (Immediate Payment Service):** Real-time, 24×7 interbank electronic fund transfer system, developed and operated by the National Payments Corporation of India (NPCI).
- **BBPS (Bharat Bill Payment System):** Integrated and interoperable bill-payment ecosystem for recurring payments, developed and operated by the NPCI.
- **NACH (National Automated Clearing House):** Bulk payment system for crediting subsidies, pensions, and loan repayments, developed and operated by the NPCI.

#### Farmers' Training and Common Facility Centre

- The Ministry of Food Processing Industries (MoFPI) has established Farmers' Training & Common Facility Centre (FT-CFC) in Koppal, Karnataka, to enhance agro-processing capabilities.
- **Funding:** The centre was built under the Members of Parliament Local Area Development Scheme (MPLADS) with support from NABARD and the Government of India.
- **Objective:** It aims to train farmers in processing, packaging, and marketing their produce, thereby ensuring value addition, fair pricing, and market connectivity.
- **Significance:** The initiative aligns with the government's 'Vocal for Local' campaign and contributes to the national goal of doubling farmers' income.
- **Agro-Processing:** It is the systematic process of converting raw agricultural materials into new or modified products to enhance their value, shelf life, and marketability.
- **MPLADS:** It is a central sector scheme that enables each Member of Parliament to recommend development projects to create durable community assets based on local needs.

#### Indian Railways Door-to-Door Freight & Parcel Services

- The Union Minister for Railways inaugurated the Sonik Integrated Logistics Hub and launched two new door-to-door freight and parcel services to improve logistics efficiency.
- **Sonik Logistics Hub:** It is India's first integrated logistics hub offering end-to-end logistics solutions, connecting the industrial regions of Lucknow and Kanpur for seamless cargo movement.

- **Transit Train:** The **Delhi-Kolkata** container train service guarantees a **120-hour transit time**, providing a dependable rail alternative to road transport.
- **Door-to-Door Service:** The **Mumbai-Kolkata parcel service** combines road and rail transportation, providing first-mile pickup and last-mile delivery, with a **30% faster transit time**.
- **Significance:** The initiatives promote integrated logistics in line with PM Gati Shakti and the National Logistics Policy, improving **freight efficiency** and **lowering logistics costs**.

### Hybrid Non-Basmati Paddy in Punjab

- Recently, **Punjab banned hybrid non-Basmati paddy in 2025**, citing low OTR and high input cost, but the move violated the **Seed Act, 1966**.
- Despite the ban, farmers procured hybrid seeds from **Haryana & Himachal Pradesh**, leading to a surge in cultivation amid erratic weather.

**Outturn Ratio (OTR):** *It is the percentage of rice obtained from paddy after milling; FCI mandates a minimum OTR of 67% for procurement eligibility.*

### Why Farmers Still Use Hybrid Non-Basmati Paddy?

- **Higher Yield Advantage:** Hybrid paddy gives **5-6 quintals/acre** higher yield (35-40 q/acre total) than traditional varieties (Punjab Agri Dept., 2024).
- **Short Duration Crop:** Matures in **125-130 days**, allowing faster turnaround, reducing stubble burning.
- **Resilience to Erratic Weather:** Performs better under variable **rainfall & temperature stress**, crucial for climate-affected Punjab plains.

### Issues of Using Hybrid Seeds

- **Economic Impact:** Low OTR caused losses up to **₹300-400 crore/year** to FCI procurement.
- **Climate Implications:** Unregulated expansion may raise input dependency and monocropping stress.

### Way Forward

- **Policy Stability:** Develop a **long-term Punjab Hybrid Paddy Policy** balancing yield, milling standards & sustainability. E.g. **Telangana's Seed Traceability System** for transparent hybrid monitoring.
- **Tech Upgradation:** Modernise rice mills under **PM Formalisation of Micro Food Enterprises (PM-FME)** to improve OTR & efficiency.
- **Climate-Smart Planning:** Encourage short-duration, water-efficient hybrids under **National Innovations in Climate Resilient Agriculture (NICRA)**.
- **Legal Clarity:** Align State actions with **Seed Act, 1966 & National Seed Policy (2002)** to reduce litigation.

### State Mining Readiness Index

- The **Ministry of Mines** has released the **first-ever State Mining Readiness Index (SMRI)** and corresponding state rankings to promote mining sector reforms across India.

### Key Highlights

- The **SMRI** evaluates States on **four criteria: auction performance, mine operationalisation, exploration efforts, and sustainable mining practices.**
- The **SMRI** serves as a reform benchmarking tool promoting **non-coal mineral development, investment-friendly policies, sustainable resource management, & cooperative federalism among States.**
- **Top Performers:**
  - **Category A:** Madhya Pradesh, Rajasthan, Gujarat (Mineral-rich States).
  - **Category B:** Goa, Uttar Pradesh, Assam (Moderate mineral endowment).
  - **Category C:** Punjab, Uttarakhand, Tripura (Limited mineral endowment).

### Department of Chemicals & Petrochemicals jointly with FICCI organised 13th Edition of "India Chem 2024" in Mumbai

'India Chem' is **one of the largest composite events of the industry in the Asia-Pacific region** and comprises an International Conference and Exhibition.

### India's chemical and petrochemical industry

- Chemical and petrochemical industry in India forms an **integral part of the growing Indian manufacturing industry**
- **Market segment**
  - **Bulk chemical:** They are chemicals **produced in large quantities but with lower value.**
    - They could be **alkali, organic and inorganic.** They significantly **cater to the downstream industries**
  - **Petrochemicals:** Also known as petroleum distillates, these chemicals are **derived from petroleum and natural gas by refining.**
    - It includes **polymers, and synthetic fibres, performance plastics** and others.
    - The **production-consumption gap** in these has remained **negative over the years**
  - **Specialty Chemicals:** Chemicals with **high value but low production volume** are considered specialty chemical.
    - For examples, **surfactants, textile chemicals, paints and coating, dyes, agrochemicals and others.**
- **Economic significance:** Contributes **over 9% to manufacturing gross value added and 7% to total exports.**
- **Growth potential:** Currently it is valued at about worth **\$178 billion** and is projected to **surpass \$300 billion by 2028** and is on track to reach **\$1 trillion by 2040.**

### Initiatives taken to promote the chemical and petrochemical industry

- **100% FDI in manufacturing through the automatic route:** Over the past decade, the

sector has attracted US \$12.48 billion in investments.

- **Petroleum, Chemical and Petrochemical Investment Regions (PCPIRs):** They are hubs of **high-class infrastructure** which creates a competitive environment conducive to setting up new firms.
- **Plastic Parks:** Aims to boost the investment, production, and exports in the **plastics** sector.

### 'eShram-One Stop Solution'

**Ministry of Labour & Employment** is set to launch the 'eShram-One Stop Solution'

- **Aim:** To **integrate information** on beneficiaries of all social security and welfare schemes for Unorganised Workers (UW) on a single platform.
- **Significance:** Making UW aware of schemes meant for them and ensuring easy access to these programs

**eShram portal** is a **centralized database** (seeded with Aadhaar) of **all UWs** including Gig and Platform workers. Since its launch in 2021, **over 30 crore UWs are enrolled on it.**

### Specialty Fertilizers

India facing specialty fertilizer price surge as China suspends exports

- These are tailored to the specific needs of different crops and soil types.
- **Definition:** Fertilizer formulations **designed to supply nutrients efficiently**, often in a controlled, targeted, or slow-release manner.
  - They improve **nutrient use efficiency (NUE)**, **reduce losses**, and **minimize environmental impact.**
- **Types:** Slow released fertilizers, Controlled-release fertilizer, stabilized fertilizer, customized fertilizer and fortified fertilizers.
- **Status of India**
- India consumes **approximately 1.2 to 1.5 MT per year of specialty fertilizers.**
- **Majority of specialty fertilizer demand** is met through imports with china accounting for more.

### Real Effective Exchange Rate (REER)

**Rupee weakens to a record low, with the Real Effective Exchange Rate (REER) indicating continued undervaluation.**

- **Definition:** REER measures a country's **currency value against a basket of major trading partners' currencies**, adjusted for **relative inflation**.
  - It is derived by adjusting the **Nominal Effective Exchange Rate (NEER)** for **relative consumer prices.**
- **Trade Competitiveness:**
  - A **higher REER** makes exports **more expensive** and imports **cheaper**, reducing trade competitiveness.

- A lower REER indicates the currency is **undervalued**, potentially boosting exports.

### **Vegetable Oil Products, Production and Availability (Regulation) Order, 2011 (VOPPA Order)**

The Ministry of Consumer Affairs, Food and Public Distribution has amended the **Vegetable Oil Products, Production and Availability (Regulation) Order, 2011 (VOPPA Order)**.

#### **Amendment**

- It **mandates registration** of all stakeholders involved in the **processing chain of edible oil**.
- Mandates **submission of monthly production and stock returns** through the designated online portal.

#### **Edible oil sector in India**

- India ranks **fourth** in the world after the United States, China, and Brazil in the edible vegetable oil market.
- India contributes about **5-6% of the world's oilseeds production**.
- However, India **imports 57%** of its edible oil demand.

### **AI Playbook for Agriculture**

This has been released along with two other publications under the **AI for India 2030 initiative** led by the Centre for the Fourth Industrial Revolution (C4IR) India, World Economic Forum (WEF).

- Launched under guidance of OPSA and Ministry of Electronics and Information Technology (MeitY), AI for India 2030 initiative aims to **develop frameworks** placing **responsible, inclusive, and scale-driven AI** at the heart of India's digital economy.

#### **Key Highlights of Report**

- **Potential AI use cases in Agriculture:**
  - **Intelligent Crop Planning:** Uses wide range of data such as soil health, weather patterns, historical prices and food import/export trends for recommending optimal crops.
  - **Smart Farming:** Satellite crop monitoring, decision support systems, rapid soil health analysis, pest prediction, hyperlocal weather advice, yield prediction, automated farm machinery etc.
  - **Farm-to-Fork Solutions:** Ensuring quality and traceability, optimizing supply chain, fintech adoption, market linkage demand and price prediction etc.
- **Framework for developing AI ecosystems in Agriculture:** Report presents Inclusive Multistakeholder Pathway for the Accelerated Convergence of AI Technologies (IMPACT AI) Framework. It has three pillars:
  - It has **three pillars** – **Enable** (formulate AI strategy, enable DPI for AI, AI upskilling etc.), **Create** (develop innovative AI products, establish AI sandbox etc.) and **Deliver** (empower front line extension systems, AI marketplace, creating awareness etc.).

### Challenges in AI Adoption for Agriculture

- **Limited Exposure to Technology:** Fewer than 20% of Indian farmers use digital technologies.
- **Lack of financial capability:** Low income of Indian farmers restricts both their ability and willingness to pay for AI solutions.
- **Fragmentation:** Close to 85% of India's 150 million farmers are smallholders and the Indian farmer's average landholding is just 1.08 hectares.
- **Lack of Investment:** Development and use of AI solutions need investment in infrastructure and resources.
- **Perception of Risk:** There are very limited institutional mechanisms for validating technology before it is deployed.

### Duty-Free Tariff Preference (DFTP) scheme

WTO credits India's Duty-Free Tariff Preference (DFTP) scheme for boosting Least Developed Country (LDC) exports.

- The DFTP scheme was introduced in **2008** and provides **duty-free or preferential tariff treatment** for products imported from LDCs into India.
- The DFTP scheme aims to **boost LDCs' economic growth, diversify exports**, and strengthen trade relations etc.

### RBI Warns State Governments against Pre-Election Populist Spending

The Reserve Bank of India (RBI) has cautioned state governments against excessive pre-election spending; highlighting the risks it poses to macroeconomic stability and fiscal discipline.

#### Pre-Election Populist Spending

- It refers to government expenditure undertaken shortly before elections with the primary aim of **gaining political support**, rather than addressing long-term economic or developmental needs.
- It includes **subsidies**, free goods or services (**Freebies**), **DBT schemes** like Ladki Bahin Yojana (Maharashtra), Mukhyamantri Mahila Rojgar Yojana (Bihar) etc. targeting voters.
- Around **₹68,000 crore** was spent by state governments across **8 major state elections (2023-25)** on populist welfare schemes.
  - **Bihar (2025)** disbursed **32.48% of its tax revenue** in various schemes just before elections.

#### Impact on State Economy

- **Fiscal Stress:** Leads to higher **fiscal deficits** and increased borrowing by the government.
- **Inflationary Pressure:** Excessive spending can **increase demand**, pushing prices up.
- **Debt Burden:** Short-term populist measures often result in **higher public debt**, affecting future budgets. E.g., Punjab's debt to touch 3.74 lakh crore by the end of 2024-25.
- **Resource Misallocation:** Diverts funds from essential development projects and long-term

welfare programs.

#### Way Forward

- **Fiscal Prudence & Debt Management:** Implement sustainable welfare schemes with **sunset clauses** to maintain fiscal health.
- **Political Consensus:** Centre and states should collaborate to **curb misuse of freebies**.
- **Role of Election Commission:** Ensure **transparency and accountability** in electoral promises.
- **Voter Awareness:** Educate citizens on **long-term economic consequences** of freebies.

#### Emerging Jobs Crisis in Asia

- Recent **youth-led protests** across Asia from **Indonesia to China** and **India** highlight growing frustration among young people over **unemployment, corruption, and inequality**.
- Behind this unrest lies a **structural jobs crisis**, intensified by **automation, AI, and trade disruptions**.

#### Scale of the Crisis of Unemployment

- Youth Unemployment rate in **India – 17.6%** and **China – 16.5%**, compared to **10.5% in the US**.
- **Over 50% of Indonesia's** workforce and **~80% of India's** are in informal jobs (ILO 2025)
- India has **84 million new job seekers** expected by 2035.
- **12 million graduating class** in China entering a stagnant job market. (Asia Society)

#### Root Causes for the Unemployment Crisis in Asia

- **Jobless Growth:** Economic growth in **India (6–7%)** and **Indonesia (5%)** isn't translating into employment gains. (World Bank)
- **Education–Employment Mismatch:** weak vocational and skill training. **Less than 5%** of India's workforce has formal skill training, vs **75% in Germany** and **96% in South Korea**. (NSDC data).
- **Automation Shock:** AI and robotics could **displace 27%** of India's current jobs by 2030. (WEF, 2025)
- **Governance Issues:** Corruption is deepening youth alienation and political **anger 46% of youth in India and Indonesia** perceive corruption as the top barrier to job access. (UNDP Youth Survey, 2024)

#### Way Forward

- **Job-Centric Growth:** Prioritise **labour-intensive sectors** like textiles, food processing, construction, and tourism. E.g. **Vietnam's "Factory-to-Export"** model linking manufacturing with export growth.
- **Strengthening Skill Ecosystem:** Shift from rote academics to vocational and digital skills training. E.g. **Singapore's SkillsFuture programme** promotes lifelong learning.
- **Labour Market Reforms:** Simplify hiring/firing, ensure safety nets, and promote gig worker protection. E.g. **Labour Codes (2020)**, **E-Shram Portal** for informal workers.
- **Harnessing Technology:** Upskill youth in AI, data, robotics, and digital entrepreneurship. **IndiaAI Mission (2024)**, **Atal Innovation Mission (AIM)**.

- **Education Industry Linkage:** Create **Industry-Academia councils** for real-time curriculum design. **Germany's Dual Vocational Education System** aligns training with employer needs.

### SWAMIH

RBI has exempted **SWAMIH (Special Window for Affordable and Mid-Income Housing) Fund**, a **government-backed** fund from its tightened rules of **Alternate investment fund (AIF)**.

- The RBI prescribes the regulatory guidelines in respect of investment by the regulated entities in AIF.

### SWAMIH, 2019

- It is a **Category II AIF**.
  - **AIF** means any fund established or incorporated in India which is a privately pooled investment vehicle which collects funds from sophisticated investors, whether Indian or foreign, for investments.
  - SEBI regulates **AIF**. E.g., Venture capital funds (Including Angel Funds)
- **Objective:** Provide priority debt financing for completion of stalled housing projects.
- **Fund Manager:** SBI Ventures Limited

### Makhananomics

Prime Minister Narendra Modi described the newly launched **National Makhana Board** as a transformative “revolution” for the sector.

### Makhana

- It is the dried edible seed of the prickly water lily or **gorgon plant (Euryale ferox)**, a species which grows in freshwater ponds across South and East Asia.
- It is known for its violet and white flowers, and massive, round and prickly leaves — often stretching more than a meter across.
- Makhana, traditionally consumed in ritual settings, has recently gained recognition as a nutrient-rich, low-fat “superfood” and healthy snack.

### Production areas

- Bihar is the leading producer of makhana in India, with cultivation concentrated in nine districts of the Mithilanchal region—particularly Darbhanga, Madhubani, Purnea, and Katihar, which account for 80% of the state's output.
- Around 15,000 hectares are used for makhana farming, yielding approximately 10,000 tonnes of popped makhana annually.
- The global makhana market was valued at \$43.56 million in 2023, and expected to touch the \$100 million-mark by 2033.

### Issues and Concerns

- Bihar, despite being the top makhana producer, lacks food processing and export infrastructure, forcing it to sell raw fox nuts cheaply to other states like Punjab and Assam, which dominate exports.

- Poor market organization and multiple intermediaries result in low earnings for farmers and the state.
- Additionally, makhana cultivation remains labor-intensive and low in productivity, raising input costs.

#### Government initiatives

- The government is promoting its commercial potential through marketing efforts, improved industrial infrastructure, and the formation of the **Makhana Board**.
- **In 2022**, 'Mithila Makhana' was conferred a **Geographical Indication (GI) tag**, a certification that signifies that a product can only be grown in a particular geographical location, and as a result, has unique characteristics (like Darjeeling's tea or Mysore sandal soap).

#### Way Ahead

- Makhanaomics envisions rural empowerment, economic growth, and regional development.
- With better infrastructure, supportive policies, and improved market access, Bihar's makhana sector could transform from a subsistence crop into a globally recognized superfood industry.

#### India to Install 100 Million Smart Meters

- The Power Ministry announced that India aims to install **100 million smart electricity meters** nationwide to enhance power sector efficiency.
- The project is a key step toward India's Digital Power Infrastructure under schemes like the **Revamped Distribution Sector Scheme (RDSS)**.

#### Key Highlights of the Announcement

- **Progress:** Out of the targeted 100 million, **10 million smart meters** have already been installed across various states.
- **Consumer Benefits:** Smart meters will enable **real-time monitoring** of electricity usage. Consumers can also **track and manage** their power consumption, helping reduce wastage and **lower electricity bills**.
  - The system is expected to **address billing disputes** and enhance transparency in power delivery.
- **Metro Expansion Update:** The Ministry highlighted India's growing metro rail network, stating that **1,100 km of metro lines** have been constructed.

India currently ranks **third globally** in metro development and is expected to move to **second** soon. Metro services operate in 24 cities and are planned to expand to 29 cities soon.

#### RBI Proposes Limits on Banks Capital Market Exposure and Acquisition Financing

- The Reserve Bank of India (RBI) has issued a draft circular proposing limits on banks exposure to capital markets and corporate acquisitions to manage risks while promoting credit growth.

#### What are the Key Proposals?

- **Capital Market Exposure:** Banks aggregate exposure, including direct and indirect (through

funds, guarantees), should not exceed **40%** of their **Tier-1 capital**.

- **Tier-1 capital** includes **equity, retained earnings**, and certain instruments capable of absorbing losses.
- **Acquisition Financing (Loans for Buying Companies):**
  - Banks' exposure to acquisition finance should be capped at **10%** of **Tier-1 capital**.
  - Banks may finance up to **70%** of the acquisition deal value; the remaining **30%** must come from the acquiring company.
  - **Only listed entities** with satisfactory net worth and profitability for the last **three years** are eligible.
  - Loans must be fully secured by the target company's shares, so the bank can recover money if needed.
- It proposed **revised risk-weight guidelines** for non-banking financial companies' infrastructure loans, a move that could lower capital requirements for lenders financing established projects.

### RBI Cautions States on Fiscal Discipline

- The **Reserve Bank of India (RBI)** has cautioned states about **fiscal slippage, excessive borrowing**, and **pre-election populist spending**.

*Pre-election populist spending refers to **increased government expenditure** on subsidies or welfare schemes before elections to **gain voter support** rather than achieve long-term economic stability.*

### Key Concerns of RBI

- **Rising Yields:** Yields on **State Development Loans (SDLs)** have increased significantly, raising the cost of borrowing for state governments.
- **Increasing Borrowing:** States borrowed **₹5.23 trillion** till Oct 2025, which is **62% of the FY26 plan**, compared to ₹4.37 trillion last year.
- **Fiscal Deficit Risk:** The FY26 combined budget deficit is projected at **3.2% of GDP**, but experts warn it could exceed this limit.
- **Populist Spending:** During **eight major state elections (2023–25)**, governments collectively spent around **₹68,000 crore** on pre-poll welfare schemes, with **Bihar** allocating **32.48%** of its tax revenue.

*SDLs are government securities issued by **individual states** in India to raise funds for **development projects** and to cover their **fiscal deficit**.*

### Recommendations of the RBI

- **Productive Spending:** Redirect fiscal resources from short-term subsidies to **capital investments** that create **durable assets** and strengthen growth.
- **Fiscal Prudence:** Adhere strictly to the targets of the **Fiscal Responsibility and Budget Management (FRBM Act)** to maintain macroeconomic stability.
- **Borrowing Strategy:** **Diversify borrowing** over various maturities and **improve communication** with investors to reduce borrowing costs and sustain market confidence.

- **Fiscal Transparency:** Enhance reporting on contingent liabilities and off-budget borrowings to give an accurate and credible overview of the state's financial situation.

### India's Forex Reserves

- India's Forex Reserves surged by **USD 4.496 billion**, reaching an **all-time high of USD 702.28 billion**, according to the Reserve Bank of India.
- India continues to rank among the **top five nations globally** in forex holdings, after China, Japan, Switzerland, and Russia.

### Latest Updates of India's Forex Reserves

- **Foreign Currency Assets (FCA):** **USD 570.41 billion**, down by USD 1.692 billion.
- **Gold Reserves:** Increased by USD 6.181 billion to **USD 108.55 billion**.
- **Special Drawing Rights (SDRs):** Rose by USD 38 million to **USD 18.72 billion**.
- **IMF Reserve Position:** Marginal decline of USD 30 million to **USD 4.60 billion**.

### Forex Reserves

- Forex reserves are **external assets held by the RBI** to ensure exchange rate stability, maintain liquidity for external payments, and build investor confidence.
- **Components:**
  - **Foreign Currency Assets (FCA):** Securities, deposits, and treasury holdings in foreign currencies.
  - **Gold Reserves:** Physical gold and gold deposit accounts valued at current international prices.
  - **SDRs:** International **reserve assets** allocated by the IMF to member nations.
  - **Reserve Tranche:** India's portion of its IMF quota that can be used for balance-of-payment needs.

### Significance of Forex Reserves

- **Exchange Rate Stability:** Helps RBI **curb rupee volatility** through market intervention.
- **Import Cover:** Secures over **10 months of import financing**.
- **Investor Confidence:** Strengthens **India's credibility** and capital flow stability.
- **Portfolio Diversification:** Gold reserves **hedge against dollar risk**.

### Global Finance Stability Report (GFSR)

International Monetary Fund (IMF) recently released the **Global Finance Stability Report (GFSR)**, April 2025.

### GFSR

- **Purpose:** Provide a regular assessment of **global financial markets** and identify **potential systemic weaknesses** before they lead to crises.
- **Key Findings**

- **Tightened Global Financial Conditions:** Have caused significant increase in the Global financial stability risks.
- **Role of Major geopolitical risk events:** Especially **military conflicts**, can lead to substantial decline in stock prices and increases in **sovereign risk premiums**.
- **Other Key Reports by IMF:** World Economic Outlook, Fiscal Monitor.

### National Household Income Survey

- The Ministry of Statistics and Programme Implementation (MoSPI) will launch the first-ever pan-India **National Household Income Survey (NHIS)** in February 2026.
- **Objective:** To provide accurate income estimates and assess income inequality across different regions and social groups.
- **Implementing Agency:** **National Statistics Office (NSO)** under the MoSPI.
- **Coverage Scope:** Both **rural** and **urban** households through digitally supervised household visits.
- **Income Dimensions:** Earnings from wages, self-employment, property, pensions, remittances, and welfare schemes.
- **Methodology:** A **Technical Expert Group** chaired by **Surjit S. Bhalla** will design the process using global best practices.

### Challenges in Conducting NHIS

- **Sensitivity Barrier:** The 2025 Pre-tests revealed that **95%** of respondents were **unwilling to disclose** their income details.
- **Fragmented Sources:** **Multiple informal income sources** in rural households hinder verification and reliable estimation.
- **Non-Monetised Output:** Household **consumption of agricultural produce** complicates the valuation of non-marketed income.
- **Data Inconsistency:** Persistent under-reporting and recall bias result in **income figures lower** than total consumption levels.
- **Irregular Earnings:** Seasonal and self-employed workers experience **fluctuating incomes**, leading to inconsistent and incomplete data.

*India's per capita gross national income in 2024-25 stood at ₹2.31 lakh in current prices, marking an 8.7% increase year-on-year.*

### Indian Coffee Gaining Global Popularity

Recently, PM Narendra Modi said that **Indian coffee is gaining popularity worldwide**, aiding farmers' income.

#### Coffee

- **Two main varieties of coffee** — Arabica (*Coffea arabica*) and Robusta (*Coffea canephora*) are cultivated worldwide, including in India.
- **Climate:** Coffee plants thrive in **warm, humid climates** but need a distinct **dry period** for berry

ripening.

- **Temperature:** Arabica grows best in 15°–24°C; Robusta tolerates higher temperatures of 24°–30°C.
- **Altitude:** Arabica thrives at 600–2,000 meters above sea level; Robusta adjusts to lower elevations.
- **Soil:** Well-drained, loamy soils rich in humus, iron, and calcium offer ideal conditions for growth.

### Coffee Production in India

- India is the **seventh-largest coffee producer** in the world, exporting about **70%** of its production to more than 120 countries.
- **Major Producers:** Karnataka, Kerala, Tamil Nadu, Andhra Pradesh, and Odisha, with **Karnataka** producing more than **70%** of the total output.
- **Uniqueness:** India is the **only country** where all coffee is grown under **natural shade**, using a **two-tier mixed canopy**.

#### Coffee Board of India

- The Coffee Board of India is a **statutory body** created by the **Coffee Act VII of 1942**, functioning under the **Ministry of Commerce and Industry**. It is based in **Bengaluru, Karnataka**.
- It comprises **33 members**, including a chairperson, all nominated by the central government.
- It promotes research and development, production enhancement, quality improvement, export promotion, and domestic market growth for Indian coffee.

### Stablecoin

Japan has launched the **world's first yen-pegged stablecoin**.

- It is a **blockchain-based digital currency** pegged to a **fiat currency (like yen or dollar)** to maintain a stable value.
- **Purpose:** It enables **faster, low-cost, and secure digital transactions**, bridging traditional finance and cryptocurrency.
- **Other key Stablecoins:** Tether (USDT) and USD Coin (USDC) etc.

### Turning Urban Challenges into Engines of Growth

Recent U.S. hike in H-1B visa fees offers India an opportunity to attract global talent and develop livable and globally competitive cities.

India's Urban Potential & Its current status:

- **Economic Engines:** Only 15 Indian cities contribute nearly **30% of India's GDP**.
  - Strengthening them could **add about 1.5% to national growth annually**.
- **Future Growth Drivers:** India already has the world's **second-largest urban system** and by

2036, urban areas will be home to 40% of the population

### Major Urban Challenges

- **Pollution and Mobility:** India has **6 out of the 10 most polluted cities globally with issues like Vehicular emissions, construction dust.**
- **Solid Waste Management:** Only **26% of collected solid waste** is scientifically treated and mixed waste remains largely uncollected.
- **Water Scarcity:** 40–50% of **pipd water is lost** due to leakages and inefficiencies.
- **Urban Density and Housing:** Affordable housing shortage could triple to **31 million units by 2030**, issue of low Floor Space Index (Increases urban sprawl).
  - **Floor Space Index (FSI), also known as Floor Area Ratio (FAR)**, is the ratio of a building's total built-up area to its plot area
- **Other Issues:** Congestion and Mobility, weak local governance and outdated regulations (**Niti Aayog**).

### Proposed Way Forward

- **Pollution and Mobility:** Electrify public transport and incentivize high-performing cities through the **Urban Challenge Fund**.
- **Water Scarcity:** Expand recycling and **rainwater harvesting**, adopt rational water pricing like “pay as you use”.
- **Urban Density and Housing:** Allow higher Floor Space Index; adopt sustainable models like **Singapore (green urban model)**.
  - **Following models from Sao Paolo and Tokyo**, developers could gain height allowances in exchange for contributions to social housing or transit infrastructure.
- **Governance and Capacity:** Devolve powers and finances to city governments, Improve revenues via **property tax reforms, digitized land records, and Land Value Capture (as in Hong Kong)**.

### Electronics Component Manufacturing Scheme

- The Ministry of Electronics & Information Technology (**MeitY**) **approved seven private investment projects** worth ₹5,532 crore under Electronics Component Manufacturing Scheme (ECMS).

### About Electronics Component Manufacturing Scheme

- The objective is to build a robust component manufacturing ecosystem by attracting global and domestic investments and integrating India's electronics industry with Global Value Chains (GVCs)
- **Offers 1–10% production incentives** for six years to boost local manufacturing and cut import dependence on critical materials like polypropylene film, copper laminates, and PCBs.
- The scheme runs for **six years** with a one-year gestation period, **spanning FY2025-26 to FY2031-32**.
- It complements **PLI for Large-Scale Electronics Manufacturing** and Semicon India Programme.

### India's Electronics Sector

- **Production Value:** ~USD 125 billion (₹10.4 lakh crore) in FY2024–25.
- **Exports:** USD 28 billion, led by smartphones and components.
- **Smartphone Exports:** Over USD 15 billion, making India the 2<sup>nd</sup>-largest producer globally.
- **Domestic Value Addition:** Up from 18% (2014) → 38% (2025).
- **Employment:** 30 lakh people employed, projected to double by FY2030.
- **Target:** USD 300 billion production by 2026 (MeitY Roadmap).

### 8<sup>th</sup> Central Pay Commission

- The Union Cabinet, chaired by the Prime Minister, has **approved the Terms of Reference (ToR) for the 8<sup>th</sup> Central Pay Commission (CPC)**.

#### Pay Commission

- It is an **advisory body** with no mandatory authority for government to accept its recommendations.
- Pay Commissions are generally formed **every 10 years**; the first one was established in **1946**.
- The Pay Commission operates under the **Department of Expenditure, Ministry of Finance**.
- The **8<sup>th</sup> Pay Commission**, chaired by **Justice Ranjana Prakash Desai**, will submit its recommendations within **18 months**, expected to be implemented **retrospectively from January 1, 2026**.

#### Terms of Reference of the 8<sup>th</sup> Pay Commission

- **Pension Reform:** Update pension and retirement benefits for serving and retired employees.
- **Fiscal Prudence:** Align pay revision with fiscal capacity and macroeconomic stability.
- **Development Focus:** Protect funds for welfare and infrastructure while revising pay scales.
- **Legacy Pensions:** Assess the unfunded burden of pre-NPS pension liabilities (new inclusion).
- **Parity Across Sectors:** Ensure balance with pay structures in states, CPSEs, and the private sector.
- **State Impact:** Evaluate financial implications on state budgets adopting CPC recommendations.

#### Significance and Challenges of the 8<sup>th</sup> Pay Commission

- **Significance of 8<sup>th</sup> Pay Commission:** Covers **1.2 crore beneficiaries**, boosts demand like 7<sup>th</sup> CPC's ₹1 lakh crore payout (~0.4% GDP growth), raises morale in **Defence (13.5 lakh)** and **Railways (12 lakh)**, ensures **pay parity & social equity**, and aligns revisions with **FRBM targets** (<4.5% fiscal deficit by FY26).
- **Challenges Before 8<sup>th</sup> Pay Commission:** Adds **₹1.5–2 lakh crore** annual fiscal burden (~0.5% GDP), risks **inflationary rise** and **state fiscal stress** (Punjab 3.5%, Rajasthan 3.3%), excludes **OPS and welfare demands**, and faces a **productivity-pay mismatch** with widening **public-private**

wage gap.

- **Way Forward:** Adopt **performance-linked pay**, enable **digital audits** via iGOT Karmayogi, enforce a **Wage-GDP cap** for fiscal discipline, form a **Pay Coordination Council**, integrate **equity audits**, and ensure **phased implementation** to manage fiscal impact.

### Centre for Science and Environment (CSE)'s Sustainable Food Systems report highlights India's soil health

The report finds severe nutrient deficiencies in Indian soils based on the Soil Health Card Scheme data.

#### Key Findings

- **Soil nutrient deficiencies:**
  - **Nitrogen:** 64% of samples tested 'low' for Nitrogen (N).
  - **Organic Carbon (SOC) Deficit:** 48.5% of samples tested 'low' for SOC, a crucial indicator for soil structure and microbial abundance.
    - Over 43% of districts at 'very high' climate risk also showed low SOC levels.
  - **Micronutrient Shortages:** 55.4% of samples tested 'low' for Boron, and 35% for Zinc.
- **High Urea Consumption:** Fertilizer consumption is heavily skewed towards urea, which is about 68 per cent of total fertilizer consumption in 2023-24.

#### Implications of soil nutrient deficiencies

- Threat to **crop productivity, food security, farmer's income** and **sustainable agriculture**.
- Reduced capacity for **carbon sequestration** and **climate change mitigation**.

#### Recommendations

- **Expand Current Soil Monitoring under SHC** to include **physical** (texture, compaction) and **biological** (microbial activity) indicators.
- **Reform fertiliser subsidy policy** to incentivise balanced and efficient use.
- **Use biochar** to improve **fertility, moisture retention**, and **carbon storage**.

#### Soil Health Card (SHC) Scheme, 2015

- **Implemented by:** Department of Agriculture and Farmers Welfare.
- **Purpose:** To assess soil fertility and provide **nutrient-based recommendations to farmers**.
- **Measures 12 Chemical Indicators:** Nitrogen, Phosphorus, Potassium, Sulphur (Macronutrients); Zinc, Iron, Copper, Manganese, Boron (Micronutrients); and pH, Electrical Conductivity and Organic Carbon.
- Soil Health Card scheme has been merged in Rashtriya Krishi Vikas Yojana (RKVY) Cafeteria scheme as one of its components under 'Soil Health & Fertility' from the year 2022-23.

- NITI Aayog released **two inaugural reports** under the **Services Thematic Series** titled “*Insights from GVA Trends and State-Level Dynamics*” and “*Insights from Employment Trends and State-Level Dynamics*.”
- These mark **India's first dedicated macro-level assessment** of the service sector through output and employment linkages.

### Key Findings of the Reports

#### Growth and Regional Patterns

- **Economic Pillar:** The **services sector contributed 55%** to India's Gross Value Added (GVA) in 2024-25, up from 51% in 2013-14.
- **Income Correlation:** States with **higher service-sector shares** in GSVA (i.e., Karnataka, Telangana, Maharashtra, Delhi, Chandigarh) show **higher per capita incomes**.
- **Beta Convergence:** Broad-based, spatially inclusive service-led growth is enabling **lagging states** to gradually **catch up** with advanced ones.
- **Digital Expansion:** The digital and knowledge-based economy leads the sector, with GVA from Computer and Information Services **rising fourfold** since 2011-12.
- **External Strength:** The services sector attracted the **highest FDI share (19%)** and contributed **\$387.5 billion** to India's total export earnings in 2024-25.

#### Employment and Urbanisation

- **Workforce Share:** The services sector employs around **188 million** people, accounting for **29.7%** of India's total workforce. It generated nearly 40 million new jobs in six years.
- **Global Lag:** India's service employment share remains below the **global average of 50%**.
- **Labour Elasticity:** **Job responsiveness** improved as employment elasticity rose from 0.35 before COVID to 0.63 after. More jobs are now created per unit of growth.
- **Urban Dependence:** Around **60%** of **urban workers** are in services, while only **18.9%** of **rural workers** depend on it.

#### Inequality and Disparities

- **Gender Divide:** Only **10.5%** of **rural women** work in services, compared to 24% of rural men. Urban participation is roughly equal at **60% for both**.
- **Wage Gap:** **Rural women** earn about 47-50% of men's wages, compared to 84% in urban areas.
- **Informal Dominance:** Most service workers lack formal contracts, social protections, or benefits, especially in **traditional sub-sectors** like trade, repair, and transport.

#### The Dual Character Paradox

- **High-Value, Low Jobs:** Modern sub-sectors such as IT, finance, and consulting generate **high economic value** but employ relatively **few workers**; reflects **capital-intensive growth**.
- **Low-Value, More Jobs:** Traditional sub-sectors like retail, trade, and transport absorb **most workers** but offer **low wages** and remain largely **informal**.
- **Policy Implication:** Bridging this gap requires increasing productivity and formalization in

low-value services while expanding employment opportunities in high-value segments.

### **Nutrient Based Subsidy Scheme (NBS)**

The Union Cabinet, chaired by Prime Minister, has approved the Nutrient Based Subsidy (NBS) rates for Rabi 2025–26 on Phosphatic and Potassic (P&K) fertilizers to ensure their smooth availability to farmers at affordable prices.

- The Nutrient Based Subsidy (NBS) is a centrally sponsored scheme under the Department of Fertilizers, which provides a fixed subsidy per kg of nutrient content (N, P, K, S) in Phosphatic and Potassic (P&K) fertilizers, ensuring affordable access for farmers.

**Launch:** Introduced on 1st April 2010, replacing the earlier product-based subsidy system for non-urea fertilizers.

**Implementing Organization:** Administered by the Department of Fertilizers, Ministry of Chemicals and Fertilizers, Government of India.

#### **Aim:**

- To make fertilizers available at reasonable prices to farmers.
- To promote balanced fertilizer use based on soil and crop requirements.
- To encourage the fertilizer industry to adopt efficiency, cost-effectiveness, and competition.

#### **Key Features:**

- **Subsidy based on nutrient content:** Fixed subsidy (₹/kg) for N, P, K, and S nutrients instead of per-product subsidy.
- **Freedom in MRP fixation:** Fertilizer companies can set **Maximum Retail Prices (MRPs)** reasonably, monitored by the government.
- **Coverage:** Applies to **28 grades** of P&K fertilizers, including **Di-Ammonium Phosphate (DAP)** and **NPKS** grades.
- **Special Support:** Government may announce **special packages** (e.g., for DAP) over and above NBS rates to stabilize prices amid global volatility.
- **Urea exception:** Urea remains under **statutory price control**, with a fixed MRP of ₹242 per 45-kg bag since March 2018.
- **Increased Allocation:** A total subsidy of **₹37,952 crore** was approved for the 2025-26 Rabi season, marking a **55% increase** from ₹24,000 crore in 2024-25.

#### **Significance:**

- **Affordable Fertilizers:** Ensures continuous supply of essential P&K fertilizers at subsidized prices to farmers.
- **Nutrient Balance:** Promotes judicious and soil-specific fertilizer use, avoiding over-reliance on nitrogenous fertilizers.
- **Fiscal Efficiency:** Provides transparent and predictable subsidy disbursement to fertilizer companies.

### **Workforce Challenges in India's Primary Healthcare System**

Recurrent strikes by **National Health Mission (NHM)** staff and state-level protests by **ASHA** and **Anganwadi workers** have revealed **deep-rooted structural weaknesses** in the primary healthcare system of India.

### Key Cadres Supporting Primary Healthcare

Cadre	Origin	Primary Role	Pay structure
<b>Anganwadi Workers (AWWs)</b>	Integrated Child Development Services (ICDS, 1975)	Nutrition, maternal & child health	Honorarium
<b>ASHA Workers</b>	National Rural Health Mission (NRHM, 2005)	Mobilisation, awareness, link between community & system	Incentive-based
<b>Community Health Officers (CHOs)</b>	Health and Wellness Centres; 2018	Provide expanded primary care services	Contractual + incentives

### Key Challenges

- **Expanding Responsibilities:** Added duties like **population enumeration, Non-Communicable Disease and palliative care**, without matching pay or support.
- **Poor Remuneration & Protection:** Low, **irregular payments; no social security**; limited safety during fieldwork (still recognised as volunteers).
- **Unionisation and Strikes:** Growing **union presence reflects discontent**, Kerala and Haryana ASHAs, and Anganwadi unions nationwide, are demanding regularisation and fair pay.
- **Vacant Regular Posts:** ~10–15% **Auxiliary Nurse Midwife posts** and **20–25% doctor posts** remain vacant.
- **Contractualisation trend:** Rising **contractual hiring reflects cost-cutting and ease of administration** but lacks clear **career growth or cadre structure**.

A balanced workforce model, coupled with transparent recruitment, fair incentives, and continuous capacity building, is essential to strengthen India's health system.

### Export of GI-Tagged Indi and Puliyanakudi Limes

Agricultural and Processed Food Products Export Development Authority (APEDA) exported the **Geographical Indication (GI)** tagged **Indi** and **Puliyanakudi limes** to the **UK** for the first time.

*APEDA is a **statutory body** established by the **APEDA Act of 1985** to **promote agricultural exports** in India. It functions under the **Ministry of Commerce and Industry**.*

*A **GI tag** is a **name or sign** used on products associated with a specific geographical location; it is a form of **Intellectual Property Right (IPR)**.*

### Indi Lime

- Indi limes are primarily grown in the **Vijayapura district** of **Karnataka**. They thrive in **semi-arid climates** and **black cotton soils**.
- They are known for their **superior quality, zesty aroma**, high juice yield, and balanced acidity.
- These limes are **used in cooking** and are also valued in **traditional medicine** and cultural practices.
- It officially received the **GI tag in 2023**, safeguarding its regional identity and export potential.

### Puliyankudi Lime

- Puliyankudi limes are grown in **Tamil Nadu's Tenkasi district**, known as the "**Lemon City of Tamil Nadu**."
- These limes, particularly the **Kadayam variety**, are characterised by their thin peel, **strong acidity**, high **ascorbic acid** content, and juice percentage of around 55%.
- Rich in **vitamin C** and **antioxidants**, they support immunity and digestion while ensuring superior quality.
- It received the **GI tag in 2025** for its unique regional and nutritional characteristics.

### China files complaint in WTO over subsidies under PLI scheme

**China alleged** that 3 Indian PLI schemes related to EV and battery provide **financial benefits** to companies operating in India contingent on Domestic Value Addition (DVA).

- The 3 specific PLI schemes challenged are:
  - scheme to incentivise establishment of **Giga-scale manufacturing capabilities of ACC batteries**;
  - scheme for auto industry, which seeks to buttress the **manufacturing of Advanced Automotive Technology (AAT)** products;
  - scheme to promote **EV manufacturing** by attracting global EV manufacturers.
- DVA requirements under these PLI schemes incentivise companies to use domestic goods rather than imported goods are a violation of Agreement on Subsidies and Countervailing Measures ("SCM Agreement") of WTO under **prohibited category**.

### SCM Agreement of WTO

- **Article 1** defines a subsidy as a financial contribution by a government or a public body that confers a benefit.
- The SCM Agreement creates 2 categories of subsidies: **Prohibited** and **Actionable**.
  - **Prohibited**: 2 categories of subsidies are prohibited by Article 3.
    - **First**: It consists of subsidies contingent, in law or in fact, whether wholly or as one of several conditions, on export performance ("**export subsidies**").
    - **Second**: It consists of subsidies contingent, whether solely or as one of several other conditions, upon the **use of domestic over imported goods** ("**local content subsidies**").
  - **Actionable**: They are subject to challenge, either through multilateral dispute settlement

or through countervailing action.

#### PLI Scheme

- **Origin:** Launched in 2020 to boost domestic manufacturing through targeted, performance-based incentives across strategic sectors.
- **Key sectors covered:** Initially targeted 3 sectors and over time expanded to include **14 sectors** ranging from electronics and textiles to automobiles and food processing.

#### Integrated Cold Chain and Value Addition Infrastructure (ICCVAI) Scheme

The ICCVAI Scheme, a demand driven scheme run by the **Ministry of Food Processing Industries (MoFPI)** as part of **Pradhan Mantri Kisan Sampada Yojana (PMKSY)**, addresses significant post-harvest losses in perishable commodities in India.

#### Key Objectives

- Build **seamless cold chain** from farm to consumer
- **Reduce post-harvest losses** through scientific preservation and efficient storage systems
- **Value addition** by increasing shelf life by promoting processing\
- **Ensure steady food availability** of safe, high-quality food products for consumers.

#### Key Components

- **Farm-Level Infrastructure**(Pre-cooling units), **Processing Centres, Distribution Hubs** (Centralized storage, consolidation, and dispatch centres for efficient movement of produce) & **Refrigerated Transportation**

#### Who are eligible for establishment of food processing units?

- Individuals (including farmers).
- Organizations:Farmer Producer Organizations (FPOs), Farmer Producer Companies (FPCs), NGOs, PSUs, Firms, Companies, Corporations, Cooperatives, and Self-Help Groups (SHGs).

#### Key Government Initiatives Complementing the ICCVAI Scheme

- **Mission for Integrated Development of Horticulture (MIDH):** Provides financial assistance for cold storages up to 5,000 MT capacity.
- **National Horticulture Board (NHB):** Supports construction/modernization of cold storage facilities ranging from 5,000 MT to 20,000 MT.
- **Agriculture Infrastructure Fund (AIF):** Facilitates term loans up to ₹2 crore with a 3% per annum interest subvention.
- **Operation Greens Scheme:** Covers fruits, vegetables, and shrimp for price stabilization and post-harvest loss minimization.

### India's Cold Storage Landscape

- **Total Capacity:** India operates **8,815 cold storage units** with a combined capacity of **40.2 million metric tonnes (MT)**, yet faces a deficit of **~35 million tonnes**.
- **Capacity Utilisation:** Existing cold storage facilities operate at about **70-75% efficiency**.
- **Top States:** **Uttar Pradesh** leads with **15 MT of capacity**, followed by **West Bengal** and **Gujarat**.
- **Storage Distribution:** **Horticultural and agricultural produce** occupy **83%** of capacity, while **processed foods** and **animal husbandry products** utilise **9%** and **7%** respectively.
- **Dominant Crop:** **Potatoes** have historically occupied around **70% of total cold storage space**.

### Integrated Cold Chain and Value Addition Infrastructure (ICCVAI) Scheme

- ICCVAI is a demand-driven **central sector scheme** administered by the Ministry of Food Processing Industries (MoFPI) under the **Pradhan Mantri Kisan Sampada Yojana (PMKSY)**
- **Objective:** To create an **integrated cold chain** from farm to consumer, minimise post-harvest spoilage and increase farmers' income.
- **Financial Assistance:** Provides grants or subsidies of **up to ₹10 crore per project** for setting up integrated cold chain systems.
  - **Covers 35%** of eligible project costs in **general areas** and **50% in 'difficult areas'** (e.g., Northeast, Himalayan regions, IITDP areas, and Islands), as well as for SC/ST groups, FPOs, and SHGs.
- **Scope:** Encompasses perishable sectors like horticulture, dairy, meat, poultry, marine or fish products.
  - **Fruits, vegetables, and shrimp** are **excluded** and covered under the Operation Greens scheme.
- **Eligible Entities:** Project Implementing Agencies (PIAs) may include **individuals, FPOs, FPCs, NGOs, PSUs, cooperatives, SHGs, and private firms**.
- **Implementation Condition:** Applicants must link 'Farm-level Infrastructure' with a 'Distribution Hubs' and/or 'Refrigerated Transport Systems' to qualify for financial assistance.

### Key Components of the Scheme

1. **Farm-Level Infrastructure:** Facilities for pre-cooling, weighing, sorting, grading, and packaging.
2. **Processing Centres:** For blast freezing, individual quick freezing, milk chilling, and meat/fish processing.
3. **Distribution Hubs:** Multi-product, multi-temperature storage and controlled-atmosphere warehouses
4. **Refrigerated Transport:** Reefer vans, insulated tankers, mobile refrigerated containers, etc.
5. **Food Irradiation Units:** Ionising radiation technology to preserve food and extend shelf life.

## Urban Planning in India Must Evolve Beyond Land Use

- The current **urban planning** framework remains confined to **land-use regulation** and lacks an **integrated approach** that connects economic planning, climate resilience, and resource sustainability.

### Limitations of Current Urban Planning

- India's planning framework dates back to **colonial-era sanitation reforms** introduced during the **19th-century plague outbreaks**. The system continues to focus **narrowly on zoning and land allocation**.
- Projections are typically based on **past population trends** rather than **forward-looking economic** and employment data.
- Cities are treated as physical spaces to manage rather than economic hubs to empower. The result is a **static planning system** disconnected from **India's growth ambitions** and climate imperatives.

### Need for a New Planning Paradigm

- **Economic Vision:** Planning should begin with **identifying the economic drivers**, industry clusters, services, logistics, or innovation zones, for the next 20-50 years.
  - This vision should determine **expected job creation**, population growth, and corresponding infrastructure needs.
- **Natural Resource Budgeting:** Each city must undertake a **natural resource audit**, mapping water, land, and energy availability against projected demand.
  - Urban development must respect a **city's carrying capacity**, ensuring **sustainable consumption**.
- **Environmental Integration:** Each city needs a **climate action plan** outlining emission-reduction pathways and resilience measures against **extreme events**.
  - Urban Master Plans must integrate an **air pollution management plan**, addressing **transport-related emissions** and industrial impacts.
- **Urban Mobility:** A **Comprehensive Mobility Plan (CMP)** should promote public transport, cycling, and walking to **curb congestion** and air pollution.
  - Transit-oriented development (TOD) and mixed-use zoning can reduce travel distances and emissions.
- **Balanced Urbanisation:** Promoting **Tier-2 and Tier-3 cities** will help **decongest** metros, create jobs locally, and distribute economic opportunities more equitably.
  - Smaller cities must be integrated into **regional growth corridors**, as they can host manufacturing and logistics hubs at lower costs.

## NITI Aayog unveils a report on India's Advanced Manufacturing Roadmap to Global Leadership

NITI Aayog's **Frontier Tech Hub** released the roadmap "Reimagining Manufacturing: India's Roadmap to

Global Leadership in Advanced Manufacturing”, outlining how **frontier technologies** like AI, Robotics, and Digital Twins can make India a top-three global manufacturing hub by 2035

**Reimagining Manufacturing:**

- **Published by:** NITI Aayog's Frontier Tech Hub, in collaboration with **CII** and **Deloitte**.
- **Purpose:** To chart India's strategic pathway to **advanced manufacturing leadership** through technology integration, sectoral focus, and institutional reforms.
- **Scope:** Covers **13 high-impact sectors** under five clusters and a **10-year roadmap (2026-2035)** to integrate frontier technologies into production ecosystems.

**Current Status of Manufacturing in India:**

- Manufacturing currently contributes **15-17% to GDP**, below East Asian peers like China (25%) and South Korea (27%).
- India aims to **raise this to 25% by 2035**, generating **100+ million skilled jobs** and **6.5% global export share**.
- Sectors such as automotive, electronics, textiles, pharmaceuticals, and renewable energy remain central to this goal.

**Potential of the Manufacturing Sector:**

- **Global Hub Vision:** By leveraging frontier technologies like AI, robotics, and digital twins, India can position itself among the top three global manufacturing hubs by 2035.
- **Economic Gains:** Advanced manufacturing integration could **add \$270 billion to GDP by 2035** and **\$1 trillion by 2047**, driving high-value industrial growth.
- **Job Creation:** Expansion of high-tech clusters can generate **over 100 million skilled jobs**, fostering inclusive and sustainable employment.
- **Export Boost:** India's merchandise exports are projected to rise from **2% to 6.5% of global trade**, boosting foreign exchange reserves and competitiveness.
- **Innovation Drive:** Embedding **AI, advanced materials, and robotics** will enhance production precision, resilience, and global sustainability credentials.

**Key Challenges:**

- **Low R&D Investment:** With R&D spending below **1% of GDP**, India lags in innovation capacity, patents, and high-tech product development.
- **Fragmented Supply Chains:** MSMEs face weak integration with global value chains due to limited digital connectivity and logistics bottlenecks.
- **Skilling Deficit:** A large workforce remains untrained in automation and AI tools, leading to slow adoption of advanced manufacturing processes.
- **Infrastructure Gaps:** Absence of smart industrial parks, 5G networks, and reliable energy constrains global-scale production.
- **Regulatory Lag:** Lack of unified data governance and technology standards delays industry-wide digitisation and interoperability.

**Initiatives Taken So Far:**

1. **National Manufacturing Mission (NMM):** Coordinates frontier tech adoption, R&D funding, and

policy convergence across priority sectors.

2. **PLI Schemes:** Provide **performance-linked incentives** to boost domestic manufacturing in sunrise sectors like electronics and semiconductors.
3. **Industrial Corridors:** Initiatives like **Gati Shakti and PM MITRA** enhance logistics, connectivity, and cluster-based competitiveness.
4. **Make in India & Digital India:** Encourage **self-reliant production ecosystems** and integrate digital tools into manufacturing processes.
5. **Skill India & AICTE Initiatives:** Drive **industry-linked training programs** and promote modular skilling aligned with Industry 4.0 needs.

### **Key Recommendations from the Report:**

- **Global Frontier Technology Institute (GFTI):** Establish a **Centre of Excellence** for advanced R&D, testing, and certification to promote innovation.
- **Plug & Play Frontier Industrial Parks:** Develop **20 tech-enabled industrial zones** with ready infrastructure, 5G, and simulation facilities.
- **Technology Access Platforms:** Build shared **digital infrastructure** to help MSMEs access AI, robotics, and automation tools affordably.
- **Champion-Based Model:** Large industries should **mentor MSMEs** through cluster-led innovation and technology demonstration programs.
- **Servicification of Manufacturing:** Shift focus from product output to **integrated service solutions** powered by AI and IoT for value creation.
- **National Digital Backbone:** Create a **real-time industrial IoT network** for seamless data exchange and predictive efficiency in production.
- **Skilling Missions:** Launch **state-specific frontier tech missions** like robotics in Tamil Nadu or green mobility in Maharashtra to localize expertise.

India stands on the cusp of a manufacturing revolution where **technology, talent, and transformation converge**. By embracing frontier technologies, India can leap from cost efficiency to global excellence. The roadmap envisions not just "Make in India", but "*Innovate in India*" — redefining the nation's industrial destiny by 2047.

### **World Inequality Report 2025**

**Climate Inequality Report 2025** was recently released by **World Inequality Lab**.

#### **Key Findings**

- **Disproportionate Emissions from Wealth Ownership:** Top 1% contributes 15% of global consumption-based emissions but **41% of emissions arising from private capital ownership**.
- **Extreme Emission Inequality:** Per capita emissions of the top 1% are **75 times higher than those of the bottom 50% by consumption**.

- **Concentration of Industrial Emissions:** Around 100 companies are responsible for **71%** of industrial GHG emissions.

### Legal Metrology (Packaged Commodities) Amendment Rules, 2025

Department of Consumer Affairs, Ministry of Consumer Affairs, Food and Public Distribution, has notified the **Legal Metrology (Packaged Commodities) Amendment Rules, 2025**.

#### Amendment Rules 2025

- Introduces **specific provisions for packages containing medical devices**, aligning the Legal Metrology (Packaged Commodities) Rules, 2011 with the **Medical Devices Rules, 2017**.
- It provides that while requirement to make mandatory declarations remains, the specific font size and dimensional standards prescribed under Medical Devices Rules shall apply instead of those under Legal Metrology (Packaged Commodities) Rules.

It aims to ensure **regulatory harmony**, **reduce compliance ambiguity**, and **enhance consumer protection** in the healthcare sector.

### KOYLA SHAKTI Dashboard and CLAMP Portal

- The **Ministry of Coal** launched the **KOYLA SHAKTI Dashboard** and the **Coal Land Acquisition, Management, and Payment (CLAMP) Portal** to promote transparent digital governance.

#### KOYLA SHAKTI Dashboard

- The **KOYLA SHAKTI** or **Smart Coal Analytics Dashboard (SCAD)** is a unified digital platform that integrates the **entire coal value chain** from mine to market in one interface.
- **Key Feature:** It consolidates data on coal production, logistics, dispatch, and consumption to **enable real-time coordination** among stakeholders.
- **Vision:** The dashboard enhances transparency, efficiency, and innovation aligned with **Aatmanirbhar Bharat** and **Minimum Government, Maximum Governance** principles.

#### CLAMP Portal

- The Portal is a unified digital solution to **streamline the full land acquisition processes** in coal sector.
- **Key Feature:** It digitises the entire land acquisition process to keep **centralised, transparent records**, ensuring fair and timely payouts and reducing delays.
- **Institutional Efficiency:** The portal improves interoperability in land management across **Coal Public Sector Undertakings (PSUs)**.

### Modernising Cross-Border Payments

- The Reserve Bank of India (RBI) has issued a draft circular proposing reforms to **speed up credit of inward foreign remittances**.

#### Key Proposals by RBI

- **Same-Day Credit Rule:** Banks must credit inward remittances received during forex market hours on the same day, and after-hours receipts by the next business day.
- **Straight-Through Processing (STP):** RBI mandates end-to-end automated crediting of remittances post-risk checks to eliminate manual delays.
- **Real-Time Reconciliation:** Banks should reconcile their **nostro account** credits every 30 minutes instead of relying on end-of-day statements.
- **Customer Notification:** Beneficiaries must be immediately informed of receipts; those received post-closing should be notified at the start of the next business day.
- **Digital Platforms:** Banks to offer online portals for uploading documents, exchanging information, and tracking FX transaction progress in real time.

*A nostro account is the account a bank holds in a foreign bank, called "ours" from the domestic bank's perspective. A vostro account is the account a foreign bank holds with a domestic bank, called "yours" from the domestic bank's viewpoint.*

### Madras High Court, becomes first to recognise Cryptocurrency as Property

In **Rhutikumari v. Zانmai Labs Pvt. Ltd**, the Court granted protection to an investor whose digital assets were frozen on a crypto exchange after a massive cyberattack.

- In 2020, **New Zealand High Court** too held crypto currencies, as digital assets and a form of property capable of **being held on trust**.

### Key Highlights of the Ruling

#### What is Cryptocurrency?

- It is a **medium of exchange**, created and stored **electronically on the blockchain**, using cryptographic techniques and algorithms. E.g., Bitcoin.
- It has **no intrinsic value or physical form** and is **not regulated** by the Central Banks.

- **Nature of Cryptocurrency:** The court held that it is **not a tangible property nor is it a currency**. Rather, it is a **property**, which is **capable of being enjoyed, possessed and being held in trust**.
  - The Court reaffirmed previous SC rulings on the **principles of property and held them to apply equally to cryptocurrencies**.
- **Legal Clarification:** The court held that under Indian law, cryptocurrency is classified as a **Virtual Digital Asset (VDA)** and it is **not treated** as a **speculative transaction** under Income Tax Act, 1961.
- **Clarification on the RBI Ban (2018):** The Court held that RBI had not banned virtual currencies as such; it had only **prohibited banks from facilitating their trade**.

### Significance of the Ruling

- **Addresses the Regulatory Grey Zone:** The ruling marks a **landmark judicial acknowledgment** of digital assets as legally ownable property.

- **Protects Investors:** It could allow **investors** to seek traditional property remedies like **bank guarantees** rather than relying on exchange-driven loss-sharing schemes.

### Declining Interest in Soybean Cultivation

- **Madhya Pradesh**, India's **largest soybean producer**, recorded a **10% decline in acreage** between 2023 and 2024, as young farmers are abandoning soybean farming.

#### Soybean (Golden Bean)

- Soybean is a **kharif crop** requiring **26–30°C** temperature, about **90 cm** of rainfall, & fertile **loamy soils**.
- It is an **oilseed crop** native to **East Asia** and widely cultivated across tropical and subtropical regions.
- **Nutritional Value:** Soybeans are high in protein, **omega-3, omega-6 fatty acids**, and **antioxidants**.
- **Leading Producers:** **Brazil** is the world's top producer; **India ranks fifth** globally by output.

#### Key Issues Faced by Farmers

- **MSP Gap:** Farmers often sell produce at **35–40%** below the **Minimum Support Price (MSP)**; the state's **Bhavantar Yojana**, designed to bridge price gaps, does not fully offset income losses.
- **Low Profitability:** Rising costs of fertilisers, diesel, and labour have significantly **increased cultivation expenses**, while market returns have remained stagnant, **narrowing profit margins**.
- **Import Threat:** Prospective imports of **cheaper soybeans** and soybean meal from the United States create **market uncertainty** about price declines and reduced competitiveness.
- **Weak Infrastructure:** **Insufficient storage and drying facilities** at government mandis lead to post-harvest losses; the lack of affordable cold storage leaves small farmers **vulnerable to price crashes**.
- **Yield Loss:** Climate change-driven **irregular rainfall** and **low-quality seeds** have significantly reduced yields, often to **less than half of previous harvests**, undermining long-term viability.
- **Debt Dependence:** Nearly **70%** of soybean farmers depend on **seasonal loans** for inputs, often resulting in "**distress sales**" immediately after harvest to repay debts.

#### Way Forward

- **Price Assurance:** **Strengthen procurement** systems and enforce MSP implementation through digital platforms like e-NAM.
- **Seed Modernisation:** Expand **ICAR-certified seed distribution** and promote climate-resilient varieties like **NRC 142** to improve productivity and yield.
- **Import Policy:** Maintain **quantitative restrictions** on soybean and soymeal imports while promoting domestic processing and value addition.
- **Diversification:** Encourage **soybean-maize-pulse crop rotation** through targeted subsidies to enhance soil fertility and ensure stable farmer incomes.
- **Agro-Processing:** Support start-ups and **Farmer-Producer Organisations (FPOs)** to develop

soy-based foods, feed, and biofuels to expand non-oil demand.

### Chabahar port

India gets **six-month U.S. sanctions waiver on Chabahar port in Iran.**

- **Location:** Sistan-Baluchistan province on the **Makran coast** in **South-eastern part of Iran**, on the **Gulf of Oman**.
- It is the **only deep-sea port in Iran** with direct ocean access.
- There are two terminals in Chabahar Port project i.e. **Shahid Beheshti** and **Shahid Kalantari**.
- It is **closest Iranian port to India** and it grants India **access to landlocked Afghanistan** and other Central Asian countries bypassing Pakistan.
- The port is part of the proposed **International North-South Transport Corridor (INSTC)**, linking Indian Ocean and Persian Gulf to Caspian Sea via Iran and onwards to northern Europe.

### Consumer Price Index (CPI)

Ministry of Statistics and Programme Implementation (MoSPI) is undertaking the **base revision exercise of the Consumer Price Index (CPI)** and has proposed **changes in housing index compilation**.

- As a part of CPI, **Housing constitutes a major component** with an expenditure share of 21.67% in urban areas and 10.07% at the All-India level in the current series.
- Currently, the housing index is **not compiled in the rural sector**.
- **Weightage of other sectors in CPI:** Food and Beverages (45.86%), Miscellaneous involving education, health, personal care etc. (28.31%), Fuel & Light (6.84%), Clothing & FootWear (6.53%), Pan, tobacco and intoxicants (2.38%).

### Foreign Rush for Indian Banks

Global financial institutions have invested billions in Indian banks, insurers, and NBFCs, signalling confidence in India's cleaned-up and fast-growing financial sector.

#### Why Global Giants Are Investing in Indian Banks?

- **High Growth Potential:** India's banking sector grew **31% YoY in 2024**, generating **\$46 billion** in net income, among the fastest globally (McKinsey).
- **High Credit growth:** It remains **above 16%**, outpacing most Asian peers.
- **Market Scale:** Over **400 million** underbanked citizens and an expanding retail credit base.
- **Policy Liberalisation:** FDI limits raised to **74% in private banks** and **100% in insurance**.
- **Macroeconomic Fundamentals:** India's GDP projected to **grow 6.8%** (RBI, 2025); stable monetary policy and cleaned-up balance sheets attract long-term capital.

## Digi Bandar

Digi Bandar, launched at India Maritime Week 2025, as a national digital framework for Indian ports.

- **Aim:** To make ports **data-driven, AI-enabled, and interconnected** to enhance efficiency, safety, and transparency.
- **Focus:** Predictive logistics, **digital twins, and automation** in port operations.

## Secondary Sanctions

Threat of USA's **Secondary Sanctions** could impact importing of Russian oil by Indian refiners.

- While Primary sanctions include **international trade restrictions** (e.g., trade embargoes from the target), Secondary sanctions **penalizes third parties**, preventing third states and economic operators from doing business as usual with target states.
- They serve as **force multipliers** for primary sanctions and have an **extraterritorial aspect**.
- E.g., The USA imposed sanctions on Iranian oil (Primary) and Indian refiners stopped importing oil from Iran (Secondary).

## CONSTITUTION, POLITY AND GOVERNANCE

### PNGRB Proposes LPG Interoperability Framework

The Petroleum and Natural Gas Regulatory Board (PNGRB) has proposed an **interoperable LPG delivery** framework to tackle long delays in cylinder refills.

#### Key Features of the Proposal

- Under the proposal, if a distributor fails to deliver a cylinder **within 24 hours of booking**, the order will be automatically routed to the nearest available distributor, regardless of oil marketing company (OMC).
  - This means that a customer of Indian Oil Corporation (IOC) can receive a refill from a **nearby BPCL or HPCL distributor**, transforming three separate silos into a **unified national LPG delivery system**.
- **Pilot Phase:** Proposal includes a **phased rollout**, starting with pilot projects in select urban and rural areas to test coordination systems.
- **Rationale Behind the Proposal**
- **Delivery Delays:** Over **1.7 million LPG-related** complaints are registered annually, with nearly half concerning delivery delays.
- **Service Excellence:** With **32 crore** domestic LPG connections and **near 100% coverage**, the challenge is no longer access but ensuring timely, reliable delivery for households.
- **Universal Service Obligation:** All **three OMCs** are under MoPNG and sell LPG at uniform prices, sharing a common mandate to **guarantee** fuel access nationwide.

#### Petroleum and Natural Gas Regulatory Board (PNGRB)

- PNGRB is a **statutory body** under the **Petroleum and Natural Gas Regulatory Board Act, 2006**, headquartered in **New Delhi**.
- **Nodal Ministry:** Ministry of Petroleum and Natural Gas.
- **Functions:** It regulates refining, storage, transportation, distribution, marketing, and sale of petroleum products and natural gas, excluding crude oil and natural gas production.
- **Appeals** against PNGRB decisions lie with the **Appellate Tribunal for Electricity**.

### India's Re-Election to the ICAO Council

India has been **re-elected to Part II of the Council** of the International Civil Aviation Organisation (ICAO) during its 42<sup>nd</sup> Assembly Session in Montreal, Canada.

- *The ICAO Council members are **elected in three parts**; Part I includes **key air transport States**, Part II comprises States making the **largest contributions** to international civil air navigation, and Part III includes States **to ensure balanced global representation**.*
- **Significance:** India secured more votes as compared to the 2022 elections, indicating increased international confidence in its aviation leadership.

### International Civil Aviation Organisation (ICAO)

- ICAO is a specialised agency of the United Nations that establishes **global standards** and **cooperation frameworks** for international civil aviation.
- **Establishment:** It was established by the **1944 Convention on International Civil Aviation (Chicago Convention)**, became a UN specialised agency in 1947, and is headquartered in **Montreal, Canada**.
- **Membership:** ICAO has **193 member states**, and **India** has been a **founding member** since 1944.
- **Structure:** It includes the **Assembly**, a sovereign body of all 193 States (meets every three years), the 36-member **Council** (governing body with a three-year term), the **Secretariat** (handles daily operations), and **Regional Offices** (for local aviation development).

### Jal Sanchay Jan Bhagidari

PM Modi recently launched the '**Jal Sanchay Jan Bhagidari**' initiative in Surat, **Gujarat**.

#### Key Features of the Initiative

- It is based on Gujarat's earlier **Jal Sanchay initiative**, which is now scaled nationally through the **Ministry of Jal Shakti**.
- Construction of around **24,800 rainwater harvesting** structures across Gujarat.
- Strong emphasis on **community participation** and **local ownership** in water resource management.

### Government Initiatives for Water Conservation

- **MGNREGS:** Supports the construction of water conservation and harvesting structures.
- **15<sup>th</sup> Finance Commission Grants:** States receive tied grants, which can be used for rainwater harvesting.
- **Jal Shakti Abhiyan:** Currently running as **Catch the Rain 2024**, implemented in all districts by converging multiple central and state schemes.
- **AMRUT 2.0:** Focus on urban rainwater harvesting, aquifer recharge, and stormwater management.
- **Atal Bhujal Yojana:** Implemented in **8,213 Gram Panchayats** across seven states to shift focus from groundwater development to groundwater management.
- **PMKSY:** Pradhan Mantri Krishi Sinchai Yojana expands irrigation, promotes water-use efficiency, and includes components like Har Khet Ko Pani and Repair, Renovation, and restoration (RRR) of water bodies.
- **Mission Amrit Sarovar:** At least **75 water bodies per district** developed or rejuvenated to store and conserve water.
- **National Aquifer Mapping (NAQUIM):** Completed **over 25 lakh sq. km**, providing state-level aquifer management plans.

### Institutional & Policy Measures

- The **Bureau of Water Use Efficiency (BWUE)** was established under the National Water Mission to promote efficient water use in irrigation, industry, and domestic supply.
- **Model Building Bye Laws (2016)** and **Unified Building Bye Laws (Delhi, 2016)** mandate rainwater harvesting in urban construction.

### UPSC Enters 100<sup>th</sup> Year of Service

The Union Public Service Commission (UPSC) marks **100 years of its establishment** on **October 1**, reaffirming its role as the guardian of **meritocracy** and **fairness** in India's governance.

**PRATIBHA Setu:** UPSC has launched a **centralised online repository** of verified biodata to connect interview-qualified but non-recommended candidates with alternate employment opportunities.

### Union Public Service Commission (UPSC)

- UPSC is an independent constitutional body under **Part XIV (Article 315-323)** of the Indian Constitution.
- It was established on **1 October 1926** as the **Public Service Commission** based on recommendations of the **Lee Commission (1924)**, which was later reconstituted as the **Federal Public Service Commission** by the **Government of India Act 1935**.
- It was renamed the **Union Public Service Commission** after independence in **1947**.

### Internet Shutdown in India

The Uttar Pradesh government ordered a 48-hour **internet suspension** in **Bareilly** to maintain law and order during **Dussehra festivities**.

### Internet Shutdown Framework in India

- **Legal Framework:** The Telecommunications Act of 2023 and **Suspension Rules of 2024** provide the legal basis for suspending internet services.
- **Government Authority:** **Section 20** of the act authorises **both central and state governments** to impose shutdowns under specific public concern conditions.
- **Decision-Making Power:** Union or State **Home Secretaries** can issue shutdown orders, with Joint Secretaries authorised only in urgent emergencies.
- **Grounds:** Internet shutdowns may be imposed during emergencies, sovereignty threats, security concerns, risks to foreign relations, public disorder, or incitement to offences.
- **Duration Limit:** Each order under the 2024 Rules is **limited to 15 days**. However, **successive renewals** are legally allowed, which could lead to indefinite shutdowns through repeated short-term orders.
- **Order Requirements:** Written shutdown orders must specify **reasons**, set a precise **duration**, and demarcate the affected **geographic area**.
- **Enforcement:** **Telecom providers** are required to appoint **nodal officers** in each state or union territory for the quick implementation of shutdowns.
- **Oversight Review:** Orders are **reviewed within five days** by committees led by the Cabinet Secretary at the centre and Chief Secretaries at the state level.
- **Use Restrictions:** Shutdowns are intended as **last-resort measures** and cannot be used as routine law enforcement tools.
- **Internet Shutdown Landscape in India**
- **Shutdown Numbers:** **84 internet shutdowns** occurred in 2024, representing **28%** of worldwide cases, down from 113 in 2023.
- **Global Standing:** India ranked **second globally** for internet shutdowns in 2024, with **Myanmar** reporting the highest at 85 cases.
- **Regional Distribution:** **Manipur (21), Haryana (12), and Jammu & Kashmir (12)** saw the most shutdowns during the year.
- **Shutdown Triggers:** **Protests (41), communal clashes (23), & exam security (5)** were the main causes of internet shutdowns.
- **Duration Lost:** Internet services were suspended for **3,160 hours** in 2024, nearly 132 days.
- **Economic Costs:** Shutdowns cost India **~\$322 million** in 2024, ranking it the **sixth highest** globally for economic losses.

### International Health Regulations Amendment

The **amendments to the International Health Regulations** have come into effect, introducing the new definition of "Pandemic Emergency" into global health law.

*Amendment Procedure: Amendments can be proposed by any State Party or the WHO Director-General, and their adoption requires a majority vote by the World Health Assembly.*

### Key Amendments

- The amendments of 2024 introduced a separate legal classification called “**Pandemic Emergency.**”
- A pandemic emergency is a **disease outbreak across multiple countries** that overwhelms health systems, disrupts societies, and requires fast, equitable, and coordinated international action.
- They require each country to establish a **National IHR Authority** to coordinate the implementation of the regulations across government ministries.
- **India's Obligation:** As a signatory, India must establish a **National IHR Authority** under the **Ministry of Health & Family Welfare**, enhance disease surveillance, & protect personal data during emergencies.

### International Health Regulations (IHR)

- The IHR is a **legally binding agreement** that applies to **196 countries**, including all 194 WHO Member States, and two non-members, Liechtenstein and the Holy See.
- **Objective:** To prevent, control, and provide a **public health response** to the international spread of diseases, while avoiding unnecessary interference with global traffic and trade.
- **Origin:** The 19<sup>th</sup>-century cholera outbreaks led to the first International Sanitary Regulations in 1951, which were renamed the International Health Regulations in 1969.
- **Major Revision:** After the 2003 SARS outbreak, it was revised to include any “**public health emergency of international concern**” (PHEIC), significantly broadening its scope.
- **Compliance:** The WHO and States Parties use **Joint External Evaluations (JEE)**, which are voluntary, collaborative reviews conducted by international and national authorities to assess readiness.

### Bihar's Final Electoral Roll After SIR

The final electoral roll of Bihar now lists **7.42 crore electors**, marking a **6% decline** following the Special Intensive Revision (SIR).

- **Deletion Reasons:** Almost **99% of deletions** were due to **death, permanent migration, or duplication.**
- **Net Revision:** Special Intensive Revision (SIR) **removed 68.6 lakh names** while **adding 21.53 lakh** new electors to the updated electoral roll.
- **Deletion Stages:** In the **draft stage**, there were 65 lakh deletions, which included 55% for migration, 34% for deaths, and 11% for duplication. The **claims stage** saw 3.66 lakh removals.
- **Appeal Provision:** Aggrieved persons can first appeal to the **District Magistrate**, with a second appeal to the **Chief Electoral Officer** under the **Representation of the People Act, 1950.**

*Special Intensive Revision (SIR) is a comprehensive, house-to-house verification process carried out by the Election Commission of India (ECI) to update and ensure the accuracy of electoral rolls.*

## Draft Promotion & Regulation of Online Gaming Rules 2025

The MeitY released the **draft Promotion and Regulation of Online Gaming Rules** under **Section 19** of the Promotion and Regulation of Online Gaming (PROG) Act, 2025.

**Objective:** The draft aims to set up a clear **regulatory framework** that promotes safe gaming and prevents gambling, addiction, and financial misuse.

### Key Features of the Draft Promotion and Regulation of Online Gaming Rules

#### Online Gaming Authority of India (OGAI)

- **Regulatory Role:** The draft rules create the **Online Gaming Authority of India (OGAI)** as the central regulator for compliance, registration, and certification.
- **Composition:** OGAI will be chaired by an **Additional Secretary** from **MeitY**, with members from the **Ministry of Youth Affairs and Sports** and the **Ministry of Information and Broadcasting**.
- **Application Requirement:** Online gaming Service providers must register with OGAI, submitting details on revenue models, safety features, and target audiences.
- **Enforcement Powers:** OGAI will decide which games are prohibited, regulate advertisements, and cancel registrations in cases of repeated violations.
- **Certificate Validity:** Registrations for e-sports and social games will be **valid for five years**, providing stability and operational predictability.
- **Public Registry:** OGAI will maintain a **National Online Social Games and Esports Registry**, listing registered firms and cataloguing games deemed prohibited money games.
- **Appeals from OGAI:** Decisions made by OGAI may be appealed to the **Secretary of MeitY**, who will act as the **Appellate Authority**.

#### Three Categories of Games

- **Prohibited Games:** Online games involving **wagers, betting**, or **cash-convertible** rewards will be banned to prevent financial exploitation and user vulnerability.
- **E-sports Recognition:** Competitive multiplayer games with **predefined rules** will be recognised under the National Sports Governance Act, 2025, and **must be registered** with OGAI.
- **Social Games:** Recreational or learning-oriented games without monetary stakes can be **voluntarily registered**, ensuring age-appropriate content and safe gaming environments.

#### Role of Multiple Ministries

- **Nodal Ministry:** **MeitY** will serve as the nodal ministry for regulation, enforcement, and inter-ministerial coordination under the **PROG Act, 2025**.
- **Esports Oversight:** The **Ministry of Youth Affairs & Sports** will regulate e-sports by issuing tournament standards, guidelines, and offering targeted incentives for sector development.
- **Social Games:** The **Ministry of Information & Broadcasting** will establish codes of practice for online social games to ensure content is safe, educational, and age-appropriate.

### Three-Tier Grievance Redressal

**Internal Mechanism:** Online gaming platforms will set up **internal grievance redressal** systems with fixed timelines for resolution.

- **Appellate Committee:** Unresolved complaints will be escalated to the **Grievance Appellate Committee** established under the **IT Rules, 2021**.
- **Final Appeal:** Appeals from the Appellate Committee decisions are submitted to the **Secretary of the MeitY**, who functions as the final appellate authority.

### Penalties and Enforcement

- **Punishments:** Offering or facilitating prohibited games will invite imprisonment for up to **three years** and fines of **up to ₹1 crore**.
- **Staff Liability:** Employees who enable violations will be personally accountable, incorporating **individual responsibility** into organisational accountability.
- **Financial Transactions:** **Banks** and **financial institutions** that facilitate payments for prohibited money games are also liable for penalties.
- **Non-Bailable Offence:** Violations linked to prohibited online games will be **cognizable** and **non-bailable**, giving authorities stronger enforcement powers.
- **Site Blocking:** The government can authorise officers to investigate and block access to websites of non-compliant platforms under Section 69A of the IT Act, 2000.

### Health Ministry Advisory on Cough Syrups for Children

The Directorate General of Health Services (DGHS) has issued guidelines to States and UTs on the **rational use of cough syrups in children**.

- The advisory follows **recent child deaths in Rajasthan and Madhya Pradesh**, allegedly linked to syrups containing **Dextromethorphan**.
- ***Dextromethorphan** is commonly used as a cough suppressant. It is harmful for children due to a risk of serious side effects, potential for accidental overdose, and unknown effects on developing brains.*
- **Guidelines Issued by DGHS**
  - Most acute cough illnesses in children are **self-limiting**, requiring **no drug intervention**.
  - Cough syrups must not be prescribed for children **under two years**.
  - **Older children** may be used only after **clinical evaluation**, with the correct dosage and shortest duration, and without multiple drug combinations.
  - **Non-pharmacological measures** like adequate **hydration** and **rest** should be preferred.
  - **Manufacturers** must adhere to *Good Manufacturing Practices (GMP)* with pharmaceutical-grade excipients when **procuring** and dispensing.
- **Details of Contamination and Investigations**
  - The Union Health Ministry clarified that the syrups linked to child deaths were **free from diethylene glycol (DEG) and ethylene glycol (EG)**.

- In Rajasthan, the formulation under scrutiny **contained dextromethorphan**, a compound not recommended for **paediatric use**.

*DEG: An industrial solvent used in antifreeze; highly toxic, causing **kidney failure**, neurological damage, and death if ingested.*

*EG: Used in antifreeze and industrial fluids; extremely toxic, leading to kidney injury.*

### Government Shutdown in the United States

The U.S. government faces its **first government shutdown since 2019** after Congress failed to pass key budget appropriation bills amid deep partisan divisions.

It resulted from a **deadlock over key policy differences**, primarily related to healthcare spending.

#### U.S. Government Shutdown

- A government shutdown takes place when Congress does not pass the **annual appropriation bills before October 1**, which marks the start of the new fiscal year.
  - This causes a halt in federal operations owing to the absence of authorised funding.
- **Legal Basis:** The **1884 Antideficiency Act** prohibits federal spending without Congress's approval. A reinterpretation in 1980 made shutdowns mandatory whenever there is a funding lapse.
- **Temporary Measure:** Congress can avoid a shutdown by passing a **Continuing Resolution (CR)**. It temporarily extends current funding levels until a full budget is approved.
- **Historical Record:** Since 1976, the U.S. has seen **20 shutdowns**. The longest one lasted 35 days during 2018-19 under the Trump administration.
- *The U.S. federal government's **fiscal year** runs from **October 1** to **September 30**, while India's fiscal year runs from April 1 to March 31.*

#### Reasons for the U.S. Government Shutdown

- **Political Gridlock:** Divided control of Congress and the Presidency often delay the passage of appropriation bills, leading to funding lapses and temporary shutdowns.
- **Political Polarisation:** Sharp partisan divisions in Congress hinder consensus on appropriation bills, especially when **different parties control the House and the Senate**.
- **Policy Confrontations:** Shutdown threats are used as **leverage to extract policy concessions**, as seen in disputes over healthcare subsidies in 2025 and border wall funding in 2018-2019.
- **Structural Separation:** The constitutional **separation of powers** enables legislative-executive deadlocks to persist, as neither branch automatically dissolves during funding lapses.
- *Unlike India, where only the Lok Sabha votes on appropriation bills, **both chambers** of the U.S. Congress **must approve** them before they become law.*

#### Consequences of the U.S. Government Shutdown

- **Furloughs:** Non-essential federal employees are put on **temporary, unpaid leave**. This disrupts

regular administrative services and citizen services.

- **Essential Services:** Key sectors like defence, law enforcement, and air traffic control continue to operate. However, employees often work **without immediate pay**.
- **Public Disruption:** Federal agencies, research institutions, national parks & other organisations suspend operations. This leads to reduced public access, less regulatory oversight, and limited data collection.
- **Exempt Programs: Social Security, Medicare,** and other entitlement-based programs continue to function because they are **funded through permanent laws**, not annual budgets.
- **Economic Impact:** Long shutdowns hurt GDP growth, delay federal contracts, and lower both investor and global confidence in U.S. financial management.

### Why India Avoids Government Shutdowns

- **Parliamentary System & Vote on Account:** Integration of executive and legislature ensures continuity, while **Article 116** allows interim funding until the full budget is passed.
- **Majority & Party Discipline:** Executive majority in Lok Sabha and anti-defection laws ensure timely budget approval without deadlocks.

### Resumption of India-China Direct Flights

India and China have **decided to restart direct flights** by late October 2025, in line with the International Air Transport Association's (IATA) winter schedule.

- **Objective:** The agreement aims to facilitate people-to-people exchanges and restore normal bilateral engagement between India and China.
- **Historical Suspension:** Direct flights were **suspended in March 2020** because of India's travel ban during the COVID-19 pandemic.
- **Extended Suspension:** Although global restrictions were relaxed, flights to China remained suspended due to tensions after the Galwan clashes along the Line of Actual Control.
- **Two Aviation Seasons**
- **IATA Framework:** The International Air Transport Association (IATA) **divides the calendar year** into summer and winter schedules to allocate airport landing and take-off slots efficiently.
- **Seasonal Variation:** The **summer schedule** (March to October) matches **peak travel demand**, while the **winter schedule** (October to March) lowers flight frequency due to **decreased seasonal demand**.

### Model Youth Gram Sabha Initiative

- The **Ministry of Panchayati Raj**, in collaboration with the **Ministry of Education** and **Ministry of Tribal Affairs**, is launching the **Model Youth Gram Sabha (MYGS) initiative** from October 2025.

#### Key Highlights

- **Aim:** Inspired by the **Model UN format**, the initiative seeks to provide **practical exposure** to the functioning of **Gram Sabhas**.

- **Students of Classes 9-12** will **assume** roles such as sarpanch, village secretary, Anganwadi worker, ANM, and junior engineers to hold **mock Gram Sabha meetings**.
- The first phase will cover **600 Jawahar Navodaya Vidyalayas (JNVs)** and **200 Eklavya Model Residential Schools (EMRS)**.

### President's Bodyguard (PBG)

President Droupadi Murmu presented the **Diamond Jubilee Silver Trumpet and Trumpet Banner** to the **President's Bodyguard**, marking **75 years of service** since their re-designation.

- The President's Bodyguard is an **elite cavalry unit** that directly serves the Head of State. It is the **oldest regiment** in the Indian Army and the **most senior unit** of the army.
- **Establishment:** The PBG was raised in **1773** at **Benares** (present-day Varanasi) by the first Governor-General, **Warren Hastings**, with support from **Raja Chet Singh**.
- **Re-designation:** The regiment was **officially renamed in 1950** as the President's Bodyguard (PBG).
- **Duties:** The PBG serves dual roles as **ceremonial state escorts** and as **operators of paratroopers**, reconnaissance units, and armoured vehicle crews.

### Tamil Nadu Challenges Governor's Referral of University Bill to President

The Tamil Nadu government has petitioned the Supreme Court, challenging **Governor R.N. Ravi's decision to reserve the Kalaingar University Bill, 2025**, for Presidential consideration.

#### Background

- Kalaingar University Bill, 2025, was passed by TN Legislative Assembly to establish a **new state university**.
- Instead of assenting, the Governor **reserved the Bill** for the President's consideration under **Article 200**.
- The State government contends that this **act violates the constitutional principle** of the Governor acting on the aid and advice of the Council of Ministers.

#### Judicial Context

- The issue comes amid a **pending Presidential Reference** on the Governor's discretion under **Article 200**, where the SC has reserved judgment (September 9, 2025).
- The reference examines **whether Governors can delay or deny assent to Bills** beyond the advice of the Council of Ministers.
- In **April 2025**, the SC ruled that Governors and the President must act on Bills **within three months**.

#### Constitutional Framework

- **Article 200:** It empowers the Governor to **grant assent** to a Bill, **withhold assent**, **return it** for reconsideration, or **reserve it** for the President's consideration.
- The Governor's discretion under this Article is **limited**, and must ordinarily **align with Cabinet advice**, as reaffirmed in previous SC rulings (e.g., Nabam Rebia v. Deputy Speaker, 2016).

- **Article 142:** Empowers the Supreme Court to use its inherent authority to **grant assent to pending Bills** and **prescribe timelines for action** by Governors and the President.
- **Article 143(1):** Authorises the **President** to seek the **Supreme Court's advisory opinion** on matters of significant legal or factual importance.

### India Proposes New International Governance Index

**India**, as the current President of the International Institute of Administrative Sciences (IIAS), proposed creating a new **International Governance Index** to address issues in existing global indices.

- *The IIAS is a global non-profit organisation for **administrative research and training**, established in 1930 and headquartered in **Brussels, Belgium**.*
- The proposed index aims to provide a new, **transparent, and inclusive framework** by using methodologies from global bodies like the World Bank and OECD to evaluate **administrative efficiency**.
- A **Research Advisory Committee** working group will develop the index, and it will be included in the agenda for the IIAS annual conference in 2026.
- **Significance:** The index can rebalance **global governance narratives**, bridge the North-South divide, and advance India's vision of "maximum governance, minimum government."

### Issues with Existing Global Indices

- **Opaque Methodology:** Indices like the V-Dem rely on expert opinion surveys with **undisclosed sampling** and **weighting methods**.
- **Western-Centric Criteria:** They use uniform liberal-democracy standards, ignoring different Asian and African administrative models.
- **Policy Impact:** The World Bank's World Governance Indicators (WGI) rely on **perception-based data** with limited on-ground validation.
- **India's Performance in Major Global Governance Indices**
- India ranked **100<sup>th</sup>** out of **179 countries** in the Sweden-based **Varieties of Democracy (V-Dem) Index (2025)** and has been categorised as an electoral autocracy since 2017.
- The US-based **Freedom in the World Index (2024)** report downgraded India's civil and political freedoms to levels comparable to the 1970s Emergency.
- India's scores in the Worldwide Governance Indicators (2023) show moderate government effectiveness and rule of law but **low political stability** compared to global averages.
- **Issues of Marginalised Communities in Neighbouring Regions**
- Recent reports highlight protests in **PoK (Muzaffarabad)** over political grievances met with crackdowns, and violence against indigenous groups in **Bangladesh's Chittagong Hill Tracts**.
- India has publicly condemned rights abuses in PoK and rejected allegations of involvement in Bangladesh.

### Implications for India

- **Humanitarian Concern:** Reinforces India's diplomatic stance, condemning human-rights abuses.
- **Security Risk:** Prolonged unrest may trigger **refugee flows, cross-border tensions** or **exploitation** by militant groups, stressing border states, which can lead to Domestic Fallout.
- **Diplomatic Leverage:** PoK unrest offers India factual grounds to **challenge Pakistan's claims on Kashmir** at bilateral and multilateral fora.
- **Strain on Bilateral Ties:** India-Bangladesh trade crossed **\$14 billion in FY2024**, making stability crucial for regional connectivity projects like **BBIN** and **BIMSTEC corridors**.
- *The **BBIN Motor Vehicles Agreement** involving **Bangladesh, Bhutan, India, and Nepal** to *faci passenger and cargo vehicles across borders, promoting regional integration.**

### Way Forward for India's Diplomatic Challenges

- **Pragmatic Diplomacy:** Adopt a pragmatic approach that prioritises India's strategic interests while promoting democratic values and human rights in the region.
- **Information Diplomacy:** Support documentation of abuses to counter misinformation. E.g. Establish a **Neighbourhood Human Rights Monitoring Cell** within MEA to compile verified data
- **Regional Cooperation:** Strengthen regional mechanisms like **SAARC** and **BIMSTEC** to foster greater cooperation and reduce the influence of external powers.
- **Security Cooperation:** Enhance security ties with neighbouring countries to address border challenges. E.g. **India-Bangladesh Coordinated Border Management Plan (CBMP)**
- **People-to-People Ties:** Focus on cultural, educational, and people-to-people exchanges to build long-term goodwill. E.g. **BIMSTEC Cultural Festivals** foster regional camaraderie.

### PM Dhan-Dhaanya Krishi Yojana (PMDDKY)

- The Centre announced **100 Aspirational Agriculture Districts** under PM Dhan-Dhaanya Krishi Yojana (PMDDKY) across 29 States and UTs to improve agricultural productivity and self-reliance.
- PMDDKY is an umbrella initiative overseen by the **Ministry of Agriculture and Farmers' Welfare**.
- **Selection Criteria:** The 100 districts were identified based on low productivity, moderate crop intensity, and below-average access to agricultural credit.
- **Scheme Integration:** PMDDKY consolidates **36 central schemes from 11 departments**, for streamlined implementation and unified agricultural support delivery.
- **Inspiration:** It is designed on the lines of NITI Aayog's Aspirational Districts Programme, emphasising data-driven, inclusive governance.
- **Implementation:** Each district will form a **District Agriculture Development Plan** overseen by local committees, with **100 Central Nodal Officers** monitoring performance.

### TRAI Recommendations on Digital Radio Broadcast Policy

- The Telecom Regulatory Authority of India (TRAI) has released **recommendations** on formulating a **Digital Radio Broadcast Policy** for private Radio broadcasters.
- **Objective:** It aims to promote **digital radio adoption** in India by establishing a regulatory framework for licensing, technology standards, and market transition.
- Digital radio uses digital technology to **transmit audio as a stream of data**, converting sound waves into numerical patterns instead of analogue electric signals.
- **Advantages of Digital Radio**
- **Audio Clarity:** Digital encoding **reduces signal noise and fading**, providing consistent, high-quality sound even in weak signal areas.
- **Spectrum Efficiency:** A single frequency can **support multiple digital stations**, enabling more channels without using additional spectrum.
- **Data Services:** Embedded digital data channels can transmit **real-time text, alerts, metadata**, and more within the same broadcast signal.
- **Simplified Tuning:** Digital radios show all available stations by name, replacing manual frequency search with **faster, error-free tuning**.

### Key Recommendations on the Digital Broadcast Policy

- **Simulcast Mode**
- **Service Start:** New broadcasters must begin their services with a **simulcast model**, which involves broadcasting in **both analogue and digital formats simultaneously**.
  - Existing FM broadcasters can voluntarily switch to the simulcast mode.
- **Channel Capacity:** In simulcast mode, each assigned frequency can support **one analogue, three digital, and one data channel**.
- **Sunset Clause:** The government will announce a timeline for **phasing out analogue broadcasting** after evaluating digital adoption and market readiness.
- **Spectrum and Licensing**
- **Pilot Rollout:** Digital radio will **initially launch in 13 cities**, including **four A+ metros** (Delhi, Mumbai, Kolkata, and Chennai) and nine A-category cities, to assess its urban deployment.
- **Frequency Auction:** Two new frequencies will be auctioned in each city, with **reserve prices** set by the Ministry of Information and Broadcasting.
- **Migration Rules:** Existing operators transitioning to digital mode must complete the migration **within six months** from the auction date, paying a fee based on auction prices & the remaining license period.
- **License Duration:** Digital broadcasting licenses will remain **valid for 15 years** to promote long-term policy stability and strengthen investor confidence.
- **Infrastructure and Technology**
- **Unified Standard:** TRAI recommended adopting a **single digital radio transmission standard** for the VHF Band II range to ensure compatibility among all broadcasters and devices.

- **Infrastructure Providers:** A new authorization framework called '**Radio Broadcasting Infrastructure Provider**' will enable companies to build & lease broadcasting infrastructure to radio operators.
- **Shared Facilities:** Prasar Bharati will share its existing broadcasting infrastructure with private players at concessional rates to support the early rollout of digital radio services.
- **Device Integration:** Manufacturers will be advised to include **digital radio receivers** in mobile phones and vehicles to expand listener access.
- **Business and Market Structure**
- **Fee Policy:** Annual authorisation fees will be **4% of Adjusted Gross Revenue (AGR)** in major cities, with reduced rates in smaller markets.
- **Ownership Limit:** A single entity **cannot own more than 40%** of frequencies in any city, to ensure competition and content diversity.
- **Online Streaming:** Broadcasters will be allowed to broadcast their terrestrial radio programmes over internet platforms, with **associated revenue included** in total Gross Revenue.

### Regulatory Oversight

- **Monitoring Body:** The **Ministry of Information and Broadcasting** will establish a steering committee to monitor the rollout and adoption of digital receivers.
- **Updated Codes: New Programme and Advertisement Codes** will be created for terrestrial radio to conform to digital content standards.

### Enhancing Alternative Dispute Resolution in India

Amid over **4.57 crore pending cases (NJDG, 2025)**, ADR mechanisms such as arbitration, mediation, and Lok Adalats are seen as essential for faster and inclusive justice delivery.

#### ADR (Alternative Dispute Resolution)

- ADR refers to mechanisms for **resolving disputes outside traditional courts**, using methods such as **arbitration, conciliation, mediation, negotiation, and Lok Adalat**.
- To ensure speedy, cost-effective, and **participatory justice** aligned with **Article 39A** of the Constitution (**equal access to justice**).

#### Statutory Basis

- Recognised under **Section 89** of the **Civil Procedure Code (CPC), 1908**.
- Governed primarily by the **Arbitration and Conciliation Act, 1996** (amended 2021).
- Supported by the **Legal Services Authorities Act, 1987** (for Lok Adalats).
- **The Mediation Act, 2023**, provides a legal framework for mediation.
- **Need for Strengthening ADR in India**
- **Case Pendency:** Over **4.5 crore cases** pending; High Courts face a **33% vacancy rate**.
- **Constitutional Backing:** **Article 39A** ensures equal justice and **free legal aid**.
- **Efficiency:** The Arbitration & Conciliation (Amendment) Act, 2021, mandates resolution **within 180 days**.

- **Social Cohesion:** Mediation fosters harmony, aligns with **Gandhian principles of reconciliation. Way Forward**
- **Institutionalisation of ADR:** Establish a **National Mediation Authority for Standardisation** as recommended by **Justice B.N. Srikrishna Committee (2017)**.
- **ADR Education:** Integrate ADR techniques into judicial academies and law schools to promote a pre-litigation mediation culture. E.g. **UK Judicial College** conducts **certified mediation modules** for judges.
- **Leverage Technology:** Justice **A.K. Sikri Committee (2020)** on ODR (Online Dispute Resolution) recommended a **standard framework for online mediation** and data governance.
- **Inclusive Dispute Resolution:** **Gram Nyayalayas Scheme (2008)** provides mobile village courts designed for quick, affordable justice. E.g. **Rwanda's Gacaca Courts** resolving 90% of rural disputes locally.

### ECI Measures for Bihar Elections

- The Election Commission of India announced **two-phase** Bihar Assembly elections and **17 new initiatives** to make the election process more efficient, transparent, and voter-friendly.
- **Major Initiatives:** The number of voters per polling station has been **lowered to reduce crowding**. An **update to the voter list** was carried out after 22 years, and **revised guidelines** were issued to enhance the readability of ballot papers.
- **Election Commission of India**
- The Election Commission of India (ECI) is a permanent, independent **constitutional body** established in **1950** to **conduct free and fair elections**.
- **Part XV and Articles 324–329** of the Indian Constitution deal with elections and outline its structure, powers, and jurisdiction.
- **ECI administers elections** to the Lok Sabha, Rajya Sabha, State Legislative Assemblies, State Legislative Councils and the offices of the President and Vice President of the country.

### Model Code of Conduct (MCC)

The MCC comes into force **from the date on which the election schedule is announced** and remains in effect until the date of the **result announcement**.

It is a **set of guidelines** issued by the ECI under **Article 324** to ensure **fairness and electoral integrity**.

**Legal Status:** The MCC **does not have statutory backing** and functions through political consensus and established precedents.

### SC Issues Nationwide Directions for Road Safety

The Supreme Court has directed **all States and UTs** to formulate **comprehensive road safety rules** within **six months**.

### Legal Basis

- Under the **Motor Vehicles (MV) Act, 1988**, the SC's directions derive authority from the following provisions:
- **Section 138(1A)**: Empowers **State governments** to regulate the movement of pedestrians and non-mechanically propelled vehicles on roads and highways.
- **Section 210-D**: Mandates the **prescription of standards** for the design, construction, and maintenance of roads to **ensure safety and uniformity**.

### Key Directives Issued by SC

- **Framing of Rules**: States and UTs must include provisions on helmet enforcement, pedestrian crossings, wrong-lane driving, unsafe overtaking, and LED headlight.
- **Helmet Enforcement**: Authorities will ensure compliance for **both riders and pillion** passengers through **e-enforcement systems**, including camera surveillance and digital challans.
- **Pedestrian Safety**: Safe crossings, shaded waiting zones, tactile paving, and adherence to **Indian Roads Congress (IRC)** standards at bus terminals, metro, and railway stations.
- **Accountability**: Under **Section 198A of the MV Act**, officials and contractors can be **personally liable** for pedestrian deaths caused by poor road design or maintenance.
- **LED Headlights & Hooters**: The court directed the **Ministry of Road Transport and Highways (MoRTH)** and State authorities to define **maximum luminance** and **beam angles**.
  - Also directed to **ban** unauthorised **red-blue strobe lights** and **hooters** completely.
- *The 'Road Accidents in India 2023' report by the Ministry of Road Transport and Highways pedestrian and 54,000 two-wheeler fatalities in 2023.*

### Grievance Redressal and Monitoring

- **States, municipal bodies**, and the **NHAI** must create a dedicated **online grievance redressal system** for complaints on footpath maintenance, encroachment, and pedestrian issues. The system must include a **review mechanism** for unresolved complaints. The Supreme Court will **continue to monitor** compliance and review progress after **seven months**.

*The SC's directions come amid **India's goal** to reduce road fatalities by **50% by 2030**, aligning with the **UN Decade of Action for Road Safety**.*

### PM-KUSUM and Pradhan Mantri Surya Ghar Muft Bijli Yojana

- India plans to showcase the PM-KUSUM and PM Surya Ghar Muft Bijli Yojana programs through the International Solar Alliance platform.

### PM-KUSUM (Pradhan Mantri Kisan Urja Suraksha evam Utthaan Mahabhiyan)

- PM-KUSUM was launched in **2019** to provide financial assistance to farmers for adopting **solar irrigation pumps** in agriculture.
- **Implementation:** Under the **Ministry of New and Renewable Energy**, via state agencies.
- **Target:** Add **34,800 MW** of solar capacity by **March 2026** to promote solar energy use in agriculture.
- **Components:** The scheme has **three components**:
  - Installation of small grid-connected solar plants and selling power to DISCOMs.
  - Stand-alone **solar pumps** in off-grid areas to reduce diesel dependence.
  - Solarisation of existing grid-connected pumps for irrigation and selling surplus power to the grid.
- **Key Achievements:** About **70%** of standalone solar pumps are installed under the scheme, but progress on grid-connected plants and pumps has been slower.

### PM Surya Ghar Muft Bijli Yojana

- PM Surya Ghar Muft Bijli Yojana is a **Central Sector Scheme** launched in **2024** to provide free electricity by installing **rooftop solar panels**.
- **Implementation:** Under the **Ministry of New and Renewable Energy** through the state-level DISCOMs.
- **Target:** Provide up to **300 units** of free electricity monthly to **1 crore** eligible households by **2026-27**.
- **Key Achievement:** The scheme has completed **10 lakh** rooftop solar installations and is steadily progressing towards its set target.

### AgriEnIcs Programme

- The **Ministry of Electronics and IT (MeitY)** launched and **transferred five indigenous agri-electronic technologies** under the **AgriEnIcs national programme**.

### AgriEnIcs Programme

- **Aim:** To develop, deploy, and commercialise indigenous electronics, sensors, and AI-based solutions for agriculture and environmental applications.
- **Theme:** "Harnessing Sensors, Electronics, and AI for an Aatmanirbhar Bharat."
- **Full Form:** Agriculture and Environment Electronics and Information Systems Programme (AgriEnIcs)
- **Nodal Implementing Agency:** Centre for Development of Advanced Computing (C-DAC), Kolkata
- **Associated Institutions:** IIT Kharagpur, ICAR-NDRI (Kalyani), ICAR-IARI (New Delhi), FCI

- *C-DAC was established in **1988** under **MeitY**, develops Electronics and IT technologies and built India's first indigenous supercomputer, **Param 8000** (1991).*

### Key Components of the Programme

- **Go-P:** Collar device monitoring **cattle temperature** to predict 'heat' cycles for artificial

insemination.

- **MAST-D:** Electrochemical device for **early detection of mastitis infection** in cattle milk.
- **Grain-Ex System:** AI-based imaging tool for **real-time quality analysis** of pulses and grains.
- **CT-VIEU System:** Conveyorised imaging system for **dry red chilli quality** assessment.
- **RIGE-Sense System:** Machine-vision and AI/ML-based system for **rice quality and age estimation**.
- **ODORPravah:** Sensor-based odour and emission monitoring device for MSW, landfill, and industrial sites.

### SC Upholds Reproductive Autonomy in Surrogacy Cases

- SC ruled that the age limits under the Surrogacy (Regulation) Act, 2021, **cannot apply retrospectively** to couples who began the surrogacy process before the law took effect in January 2022.

*Constitutional Basis: Court invoked its precedent in **Suchita Srivastava v. Chandigarh Administration (2009)**, which recognised a woman's right to reproductive choice as part of bodily autonomy.*

### Key Takeaways from the Judgment

- **Reproductive Autonomy:** The Court reaffirmed that reproductive rights form part of the **right to privacy and personal liberty** under **Article 21** of the Constitution.
- **Equality in Parenthood:** The Court highlighted that **adoption laws** impose **no such age bar**, questioning the rationale of restricting **assisted reproduction** based on age.
- **State's Role:** While the State can regulate for medical safety, it **cannot retrospectively interfere** with lawful reproductive decisions already made.

### Surrogacy (Regulation) Act, 2021

- **Objective:** To **ban commercial surrogacy** and allow only altruistic surrogacy.
- **Eligibility:** For an intended couple, the age limits are **23-50 years for women & 26-55 years for men**.
- **Single Women:** Only **widows or divorcees** aged **35-45** are eligible as intending mothers.
- **Surrogate Mother:** Must be a close relative, aged 25-35, have at **least one child** of her own, and can act as a surrogate **only once** in her lifetime.
- **Not Eligible:** Foreigners, single men, unmarried couples, live-in partners, same-sex couples, and couples with an existing child.

### Shram Shakti Niti 2025

- The **Ministry of Labour and Employment (MoLE)** has released the draft National Labour & Employment Policy, **Shram Shakti Niti 2025**, for public consultation.

*The policy is rooted in the concept of **Śrama Dharma**, the dignity and moral value of work, it aims to ensure **Protection, Productivity, and Participation** for every worker.*

### Key Digital Reforms and Platforms

### National Career Service (NCS)

- To be developed as India's Digital Public Infrastructure (DPI) for Employment.
- It offers **AI-driven job matching**, skill alignment, and multilingual access to equitable opportunities.
- Will serve as India's central **Employment Exchange 2.0**, enabling transparent and inclusive job matching.
- **Designed to connect** job seekers & employers across Tier-II & III cities, rural districts, & MSME clusters.

### Integrated Labour Stack

- It **merges** existing databases like **EPFO, Employees' State Insurance Corporation (ESIC), e-Shram**, and **National Career Service (NCS)** into a single interoperable digital framework.
- **Objective:** Enable **interoperable social protection**, lifelong learning, and income security through a unified digital ecosystem.

*Labour is covered by the **Concurrent List (List III)** of the **Seventh Schedule**, which allows both the Union and State Governments to frame laws on matters related to labour and employment.*

### Key Focus Areas of the Policy

- **Expands universal social security** to include all categories of workers, particularly those in the informal and gig sectors.
- **Seeks to raise women's labour-force participation rate to 35% by 2030** through entrepreneurship, childcare support, and flexible work arrangements.
- **Strengthens occupational safety and health (OSH)** standards to ensure safe and dignified workplaces across industries.
- Promotes **green & technology-enabled jobs** that align with national climate goals.

### Workplace Safety in India

- Recent industrial tragedies, including the **Ennore Thermal Power Station** collapse in **Chennai**, underscore India's persistent workplace safety crisis and inadequate regulatory enforcement.

### Legal Framework for Workplace Safety in India

- **Fundamental Right: Article 21** of the Constitution guarantees the **right to life** and personal liberty, encompassing a safe, healthy, and dignified working environment.
- **Directive Principles: Article 42** directs states to ensure just and **humane working conditions**, while **Article 41** aims to protect workers' health and prevent exploitation.
- **OSH Code 2020:** The Occupational Safety, Health, and Working Conditions (OSH) Code, 2020, replaces 13 labour laws and **standardises safety standards** across sectors.
- **ECA 1923:** The **Employees' Compensation Act, 1923**, requires employers to **give compensation** to employees or their dependents for **injuries, disabilities, or death** occurring during employment.
- **ESI Act 1948:** The ESI Act of 1948 addresses **employment injuries or occupational**

**diseases** and includes commute-related accidents when there is a direct link to work duties.

- **Institutional Oversight:** The Directorate General of Factory Advice Service and Labour Institutes (DGFASLI) and **State Inspectorates of Factories** enforce industrial safety and compliance.
- **Safety Committees:** The Occupational Safety, Health and Working Conditions (OSH) Code, 2020 requires the **creation of Safety Committees** in **hazardous workplaces** to ensure safety practices.

#### Factors Contributing to Frequent Workplace Accidents in India

- **Weak Oversight:** From 2018 to 2020, over 3,300 factory deaths led to **only 14 convictions**, highlighting near-total enforcement failure and weak deterrence.
- **Informal Workforce:** Nearly **90% of workers** fall **outside formal safety regulation** and social protection, leaving them exposed to occupational hazards.
- **Leadership Neglect:** Over two-thirds of listed companies **leave contract and supply-chain workers** out of workplace safety policies and practices.
- **Profit-Centric Governance:** Board remuneration structures **prioritise profitability over safety compliance**, which discourages preventive investment and long-term risk management.
- **Inadequate Monitoring:** Factory inspections remain infrequent due to staff shortages, outdated technology, and **overlapping jurisdiction** between state and central authorities.

#### Workplace Accident Landscape in India

- **Global Share:** India accounts for nearly **25% of global workplace fatalities**, making it one of the most hazardous labour environments worldwide.
- **Official Data:** DGFASLI confirms that **three factory workers die daily** due to preventable safety failures in registered industrial establishments.
- **State Hotspots:** **Gujarat** records the highest number of factory deaths, followed by **Maharashtra** and **Tamil Nadu**, indicating a concentration in key industrial regions.
- **Training Deficit:** The **lack of structured training** and **employer negligence** remain major causes of industrial accidents across various sectors.
- **Data Gaps:** DGFASLI's 2020 report listed **1,000 fatalities**, but many deaths in the informal sector continue to go unreported.

#### SC Allows Direct Recruitment for District Judges

- In a **landmark ruling**, the Supreme Court has **allowed serving judicial officers** to apply for the post of **District Judge** through **direct recruitment**.
- **Earlier**, district judges were appointed through **two routes**, direct recruitment from advocates and **promotion** from the subordinate judiciary.
- The case began when a Kerala judicial officer was **disqualified** from **direct recruitment** under the bar quota based on the **Dheeraj Mor (2020) ruling**, leading the **SC to re-examine** the issue.
- A **three-judge** bench then referred the matter to a **Constitution Bench** to clarify the interpretation of **Article 233(2)**, which governs **district judge appointments**.

#### Key Directions Issued

- **Eligibility Expansion:** Serving judicial officers can **now apply** under the **direct recruitment quota**.
- **Experience Requirement:** Minimum of **7 years** of continuous professional experience (as an advocate, judicial officer, or both).
- **Age Criterion:** Minimum **35 years** of age for all applicants.
- **Eligibility Timeline:** Eligibility to be determined at the time of application, not appointment.

### India Upgrades Medical Device Standards

- India plans to **upgrade its medical device standards** to match global benchmarks, strengthening its **\$12-billion MedTech sector**.

#### Key Developments

- **Role of IPC:** The Indian Pharmacopoeia Commission (IPC), under the **Ministry of Health & Family Welfare**, will now set standards for medical devices in collaboration with the Bureau of Indian Standards (BIS).
- **Creation of Monographs:** IPC has begun **auditing medical device companies** and **preparing monographs** to define specifications and quality parameters for medical equipment.
- **Avoiding Duplication:** IPC and BIS will coordinate to harmonise standards, ensuring consistency and avoiding duplication of regulations across agencies.
- **Testing:** IPC is setting up its own medical device testing laboratory, with a new **Medical Device Division** to plan testing based on available infrastructure and expertise.

#### Policy and Industry Vision

##### National Medical Devices Policy, 2023

- Aims to grow India's medical device market from \$12 billion (2025) to **\$50 billion by 2030** and capture 10–12% of the global market within 25 years.
- **Promotes development of indigenous standards** to make Indian manufacturers globally competitive.

#### Current Standards and Imports

- India currently has around **1,500 BIS-approved standards** for medical devices.
- Despite growing manufacturing capacity, India imports **nearly 60-70%** of its medical devices, underlining the need for **domestic standardisation** and quality assurance.

#### SPARK 4.0 Initiative

- The **Central Council for Research in Ayurvedic Sciences (CCRAS)** launched the **4<sup>th</sup> edition of SPARK 4.0** (2025–26) under the **Ministry of Ayush**.

##### SPARK (Studentship Program for Ayurveda Research Ken)

- SPARK is a flagship studentship program designed to promote **research skills** and a **scientific mindset** among undergraduate Ayurveda students nationwide.
- **Target Group:** It includes **Bachelor of Ayurvedic Medicine and Surgery (BAMS)** students from

colleges recognised by the **National Commission for Indian System of Medicine (NCISM)**.

- **Research Support:** Students get **financial support** to conduct independent research projects and receive a certification upon successful completion.
- **Significance:** It advances innovation in Ayurveda research aligned with the **Viksit Bharat 2047 vision**.

- *The NCISM is a **statutory body** in India that regulates the education and practice of **Indian Systems of Medicine**, including Ayurveda, Unani, Siddha, and Sowa-Rigpa.*

#### **Central Council for Research in Ayurvedic Sciences (CCRAS)**

- CCRAS is an autonomous body under the **Ministry of Ayush**, functioning as India's apex organisation for promoting scientific research in Ayurveda.
- **Objective:** It aims to bridge **traditional Ayurvedic knowledge** with **modern scientific methods**.
- **Research Scope:** The Council's work covers a broad range of studies, including medicinal plants, pharmacology, clinical research, and tribal health, for **evidence-based progress** in Ayurveda.

#### **Experts Call for National Strategy on Alzheimer's & Ageing Health**

- **Health experts** have urged the need for a **National Strategy on Ageing and Mental Health** to address the rising burden of Alzheimer's disease and dementia in India.

- *Currently, **5.3 million** Indians are estimated to be **living with dementia**, a number projected to **triple by 2050** due to population ageing.*

#### **Key Recommendations from Experts**

- **National Dementia Strategy:** Experts urged the government to adopt a **comprehensive national plan** integrating dementia care into **India's broader ageing** and mental health policy.
  - The plan should align with the WHO **Global Action Plan on Dementia (2017-2025)**.
- **Community-Level Screening:** Incorporate **cognitive health screening** within Ayushman Arogya Mandirs (expanded Health and Wellness Centres).
- **Care Platforms:** Expand the use of **memory clinics** and **telemedicine platforms** like eSanjeevani.
- **Infrastructure Support:** To address the social and economic impact of dementia, **strengthen caregiver support systems**, long-term care infrastructure, and research on risk factors.

### Recent Initiatives for Elderly Mental Health Care

- To strengthen elderly mental health care, the **National Institute of Mental Health and Neuroscience** launched **two initiatives**:
  - NIMHANS-Vayomanasa Sanjeevani (VMS) Gruha**: A community outreach programme delivering psychiatric care to elderly citizens at their homes and complements Tele-MANAS.
  - Post-Diagnostic Dementia Care Centre**: Established in collaboration with the **Dementia India**, provides post-diagnostic care, counselling, and therapies.

### Satark Nagrik Report Flags Gaps in RTI

- The **Satark Nagrik Sangathan's 2025 report** highlights significant gaps in India's **Information Commissions** as the Right to Information (RTI) Act, 2005, approaches its 20<sup>th</sup> anniversary.

#### Information Commissions of India

- The Information Commissions are **statutory bodies** established under the **RTI Act, 2005**, to hear final appeals and complaints regarding citizens' requests for public information.
- Two types**: The **Central Information Commission (CIC)** oversees cases of the central government, while the **State Information Commissions (SIC)** handle matters related to states and union territories.
- Composition**: Both CIC and SIC include a **Chief Information Commissioner** and **up to 10 Information Commissioners**, appointed by the President or Governor, respectively.

### Key Findings of the Report

- Non-Functionality**: Several Information Commissions are **non-functional due to unfilled posts**, with the CIC operating at minimal capacity and lacking a Chief Information Commissioner.
- Severe Backlogs**: Over **2.4 lakh appeals** and complaints remained pending across the country in 2024, with some commissions expected to take decades to clear their current caseloads.
- Transparency Deficits**: Twenty of the twenty-nine commissions **failed to publish their 2023-24 annual reports**, despite the legal mandate of the RTI Act.
- Weak Enforcement**: Penalties on Public Information Officers (PIOs) were applied in **only about 2% of eligible cases**, which weakens accountability and raises non-compliance.

### RTI Act, 2005

- The RTI Act, 2005, grants citizens the **right to access information** from **public authorities**, promoting transparency, accountability, and integrity in governance.
- Constitutional Basis**: The Act is rooted in **Article 19(1)(a)** of the Constitution, which guarantees the right to freedom of speech and expression.
- Nodal Agency**: The **Department of Personnel and Training (DoPT)** under the Ministry of Personnel, Public Grievances and Pensions.
- Operational Framework**: The Act mandates public authorities to appoint a PIO to provide information **within 30 days**.
  - Applicants may initially appeal to the **First Appellate Authority (FAA)** in case of denial or delay, and if unresolved, they can submit a final appeal to the **Information Commissions**.

### Govt Panel Proposes Reforms to Boost Nuclear Energy

- A panel under the **Ministry of Power** has proposed reforms to accelerate India's nuclear programme & achieve the **100 GW capacity target by 2047**, up from the current **8.88 GW**.

#### Key Recommendations of the Panel

- **Faster Approvals:** The panel has called for reducing the **average 11-12-year** timeline from site approval to reactor commissioning through streamlined land acquisition and regulatory clearances.
- **Site Optimisation:** It is recommended to use **existing nuclear sites** and **retired thermal power plant locations** for upcoming projects.
- **Fuel Security:** The panel urged boosting **domestic uranium mining**, acquiring overseas uranium assets, and **allowing private participation** in uranium sourcing and fuel fabrication.
  - It also advised maintaining a strategic fuel **reserve sufficient** for reactor lifespans of **up to 60 years**.
- **Fuel Reprocessing:** Supported **continuation of spent fuel reprocessing**, to be managed by a government entity, ensuring sustainability in the nuclear fuel cycle.
- **Insurance Framework:** Suggested restructuring the nuclear insurance pool to provide **₹15 billion coverage** per incident per operator, replacing the **existing annual liability cap** across installations.

### India-AI Impact Summit 2026

- The Government has announced applications for three flagship **Global Impact Challenges** under the upcoming **India-AI Impact Summit 2026**.

#### India-AI Impact Summit 2026

- The India-AI Impact Summit 2026 is a **global platform** to highlight the **transformative role of Artificial Intelligence** in fostering inclusive development and sustainability.
- It will be held in **New Delhi** by the **Ministry of Electronics and Information Technology**.
- **Objective:** Promote a global vision for ethical and inclusive AI and focus on achieving **real-world impact** through AI solutions.
- **Guiding Sutras:** The Summit is based on three principles — **People** for human dignity and inclusion, **Planet** for climate-resilient innovation, and **Progress** for equitable benefits.
- **Significance:** It is the **first summit of its kind** hosted by a **Global South country**, highlighting India's leadership in AI governance.

#### Key Initiatives

- **AI Pitch Fest (UDAAN):** Showcases global AI startups and India's **Tier-2** and **Tier-3 innovators**.
- **Global Impact Challenges:** Includes **AI for All** to address global development issues, **AI by HER** to empower women-led innovation, and **YUVAi** to nurture youth-driven AI solutions for the public good.

- **Symposium & Expo:** Features a state-of-the-art AI research forum and an expo with over 300 exhibitors from more than 30 countries.

### Fare Se Fursat Scheme

- The **Ministry of Civil Aviation** launched the 'Fare Se Fursat' scheme through the state-owned carrier **Alliance Air** to provide fixed airfares for passengers.
- The initiative replaces the conventional **dynamic pricing system** with fixed fares that stay the same.
- **Implementation:** Alliance Air, a **regional airline connecting Tier-2 and Tier-3 cities**, will implement the scheme on a pilot basis to evaluate its operational feasibility.
- **Objective:** To ease passengers' worries about airfare fluctuations and make **air travel more affordable**.
- **Significance:** The scheme aligns with the objectives of the UDAN (**Ude Desh ka Aam Nagrik**) initiative and promotes **last-mile air connectivity**.

### Bharat Taxi Initiative

- **National e-Governance Division (NeGD)** and **Ministry of Electronics & Information Technology** have partnered with **Sahakar Taxi Cooperative Limited** to launch **Bharat Taxi Initiative**.

### Key Highlights of the Initiative

- It is a **first-of-its-kind** cooperative-driven, citizen-first national ride-hailing initiative.
- **Cooperative Model:** The platform is jointly promoted by major cooperatives and financial institutions such as NCDC, Indian Farmers Fertiliser Cooperative (IFFCO), KRIBHCO, NAFED, National Dairy Development Board (NDDB), AMUL, and NABARD.

**Technical Architecture:** Integrating Bharat Taxi with **key national digital platforms** such as DigiLocker, UMANG, and API Setu facilitates secure digital identity verification and service delivery.

### Civil Registration System (CRS) Report 2023

- The Vital Statistics of India, based on the **CRS Report 2023**, released by the **Registrar General of India (RGI)**, highlights demographic trends of India.

### Key Findings of the Report

- **Births Registered:** India recorded **2.52 crore** births in 2023, a slight decline from 2022, with an overall registration rate of 98.4%.
  - This marks the **third drop in five years** (2020, 2021, and 2023), reflecting a steady fall in birth registrations.
- **Deaths Registered:** 86.6 lakh deaths were registered in 2023, slightly up from **86.5 lakh** in 2022.
  - The data shows **no major spike** in mortality post-COVID, unlike 2021, when deaths surged to 102.2 lakh due to the pandemic's impact.

- **Sex Ratio at Birth:** Arunachal Pradesh (1,085) recorded the **highest**, followed by Nagaland (1,007) and Goa (973), while **Jharkhand (899)** and Bihar (900) reported the **lowest sex ratios**.
- **Institutional Births:** 74.7% of births in 2023 occurred in healthcare institutions, indicating expanding access to maternal and child health services.
- **Timely Registration:** Over 90% of registrations in 11 States/UTs, including Gujarat, Tamil Nadu, Haryana, and Puducherry, were completed **within 21 days of birth**.
  - States such as Bihar, Jharkhand, Uttar Pradesh, and West Bengal lagged, with registration levels between 50% and 80%.

### Limestone Reclassification as a Complete Major Mineral

- The **Ministry of Mines (MoM)** has reclassified limestone **entirely as a major mineral** to modernise regulation and enhance ease of doing business.
- Limestone was previously classified **based on its use**—a **minor mineral** when used in kilns for the manufacture of lime, and as a **major mineral** for producing cement, chemicals, fertilisers, steel, sugar, etc.
- **Rationale:** The NITI Aayog-led **inter-ministerial committee** recommended the change because industrial use has greatly exceeded traditional uses, making **dual classification outdated**.
- **Significance:** The change will allow limestone to be sold for any purpose, increasing its availability, boosting **industrial production**, and increasing **rural employment**.

### Major and Minor Minerals

- Minerals are legally categorised as “**Major**” and “**Minor**” based on their **economic** and **strategic importance**, under the **Mines and Minerals (Development and Regulation) Act of 1957 (MMDR Act)**.
- Major Minerals: These are listed in the **First Schedule** of the MMDR Act, e.g., coal, lignite, iron ore, bauxite, copper, and atomic minerals like uranium. The **Central Government** regulates them.
- Minor Minerals: These include building stones, gravel, ordinary clay, and sand, or any mineral declared minor by the Centre. **State Governments** regulate their extraction, royalties, and operational rules.

#### Limestone

- Limestone is a **sedimentary rock** mainly composed of **calcium carbonate (CaCO<sub>3</sub>)**, formed from the remains of marine organisms over millions of years.
- **Mineral Forms:** Mainly consists of **calcite, aragonite**, and sometimes mixed with **dolomite**.
- **Uses:** It is vital in **cement, steel, fertiliser, glass, chemical**, and **construction industries**, and also used in agriculture for soil conditioning.
- **Largest Reserves:** Karnataka holds about **25–28%** of India's total limestone resources (IMYB 2022).
- **Top Producers:** Rajasthan leads in production, followed by **Madhya**

**Pradesh and Andhra Pradesh**; together they contribute about **50% of national output** (MoM).

### SC Allows Green Firecrackers in Delhi-NCR

- The Supreme Court eased the blanket ban on firecrackers, allowing the sale and **use of green firecrackers in Delhi-NCR** to curb the smuggling of traditional firecrackers.

### Green Crackers

- Green firecrackers are **low-emission, 'eco-friendly' fireworks** designed to lower air and noise pollution compared to traditional ones.
- **Developed By:** The Council of Scientific and Industrial Research–National Environmental Engineering Research Institute (CSIR–NEERI).
- **Legal Basis:** Introduced following the 2018 Supreme Court ruling in **Arjun Gopal v. Union of India**, which **banned traditional crackers** and permitted only certified green crackers.
- **Types:** There are **three main types** of certified green crackers-
  - **SWAS (Safe Water Releaser)** releases **water vapour** during ignition to suppress dust particles and dilute harmful gases by about 30%.
  - **STAR (Safe Thermite Cracker)** is made without **potassium nitrate** or **sulphur**, significantly lowering emissions and noise levels.
  - **SAFAL (Safe Minimal Aluminium)** lowers **aluminium** by replacing it with safer options like magnesium, reducing particulate matter by nearly 35%.
- **Benefits:** They ensure environmental safety by reducing emissions & maintaining **noise below 125 DB**.
- **Concerns:** Despite the “green” label, they emit harmful **ultra-fine particles**; widespread availability of **counterfeit versions** and **low public awareness** hinder effective adoption.

### Legal Information Management and Briefing System

- The **Ministry of Law and Justice** held an event in New Delhi to showcase the new “**Live Cases**” Dashboard of the **Legal Information Management and Briefing System (LIMBS)**.

### LIMBS

- LIMBS is a **web-based system** that enables the Indian government to **monitor and manage court cases involving the Union of India**.
- **Development:** It is developed by the **Department of Legal Affairs** under the **Ministry of Law and Justice**, in collaboration with the **National Informatics Centre (NIC)**.
- **Launch Timeline:** LIMBS was initially launched in **2016** for ministries, departments, autonomous bodies, and Central Public Sector Undertakings (CPSUs); An upgraded version was launched in 2020.
  - The “**Live Cases**” **Dashboard** was recently introduced to provide real-time visualisation of litigation.

- **Litigation Coverage:** It includes cases from the **Supreme Court, High Courts, District and Sessions Courts**, and various **Tribunals**.
- **Key Feature:** The platform allows **24/7, proactive tracking** of court cases, ensuring that officials and legal teams remain constantly updated on case status.
- **Advantage:** It brings together all stakeholders onto a **single unified digital platform**, thereby eliminating fragmented case information and reducing the reliance on physical files.

### Hike in Welfare Grants for Ex-Servicemen and Dependents

- The Defence Ministry has approved a **100% increase in financial assistance** for ex-servicemen and their dependents.
- **Funding Source:** The scheme is funded through the **Raksha Mantri Ex-Servicemen Welfare Fund**, which is part of the **Armed Forces Flag Day Fund**.
- **Implementing Agency:** The **Department of Ex-Servicemen Welfare** implements the scheme through the **Kendriya Sainik Board**.
- **Eligibility:** It covers **non-pensioner ex-servicemen over 65 years** (or their **widows**) without any regular income. **Zila Sainik Board (ZSB)** recommends the applicants.
- **Objective:** To **improve social security support** and reaffirm the government's commitment to **honouring the service of Ex-Servicemen**.

### National Security Guard Hub

- A new **National Security Guard (NSG) hub** will be established in **Ayodhya, Uttar Pradesh**, to enhance India's **counter-terrorism preparedness** and strengthen rapid-response capabilities.
- The hub will **operate 24/7** with commandos ready for rapid deployment during emergencies.
- **Training facility:** A **Special Operations Training Centre (SOTC)** is also under development in **Haryana** to train both NSG personnel and anti-terror units from state police forces.
- *The National Security Guard (NSG) is India's elite counter-terrorism and special operations force established in 1984 under the Ministry of Home Affairs following Operation Blue Star and Prime Minister Indira Gandhi's assassination.*

### Codex Committee on Spices and Culinary Herbs

The **8<sup>th</sup> Session** of the Codex Committee on Spices and Culinary Herbs (**CCSCH**) was inaugurated in **Guwahati, Assam**.

- **Organisers:** It is organised by the Spices Board of India under the **Ministry of Commerce & Industry**.
- **Agenda:** Discussions focused on setting global standards for **large cardamom, sweet marjoram, cinnamon, and dried coriander seeds**.
- The Codex Committee on Spices and Culinary Herbs (**CCSCH**) is an international body that

develops **global standards** for the quality and safety of **spices** and **herbs**.

- **Framework:** Founded in 2013, it operates under the **Codex Alimentarius Commission (CAC)**, which is jointly managed by the FAO and the WHO.
- **Objective:** Recommend quality and safety standards for spices and culinary herbs (mainly in **dried** and **dehydrated** form) to safeguard consumer health and promote fair **international spice trade**.
- **India's Role:** India hosts the CCSC, with the **Spices Board** of India serving as its **permanent Secretariat**.

### Nodal Officers to Trace Missing Children

- The Supreme Court has directed the Centre to ensure that **all States and UTs appoint nodal officers** to handle cases of missing children.

### Existing Digital Infrastructure for Tracing Missing Children

- **Track Child Portal:** Exclusively for **law enforcement** agencies.
- **Khoya-Paya Portal:** Accessible to the **general public**, including parents and guardians
- **Integration:** The **Mission Vatsalya** portal now integrates the earlier *TrackChild* and *Khoya-Paya* platforms and involves **14 key stakeholders**.
- **Crime Multi Agency Centre (Cri-MAC):** Launched in **2020** for **real-time information** sharing on trafficking crimes.

### Proposed Enhancements by the Bench

- **Two-Way Mechanism:** Allows both government agencies (when a child is found) and **parents/guardians** (when a child is lost) to **register complaints**.
- **National Coordination:** Central portal under **Home Ministry** supervision for inter-state coordination.
- **Real-Time Alerts:** **Automatic dissemination** to nodal officers upon complaint registration.
  - Their contact details (name and phone number) are to be uploaded on the **Mission Vatsalya** portal for public access.

### Root Causes of Tracing Failures

- **Data Fragmentation:** Key databases, such as police FIRs, TrackChild, Childline, and Mission Vatsalya, follow different formats, **lack unique case IDs**, and are not linked in real time.
- **Inter-State Coordination:** Many cases involve **cross-border movement**, but the absence of standardised nodal officers and **clear SOPs** delays information sharing and action.
- **Capacity Constraints:** Police units often lack trained staff to use digital tools, conduct cyber/social media searches, or coordinate with AHT (Anti-Human Trafficking) units.
- **Low Trace Conversion:** Despite high reporting, many children remain missing due to **delayed FIRs** and misreporting of **abduction/runaway cases**.

### Legal & Institutional Background

- **Juvenile Justice (Care & Protection) Act, 2015**, and **Model Rules** mandate mechanisms

for care, rescue and coordination.

- **Integrated Child Protection Scheme (ICPS)** and **Mission Vatsalya** provide welfare, rehabilitation and digital case-management platforms; **Childline-1098** is the emergency outreach.

### UIDAI launches SITAA to Combat Deepfakes

- Unique Identification Authority of India (UIDAI) has launched the **Scheme for Innovation and Technology Association with Aadhaar (SITAA)** to enhance Aadhaar authentication security.

#### Key Highlights of SITAA

- UIDAI has partnered with **MeitY Startup Hub (MSH)** and **NASSCOM** to promote collaboration among startups, academia, and industry.
- The initiative aims to **create a secure and self-reliant digital identity ecosystem**, focusing on biometric innovation, AI-based authentication, and data privacy.

#### Three Core Innovation Challenges under SITAA

- **Face Liveness Detection:** Development of **software development kits (SDKs)** for detecting fake or manipulated face inputs using **photos, videos, masks, morphs, or deepfakes**.
- **Presentation Attack Detection (PAD):** Proposals from research institutions to create **AI/ML-based tools** capable of detecting print, replay, and deepfake attacks in real or near-real time.
- **Contactless Fingerprint Authentication:** Using **standard smartphone cameras** or low-cost devices, developing fingerprint authentication, ensuring image accuracy and spoof detection.

### Henley Passport Index 2025

- India's passport has fallen to **85<sup>th</sup> in the 2025 Henley Passport Index**, offering visa-free access to **57 countries**, down from 59 last year.

#### Key Findings from the Index

- **Global Leaders:** Singapore (193 destinations) ranks 1<sup>st</sup>, followed by **South Korea & Japan** (192).
- **Regional Comparison:** Bangladesh (100th) - 38 destinations; **Pakistan** (103rd) - 31 destinations.
- **World's Weakest Passports:** **Afghanistan** (24), **Syria** (26), and **Iraq** (29) at the bottom of the index.

#### Henley Passport Index

- **Overview & Purpose:** Launched in **2005** (rebranded in 2018), it ranks countries by the number of destinations their citizens can access visa-free.
- **Data & Update:** Covers **199 passports** and 227 destinations using IATA data; updated **quarterly**.

### SC Expands Scope of Public Trust Doctrine

The Supreme Court expanded the Public Trust Doctrine to cover **artificial waterbodies** in a ruling

concerning Nagpur's historic Futala Lake.

### Public Trust Doctrine

- The Public Trust Doctrine is a **legal principle** that holds the **government as a trustee to protect specific natural and cultural resources for public use**.
- **Objective:** To promote **intergenerational equity** through the sustainable use of resources.
- **Evolution:** The doctrine originated in **Roman law** and evolved through English Common Law.
- **Indian Adoption:** It was formally introduced into Indian environmental jurisprudence in the **M.C. Mehta v. Kamal Nath (1997)** case.
- **Constitutional Basis:** It is anchored in Article 21 (Right to Life) and Article 48A (State's duty to protect and improve the environment).

### Landmark Judgements Related to the Doctrine

- **Foundational Case:** **M.C. Mehta v. Kamal Nath (1997)** established the doctrine, holding that leasing forest land was a breach of public trust.
- **Urban Application:** **M.I. Builders v. Radhey Shyam Sahu (1999)** expanded the doctrine to include **urban** public spaces such as parks.
- **Aquatic Protection:** **Intellectuals Forum v. State of Andhra Pradesh (2006)** applied it to protect specific lakes and water bodies.
- **Coastal Conservation:** **Fomento Resorts v. Minguel Martins (2009)**, extended the doctrine to coastal areas and beaches.
- **Ecological Extension:** **T.N. Godavarman v. Union of India (1996 onwards)** applied the doctrine to broaden the definition of forest and expanded it to Eco-Sensitive Zones (2022).
- **Recent Development:** **Swachh Association v. State of Maharashtra (2025)** extended it to artificial lakes, recognising their ecological and cultural importance.

### Shiromani Gurdwara Parbandhak Committee (SGPC)

- Shiromani Gurdwara Parbandhak Committee (**SGPC**) was in the news due to election issues.
- The SGPC is the apex governing body of **all Sikh gurdwaras** in **Punjab, Himachal Pradesh**, and the Union Territory of **Chandigarh**.
- Established in **1920** in **Amritsar**, the SGPC initially aimed to administer the **Darbar Sahib** and other historically significant gurdwaras.
- In the 19th century, Punjab, under British control, experienced a rise in Christian missionary activities and the **influence of the Arya Samaj movement**. In response, the **Singh Sabha movement** emerged within the Sikh community to **combat** the perceived "**degradation of Sikh thought and principles**".
- Despite these movements, control of the Darbar Sahib and other gurdwaras remained with powerful **mahants** (priests), who had tacit support from the **British**. These mahants treated the gurdwaras as personal fiefdoms, encouraging practices that violated Sikh tenets, such as idol worship and discrimination.
- The **SGPC** was **established to replace the unpopular mahants** and ensure Sikh gurdwaras were

governed according to Sikh religious principles. After its creation, the SGPC faced resistance, often leading to violent confrontations, but it eventually gained control of many gurdwaras.

- The British passed the **Gurdwaras Act of 1925**, legally recognising the **SGPC** and turning it into a **democratic body** for the governance of Sikh gurdwaras.

*The Gurdwara Election Commission (GEC) is a statutory body under the 1925 Act. The Union Home Ministry appoints the Chairman and coordinates elections with the Punjab government.*

### **MHA issues advisory to states & UTs to implement Section 479 BNSS for relief of Undertrial Prisoners**

The advisory from the **Ministry of Home Affairs (MHA)**, raising the issue of long detention of **undertrial prisoners**, highlights the recent Supreme Court of India's order.

- The order legally mandates the state that **Section 479 of Bharatiya Nagarik Suraksha Sanhita (BNSS)** applies to all undertrials, irrespective of whether the case was registered before **1<sup>st</sup> July 2024**" (BNSS came into effect).

#### **Bail Provisions under BNSS for the detainees**

- **Regular Cases:** Undertrial to be released if detention period reaches **half of maximum specified imprisonment**.
- **First-Time Offenders:** To be released if detention reaches **1/3<sup>rd</sup> of maximum imprisonment**. Not applicable for offenses with **death/life imprisonment**.

#### **Undertrials in India**

- As per **National Crime Records Bureau**, India's prisons (It's a state subject as per the 7<sup>th</sup> Schedule of the constitution) have a **131.4% occupancy**. **Around 75% are undertrials (2022)**.
- An undertrial prisoner is in **prison or judicial custody** while the **charges** against them are **tried in court**.

#### **Reasons for high number of Undertrial prisoners in India**

Indiscriminate arrests by police, ignorance of legal rights, delay in trial, reluctance of the courts to grant bail, inability to provide surety.

#### **Measures taken to alleviate hardships faced by the Undertrials**

- **Support to Poor Prisoners Scheme:** Provides relief to financially constrained prisoners who cannot pay fines or secure bail bonds.
- **E-prisons portal:** Provides data of inmates in a quick and easy manner for identifying eligible inmates for bail.
- **The Model Prison Manual 2016:** Detailed guidelines on the facilities which may be provided to undertrial inmates.
- **State Legal Services Authorities have established Legal Service Clinics in Jails** to provide free legal assistance.

## International Telecommunication Union (ITU)

ITU's World Telecommunication Standardization Assembly (WTSA) 2024 held in New Delhi.

- WTSA is the governing conference for the standardization work of the ITU, **organized every four years.**
- It is for the **first time that the ITU-WTSA is being hosted in India and the Asia-Pacific.**

### ITU

- **Genesis:** In 1865, the first **International Telegraph Convention** signed in Paris established **International Telegraph Union** (the first incarnation of ITU).
- **Role:**
  - UN's **specialized agency for digital technology**
  - **Harnessing innovation and connecting everyone** to ensure a better future for all
- **Members:** 193 Member States (including India)
- **Headquarters:** Geneva (Switzerland)

## Indian Railway and its Challenges

- **Mysuru-Darbanga Express collision** and the **challenges** that Indian Railways faces in **safety and operational efficiency.**

### Challenges of Indian Railways

- **Frequent Train Accidents** like **Balasore (2023)** and **Kavaraipettai (2024)** reveal safety gaps, primarily due to **staff errors (55.8%)** and **signaling failures.**
- **Limited Implementation of 'Kavach':** Kavach, a **collision prevention system**, covers **only 2%** of the network due to **high costs** (₹50 lakh per km), and slowing rollout.
- **High Operating Ratio:** An OR of **98.2 (2024-25)** signals **high costs, limiting capital investment** and increasing reliance on government support, with dues rising from 10% to 17% of revenue since 2015-16.
- **Freight Congestion:** Freight, which contributes **65%** of revenue, faces network congestion, reducing the **average speed to 26 km/h.** Delays in Dedicated Freight Corridors exacerbate the issue.
- **Over-Reliance on Coal:** Heavy reliance on coal freight **risks long-term revenue sustainability** while the government pushes for **renewable energy.**
- **Track and Maintenance Deficiencies:** **Capital allocation** for track renewal fell to **7.2% in 2023-24**, reducing maintenance and equipment upgrades.
- **Passenger Service Losses:** Passenger services operate at a loss, with **₹68,269 crore in losses** (2021-22), despite increased revenue in 2024-25.
- **Capacity Constraints:** **30%** of the network operates **beyond 100% capacity**, causing delays and inefficiencies and impacting technologies like Kavach.
- **Wage and Operational Costs:** Rising wage, pension, and fuel costs, along with **stressful working conditions for pilots**, add to financial and **operational pressures.**

### Government Initiatives to Strengthen Indian Railways

- **Kavach Safety System** provides **real-time alerts** and **automatic braking** to prevent accidents.
- **Track Development**: In 2022-23, **5,243 km of new tracks** were laid, averaging 14.4 km per day. This reduces congestion and enhances network efficiency.
- **Gauge Conversions**: Between 2014-2022, **1,544 km** of gauge conversions and new lines were completed, improving **regional connectivity**.
- **High-Speed Rail Project**: The **\$14.27 billion Mumbai-Ahmedabad high-speed rail project** is being constructed to offer faster train services.
- **Gati Shakti National Master Plan** to enhance **multimodal connectivity**, improves freight and passenger logistics by streamlining operations and reducing bottlenecks across various transportation modes.
- **Dedicated Freight Corridors**: The **Eastern DFC** from Ludhiana to Dankuni for freight movement in key industrial area and The **Western DFC** from Dadri to Jawaharlal Nehru Port for improving overall efficiency.
- **Integration with Union Budget**: Since **2016-17**, merging the railway budget with the general budget has increased flexibility in accessing gross **budgetary support** and reduced reliance on internal revenues.
- **Railway Electrification**: Aiming for **100% electrification by 2024**, 61,813 km of broad-gauge track was electrified by 2023, saving **\$1.55 billion** annually.
- **Automatic Block Signaling (ABS)** implemented over **3,946 route km** to improve operational safety.
- **Technological and Green Initiatives**: By 2024, **Wi-Fi** will be installed at **6,089 railway stations** to enhance passenger connectivity, and over **1,000 stations solarised** to promote **sustainable energy use**.
- **Freight Optimization**: Record freight loading of 1,512 MT in 2022-23, with a **2024 target of 2,024 MT**. Freight revenue constitutes **65% of internal earnings**, largely from coal.
- **FDI in Railways**: **100% FDI** is allowed in **railway infrastructure** to modernise stations, introduce high-speed corridors, and upgrade technology.
- **400 Vande Bharat Trains** planned for faster, more efficient travel across key routes.

### Way Forward for Indian Railways

- **Deploy the Kavach system** across the network, as the **Kakodkar Committee (2012)** recommended.
- **Dedicated Freight Corridors (DFCs)** could increase freight capacity by **70%**, with the **Eastern DFC** cutting transit time from Ludhiana to Kolkata from **60 to 24 hours**.
- **Diversifying Revenue Streams**: **Public-private partnerships (PPPs)** could attract **₹20,000 crores by 2024** and reduce dependence on ticket sales.
- **100% Electrification by 2024**: At **85%**, this goal will be supported by renewable energy initiatives like **solar installations**, which are projected to generate **20 GW**.
- **Intelligent Transportation Systems (ITS)**: Implement **real-time traffic**

management and automated train control systems. Over 100 trains use GPS tracking and digitise 70% of ticket sales by 2025.

- **Fast-track high-speed rail projects** starting with **Mumbai-Ahmedabad route**, which will cut travel time.
- **Infrastructure upgrades** and optimised train schedules are essential to address the **8% annual passenger growth rate** contributing to congestion.
- **Staff Training:** Enhance railway personnel skills, as the **Rakesh Mohan Committee** emphasises. Improving working conditions for **locomotive pilots** could increase their efficiency by up to **30%**.
- **Enhancing Passenger Amenities:** Upgrade station facilities and onboard services. A survey revealed that **78%** of passengers want **better sanitation**.
- **Establishing Robust Frameworks** as the **Bibek Debroy Committee** recommended setting key performance indicators, aiming for a **20% improvement in service delivery**.

### Kartarpur Corridor Agreement

- India and Pakistan renew the **Kartarpur Corridor agreement** until **2029**. The agreement is valid **initially for five years**.

### Kartarpur Corridor Agreement

- The first agreement was signed in **October 2019** to allow **visa-free** travel through corridor.
- Open for Indian pilgrims of **all faiths** (with **valid passport**) & **persons of Indian origin** (with OCI card).
- It is open from **dawn to dusk**. Pilgrims travelling in the morning will have to return on the **same day**.

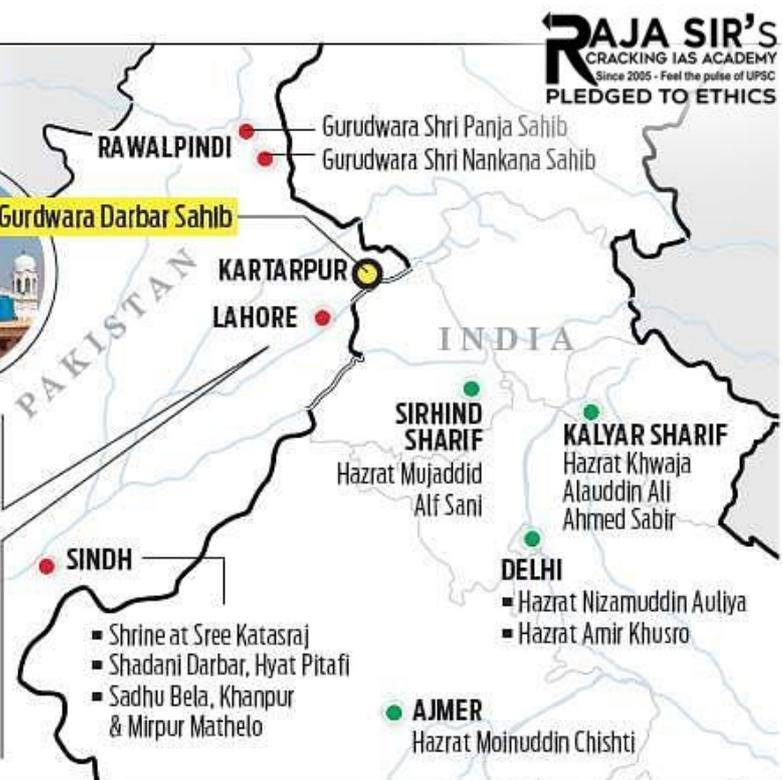
## Beyond the border

Over 15 shrines in Pakistan and five in India are covered under the 1974 India-Pakistan Protocol on Visits to Religious Shrines. Here's a look at the gurudwaras on either side of the border that are difficult to access



PEOPLE CAN VISIT THESE SHRINES ONLY IN GROUPS

Samadhi of Maharaj Ranjit Singh  
Gurdwara Shri Dera Sahib  
Gurdwara Janam Asthan  
Gurdwara Deewan Khana  
Gurdwara Shaheed Ganj, Singhanian  
Gurdwara Bhai Tara Singh  
Gurdwara of Sixth Guru, Mozang  
Birthplace of Shri Guru Ram Das  
Gurdwara Cheveen Padshahi, Mozang  
Shrine of Hazrat Data Ganj Bakhsh



### MeitY proposed amendments to the IT Rules, 2021 to regulate AI-generated Content

The Ministry of Electronics and Information Technology (MeitY) has proposed amendments to the Information Technology (Intermediary Guidelines and Digital Media Ethics Code) Rules, 2021 (IT Rules, 2021) by exercising power under the Information Technology Act, 2000 (IT Act).

#### Key Proposed Amendments:

- **Defining Synthetically Generated Information (commonly known as deepfake or AI-generated Content):** It is information that is **artificially or algorithmically created**, generated, modified or altered using a computer resource, in a manner that appears reasonably authentic or true.
- **Mandatory Declaration:** Content creators must clearly label all AI-generated or modified content before upload.
- **Enhanced Obligations for Significant Social Media Intermediaries(SSMIs):** E.g., Obtain a user declaration on whether uploaded information is synthetically generated

#### Need of Proposed Amendments

- **National Security Risk:** Deepfakes can be used for spreading **propaganda** by anti-national forces, **terrorist recruitment**, etc.
- **Spreading Misinformation:** E.g., Used to spread **false narratives**, manipulate public opinion, and influence elections.
- **Gender-Based Harm:** E.g., Deepfakes frequently targets **women**, leading to **non-consensual explicit content** and **harassment**.
- **Defamation:** Can damage the **reputation** of **individuals** or institutions through **fabricated** videos or statements.
- **Fraud & Impersonation:** Enables **identity theft**, **financial scams**, and **social engineering** attacks. E.g., Deepfake phishing

### Armed Forces Special Powers Act (AFSPA) 1958

- AFSPA extended in 4 districts of Assam amid recent turmoil in **Bangladesh**.

#### History of AFSPA

- **British Ordinance 1942:** It was enacted during **WW II** to control the Indian independence movement.
- **Initial Imposition in Naga Hills in 1958** was primarily to address **rising insurgencies** and to restore order amid violent separatist movements led by the **Naga National Council (NNC)**.
- **Expansion to Other Northeastern States (1960s-1980s)** AFSPA was extended to other northeastern states, including Assam, **Manipur**, Tripura, Mizoram, Arunachal Pradesh and Meghalaya.
- **Extension to Jammu and Kashmir in 1990** amid an increase in militancy and separatist movements, particularly with the rise of armed insurgent groups like Hizbul Mujahideen and Lashkar-e-Taiba.

- Amendments to the AFSPA in 1972, allowed the **central government** to declare **any area** as “**disturbed**” and to apply **AFSPA without consent** from the respective **state governments**.

#### Recent impositions and withdrawals

- Withdrawal in Tripura (2015) due to significant improvements in law and order and a decline in insurgency-related violence, indicating a shift towards normalcy in the region.
- Withdrawal in Meghalaya (2018) as the state reported a peaceful environment with reduced violence from insurgent groups, reflecting progress in reconciliation and strengthening civil governance.
- Extended the AFSPA by The Union Home Ministry in parts of Nagaland and Arunachal Pradesh for an additional 6 months, effective from October 1, 2024.

#### Features of the AFSPA

- Declaration of Disturbed Areas under **Section 3** of AFSPA by the **Governor, UT Administrator**, or the **Central Government** can through a notification in the **Official Gazette**.
- Special Powers for Armed Forces: Section 4 grants armed forces personnel special powers to use force, including **lethal measures**, against individuals violating laws or engaging in **unlawful activities**.
- Powers of Arrest without Warrant: Empowers armed forces to arrest individuals without a warrant if there is **reasonable suspicion** of their involvement in unlawful activities.
- Search and Seizure: Permits armed forces to enter and search premises without a warrant, facilitating swift action against insurgents or lawbreakers.
- Prohibition of Assembly: Prohibits gatherings of **five or more individuals** in disturbed areas, aiming to prevent potential unrest or violence.
- Immunity from Prosecution: Section 6 Provides legal protection to armed forces personnel from prosecution for actions taken under AFSPA unless the Central Government allows it.
- Periodic Review: The status of disturbed areas and the necessity of AFSPA are subject to periodic review by the government, allowing for adjustments based on the prevailing law-and-order situation.

#### Positive implications of AFSPA

- Operational Flexibility: The powers under AFSPA allow for **fast action** without legal delays. In 2017, an operation in Nagaland under AFSPA led to the elimination of several key insurgents from NSCN-K.
- Legal Protection: AFSPA provides immunity to armed forces personnel from prosecution, allowing them to perform their duties without fear of legal reprisals.
- Ensuring National Security by securing areas vulnerable to insurgency and foreign threats. Operations in **Manipur** under AFSPA have been instrumental in curbing **drug trafficking** from the **Golden Triangle**.
- Deterring Insurgency: The presence of AFSPA creates a **deterrence** against anti-national activities and strengthens security in **border areas**.

- **Restoring Political Stability** where civilian administration is weak due to insurgency. AFSPA in Assam helped stabilize the state and allowed for the conduct of elections.

#### Challenges of AFSPA

- **Human Rights Violations:** As of 2020, there were more than 1,500 **extrajudicial killings** attributed to AFSPA in Manipur (as per the Supreme Court's data).
- **Alienation of Local Populations:** The continued presence of armed forces under AFSPA often leads to **alienation** and **mistrust** among civilians.
- **Prolonged Enforcement:** AFSPA has been in force for **decades** in certain areas without showing substantial improvement in peace. **Nagaland** has been under AFSPA **since 1958**, yet insurgency persists.
- **Psychological Impact on Civilians:** Continuous military presence affects the **mental health** of local populations, instilling fear and trauma.
- **Judicial Criticism:** SC 2016 ruling questioned justification behind excessive use of force under AFSPA.

#### Way Forward

- **Phased Withdrawal** as law-and-order situations improve. AFSPA was lifted from Tripura, Meghalaya and some parts of north eastern states after a significant reduction in insurgent activities.
- **Strengthening Accountability** for independent investigations. The 2005 **Jeevan Reddy Committee** recommended the **repeal of AFSPA** and replacing it with a more humane legal framework.
- **Balancing Security and Rights** for not infringing on **fundamental rights**. The **Supreme Court's** ruling on "**encounter killings**" (2016) emphasized human rights in AFSPA regions.
- **Political Dialogue** with insurgent groups can help in reducing dependence on military measures. E.g. **Naga peace accord 2015** Indian government and the National Socialist Council of Nagaland.

**Increased Focus on Development:** Address the root causes of insurgency by promoting **economic development** and improving **infrastructure** in disturbed areas.

#### Patna Sahib Gurudwara

Sacred '**Jore Sahib**', are being carried through **the Guru Charan Yatra**, from New Delhi to Bihar's Patna Sahib Gurudwara.

- Revered Jore Sahib are the sandals of **Guru Gobind Singh, the tenth Sikh Guru**, and his wife Mata Sahib Kaur Ji.
- **Location:** Patna, Bihar; one of the five **Takhts** (seats of Sikh authority).
- **Historical Significance:** The construction of the Takht was commissioned by **Maharaja Ranjit Singh** in the 18<sup>th</sup> century to mark the birthplace of Guru Gobind Singh.
- **Architecture:** Blend of Mughal and Sikh styles with golden dome and intricate artwork.

## 9 Years of UDAN Scheme

- The UDAN (Ude Desh Ka Aam Nagrik) scheme, launched on 21 October 2016, has completed 9 years.

### Key Achievements of UDAN Scheme

- **649 regional routes** (as of 2025) and **1.56 crore passengers** served in 9 years.
- **3.23 lakh UDAN flights** through **93 airports, 15 heliports, 2 water aerodromes**.
- **₹4,300 crore** disbursed as **Viability Gap Funding (VGF)** and **₹4,638 crore** invested to support airlines.
- Estimated **1 lakh+ direct & indirect jobs** created (MoCA Report, 2025).
- **UDAN 5.5** Launched to enable a special bidding round for **seaplanes** and **helicopters**.
- Expanded **UDAN Framework (Post-2027)** to focus on hilly, **North-Eastern**, and aspirational districts.

### UDAN Scheme

- The primary objective of the scheme is to provide **affordable and efficient air travel options** to residents of **tier-2 and tier-3 cities**, remote areas, and regions with limited or no air connectivity.
- Launched by the **Ministry of Civil Aviation (MoCA)** in October 2016 under the **National Civil Aviation Policy (NCAP)**, with the **Airports Authority of India (AAI)** as the nodal implementing agency.
- The scheme is applicable for **10 years (till 2026)** and was honoured with the **Prime Minister's Award for Excellence in Public Administration (2020)** under the Innovation Category.
- It is supported through **Viability Gap Funding (VGF)** from the **Regional Connectivity Fund**, shared between the **Centre (80–90%)** and **States (10–20%)**.
- Airlines get **fee waivers** on parking and navigation, **~50% seats** at subsidised fares, and state support for land, utilities, and security at concessional rates.

## India's Renewable Energy Transition

- India's renewable strategy is shifting from just rapid expansion to focus on **system integration** and **stability** to achieve its **500 GW** renewable energy capacity target **by 2030**.

### India's Current Renewable Landscape

- **Installed Capacity:** India's installed renewable capacity **grew over fivefold** from 35 GW in 2014 to **197 GW in 2025** (excluding large hydro projects).
- **Project Pipeline:** Over **40 GW** of renewable projects are in advanced stages of securing Power Purchase Agreements (PPA), Power Sale Agreements (PSA) and transmission connectivity approvals.
- **Annual Addition:** India continues to add **15-25 GW** of renewable capacity **annually**, sustaining one of the world's **fastest growth** rates.
- **Transmission Corridors:** Green Energy Corridors and high-capacity transmission lines from Rajasthan, Gujarat, and Ladakh will **unlock over 200 GW** of renewable generation potential.
- **Grid Capacity:** Supported by the ₹2.4 lakh crore Transmission Plan, inter-regional grid capacity is

expected to grow from 120 GW to 143 GW by 2027 and reach 168 GW by 2032.

India's current renewable energy mix (excluding large hydro) comprises solar (64.63%), wind (26.96%), biopower (5.46%), small hydro (2.60%), and waste-to-energy (0.43%).

### Changing Renewable Policy Directions

- **Tender Focus:** New tenders now prioritise **energy storage** and **Round-The-Clock (RTC)** power, indicating a clear shift towards dispatchable renewable energy.
- **Manufacturing Policy:** Earlier import-dependent solar capacity is now being replaced by **self-reliant domestic manufacturing** supported by the PLI scheme, duty exemptions, etc.
- **Grid Access:** The 2025 **General Network Access (GNA)** framework replaces static grid connectivity with a **time-segmented system** that allocates transmission corridors based on generation hours.
  - E.g., solar projects to use them during the daytime and wind or storage projects at night.
- **Market Mechanisms:** Traditional long-term PPAs are evolving into **Virtual PPAs (VPPAs)**. VPPAs offer flexibility by **decoupling procurement from physical delivery**.
- **Future Levers:** Policy focus is expanding beyond land-based renewables to include **offshore wind, pumped hydro storage, and green hydrogen** for long-term diversification.

### Government Initiatives for Renewable Energy

- **PLI Scheme for Solar PV Modules:** Offers **financial incentives** to manufacturers of high-efficiency solar photovoltaic (PV) modules to boost domestic production and **reduce imports**.
- **Battery Energy Storage Systems (BESS):** Maintains grid stability and stores surplus renewable energy, targeting **236 GWh** of storage capacity **by 2031-32**.
- **Green Energy Corridor (GEC):** Builds dedicated transmission networks to transfer renewable energy **from resource-rich states** like **Rajasthan** and **Gujarat** to the national grid.
- **Ultra Mega Renewable Energy Parks:** Provide developers with land and transmission facilities on a "**plug-and-play**" basis for **large-scale** renewable projects (**minimum capacity: 500 MW**).
- **Renewable Purchase Obligations (RPO):** Require power distribution companies to **procure a fixed share** of electricity from renewable energy sources.
- **National Green Hydrogen Mission:** Aims to make India a major producer of green hydrogen with a **5 MMT annual** production target by 2030.

### Chief Justice of India (CJI) to recommend a successor

The **Memorandum of Procedure (MoP)** provides the guidelines for appointing the CJI & other Supreme Court (SC) judges.

- CJI of and other SC judges are appointed by the President under **Article 124(2)** of the Constitution.

### How CJI and SC Judges are appointed?

- **Appointment of CJI**

- **Seniority Principle:** Conventionally, the **senior-most judge** of the Supreme Court is elevated as the CJI.
- **Government Initiatives Process:** Union government asks the current CJI to recommend a successor, usually about a month before retirement.
- **Recommendation by CJI:** The CJI sends a formal recommendation to the **Ministry of Law**, naming the senior-most eligible judge.
- **Approval & Appointment:** After PM's approval, the President issues the warrant of appointment.
- **Appointment of Other Judges**
  - **Other SC judges** are appointed by the **President**, based on recommendations of the **Collegium** consists of **CJI and four other senior-most judges** of the SC.
    - **High Court Judges:** Appointed by the President under **Article 217**, based on recommendations of the **Collegium (CJI and two senior-most SC judges)**.
  - **Collegium System** evolved through the **Three Judges Cases (1981, 1993, & 1998)**.

#### Concerns Related to Judicial Appointments/ Collegium System

- **Lack of Transparency:** Deliberations are confidential; reasons for appointments rarely disclosed.
- **Accountability:** No formal mechanism to review Collegium decisions.
- **Limited Executive Role:** Concentration of power within the judiciary.

#### 99th Constitutional Amendment & NJAC Act (2014)

- Attempted to reform judicial appointments through the **National Judicial Appointments Commission (NJAC)**.
- Struck down by the Supreme Court in 2015 (**4<sup>th</sup> judge case**), retaining the **Collegium system**.

#### SC Judgement on Preventive Detention

- The Supreme Court in **Dhanya M. vs State of Kerala (2025)** reaffirmed that preventive detention must be used **sparingly, not as a substitute** for criminal prosecution or to bypass bail.
- Yet, its misuse persists through laws such as **KAAPA (Kerala)** and the **NSA (National Security Act)**.

*Article 22 authorises preventive detention, allowing individuals to be held without trial for up to 12 months under certain laws.*

#### Need for Re-examination of Preventive Detention

- **Judicial Disquiet:** Despite repeated SC warnings (**Rekha vs Tamil Nadu, Banka Sneha Sheela**), preventive detention remains a routine tool of administration.
- **Colonial Legacy:** Traces back to **Bengal Regulation III, 1818**, retained post-Independence.
- **Rising Use:** Over **24,000+** preventive detentions annually under various state and central laws (NCRB, 2023), with **poor conviction or review rates**.
- **Erosion of Liberty:** Undermines **Articles 14, 19, 21** — the "**Golden Triangle**" of fundamental

rights.

- **Wide Definitions:** Terms like “goonda” or “anti-social element” enable vague and arbitrary detentions.
- **Global Concern:** India ranks **lowest** among G20 in **Rule of Law Index (World Justice Project, 2024)**.

#### Way Forward

- **Constitutional Revisit:** Harmonise **Article 22** with **Article 21's** due process principle post-Maneka Gandhi. (**Law Commission 276th Report**)
- **Periodic Review:** Mandate **quarterly judicial audits** of all detentions; ensure public data disclosure. E.g. Periodic Review clause in the **UK's Terrorism Prevention and Investigation Measures Act, 2011**.
- **Digital Transparency:** **e-Detention Tracker** for tracking detention orders, reasons, and review outcomes. E.g. **OECD Open Justice Data Initiative**.
- **Rights Safeguards:** Compulsory assignment of **state-funded lawyers** to all detainees **within 48 hours**.

#### Inadequate Laws to Protect Domestic Workers in India

As highlighted in the news recently, Union Government is yet to frame a **comprehensive domestic workers' rights law** as directed by the Supreme Court in January, 2025.

#### Other Legal Frameworks Available

- **Right to Fair Wages:** Workers must receive at least the state-prescribed **minimum wage** under the **Minimum Wages Act, 1948**.
- **Right to Safe Working Conditions:** Employers must provide an **abuse-free environment** (**POSH Act, 2013**).
- **Protection from abuse/exploitation:** **Bharatiya Nari Suraksha (BNS) Act, 2023** provides protection **against all forms of abuse**; enables **legal remedies and complaint mechanisms**.
- **State-Level Initiatives:** Tamil Nadu provides **welfare benefits and minimum wages under the Manual Worker Act, 1982**, while **Karnataka's 2025 Bill** mandates worker registration, contracts, minimum wages etc. to a welfare fund.

#### Issues in Implementation of Legal Protection

- **Patchy State Regulation:** Minimum wages and labour protections **vary across states**; enforcement is weak.
- **Exclusion under Labour Codes:** Defines a “worker” in relation to establishments or industries, **excluding workers** employed in **private households, such as domestic workers**.
- **Limited Organising:** **Dispersed workplaces, migratory status, poor socio-economic conditions**, etc. make unionisation difficult.
- **Data and Definition Issues:** Lack of **credible data and contested definitions** of domestic work complicate policy-making.

Way Forward

- **Minimum wages:** All states must **stipulate and update wages**.
- **Compulsory Registration:** Employers, agencies, and workers **should be compulsorily registered** at the state level.
- **Legislative action:** Comprehensive **Central legislation to enforce rights, wages, social security**, and welfare for domestic workers.

### Responsible Use of AI during Elections

The Election Commission issued an advisory to all political parties on responsible use of AI-generated content during elections.

- The advisory will help ensure a level playing field in elections and promote fairness in the electoral process.

#### Key Guidelines

- AI-generated or digitally altered campaign content must carry a **clear label such as "AI-Generated" or "Synthetic Content"**.
- Unlawful or misleading content that **distorts a person's identity**, appearance, or voice is strictly prohibited. E.g. Deepfakes.
- Political parties must maintain detailed records of all AI-generated materials etc.

### Doctrine of Lis Pendens

- The Delhi High Court held that courts have the discretion to exempt property from the **Doctrine of Lis Pendens** to safeguard genuine owners from vexatious or frivolous litigation.
- Derived from Latin for "**pending litigation**," it prevents any party from transferring or altering property rights under dispute to ensure the case outcome remains unaffected.
- It is defined under **Section 52 of the Transfer of Property Act, 1882**.

*In Jayaram Mudaliar vs Ayyaswami & Ors (1972), the SC held that lis pendens applies even without notice of the pending suit, as it is based on public policy.*

### Conference for the Chief Electoral Officers

- The Election Commission of India convened a **conference of Chief Electoral Officers (CEOs)** in **New Delhi** to assess readiness for the upcoming nationwide Special Intensive Revision (SIR).
- **Other Focus:** The conference discussed mapping electors, verifying voter addresses through house-to-house visits, and restricting **polling stations** to a **maximum of 1,200 electors**.
- **First Phase:** The nationwide SIR will start in 10 states and one UT, beginning with Assam, Tamil Nadu, Puducherry, Kerala, and West Bengal.

#### Chief Electoral Officer

- The Chief Electoral Officer (CEO) is a **statutory authority** responsible for **overseeing elections** within a **state or union territory**.

- **Institutional Supervision:** The CEO functions under the overall **supervision, direction**, and control of the **Election Commission of India (ECI)**.
- **Appointment:** The **ECI nominates** or designates the CEO for each state or UT in consultation with the respective government.

#### Key Roles and Responsibilities

- **Electoral Management:** Preparation and revision of electoral rolls; handling citizens' objections; ensuring accurate voter lists.
- **Election Conduct:** Arranging polling stations, EVMs, and logistics; maintaining **law and order**; and ensuring fair and secure voting.
- **Monitoring & Awareness:** Enforcing the Model Code of Conduct; overseeing campaign expenditure; leading voter awareness programmes.
- **Counting & Reporting:** Supervising vote counting; ensuring transparency; communicating results and updates to the ECI.

#### Freedom of Religion & Right to Privacy are interlinked

The Supreme Court in *Rajendra Bihari Lal vs. State of Uttar Pradesh and Others* emphasized that the **Right to Privacy** is intrinsic to **Freedom of Religion**.

- **Direct link between Privacy & Religion:** The Supreme Court highlighted that **Article 25 includes elements of privacy in right to freedom of conscience and the right to freely profess, practice and propagate religion**.
  - **Article 25 includes the ability to choose a faith and freedom to express or not to express** such a choice.
  - **Publishing and declaration** of one's personal faith **breaches the fundamental right to privacy** under **Articles 25 and 21**.
- Various **anti-conversion legislations** framed by several states, now being examined by the Supreme Court, **are required to meet the privacy test**.

#### Other Observations by SC

- **Secularism:** The bench reiterated that the word '**secular**' in the Preamble is an intrinsic part of the **basic structure** of the Constitution.
- **Previous Judgements Highlighted by SC**
  - **K.S. Puttaswamy case:** The **right to privacy is a fundamental right** protected within Article 21 in particular and Part III on the whole.
  - **Shafin Jahan v. Asokan K.M. Case:** Upheld **individual autonomy in faith and marriage choices**.

#### Strengthening Governance through Blockchain Technology

In the recent time, Blockchain Technology has emerged as a key driver in transforming governance in India.

- **Blockchain** is a distributed, transparent, secure, and immutable database that functions like

a **ledger** of records or transactions, resistant to tampering and accessible across a network of computers.

### Key Role of Blockchain Technology in Governance

- **Property Chain: Blockchain-powered Property Management System** ensures that every property transaction is securely recorded on the blockchain.
  - This transparency helps prospective buyers verify ownership, rights, and liabilities, significantly reducing litigation and expediting dispute resolution.
- **Certificates and Document Chain:** E.g., National Informatics Centre (NIC) has built a 'Certificate Chain' for secured storage and retrieval of records.
- **Logistics Chain:** All transactions in the supply chain are recorded in a tamper-proof ledger, ensuring traceability and accountability at every stage. E.g., Online Supply Chain Management System for medicines (Aushada) of Karnataka
- **Judiciary Chain:** Blockchain facilitates electronic delivery of notices, summons, and bail orders, reducing delays and eliminating manual dependencies.
- **Inter-Operable Criminal Justice System (ICJS):** Over 39,000 ICJS documents have been verified on the blockchain platform, as of October 2025.

### Key Initiative taken for Promoting Blockchain Technology

- **National Blockchain Framework (NBF), 2024**, its core components include **Vishvasya Blockchain Stack**, NBFLite, Praamaanik (Innovative Blockchain Solution for App Verification), and the National Blockchain Portal.
- **National Strategy on Blockchain** developed by MeitY
- **Centre of Excellence (CoE)** in Blockchain Technology by NIC

### SC on Transgender Equality

- The Supreme Court of India flagged **persistent discrimination** against transgender persons, directing the Centre and States to formulate a **comprehensive Equal Opportunity Policy**.
- The case arose from a plea by a transgender woman who was terminated from schools in UP and Gujarat, highlighting systemic exclusion despite the **Transgender Persons (Protection of Rights) Act, 2019**.

**NALSA v. Union of India (2014):** Landmark judgment recognising transgender persons as the "third gender" under Articles 14, 15, 16, and 21, affirming their right to self-identification and equality.

### Key Directives of the Supreme Court

- **Advisory Committee Formation:** Headed by Justice Asha Menon (Retd.), tasked with drafting the policy and recommending institutional reforms **within 6 months**.
- **Institutional Mechanisms:** **Transgender Welfare Boards** in all States/UTs (as per 2020 Rules) and **Transgender Protection Cells** at district and state levels under DMs and DGPs.
- **Support Systems:** A nationwide **toll-free helpline** for reporting violations.

### Challenges Faced by Transgenders

- **Low Workforce Participation:** Only 6% of transgender persons are in formal employment, and around 92% work in the informal sector, often in begging or sex work (NHRC-NITI Aayog Report, 2021).
- **Education Gap:** 46% of transgender children drop out before completing secondary school, and less than 2% reach higher education (NHRC, 2022).
- **Healthcare Discrimination:** Only 30% have access to gender-affirming healthcare, and one in four reports denial of medical care in hospitals (Ministry of Social Justice data, 2023).
- **Policy Implementation Deficit:** Only 11 States have notified Transgender Welfare Boards & welfare allocation per transgender individual remains below ₹1,000 annually in most States (CAG Report, 2023).

#### Way Forward

- **Policy Integration:** "Trans-Inclusive Governance" like the UK's Equality Act, 2010, which mandates non-discrimination across employment & public services.
- **Education & Skill Development:** Integrate gender diversity in teacher training & Skill India Mission.
- **Economic Empowerment:** Extend PM Vishwakarma Yojana & PMEGP benefits to transgender entrepreneurs via targeted sub-quotas.
- **Data & Accountability:** Include transgender indicators in the National Family Health Survey (NFHS-6) & Periodic Labour Force Survey (PLFS) for evidence-based policymaking.

#### National Crisis Management Committee (NCMC)

The Cabinet Secretary chaired a meeting of the National Crisis Management Committee (NCMC) in regard to cyclones in Bay of Bengal.

#### NCMC

- **Has been given statutory status under** The Disaster Management Act (Amendment) Act, 2025.
- **Status:** Nodal statutory body to deal with the major disasters which have serious or national ramifications.
- **Members:** Cabinet Secretary as Chairperson and such other members as may be notified by the Central Government.
- **Powers and Functions**
  - Can evaluate preparedness for any disaster or emergency situation.
  - Coordinates and monitors national disaster response efforts.

#### Deep-Sea Fishing Vessels

- The union Home minister launched the distribution of Deep-Sea Fishing Vessels under the Pradhan Mantri Matsya Sampada Yojana (PMMSY) at Mazagon Dock, Mumbai.

*The PMMSY, launched in 2020, is a flagship government scheme aimed at promoting the **Blue Revolution** through **sustainable fisheries development** and the welfare of fish farmers.*

- The government plans to distribute **200 such vessels nationwide over five years** on a cooperative basis.
- **Objective:** The initiative aims to **enhance India's deep-sea fishing capacity** and to explore resources within India's **Exclusive Economic Zone (EEZ)** and the High Seas.
- **Funding:** Under PMMSY, supported by the **Department of Fisheries**, the **National Cooperative Development Corporation (NCDC)**, and state governments like Maharashtra.
- **Key Focus:** Supporting **Fisheries Cooperative Societies** and **Fish Farmer Producer Organisations (FFPOs)**, emphasising women-led cooperatives for inclusive growth.
- **Significance:** The initiative encourages shifting from **traditional coastal fishing** to sustainable **deep-sea activities**, supporting **Aatmanirbhar Bharat** and India's Blue Economy vision.

### **MoRTH Flags Poor DPRs Behind Tunnel Project Delays**

- The Ministry of Road Transport and Highways (MoRTH) has warned that **long tunnel projects (over 1.5 km)** are delayed because **Detailed Project Reports (DPRs)** lack proper investigations.

### **Policy Recommendations by the Ministry**

- Executing agencies must notify **MoRTH's Tunnel Zone** at the **feasibility/DPR stage** for **prior consultation** before finalising alignment and investigations, to speed up reviews and approvals.
- Tunnels must follow **Indian Roads Congress (IRC)** guidelines, specifically **IRC: SP:91-2019** (Guidelines for Road Tunnels), which advises **avoiding snowbound zones, eco-sensitive areas, water bodies and congested corridors**.
- Strengthen **state/agency capabilities** in **geo-technical** studies and tunnel engineering.
- Include contingency budgets and **geological risk mitigation** plans in DPRs for **project de-risking**.
- Ensure that the National Highways Authority of India (NHAI), State PWDs, and local administrations align early on clearances and environmental safeguards.

### **Indian Roads Congress (IRC)**

- IRC was established in **1934** on the recommendation of the **Jayakar Committee**. It serves as the apex body for road and highway engineering.
- It comprises experts from the central and state governments, Border Roads Organisation, academia, and the private sector.
- **Function:** Formulates standards, codes of practice, and guidelines for the design, construction, maintenance, and safety of roads, bridges, tunnels, and related infrastructure.

### Network Survey Vehicles by NHAI

- The National Highways Authority of India (NHAI) has launched a large-scale survey initiative deploying **Network Survey Vehicles (NSVs)** across **23 states**, covering **20,933 km** of National Highways.
- The initiative uses scientific surveys to detect road defects like cracks and potholes, feeding data into the **Road Asset Management System (RAMS)** for evidence-based planning of national highways.

*RAMS was developed by the Ministry of Road Transport and Highways (MoRTH) in 2019. It is a centralised digital platform ("Datalake") for collecting, processing, and analysing road and pavement data across the entire NH network.*

### Challenges Faced in the Surveying of National Highways

- **Limited Coverage Capacity:** India's National Highway network spans **1.46 lakh km**, but the current NSV survey covers only **~20,933 km (≈14%)**, leaving a large portion unsurveyed.
- **Data Processing Delays:** Each vehicle generates **hundreds of GBs of data daily**, and insufficient analytics infrastructure **delays defect identification** and reporting.
- **Uneven Regional Expertise:** Smaller contractors in **eastern and northeastern states** often lack trained operators for **GPS calibration** and **RAMS data upload**, affecting accuracy.
- **Weather and Terrain Constraints:** Monsoon flooding and hilly terrain (e.g., **Uttarakhand, Meghalaya**) hinder smooth NSV movement and cause sensor distortion.

### Way Forward

- **Integrated Data Platform:** Create a **real-time NSV-RAMS dashboard** linking state PWDs, NHAI, and MoRTH for instant data validation. E.g. **Singapore's OneMap Infrastructure Portal**.
- **Fleet Expansion:** Induct **at least 100 NSVs** across all states through PPP or leasing models to achieve **100% NH coverage by 2027**. The current fleet covers **<15%** of the NH length annually (NHAI, 2025).
- **AI-Based Defect Detection:** Use machine learning models to detect cracks and potholes from NSV video feeds automatically. E.g. **The UK's National Highways Pavement Management System**.
- **Training & Calibration Centres:** Set up regional NSV **calibration labs and training hubs** under the **Indian Academy of Highway Engineers (IAHE)** to improve data reliability.
- **Public Dashboard:** Display **road quality scores** and **maintenance timelines** on a public portal to enhance accountability. E.g. **US DOT Road Condition Index** publishes open-access highway condition data.

### E-Passports for Indian Nationals in the UAE

- The **Indian Embassy in Abu Dhabi** announced that **chip-embedded** e-passports will be issued to all **Indian nationals** residing in the **UAE**.
- The e-passports will be issued under the upgraded **Global Passport Seva Programme (GPSP)**

2.0) launched by the **Ministry of External Affairs**.

- The embedded chip stores **biometric** and **personal information**, providing **better security** and **quicker verification** at immigration points.

### NCERT Signs MoU with IIT-Madras

- The **National Council for Educational Research and Training (NCERT)** has signed a Memorandum of Understanding (MoU) with **IIT-Madras** to integrate technology into education.
- **Objective:** Promote **Information Technology (IT)**, **Artificial Intelligence (AI)**, and **Machine Learning (ML)** enabled solutions to enhance **student learning** and **teacher training**.
- **Key Focus:** Research in data analytics, multilingual education, digital content, and platform development.
- **Significance:** The collaboration supports India's aim to create an **inclusive, high-quality learning environment** for all students and teachers, in line with the **National Education Policy (NEP) 2020**.

### Moving Forest Dwellers from Tiger Reserves Must Be Voluntary: Ministry of Tribal Affairs

The Ministry of Tribal Affairs has sent a brief titled "**Reconciling Conservation and Community Rights: A Policy Framework for Relocation and Co-existence in India's Tiger Reserves**" to the Ministry of Environment, Forest and Climate Change.

#### Key Recommendations

- Relocation must be **voluntary**, based on **free, prior, and informed consent**, without pressure or inducement.
  - Forest Right Act (FRA) provides safeguards against forced eviction.
    - According to FRA, **no member of a forest dwelling Scheduled Tribe or other traditional forest dwellers shall be evicted or removed** from the forest land under his occupation till the recognition and verification procedure is complete.
    - FRA is applicable in **National Parks, Wildlife Sanctuaries, and Tiger Reserves**.
- Establish a **National Framework for Community-Centred Conservation and Relocation (NFCCR)** jointly by the **Environment and Tribal Affairs Ministries**.

#### Key Challenges in relocation of forest dwellers

- **Rights vs protection models:** Traditional Forest conservation treats local peoples as threats rather than partners, undermining FRA's inclusive vision.
- **Livelihood disruption:** Restriction of customary forest access and relocation from protected areas cut off income for many Indigenous groups.
- **Uneven development & regional disparity:** Forest-dependent tribal regions often lag in infrastructure, skills and access compared to high-income states focused on modern services.
- **Sustainable Development Goals:** Creating a balance between **SDG-1 (No Poverty)** and **SDG-13 (Climate Action)**.

Path Forward

- **Conservation by co-management:** Treat Indigenous peoples as stewards and co-managers, not adversaries.
- **In-situ development:** Prioritise provisioning of health, schooling, water, electrification, market access and mobility to enable sustainable co-existence.
- **Integrate Indigenous knowledge:** Document and apply traditional management practices within conservation plans.
- **Conditional fiscal incentives:** Link central/state transfers to measurable FRA implementation and co-management outcomes.

### Kerala to Implement the PM-SHRI Scheme

- **Kerala** has signed a Memorandum of Understanding (MoU) with the Centre to implement the **PM Schools for Rising India (PM-SHRI) scheme**.

*All states except Tamil Nadu and West Bengal have adopted the scheme, with 13,070 schools designated as PM-SHRI schools so far.*

### PM-SHRI

- The PM-SHRI scheme, launched in **2022**, is a **centrally sponsored scheme** to develop more than **14,500** existing schools across India.
- **Objective:** to transform existing government-run schools into **model institutions** exemplifying the **National Education Policy (NEP) 2020**.
- **Nodal Agency:** The Department of School Education and Literacy, under the **Ministry of Education**.
- **Implementation:** It is implemented through the existing administrative structure available for Samagra Shiksha, **Kendriya Vidyalaya Sangathan (KVS)**, and **Navodaya Vidyalaya Samiti (NVS)**.

### Key Features

- **Green Schools:** PM-SHRI schools incorporate **eco-friendly features** like **solar panels**, LED lights, water conservation, and **waste management systems**.
- **Selection Method:** Schools are chosen through a **three-stage Challenge Mode**, with schools self-applying through an online portal.
- **Evaluation Framework:** A **School Quality Assessment Framework (SAQF)** has been developed to monitor learning outcomes.

### United Nations Convention against Cybercrime

At least 72 of the 193 UN member states signed the **United Nations Convention against Cybercrime** in **Hanoi, Vietnam**, marking the first global treaty to combat cybercrime.

### United Nations Convention against Cybercrime

- The UN Convention against Cybercrime is the **first international treaty** dedicated to preventing, investigating, and prosecuting cybercrimes globally.
- **Adoption:** Adopted by the **UN General Assembly in December 2024 (Resolution 79/243)** and opened for signature in October 2025 in Hanoi, Viet Nam.
  - It will become **legally binding 90 days** after **40 countries** ratify it.
- **Scope:** Covers both **cyber-dependent crimes** like hacking and ransomware, and **cyber-enabled crimes** such as online fraud and trafficking.
- **Secretariat:** The **UN Office on Drugs and Crime (UNODC)**.

#### Key Provisions

- **Privacy Protection:** Makes the **non-consensual sharing of intimate images** a criminal offence under international law for the **first time**.
- **Cross-Border Cooperation:** Establishes a **24/7 global network** for quick evidence sharing and coordination in cross-border investigations.
- **Digital Evidence:** Introduces **uniform global standards** for collecting, using, and sharing electronic evidence in serious cybercrime cases.
- **Asset Recovery:** Allows freezing, confiscation, and **repatriation of cybercrime proceeds** to dismantle illicit financial networks.
- **Research Freedom:** Exempts legitimate cybersecurity research from criminal liability to encourage innovation and capacity building.
- **Capacity Building:** Provides training and technical support, especially to developing countries, to strengthen national cybercrime response mechanisms.
- **Rights Safeguards:** Requires that all actions under the treaty **comply with international human rights law** and judicial oversight.

#### Implementation Measures

- **Domestic Legislation:** Countries must **mandate national laws** to criminalise offences such as hacking, malware, and online exploitation.
- **Central Authority:** Each member state will **appoint a central authority** to coordinate legal assistance and evidence-sharing requests.
- **Victim Support:** Parties must ensure protection, rehabilitation, and compensation mechanisms for victims of cybercrimes.
- **Legal Cooperation:** Member countries should extend **maximum cooperation** in investigations, prosecutions, and judicial processes.
  - States may refuse cooperation due to **sovereignty, public order, or data protection** concerns.

#### SC Directs NHRC to Monitor Mental Health Authorities

- The SC has directed the **National Human Rights Commission (NHRC)** to monitor the functioning of **Central and State Mental Health Authorities**, ensuring effective implementation of

the Mental Healthcare Act, 2017.

- The decision follows a 2018 petition highlighting the inhumane treatment of mentally ill prisoners at a faith-based asylum in Badayun, Uttar Pradesh.

### **Mental Healthcare Act, 2017**

- It replaced the **Mental Health Act, 1987**, and aligns Indian law with the **UN Convention on the Rights of Persons with Disabilities**.
- Its core aim is to **provide mental healthcare** and protect the **rights of persons with mental illness**.
- **Definition:** Mental illness covers substantial disorders of thinking, mood, perception, orientation or memory that **grossly impair judgement**, behaviour or ability to meet ordinary life demands (includes conditions linked to alcohol/drug use).
- **It Provides for:**
  - Establishment of **Central and State Mental Health Authorities**.
  - Creation of **Mental Health Review Boards**.
  - Right to access affordable and quality mental healthcare, and;
  - **Decriminalisation of suicide attempts** by individuals with mental illness.

### **Doctrine of Merger**

The Supreme Court (SC) has recently clarified the 'Doctrine of Merger' not of rigid & universal application.

#### **Doctrine of Merger**

- **Rationale:** there cannot be more than one operative decree at a given point of time.
- **Application:** It applies irrespective of whether the appellate court has affirmed, modified or reversed the decree of the trial court.
  - It means that after a **higher court gives its verdict, the lower court's decision becomes part of that ruling** and is no longer treated as a standalone judgment.
- **Purpose and Benefits:** maintenance of the decorum of the hierarchy of courts and tribunals, **ensures finality in judicial decisions**
- **In State of Madras v. Madurai Mills Co. Ltd.,** SC held that the doctrine of merger applies **depending on the nature of the appellate or revisional order and the scope of the statutory provisions granting such jurisdiction**.

### **Rashtriya Ekta Diwas**

- Rashtriya Ekta Diwas (**National Unity Day**) is observed annually on **October 31** to commemorate the birth anniversary of Sardar Vallabhbhai Patel.
- The **Ekta Diwas 2025** celebrations will feature a **grand parade** in Ekta Nagar, Gujarat, alongside the nationwide '**Run for Unity**' and the '**Unity March**' to promote national cohesion.
- The year 2025 marks **Sardar Patel's 150<sup>th</sup> birth anniversary** and the **10<sup>th</sup> anniversary** of the Ek

### **Bharat Shreshtha Bharat (EBSB) initiative.**

#### **Sardar Vallabhbhai Patel**

- **Vallabhbhai Patel (1875-1950)**, born in Nadiad, Gujarat, was a prominent nationalist leader and the **first Deputy Prime Minister** and **Home Minister** of independent India.
- **Agrarian Struggles:** He led the Kheda Satyagraha (1918), demanding tax relief for drought-affected farmers, and the Bardoli Satyagraha (1928) against unfair taxation, earning the title "Sardar."
- **National Integration:** He became known as the "Iron Man of India" for unifying 565 princely states into the newly independent Indian Union.
- Civil Services: He established the modern **All India Services** as the "Steel Frame" to protect India's unity and integrity. This earned him the popular title, "Patron Saint of Indian Civil Servants."

#### **Statue of Unity**

- The Statue of Unity, honouring **Sardar Vallabhbhai Patel**, was unveiled in 2018 in Ekta Nagar, Gujarat.
- It is the **world's tallest statue**, standing at **182 meters**, designed by Indian sculptor **Ram V. Sutar**.
- It is situated on **Sadhu Bet Island** in Narmada district, Gujarat, facing the Sardar Sarovar Dam.

#### **Ek Bharat Shreshtha Bharat (EBSB)**

- The initiative was launched on **31 October 2015** by the Government of India to promote 'unity in diversity' among States and Union Territories.
- **Objective:** Strengthen emotional bonds, promote integration, celebrate cultural diversity, and encourage interstate partnerships.
- **Key Initiatives:** EBSB promotes unity through the **Bhasha Sangam App** (multilingual learning), **Yuva Sangam** (student exchanges), **Kashi Tamil Sangamam** (cultural bonding), and digital campaigns on the **EBSB Portal** showcasing inter-state activities.

#### **India-Nepal Power Transmission Agreements**

- **India** and **Nepal** signed **two major agreements** to build new high-capacity cross-border **power transmission corridors**.
- The agreements were signed between **India's POWERGRID** and **Nepal Electricity Authority (NEA)** to form **two joint venture (JV) companies**, one in each country.

**Power Grid Corporation of India Limited (POWERGRID) is a Maharatna public sector enterprise operating under the administrative control of India's Ministry of Power.**

- The joint ventures will facilitate the construction of **two 400 kV double-circuit** transmission

lines — Inaruwa (Nepal)–New Purnea (India) and Lamki (Dododhara, Nepal)–Bareilly (India).

- **Objective:** To enhance regional **energy cooperation and trade**, strengthen **grid connectivity**, and facilitate **clean energy exchange**.
- **Significance:** The projects align with the **India-Nepal Joint Vision Statement on Power Sector Cooperation (2022)** and support shared goals of energy security.

### Model Youth Gram Sabha (MYGS)

Ministry of Panchayati Raj, in collaboration with the Ministry of Education and Ministry of Tribal Affairs, launched MYGS initiative.

#### MYGS

- It is a pioneering initiative to **strengthen Janbhagidari** and **promote participatory local governance** by engaging students in simulated Gram Sabha sessions.
- It is aligned with **National Education Policy 2020**, and will be implemented across Jawahar Navodaya Vidyalayas (JNVs), Eklavya Model Residential Schools (EMRSs), and State Government Schools.
  - **JNVs** are residential schools established under NEP 1986 to provide education to rural children irrespective of their socio economic status.
  - **EMRSs** aim to provide quality education to Scheduled Tribes (ST) students in areas having more than 50% ST population and at least 20,000 tribal persons.

## INTERNATIONAL RELATIONS AND SECURITY

### Israel-Hamas Conflict

- The conflict dates back to **1947 UN partition plan**, which proposed **separate Jewish & Arab states**.
- Arabs **rejected** the plan, while Jews declared **Israel's independence in 1948**, leading to wars.
- The **Oslo Accords (1993)** between Israel and the Palestine Liberation Organisation (PLO) sought peace, but Hamas opposed the agreement and continued its resistance.
- **Recent Escalation:** In October 2023, Hamas launched **Operation Al-Aqsa Storm**, killing over 1,200 people in Israel.
- Israel responded with large-scale military operations, causing more than 64,000 casualties in Gaza.

### South-South and Triangular Cooperation (SSTC)

SSTC has become a key tool for promoting development, solidarity, and innovative solutions amid

declining traditional aid and global inequalities.

- With the 2030 Agenda for **Sustainable Development** nearing its deadline, India is leveraging SSTC to strengthen development partnerships among **Global South countries**.
- **South-South Cooperation** is a framework for collaboration and exchange among developing countries in political, economic, social, cultural, environmental, and technical domains.
- **Triangular Cooperation** is a Southern-driven partnership between two or more developing countries, supported by a developed country or multilateral organisation.
- It is based on Principles of Mutual respect for **sovereignty, equality, non-interference, mutual benefit, solidarity, and peaceful coexistence**.
- **Evolution of South-South and Triangular Cooperation**
- The **United Nations Office for South-South Cooperation (UNOSSC)** was created on **1974** to promote economic cooperation among developing countries.
- **Buenos Aires Plan of Action (BAPA) 1978**, adopted by 138 UN member states, establishing the first framework for SSC and emphasising solidarity, mutual respect, and shared learning.
- **Nairobi Outcome Document (2009)** expanded SSC beyond technical cooperation to political, institutional, and infrastructural collaboration.
- **India-UN Development Partnership Fund (2017)** was established to finance demand-driven SSTC projects across developing countries.
- The **United Nations** declared "**New Opportunities and Innovation through SSTC**" as the theme for the **2025 UN Day for South-South and Triangular Cooperation**
- **Contemporary Relevance of South-South and Triangular Cooperation**
- **Empowerment and Solidarity:** Strengthens **self-reliance, mutual respect, and shared learning** while avoiding the conditionalities often linked to North-South aid
- **Tackling Global Challenges:** Provides collective solutions to poverty, rising inequalities, climate change, and shrinking traditional aid.
- **Driver of SDGs:** Acts as a major force for achieving the **2030 Agenda**, particularly **SDG 2 (Zero Hunger)**, through affordable, locally driven innovations.
- **Multi-Sectoral Role:** Supports progress in agriculture, health, education, digital economy, climate resilience, social protection, and urban development.
- **India's Role in South-South and Triangular Cooperation**
- **Philosophy:** Aligned with India's philosophy of **Vasudhaiva Kutumbakam** ("The world is one family").

#### **Institutional Mechanisms:**

- **Development Partnership Administration:** Key agency within the Ministry of External Affairs (MEA), Central body for planning and implementing SSTC projects.
- **Indian Technical and Economic Cooperation (ITEC):** Capacity-building program in 160+ countries.
- **India-UN Development Partnership Fund:** Supports 75+ demand-driven projects in 56

countries, focusing on **Least Developed Countries (LDCs)** and **Small Island Developing States (SIDS)**.

- **Technological Leadership:** Shares digital public infrastructure like Aadhaar and UPI for cost-effective, replicable solutions globally.
- **Regional Advocacy:** Hosted **Voice of the Global South Summits** to amplify Southern priorities and advocated for permanent **African Union membership** in **G20**.
- **World Food Programme (WFP):** Piloted **Annapurta** (Grain ATMs), women-led **Take-Home Ration**, and **rice fortification** for improving food security in other developing countries.
- **Challenges in South-South and Triangular Cooperation**
- **Fragmentation:** Diverse political systems, economic priorities, and historical contexts often lead to scattered efforts, diluting impact and hindering cohesive collaboration.
- **Funding Gaps:** SSTC largely depends on trust funds and voluntary contributions (e.g. IBSA Fund), which are often unpredictable and insufficient.
- **Political Will:** Inconsistent commitment and delayed initiatives weaken trust among partners.
- **Triangular Cooperation Complexities:** Involvement of developed countries or multilateral organisations introduces bureaucracy and power asymmetries, which may compromise Southern leadership.
- **Monitoring Gaps:** Absence of a common framework results in weak evaluation, limited transparency, and difficulty in scaling successful projects.

### Way Forward

- **Foster Innovation:** Building on the 2025 UN Day theme, countries should promote creative, locally relevant solutions and support pilot projects with strong institutional frameworks.
- **Enhance Financing:** Increase funding for demand-driven initiatives and embed monitoring to strengthen transparency, effectiveness, and replication.
- **Multi-Stakeholder Partnerships** to include civil society, private sector, academia, and grassroots communities, ensuring cooperation remains people-centred and contextually relevant.
- **High-Impact Sectors:** Prioritise food security, nutrition, climate resilience, health systems, and education, where Southern innovations can be scaled and replicated across similar contexts.
- **Knowledge Sharing:** Strengthen regional and global knowledge platforms, facilitate training programs, and share best practices to enhance learning across countries.
- **Align with SDGs:** Design projects with measurable development outcomes, linking SSTC initiatives to Sustainable Development Goals (SDGs) for maximum impact.

### Bagram Air Base

US President Donald Trump demanded the return of **Bagram Air Base (Afghanistan)**, arguing it was key to countering China's nuclear facilities in Xinjiang.

### Significance of Bagram

- **Strategic Location:** Located in **Parwan province**, Bagram links major Afghan highways, making it a vital gateway to **Central and South Asia**.
- **Counterterrorism Role:** Served as the epicentre of the **“War on Terror,”** enabling strikes on **Al-Qaeda, Taliban, IS-K** and other terror groups.
- **Mineral Wealth Leverage:** Control of Bagram offers access to Afghanistan’s **\$1–3 trillion** mineral reserves, critical for EVs, electronics, and defence technologies.
- **Proximity to Rivals:** From Bagram, **US ISR** (intelligence, surveillance, reconnaissance) could monitor **China’s Xinjiang** and **Russia’s Central Asian sphere**.
- **Challenges to US Re-entry**
- **Taliban’s Resistance:** Firm rejection of any foreign bases, framing it as a violation of Afghan sovereignty.
- **Regional Pushback:** China, Russia, Iran, and Pakistan oppose US return, seeing it as a destabilising action.
- **Operational Costs:** Reoccupation would require 10,000+ troops and billions in reconstruction, making it both politically and militarily costly.
- **China’s Defence Posture:** Beijing’s rapid **nuclear modernisation** (**JL-3 SLBM**, missile silos, mobile systems) makes Bagram a flashpoint in US-China rivalry.

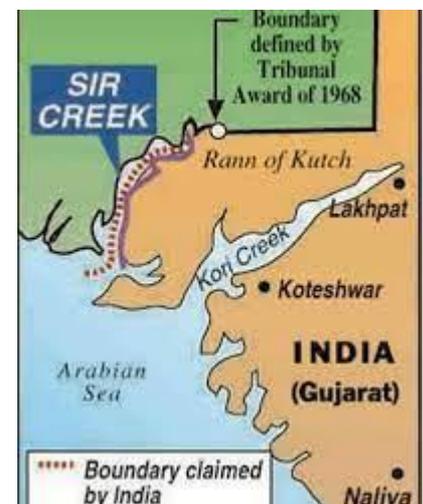
### Implications for India

- **Heightened Terror Risk:** Absence of US monitoring allows **LeT & JeM** greater freedom in Afghan soil.
- **China Factor:** Any Chinese foothold would tighten India’s encirclement under Beijing’s **“String of Pearls.”**
- **Strategic Leverage Loss:** Earlier, India benefited indirectly from the US presence; now focus has shifted to diplomatic engagement & aid.
- **Connectivity Impact:** Projects like **Chabahar Port–Afghanistan–Central Asia corridor** face uncertainty.

### Sir Creek

India’s Defence Minister cautioned Pakistan on military activities near **Sir Creek** and recalled Operation Sindoor to emphasise India’s ability to respond effectively.

- Sir Creek is a **96-kilometre tidal estuary** in the **marshy Rann of Kutch**. It flows into the **Arabian Sea** and roughly separates **Pakistan’s Sindh province** from **Gujarat’s Kutch region**.
- Originally called **Ban Ganga**, it was renamed Sir Creek after a British surveyor during colonial mapping.
- **Importance:** It has valuable fishing areas, possible oil and gas



reserves, and its boundary determines the Exclusive Economic Zone; its proximity to Karachi also makes it **essential for naval security**.

### The Dispute Regarding Sir Creek

The Sir Creek dispute arises from differing interpretations of the maritime boundary between **Kutch** and **Sindh**, which were part of the **Bombay Presidency** before 1947.

- **India's Claim:** The boundary should follow the **mid-channel** of the creek, apply the **Thalweg principle**, and insist on a bilateral settlement under the 1972 Simla Agreement.
- **Pakistan's Claim:** Pakistan asserts the **boundary lies along the eastern bank**, known as the **Green Line**, under the Bombay Government Resolution of 1914, giving it control over the entire creek.
  - **Pakistan** states that the Thalweg Principle doesn't apply to Sir Creek because it's **not navigable**.
- *The **Thalweg Principle** is a concept of international law that states the boundary in a **navigable water** body should follow its **deepest channel**, ensuring a fair division of access and resources.*
- *The **1972 Simla Agreement** was a **peace treaty** signed after the 1971 India-Pakistan War, emphasising bilateral negotiations, mutual respect, and the establishment of the Line of Control.*

### Britain to Introduce Compulsory Digital ID for Workers

- **Britain** is set to introduce **mandatory digital IDs** for all **British citizens & residents** starting a new job, to tackle illegal immigration and unregulated employment.
- **Policy Lessons for India from the UK's Digital ID Initiative**
- **Digital Governance:** India's Aadhaar already **streamlines welfare**, and the UK's model underlines the need for **stronger data security** and privacy safeguards.
- **Labour Monitoring:** The UK's Digital ID verifies "**Right to Work**" status to curb informal jobs and wage fraud; a similar system in India could improve legal employment and timely wage payments.
- **Migration Control:** Digital systems could help India manage **cross-border migration**, especially in sensitive border regions.
- **Rights Protection:** In India, ongoing **Aadhaar privacy debates** and new data protection laws stress the importance of designing **identity systems** that build public trust through transparency and user consent.

### Operation Sindoor and Emerging Maritime Dimensions

Following **Operation Sindoor**, India and Pakistan have shifted their attention to the maritime domain, signalling preparedness through infrastructure expansion and capability demonstrations.

- ***Operation Sindoor** is India's most extensive counter-terror military strike in recent years, **targeting nine terror camps across Pakistan** and Pakistan-occupied Jammu & Kashmir (PoJK) in a retaliatory response to the **Pahalgam terror attack**.*

### Significance of the Maritime Domain for India

- **Geostrategic Importance:** A vital maritime highway through which **80% of global oil shipments** pass, it is crucial for India's regional and global strategy.
- **Economic Lifeline:** Facilitates **90% of India's trade by volume** and **70% by value**, making it indispensable for economic growth.
- **Maritime Security:** India's **11,098.81 km** coastline, along with **Andaman & Nicobar** and **Lakshadweep** Islands, enhances defence against piracy, illegal fishing, and external threats.

#### India's Recent Initiatives in the Indian Ocean Region (IOR)

- **MAHASAGAR Doctrine (2025):** Strengthens India's commitment to regional security and economic cooperation, building upon the **SAGAR (Security and Growth for All in the Region)** vision.
- **Indo-Pacific Strategy:** Expansion of the **Indo-Pacific Oceans Initiative (IPOI)** with increased engagement from **ASEAN**, emphasising maritime security and connectivity.
- **Infrastructure Development:** Investments in **Chabahar Port (Iran)**, **Sittwe Port (Myanmar)**, and **Sabang Port (Indonesia)** to strengthen trade connectivity and counterbalance China's BRI influence.
- **Blue Economy Initiatives:** Launch of the **Samudrayaan mission** for **deep-sea mining** and the **Deep Ocean Mission (DOM)** to explore polymetallic nodules and marine biodiversity conservation.

#### Challenges Faced by India in the Maritime Domain

- **Narrowing Capability Gap:** Pakistan is enhancing its naval strength with Chinese-built **Type 039A Hangor-class submarines** and **Babur-class corvettes** from Türkiye, thereby shrinking India's superiority.
- **Chinese Strategic Presence:** Beijing's logistical and intelligence footprint in **Gwadar** and **Karachi** complicates India's freedom of manoeuvre in the Arabian Sea.
- **Maritime Terrorism:** The resurgence of piracy off the **Somali coast** threatens global trade routes, while terrorist networks increasingly exploit sea routes for arms and drug smuggling.
- **Climate Change:** Rising sea levels endanger coastal cities & island nations like the Maldives & Bangladesh, while increasing **cyclones** and **tsunamis** disrupt trade and displace populations.
- **India's Response to the Challenges**
- **Forward Deterrent Posture:** **Operation Sindoor** underscored India's readiness for **pre-emptive maritime action**, signalling capability and intent.
- **Indigenous Modernisation Drive:** Focus on stealth frigates, submarines, and AI-driven surveillance under '**Aatmanirbhar Navy Vision 2047**' to ensure technological edge. E.g. India launched **INS Vindhyagiri (2023)** — a stealth frigate under **Project 17A**, boosting **blue-water capability**. \*
- **Regional Partnerships:** Expanded cooperation with **ASEAN, QUAD**, and **IORA** nations to counterbalance China's Indo-Pacific footprint.

- **Crisis Management Mechanisms:** Strengthening **maritime communication hotlines** and **naval-to-naval engagement protocols** to mitigate escalation risks.

### Way Forward

- **Modernisation with Scale:** Accelerate **shipbuilding** under 'Make in India', ensuring force balance with Pakistan's growing submarine fleet.
- **Enhanced Maritime Domain Awareness (MDA):** Expand **Information Fusion Centre-Indian Ocean Region (IFC-IOR)** to integrate real-time intelligence across friendly navies.
- **Strategic Signalling Balance:** Use maritime deployments for **calibrated deterrence**, which is assertive yet restrained, avoiding uncontrolled escalation.
- **Strengthen Blue-Water Capabilities:** Prioritise aircraft carriers, nuclear submarines, and logistics hubs to project sustained power in the Arabian Sea and Indo-Pacific. E.g. India aims for a **third aircraft carrier by 2035**, along with the **Arihant-class SSBN** fleet forming the sea leg of its **nuclear triad**.

### DRDO Releases the Indian Radio Software Architecture

The *Defence Research and Development Organisation (DRDO)*, in collaboration with the **Integrated Defence Staff** and *Tri-Services*, has released the **Indian Radio Software Architecture (IRSA) 1.0**.

- IRSA is India's *first national software framework* for military communication, enabling **interoperability** among *Software-Defined Radios (SDRs)* across the Army, Navy, and Air Force.
- It standardizes *software interfaces* and **APIs**, allowing waveforms to be reused across platforms.
- *SDRs* use software to manage **frequency, modulation, and encryption**, enabling *flexible and secure communication*.
- IRSA supports **Atmanirbhar Bharat** by providing *secure, future-ready, and interoperable defence communication systems*.

### India to Host the 8th International Solar Alliance Assembly

India will host the *8th Session* of the **International Solar Alliance (ISA) Assembly** from **October 27 to 30, 2025**.

- India has achieved **50% of its installed electricity capacity** from non-fossil fuels, five years ahead of schedule.
- It ranks **third in solar energy production** and *second in renewable energy market growth* and solar module manufacturing.
- The country targets **5 million tonnes of green hydrogen** by 2031 and has installed rooftop solar in over **20 lakh households** under *PM Surya Ghar Muft Yojana*.
- The ISA, launched by **India and France** at *COP21 in 2015*, is headquartered in **Gurugram** and has **124 member and signatory countries**.

### Defence Exports Target ₹50,000 Crore by 2029

- India's defence exports are projected to reach ₹50,000 crore by 2029, up from the current ₹24,000 crore.

#### Overview of Defence Export Performance

##### Export Growth

- Exports grew **12.04%** in FY 2024-25, compared to FY 2023-24.
- Defence items are now exported to nearly **80 countries**, covering arms, ammunition & sub-systems.
- **Export authorisations** rose **16.9%** in 2024-25, with **defence exporters** increasing by over 17%.
- Defence Public Sector Undertakings (DPSUs) registered a **42.85% rise** in exports in 2024-25 compared to the previous year.

#### Make in India and Self-Reliance

- Indigenous manufacturing drives growth, with **64%** of Tejas Light Combat Aircraft parts locally made.
- In FY 2024-25, the Ministry of Defence awarded **92% of contracts** to the **domestic industry**.

##### Institutional Support

- Liberalised FDI policy allows up to 74% through the automatic route and higher.
- Initiatives like Innovations for Defence Excellence (iDEX) promote defence innovation, offering grants of up to ₹1.5 crore to MSMEs, startups, and R&D institutions.

##### Policy reforms

- **Simplified industrial licensing** by removing parts and components from the licensing regime.
- Extended the **validity of licences** to 15 years.
- Streamlined SOPs for **export authorisation** by the digital export authorisation system.

### Exercise Konkan 2025

- **Exercise Konkan 2025**, an annual bilateral naval drill between the **Indian Navy** and the **UK's Royal Navy**, commenced off the **western coast of India**.
- **Objective:** To enhance military cooperation, improve interoperability, and reaffirm both nations' commitment to a rules-based international maritime order.
- **Participants:** The exercise featured the **first-ever participation** of carrier strike groups (CSGs) from both navies, led by the Indian aircraft carrier INS Vikrant and the **UK fleet's HMS Prince of Wales**.
- **Key Feature:** It was conducted in **two phases, harbour and sea**. The harbour phase involved professional interactions, while the sea phase focused on advanced maritime and aviation drills.
- **Significance:** It highlights the **deepening strategic cooperation** between the two nations, aligning with the '**India-UK Vision 2035**' roadmap.

### Defence Manufacturing Target of ₹3 Lakh Crore by 2029

- India has set an ambitious target to achieve **₹3 lakh crore** in defence manufacturing and **₹50,000 crore** in defence exports by **2029**.

#### Rising Domestic Defence Production

- India's defence production reached a record **₹1.5 lakh crore** in **FY 2024-25**, a sharp increase from **₹46,000 crore** in **2014**.
- Approximately **25% of annual procurement** is now reserved for **MSMEs**, with over **350 items earmarked** exclusively.
- In **FY 2024-25**, the Ministry of Defence awarded **92% of contracts** to the **domestic industry**.
- Defence Production and Export Promotion Policy (DPEPP) **2020** targets **₹1.75 lakh crore** in production and **₹35,000 crore** in exports by **2025**.

#### Defence Startups on the Rise

- Defence Minister has urged entrepreneurs to create **India's first defence unicorn**, a **\$1 billion startup** that would signify the **maturity** of the domestic defence ecosystem.
- Since its launch in **2018**, the Innovations for Defence Excellence (iDEX) programme has supported over **650 innovators** and led to **prototype procurements** worth **₹3,000 crore**.
- Under the new Defence Procurement Manual (DPM-2025), **startups** will receive **assured five-year contracts**, which can be extended for another five years.

#### Government Initiatives for Defence Production

- The government introduced **Positive Indigenisation Lists (PILs)** to **ban imports** of specific items and promote domestic manufacturing.

*PILs are issued by the **Ministry of Defence**; these lists identify defence items **reserved for procurement** from domestic manufacturers only.*

- Indigenous manufacturing** is gaining momentum, with **64%** of Tejas Light Combat Aircraft parts made locally.
- Liberalised FDI policy** allows up to **74%** through the automatic route and higher.

### India's Policy on Recognising the Taliban

- India hosted Afghanistan's **Taliban Foreign Minister** with full protocol, signaling cautious movement toward formal engagement, though it has not officially recognized the regime.
- India maintains a **technical team** at its **Kabul embassy** since June 2022 and allows Taliban-appointed officials to manage consulates in **Mumbai** and **Hyderabad**.
- Non-recognition stems from concerns over **human rights**, the Taliban's links with terrorist groups like **LeT** and **JeM**, and alignment with **Pakistan's ISI**.
- Strategic engagement may help protect Indian investments like the **Salma Dam** and secure **overland access to Central Asia** via the **Chabahar route**.
- India has invested over **\$3 billion in Afghanistan**, including the **Afghan Parliament** and key infrastructure projects

## India-UK Bilateral Talks 2025

- **UK PM Keir Starmer** visited India and held bilateral talks with PM Narendra Modi, leading to **significant agreements in key sectors**.

### Key Outcomes

- **Defence Deal:** India signed an agreement to procure British-made **Lightweight Multirole Missiles (LMM 'Martlet')** for the Indian Army.
- **Naval Collaboration:** Both countries agreed to jointly develop **electric-powered engines for next-generation Indian naval vessels**.
- **Fintech Corridor:** A new **India-UK Fintech Corridor** will connect regulators, startups, and investors to promote innovation and digital financial cooperation.
- **AI Collaboration:** A joint research centre will develop **AI-native 6G network technologies** to strengthen cybersecurity and digital infrastructure.
- **Critical Minerals Partnership:** Phase II of the **UK-India Critical Minerals Observatory**, along with an Industry Guild, has been launched to ensure sustainable mineral supply chains.
- **Education Linkages:** **Lancaster University** and the **University of Surrey** were given approval to establish campuses in India, aligning with the NEP 2020.

### Lightweight Multirole Missile (LMM)

- The LMM is a versatile, lightweight, and **adaptable precision-guided missile** designed for use across air, land, and naval platforms.
- **Flexibility:** It can carry out various missions such as air-to-air, air-to-surface, surface-to-air, and surface-to-surface engagements.
- **Speed and Range:** The missile travels at about **Mach 1.5** and can hit targets **up to 8 km away**.
- **Guidance System:** It uses a **laser beam-riding system** where a projected laser guides the missile accurately to the target, ensuring precision even in complex maritime environments.

## Russia Withdraws from Plutonium Agreement with US

- **Russia to formally withdraw** from the **Plutonium Management and Disposition Agreement (PMDA)**.

### Plutonium Management and Disposition Agreement (PMDA)

PMDA is a bilateral agreement between United States & Russia, signed in 2000 & came into force in 2011.

- **Objective:** To safely **dispose of surplus weapons-grade plutonium** following **post-Cold War** arms reductions and to reduce nuclear proliferation risks.
- Both countries committed to eliminating **34 tonnes of weapons-grade plutonium** each, enough to produce approximately **17,000 nuclear warheads**.
- The plutonium was to be **converted into mixed oxide (MOX) fuel for nuclear reactors** or

irradiated in **fast-neutron reactors** to prevent its **reuse** for weapons.

**Reasons for Withdrawal:**

- Russia accused the U.S. of **breaching the agreement** by **diluting plutonium** instead of converting it into MOX fuel without prior consent.
- It also **cited U.S. sanctions**, NATO expansion, & other “*unfriendly actions*” as reasons for withdrawal.

**US to Supply Advanced AMRAAM Missiles to Pakistan**

The US has clarified that Pakistan will **not receive** new **Advanced Medium-Range Air-to-Air Missiles (AMRAAMs)**, as the amended contract covers only sustainment and spare parts.

**AIM-120 AMRAAM Missile**

- The AIM-120 **Advanced Medium-Range Air-to-Air Missile (AMRAAM)** is an advanced **beyond-visual-range** air combat weapon with additional **surface-to-air capability**, by the US.
- It is mainly **intended for deployment from fighter jets** such as the **F-16**.
- **Range & Speed:** It can target airborne objects **over 160 km** away and exceed speeds of **Mach 4**.
- **Target Precision:** The missile uses an advanced guidance system with **Global Positioning System (GPS)** inputs to ensure high accuracy.
- **Autonomous Targeting:** It has a “**fire-and-forget**” **capability**, with a two-way data link for real-time updates, allowing the missile to guide and adjust its course independently.

**India to Host UNTCC 2025**

- The Indian Army will host the **United Nations Troop Contributing Countries' (UNTCC) Chiefs' Conclave** in **New Delhi** from October 14-16, 2025.
- It will bring together senior military leaders from **32 nations** involved in UN Peacekeeping.

*The UNTCC Conclave serves as a **global platform** for dialogue among countries contributing troops to UN peacekeeping missions. It aims to address **operational challenges**, enhance **interoperability**, and promote inclusivity in decision-making within UN peace operations.*

**India's Leadership in UN Peacekeeping**

- Since its inception in **1948**, India has been among the **largest and most experienced** troop contributors to UN peacekeeping missions.
- Over **2,70,000 Indian peacekeepers** have served across **50 UN missions**, often in high-risk zones.
- Indian contingents are known for their professionalism, gender inclusivity, and humanitarian outreach, including the deployment of the **first all-women peacekeeping** contingent in South Sudan.

## SAKSHAM

**RAJA SIR'S**  
CRACKING IAS ACADEMY  
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**PLEGED TO ETHICS**

### Situational Awareness for Kinetic Soft and Hard Kill Assets Management (Saksham)

The system is designed to detect, track, identify, and neutralise hostile drones and unmanned aerial systems in real time.

- Ensuring comprehensive airspace security across the newly defined Tactical Battlefield Space (TBS), which now includes the Air Littoral (airspace up to 3,000 metres, or 10,000 feet, above ground level).

It is developed in collaboration with the Bharat Electronics Limited (BEL), Ghaziabad.

It is a modular, high-end Command and Control (C2) system operating on the secure Army Data Network (ADN).

It creates a real-time, integrated Recognised UAS Picture (RUASP) for commanders, merging sensor data, counter-drone systems, and AI-driven analytics.

20 YEARS  
483 OFFICERS



9884 554 654

### Saksham Counter-UAS Grid

The Indian Army has started procuring the 'Saksham' (Situational Awareness for Kinetic Soft and Hard Kill Assets Management) Counter-UAS Grid to secure Tactical Battlefield Space.

#### Saksham

- Saksham** is an **indigenous AI-powered** command and control system designed to detect, track, and neutralise hostile **unmanned aerial systems (UAS)**.
- Joint Development:** It is jointly developed by the **Indian Army** and **Bharat Electronics Limited (BEL)**.
- Sensor Integration:** The system combines data from radars, electro-optical sensors, and signal intelligence

tools to deliver **real-time situational awareness** across the **Tactical Battlefield Space (TBS)**.

- Threat Response:** It coordinates **soft-kill methods** such as jamming and spoofing with **hard-kill options** for effective neutralisation of aerial threats.
- Network Architecture:** Saksham operates through the secure **Army Data Network (ADN)** and remains compatible with existing defence systems, including the Akashteer Air Defence System.
- Operational Visualisation:** The platform provides advanced **3D battlefield visualization**, allowing commanders to monitor and react swiftly to aerial intrusions.

#### Tactical Battlefield Space (TBS)

- The Tactical Battlefield Space represents a **multi-dimensional combat environment** that combines land and low-altitude aerial zones in modern warfare.
- Distinction:** Unlike the older Tactical Battle Area (TBA), which primarily focused on ground combat, TBS covers both **land operations** and the **Air Littoral** domain.
  - Air Littoral:** Refers to low-altitude airspace **up to 3,000 meters (10,000 feet)** above the surface.
- Strategic Shift:** The growing use of inexpensive hostile drones has transformed the Air Littoral into a contested combat zone.

### India to Restore Diplomatic Ties with Afghanistan

- External Affairs Minister S. Jaishankar announced that India will upgrade its diplomatic presence in Afghanistan by **reopening its embassy in Kabul**.

- **Ministerial Engagement:** The announcement was made during his meeting with **Taliban Foreign Minister** Amir Khan Muttaqi, marking a move towards normalising relations with Afghanistan.
- **Technical Mission:** Since June 2022, India has maintained a technical mission in Kabul to coordinate humanitarian aid and oversee relief efforts.
- **Restoration of Relations:** The upgrade turns India's technical mission into a full embassy, **four years after** it was closed following the **Taliban's 2021 takeover**.

#### Taliban Takeover of Afghanistan

- **Doha Accord (2020):** The U.S. and Taliban signed a **peace agreement** requiring U.S. troop withdrawal in return for counterterrorism assurances.
- **Troop Withdrawal:** Following the accord, U.S. and NATO forces exited Afghanistan, enabling the Taliban to launch a sweeping military offensive.
- **Fall of Kabul (2021):** The Taliban **captured Kabul** on **August 15, 2021**, marking the collapse of the Islamic Republic of Afghanistan.
- **Restoration of the Emirate:** The **Islamic Emirate** was reestablished under **Hibatullah Akhundzada** with strict Sharia law and a reversal of democratic and human rights reforms.

#### India-UK Connectivity and Innovation Centre

- **India** and the **UK** signed a strategic partnership to establish the **India-UK Connectivity and Innovation Centre (CIC)** to promote innovation in digital connectivity.
- **Objective:** The centre aims to promote inclusive, secure, and resilient digital communication between both nations; it also seeks to shape the global ecosystem for **6G** and **AI-enabled telecom systems**.
- **Implementation:** It will be implemented under the **UK-India Technology Security Initiative**, jointly executed by UK Research and Innovation (UKRI) and India's Department of Telecommunications (DoT).
- **Key Feature:** The CIC will serve as a bridge between **academic research** and **industry application** by supporting applied research through joint lab testing and field trials.
- **Focus Areas:** The centre will focus on **three** strategic domains over the next four years—
  - **AI-Driven Telecom:** Using advanced AI tools to **optimise telecom networks** and enable innovative digital services.
  - **Non-Terrestrial Networks (NTNs):** Developing **satellite** and **airborne systems** to ensure reliable, high-speed connectivity in rural and remote areas.
  - **Telecom Cybersecurity:** Strengthening network security and promoting **interoperable, resilient** communication systems.
- **Significance:** The CIC strengthens **India-UK digital cooperation** under the Vision 2035

roadmap, advances **6G preparedness** and aids in the development of global telecom standards.

### Gaza Peace Summit 2025

- The **US** and **Egypt** co-hosted the **Peace Summit on Gaza** in Sharm el-Sheikh, **Egypt**, to end the war in Gaza and restore stability in the region.
- The summit followed a **ceasefire agreement** based on the US President's 20-point peace plan for ending the Israel-Hamas conflict.
- **Objective:** To finalise an agreement, disarm Hamas and establish a **new governing body** in Gaza.
- **Participation:** Over 20 countries, including **India**, attended the summit, but representatives from **Israel**, **Hamas**, and the **Palestinian Authority** did not participate directly.
- **Significance:** The summit highlights renewed **multilateral diplomacy** in the Middle East and a shared global responsibility for post-conflict recovery.

### Implications of Israel-Hamas Ceasefire on India's Economy

- The Israel-Hamas ceasefire has revived hopes for **reopening** the Red Sea trade corridor, which has been disrupted for nearly two years by Houthi rebel attacks.
- While the truce may **ease freight rates** and **stabilise maritime routes**, its impact on **India's trade** will depend on **restoring security** along the Red Sea corridor.

### Implications for India

- Around **90-95% of India's trade** depends on **foreign shipping lines**, making it highly vulnerable to fluctuations in freight rates.
- Exporters of **low-margin goods** like textiles, marine products, footwear, and engineering items were hit hardest as **profit margins shrank**.
- Even before the crisis, India **remitted** over **\$100 billion annually** as transport service payments, a figure that surged during the crisis.
- The **Cape of Good Hope** route significantly **increased voyage duration** and **insurance costs**, reducing **export competitiveness**.

### Geopolitical and Strategic Dimensions

- The **India-Middle East-Europe Economic Corridor (IMEC)**, announced at the **2023 G20 Summit**, also faced **uncertainty** due to prolonged regional tensions.
- IMEC, comprising an **Eastern Corridor (India-Gulf)** and a **Northern Corridor (Gulf-Europe)**, aims to offer a **40% faster alternative** to the Suez Canal route.

- The ceasefire may **revive confidence** in regional infrastructure projects, though **stability in Yemen** and the Red Sea remains critical.

### Maritime and Shipbuilding Reforms as Government Response

- To reduce dependence on foreign carriers, the Centre approved a **₹69,725 crore shipbuilding package**.
- **Key components include:**
  - Extension of the **Shipbuilding Financial Assistance Scheme (SBFAS)** till March 2036 with a corpus of ₹24,736 crore.
  - Introduction of a **Shipbreaking Credit Note** worth ₹4,001 crore.
  - Creation of a **National Shipbuilding Mission** to coordinate domestic capacity building.
- The package aims to unlock **4.5 million Gross Tonnage capacity**, create **30 lakh jobs**, and attract **₹4.5 lakh crore** investment.



### Maitri II Research Station

The Government of India has cleared the proposal for Maitri II, a **new Antarctic research station** to be established by **January 2029**.

*Maitri II will replace Maitri as the main year-round base, while Maitri will continue as a summer research camp.*

### Key Highlights of the Station

- Maitri II will become **India's fourth research station** in **Antarctica** after Dakshin Gangotri (decommissioned), Maitri (1989), and Bharati (2012).
- **Nodal Agency:** The **National Centre for Polar and Ocean Research (NCPOR)**, Goa, under the Ministry of Earth Sciences

(MoES), will lead the project's operations.

- **Location:** It will be established in **Eastern Antarctica**, near **Schirmacher Oasis**, replacing the **ageing Maitri** base.
- **Design & Planning:** A **German design firm** has been selected through an international competition to develop the station's blueprint and **Detailed Project Report (DPR)**.
  - It is designed as a **green research facility** and will use **solar and wind energy** for power generation.
- **Budget:** The project is estimated to cost **₹2,000 crore** over **seven years**.

### Strategic and Scientific Importance

- Strengthens **India's presence in Antarctica** under the framework of the Antarctic Treaty System (1959) and the Indian Antarctic Act (2022).
- Enhances India's contribution to **climate change research**, glacial monitoring, **seismology**, and polar biodiversity studies.

### India-Mongolia Diplomatic Relation

- During the Mongolian President's visit to New Delhi, India and Mongolia signed 10 agreements, strengthening their bilateral relations.

### Key MoUs Signed

- **Oil Refinery Project:** India will **finance Mongolia's oil refinery** through a **\$1.7 billion Line of Credit**, marking **India's largest overseas** development partnership.
- **Defence Cooperation:** India to **train Mongolian armed and border security forces** and has appointed a **Defence Attaché** at its embassy in Ulaanbaatar.
- **Cultural & Spiritual Ties:** India will send a **Sanskrit teacher** to **Gandan Monastery** and collaborate to **digitise one million ancient Buddhist manuscripts**.
  - Holy relics of Buddha's disciples, **Sariputra and Maudgalyayana**, will be sent to Mongolia in 2026.
- **Regional Collaboration:** A new MoU between **Ladakh's Hill Development Council** and **Mongolia's Arkhangai Province** seeks to promote cultural and educational exchanges.
- **Economic Cooperation:** India and Mongolia will **explore joint ventures** in critical minerals, rare earths, digital technology, and clean energy.

*India-Mongolia Relations: Diplomatic ties established in 1955 and elevated to a Strategic Partnership in 2015; total bilateral trade stands at **USD 110.8 million (2024)**.*

### India-Canada to Strengthen Cooperation

**Canadian Foreign Minister Anita Anand** made her first official visit to India, during which both countries reached **agreements to restore cooperation** after a long diplomatic rift.

### Key Agreements to Restore Ties

- **Ministerial Dialogue:** Renewed consultations will focus on advancing trade, investment, energy cooperation, and overall **strategic alignment**.
- **Comprehensive Economic Partnership Agreement (CEPA):** Negotiations will resume under a revised framework to expand trade and investment relations.
- **Canada-India CEO Forum:** The forum will reconvene in early 2026 to **promote joint ventures** in clean technology, agri-food, digital innovation, and sustainable infrastructure.
- **Canada-India Ministerial Energy Dialogue (CIMED):** Energy dialogue will be reinstated to

strengthen cooperation in **low-carbon fuels**, energy transition, and **grid resilience**.

- **Critical Minerals Annual Dialogue:** Scheduled for **March 2026** in **Toronto**, it will foster collaboration in sustainable mining, critical mineral processing, and secure supply chains.
- **Joint Science and Technology Cooperation Committee:** The committee will be revived to expand **research networks** and cooperation in digital infrastructure.
- **Joint Working Group on Higher Education:** The renewed mandate will strengthen academic collaboration in AI and cybersecurity, while facilitating Canada's academic presence on Indian campuses.
- **Civil Nuclear Cooperation:** Ongoing engagement will secure **uranium supply chains**, enhance nuclear safety partnerships, and support India's clean energy transition.
- **Mutual Respect Clause:** The joint statement reaffirmed mutual sensitivities, signalling intent to **rebuild trust** and **balanced diplomatic engagement**.

### Pakistan-Afghanistan Border Clashes

- Renewed clashes broke out between **Afghanistan** and **Pakistan** along the **Durand Line**, causing heavy casualties and the closure of major crossings.

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## DURAND LINE

Border clashes erupted between Pakistan and Afghanistan along the disputed Durand Line.

**ABOUT DURAND LINE**

- The Durand Line is the 2,640-kilometer international land border between Afghanistan and Pakistan.
- The line was established in 1893 by an agreement between Sir Henry Mortimer Durand, the Foreign Secretary of British India, and Amir Abdur

9884 554 654

20 YEARS  
483 OFFICERS

*Durand Line is a 2,600 km border between Afghanistan and Pakistan, established in 1893 through an agreement between Sir Henry Durand (Foreign Secretary of British India) & Emir Abdur Rahman Khan.*

The **Golden Crescent**, comprising **Afghanistan, Iran, and Pakistan**, is a key global hub for opium production, directly impacting Indian states like **Jammu and Kashmir, Punjab, Rajasthan, and Gujarat** due to their proximity to the **Indo-Pakistan border**.

Similarly, the **Golden Triangle**, which includes parts of **Laos, Myanmar, and Thailand**, is notorious for the production and trafficking of heroin, with **Myanmar alone accounting for 80% of the world's heroin supply**. These regions not only serve as the source of illicit drugs but also use India as a **transit route**, posing serious challenges to the nation's internal security and public health.

### Causes of the Afghanistan-Pakistan Conflict

- **Boundary Dispute:** The **Durand Line**, established by the British, has never been accepted by Afghanistan, while Pakistan's strict enforcement continues to trigger recurring border clashes.
- **Militant Safe Havens:** Pakistan accuses the Taliban of sheltering **Tehreek-e-Taliban Pakistan**

(TTP) militants responsible for attacks in Pakistan, while Kabul blames Islamabad for using militant networks.

- **Strategic Autonomy:** The Taliban aims for an **independent foreign policy**, building ties with China, Russia, and India, which challenges Pakistan's long-standing goal of "**strategic depth**" in Afghanistan.
- **Refugee Deportations:** Pakistan has expelled **over one million** Afghan refugees since 2023, worsening humanitarian stress and deepening bilateral distrust.
- **Border Closures:** Pakistan frequently closes crossings such as **Torkham** and **Chaman** during clashes, disrupting Afghanistan's trade and worsening its economic crisis.

### Challenges for India

- **Regional Instability:** Ongoing tensions between Pakistan and Afghanistan could destabilise the region and indirectly impact **India's security interests**, particularly in Jammu and Kashmir.
- **Narco-Terrorism:** The conflict fuels Afghanistan's **illegal opium trade**, which funds extremist groups, thereby strengthening the drug-terror nexus in South Asia.
- **Diplomatic Dilemma:** Pakistan's persistent allegations of "Indian-sponsored terrorism" weaken India's counter-terrorism narrative and **limit diplomatic engagement opportunities** with the Taliban.
- **Connectivity Barriers:** The conflict disrupts India's transit routes through Afghanistan and restricts overland access to Central Asia.

### Potential for India

- **Strategic Opportunity:** The conflict reduces Pakistan's influence in Afghanistan and weakens its regional presence, enabling India to strengthen strategic partnerships with Iran and Central Asian countries.
- **Alternate Connectivity:** India can strengthen regional trade through the Chabahar Port and **Zaranj-Delaram Highway** to access Central Asian markets and energy resources.
- **Security Cooperation:** India's pragmatic engagement with the Taliban on **humanitarian aid and counterterrorism** creates scope for focused coordination on intelligence sharing and border security.

### Astra Mark 2

- The **Defence Research and Development Organisation (DRDO)** is developing the **Astra Mark 2** with an **extended range** of over **200 kilometres**.

### Key Features of Astra Mark 2

- Astra Mark 2 is an **indigenously** developed **Beyond Visual Range (BVR) air-to-air missile** designed for **long-range aerial** combat.
- **Range:** With a range of **over 200 km**, it extends engagement capability beyond Astra Mark 1's **110 km**. The latest configuration has now surpassed earlier projections of 130-160 km.

- **Propulsion:** While Astra Mark-1 is a single pulse, **Astra Mark 2** is equipped with a **dual-pulse solid rocket motor**.
- **Speed:** Capable of speeds exceeding **Mach 4**, allowing rapid engagement of fast-moving aerial threats.
- **Integration:** To be deployed on Su-30MKI and LCA Tejas Mk1A aircraft, strengthening the IAF's **indigenous** weapons ecosystem.
- **Strategic Significance:** The Mark 2 version offers India a critical edge in air combat by enabling a **first-shot advantage** at longer ranges. It also counters advanced imported missiles like the **Chinese PL-15**.

### Military Exercises – Samudra Shakti

- The Indian Navy hosted the fifth edition of the **annual bilateral naval exercise 'Samudra Shakti'** with the **Indonesian Navy** in **Visakhapatnam**. **Other India-Indonesia Joint Exercises:** **Garuda Shakti** (Army special forces), **IND-INDO CORPAT** (maritime patrol).

### Global Hunger Index Report 2025

- A report titled "*2025 Global Hunger Index: 20 Years of Tracking Progress – Time to Recommit to Zero Hunger*" was recently released to mark **20 years** of the Global Hunger Index.

### Global Hunger Index (GHI)

- The GHI is an **annual publication** released jointly by **Concern Worldwide** (Ireland) and **Welthungerhilfe** (Germany). It aims to assess hunger trends to support evidence-based policymaking.
- **Score Range:** The Index ranges from **0 to 100**, with higher scores indicating greater levels of hunger and undernutrition.
- **Indicator Framework:** GHI scores are determined based on **four indicators:** (a) Undernourishment, (b) Child stunting, (c) Child wasting, and (d) Child mortality.
- **India's Rank:** In the 2024 Global Hunger Index, India ranked **105th** out of 127 countries with a score of **27.3**, categorised as a "**serious**" hunger level.

### Key Findings of the Report

- **Stalled Progress:** The world's GHI score is currently **18.3**, only slightly better than 19.0 in 2016. At this pace, the UN's Zero Hunger Goal for 2030 might not be achieved **until 2137**.
- **Crisis Driver:** Wars in Gaza and Sudan led to famine-level food insecurity in 2024, and 20 major food crises impacted nearly **140 million people** worldwide.
- **Rising Hunger:** **42 countries** face serious or alarming hunger levels: **7 alarming** (e.g., Burundi, Haiti, Somalia, South Sudan, Yemen) and **35 serious**. Hunger levels **worsened** since 2016 in **27 countries**.
- **Uneven Progress:** Hunger remains serious in Southern Africa and South Asia, while Southeast Asia and Latin America show modest improvement. **Europe** and **Central Asia** record the **lowest GHI** score.

**Hopeful Models:** Notable progress was achieved in Mozambique, Rwanda, Somalia, Togo, and

Uganda. **Tajikistan's** progress stands out as the most remarkable.

### India Elected to UNHRC

- India has been elected unopposed to the **United Nations Human Rights Council (UNHRC)** for a **three-year term from 2026 to 2028**.
- **Election Milestone:** This marks the **seventh time** India has been elected to the UNHRC.
- **Previous Terms:** India served **two consecutive terms** until 2024 but abstained from contesting in 2025 as the **UN guidelines** prohibit three successive terms.
- **Significance:** It highlights India's consistent support for **human rights**, fundamental freedoms and democracy across multilateral platforms.

### UN Human Rights Council

- The UNHRC is a **Geneva-based intergovernmental body** within the United Nations, established in **2006** to promote, protect, and address human rights violations worldwide.
- It has **47 seats** with **regional allocation**: African States (13), Asia-Pacific States (13), Latin American & Caribbean States (8), Western European & Other States (7), Eastern European States (6).

### India-Australia Renewable Energy Partnership

- Australia's Minister for Climate Change & Energy met his Indian counterpart to strengthen cooperation under the India-Australia Renewable Energy Partnership (REP).

### India-Australia Renewable Energy Partnership (REP)

- India-Australia Renewable Energy Partnership (REP) is a **strategic initiative** aimed at deepening **bilateral cooperation** in the renewable energy sector.
- **Launch Framework:** It was formally established in **2024** under the broader Comprehensive Strategic Partnership between the two countries.
- **Objective:** REP combines **Australia's mineral resources and technology** with **India's manufacturing scale** to build a diversified clean energy value chain.
- **Priority Areas:** Cooperation covers **eight sectors**: Solar PV, Green Hydrogen, Energy Storage, Solar Supply Chains, Circular Economy, Two-way Investments, Capacity Building, and Shared Priorities.
- **Dialogue Mechanism:** It includes a **Track 1.5 Dialogue** that links policymakers, industries, and research organisations to turn policy intent into practical collaboration.
- **Supporting Frameworks:** The REP builds on the India-Australia Economic Cooperation and Trade Agreement (ECTA), which **reduced tariffs** on critical minerals and facilitated smoother trade.
- **Nodal Agency:** Ministry of New & Renewable Energy (MNRE) coordinates REP implementation in India.

### Significance of REP for India

- **Mineral Diversification:** The REP expands India's access to lithium, cobalt, and rare earths

and **reduces dependence** on Chinese suppliers.

- **Skill Ecosystem:** The **Rooftop Solar Training Academy** aims to train 2,000 technicians by 2027 to meet India's rising solar infrastructure needs.
- **Industrial Integration:** The **Green Steel Partnership** will link Australian minerals with Indian steel production and accelerate the shift to a low-carbon manufacturing ecosystem.
- **Panchamrit Goals:** The REP supports India's 2030 target of **500 GW** non-fossil fuel capacity, including **280 GW** from solar energy.
- **Ethical Sourcing:** The partnership enforces **ESG norms** (Environmental, Social, and Governance), ensuring full traceability and transparency throughout the mineral supply chain.

#### Associate Challenges

- **Downstream Gaps:** Australia's lack of **large-scale refining** facilities limits its ability to support India's growing manufacturing sector.
- **Regulatory Divergence:** Differences in trade rules, certification norms, and technical standards complicate cross-border renewable investments.
- **Capital Competition:** Attractive **subsidy schemes** in the **U.S.** and **EU** draw private investment away from India's clean energy market.
- **Grid Constraints:** Large-scale renewable integration requires advanced grid systems and **increased transmission** capacity to maintain stability.

#### US-China Rare Earth Tensions

- China's new **export curbs on 12 rare earth elements** have reignited trade tensions with the US. The US responded by imposing **100% tariffs** on Chinese exports effective November 1, 2025.

#### Rare Earth Elements

- **Group of 17 elements:** It includes **15 lanthanides + scandium + yttrium**.
- **Availability:** **abundant in crust** but found in low concentrations, **hard to extract**.
- **Categorisation:** **Light (LREEs)** and **Heavy (HREEs)**; HREEs are scarcer and more critical.
- **Key uses:** EV motors, wind turbines, defence, medical & electronic devices.
- **Neodymium:** LREE, which is vital for EVs, phones, and MRI machines.
- **Dysprosium & Yttrium:** HREEs, which are essential for clean energy tech.
- **Global Scale:**
  - **China's dominance:** Mines  $\approx 61\%$  and processes  $\approx 92\%$  of global supply (IEA 2024).
  - **India:** 3rd largest reserves ( $\sim 6\%$ ) but  $< 2\%$  production (USGS 2024).

#### Consequences for India due to US-China Rare Earth Tensions

- **Supply Risk:** India imports **nearly 90%** of its rare earth compounds from China (DGFT, 2024), risking disruption to EV, semiconductor & defence supply chains.
- **Import Bill Rise:** Rare earth tariffs and curbs could raise input costs for electronics by **20-25%** (IEA, 2025).
- **Strategic Opportunity:** India holds **6.9 million tonnes** of REE reserves (USGS, 2024), giving

scope to expand **Indian Rare Earths Ltd (IREL)** and the **Critical Minerals Mission (2023)** for self-reliance.

- **Geopolitical Leverage:** Strengthens India's position in the **Quad Critical Minerals Partnership (2022)** and **Indo-Pacific Economic Framework (IPEF)** to diversify global supply chains.

#### Consequences for the World due to US-China Rare Earth Tensions

- **Supply Chain Disruptions:** China controls **92% of global rare earth** processing (IEA, 2025).
- **Price:** Global REE prices surged **35-40%** post-export curbs (IEA Market Update, Sept 2025).
- **Strategic Decoupling:** US, EU & Japan accelerating **friend-shoring** to Australia, Vietnam, and Africa via Minerals Security Partnership (MSP).
- **Environmental Pressure:** New mining hubs (**Congo, Myanmar**) risk fresh ecological damage.
- *Friend-shoring is the process of relocating critical supply chains to geopolitically trusted partner nations to reduce dependence on rivals*

#### Way Forward

- **Supply Diversification:** Expand mining & refining partnerships across **Australia, Vietnam, and Africa** under the **Minerals Security Partnership** led by the U.S. and allies.
- **Sustainable Mining:** Promote ESG-based standards via the **UNEP Global Mineral Governance Framework**, ensuring low-impact extraction and rehabilitation.
- **Strategic Stockpiles:** Create rare-earth reserves under the **G7 Critical Minerals Agreement** to cushion price shocks and supply disruptions.
- **Recycling & Circularity:** Scale up e-waste recovery networks (E.g. **Japan's Urban Mining Model**) to recover **neodymium** and **dysprosium** from end-of-life electronics.

#### India Elected Co-Chair of UN-GGIM Asia-Pacific Committee

- India has been elected Co-Chair of the **United Nations Global Geospatial Information Management for Asia and the Pacific (UN-GGIM-AP)** Committee for a **three-year term until 2028**.
- The UN-GGIM-AP is a **regional committee** under the **UN Committee of Experts on Global Geospatial Information Management (UN-GGIM)**, which includes **56 member** countries and regions.

#### UN-GGIM

- It is the **apex intergovernmental body** of the United Nations responsible for managing and coordinating **global geospatial information**.
- **Foundation:** It was established by the **UN Economic and Social Council (ECOSOC)** in **2011**.
- **Objective:** To address cross-border challenges in **data interoperability** and governance by developing global frameworks, standards, and guidelines for geospatial data and services.
- **Structure:** It is a global Committee of Experts representing all **UN Member States**, supported

by **five regional committees** and various **working groups**.

- The five regional committees of the UN-GGIM represent **Africa, the Americas, the Arab States, Asia and the Pacific, and Europe**.
- **Key Initiatives:** The Integrated Geospatial Information Framework (IGIF) **guides national strategies**; the Global Geodetic Reference Frame (GGRF) ensures reliable geospatial data and supports **SDG monitoring**.

*UN ECOSOC is one of the six principal organs of the UN established under the 1945 Charter; it is the main forum for policy discussions on global economic, social, and environmental issues.*

### DRDO's Military Combat Parachute System

The indigenously developed **Military Combat Parachute System (MCPS)** was successfully tested by the **Indian Air Force** at **32,000 ft**.

- **Developed By:** The Defence Research and Development Organisation (DRDO).
- **Key Features:** The parachute provides a slower descent, better stability, and enhanced steering control, improving safety and tactical accuracy.
- **Operational Capability:** The MCPS is the **only parachute system** currently in use by the Indian armed forces capable of deployment **above 25,000 ft**.
- **Navigation Integration:** It integrates **Navigation with Indian Constellation (NavIC)**, making it resistant to interference or denial by external actors.
- **Significance:** It marks the beginning of the induction of Indigenous parachute systems, ensuring **self-reliance** in high-altitude airborne operations.

- *DRDO is India's leading defence R&D agency, formed in 1958 under the Ministry of Defence, responsible for developing advanced technologies and systems for the armed forces.*
- *NavIC is an independent navigation satellite system developed by ISRO, providing precise, real-time positioning and timing services across India and up to 1,500 km beyond its borders.*

### Expansion of LCA Tejas and HTT-40 Production Lines

- The union Defence minister has inaugurated **Hindustan Aeronautics Limited's (HAL) third LCA Tejas Mk1A** and **second HTT-40** production lines at **Nashik, Maharashtra**.
- The defence minister also flagged off the **maiden flight** of the first **Tejas Mk1A** aircraft produced in the new HAL facility.
- **LCA Tejas:** The Tejas Mk1A is a 4.5-generation, **single-engine, delta-wing**, multi-role light combat aircraft designed by the Aeronautical Development Agency (ADA) and manufactured by HAL.
- **HTT-40 Trainer:** The **Hindustan Turbo Trainer-40 (HTT-40)** is an indigenous tandem-seat

turboprop **trainer aircraft** developed by HAL for primary **flight training** of Indian Air Force cadets.

*Hindustan Aeronautics Limited is a 'Maharatna' PSU headquartered in Bengaluru. It designs, develops, and manufactures aircraft, helicopters, engines, and avionics for India's defence and aerospace sectors.*

### IN-RoKN Exercise

- The **Indian Naval Ship (INS) Sahyadri** arrived at **Busan Naval Harbour** recently to take part in the inaugural **India-Republic of Korea Navy (IN-RoKN)** Bilateral Exercise.
- The exercise aims to enhance *interoperability, coordination, and mutual understanding* between the two navies, in line with *India's Act East Policy and Indo-Pacific Oceans Initiative (IPOI)*.

*INS Sahyadri: A Shivalik-class guided missile stealth frigate, INS Sahyadri was **indigenously** designed and commissioned in 2012.*

### India and FAO Celebrate 80 Years of Partnership

- On **World Food Day 2025**, India and the **Food and Agriculture Organisation (FAO)** celebrated **80 years of partnership**.

### India's Achievements in Food Security

- Despite having **less than 4%** of the **world's agricultural land** and freshwater, India maintains food self-sufficiency and price stability.
- Initiatives like **Minimum Support Price (MSP)** and public stockholding ensure food access to **800 million beneficiaries** under the **National Food Security Act (NFSA)**.
- **Targeted interventions** for small and marginal farmers, accounting for **146 million cultivators**, are the backbone of Indian agriculture.

### Food and Agriculture Organisation (FAO)

- The FAO, founded in **1945** and headquartered in **Italy**, is a **UN specialised agency** with **194 member countries** operating in over 130 nations.
- FAO's mission is to ensure Better Production, Better Nutrition, a Better Environment, and a Better Life for all, acting as the **custodian** for **62 SDG indicators**.
- **India, a founding member of FAO**, has been pivotal in helping India move from **food scarcity post-Independence** to **self-sufficiency** in food grains.
- Recent collaborations include the Blue Ports initiative for sustainable fisheries & agriculture programs.

### India-Egypt Strategic Dialogue

- External Affairs Minister S. Jaishankar co-chaired the inaugural India-Egypt Strategic Dialogue in **New Delhi** to promote collaboration in political, economic, defence, and counterterrorism.

### India-Egypt Relations

- Diplomatic Evolution:** India and Egypt established **diplomatic relations in 1947**, signed a **Friendship Treaty in 1955**, and elevated their relationship to a **Strategic Partnership in 2023**.
- Trade Targets:** Both nations aim to increase bilateral trade to **\$12 billion by 2028**, up from \$5 billion in 2023-24. **India's exports** make up nearly **75%** of total trade (mainly petroleum products).
- Defence Collaboration:** India and Egypt regularly hold joint military exercises like **Bright Star, Exercise Cyclone, and Desert Warrior**.
  - Egypt has expressed interest in acquiring Indian defence systems like LCA Tejas and Akash missiles.
- Cultural Ties:** The **Maulana Azad Centre for Indian Culture in Cairo** promotes cultural engagement through events like '**India by the Nile**' and Hindi language courses.
- Strategic Importance:** Egypt's control of the **Suez Canal** remains critical for India's maritime trade. Both nations collaborate on Red Sea **anti-piracy** and regional counterterrorism operations.
- Global South:** India and Egypt collaborate through platforms like the UN, G20, and BRICS to amplify the voice of the Global South. Both were founding members of the Non-Aligned Movement.
- Emerging Threats:** Instability in the Middle East, disruptions in the Suez Canal, global supply chain vulnerabilities, and China's expanding influence pose challenges for India-Egypt relations.

### India-Central Asia Security Dialogue

- National Security Advisor (NSA) Ajit Doval participated in the 3<sup>rd</sup> '**India-Central Asia NSA/Secretaries of the Security Councils' Meeting in Bishkek, Kyrgyzstan**.
- Established at the 1<sup>st</sup> **India-Central Asia Summit in 2022**, it promotes cooperation on security & counterterrorism among **India, Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, & Uzbekistan**.
- The meeting supports India's '**Connect Central Asia**' policy by promoting regional cooperation and lasting strategic engagement with the **five Central Asian** republics.

### India-Kyrgyzstan Bilateral Relations

- Diplomatic Evolution:** India and Kyrgyzstan established diplomatic relations in **1992** and elevated them to a **Strategic Partnership** during PM Modi's **2019** visit to Bishkek.
- Trade Relations:** Bilateral trade reached **~\$120 million** in 2024, led by Indian exports of **pharmaceuticals, machinery, and textiles**, while Kyrgyzstan supplies raw hides and wool.

- **Connectivity Corridors:** India seeks to access Kyrgyzstan through the Chabahar Port and the International North–South Transport Corridor (INSTC), bypassing Pakistan.
- **People-to-People Ties:** Over 17,000 Indian students study medicine and technology in Kyrgyzstan. The 2022-26 Cultural Exchange Programme promotes artistic collaboration.
- **Regional Forums:** Both countries cooperate in the Shanghai Cooperation Organisation (SCO) and the India-Central Asia Dialogue on counterterrorism, energy security, and sustainable development.
- **Defence Cooperation:** India and Kyrgyzstan conduct the annual **Khanjar Special Forces Exercise** to improve joint capabilities in counterterrorism and mountain warfare.
- **Challenges:** Limited transport connectivity, China's Belt and Road Initiative (BRI), and Afghan instability continue to impede stronger trade and strategic engagement.



### Yunus Declares a 'New Bangladesh' Through National Charter

- Bangladesh's interim government chief and Nobel laureate Muhammad Yunus signed the 'July National Charter', declaring it the "birth of a new Bangladesh."
- It includes over 80 reform proposals, spanning governance and electoral restructuring, signed by 25 political parties.
- The declaration marks a major political transition following the 2024 student-led uprising that overthrew Sheikh Hasina's Awami League government.

### ACTCM Barge LSAM 25

- The Indian Navy inducted its **11<sup>th</sup> Ammunition Cum Torpedo Cum Missile (ACTCM) Barge, LSAM 25 (Yard 135)**, at the Naval Dockyard in **Mumbai**.

**Barge:** A large flat-bottomed vessel used for transporting heavy cargo along inland waterways or ports.

**LSAM:** Landing Ship Ammunition is a type of barge used to transport ammunition and missiles safely.

- LSAM 25 **enhances Navy logistics** by supporting the transport, embarkation, and disembarkation of ammunition at both jetties and outer harbours.
- Built By:** MSME shipyard M/s Suryadipta Projects Pvt. Ltd., Thane, under Ministry of Defence contract.
- Significance:** The ACTCM series highlights India's increasing defence **indigenisation**, aligning with the Make in India and **Aatmanirbhar Bharat** initiatives.

### Bipolar World and India

- India's **diplomatic engagement** with **China** is tense following the **2020 Galwan Valley clash**, while relations with the U.S. are strengthening amid escalating **Sino-American rivalry**.
- Indian National Security Adviser** Ajit Doval met **Chinese Foreign Minister** Wang Yi at the **BRICS National Security Advisers' meeting** in St. Petersburg, indicating a potential thaw in diplomatic relations.

### Reason for a Bipolar World

- China's rapid economic rise** as the world's **second-largest economy**, with a GDP of approximately **\$18 trillion in 2023**, competing with the **U.S.'s GDP** of about **\$26 trillion**.
- China has modernised its military** about **350 battle-force ships**, surpassing the **U.S.'s 293** as of 2024. Rising tensions in the **South China Sea** and issues regarding **Taiwan** further exacerbate this.
- U.S.'s democracy and China's authoritarianism:** As of 2023, only **20%** of the global population lives in free countries, while **authoritarian regimes** govern around **30%**.
- Shift in global power dynamics:** U.S. **unilateralism** has declined, reducing its share of global GDP from **40% in 1990** to **24% in 2024**. This shift allows China to challenge U.S. dominance.
- Technological Competition:** China aims to lead in **AI by 2030**, with the sector projected at **\$1 trillion**. It also controls about **70% of the global 5G market** as of 2024.
- Cold War-like containment strategies** of USA through alliances such as the **Quad**, enhancing security in the **Indo-Pacific**. The 2024 military budget includes \$9 billion for initiatives countering China.

### India's Stand in a Bipolar World

- **Non-Alignment and Strategic Autonomy** allowing engagement with both the U.S. and China.
- **Balancing Relationships** with major powers by engaging with the U.S. through partnerships like the Quad while managing over **\$117 billion in trade with China** despite ongoing border tensions.
- **As a leader in the Indo-Pacific** India promotes stability through initiatives like the Act East Policy and strengthened ties with Southeast Asia by hosting the **India-ASEAN summit in 2023**.
- **Economic Engagement:** India aims to diversify its economic relationships. The "Make in India" initiative seeks to enhance local manufacturing and **reduce import dependence**.
- **Enhancing military** through collaborations with the U.S., such as the **Defense Technology and Trade Initiative (DTTI)**. In 2024, India's defense budget is approximately \$73 billion, focusing on modernisation.
- **Technological Development:** India is investing in information technology, AI, and space technology, with the **Indian space sector** projected to grow to **\$13 billion by 2025**.
- **India advocates for a multipolar world** and seeks reforms in global governance institutions, including the UNSC. Its **G20 presidency in 2023** underscores its influence on global decision-making.
- **Diplomatic Engagement:** India manages tensions through dialogue with China, including **2023 talks to de-escalate border issues** and participation in multilateral forums like **BRICS** and **SCO**.

### Challenges of India in a Bipolar World

- **Sovereignty and Security:** India must protect its sovereignty amid U.S.-China tensions and threats from China's assertive foreign policy, as seen in the **2020 Galwan Valley clash**.
- **Strategic Autonomy:** India should avoid becoming a pawn in geopolitical contests, exemplified by its participation in the **Non-Aligned Movement (NAM)** to maintain independent strategies.
- **Economic Dependence:** Engaging with the U.S. and China risks economic dependence. In 2022, India's trade with China reached **\$117 billion**, highlighting the need for a balanced economic approach.
- **Regional Stability:** U.S.-China tensions may destabilise the **Indo-Pacific**, impacting India's national security, as demonstrated by **2022 naval encounters in the South China Sea**.
- **Military Modernization:** India must modernise its military in response to China's expansion, which includes about **350 battle-force ships** compared to **India's 130**, requiring significant defence investment.
- **Technological Competition:** India needs to enhance its technological capabilities. In 2024, **China controlled 70% of the global 5G market**, risking India's marginalisation in tech innovation.
- **Global Governance:** India must assert influence in global governance shaped by U.S.-China rivalry, as seen during its **G20 presidency in 2023**, advocating for a **multipolar world**.
- **Geopolitical Alliances:** India should carefully choose alliances to avoid alienating the U.S. or China, balancing its partnership with the **Quad** and maintaining dialogue with China for

autonomy.

### Way Forward for India in a Bipolar World

- **Enhancing Regional Alliances:** Expand ties with Southeast Asia through the **Act East Policy**. The 2023 India-ASEAN summit aimed to counter **China's 25% share of ASEAN trade** in 2021.
- **Diversifying Economic Engagement:** Reduce dependence on China, with 2022 trade at \$117 billion, by promoting "**Make in India**" and targeting a **\$500 billion manufacturing output by 2025**.
- **Investing in Defense Modernisation:** Increase the **defence budget** of around **\$73 billion** to modernise military capabilities, including acquisitions like **Rafale jets**, against China's 350 battle-force ships.
- **Promoting Technological Advancement:** Invest in AI and space sectors, projected to reach **\$13 billion** by 2025, to enhance global competitiveness through initiatives like the **National AI Mission**.
- **Advocating for Reforms in Global Governance:** Push for a permanent **UN Security Council seat**, leveraging its **2023 G20 presidency** to influence global discussions on sustainability.
- **Enhancing Diplomatic Engagement:** Engage in constructive dialogue with China to address border tensions, exemplified by the **2023 Eastern Ladakh talks**, while participating in multilateral forums like **BRICS**.
- **Fostering Public Diplomacy:** Educate the public on foreign policy through initiatives like the **International Day of Yoga**, celebrated in over 180 countries, to enhance **India's soft power globally**.

### European Sky Shield Initiative (ESSI)

Switzerland joins **European Sky Shield Initiative (ESSI)**.

- **Genesis:** Founded in 2022 after Russia invaded Ukraine
- It is a German led **European Iron Dome-style defence system**.
- **Aim:** Bolstering Europe's defence against air strikes as it will strengthen NATO's integrated air and missile defence.
- **Members:** 21 member states, including the UK
- At the heart of this initiative is the **Arrow 3**, an **Israeli-American missile** defence system that can intercept long-range ballistic missiles.

### Naseem Al Bahr

- **Indo-Oman** bilateral **naval exercise** held on the coast of **Goa**, demonstrating India's commitment to collaboration with Oman and regional security in the Indian Ocean Region

### Other Bilateral Exercises with Oman

- **Al Najah** is a **bilateral military exercise** between the **Indian Army** and the **Royal Army of Oman** focused on counter-terrorism in desert environments.

- **Eastern Bridge** is a **bilateral air exercise** between the Indian Air Force and the Royal Air Force of Oman.

### Japan Elects First Female Prime Minister

Japan has elected Sanae Takaichi as the country's first female Prime Minister reflecting a gradual shift toward inclusivity and gender balance.

### Similarities between the Indian and Japanese political systems

- **Written constitutions:** India's constitution is the lengthiest in the world, while Japan has a small constitution with utmost 5000 word.
- **Parliamentary Democracies:** Both are **parliamentary democracies** with a **Prime Minister as the real executive head**.
- **Bicameral Legislatures:** Japan's **National Diet** consists of the **House of Representatives** and the **House of Councillors**, while India's **Parliament** comprises the **Lok Sabha** and the **Rajya Sabha**.
- **Fundamental Rights:** In Japan, **Chapter III (Articles 10–40)** guarantees equality, liberty, and human dignity, while in India, **Part III (Article 12-35)** ensures **6 fundamental rights**.
- **Other: Independent judiciary, Universal Adult Franchise, Constitutional Supremacy** etc.

Aspect	Japan	India
 <b>Head of State</b>	<b>Constitutional Monarchy:</b> The Emperor is a symbolic head.	<b>Republic:</b> The President is an elected head.
 <b>Structure of Government</b>	<b>Unitary system:</b> Power centralized in the national government.	<b>Federal system:</b> Powers divided between the Centre and States
 <b>Nature of Constitution</b>	<b>Rigid:</b> Japan's constitution has never been amended since it was Promulgated in 1946.	<b>Partly Rigid, Partly Flexible:</b> Can be amended by Parliament under <b>Article 368</b> , but the basic structure cannot be altered.
 <b>Political Parties and System</b>	<b>Dominant-party system:</b> Led mainly by the <b>Liberal Democratic Party</b> .	<b>Multi-party system</b>

### Strategic EU-India Agenda

The European Council has approved the EU-India Strategic Agenda, identifying **five priority pillars** to address emerging opportunities, challenges, and threats in a geopolitical context.

### Five Priority Pillars

- **Prosperity and Sustainability:** Focuses on **economic growth, job creation, decarbonization**, and strengthening supply chains.
  - The goals of finalizing a **Free Trade Agreement (FTA)** and concluding an **Investment Protection Agreement (IPA)** are central to this.

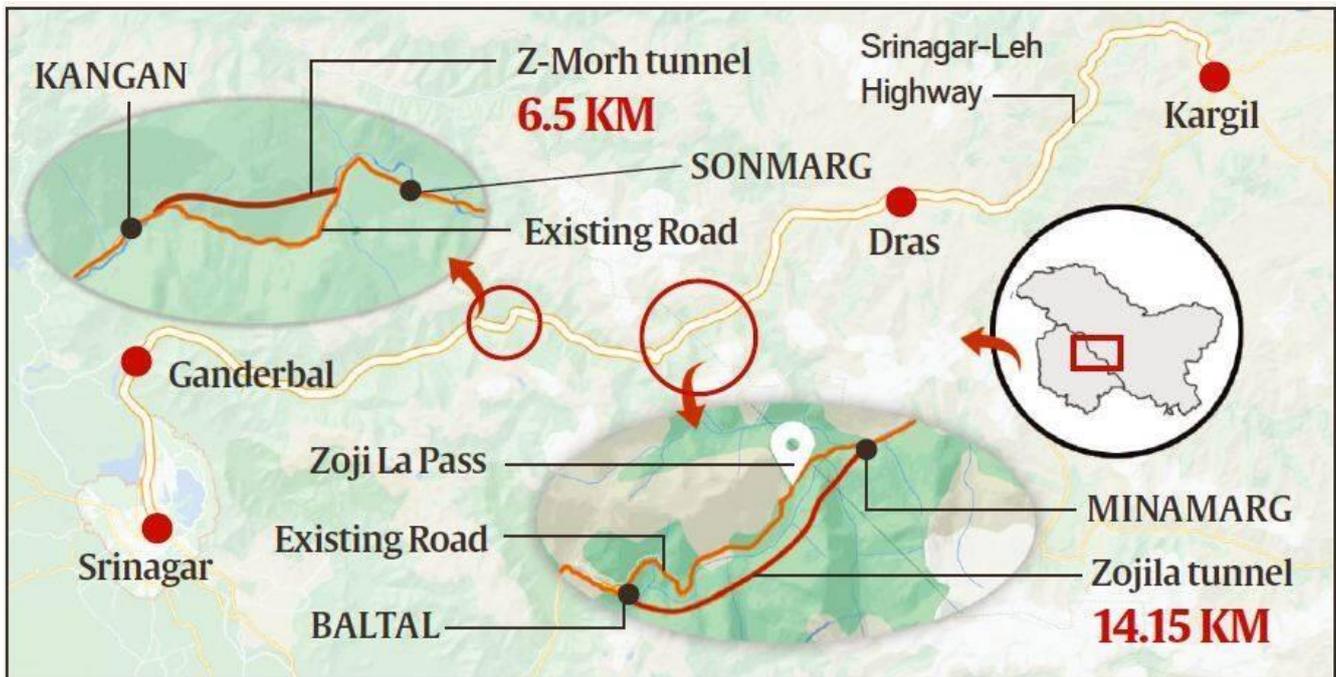
- **Technology and Innovation:** Deepens cooperation on **critical emerging technologies**, digital infrastructure, and promoting **research collaboration** through the **Trade and Technology Council** and **Horizon Europe**.
- **Security and Defence:** Addresses global security threats, geopolitical tensions, and technological change. E.g. Coordinate on Indo-Pacific and promote **rule based maritime order**.
- **Connectivity and Global Issues:** Strengthens regional connectivity, global governance, and cooperation in third countries.
  - Example: Strengthening initiatives like **India-Middle East-Europe Economic Corridor (IMEC) and Global Gateway**.
- **Enablers across Pillars:** Facilitates skills mobility, knowledge exchange, business engagement, and institutional cooperation to support all four main pillars.

#### India-EU Relations

- **Diplomatic Relations:** India was amongst the first countries to establish diplomatic relations with the European Economic Community in **1962**.
  - In **2004** their relationship was upgraded to a **Strategic Partnership**.
- **Bilateral Trade:** Trade in goods between India and the EU reached **€120 billion** in 2024.
  - EU being **India's largest trading partner** in goods.
- **Foreign Direct Investment (FDI):** Cumulative inflows from EU valued at **USD 107.27 billion** between April 2000 and December 2023.

#### Z-Morh Tunnel

- Militants targeted the workers involved in constructing the **Z-Morh tunnel**.
- The Z-Morh tunnel connects the **Sonmarg** health resort with Kangan town in **Ganderbal, Kashmir**.
- It is part of the **Zojila tunnel project**, which aims to provide all-weather connectivity from **Srinagar** to **Ladakh** throughout the year. Originally conceived by the **Border Roads Organisation** in 2012.
- It acquired its name from the **Z-shaped road stretch** where the tunnel is being constructed. The stretch is situated at an altitude of over **8,500 feet** and is prone to snow avalanches in the winter, leading to its closure for most of the winter.



### Strategic importance of the Z-Morh tunnel

- Provide **quick** access for military personnel to the border areas of Ladakh.
- Provide safe connectivity between **Srinagar, Dras, Kargil** and **Leh** regions.
- This all-weather road will lessen the dependence on air maintenance of the forward locations of the Army through the transport of aircraft of the Indian Air Force, thus reducing expenditure on aircraft use.

### Shadow Fleet

- **India** has been painted as a host of a **shadow fleet** that is 'laundering' Russian crude.
- 'Shadow fleet', also known as **dark fleet**, comprises ships engaged in **illegal operations to avoid detection** and circumvent sanctions.

### Tactics used by Shadow Fleets

Tactic	Description
<b>Dark activities</b>	Disabling the automatic identification system (AIS) to hide vessel movements
<b>Location manipulation</b>	Manipulating Global Navigation Satellite System (GNSS) data to distort vessel location
<b>Weak ownership structures</b>	Using vague/complex ownership structures to obscure the true owners of vessels
<b>Multiple flags of convenience</b>	Frequent switching of flags (flag hopping) to avoid sanctions and regulation scrutiny

*A **flag of convenience** refers to a situation where the ship is registered in a different country than the one where the ship's owner resides or holds citizenship.*

## JAIMEX -25

INS Sahyadri, an indigenously built Shivalik-class Guided Missile Stealth Frigate, participated in the Sea phase of **Japan-India Maritime Exercise (JAIMEX)-25**.

- It is a **biennial** naval exercise.
- It is organised to enhance maritime cooperation between the **Indian Navy** and the Japan Maritime Self-Defense Force (**JMSDF**).
- **Conducted in 2 Phases: Sea Phase and Harbour Phase**

## Nuclear powered ballistic Submarine (S4)

- **India's fourth nuclear-powered ballistic missile** submarine (SSBN), **S4**, was launched.
- **S4** is **bigger** than **INS Arihant (S2)** which was developed under the **Advanced Technology Vessel programme**. S4 carries the advanced **3,500 km** range submarine-launched **ballistic missile K-4**.
- **First Three Submarines:** **INS Arihant (S2)**, **INS Arighaat (S3)**, **Aridhman (S4**, currently undergoing sea trials and is expected to be commissioned next year).
- With successful return of **INS Arihant's first deterrence patrol** India completed its **nuclear triad** in **2018**.

## Basic principles of India's nuclear doctrine

- It is based on **Credible Minimum Deterrence (CMD)** and a **No-First-Use (NFU) policy**.
- **Credible Minimum Deterrence (CMD):** It emphasises maintaining a nuclear arsenal **sufficient to deter** adversaries but **not excessively large**.
- **No First Use (NFU):** India commits to not using nuclear weapons **unless first attacked** by an adversary using nuclear weapons.

### Advanced Technology Vessel (ATV) Project

- Initiated in the 1980s to develop indigenous **nuclear-powered ballistic missile submarines (SSBNs)**.
- This idea gained momentum after the 1971 **Indo-Pakistani War**, which highlighted the need for a strong nuclear deterrent. The project saw its first major success with the launch of **INS Arihant**.

## International Convention for the Suppression of the Financing of Terrorism

Iran ratifies **International Convention for the Suppression of the Financing of Terrorism**

- Adopted by the UN General Assembly in 1999 and entered in 2002.
- **Purpose:** Criminalizes the financing of terrorism and holds funders of terrorist acts accountable.
- **India** has also **ratified it**

### Defence Acquisition Council (DAC)

DAC clears proposals, worth around Rs 79,000 crore, to enhance the capability of the Armed Forces.

- Acceptance of Necessity (AoN) has been granted for **Nag Missile System Mk-II, High Mobility Vehicles (HMs)** with Material Handling Crane etc.

#### DAC

- It is an **overarching structure** for **strategic defence acquisition planning and oversight, ensuring coordinated decision-making** across India's defence establishment.
- **Chairman:** Union Minister of Defence.
- **Functions**
  - Gives approval to **Capital acquisitions** in the **Long Term** Perspective Plan.
  - **Monitors the progress** of major projects.
  - Grants **acceptance of necessity** for acquisition proposals.

### International Convention against Doping in Sport

India Re-elected as Vice-Chair of Bureau for the Asia-Pacific at the 10<sup>th</sup> session of the CoP to the International Convention against Doping in Sport.

- Azerbaijan was elected Chairperson.
- **Overview:** It is a **multilateral treaty** by which States agree to adopt **national and international measures to prevent and eliminate doping in sport.**
- **Genesis:** Adopted by **UNESCO in 2005** and **entered into force in 2007.**
- **Aim:** To **harmonize anti-doping legislation, regulations and rules internationally** to ensure a level playing field.
- **Parties:** **192 (India is a signatory).**

### Exercise Ocean Sky

Indian Air Force (IAF) Joins Exercise Ocean Sky 2025 in Spain.

- **Overview:** It is a **multinational air exercise** hosted by the Spanish Air Force.
- **Aim:** Enhance interoperability, sharpen air combat skills, and foster mutual learning among participating nations.
- **Significance:** This is the first time a **non-NATO country** is participating in this exercise highlighting growing **India-Spain ties.**

### Storm Shadow Cruise Missile

- In October 2025, Ukraine launched **UK-supplied Storm Shadow long-range cruise missiles** to strike a Russian chemical plant in **Bryansk.**
- Storm Shadow is an **Anglo-French cruise missile** (developed by the UK and France). In France, it is called the **SCALP-EG.**
- It has a range exceeding **250 kilometres** and is designed for **precision strikes.**

- The missile can operate **day and night**, in **all weather conditions**, and is equipped with **fire-and-forget technology**, allowing it to independently navigate and strike after launch.
- Its guidance system combines **Inertial Navigation System (INS)**, **Global Positioning System (GPS)**, and **Terrain Reference Navigation (TRN)**, enabling accurate route control and terrain-following flight.
- The **BROACH (Bomb Royal Ordnance Augmented Charge)** warhead features a **two-stage design** — the first charge pierces the target's surface, and the second detonates inside, ensuring deep penetration.

*INS uses onboard accelerometers and gyroscopes to continuously calculate a vehicle's position and velocity without external signals, while TRN matches onboard terrain-height profiles with ground elevation data to correct and refine the missile's flight path.*

### Mahe Water Crafts

The first of **8 Anti-Submarine Warfare Shallow Water Crafts (ASW SWC) 'Mahe'** was delivered to the Indian Navy.

#### Mahe

- **Built by:** Cochin Shipyard Limited (CSL), Kochi.
- **Named after:** Historic port town in the **Union Territory of Puducherry**.
- **Capabilities:** **underwater surveillance, Low Intensity Maritime Operations (LIMO), Anti-Submarine Warfare (ASW) operations** in coastal waters.
- **Significance:** Enhances **Indian Navy's ASW capability in littoral zones** & supports Government's **Aatmanirbhar Bharat** vision.

### Weakening of Multilateralism

Experts have highlighted that the erosion of multilateralism is occurring at a time when the world urgently needs coordinated global action.

- **Multilateralism** refers to **coordinated action** among at least three actors to address common problems beyond individual capacity.

#### Erosion of Multilateralism

- **Reduced effectiveness of Global Organisation:** E.g., Blocking of new Appellate Body appointments by US, leaving appeals unresolved and enforcement delayed.
- **Withdrawal from Global Frameworks:** E.g., US withdrew from the **Human Rights Council** and UNESCO
- **Resolving Conflicts-** E.g., Failure of UN to resolve Russia-Ukraine Conflict
- **Rise of Minilateralism and regional partnership:** Due to delayed decision making in multilateral institutions, nations are shifting towards mini-lateral. E.g., BRICS, Regional Comprehensive Economic Partnership (RCEP), etc.
- **Other:** Imposing unilateral economic sanctions, protectionist policies, etc.

### Way Ahead

- **Institutional Overhaul**- E.g., reforming the UNSC to grant veto power to countries such as India, Japan, and Brazil, to make it more representative and effective.
- **Addressing New and Emerging Global Challenges**: Establish new global standards in evolving areas such as digitalization and artificial intelligence.
- **Other**: Addressing Global South Priorities (e.g., climate finance), addressing protectionist policies, etc.

### PM Modi to Attend ASEAN Summit Virtually

- PM Modi will participate virtually in the **47<sup>th</sup> ASEAN Summit**, scheduled to be held in **Kuala Lumpur, Malaysia**, from October 26 to 28, 2025.

### Association of Southeast Asian Nations (ASEAN)

- It is a **regional group** of ten countries that promotes **economic, political, and security cooperation**.
- It was established in **1967** in **Bangkok** with the signing of the **ASEAN Declaration** (Bangkok Declaration). Its secretariat is in Jakarta, Indonesia.
- ASEAN has **10 member** countries: Brunei, Cambodia, Indonesia, Laos, Malaysia, Myanmar, the Philippines, Singapore, Thailand, and Vietnam. **India is not a member of ASEAN**.
- ASEAN led the creation of the Regional Comprehensive Economic Partnership (RCEP), now the world's largest **free trade agreement**.
- ASEAN is **one of India's largest trading partners** and collectively accounts for **approximately 11%** of India's global trade.

### State of Emergency in Peru

- **Peru's President José Jerí** declared a 30-day **state of emergency** in the **capital Lima** and the nearby Callao region, citing worsening public security and increasing crime rates.
- Peru has been experiencing a **rise in organised crime**, with nationwide **protests** led by "Gen Z" activists.

### Peru

- **Location**: Peru lies on the **western coast** of **South America**, bordered by **Ecuador** and **Colombia** to the north, **Brazil** to the east, **Bolivia** and **Chile** to the south, and the **Pacific Ocean** to the west.
- **Physical Divisions**: Three distinct regions — the **arid coast** in the west, the **Sierra (central highlands)** with the Andes mountains, and the **humid Selva (jungle)** with the Amazon rainforest in the east.
- **Drainage**: Includes the Amazon River, which originates in the **Andes** and flows into the **Atlantic Ocean**, and Lake Titicaca, the **world's highest navigable lake** shared with Bolivia.

- **Climate:** Varies from **dry coastal deserts** to **humid rainforests** due to latitude, elevation, and opposing currents of the **cold** Humboldt and **warm** El Niño.

### Indo-Tibetan Border Police (ITBP) Raising Day

- The 64th raising day of Indo-Tibetan Border Police (ITBP) was observed recently.

### Indo-Tibetan Border Police (ITBP)

- It was raised on October 24, 1962 and it guards the 3,488 km-long **India-China border**, stretching from the Karakoram Pass in Ladakh to Jachep La in Arunachal Pradesh.
- It also plays a crucial role in **internal security operations**, including **anti-Naxal duties** in **Chhattisgarh**.
- Many of the ITBP's Border Out Posts are located at altitudes between 9,000 and 18,800 feet, where temperatures can plummet to minus 45 degrees Celsius during winters.

### Relevance

- It is recognised as a specialised armed police force.
- It trains its personnel in mountaineering, skiing, and tactical combat, in addition to maintaining readiness for disaster response and relief operations in the Himalayan region.
- It has conducted numerous rescue missions, providing timely assistance to citizens affected by natural calamities.

### Defence Procurement Manual 2025

- The Defence Minister of India, Rajnath Singh, released the Defence Procurement Manual (DPM) 2025 in New Delhi.
- The Defence Procurement Manual (DPM) governs **revenue procurements** required for the **day-to-day functioning, maintenance, and operational readiness** of the Armed Forces.
- It is distinct from the **Defence Acquisition Procedure (DAP)**, which handles capital procurements.
- It replaces the **earlier manual of 2009** and incorporates lessons from defence reforms under the **Atmanirbhar Bharat initiative** and the **Defence Production and Export Promotion Policy (DPEPP) 2020**.
- The manual will become effective from **November 1, 2025**, and is expected to govern revenue procurement of about **₹1 lakh crore** by the three-Armed Services under the **Ministry of Defence**.

### Significance of the Defence Procurement Manual

- **Promoting Indigenisation:** Introduces a framework for **assured orders up to five years for indigenously developed products**, providing predictability for domestic manufacturers.
- **Level Playing Field:** Eliminates the requirement of **No Objection Certificates** from Defence Public Sector Undertakings before procurement from private sources.
- **Ease of Doing Business:** Simplifies procurement worth about **₹1 lakh crore** by decentralising authority to **Competent Financial Authorities (CFAs)** at the field level, enabling faster approvals.

- **Relaxed Penalties:** No Liquidated Damages (LD) during development; minimal post-prototype penalties incentivise genuine suppliers and support indigenisation.

### Challenges Within the Defence Procurement Manual

- **High Import Dependence:** India remains the world's largest arms importer (SIPRI, 2024), with around 36% of its defence needs sourced externally.
- **Low R&D Spending:** Defence research accounts for less than 1% of GDP, limiting innovation capacity.
- **Limited Private Sector Participation:** Historically dominated by public sector undertakings, private firms contributed only 22% of total defence production (MoD, 2023-24).

### Way Forward

- **Support to MSMEs:** Simplify eligibility norms, expand limited Tender options up to ₹50 lakh to promote inclusion and align the manual with MSME Samarth and Make in India initiatives.
- **Capacity Building:** Establish Defence Procurement Training Institutes for the uniform implementation of procedures. E.g. United Kingdom's Defence Equipment and Support Agency.
- **Monitoring & Transparency:** Create a digital monitoring dashboard for tracking revenue procurement at all stages. E.g. South Korea's Defence e-Procurement System (D2B).
- **Encouraging MRO Sector:** Allow a 15% upfront growth margin during refits and overhauls to strengthen the Maintenance, Repair and Overhaul ecosystem. E.g. Indian Navy's MRO Vision 2030.

### Project Arunank

- Project Arunank of the Border Roads Organisation (BRO) marked its 18th Raising Day in Naharlagun, Arunachal Pradesh.
- It was established in 2008 and it has built over 696 km of roads and 1.18 km of major bridges, enhancing connectivity to remote areas and supporting Armed Forces operations.
- **Notable achievements** include the blacktopping of the 278 km Hapoli-Sarli-Huri Road and strategic links like the TCC-Maza and TCC-Taksing Roads.
- It has embraced **sustainable technologies** such as Steel Slag, Geo Cells, and GGBFS Concrete to improve infrastructure durability.
- **Environmental efforts** include planting 23,850 trees under the 'Ek Ped Maa Ke Naam' initiative, while welfare measures for Casual Paid Labourers have improved working conditions.

### Future Plans

- BRO plans to expand road networks, build new bridges and tunnels, and enhance high-altitude connectivity using advanced technologies for safer, more sustainable infrastructure.

### ICGS Ajit and ICGS Aparajit

- The Indian Coast Guard launched two advanced **Fast Patrol Vessels—ICG Ship Ajit and ICGS Aparajit—at Goa Shipyard Limited (GSL).**
- These vessels are the seventh and eighth in a series of eight indigenously built FPVs being constructed by Goa Shipyard Limited (GSL) for the ICG, underscoring India's growing self-reliance in defence shipbuilding.
- The 52-metre-long vessels displace 320 tonnes and are equipped with Controllable Pitch Propellers (CPP) — the first of their kind in this class of ships in India — ensuring superior manoeuvrability and propulsion efficiency.

### Importance and Roles

- The FPVs are designed for multi-mission roles such as fisheries protection, coastal patrol, anti-smuggling, anti-piracy, and search and rescue operations, especially around India's island territories and Exclusive Economic Zone.

This marks a key step in enhancing India's coastal defense and maritime surveillance capabilities.

### Asia Pacific Accident Investigation Group

- For the first time, India will host the **APAC-AIG Meeting**. The event is being organised by the **Aircraft Accident Investigation Bureau (AAIB)**.

#### APAC-AIG

- A **regional cooperative mechanism** under ICAO that focuses on capacity-building, training, and standardisation of investigation procedures across the **Asia-Pacific region** as per **ICAO Annex 13**.
- The **annual meeting** is hosted by any one **ICAO member** state in the region.

### International Civil Aviation Organisation (ICAO)

- ICAO is a specialised agency of the United Nations that establishes **global standards** and **cooperation frameworks** for international civil aviation.
- **Establishment:** It was established by the **1944 Convention on International Civil Aviation (Chicago Convention)**, became a UN specialised agency in 1947, and is headquartered in **Montreal, Canada**.
- **Membership:** ICAO has **193 member** states, and **India** has been a **founding member** since 1944.
- **Structure:** It includes the **Assembly**, a sovereign body of all 193 States (meets every three years), the **36-member Council** (governing body with a three-year term), the **Secretariat** (handles daily operations), and **Regional Offices** (for local aviation development).

### Aircraft Accident Investigation Bureau (AAIB)

- The AAIB, established in **2012**, is India's primary agency for **investigating aviation accidents** and functions as an attached office under the **Ministry of Civil Aviation**, with its headquarters in **New Delhi**.

- Before AAIB, such investigations were handled by the **Directorate General of Civil Aviation**.
- It fulfils India's obligations under **Annexe 13** of the **Chicago Convention, 1944**.

### India Maritime Week 2025

- **India Maritime Week 2025** is taking place at the NESCO Grounds in **Mumbai**, organised by the **Ministry of Ports, Shipping and Waterways (MoPSW)**.
- This is a five-day **international maritime event** themed "Uniting Oceans, One Maritime Vision."
- **Objective:** Showcase India's maritime progress and attract global investments to position India as a leading **naval** and **Blue Economy hub**.
- **Participation:** **Ministers from 11 countries** and over **100,000 delegates** from **85 nations**—including policymakers and industry leaders will participate, making it the world's largest maritime gathering.
- **Events:** IMW 2025 will host key events, including the **4<sup>th</sup> Global Maritime India Summit (GMIS)**, the **QUAD Ports of the Future Conference**, the **UNESCAP Asia-Pacific Dialogue**, and **Sagarmanthan**.
- **Significance:** The event promotes India's Maritime India Vision 2030 and Maritime Amrit Kaal Vision 2047, emphasising **sustainability**, innovation, inclusive growth, **trade**, and **connectivity**.

*According to the World Bank, the **blue economy** is the "sustainable use of ocean resources for economic growth, improved livelihoods, and jobs while preserving the health of the ocean ecosystem".*

### 72 nations signed the UN Convention against Cybercrime in Hanoi, Việt Nam

It is the **world's first legally binding global convention to prevent and respond to cybercrimes**, adopted by the UN General Assembly in 2024.

- It will enter into force 90 days after ratification by at least 40 UN member states.

#### UN Convention against Cybercrime

- **Electronic Evidence:** It is the first global framework for the collection, sharing and use of electronic evidence for all serious offences, establishing a global standard.
- **Criminalization of Cybercrimes:** First global treaty to criminalize cyber-dependent crimes and also offences related to online fraud, online child sexual abuse and exploitation material and online grooming of children.
  - It is first in recognising **non-consensual dissemination of intimate images** as an offence.
- **Global Network:** It creates the **first global 24/7 Cooperation Network** where countries can quickly initiate cooperation.

#### Cybercrimes

- Cybercrime falls into **two broad categories:** cyber-enabled and cyber-dependent.
  - **Cyber-enabled crimes** include traditional criminal activities conducted online, such as trafficking, fraud, and incitement to violence and hate.
  - **Cyber-dependent crimes** are those committed through the use of Information and Communication Technology (ICT) devices, including phishing, identity theft, and the

deployment of malware and ransomware.

- **Threat:** Cybercrimes transcend geographic boundaries, targeting systems, networks, and individuals with unprecedented speed and efficiency.
  - Regions like **Southeast Asia** have been described as “ground zero” for organized cybercrime operations.

### 22<sup>nd</sup> ASEAN-India Summit

- The **22<sup>nd</sup> ASEAN-India Summit** was held virtually under **Malaysia's chairmanship**, as part of the larger 47<sup>th</sup> ASEAN Summit in **Kuala Lumpur**.

*Timor-Leste formally joined ASEAN as the 11<sup>th</sup> member and participated in the summit for the first time as a full member.*

### Key Outcomes of the Summit

- **Maritime Cooperation:** India declared 2026 as the ‘**ASEAN-India Year of Maritime Cooperation**’ to advance collaboration in the blue economy and maritime security.
- **Sustainable Tourism:** A **Joint Statement on Sustainable Tourism** was adopted to promote eco-friendly practices aligned with the **2025 ASEAN-India Year of Tourism**.
- **Trade Agreement Review:** India called for an early review of the **ASEAN-India Trade in Goods Agreement (AITIGA)** to address trade imbalances and streamline market access.
- **Strategic Partnership:** The summit renewed the **ASEAN-India Comprehensive Strategic Partnership (2026-2030)**, with a focus on digital inclusion, food security, and resilient supply chains.
- **Institutional Initiatives:** India proposed a **Centre for Southeast Asian Studies** at Nalanda University and a **Maritime Heritage Festival** at Lothal, Gujarat.

### Significance of the Summit

- **Act East Policy:** The summit reinforced ASEAN's centrality in India's **Act East Policy** and **Indo-Pacific** strategic outreach efforts.
- **Regional Stability:** India reaffirmed its commitment as a trusted partner in ensuring peace and maritime stability in the Indo-Pacific.
- **Cultural Linkage:** Civilizational links and people-to-people exchanges were highlighted to promote mutual trust and regional goodwill.

### Timor-Leste

- **Location:** Timor-Leste, or East Timor, is located on the **eastern half of Timor Island** in Southeast Asia.
  - Timor Island is the largest and easternmost of the **Lesser Sunda Islands**, situated at the southern end of the **Malay Archipelago**.
- **Boundaries:** It is bordered by the **Timor Sea** to the southeast, **Wetar Strait** to the north, **Ombai Strait** to the northwest, and **western Timor** to the southwest.

- **Relief and Capital:** Mount Tatamailau (Mount Ramelau) is the **highest point**, while Dili is the **capital**.
- **History:** It was a **Portuguese colony**, later occupied by **Indonesia**, and gained full independence in 2002.
- **Geographic Distinction:** Timor-Leste is the **only Asian country** entirely in the **Southern Hemisphere**.

### Burevestnik Cruise Missile

Russia successfully tested its **nuclear-powered Burevestnik cruise missile**, reportedly travelling 14,000 km and staying airborne for nearly 15 hours.

#### Burevestnik Missile

- Burevestnik, meaning “storm petrel,” is a Russian **ground-launched, nuclear-powered, and nuclear-armed cruise missile** with a **virtually unlimited range**.
- **Propulsion System:** It is launched using a solid-fuel rocket booster, after which a **compact nuclear reactor** powers sustained, long-range flight.
- **Operational Range:** Nuclear propulsion offers extended endurance, allowing **low-altitude flight** with **unpredictable** and flexible routes.
- **Evasion Capability:** Its low-flying, **highly manoeuvrable design** allows it to evade radar detection and bypass advanced missile defence systems.
- It is one of six **strategic weapons of Russia's** new-generation **nuclear arsenal**.
- **Type:** Long-range, low-flying **nuclear-powered cruise missile**.
  - Cruise missile is powered by jet engines for continuous flight throughout their journey.

### Evolving Geopolitical Centrality of the Western Indian Ocean Region (WIOR)

Recently, China sent a new navy fleet for escort missions in the **Gulf of Aden** and **off the coast of Somalia**.

#### Significance of WIOR

- **Strategic & Geopolitical:** Connects key sea lanes linking the Middle East, Africa, and Asia.
  - It includes important chokepoints like the Strait of Hormuz, Bab el-Mandeb, and Mozambique Channel.
- **Energy Security:** **Strait of Hormuz** carries around 20 % of global oil shipments.
- **Economic:** The total “ocean asset base” of the WIOR is at least USD333.8 billion.
- **Gateway to Africa:** Acts as a bridge between Asia and Africa.
- **For India:**
  - **Indo-Pacific Cooperation:** Strengthen India's engagement with countries such as France and others.
  - **Net Security Provider:** Engagement with WIOR enhances its influence.

- **Blue Economy:** Central for **Deep Ocean Mission**.

### Challenges in WIOR

- **Rising Chinese Influence:** China is using policies like “debt-trap diplomacy” to increase its influence. E.g., China’s military base in Djibouti and Gwadar port in Pakistan
- **Emerging Maritime Threats:** E.g., maritime piracy, illegal carrying of weapons, drug trafficking, etc.
- **Conflicts:** E.g. Conflicts in Yemen (Houthis Militias)
- **Other: Non-traditional** (E.g., Environmental threats driven by climate change), etc.

### India’s Measures to Protect Its Interests in WIOR

- **SAGAR (Security and Growth for All in the Region):** Maritime cooperation doctrine for the Indian Ocean region.
- **Memberships in common multilateral forums:** E.g. Indian Ocean Rim Association (IORA), Indian Ocean Naval Symposium (IONS) etc.
- **Defence Cooperation and Capacity Building:** E.g., Naval exercises Konkan (between Indian and the United Kingdom)
- **Strategic Partnerships with Island Nations:** E.g., Mauritius developed runway and jetty with Indian assistance at Agalega Island.
- **Other:** Information Fusion Centre–IOR, **Operation Sankalp** (played a pivotal role as the ‘First Responder’ and ‘Preferred Security Partner’ in IOR), Chabahar Port (Iran), etc.

### Panda Diplomacy

China's golden monkeys were sent to France and Belgium, fostering scientific and conservation collaborations similar to **Panda Diplomacy**.

- **Golden Snub-Nosed Monkeys** (also known as the **Sichuan golden-snub monkey**) is an Afro-Eurasian primate native to the central and southwestern regions of China.
- It refers to the **practice of the Chinese government gifting or loaning giant pandas** to other countries as a symbol of friendship, goodwill, or to strengthen diplomatic relations.
- **Other Similar Diplomacies:** Orangutan diplomacy of Malaysia, Koala diplomacy of Australia, Elephant Diplomacy of Thailand.

### INS Mahe

- **Cochin Shipyard Limited (CSL)** delivered the **first of eight Anti-Submarine Warfare Shallow Water Crafts (ASW-SWC)** named **INS Mahe** to the **Indian Navy**.
- Named after the **historic port town of Mahe** in the Union Territory of **Puducherry**, the **78-metre INS Mahe** is the **largest Indian naval warship** powered by a **diesel engine waterjet propulsion** system.
- It is engineered for **underwater surveillance**, anti-submarine warfare in coastal waters, **low-**

**intensity** maritime operations, search and rescue, and **advanced mine-laying**.

- With over **80% indigenous content**, it embodies the spirit of **Aatmanirbhar Bharat** and has been designed and built under the **Classification Rules of Det Norske Veritas (DNV)**.

***Det Norske Veritas (DNV): A Norwegian classification and quality assurance agency that sets international standards for the design, safety, and construction of ships and offshore structures.***

### **Eighth Session of the International Solar Alliance (ISA) Assembly Held in New Delhi**

#### **ISA**

- **Genesis:** It is a **global intergovernmental organization launched in 2015** by India and France at COP21 in Paris.
  - It is the **largest treaty-based intergovernmental organisation** from the Global South.
- **Headquarters:** Gurugram, India. It is the **first international intergovernmental organization headquartered in India**.
- **Membership:** **124 Member and Signatory Countries**.
  - Following a **2020 amendment** to its Framework Agreement, **all UN member states are now eligible to join the Alliance**.
- **Aim:** To bring **clean, reliable, and affordable energy** to communities, driving **sustainable growth** and improving **quality of life**.
- **Mission:** To **unlock \$1 trillion in solar investments by 2030** while reducing technology and financing costs.
- **Collaborative Initiatives:** SolarX Startup Challenge, STAR-C Initiative, Global Solar Facility, One Sun, One World, One Grid (OSOWOG) etc.

#### **Key highlights of the Session**

- **Launch of SUNRISE (Solar Upcycling Network for Recycling, Innovation & Stakeholder Engagement):** A global initiative to promote solar waste recycling, green employment, and circular economy.
- **Small Island Developing States (SIDS) Procurement MoU:** 16 SIDS joined hands under an **ISA-World Bank platform** for coordinated solar procurement and capacity building.
- Released ISA's flagship reports: **Ease of Doing Solar 2025 and Solar Trends 2025**.
- **Other:** **Global Capability Centre** was unveiled to create a **Silicon Valley for Solar** in India, **ISA Academy** ( AI-based online learning platform) launched.

### **South Korea, US, Japan to Hold Trilateral Diplomatic Talks at APEC**

- South Korea, the US, and Japan will hold **trilateral talks** during the **Asia-Pacific Economic Cooperation (APEC) Summit 2025** in South Korea.

#### **Asia-Pacific Economic Cooperation (APEC)**

- APEC is a **regional economic forum** established in **1989** to leverage and support the growing interdependence among Asia-Pacific economies.

- The **headquarters** of APEC is in **Singapore**.
- It comprises **21 member economies** from the Pacific Rim, including the US, China, Japan, Australia, Canada, South Korea, and others. However, **India is not a member**.
- All decisions require consensus and are **non-binding**, and commitments are voluntary.
- APEC is home to over **2.9 billion people** and accounts for over **60% of global GDP**.

### 20<sup>th</sup> East Asia Summit

The **20<sup>th</sup> East Asia Summit**, held in **Malaysia**, adopted the **Kuala Lumpur Declaration** reaffirming its commitment to peace and stability in the Indo-Pacific.

### East Asia Summit (EAS)

- The East Asia Summit (EAS) is an **ASEAN-led annual forum** in the **Indo-Pacific** that addresses regional political, security, and economic issues.
- **Formation:** Established in **2005 in Kuala Lumpur**, it remains the **only leader-led forum** in the Indo-Pacific dedicated to strategic dialogue.
- **Members: 18 Countries; 10 ASEAN members** and **8 dialogue partners** (**India, China, Japan, US, Russia, Australia, New Zealand, South Korea**). **Chairmanship** rotates annually among **ASEAN members**.
  - Timor-Leste has become the **11<sup>th</sup> member** of ASEAN, bringing the total membership to **19**.
- **Objective:** To promote regional peace, prosperity, and rule-based cooperation through open dialogue.
- **Core Principles:** Upholds openness, inclusivity, and respect for international law with ASEAN centrality.
- **Six Focus Areas:** (a) Environment and energy, (b) Education, (c) Finance, (d) Global health, (e) Natural disaster management, and (f) ASEAN connectivity.

### 20<sup>th</sup> East Asia Summit

- The 20<sup>th</sup> East Asia Summit was held in **Kuala Lumpur** in October 2025 alongside the 47<sup>th</sup> ASEAN Summit under **Malaysia's chairmanship**.
- **Theme:** "**Inclusivity and Sustainability**".
- **Key Outcome:** The summit adopted the '**Kuala Lumpur Declaration**', reaffirming collective commitment to peace, stability, multilateralism, and ASEAN centrality.

### SJ-100 Civil Aircraft

- **Hindustan Aeronautics Limited (HAL)** has signed a MoU with **Russia's PJSC United Aircraft Corporation (UAC)** for the domestic production of the SJ-100 civil commuter aircraft.

### SJ-100

- The **SJ-100** is a **twin-engine, narrow-body commuter aircraft**, already in service with over 16

commercial airlines globally.

- **Russia's SJ-100 aircraft** is a new-generation regional jet with a seating capacity of **103 passengers** and a **flight range of 3,530 km**, designed for medium-haul routes.
- **Key features** are engineered for **low operating costs** and capable of **functioning in extreme temperatures** ranging from  $-55^{\circ}\text{C}$  to  $+45^{\circ}\text{C}$ , enhancing its adaptability for diverse climatic conditions.

#### Significance of the Collaboration

- HAL will now hold the **manufacturing rights** for the SJ-100 in India, marking the **country's first full-scale passenger aircraft production** since the AVRO HS748 project (1961-1988).
- The aircraft is expected to become a "game changer" for **short-haul and regional connectivity** under the UDAN (**Ude Desh ka Aam Nagrik**) Scheme, enhancing accessibility to Tier-2 and Tier-3 cities.
- India's aviation sector is projected to require over **200 aircraft** of this category within the **next decade**, driven by expanding regional air networks.
- An additional **350 aircraft** may be needed for the Indian Ocean region, catering to short international routes and tourism hubs.

### US and Chinese president met on the sidelines of Asia-Pacific Economic Cooperation (APEC) summit in Busan

#### Key Outcomes of Busan meet

- U.S. agreed to **reduce a tariff punishing China** for the flow of fentanyl into the U.S. by 10%.
  - Fentanyl is an **opioid drug, like morphine or heroin**, made entirely in laboratories with no natural ingredients.
- China agreed to **extend for one year a pause on export controls of rare earth minerals**.
  - Rare earths (group of 17 metallic elements) are used to produce magnets and other components used in missiles, aircraft, cars, refrigerators, other hi-tech devices etc.
- US president dubbed the meeting as **G-2**, a word first popularized by American economist C.F Bergsten in 2005.
  - G-2 envisaged the US and China as **co-managers of global stability** through joint responsibility on economic governance, trade imbalances, and global problem-solving.

#### Implication of G2 for world

- **Relevance of Regional institutions:** Like Quad, Aukus, which were put to counter China could be questioned as US and China move towards a strategic accommodation.
- **Shift Towards Bipolarity:** G2 signals convergence between US and China as global powers and bilateral decisions on key global issues can undermine multipolarity and interests of global south.
- **Dependence on China:** The shift identifies global and American reliance on China for critical minerals and semiconductor supply chains.
- **Implications for India:** US-China rapprochement could reduce the US's reliance on India as a

geopolitical counter to China while emboldening China's assertiveness towards India.

### Exercise Trishul

India launched **Exercise Trishul**, a large-scale **tri-service war game** along its **western border with Pakistan**, with a focus on the disputed Sir Creek region.

A war game is a **simulation of a military operation**, battle, or campaign involving real military units and equipment in the field to **evaluate combat readiness** under controlled conditions.

- It is a **12-day drill** involving the **Army, Navy, and Air Force**, taking place across **Rajasthan and Gujarat**.
- **Objective:** To test **tri-service coordination** and validate newly inducted **indigenous tech & weapons**.
- **Scale:** Over 20,000 Army personnel supported by **T-90 tanks**, BrahMos missile units, and **Prachand helicopters** operate alongside **naval frigates and destroyers** for amphibious and maritime drills.
- **Key Feature:** The Air Force is conducting high-tempo '**Mahagujrat**' operations, deploying Rafale and Sukhoi-30MKI fighters, as well as unmanned aerial vehicles (UAVs), among others.
- **Significance:** The exercise incorporates **indigenously developed systems** and weapons platforms, highlighting India's "**Atmanirbharta**" (self-reliance) in defence technology.

## SOCIETY AND SOCIAL JUSTICE

### NITI Aayog AI Roadmap for Inclusive Societal Development

- *NITI Aayog*, in partnership with **Deloitte**, launched "AI for Inclusive Societal Development" and initiated *Mission Digital ShramSetu*.
- The mission aims to make **AI accessible, affordable**, and impactful for India's **490 million informal workers**.
- Digitizing informal work could boost GDP by **1.5–2 percentage points annually**, unlocking **\$400–500 billion in productivity gains by 2047**.
- AI interventions aim to raise informal workers' income from **\$6,000 to \$14,500 per year by 2047** and increase female labor participation from **37% to over 45%**.
- *AI and blockchain-based digital IDs* could formalize **150 million unregistered enterprises**, improving access to credit and welfare.

### E-Cigarettes and the Rising Health Risks

WHO's first global estimate of e-cigarette use reveals that teens are nine times more likely to vape than adults.

## How e-cigarettes work

- 1 Device is activated when user inhales from the mouthpiece
- 2 Atomiser heats up liquid in cartridge
- 3 Vapour is produced and the LED indicator lights up



### E-Cigarettes

E-cigarettes are **battery-powered devices** that heat a liquid into an inhalable aerosol that contains **nicotine, propylene glycol, glycerin**, flavourings, and other chemicals.

E-cigarettes are also known as vape pens, vapes, **electronic nicotine delivery systems (ENDS)**, etc.

E-cigarettes may/may not have nicotine, but they do not contain tobacco.

### Key Findings of WHO's Report

**15 million teens** (13–15 yrs) use e-cigarettes, and youth are **9 times more** likely to vape than adults.

Total Vapers: **>100 million globally**, including 86 million adults, mainly in high-income countries.

Tobacco users declined from **1.38 billion (2000) → 1.2 billion (2024)**.

#### Regional Trends

**Southeast Asia:** Male tobacco use fell from 70% → 37% (2000–2024).

**Europe:** Now the highest tobacco prevalence (24.1% overall).

*In India, the possession of e-cigarettes and similar devices is a violation of the **Prohibition of Electronic Cigarette Act of 2019**.*

### Prohibition of Electronic Cigarettes Act, 2019

- **Complete Ban:** The Act prohibits the **production, manufacture, import, export, transport, sale, distribution, storage, and advertisement** of all electronic cigarettes (e-cigarettes).
- **Prohibited Activities:** No individual or company can trade, advertise, or promote e-cigarettes.

### Penalties:

- **Manufacture, sale, or advertisement:** Imprisonment up to **1 year** or a **fine up to ₹1 lakh** (first offence); for subsequent offences, imprisonment **up to 3 years** or a **fine up to ₹5 lakh**.
- **Storage of e-cigarettes:** Imprisonment up to 6 months or a fine up to **₹50,000, or both**.
- **Exemptions:** The Act does not apply to **approved research and testing** activities.

### Challenges in the Implementation of the Act in India

- **Online Sales:** A 2023 study by the **NGO Voluntary Health Association of India** found that **over 60%** of e-cigarette products were accessible via e-commerce platforms in India.
- **Youth Targeting:** Influencer marketing on **social media** and flavour-based products attract minors.
- **Absence of Cessation Support:** Only **1 in 5 tobacco users in India** has access to counselling or nicotine replacement therapy (**Global Adult Tobacco Survey, 2022**).
- **Product Innovation:** New **disposable** and **flavoured devices** enter the market under alternative brand names, evading customs and enforcement scrutiny.

### Way Forward

- **Digital Surveillance:** Deploy **AI-based monitoring** tools to detect online vape sales and social-media promotions. E.g. Inspired by the EU's "**Track & Trace**" digital monitoring system.
- **Youth Awareness Campaigns:** Integrate anti-vaping education under the **National Tobacco Control Programme (NTCP)**. E.g. **New Zealand's "Vape-Free Schools"** policy to reduce adolescent exposure.
- **Cessation Infrastructure:** Expand quit-support helplines like "**mCessation Programme**" under Digital India, which has already **helped over 3 million tobacco users attempt quitting**.
- **Inter-Agency Coordination:** Create a central "**Nicotine Product Enforcement Task Force**" involving the MoHFW, IT Ministry, and the Customs.

### Tobacco Free Youth Campaign 3.0

The *Ministry of Education* and the **Ministry of Health & Family Welfare** jointly launched *Tobacco*

### Free Youth Campaign 3.0.

- It is a **60-day initiative** to prevent tobacco use among students and promote a *tobacco-free lifestyle* in schools and higher education institutions.
- India has over **270 million tobacco users**, with **8.4% of youth aged 13-15** currently using tobacco.
- Key activities include *awareness rallies*, **pledge ceremonies**, enforcement of *Tobacco-Free Educational Institutions (ToFEI)* guidelines, and counseling sessions.
- The campaign aligns with **Viksit Bharat@2047** and builds on existing measures like **COTPA 2003**, the *National Tobacco Control Programme (NTCP)*, and the **Prohibition of Electronic Cigarettes Act 2019**.

### Unified Mental Health Response

- India's 13.7% mental disorder prevalence is worsening due to stress from disasters and conflicts.
- *World Mental Health Day* urged a **unified response and integration of mental health** in emergency management, as **1 in 5 crisis-hit people** face mental disorders.

- *World Mental Health Day (October 10)*, observed since 1992 by the **World Federation for Mental Health (WFMH)** with WHO support, carries the 2025 theme — "*Mental health in humanitarian emergencies*", reaffirming that mental health is a universal human right.

### Need for a Unified Mental Health Response in India

- **High National Burden:** India has a **13.7% lifetime prevalence** of mental disorders, affecting **nearly 200 million** people, signalling a large unmet care need (National Mental Health Survey, 2015-16).
- **Global Scale:** Over **1 billion individuals (13% of the world population)** live with mental illnesses, making it a major global health crisis (World Health Organisation, 2025).
- **Workforce Deficiency:** Only **0.75 psychiatrists** and **0.12 psychologists** per 1 lakh population, far below the **WHO norm of 3 psychiatrists per 1 lakh**, which limits accessibility (WHO Mental Health Atlas).
- **Budgetary Shortfall:** Mental health receives just **1.05%** of India's total health budget, compared to **8-10% in developed nations** like the U.K. and Canada (Union Budget 2024-25; OECD, 2024).
- **Medication & Rehabilitation Gaps:** **Less than 15%** of identified patients receive rehabilitation; frequent **stock-outs of psychotropic drugs** at PHCs hinder continuity (MoHFW Evaluation Report, 2023).
- **Awareness Deficit:** Over **50% of Indians** still attribute mental illness to "**personal weakness**" or "**shame**," reducing early help-seeking (NIMHANS Perception Survey, 2022).
- **Urban-Centric Services:** **Nearly 70%** of India's population lives in rural areas, **but < 25%** of mental-health facilities are located outside cities (National Health Profile, 2023).

### Urgent Need to Prioritise Mental Health in Crises and Emergencies

- **Impact of Crises:** Nearly **1 in 5 people (22%)** exposed to war or conflict in the past decade suffer from depression, anxiety, PTSD, or related disorders (Global Health Estimates 2024).
- **Climate & Disaster Link:** Over **70 million people** are displaced annually by climate-induced disasters worldwide, **exacerbating** trauma, stress, and grief (UNDRR, 2024).
- **Pandemic After-Effects:** The COVID-19 pandemic **triggered a 25% global rise** in anxiety and depression, demonstrating how emergencies amplify mental disorders (WHO Scientific Brief, 2022).
- **India's Crisis Exposure:** India has faced **over 55 major disasters** between 2000 and 2024, affecting **~900 million** people; yet, most disaster response plans lack mental health components (NDMA, 2024).
- **Children at Risk:** Exposure to disaster-related violence or displacement **increases the risk of depression by 60%** among minors (UNICEF, 2023).
- **Limited Crisis Workforce:** **Less than 10%** of district disaster teams include trained mental-health professionals, highlighting institutional neglect (NDMA Assessment, 2024).

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## Nobel Prize in Literature, 2025

Hungarian writer Laszlo Krasznahorkai won 2025 Nobel Prize in Literature.

Laszlo Krasznahorkai was born in 1954 in Gyula, Hungary, near the Romanian border.

Major works: *Satantango* (1985), *The Melancholy of Resistance* (1989), *War & War* (1999), etc.

**About Nobel Prize**

Established by Alfred Nobel in 1895.

First Nobel Prizes were awarded in 1901.

An international award administered by the Nobel Foundation in Stockholm, Sweden.

6 Categories: Peace, Physics, Chemistry, Medicine, Literature, and Economic Science.



### Nobel Prize in Literature 2025

- The Royal Swedish Academy of Sciences awarded the **2025 Nobel Prize in Literature** to Hungarian novelist and screenwriter **László Krasznahorkai**.
- **Major Novels:** Known for distinct long sentences that can span dozens of pages, his acclaimed works include *Satantango* (1985) and *The Melancholy of Resistance* (1989).

**Citation:** The Academy honoured him for an introspective body of work that reaffirms **art's enduring humanistic power** amid apocalyptic themes.

### Nobel Peace Prize 2025

- The Norwegian Nobel Committee awarded the **2025 Nobel Peace Prize** to Venezuelan opposition leader **María Corina Machado**.

- **Recognition:** She was honoured for **promoting democratic rights** and **advocating a peaceful transition** from dictatorship to democracy in Venezuela.
- **Political Role:** Machado, the leader of the **Vente Venezuela party**, has mobilised civic movements demanding judicial independence, electoral transparency, and human rights protection.

### Fiji's National Child Safeguarding Policy

- **South-Pacific** island-nation Fiji launched its first **National Child Safeguarding Policy** to standardise child protection efforts across institutions.
- **Objective:** The policy aims to ensure that all **child-related services** are delivered in a **safe, respectful**, and equitable manner, while holding service providers accountable.
- It mandates every organisation working with children to adopt a **Child Protection Code of Conduct** and recruit staff only after mandatory **criminal background checks**.
- The policy addresses child protection concerns, as UNICEF reports that **Pacific Island nations** face some of the highest rates of **violence against children** worldwide.

### Decline of the Maoist Movement

- Maoist insurgency in India has **weakened significantly** in recent years as security operations, surrenders, and development-led governance have reduced its spread to only a few districts.
- In 2025 alone, 270 Naxalites were killed, 680 arrested, and 1,225 surrendered to authorities

### Factors for the Decline of the Maoist Movement in India

#### Counter-Offensive By the Government

- **Security Crackdowns:** Sustained joint operations by central and state forces have eliminated cadres, dismantled bases, and restored state control in former Maoist strongholds.
- **Infrastructure Expansion:** The development of roads through PMGSY and telecom connectivity via BharatNet has enhanced mobility and deployment, reducing Maoist control over supply routes.
- **Financial Targeting:** The National Investigation Agency (NIA) and Enforcement Directorate have disrupted Maoist funding networks, frozen assets, and blocked cash flows vital to their operations.
- **Surrender Policy:** Attractive **rehabilitation packages** offering financial aid, vocational training, and housing support have resulted in widespread surrenders and a decline in insurgent manpower.

#### Organizational Weakness

- **Leadership Loss:** The deaths and arrests of top leaders, such as General Secretary Nambala Keshav Rao in 2025, caused a leadership vacuum and disrupted the command chain.
- **Internal Divisions:** Ideological splits over the **relevance of armed struggle** have fractured leadership unity, weakening cohesion among state committees and regional commands.

#### Changing Socio-Political Context

- **Development Outreach:** The expansion of education, healthcare, and welfare programs in remote

districts has **eased socio-economic grievances** that Maoists frequently exploit.

- **Ideological Fatigue:** The **austere jungle lifestyle** and rigid ideology have **lost relevance among youth** seeking modern livelihoods and democratic participation.
- **Public Disillusionment:** Years of violence, extortion, and coercion have diminished trust in Maoist ideology, **redirecting local loyalties** toward governance and peace.

#### Current Maoist Insurgency Landscape in India

- **Eradication Goal:** The Ministry of Home Affairs aims to **eliminate Naxalism by March 31, 2026**, through intensified security operations and targeted development initiatives.
- **Security Expansion:** Between 2019 and 2025, **320 new security camps** and **68 night-landing helipads** were established to expand the state's presence in Maoist-affected areas.
- **Infrastructure Push:** Since 2019, **development spending** in Maoist-affected districts has risen by **300%**, with over **10,000 projects** and 14,600 km of roads completed.
- **District Reduction:** The number of **most affected districts** has decreased from 12 to **6**, bringing the **total Maoist-affected districts to 18**.
- **Violence Decline:** Reported left-wing **extremism incidents** sharply declined from 1,936 in 2010 to **374 in 2024**, indicating continued operational success.
- **Affected Police Station:** The number of **Maoist-affected police stations** decreased to **104 in 2024**.

#### Siddi Community

- President Droupadi Murmu commended the Siddi community for reaching **over 72% literacy** and encouraged them to keep pursuing education for empowerment.
- The **Siddis**, also known as **Sheedis** or **Habshis**, are a **primitive tribal group of African origin**.
- They were brought from **East Africa to India** as **slaves** by Indian rulers & Portuguese traders between the **15<sup>th</sup> and 17<sup>th</sup> centuries**.
- **Distribution:** They are mainly concentrated in **Gujarat, Maharashtra, Karnataka, and Andhra Pradesh**.
- **Religious Practices:** They practice several religions, including Islam, Hinduism, and Christianity.
- **Cultural Traditions:** The Siddis are known for their **Dhamal** or **Goma tradition**, which combines **African drumming** and rhythms with Indian influences.
- **Legal Status:** Recognised as a **Scheduled Tribe** in the **2011 Census** and classified as a Particularly Vulnerable Tribal Group (PVTG) in **Gujarat**.

#### Inequality in Pre-Primary Education

- The **NSS 80<sup>th</sup> Round (2025)** reveals deep inequalities in **India's pre-primary education**, showing how early schooling access and quality diverge sharply across rural-urban and income lines.

#### Key Findings of NSS 80<sup>th</sup> Round Survey

- **Pre-primary enrolment:** Only **10.4%** of total school students, the lowest among all levels.

- **Rural-Urban Divide:** 65.6% of rural pre-primary students attend government institutions, whereas 62.9% of urban students attend private unaided schools.
- **Expenditure Gap:** Avg. rural household spending is ₹6,059/year and Avg. urban household spending is ₹18,943/year, which is 3× higher.
- **Tuition Add-on:** Urban parents spend ₹783/year on private coaching even at the pre-primary level.
- **Gender Parity:** 10.3% (boys) vs 10.6% (girls) shows a negligible difference.

### Challenges Faced in the Pre-Primary Education System

- **Structural Inequity:** Only 8% of rural households can afford private pre-primary education (NSS 2025).
- **Privatisation Surge:** Over 60% of urban pre-primary students in private unaided schools, and the government pre-primary enrolment share has declined by 12% since 2015 (NIEPA 2024).
- **Quality Deficit:** 1.3 million Anganwadis, but only 58% have dedicated learning spaces. Only 1 in 4 ECCE teachers receive formal pedagogical training (NCERT, 2023).
- **Normative Conditioning:** Social stratification begins by age 3-4, reducing intergenerational mobility (UNESCO GEM Report 2024).

### Way Forward

- **Universal ECCE Access:** Expand Anganwadi-Pre-school Integration under Saksham Anganwadi & Poshan 2.0 for uniform quality. E.g. Tamil Nadu's Anganwadi-Balwadi model.
- **Equity-focused Funding:** Implement NEP 2020's 6% GDP target for education with dedicated pre-primary spending and use Samagra Shiksha 2.0 to bridge infrastructure gaps in rural areas.
- **Regulate Private Pre-schools:** Introduce a National Early Childhood Care and Education (ECCE) Regulatory Framework to standardise fees, curriculum, and quality.
- **Capacity Building:** Launch National Early Educator Fellowship for training ECCE teachers.
- **Digital Inclusion:** Develop a Unified ECCE Data Portal under the Ministry of Education for tracking enrolment, dropouts, and infrastructure. E.g. DIKSHA & PM eVidya platforms.

### Natural Farming and Gender Inequality

- Experts warned that India's natural farming policies, while promoting sustainability, risk reinforcing gender inequality by overlooking feminisation of Agriculture.
- National Women Farmers' Day & International Day for Rural Women are observed on October 15.

### Gender Dimensions in Agriculture

- **Rising Female Participation:** As per the Periodic Labour Force Survey (PLFS) 2023-24, 76.95% of rural women are engaged in agriculture. ~50% of self-employed farmers are women.
- **Low Land Ownership:** Only 12.8% of operational land holdings are owned by women,

which constitutes 10.34% of the area of holdings. (Agriculture Census, 2021).

- **Credit & Insurance Access:** Fewer than 10% of women farmers access formal credit or crop insurance (NABARD, 2022).

### National Mission on Natural Farming

- **Aim:** Promote chemical-free, resource-efficient, biodiversity-based farming.
- **Approach:** Agroecology principles of Beejamrut, Jeevamrut, Ghanajeevamrut.
- **Implementing agency:** Ministry of Agriculture & Farmers' Welfare.
- **Model State:** Andhra Pradesh Community Natural Farming (APCNF).
- **Governing Vision:** "Farmer-led, local resource-based, low-input agriculture."
- **Issue of Gender Inequality:** Policy is blind to gender, omitting it entirely, while Krishi Sakhis are included only as activity-based para-extension workers without secure employment.

### Skilling for AI Readiness (SOAR) Programme

- The **Ministry of Skill Development and Entrepreneurship (MSDE)** launched the **SOAR programme** to equip students and educators with foundational **AI literacy** for AI-era jobs.

### Key Elements of the Programme

- It includes **school students (classes VI-XII)** and **educators** across government and private schools.
- The **programme** offers **three 15-hour modules** for students and a **45-hour module** for teachers.
- Union Budget 2025-26 allocated **₹500 crore** to set up a **Centre of Excellence in Artificial Intelligence** for Education to support research, content and teacher training.
- The SOAR initiative complements ongoing programmes under the Skill India Mission, including the **Pradhan Mantri Kaushal Vikas Yojana (PMKVY) 4.0**, **National Apprenticeship Promotion Scheme (NAPS-2)**, and the **Skill India Digital Hub (SIDH)**.

*The CBSE introduced AI as a subject for **Class IX in 2019-20** and later extended it to **Class XI**, aligning with NEP's vision of skill-based learning and real-world applications.*

### Kerala's Extreme Poverty Eradication Programme

- **Kerala** will be officially declared **free from extreme poverty** on **November 1, 2025**, becoming the **first Indian State** to achieve this milestone.
- The announcement marks the culmination of a four-year effort under the **Extreme Poverty Eradication Programme (2021-2025)**.

### Extreme Poverty

- **Definition:** The World Bank defines extreme poverty as living on less than **\$2.15 per day**, indicating a level of absolute deprivation where basic needs such as food, shelter, and healthcare cannot be met.

- **Updated Benchmark (2025):** Reflecting inflation and higher living costs, the World Bank revised the threshold to **\$3 per day (PPP 2021)** for low-income nations.
- **Measurement Method:** The metric is based on **Purchasing Power Parity (PPP)**, which equalises the cost of living across countries and uses **Household Consumption Expenditure Survey (HCES)** data.

### Extreme Poverty Eradication Programme (2021–2025)

- Initiated in **2021** to make Kerala **free from extreme poverty** by addressing deprivations in food, health, housing, and livelihood under the support of **Kudumbashree** (women empowerment program).
- Identified **64,006** **extremely poor families** through **door-to-door surveys** using **multidimensional poverty indicators**. By **2025, 59,277 families** were uplifted; **3,913 houses** were built, **1,338 families** were given land, and **21,263 individuals** received essential IDs.
- Every beneficiary was **geo-tagged**, and **micro-plans** were prepared for each household to ensure long-term social and economic rehabilitation.

### How Kerala Became India's First Extreme Poverty-Free State?

- **Data-Driven Targeting:** **Smart Panchayat Project** and **Kerala State Poverty Eradication Mission (Kudumbashree)** enabled accurate beneficiary identification via community data validation.
- **Integration of Welfare Schemes:** Converged State and Central welfare schemes into a unified beneficiary support plan. E.g. **Life Mission:** housing for landless families, **Aardram Mission:** primary healthcare for poor households, **Ashraya Project:** targeted welfare for destitute and elderly.
- **Decentralised Governance Model:** **People's Plan Campaign** (Janakeeya Aasuthranam) and **Nava Kerala Mission** ensured community-driven planning and financial autonomy at the local level.
- **Use of Technology:** **Kerala State IT Mission** developed GIS platforms for tracking assets, **e-Sevanam Portal** integrated service delivery and houses geo-tagging under **Rebuild Kerala Initiative (RKI)**.
- **Political Consensus:** Idea of "**Mission Mode Governance**", aligning political consensus with social welfare targets, and **Kerala Institute of Local Administration (KILA)** training for local officers.

### Ollo Tribe

- The Khonsa Battalion of the Assam Rifles has launched a **skill-based empowerment initiative** for the **Ollo tribe** women under **Operation Sadbhavana** in Lazu village, **Arunachal**

### Pradesh.

- The Ollo tribe, also known as **Lazu Naga** or a subgroup of the **Tangshang Naga**, is an indigenous Tibeto-Burman community inhabiting the **Lazu Circle of Tirap district, Arunachal Pradesh**.
- Ollo society is **patriarchal** and clan-based, traditionally led by chiefs called **Lowang** and **Ngongpa**.
- Their main festival, **Woraang (Voorang)**, celebrates the harvest season.
- The Ollo tribe remains **unrecognised as a Scheduled Tribe (ST)** by the Government of Arunachal Pradesh and is often grouped administratively under the Nocte or other Naga tribes.
- According to the 2011 Census, the total population of the Ollo tribe in India is **just over 1,500**.

### Garbage Café Initiative

- PM Modi applauds **Chhattisgarh's 'Garbage Café' Initiative** for promoting cleanliness and social responsibility.
- The initiative, launched as part of **Swachh Survekshan**, builds on this legacy by merging environmental action with social welfare, ensuring that **no plastic goes to waste** and **no one sleeps hungry**.

It allows citizens to **exchange plastic waste** for **food**, turning waste collection into a community-driven initiative. One kilogram of plastic earns a full meal, while half a kilogram provides a snack.

### 69<sup>th</sup> National School Games 2025

- The **69<sup>th</sup> National School Games 2025** (Under-17 Boys and Girls – Boxing) was inaugurated in **Itanagar**, marking **Arunachal Pradesh's first-ever hosting** of the event.
- The **69<sup>th</sup> National School Games (NSG)** are being held across **multiple cities in India**, organised by the **School Games Federation of India (SGFI)**.
- **Objective:** Promote sports and physical fitness among students, **identify young talent**, and foster national unity and harmony through sport.
- **Significance:** The NSG aligns with the Khelo India initiative and the Khelo Bharat Niti-2025 to revive India's **sports culture** at the **grassroots level**.

*The SGFI, founded in 1954, is the national organisation responsible for organising and promoting school-level sports and games competitions across India.*

### Rehabilitation Council of India

- The **Rehabilitation Council of India (RCI)** has announced reforms to enhance transparency, efficiency, and inclusivity within the rehabilitation ecosystem nationwide.
- **Key reforms:** Includes free and extended **registration for professionals**, the establishment of **Centres of Excellence**, and **comprehensive examination reforms** such as faster

supplementary exams.

- **Significance:** These reforms reaffirm RCI's commitment to empowering students and professionals, aligning with the vision of Jan Vishwas (**trust-based governance**) and the **Ease of Doing Business**.

#### RCI

- The RCI is a **statutory body** under the **Ministry of Social Justice and Empowerment**, established as a society in **1986** and granted statutory status in **1993**.
- **Objective:** To regulate and standardise the training policies and programs for professionals working with **persons with disabilities**.
- **Mandate:** To maintain the **Central Rehabilitation Register** and oversee the **service delivery** of personnel working in the fields of Rehabilitation and Special Education.

#### Introducing Artificial Intelligence in Schools

- The **Ministry of Education** has announced the introduction of an **Artificial Intelligence (AI) curriculum** for **Classes 3 and above** beginning from the 2026-27 academic year.
- **Policy Alignment:** The curriculum will align with the **National Education Policy (NEP) 2020** while promoting the vision of '**AI for Public Good**'.

#### Benefits of Introducing AI in Schools

- **Cognitive Development:** AI-based education encourages **creativity, computational reasoning, and problem-solving skills** among young learners.
- **Workforce Preparedness:** Early AI exposure develops necessary skills vital for **future employability** in an AI-integrated world.
- **Personalised Learning:** AI-driven tools tailor lessons to **individual learning styles** and incorporate accessibility features like speech-to-text and real-time translation to support diverse learners.
- **Teacher Efficiency:** Automating routine tasks like grading enables educators to dedicate more time to focus on student engagement and mentorship.
- **Ethical Literacy:** Educating about AI ethics in schools **raises awareness** of bias, privacy, and fairness, promoting responsible use.

#### Risks and Challenges

- **Cognitive Dependency:** Overreliance on AI tools can **diminish students' analytical abilities** and impede the development of critical thinking skills.
- **Social Disconnection:** Excessive use of AI tools can **weaken student-teacher and peer interactions**, reducing opportunities for social and emotional growth.
- **Digital Divide:** High costs of AI infrastructure hinder adoption in under-resourced areas. Additionally, low-income students lack devices, connectivity, and digital skills, which worsens

educational inequalities.

- **Academic Integrity:** Generative AI tools make **plagiarism and cheating easier**, undermining the reliability and credibility of traditional assessment systems.
- **Data Ethics:** AI systems trained on biased datasets can **reinforce stereotypes** and lead to unfair evaluations. Large-scale data collection also raises significant concerns over privacy and data security.

### Way Forward

- **Problem-Centric Design:** Introduce AI tools to solve specific educational challenges, such as enhancing comprehension or lowering grading time.
- **Teacher Training:** Institutionalise continuous professional development to **equip teachers with AI literacy** and responsible integration practices.
- **Human Oversight:** Implement the **“human-in-the-loop”** approach for all critical decision-making, ensuring educators remain responsible for the final decisions.
- **Hybrid Learning:** Encourage blended classrooms by combining traditional and digital methods to maintain **continuity during connectivity gaps**.
- **Performance Evaluation:** Track measurable outcomes such as engagement levels, feedback speed, and skill improvement to assess **AI's educational efficacy**.
- **Equity and Inclusion:** Prioritise affordable digital infrastructure and localised content development to ensure nationwide access and participation.

### Curriculum on Artificial Intelligence and Computational Thinking (AI & CT) to be introduced from class 3 onwards in all schools

Ministry of Education is supporting institutions such as CBSE, NCERT, KVS, and NVS, along with States and UTs, in designing a meaningful and inclusive curriculum under the **National Curriculum Framework for School Education (NCF SE) 2023**.

- Central Board of Secondary Education (CBSE) has constituted an **expert committee** chaired by Prof. Karthik Raman, IIT Madras, to **develop the AI & CT curriculum**.
- **Teacher training and learning-teaching materials on NISHTHA platform** will form the backbone of curriculum implementation.

### Role of AI & CT in Education

- **Development of Computational Thinking:** It is a problem-solving approach that involves understanding a complex problem and develop possible solutions in a way that computer can execute.
  - It has **four key techniques – decomposition** (breaking down complex problem), **pattern recognition**, **abstraction** (focusing on important information), and **algorithms** (developing step-by-step solution to problem).
- **Foundational Skills:** Introducing AI at young age helps build critical thinking, logical reasoning,

and ethical awareness.

- Students learn to understand and question technology, **developing meta-skills** that are becoming as crucial as literacy and numeracy in the digital age.
- **Future Readiness:** As automation transforms industries, AI curriculum ensures the next generation is skilled and adaptable to rapidly changing job market.

## **GEOGRAPHY, ENVIRONMENT, BIODIVERSITY AND DISASTER MANAGEMENT**

### **NBA Sanctions Funds for Red Sanders Conservation**

The National Biodiversity Authority (NBA) has sanctioned ₹82 lakh to the **Andhra Pradesh Biodiversity Board** for **Red Sanders** conservation.

- The funding is provided under the **Access and Benefit Sharing (ABS)** mechanism.
- *The NBA, headquartered in **Chennai**, is a **statutory body** established under the **Biological Diversity Act, 2002**, and was formally set up in **2003**. It also enjoys the powers of a **civil court**.*

### **Key Highlights**

- **Aim:** To raise 1 lakh Red Sanders saplings to be supplied to farmers under the Trees Outside Forests (ToF) programme.
- **Funding Source:** Benefit-sharing amounts collected from Red Sanders users are **channelled back** to stakeholders.
- **Distinct** from sale proceeds, ensuring community-level **reinvestment** in conservation.

### **Access and Benefit Sharing (ABS) Mechanism**

- **Definition:** ABS regulates who can **access biological resources** and ensures that benefits are shared fairly with providers such as local communities and conservers.
- **Legal Framework:** The **Biological Diversity Act, 2002**, gave effect to India's commitments under the Convention on Biological Diversity (CBD), 1992, which initially emphasised fair and equitable benefit sharing from the use of biological resources.
- **Implementation:** Through a **three-tier system** comprising the National Biodiversity Authority, the State Biodiversity Boards (SBBs), and Biodiversity Management Committees (BMCs) at the local level.

### **Red Sanders**

- **Habitat:** The species, **Pterocarpus santalinus**, is native to the **Southern Eastern Ghats**.
- Red Sanders typically grow in **rocky, degraded, & fallow lands** with **red soil** under a **hot & dry climate**.
- **Use:** Recognised for its **high commercial value** (used in furniture, musical instruments, & medicines).

- **Threat:** Smuggling and over-exploitation.
- **Conservation Status:** IUCN Red List: Endangered | CITES: Appendix II | WPA,1972: Schedule IV

### Environmental Surveillance

- **Environmental surveillance** using wastewater is emerging as a key tool in India for **early detection** of disease outbreaks and **public health preparedness**.
- **Definition:** Tracking pathogens (bacteria, viruses, parasites) in sewage, hospital effluents, soil, and public spaces to provide early warning of disease outbreaks.
- **Mechanism:** Pathogens from secretions of infected individuals enter sewage or public spaces, where samples are collected and analysed using **genome sequencing** to track disease trends and variants.
- **Purpose:** Detect infections before clinical cases emerge, especially asymptomatic or mild cases, providing a realistic picture of disease burden.
- **Importance of Environmental Surveillance**
- It detects **changes in pathogen load** before clinical spikes, allowing timely public health responses.
- It captures the **true spread**, whereas traditional detection often underestimates infections.
- It helps **allocate resources**, prepare healthcare systems, and design targeted interventions.
- Tracks the **effectiveness of vaccination campaigns** or sanitation interventions.
- **India's Efforts in Environmental Surveillance**
- **Polio Monitoring (2001):** Wastewater surveillance for polio began in Mumbai and was later expanded.
- **COVID-19 Response:** Wastewater-based monitoring launched in five cities, continues post-pandemic.
- **Avian Flu:** Environmental surveillance is used in outbreak-prone areas.
- **ICMR Initiative (2025):** Plans to monitor 10 viruses across 50 cities through **wastewater surveillance**.
- *The Indian Council of Medical Research (ICMR) facilitates clinical trials in India, while CDSCO, under the DCGI, handles their approval and regulation.*
- **Future Directions for Environmental Surveillance**
- **National System Development:** Establish a comprehensive, **integrated wastewater surveillance system** linked with routine disease monitoring.
- **Global Alignment:** Align with **WHO guidelines** and adopt international best practices for comparability.
- **Preparedness:** Ensure rapid response mechanisms so early warnings translate into timely action.
- **Innovation:** Use **Audio surveillance** for cough detection in public spaces, combined with **machine learning** for respiratory disease monitoring.
- *Machine learning (ML) is a subfield of artificial intelligence (AI) that gives computer systems the*

*ability to learn from data without being explicitly programmed.*

## Philippines

- A 6.9 magnitude earthquake recently hit the coastal city of **Cebu in the Philippines**, resulting in several deaths and injuries.
- The Philippines is an island nation of Southeast Asia in the **western Pacific Ocean**; its capital is **Manila**.
- **Maritime Borders:** The **Philippine Sea** to the east, the **South China Sea** to the west, the **Sulu Sea** to the southwest, and the **Celebes Sea** to the south.
- **Climate:** It has a **tropical monsoon climate** characterised by hot, humid, and rainy conditions.
- **Geographic Features:** **Mount Apo** is the highest mountain, the **Cagayan River** is the longest river, and the Puerto Princesa Subterranean River in Palawan is a UNESCO World Heritage Site.
- **Volcanoes:** Active volcanoes include Mayon, Taal, & Pinatubo, which are part of the Pacific "Ring of Fire".

## Pacific Ring of Fire



- Also referred as Circum-Pacific Belt, it is a **horseshoe-shaped belt** of intense seismic and volcanic activity encircling the Pacific Ocean basin.

### It accounts for:

- ~75% of the world's active volcanoes
- ~90% of the world's earthquakes

### Location & Extent

- Extends for ~40,000 km around the Pacific Ocean.
- It traces boundaries between several tectonic plates including the Pacific, Juan de Fuca, Cocos, Indian-Australian, Nazca, North American and Philippine Plates.

### Features of Circum-Pacific Belt

- **Geography:** It has led to the formation of mountains, island arcs, deep underwater trenches, like the Mariana Trench (world's deepest spot).
- **Source of geothermal energy:** More than 40% of global geothermal energy resources are stored in that region.
- **Minerals:** Home to many rich mineral deposits, such as gold, copper, molybdenum, and other metals.
- **Agricultural Significance:** Volcanic soils are fertile (good for crops like rice, coffee)
- **Cause of Frequent Earthquakes and Volcanism along pacific ring of fire**
- **Subduction zones:** Along Ring of Fire, tectonic plates overlap at convergent boundaries called

subduction zones where the lower plate is pushed down by the upper plate.

- Subducted rock melts into magma near earth surface, an ideal condition for volcanic activity. E.g. Taupo Volcanic Arc, near New Zealand where dense Pacific Plate is **subducting beneath Australian Plate**.
- **Zone of transform boundary/fault:** In places like the San Andreas Fault (California), plates slide past each other laterally. This shearing motion causes powerful earthquakes but little volcanism.
- **Mid-oceanic Ridges/Divergent Boundaries:** Tectonic plates pulling apart create seafloor spreading and rift valleys.
  - E.g. **East Pacific Rise** exemplifies **major seafloor spreading in Ring of Fire**, located where Pacific Plate diverges from **Cocos, Nazca, and Antarctic Plates**, featuring both volcanism and hydrothermal vents.
- **Hot Spots:** Areas deep in Earth's mantle where rising heat melts rock in the upper mantle. This magma pushes through crustal cracks to form volcanoes.
- The Ring of Fire exemplifies Earth's dynamic geology, where converging tectonic processes create the vast majority of global volcanic eruptions and seismic activity, profoundly shaping Pacific civilizations and ecosystems.

### Building Self-Reliance in Natural Resources

- Despite its rich geology, India imports **nearly 50% of its natural resource** needs, including oil, gold, copper, bauxite, and coal.
- *India imports about 90% of its oil, 95% of its copper, and 99% of its gold, accounting for nearly 60% of India's resource import bill.*
- **Key Policy Measures Suggested**
- **Exploration Focus:** Encourage small, **start-up style exploration** companies to take **high-risk bets**, similar to global practice.
  - Move beyond government-driven baseline exploration; open up exploration to private entrepreneurs.
- **Faster Clearances:** Replace lengthy **multi-layered approval systems** with **self-certification**, where entrepreneurs follow rulebook norms and the government audits compliance later.
- **Revive Dormant Assets:** Existing resources such as Kolar Gold Fields, Hindustan Copper, Hutti Gold Mines, and underproducing oil fields should be **revived with fresh private investment**.
- **Level Playing Field:** End **preferential treatment** for public sector companies in allocation and fiscal support, which will give **fair competition** to **private players**, particularly new entrepreneurs.
- **Implications of the Measures**
- None of these measures requires an **extra burden** on the government budget; instead, they will **increase revenue** through **royalties** and **taxes**.
- Increased domestic production will **create millions of jobs** and build **strong supply chains**, aligning with **Viksit Bharat 2047's vision**.

- **Government Measures to Reduce Import Dependency on Natural Resources**
- **Sustainable Alternative Towards Affordable Transportation (SATAT)** promotes **compressed biogas (CBG)** as an **automotive fuel** to diversify energy sources.
- **National Bioenergy Programme** supports the use of biofuels like **biodiesel**.
- **Hydrocarbon Exploration and Licensing Policy (HELP)** **simplifies licensing** to encourage domestic **oil and gas** exploration and production.
- **National Green Hydrogen Mission** promotes clean hydrogen to reduce future hydrocarbon imports.
- **Increase in export duty** on bauxite discourages **raw bauxite exports** and prioritises domestic use for the **aluminium industry**.
- **National Critical Minerals Mission** seeks to **minimize import dependency** by enhancing domestic exploration and mining efforts for critical minerals.

### Odonate Census in Delhi

- The 2025 post-monsoon census across **seven Delhi biodiversity parks** recorded a **54% increase in dragonfly and damselfly populations**.
- The census identified **51** odonate species, with **Kalindi** and **Kamla Nehru Ridge** parks accounting for over half the total sightings.
- **Key Findings from the Survey**
- **Population Surge:** The number of odonates (dragonflies and damselflies) increased to 13,253, a rise from 8,630 the previous year.
  - **Kamla Nehru Ridge Park** recorded the highest count with 3,935 individuals across 26 species.
- **New Species:** The **Yellow-tailed Ashy Skimmer** (*Potamarcha congener*) was noted for the first time in the Yamuna Biodiversity Park.
- **Monsoon Breeding:** This year's **heavy monsoon rains** created temporary water bodies that provided ideal breeding conditions for the increase in odonate populations.
- **Significance of Odonates**
- **Vector Control:** Both adult and larval odonates **feed on mosquitoes**, which naturally lowers the chances of dengue and other vector-borne diseases.
- **Bioindicators:** Odonate larvae need clean, well-oxygenated water. Their presence is a reliable **indicator of the health of wetlands**.
- **Nutrient Transfer:** Their life cycle **transfers nutrients** from **aquatic habitats to land**, connecting water ecosystems with the terrestrial food webs.
- **Climate Sensitivity:** Odonate species are **highly responsive to temperature changes**, making them valuable for tracking the impacts of climate change.
- **Yellow-tailed Ashy Skimmer (Potamarcha congener)**
- Also known as the "**Common Chaser**" or "**Swampwatcher**," it is a medium-sized dragonfly species.

- **Appearance:** The yellow abdomen with distinct black markings gives it the name 'yellow tail.'
- **Flight Ability:** This species can **uniquely fly backwards**, which is rare among insects.
- **Preferred Habitat:** It thrives near **stagnant water bodies**, including ponds, marshes, and rice fields.
- **Distribution:** Found widely across **South Asia, Southeast Asia**, and parts of Oceania.
- **India Range:** Present across the northern and northwestern plains of the country.
- **Conservation Status:** IUCN: **Least Concern**

### Increasing Tree Size in the Amazon Rainforest

- A new study, 'Increasing Tree Size Across Amazonia,' shows that the **average size of trees** in the Amazon rainforest is **increasing** due to rising levels of carbon dioxide (CO<sub>2</sub>) in the atmosphere.
- **Key Finding:** Scientists observed trees over large areas for up to 30 years and found that, on average, their **diameter increased** by about **3.3% each decade**.
- **Comparison:** Usually, in a forest, tree diameters stay the same, but Amazon trees grew because atmospheric CO<sub>2</sub> levels **increased by nearly 20%** in the last 30 years.
- **Underlying Reason:** Rising CO<sub>2</sub> levels trigger the carbon fertilisation effect, which **enhances photosynthesis**, resulting in increased growth in some plants.
- **Significance:** Larger trees can absorb and **store more carbon**, enhancing the Amazon rainforest's role as a significant carbon sink.

#### Amazon Rainforest

- The Amazon rainforest is the **world's largest rainforest**, in the Amazon River basin in **South America**.
- It is also called the **Earth's lungs** because it absorbs about **150–200 billion tonnes of carbon**.
- The Amazon rainforest spans **nine countries**, Brazil, Peru, Colombia, Venezuela, Ecuador, Bolivia, Guyana, Suriname, and French Guiana, covering about **40% of Brazil's land area**.
- **Natural Boundaries:** **Guiana Highlands** in the north, the **Andes Mountains** in the west, the **Brazilian Plateau** in the south, and the **Atlantic Ocean** in the east.
- **Biodiversity:** It is the most biodiverse region in the world, covering only **1% of Earth's surface** but hosting nearly **10% of all known species**, including jaguars and Amazon River dolphins.

### Polar Geoengineering Projects

- A recent study has raised serious concerns over **five polar geoengineering concepts** aimed at mitigating climate change.

#### Proposed Polar Geoengineering Methods

- Stratospheric Aerosol Injection (SAI): Releasing **reflective aerosols** like sulphur dioxide to cool the atmosphere.
- **Sea Curtains/Walls:** Large buoyant structures **blocking warm water** inflows to ice sheets.

- **Sea Ice Management:** Using **glass microbeads** to increase **ice reflectivity**.
- **Basal Water Removal:** Extracting **subglacial water** to slow glacier flow.
- **Ocean Fertilisation:** Adding nutrients (iron) to **stimulate phytoplankton** and absorb CO<sub>2</sub>.
- **Major Concerns Identified in these Methods**
- **Stratospheric Aerosol Injection (SAI):** Ineffective in polar winters when **no sunlight is available**. If suddenly stopped, there is a risk of "termination shock," which could lead to a rapid global temperature rise within 10-20 years.
- **Sea Curtains:** Involve **technical difficulties** in anchoring structures in remote hostile seas, and the costs exceed \$1 billion per kilometre.
- **Sea Ice Management:** Microbeads could dissolve quickly or even absorb heat, **worsening warming**. Also, 360 million tonnes of beads are required annually, equal to global plastic production.
- **Ocean Fertilisation:** It risks disrupting **marine food chains** and **nutrient cycles**.
- **Alternative Solutions to Geoengineering**
- **Decarbonisation:** Immediate decarbonisation remains the **proven, effective way** to protect polar regions and stabilise the global climate.
  - Challenges include upfront costs, supply chain constraints for critical minerals, and political resistance.
- **Natural Defences:** Better management of **protected areas** and ecosystem-based adaptation (e.g., mangrove restoration).
  - Avoid **fortress-style conservation** that excludes local communities; instead, integrate traditional knowledge and livelihoods.

### Government Restricts Animal-Based Bio-Stimulants

- The **Union Agriculture Ministry** has recently withdrawn approval for **11 animal-derived** biostimulants, citing concerns related to religious and dietary restrictions.

#### Biostimulants

- Biostimulants are **substances or microorganisms** applied to plants, seeds, or soil that **promote natural processes** to improve growth, quality, and stress resilience.
- **Key Distinctness:** They do not directly provide nutrients like fertilisers nor function as pesticides; instead, they help plants **utilise existing nutrients** more efficiently.
- **Main Sources:** Biostimulants are derived from microbes, algae, seaweed extracts, humic acids, protein hydrolysates, beneficial microorganisms, and composted organic matter.
- **Complexity:** Their diverse and partially understood mechanisms make **outcomes unpredictable**, necessitating scientific trials and localized agronomic recommendations.

#### Types of Biostimulants

- **Humic and Fulvic Acids:** Humic and fulvic acids **from decomposed organic matter** increase soil

porosity, enhance water retention, and improve nutrient absorption.

- **Seaweed Extracts:** Seaweed and **algal extracts** contain **natural hormones** and bioactive compounds that stimulate growth and increase tolerance to abiotic stress factors.
- **Protein Hydrolysates:** Amino acids and protein hydrolysates stimulate **plant metabolism**, aiding recovery and yield during heat and drought conditions.
- **Beneficial Microbes:** Beneficial **bacteria** (e.g., **Rhizobium**) and **fungi** (e.g., **mycorrhiza**) enhance root growth, **nitrogen fixation**, and **phosphorus absorption**.
- **Bioactive Compounds:** Substances like **vitamins** and **antioxidants** trigger plant defence responses, strengthening resilience and improving produce quality during stress.
- **FCO Classification:** **Schedule VI** of the 2021 FCO amendment categorises **nine groups** of biostimulants with specified standards and claims.

Biofertilizers		Biostimulants
	Living microbes	Natural substances or microbes
	Make nutrients like N & P available	Boost plant growth and stress resistance
	Nutrient uptake	Drought, salinity, heat tolerance
	Soil fertility builders	Plant performance enhancers
	<b>Rhizobium, Azospirillum</b>	 <b>Seaweed extract humic acids</b>

Smart farmers use **both** for better yield & healthier soil

### Biostimulants Regulation Framework in India

- **FCO Coverage:** Biostimulants were brought under the **Fertiliser (Inorganic, Organic or Mixed) (Control) Order, 1985**, through a 2021 amendment.
- **Approval Requirement:** No biostimulant can be manufactured, sold, or imported unless it is notified and listed in **Schedule VI** of the Fertiliser Control Order by the Central Government.
- **Central Committee:** The **Central Biostimulant Committee** was formed in 2021 under the Ministry of Agriculture to review evidence, set specifications, and advise the government.
- **Residue Limit:** The **permissible pesticide residue limit** for biostimulants, initially 0.01 ppm, was increased to **1.0 ppm** through a 2024 amendment.

### Biostimulants Landscape in India

- **Market Growth:** The Indian biostimulant market was valued at **\$355 million** in 2024 and is projected to surpass USD 1.13 billion by 2032, with a compound annual growth rate of more than **15%**.
- **Major Crops:** **Cereals** such as wheat, rice, and maize account for the largest share due to their cultivation scale and responsiveness to biostimulants.
- **Active Ingredient:** **Seaweed extracts** dominate as the largest ingredient segment because of

proven efficacy, availability, and favourable regulatory recognition.

- **Common Application: Foliar spraying** is the most prevalent method, enabling rapid nutrient uptake and improved stress resilience in crops.

### Global Uranium Reserves

- Uranium is a key mineral for nuclear energy, supplying about **10% of the world's electricity**, and is shaping global **energy security** and **geopolitics** as clean energy demand grows.
- **Top 5 Countries with the Largest Uranium Reserves**
- **Australia: Largest uranium reserves globally** with **3.6 million tonnes**, home to some of the richest ore, making it the leading nuclear fuel resource nation.
- **Kazakhstan: World's top uranium producer**, supplying **about 40% of global output annually**; holds nearly 3 million tonnes, mainly via in-situ leaching.
- **Canada: Third in reserves** with 1.7 million tonnes; the **Athabasca Basin** hosts the **highest-grade uranium deposits** in the world.
- **Russia: Around 1.2 million tonnes** of reserves, powering its civil nuclear plants and military programmes.
- **Namibia: Africa's uranium hub**, with about **1 million tonnes**, exports most of its supply to Europe & Asia.

### Uranium

- A silvery-grey metallic **radioactive element**, naturally formed only in supernova explosions.
- Along with **thorium** and **potassium**, it contributes to natural terrestrial radioactivity.
- Chemical symbol **U**, atomic number **92**.
- **Naturally Occurring Isotopes: U-238 (99.27%) and U-235 (0.72%)**.
- All isotopes are radioactive & fissionable, but only **U-235** is fissile (supports neutron chain reaction).

### Uranium in India

- **India's domestic uranium output** remains **much lower than demand**, leading to imports of over 7,600 tonnes in recent years, mainly from **Kazakhstan** and **Canada**.
- **Atomic Minerals Directorate for Exploration & Research (AMD)** under the **Department of Atomic Energy** continues active exploration.

### Govt Approves Mitigation Projects Across Nine States

- A High-Level Committee Approves **₹4,645 Crore Disaster Mitigation and Recovery Projects** across nine states.
- **Beneficiary States:** Assam, Kerala, Madhya Pradesh, Odisha, Rajasthan, Uttar Pradesh, Bihar, Chhattisgarh, & Andhra Pradesh will receive funding support under the National Disaster Mitigation Fund (NDMF).
- **Major Approvals by Committee**
- **Wetland Restoration in Assam**
- A project worth **₹692.05 crore** has been sanctioned for the **rejuvenation of 24**

wetlands across **9 districts** in the **Brahmaputra system**.

- **Aim:** Improve water retention capacity, enhance flood resilience, protect the aquatic ecosystem, and promote fisheries-based economic growth.
- **Funding Pattern:** 75% by the Centre and 25% by the State.

#### Urban Flood Risk Management Programme (UFRMP)-Phase II

- **Approved for 11 Cities:** Bhopal, Bhubaneswar, Guwahati, Jaipur, Kanpur, Patna, Raipur, Trivandrum, Visakhapatnam, Indore, and Lucknow, with the financial outlay of **₹2,444.42 crore**.
- **Funding Pattern:** 90% by the Centre and 10% by the State.
- **Focus: Structural measures** (stormwater management, flood walls, erosion control) and **non-structural measures** (flood early warning systems, data acquisition, capacity building).
- **Urban Flood Risk Management Programme (UFRMP)**
- **Objective:** Recommended by the **15<sup>th</sup> Finance Commission**, it aims to **mitigate urban flood risks** in vulnerable cities through structural and non-structural measures.
- **Coverage:** Implemented in two phases, **Phase I** covered **seven** metro cities (Chennai, Mumbai, Kolkata, Ahmedabad, Hyderabad, Bengaluru, Pune).
- **Implementation:** Under the **National Disaster Management Authority (NDMA)** and the **Ministry of Housing and Urban Affairs (MoHUA)**.

#### Urban Tree Plantation and Air Pollution

- Urban tree plantation drives, often promoted as solutions for pollution, can worsen air quality if **high Volatile Organic Compounds (VOC)** emitting species are planted in traffic-heavy cities.
- **Tree Plantation and Its Unintended Consequences**
- **VOC Emissions:** Certain trees (e.g., mango, peepal, banyan) **release VOCs** like isoprenes and **monoterpenes**, worsening the **air pollution**.
- **Urban Chemistry:** VOCs + vehicular NO<sub>x</sub> + sunlight → **form ground-level ozone**, a harmful pollutant.
- **Public Health Impact:** Ozone exposure causes **asthma, respiratory issues**, and **eye irritation**.
- **Rising Deaths:** In **2021, 237,700 deaths** in India were attributed to ozone (**Health Effects Institute**).
- **Climate Link:** VOCs can **extend methane's lifetime**, indirectly worsening global warming.
- **'Right Tree, Right Place' Approach**
- **Tree Selection**
  - Avoid high-VOC emitters in traffic-heavy zones such as Peepal, mango and banyan.
  - Prefer low-VOC species including Neem, tamarind, arjuna, golden shower, ashoka and silk cotton.
- **Location Planning**
  - Prioritise high-dust areas because trees act as natural pollutant traps.
  - Ensure **pruning & leaf-litter management** to reduce VOCs from decaying biomass.
- **Integrated Approach:** Control **NO<sub>x</sub> emissions** and **conduct awareness** alongside tree planning.
- **Balanced Strategy:** Urban forestry must **go beyond the number of trees planted** and focus on

species mix, location and maintenance.

*Pruning is the process of selectively removing plant parts, such as branches, leaves, and buds, to maintain plant health, shape, and productivity.*

### Cyclone Shakti

The **India Meteorological Department (IMD)** has issued alerts for **Maharashtra** and **Tamil Nadu** due to **Cyclone Shakti**, forming over the **Arabian Sea**.

- The name “**Shakti**” was proposed by **Sri Lanka** and approved by the **WMO** panel
- **Cyclone Naming Process**
- **WMO (World Meteorological Organisation)** divided the world's Oceans into Basins and assigned the responsibility of naming the Cyclones to the respective regional bodies.
- Worldwide, **six regional specialised meteorological centres (RSMCs)** and five regional tropical Cyclone Warning Centres (TCWCs) are mandated to issue advisories and name tropical cyclones.
- The **India Meteorological Department (RSMC New Delhi)** names tropical cyclones formed over the **Bay of Bengal** and the **Arabian Sea**.
- **Conditions Favourable for Tropical Cyclone Formation**
- Large sea surface with **temperature** higher than **27° C**,
- Presence of the **Coriolis force** is enough to create a cyclonic vortex,
- **Small variations** in the **vertical wind speed**,
- A **pre-existing weak low-pressure area** or low-level cyclonic circulation,
- **Upper divergence** above the sea level system.
- *The cyclonic wind movements are **anti-clockwise in the northern hemisphere** and **clockwise in the southern hemisphere** (This is due to the **Coriolis force**).*

### Landslides in West Bengal and Himachal Pradesh

- Recently, **heavy rainfall triggered a series of deadly landslides** across the Himalayan districts of Darjeeling and Kalimpong in **West Bengal**, and Bilaspur district in **Himachal Pradesh**.
- **Definition:** A landslide is the **rapid downward movement** of rock, debris, or soil **caused by gravity**, often triggered by rainfall, earthquakes, or human disturbances.
- **Mechanism:** Landslides occur when the **downward gravitational force exceeds the binding strength** of the **slope materials** (e.g., soil, rock), resulting in large-scale mass movement.
- **Natural Triggers:** Long monsoon spells, seismic tremors, volcanic activity, snowmelt, inadequate drainage, rapid river incision, and glacial retreat.
- **Human Factors:** Deforestation, slope cutting for roads, unregulated construction, quarrying, and alteration of natural drainage channels.

- **Flagship Project: National Landslide Risk Mitigation Project (NLRMP)** was launched to strengthen hazard mapping, real-time monitoring, and early warning systems in 66 landslide-prone districts in India.
  - **National Disaster Management Authority (NDMA)**, under the **Ministry of Home Affairs**, is the nodal agency for the project.
- **Landslide Distribution in India**
- **Extent in India:** About **12.6%** of India's **non-snow-covered land**, or nearly **0.42 million square kilometres**, is vulnerable to landslides (GSI). **42% of the vulnerable area** is in the **Northeastern region**.
- **Regional Share:** The **North-Western Himalayas** account for 66.5% of landslides, followed by the **North-Eastern Himalayas** (18.8%) and the **Western Ghats** (14.7%).
- **States Hotspots:** **Mizoram** recorded the highest number of landslides with 12,385 cases (1998-2022), followed by **Uttarakhand** (11,219) and **Jammu & Kashmir** (7280).
- **District Hotspots:** **Rudraprayag** and **Tehri Garhwal** districts in **Uttarakhand** report the **highest landslide density**, especially along the Alaknanda valley and Char Dham route.

### India's First Cooperative Compressed Biogas (CBG) Plant

- The **Ministry of Cooperation** inaugurated India's first cooperative multi-feed Compressed Biogas (CBG) plant in **Maharashtra**.
- *CBG is a **purified form of biogas** derived from organic waste like crop residues and animal dung, cleaned and compressed to match CNG standards, making it a sustainable green fuel for use.*
- **Key Highlights**
- **Capacity:** It will produce **12 tonnes of CBG** and **75 tonnes of potash per day** using jaggery and molasses as feedstock.
- **Aim:** To reduce **India's import dependence** on potash and biogas, while promoting sustainable energy and waste-to-wealth practices.
- **Circular Economy Model:** Converts sugarcane **by-products** into energy and fertiliser, maximising resource efficiency.

Feature	CBG (Compressed Biogas)	CNG (Compressed Natural Gas)
<b>Source</b>	Produced from <b>biomass and organic waste</b> .	Extracted from <b>fossil fuels</b> (natural gas fields)
<b>Environmental Impact</b>	<b>Eco-friendly</b> , reduces <b>air pollution</b> (e.g., stubble burning), utilizes waste, supports circular economy	Cleaner than petrol/diesel but <b>fossil fuel-based</b> , contributes to greenhouse gas emissions if not captured efficiently.
<b>Dependence on Imports</b>	Can be produced domestically from <b>local biomass</b> , reducing import dependence	Import dependency in the case of natural gas was at 50.8% in FY25, increasing foreign dependence

<b>Commercial Viability</b>	Supports <b>rural employment</b> and renewable energy initiatives	Conventional energy source, limited scope for rural livelihood creation
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### India to Release Its First Red List at IUCN World Congress

- India will unveil its **first Red List of Endangered Species** at the International Union for Conservation of Nature (IUCN) **World Conservation Congress 2025** in **Abu Dhabi, UAE**.
- **IUCN World Conservation Congress**
- The IUCN World Conservation Congress is a **quadrennial** (held every 4 years) global summit organised by the IUCN to set priorities for **nature conservation** and **sustainable development**.
- It is considered the **world's largest** environmental policy forum, uniting governments, scientists, civil society, indigenous peoples, and private sector leaders.
- **Previous Congress:** The last congress held in Marseille, France, in **2021**, adopted the **Marseille Manifesto**, focusing on post-COVID recovery, the biodiversity crisis, and the climate emergency.
- **Congress 2025:** It will focus on **five core themes** – Resilient Conservation Action, Climate Overshoot Risks, Equity, Nature-Positive Economies, and Disruptive Innovation for Conservation.

### IUCN

- The IUCN is the **world's largest environmental organisation**, promoting nature conservation and sustainable resource management.
- Founded in **1948** and headquartered in **Gland, Switzerland**, it is a membership union of government and civil society organisations.
- The IUCN publishes the Red List of Threatened Species, manages thematic commissions, and advises global policy on biodiversity and sustainability.
- **India's Membership:** India became a State Member in **1969**, represented by the **Ministry of Environment, Forest and Climate Change**, the Wildlife Institute of India, and partner NGOs.

### Philippines Coral Larvae Cryobank

- **Philippines** to host **Southeast Asia's first coral larvae cryobank** to freeze and preserve coral larvae for reef restoration.
- According to the report *Status of Coral Reefs of the World 2020*, **14% of corals were lost** (2009–18) and **up to 90% could vanish by 2050** if global warming exceeds 1.5°C.
- *Coral reefs are formed by **thousands of tiny coral polyps**, shallow-water animals related to **anemones** and **jellyfish**, which secrete calcareous skeletons from seawater calcium to build the reef structure.*

### Coral Cryobank Initiative

- The initiative involves research institutions from **Philippines, Taiwan, Indonesia, Malaysia, & Thailand**.
- It aims to ensure long-term protection of **coral genetic diversity** and **strengthen reef resilience** against environmental threats.
- **Coral Triangle**
- **Geographic Spread:** Covers **six countries:** Indonesia, Malaysia, the Philippines, Papua New Guinea, Solomon Islands, and Timor-Leste.

#### Significance:

- **Marine Richness:** Known as the *"Amazon of the seas,"* it harbours **76% of all coral species**.
- **Human Reliance:** Sustains over **120 million people** through fishing, tourism, and other livelihoods.
- **Major Threats:** Overfishing, habitat loss, pollution, and climate-induced coral bleaching.
- **Conservation Actions:** The **Coral Triangle Initiative (CTI)** advances sustainable fisheries, marine protection, and climate adaptation.
- **The Coral Triangle Initiative (CTI-CFF)** is a partnership among **six nations**—Indonesia, Malaysia, the Philippines, Papua New Guinea, the Solomon Islands, and Timor-Leste—that promotes **marine biodiversity, climate resilience, and food security**.

### National Camel Sustainability Initiative (NCSI)

- The **Ministry of Fisheries, Animal Husbandry and Dairying** aims to launch the **National Camel Sustainability Initiative (NCSI)** to address the steep decline in India's camel population.
- NCSI is a **multi-ministerial initiative** involving the Department of Animal Husbandry & Dairying, the Ministries of Environment, Rural Development, and Tourism, along with State governments, to **conserve the camel population**.
- **Collaboration:** It was developed in consultation with the Food and Agriculture Organisation (FAO).
- **Rationale:** India's camel population has **declined by over 75%** since 1977 (20<sup>th</sup> Livestock Census), and current measures remain fragmented and underfunded.
- **Key Proposals:** Reform legal barriers and promote **regulated trade**, launch a **nationwide camel awareness campaign**, and celebrate **World Camel Day (June 22)** to enhance camel culture and conservation.

### Camels

- Camels, called the *"ship of the desert,"* sustain desert ecosystems by providing mobility and economic support to **pastoralist communities** like the Raikas, Rabaris, & Fakirani Jats in western India.
- India hosts **two types of camels** — **single-humped** (*Camelus dromedarius*) in Rajasthan and

Gujarat, and **double-humped** (*Camelus bactrianus*) in Ladakh and Nubra Valley.

- **Population:** Around **90%** of India's camels live in **Rajasthan and Gujarat** (20<sup>th</sup> Livestock Census).
- **Causes of Decline:** Mechanisation of transport, destruction of habitat, **environmental stress**, restrictive legal frameworks and **weak veterinary coverage** have caused a decline in the population.
- **Conservation Efforts:** Include the National Livestock Mission, the **ICAR-National Research Centre on Camel (NRCC)**, and financial assistance from the AHIDF for dairy infrastructure (includes camel milk).

### World's Highest Motorable Pass

- Border Roads Organisation (BRO) has opened the **Mig La Pass** in **Ladakh** at an altitude of **19,400 feet**, making it the **world's highest motorable pass**, surpassing **Umling La**.
- **Key Highlights:**
  - **Mig La Pass** is part of the **Likaru-Mig La-Fukche road** alignment under **BRO's Project Himank**.
  - This strategic route strengthens India's connectivity in the **eastern Ladakh sector**, enhancing border accessibility near the **Line of Actual Control (LAC)**.

### Border Roads Organisation (BRO)

- Founded in **1960**, the Border Roads Organisation (BRO) functions under the **Ministry of Defence**.
- **Objective:** Develops and maintains strategic road infrastructure in **border areas** and **neighbouring countries** for defence and socio-economic growth.
- Operates under the **Border Roads Development Board (BRDB)**, chaired by the **defence minister**.
- **Major Projects:** Key initiatives include Project Himank and Vijayak (Ladakh), Project Sampark (J&K), Project Dantak (Bhutan), and Project Arunank (Arunachal Pradesh).
- The BRO has now **constructed 11 of the world's 14 highest motorable passes**.

### Arunachal Pradesh's 1<sup>st</sup> commercial coal mine

- The **Ministry of Coal and Mines** inaugurated Arunachal Pradesh's first commercial coal mine at **Namchik Namphuk** in Changlang district.
- **Key Highlights**
- The mine has been operationalised under **Coal Projects Private Limited (CPPL)** with the formal handing over of the mining lease and deployment of equipment.
- The mine, with reserves of around **1.5 crore tonnes**, is expected to generate **over ₹100 crore annually**.
- It will create significant **direct and indirect employment**, supporting ancillary industries such

as **transport, logistics**, and equipment supply.

- It supports the **National Coal Gasification Mission** and the Make in India initiative.
- *The National Coal Gasification Mission, launched in 2020 by the **Ministry of Coal**, aims to achieve **100 MT** of coal gasification **by 2030**, using coal gasification for sustainable use.*

### Wildfire Smoke & Rising Mortality

- Researchers warn that if current warming trends persist, **wildfire smoke** exposure could kill **70,000 Americans annually by 2050 +**
- The study links rising temperatures, worsening wildfires, and **PM2.5 pollution** to major health threats.

#### Key Facts from the Research

- Annual smoke-related deaths projected to **reach 70,000 (by 2050)** vs. ~12,000 currently. (Nature, 2025)
- **Over 2 million** cumulative deaths expected **by 2050** if emissions persist.
- Planet **warmed 1.3°C** since the Industrial Revolution.
- **Frequency** of extreme wildfires has **doubled in two decades**. (Stanford–Harvard study, 2025)

#### Regional Hotspots:

- **+4,500** annual smoke-related deaths in **California**.
- **New York, Texas, Washington: 1,800–2,000** additional annual deaths each.
- 50% of total deaths expected in the **Eastern U.S.** due to higher population density.

#### Impacts of Global Wildfires

- **Public Health Crisis:** Wildfire smoke (**PM2.5**) exposure causes **over 3 lakh premature deaths** annually, leading to spikes in respiratory and cardiac diseases (**WHO, 2024**).
- **Climate Feedback Loop:** Fires release **billions of tonnes of CO<sub>2</sub>**, worsening global warming and triggering more frequent and intense fires.
- **Biodiversity Loss:** Massive habitat destruction in ecosystems like the **Amazon** and **Australian bushlands**, threatening endangered species and disrupting food chains.
- **Economic Damage:** Global wildfire losses crossed **\$120 billion in 2024**, affecting tourism, agriculture, and property, especially in the U.S., Canada, and Europe.

#### Way Forward

- **Regional Fire Cooperation:** Establish cross-border wildfire response & data-sharing systems. E.g. **ASEAN Agreement on Transboundary Haze Pollution**
- **Climate-Resilient Forestry:** Promote fire-resistant tree species and restore degraded lands. E.g. **UN-REDD, Bonn Challenge** – restore **350M ha by 2030**)

- **Early Warning Systems:** Deploy satellite-based fire alerts and **AI smoke models**. E.g. **Global Wildland Fire Network – FAO initiative**)
- **Public Health Protection:** Strengthen air quality monitoring & issue smoke advisories. E.g. **WHO–UNEP Global Alliance on Health & Pollution**

**TINY WONDER AT CENTRAL PARK**

➤ **Nesolynx Ashmead, 1905**, is a small genus comprising 18 species worldwide, mostly distributed in the Oriental and other tropical regions

➤ **Six species were known from India:** *N. deltaphagus* James, *N. flavipes* Ashmead, *N. javanica*, *N. orientalis* Khan, *N. phaeosoma*, and *N. thymus*

➤ ***N. banabitanæ* (in pic)** is the seventh species that has been discovered

● The new findings have been published in the prestigious journal of the Korean Society of Applied Entomology



➤ The research team utilised advanced techniques, including scanning electron microscopy, to study the wasp's antennal sensilla

➤ A detailed analysis revealed six types of sensilla, with 11 subtypes, providing insights into the sensory biology of this newly discovered species

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### **Nesolynx banabitanæ** **Wasp Species**

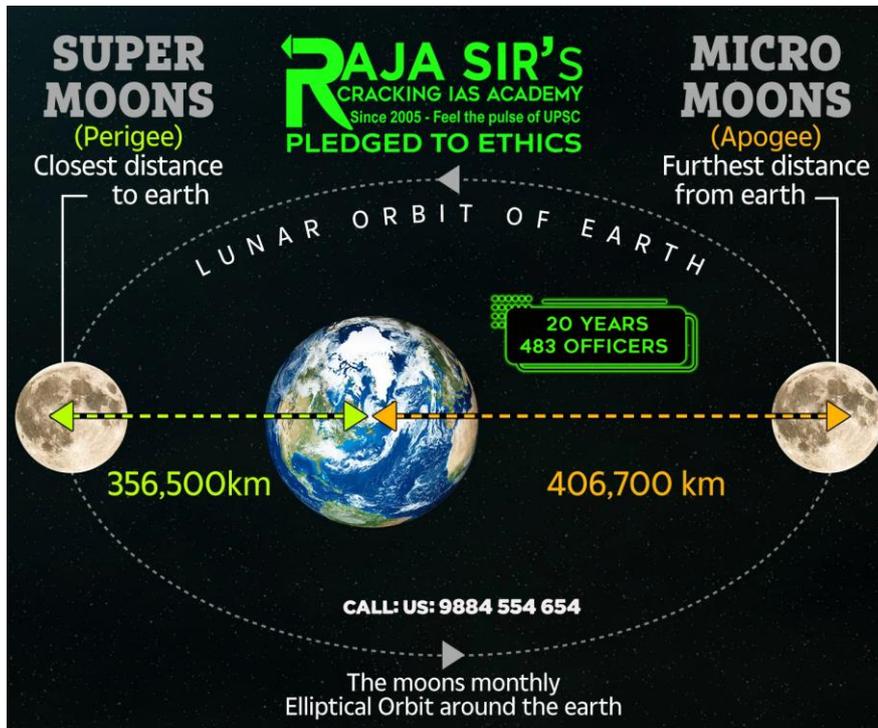
- A new *hyperparasitoid* wasp species, ***Nesolynx banabitanæ***, was discovered in **Banabitan Biodiversity Park**, Kolkata, West Bengal.
- It belongs to the *Eulophidae* family and parasitizes larvae and pupae of other parasitoid wasps like **Charops aditya**.

- The species is named after its *discovery site*.
- *Larvae* feed on host pupae, while adults consume **nectar** and *honeydew*.
- It inhabits *semi-natural environments* such as **urban parks** and agro-ecosystems in the *Gangetic plains of West Bengal*.

### **Supermoon**

- A *supermoon* occurs when a full or new moon coincides with the Moon's closest approach to Earth (*perigee*), making it appear about **14% larger** and **30% brighter** than a full moon at apogee.
- The Moon's *elliptical orbit* causes its distance from Earth to vary, with **perigee** at approximately **363,300 km** and *apogee* at **405,500 km**.

- *Supermoons* typically occur **three to four times a year** and can cause higher-than-normal tides, known as *perigean spring tides*, due to increased gravitational pull.



### National Red List Assessment (NRLA) Initiative

- The **Ministry of Environment, Forest and Climate Change** launched the **National Red List Assessment (NRLA)** initiative at the IUCN World Conservation Congress in **Abu Dhabi**.
- It includes **The National Red List Roadmap** and **The Vision 2025-2030**, outlining the programme's long-term goal and strategic objectives.
- **NRLA Initiative**
- The NRLA initiative is India's **first comprehensive framework** to create a nationally coordinated, science-based system for assessing and documenting the **conservation status** of **native species**.
- **Objective:** It aims to publish **National Red Data Books** for both **flora and fauna by 2030** to guide national conservation planning and policy.
- **Target:** To conduct a comprehensive threat assessment for at least **11,000 Indian species by 2030**.
- **Nodal Agencies:** The **Botanical Survey of India (BSI)** and **Zoological Survey of India (ZSI)**.
- **Significance:** It reinforces India's commitment to the **Convention on Biological Diversity (CBD)** and the **Kunming-Montreal Global Biodiversity Framework (KMGBF)** and aligns with the **IUCN global standards**.

### Biodiversity of India

- India is recognised as one of the world's **17 megadiverse countries**, with **4 of the 36 global** biodiversity hotspots located entirely or partially within its territory.
- India accounts for **7-8%** of all recorded species despite having only **2.4%** of the world's land area.
- India ranks **7<sup>th</sup>** in mammals, **9<sup>th</sup>** in birds, and **5<sup>th</sup>** in reptiles globally in terms of species richness.
- **Legal Framework:** Include the Wildlife (Protection) Act, 1972; Forest (Conservation) Act, 1980; Environment (Protection) Act, 1986; and Biological Diversity Act, 2002.

### Fungus *Bridgeoporus kanadii*

- The Botanical Survey of India discovered a new **fungal species, *Bridgeoporus kanadii***, during a monsoon biodiversity survey in West Kameng district, **Arunachal Pradesh**.



- ***Bridgeoporus kanadii***
- *Bridgeoporus kanadii* is a **polypore fungus** with exceptionally **large conks** (fruiting bodies) reaching up to three meters in radius.
- **Etymology:** Named in honour of mycologist **Dr Kanad Das** for his contributions to fungal taxonomy.
- **Proffered Habitat:** It occurs in the **subtropical temperate forests** of the Eastern Himalayas
- **Host Tree:** The fungus grows in dense clusters on dead or decaying **coniferous** trees, especially **fir** trees.
- **Distribution:** The only known population is found in **Shergaon village** in Arunachal Pradesh.

• The genus *Bridgeoporus* was once considered monotypic, represented solely by *B. nobilissimus* from the **Pacific Northwest** of North America.

- **Ecological Role:** It **decomposes cellulose** and **lignin** from dead wood, supporting nutrient cycling.
- **Human Use:** The species is **inedible** and has **no known commercial value** for human use.

### Four New Plant Species in Karnataka

Scientists identified four new plant species in the Western Ghats of Karnataka.

### Newly Discovered Plant Species

- ***Zeuxine seetharamii***: Dwarf orchid bearing **thick rhizomes** and compactly arranged flowers.
- ***Oberonia marnkuliensis***: **Epiphytic orchid** species with small cream to orange-yellow flowers.
- ***Parasopubia gorensis***: A **dwarf herb** characterised by **sickle-shaped seeds** and **spiny leaves**.
- ***Utricularia kumtensis***: **Lithophytic** (grows on rocks) bladderwort with small, **half-opened** flowers.

### Fungal Pathogen Discovered in Western Ghats Plant

- Scientists have discovered a new species of phytopathogenic fungus, called ***Paramyrothecium strychni***, in Kerala.
- The fungal species causes **leaf spot** and blight diseases in the medicinal plant ***Strychnos dalzellii***, commonly known as **Kanjiram** or **Modirakanjiram**.
- **Significance**: The finding highlights Kerala's exceptional **fungal diversity** and adds to global taxonomic knowledge of leaf-infecting fungal species.

*The genus **Paramyrothecium** consists of fungi primarily known as **plant pathogens**, causing various diseases in both wild and cultivated plants.*

- **Kanjiram or Modirakanjiram**
- It is a medicinal plant native to the **Western Ghats**, categorised as Vulnerable (**VU**) on **IUCN Red List**.
- **Use**: It contains alkaloids with **analgesic, anti-inflammatory**, and **antimicrobial** properties, traditionally used to treat fever, **rheumatism**, and digestive ailments.
- **Threats**: It faces serious threats from **overexploitation**, habitat loss, and the emerging fungal disease.

### Wild Life Protection (Kerala Amendment) Bill, 2025

- The Kerala Assembly passed the **Wild Life Protection (Kerala Amendment) Bill, 2025**, to tackle the rising human-wildlife conflicts in the state.

*As **wildlife** falls under the **Concurrent List** and the Bill aims to amend a **central legislation** (Wildlife Protection Act, 1972), it requires **Presidential assent** under **Article 254(2)** to become law.*

### Key Provisions of the Bill

- **Vermin Declaration**: It authorises the state government to classify **Schedule II animals** as **vermin** for specific regions and durations.
  - **Section 62 of the WPA**: Allows only the **Central Government** to declare any wild animal vermin.

- **Emergency Response:** The bill empowers the **Chief Wildlife Warden** to order the killing, capturing, tranquillising, or relocating of animals that cause serious injury to humans.
- **Decentralising Actions:** It also allows **regional forest conservators** and **local bodies** (e.g., panchayats) to carry out interventions against animal threats.
- **Issues with the Bill**
- **Scientific Oversight:** The Bill **lacks data-backed criteria** for identifying vermin, risking indiscriminate culling and weaker biodiversity safeguards
- **Discretionary Powers:** It risks encouraging a **“shoot-first” approach** by granting wide, unchecked authority to wardens.
- **Structural Gaps:** The amendment **overlooks root causes** of human-animal conflicts, like habitat destruction, encroachment, and poor land-use planning.
- **Constitutional Conflict:** It conflicts with the Wildlife (Protection) Act, 1972, which gives the Union government **exclusive authority** to amend schedules.

### Small Island Developing States

- A 2025 report by the **Global Commission on Adaptation (GCA)** warns that Small Island Developing States (**SIDS**) could suffer economic losses worth **\$476 billion by 2050**.

#### Small Island Developing States (SIDS)

- SIDS are islands of the **Caribbean Sea** and the **Atlantic, Indian, and Pacific Oceans**.
- SIDS are a group of **39 states** and **18 Associate Members** of the United Nations regional commissions facing unique social, economic, and environmental vulnerabilities.
- Characterised by small populations, limited resources, narrow export bases, high dependence on tourism and fisheries, and acute climate vulnerability.
- **Contribute < 1 % of global greenhouse-gas emissions** but are among the most climate-exposed regions globally.

### Magnitude of Climate Risk Faced by SIDS

- **Projected Losses: \$476 billion by 2050** (GCA 2025).
- **Sea-level rise:** Up to 1 metre threatens 80 % of infrastructure in atoll nations (IPCC AR6).
- **Climate Finance Gap:** Receives only \$2 billion/year = **0.2 % of global climate finance**; 44 % as loans.

*India-led Platforms – International Solar Alliance (ISA) and Coalition for Disaster Resilient Infrastructure (CDRI) provide renewable energy and infrastructure resilience support to the Indian Ocean & Pacific SIDS.*

### Sri Lanka's Landmass as a Natural Barrier to Ocean Swells

- A study by INCOIS shows that the **Sri Lankan Land Mass (SLLM)** acts as a natural barrier, blocking long-period swell waves from the **Southern Ocean** from reaching **India's southeastern coast (Tamil Nadu & Andhra Pradesh)**.

*India has a coastline of 11,098.81 km, 7,516.6 km of mainland coast, & rest is contributed by the 1,382 km islands spanning 13 coastal States & Union Territories, as per the Ministry of Earth Sciences.*

### Key Findings of the Study

- **Wave Blocking Effect:** SLLM prevents ~96% of long-period swell waves (recorded off Kollam) from reaching Pondicherry and further north.
- **Model Simulations:** Using **WAVEWATCH III**, scientists found that removing Sri Lanka hypothetically exposes **TN-AP coasts** to destructive Southern Ocean swells.
- **Geographical Protection:** While **Kerala's coast** faces frequent coastal erosion from these swells, **TN-AP coasts** remain largely safe due to Sri Lanka's position.

*WAVEWATCH III is a **third-generation wave model**, a development of previous models, and is evolving into a wave modelling framework*

### India's Clean Energy and Climate Finance

- India added **24.5 GW of solar capacity in 2024**, becoming the **3<sup>rd</sup> largest contributor** globally after China and the U.S. (**UN 2025 Climate Report**). However, this momentum risks slowing **without an expansion in climate finance** to sustain the transition.

#### Climate Finance

- The **UNFCCC** defines climate finance as multi-source public and private funding that supports **mitigation & adaptation** to climate change.
- **Article 9 of the Paris Agreement** obligates developed countries to mobilise **\$100 billion each year** for developing nations until 2025.
- The obligation is based on the principle of **common but differentiated responsibilities and respective capabilities (CBDR-RC)**.

#### Significance of India's Clean Energy Growth

- **Employment Generation:** Renewable energy sector employed **1 million+ people in 2023**, contributing **5% of GDP growth**, boosting Economic growth.
- **Climate Goals Alignment:** Supports India's **Net Zero by 2070** and **Panchamrit targets** — achieving **500 GW of renewables by 2030**.

- **Leadership Role: International Solar Alliance (ISA)** demonstrates India's global climate leadership.

### Challenges in Climate Finance

- **Financing Gap:** India needs **\$2.5 trillion by 2030** for a **1.5°C pathway**, but current flows (~\$400 billion projected) leave a gap of around \$2.1 trillion. (IRENA Report)
- **Policy Misfit:** India's frameworks often diverge from **multilateral fund access** requirements.
- **Private Gap: Adaptation finance** in India faces a **funding deficit of over \$580 billion**, with **private participation below 5%** due to low returns and high perceived risks.
- **Project Risk: Long gestation periods** deter banks from financing green infrastructure projects.
- **India's Climate Finance Initiatives**
- **NCEF:** The National Clean Energy Fund uses **coal cess revenue** for **clean tech R&D** and deployment.
- **NAFCC:** The National Adaptation Fund on **climate resilience projects** in vulnerable states.
- **Sovereign Green Bonds:** Introduced in Budget 2022-23 to finance **green public infrastructure**.
- **NABARD Strategy:** NABARD's **2030 strategy** broadens rural green finance and resource mobilisation.
- **GCF Access:** India accesses the **Green Climate Fund** for adaptation and clean energy investments.

### Way Forward

- **Diversify Climate Finance:** combining public funds with private capital to de-risk green investments. E.g. Partial credit guarantees used by the **World Bank's Solar Rooftop Program**.
- **Domestic Institutional Capital:** Encourage pension and insurance funds (**EPFO, LIC**) to allocate portfolios for green infrastructure. E.g. **Denmark** has set up **National Green Investment banks**.
- **Carbon Market Mechanisms:** Operationalise the **Carbon Credit Trading Scheme (CCTS)** with transparency and equity to create new finance streams.
- **Climate Finance Taxonomy:** To guide investments toward climate-resilient, low-carbon activities and prevent greenwashing. E.g. **India's Draft Climate Finance Taxonomy Framework (2025)**.
- **Budget Tagging:** **Chile's fiscal tagging model** can help transparently track green public expenditure.
- **Debt Swap:** Use **debt-for-climate swaps**, like **Belize**, to redirect repayments into climate projects.

### Understanding Nightshades

- The nightshade family, scientifically known as **Solanaceae**, is a diverse group of **flowering plants** that includes **toxic species** and **widely consumed vegetables**.

## THE NIGHTSHADE OR SOLANACEAE FAMILY

A diverse plant family with staple foods, striking ornamentals, and a few toxic cousins.



## Nightshade Family

- **Common Members:** Includes edible plants like **tomato**, **potato**, **brinjal** (eggplant), and **chilli**, alongside toxic varieties like deadly nightshade (belladonna).
- **Characteristic Features:** Most nightshades bear **star-shaped**, five-petalled flowers.
- **Toxicity Factor:** Nightshades contain **alkaloids** that can be **harmful in excess** but are **safe** or beneficial in small amounts.
- **Ripe potatoes & tomatoes** are harmless, while **green potatoes** with higher alkaloids should be avoided.
- **Role of Solanine:** Solanine is a **glycoalkaloid** found in nightshades. It is

bitter and toxic in **excess**. However, it is also a **natural pesticide** for the plant.

*Alkaloids are **nitrogen-containing** organic compounds found in nearly all nightshade species, contributing to their **bitterness** and **toxicity**.*

## Sawalkote Hydropower Project

- The Sawalkote Hydroelectric Project on the Chenab River in **Jammu & Kashmir** has received environmental clearance from **Ministry of Environment, Forest & Climate Change (MoEFCC)**.
- **Implementing Agency:** National Hydro Power Corporation (NHPC) Ltd.
- **Key Highlights of the Project**
- This project marks the **first major hydropower** clearance on the Indus River system since India suspended the Indus Waters Treaty (IWT) with Pakistan in April 2025.
- Designed as a **run-of-the-river project**, it will harness the Chenab's natural flow **without** constructing a **large storage dam**.
- The project includes a 192.5-metre-high **Roller Compacted Concrete (RCC) gravity dam**.
- With an installed capacity of **1,856 MW**, the plant is expected to generate around **8,000 million units of electricity** annually.

## Greenhouse Gas Emission Intensity (GEI) Target Rules, 2025

- MoEFCC notified the **Greenhouse Gas Emission Intensity (GEI) Target Rules, 2025**, establishing **India's first legally binding** framework for industrial emission reductions.

- **Greenhouse Gas Emission Intensity (GEI) Target**
- The GEI Target Rules are a set of **legally binding mandates** for **carbon-intensive industries** to reduce greenhouse gas emissions per unit of output.
- **Scope:** The rules apply to 282 industrial units across **four sectors** — **Aluminium, Cement, Pulp and Paper, and Chlor-alkali.**
- **Definition:** GEI is defined as the amount of greenhouse gas emitted **per unit of output**, measured in tonnes of CO<sub>2</sub> equivalent (**tCO<sub>2</sub>e**).
- **Compliance Cycle:** The first compliance phase spans **FY 2025-26 and 2026-27**, with sector-specific targets based on the **2023-24 baseline.**
- **Carbon Credit Trading Scheme (CCTS) Compliance**
- **Compliance:** The GEI Target Rules implement the **compliance framework** under India's **Carbon Credit Trading Scheme (CCTS), 2023.**
- **Credit Mechanism:** Units meeting their reduction targets earn **tradable carbon credits**, while non-compliant units must **buy credits** or pay **environmental compensation.**
  - The environmental compensation is set at **twice the average trading price** of carbon credits.
- **Institutional Oversight:** The **Bureau of Energy Efficiency (BEE)** issues credits, and the **Central Pollution Control Board (CPCB)** monitors compliance and enforces **penalties within 90 days.**
- **Significance of GEI Target Rules, 2025**
- **Climate Commitments:** Supports India's Paris Agreement goal to reduce GDP emission intensity **by 45%** from 2005 levels by 2030.
- **Carbon Market:** Implements the compliance segment of the Carbon Credit Trading Scheme (CCTS) to ensure **accountability** in emissions reduction.
- **Clean Technology:** Encourages industries to adopt **energy-efficient** and **low-carbon technologies.**
- **Global Competitiveness:** Strengthens India's preparedness for international frameworks such as the EU's **Carbon Border Adjustment Mechanism (CBAM).**

### Chowna Buku Chulu

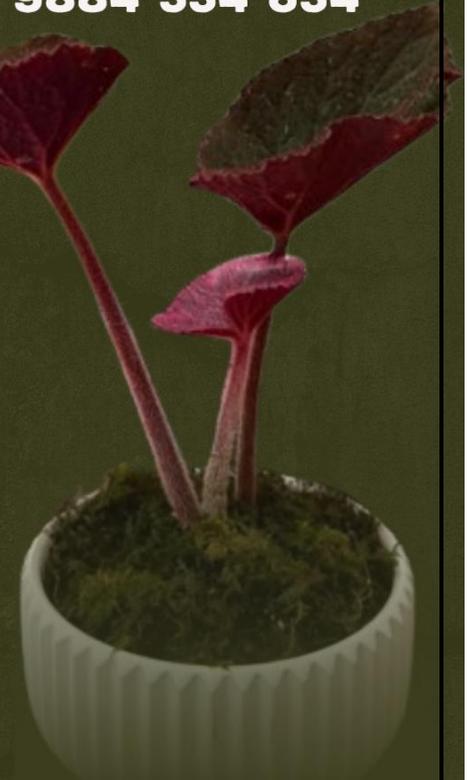
- Scientists have discovered a new **Begonia species** named **Chowna Buku Chulu** in Leparada district, Arunachal Pradesh, distinguished by its **bright red leaves.**
- **Chowna Buku Chulu**
- **Chowna Buku Chulu** is a newly identified **flowering Begonia species** found in the Leparada district, Arunachal Pradesh.
- **Trait:** It features **bright ruby-red leaves** that enhance its ornamental appeal and market potential.
- **Etymology:** The name, meaning "**Noble Red**" in Sanskrit (Aryarakta), honours Deputy Chief Minister of Arunachal Pradesh, Chowna Mein.

# New Begonia

Discovered in Arunachal Pradesh

Scientists from the Arunachal Pradesh State Horticulture Research and Development Institute (SHRDI) have discovered a new Begonia species, 'Chowna Buku Chulu' (Aryarakta), with beautiful ruby-colored leaves in Basar, Lepa Rada District.

The plant is named in honor of Hon'ble Deputy Chief Minister Chowna Mein for his support of horticulture and sustainable development. The discovery was led by Egam Basar, with Dr. Dipoo Dipankar Borah, Dr. Momang Taram, and Dr. Krishna Chowlu.



## Genus Begonia

- Begonia includes around **2,000 flowering plant species** known for their **colourful leaves** and diverse ecological diversity.
- **Habitat:** These plants thrive in **moist tropical** and **subtropical** regions, usually under **shaded**, humid forest canopies.
- **Adaptation:** Their **asymmetrical leaves** with **red undersides** reflect light upward, aiding photosynthesis in low-light forest floors.
- **Distribution:** Begonias have a **pantropical range** across South America, Africa, and South and Southeast Asia. India has rich Begonia diversity, especially in the **Eastern Himalayan states**.
- **Defence:** Some species produce **oxalic acid** to deter herbivores and protect against grazing damage.
- **Applications:** Begonias have **medicinal, ornamental,** and **dye-related** uses. They contain phytochemicals with **antioxidant, antibacterial,** and **anti-inflammatory** properties.

### Kabad Se Kalakriti Initiative

**South Eastern Coalfields Limited (SECL)** built a model of the S-400 missile launcher system and a robotic soldier from industrial scrap under the Swachhta Hi Seva Campaign.

- The initiative is part of SECL's flagship '**Kabad Se Kalakriti**' programme, aligning with the national "**Waste to Wealth**" theme to turn industrial scrap into creative artworks.
- **Materials:** SECL used almost 800 kg of metal scrap, including old chassis, steel pipes, and other iron parts.
- **Symbolism:** The creations honour Operation Sindoor and serve as symbols of India's **defence innovation** and **eco-friendly waste reuse**.

- *The SECL is a Miniratna public sector enterprise and a subsidiary of Coal India Limited (CIL).*
- *The S-400 Triumph is a Russian-made, long-range surface-to-air missile (SAM) system known as "Sudarshan Chakra" in India.*

### IUCN World Heritage Outlook Report

- The International Union for Conservation of Nature (IUCN) published its **fourth edition** of **World Heritage Outlook** at the World Conservation Congress in **Abu Dhabi**.
- First launched in **2014**, the report assesses the conservation status of all **Natural** and **Mixed** UNESCO World Heritage Sites.

#### World Heritage Sites

- A World Heritage Site (WHS) is a location recognized by **UNESCO** under the **1972 World Heritage Convention** for possessing "**Outstanding Universal Value**" for all of humanity.
- **Global Count:** As of 2025, there are **1,248** World Heritage Sites worldwide, including **44 in India** (36 cultural, 7 natural, and 1 mixed).
- **Governance:** The **UNESCO World Heritage Committee** manages the listing process through multiple stages, starting with national Tentative Listing and concluding with final inscription after approval.
- **Advisory Role:** The **IUCN** serves as the official advisory body for **natural** and **mixed sites** to the UNESCO World Heritage Committee.

#### World Heritage Outlook Report

- The World Heritage Outlook is a periodic global assessment published **every 3-5 years** by the **IUCN** to evaluate the conservation prospects of **Natural** and **Mixed** WHS.
- **Evaluation Criteria:** Sites are evaluated based on **three parameters**: (a) the current condition of **site values**, (b) the severity of **threats** faced, and (c) the effectiveness of **management**.
- **Rating System:** Each site receives one of **five ratings**: (a) **Good**, (b) **Good with Some Concerns**, (c) **Significant Concern**, (d) **Critical**, or (e) **Data Deficient**.
- **Purpose:** It provides an evidence-based assessment of conservation progress and guides policy

actions.

### Key Findings of the World Heritage Outlook Report

- **Declining Outlook:** Sites rated 'Good' or 'Good with Some Concerns' fell from 62% (2020) to 57% (2025).
- **Climate Threats:** Climate change is now the **most prevalent** threat, affecting 43% of all-natural WHS.
- **Invasive Species:** Invasive Alien Species remain the **second most** common threat, affecting 30% of all assessed sites.
- **Emerging Pathogens:** Wildlife & plant diseases now threaten 9% of sites, compared to only 2% in 2020.
- **Compounding Threats:** Interlinked climate change, species invasion, and pathogen pressures are accelerating ecosystem degradation.
- **Biodiversity Hotspots:** Sites with rich biodiversity are facing disproportionately **higher vulnerability**.
- **Protection Gaps:** Only 50% of the assessed sites reported having adequate protection and management.
- **Funding Risks:** Around 15% of sites face severe financial shortages that weaken conservation outcomes.
- **Positive Trends:** 13 sites improved since 2020 due to targeted investment and community engagement.

### India-Related Findings

- **Sundarbans Decline:** The Sundarbans National Park dropped from 'Good with Some Concerns' (2020) to 'Significant Concern' (2025) due to sea-level rise, increasing salinity, cyclones, & mangrove diseases.
- **Persistent Concerns:** Manas National Park and the Western Ghats remain under 'Significant Concern'
- **Positive Performer:** Khangchendzonga National Park continues to be India's only site rated as 'Good,'
- **Moderate Outlook:** Great Himalayan, Kaziranga, Keoladeo, and Nanda Devi-Valley of Flowers are rated 'Good with Some Concerns.'
- **Cascading Threats:** Glacial retreat and invasive alien species in Himalayan sites threaten hydrology and biodiversity in the Ganga River basin.

### Green Sea Turtle (*Chelonia mydas*)

- The IUCN has upgraded the conservation status of the **Green Sea Turtle (*Chelonia mydas*)** from Endangered to **Least Concern**, reflecting progress in global conservation efforts.
- **Population Recovery:** Global populations have **risen by almost 28%** since the 1970s, despite

ongoing threats to some regional subpopulations.

### Green Sea Turtle (*Chelonia mydas*)

- The Green Sea Turtle (*Chelonia mydas*) is the **largest hard-shelled sea turtle** and the only sea turtle with a **strictly herbivorous** adult diet.
  - It gets its name from the **green hue** of its body fat and cartilage, not its outer shell.
- **Diet:** Hatchlings are **omnivorous**, while adults are herbivorous, using **beak-like jaws** adapted for grazing on **seagrass** and **algae**.
- **Distribution:** Found across **tropical** and **subtropical** oceans, including the Atlantic, Pacific, Indian Oceans, and the Mediterranean Sea.
  - **Indian Range:** Occurs along India's mainland coasts and islands, with key nesting sites in **Saurashtra, Lakshadweep, and Andaman-Nicobar**.
- **Habitat Preference:** Juveniles inhabit the **open pelagic** zone, while adults prefer **shallow coastal** areas like lagoons, reefs, and seagrass beds.
- **Migration:** Green Sea turtles are **highly migratory** and travel thousands of kilometres. They use **Earth's magnetic fields** to locate natal nesting sites.
- **Reproduction:** **Temperature-dependent sex** determination produces **more females** in warmer nests and more males in cooler conditions.
- **Keystone Role:** Their grazing **sustains seagrass ecosystems**, improves carbon sequestration, and strengthens the resilience of marine biodiversity.
- **Indicator Species:** As **long-lived (~80 years)** marine organisms, their population patterns reveal the health and resilience of global ocean ecosystems.
- **Major Threats:** Overharvesting, hunting, entanglement in fishing nets, habitat destruction, and nesting disruptions caused by climate change.

**Conservation Status:** IUCN: Least Concern; CITES: Appendix I; CMS: Appendix I & II; WPA: Schedule I.

### Ozone Pollution in Indian Cities

#### Ozone Pollution

- Ozone pollution refers to the accumulation of **ozone gas (O<sub>3</sub>)** near the Earth's surface, formed when **nitrogen oxides (NO<sub>x</sub>)** and **volatile organic compounds (VOCs)** react under sunlight.
- It is a **secondary** pollutant, meaning it is not directly emitted but produced through chemical reactions.
- Ozone exists in two forms: **Stratospheric ozone ("good")**, which forms the protective ozone layer shielding Earth from UV radiation, and **Tropospheric ozone ("bad")**, a harmful pollutant

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**OZONE**

**NOx + VOC + Sunlight = Ozone**  
Ground-level or "bad" ozone is harmful when inhaled. Ground-level ozone is created by chemical reactions between nitrogen oxides (NOx) and volatile organic compounds (VOC) in the presence of sunlight.

Emissions from industrial facilities, electric utilities, motor vehicle exhaust, gasoline vapors, and chemical solvents are some of the sources of NOx and VOC.

20 YEARS  
483 OFFICERS

**9884 554 654**

- The **National Green Tribunal (NGT)** has taken suo motu cognisance of a report on the alarming rise of ground-level ozone pollution in major Indian cities.
- The tribunal linked high ozone to **vehicular, industrial, and power-sector NOx emissions** and sought a CPCB-led expert study to frame control measures.

#### Scale of the Issue

- **Ozone Exceedance:** Highest in **Delhi-NCR** and **Mumbai**, often breaching safe limits (CPCB, 2025).
- **Rising Trend:** Urban ozone up **>30% since 2018** from vehicles and power plants (MoEFCC, 2024).
- **Health Impact:** Causes respiratory diseases and **~70,000 premature deaths** annually (WHO, 2024).
- **Emission sources:** Transport (**~40%**) and power generation (**~30%**) major NOx contributors.
- **Environmental impact:** Reduces crop yields by **5-20%** and contributes to climate warming.

#### Synchronous All India Elephant Estimation 2021-25

- The Synchronous All India Elephant Estimation (SAIEE) 2021-25 places **India's elephant population at 22,446**, marking an **18% decline** from the 2017 estimate of 27,312.
- Officials clarified that the **figures are not directly comparable** due to a **new methodology** and will serve as a **fresh baseline** for future assessments.

#### Key Highlights

- **Regional Distribution:** The **Western Ghats** (11,934) have the **highest population**, followed by the Northeast (6,559), Shivalik-Gangetic plains (2,062), and Central-Eastern Ghats (1,891).
- **Top States:** Karnataka (6,013), Assam (4,159), Tamil Nadu (3,136), Kerala (2,785), Uttarakhand

(1,792), and Odisha (912) continue to host the largest elephant populations.

- **Threats identified:** Expansion of coffee and tea plantations and linear infrastructure projects such as railways, roads, and power lines cutting through corridors.
  - In Central India, mining and human-elephant conflict remain major conservation challenges.

### First IUCN Green Status of Species assessment for the Tiger Released

- The IUCN's Green Status Assessment classified the tiger (*Panthera tigris*) as 'Critically Depleted', highlighting persistent global range loss despite local recovery gains.
- It showed a moderate recovery capacity, and the population could rise to over 25,000 individuals within the next century.

## INCENTIVIZING CONSERVATION WITH THE IUCN GREEN LIST OF SPECIES

**IUCN is creating a new tool to:**

-  **ELEVATE** levels of ambition for species conservation beyond avoiding extinctions
-  **RECOGNIZE** conservation achievements
-  **HIGHLIGHT** species dependent on continued conservation actions
-  **FORECAST** the impact of planned conservation action

The Green List of Species will work *with* the Red List of Threatened Species™ to provide a more complete picture of species conservation



### IUCN Green Status of Species

- The IUCN Green Status of Species is a **conservation assessment tool** that measures how close a species is to full recovery and monitors conservation outcomes over time.
- **Optimistic Tool:** Launched in 2021, it complements the IUCN Red List by highlighting **species recovery** instead of only extinction risk.
- **Green Score:** Each species receives a **Green Score (0–100%)** showing its progress toward complete population recovery.

### Key Aspects of Species Recovery

- **Range Occupancy:** How much of its original, **historical distribution** range the species occupies.
- **Population Viability:** Whether the species' populations are **self-sustaining** and safe from

extinction.

- **Ecological Functionality:** Whether the species is performing its natural ecological functions (e.g., predation, seed dispersal, etc.)
- **Green Status Categories**
- The Green Status divides species into **eight recovery levels** from 'Extinct in the Wild' to 'Non-Depleted.'
- **Extinct in the Wild:** No living populations remain in natural habitats, surviving **only in captivity**.
- **Critically Depleted:** Species persists in small areas and **depends entirely** on conservation efforts.
- **Largely Depleted:** Most historical populations are absent, and recovery remains limited or **localized**.
- **Moderately Depleted:** **Partial recovery** achieved, but extensive restoration is still required.
- **Slightly Depleted:** Nearly recovered, with a few populations or habitats yet to be restored.
- **Fully Recovered:** Populations restored to historic levels and functioning naturally in all native ecosystems.
- **Non-Depleted:** Species is widespread, has **never faced a major decline**, and is not at risk of extinction.
- **Indeterminate:** Recovery status uncertain due to insufficient or unreliable data.

### Conservation Impact Metrics

- The Green Status uses **four key metrics** to measure the effectiveness of conservation actions.
- **Conservation Legacy:** Benefits from **past conservation efforts** that led to the present recovery levels.
- **Conservation Dependence:** How a species' condition would deteriorate if existing conservation efforts were withdrawn.
- **Conservation Gain:** The extent of recovery expected within the **next decade** under current interventions.
- **Recovery Potential:** Likelihood of achieving full restoration over the **next 100 years** under **optimal** conservation conditions.
- **Criteria for Full Recovery**
- A species is considered fully recovered if it meets **three main criteria** across its historical range.
- **Historical Presence:** The species must **return to all areas** it occupied before human disruption.
- **Population Health:** Populations must be **viable, reproducing**, and resilient across their natural range.
- **Ecological Role:** The species must resume its **ecological functions** in all native ecosystems.

*The tiger (Endangered) is the largest living cat species and a solitary ambush predator native to Asia. India supports the largest wild tiger population, with 3,167 individuals (over 70% of the total).*

### Five Maharashtra Beaches Get Blue Flag Certification

- **Context (NOA):** Five beaches in Maharashtra have recently been awarded the **international Blue Flag certification**.
- **Certified Beaches:** Shrivardhan and Nagaon (Raigad), Parnaka (Palghar), and Guhagar and Ladghar (Ratnagiri) have received the certification.
- **Blue Flag Certification**
- Administered by the **Foundation for Environmental Education (FEE), Denmark**, the **Blue Flag Programme**, launched in **France in 1985** and expanded globally in 2001.
- Awarded to beaches meeting **33 criteria** on cleanliness, water quality, safety & environmental education.
- The selection is made by an international jury representing UNEP, United Nations World Tourism Organisation (UNWTO), FEE, and IUCN.
- India launched its own eco-label, **Beach Environment and Aesthetics Management Services (BEAMS)**, in **2018** under the **Integrated Coastal Zone Management (ICZM)** project.
- **Other Blue Flag-Certified Beaches in India:** Shivrajpur (Gujarat), Golden Beach (Odisha), Ghoghla (Diu), Kasarkod and Padubidri (Karnataka), Kappad and Chal (Kerala), Rushikonda (Andhra Pradesh), Radhanagar (Andaman & Nicobar Islands), Kovalam (Tamil Nadu), Eden Beach (Puducherry), Minicoy Thundi and Kadmat (Lakshadweep).

### Global Land Outlook on Ecological Connectivity

- The United Nations Convention to Combat Desertification (UNCCD) released the **2025 Global Land Outlook Thematic Report on Ecological Connectivity & Land Restoration** at the IUCN World Conservation Congress in **Abu Dhabi**.
- **Global Land Outlook (GLO) Report**
- The Global Land Outlook is the flagship publication of the UNCCD that assesses global land resources and sustainable management practices. It has been published **twice** so far, in **2017** and **2022**.
- **Core Objective:** It examines **land degradation, desertification, and drought**, as well as their combined effects on food, water, and climate stability.
- **Thematic Reports:** These offer in-depth, evidence-based analysis on **specific land-related issues**. They are developed in collaboration with global partner institutions.
  - The Ecological Connectivity and Land Restoration report was co-published with the **Convention on Migratory Species (CMS)**.

### Key Findings of the Report

- **Habitat Fragmentation:** Nearly **one-third** of global land has been transformed by humans, breaking natural habitat links and weakening ecosystems.
- **River Barriers:** More than **60% of rivers** are **dammed or diverted**, halting fish migrations and disturbing natural water cycles.
- **Infrastructure Expansion:** Global road networks may **rise by 60% by 2050**, which will worsen

habitat loss and ecological isolation.

- **Degradation Extent:** Around **40% of Earth's land is degraded**, placing half the **global population** under environmental strain.
- **Migration Threats:** Expanding agriculture and cities block species migration routes, e.g., **wildebeest** in the **Serengeti-Mara** (Tanzania), fisheries in the Mekong River.
- **Ecosystem Decline:** Reduced connectivity harms soil health, crop yields, and water access, while raising disaster exposure.
- **Successful Models Highlighted in the Report**
- **European Green Belt (Europe):** It connects **24 countries** from Northern Europe to the Mediterranean, showing coordinated conservation across borders.
- **Wildlife Corridors (Costa Rica):** A national system of wildlife corridors was built to aid **jaguar movement** and promote ecotourism.
- **Agroforestry Practices (Bolivia):** **Indigenous communities** are restoring connectivity using traditional sustainable agroforestry practices.
- **Great Green Wall (Africa):** The project aims to **restore 250 million acres of degraded land**, capture 250 million tonnes of carbon dioxide, and create 10 million jobs **by 2030**.
- **Rewilding Projects (Portugal):** The project in the **Greater Côa Valley** focuses on large-scale ecological restoration through reintroducing locally extinct wild species.

### Forest Declaration Assessment 2025

- The **Forest Declaration Assessment 2025** warns the world is **"off-track by 63 %"** in meeting the **2030 zero-deforestation goal**.
- *The Forest Declaration Assessment 2025 was released by the Forest Declaration Platform, a multi-stakeholder initiative coordinated by Climate Focus in collaboration with UNDP and UNEP*
- **Global Forest Loss Data**
- **Forest Loss Escalates:** Total Forest loss reached **8.1 million ha in 2024**, overshooting the global target by **3 million ha**, indicating the world is **63% off track to halt deforestation by 2030**.
- **Tropical Forests as Epicentre:** Nearly **94% of total forest loss occurred in tropical regions**, with 6.7 million ha of humid tropical primary forests destroyed mainly in **Latin America and Africa**.
- **Restoration Gap Widens:** Only **10.6 million ha under active restoration**, a mere **0.3% of global potential**, far below the 30% restoration goal under global pledges (**Glasgow Declaration**).
- **Indigenous Rights:** Only **13%** of customary lands in tropical forests are formally recognised, undermining community-based conservation and local stewardship.
- **Reasons for the Forest Crisis**
- **Agricultural Expansion:** **≈ 86 % of global deforestation** is driven by cropland & pasture conversion.
- **Mining & Infrastructure:** **77 % of global mines** lie within 50 km of KBAs.

- **Wildfires & Climate Stress:** Amazon fires emitted 791 Mt CO<sub>2</sub>e (2024) — major degradation driver.
- **Weak Governance:** Only 3 % of companies fully implement deforestation-free pledges.
- **Critical Mineral Demand:** Mining in biodiverse zones rose 47 % (2023–24) due to the energy transition.

#### Way Forward

- **Forest Finance:** Mobilise global funds for restoration and carbon sequestration. E.g. UN-REDD+, Green Climate Fund, Forest Carbon Partnership Facility.
- **Empower Indigenous Communities:** Recognise land rights and community forest governance. E.g. India's Forest Rights Act, 2006, UNDRIP, 2007)
- **Restoration Incentives:** Integrate forest credits with CSR norms. (India's Green Credit Programme)
- **Forest-Smart Mining:** Enforce **no-go zones** around Key Biodiversity Areas (KBAs). (IUCN Mining and Biodiversity Guidelines, 2023)

#### World Meteorological Organisation Greenhouse Gas Bulletin

- The World Meteorological Organization (WMO) published its annual **Greenhouse Gas Bulletin 2025**, reporting record global concentrations of CO<sub>2</sub>, CH<sub>4</sub>, and N<sub>2</sub>O in 2024.

##### Key Findings of the Bulletin

- **CO<sub>2</sub> Surge:** Global CO<sub>2</sub> concentration increased by 3.5 ppm to **423.9 ppm in 2024**, representing the **largest annual rise** since 1957.
- **Historical Ratio:** CO<sub>2</sub> levels reached **152% of pre-industrial concentration** due to persistent fossil fuel emissions and **declining absorption** by natural carbon sinks.
  - The 2024 El Niño event, combined with severe wildfires in the Amazon and Southern Africa, decreased ocean and land CO<sub>2</sub> absorption.
- **Methane Level:** CH<sub>4</sub> concentration reached **1942 ppb**, or **266%** of pre-industrial levels, contributing about **16%** to total **radiative forcing** from long-lived greenhouse gases.
- **Nitrous Oxide:** N<sub>2</sub>O concentration was **338 ppb (125%** of pre-industrial levels), mainly due to fertiliser use and biomass burning.
- **Radiative Forcing:** The combined warming impact from long-lived greenhouse gases **rose 54%** between 1990 and 2024, with **CO<sub>2</sub> alone** accounting for around **81%** of this increase.
- **Temperature Threshold:** In 2024, the global mean temperature **exceeded 1.5°C** above pre-industrial levels for the first time, indicating a narrowing window for climate action.

##### World Meteorological Organization (WMO)

- The World Meteorological Organization (WMO) is a UN specialised agency that **promotes global cooperation in weather, climate, and water sciences**.
- Founded in **1950** and headquartered in **Geneva**, it currently includes **193 member states & territories**.

### Sundarbans Aquaculture Model Wins FAO Global Recognition

- The **Food and Agriculture Organisation (FAO)** has awarded Global Technical Recognition to the **Sustainable Aquaculture in Mangrove Ecosystems (SAIME)** from the Sundarbans.
- *FAO, the specialised United Nations agency, was established in 1945 to lead global efforts in eradicating hunger and improving nutrition and food security.*

#### SAIME Model

- It is a **community-driven initiative** in the Sundarbans region of **West Bengal** that promotes eco-friendly, **climate-resilient** aquaculture along with mangrove **restoration**.
- The model ensures that mangroves cover **5-30%** of brackish water **shrimp farming areas** and utilises **mangrove litter** as natural feed, thereby reducing production costs.
- **Implementation:** Launched in **2019**, it is jointly conducted by the **Nature Environment and Wildlife Society (NEWS)** in India and two organizations from Germany and Bangladesh.
- **Key Outcome:** Participating farmers achieved **profit gains of over 100%** due to reduced input costs and increased productivity.
- **Significance:** The initiative enhances **coastal resilience**, promotes **sustainable livelihoods**, assists in carbon sequestration, and encourages **chemical-free** aquaculture.

#### Sundarbans

- The Sundarbans is the **world's largest mangrove forest** and part of the largest delta formed by the Ganga, Brahmaputra, and Meghna rivers.
- It covers about **10,000 sq. km**, with about **40% in India** (West Bengal) and **60% in Bangladesh**.
- It is named after the **Sundari tree** (*Heritiera fomes*), a dominant mangrove species native to the region.
- **Global Recognition:** It is designated as a Biosphere Reserve, Tiger Reserve, Ramsar Site, and UNESCO World Heritage Site.

### Indian Wolf as a Distinct Species

- The **Indian wolf** (*Canis lupus pallipes*) might soon be classified as a **distinct species** by the IUCN, increasing the total number of **wolf species** to **eight**.
- **Indian Wolf** (*Canis lupus pallipes*)
- The Indian Wolf, also called the **Peninsular Wolf**, is a **subspecies** of the **grey wolf** native to the **Indian subcontinent** and Southwest Asia.
- **Genetic Distinction:** Genetic studies show it diverged from other wolf lineages around 110,000 years ago, making it one of the **oldest wolf lineages** in the world.
- **Physical Traits:** The Indian wolf is **smaller** and **leaner** than the Himalayan wolf, and it **lacks** a dense **winter coat** to adapt to warmer climates.
- **Behavioural Traits:** It travels in **smaller packs** of six to eight individuals, is **less vocal** than other

wolf subspecies, and is primarily **nocturnal**.

- **Habitat Range:** Prefers **semi-arid scrublands, open grasslands**, and agro-pastoral ecosystems, while avoiding dense forests with high predator competition.
- **Distribution:** About **3,000 individuals** survive across **India and Pakistan**. In India, populations are concentrated in Madhya Pradesh, Rajasthan, Gujarat, and Maharashtra.
- **Ecological Role:** As an **apex predator**, it maintains grassland ecosystem balance by **regulating herbivore** populations and preventing overgrazing.
- **Key Threats:** Habitat loss due to industrial and agricultural expansion, **genetic dilution** from feral dog hybridization, human-wildlife conflicts, prey base depletion, etc.
- **Conservation Status:** IUCN: **Vulnerable**; CITES: **Appendix I**; WPA: **Schedule I**.

### Snow Leopard is the Least Genetically Diverse Cat Species

- A recent Stanford University study found that the Snow Leopard (*Panthera uncia*) has the **lowest genetic diversity** among all big cat species.
- **Causes of Low Genetic Diversity in Snow Leopards**
- **Small Population:** Snow leopards evolved in small, **isolated populations** because of their harsh, high-altitude habitats with limited resources.
- **Natural Barriers:** Mountain ranges and deserts, such as the Himalayas and Taklamakan, **limit movement and gene flow** between regional populations.
- **Niche Adaptation:** Adaptation to extreme cold and arid environments confined genetic variation to a **narrow ecological spectrum**.
- **Human Fragmentation:** Expanding infrastructure, mining, and settlements further isolated their populations and reduced interbreeding opportunities.

#### Homozygous Load

- Homozygous load refers to the total number of **harmful recessive mutations** that are expressed when identical defective alleles (faulty genes) are inherited **from both parents**.
- **Low Homozygous Load:** Despite minimal diversity, snow leopards show a **remarkably low** number of expressed **deleterious mutations** (harmful changes).
- **Purging Mechanism:** Over generations, **natural selection eliminated** these mutations because affected individuals had lower survival and reproductive success.
- **Comparison:** Unlike **cheetahs** that underwent **population bottlenecks**, snow leopards remained demographically stable, enabling gradual genomic refinement through natural selection.

#### Snow Leopard (*Panthera uncia*)

- The snow leopard is a large, **elusive wild cat** species adapted to survive in the cold, **high-altitude mountains** of **Central and South Asia**.
- **Behaviour:** Often called the "**ghost of the mountains**," it leads a **solitary** life and is primarily **crepuscular** (active during dawn and dusk).
- **Habitat Preference:** They inhabit steep, rugged mountainous areas **above the tree line**, usually

between 3,000 and 4,500 meters.

- **Geographic Range:** Snow Leopards span **12 Asian countries**, including China, India, Nepal, Bhutan, and Russia; **China** accounts for **nearly 60% of their habitat**.
- **India Population:** India has about **718 snow leopards**, concentrated mainly in **Ladakh (477)**, followed by **Uttarakhand, Himachal Pradesh**, Arunachal Pradesh, Sikkim, and Jammu & Kashmir.
- **Key Threats:** Habitat fragmentation, poaching for **pelts** (skin with fur), climate change, livestock competition, and **unregulated tourism**.
- **Conservation Status:** IUCN: Vulnerable; CITES: Appendix I; WPA: Schedule I.

### Global Push for Fossil Fuels Phase-Out Treaty

- At the **IUCN World Conservation Congress** (Oct 2025), the IUCN adopted **Motion 042**, officially identifying fossil fuel production as a **direct threat to nature and biodiversity**.

*The IUCN World Conservation Congress is a quadrennial (held every 4 years) global summit organised by the IUCN to set priorities for nature conservation and sustainable development.*

### UNFCCC (United Nations Framework Convention on Climate Change)

- **Adopted:** In **1992** at the **Rio Earth Summit** and entered into force in **1994**.
- **Headquarters / Secretariat:** Located in **Bonn, Germany**.
- **Objective:** To stabilise greenhouse gas (GHG) concentrations in the atmosphere at a level that prevents dangerous human-induced interference with the Earth's climate system.
- **Conference of Parties:** Supreme decision-making body; meets **annually**.
  - **COP28 (2023):** Dubai, UAE | **COP29 (2024):** Baku, Azerbaijan | **COP30 (2025):** Belém, Brazil

### IUCN (International Union for Conservation of Nature)

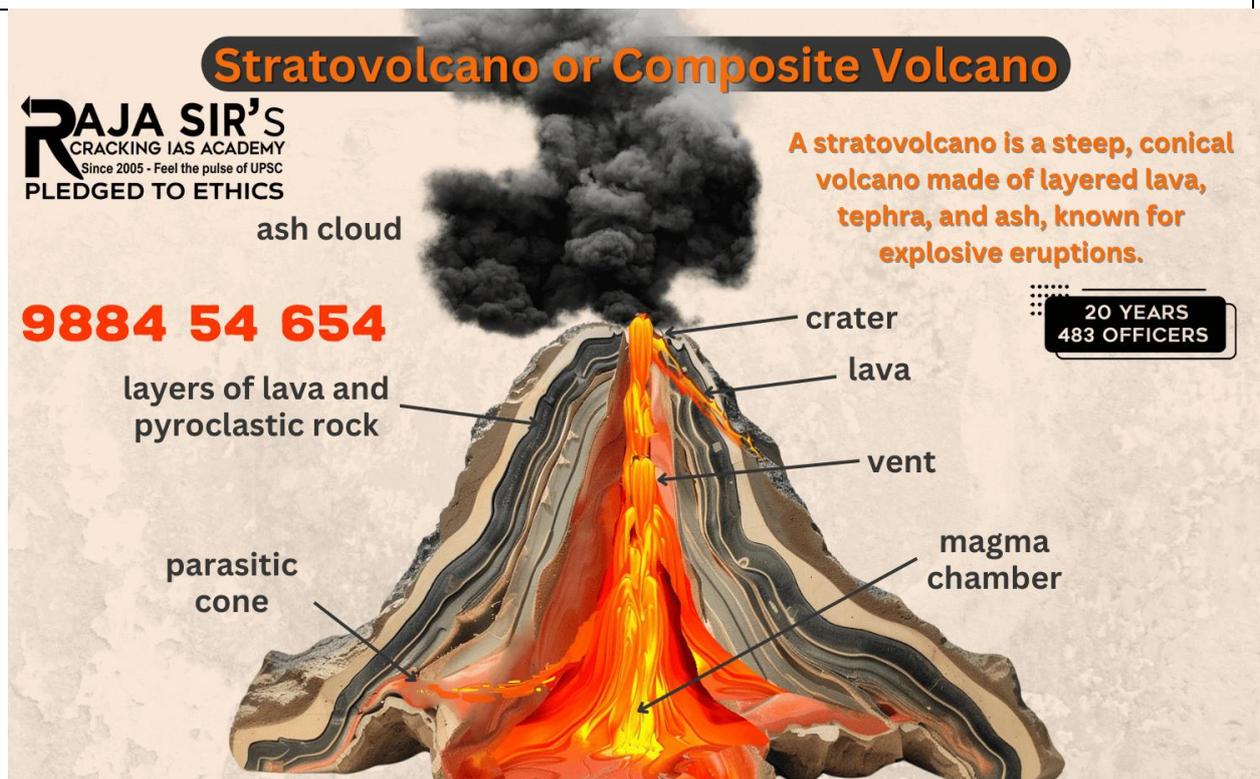
- **Founded:** In **1948**; Headquarters located in **Gland, Switzerland**.
- **Membership:** Comprises **1,400+ members**, including States, NGOs, and scientific organisations.
- **Core Role:** Serves as the global authority on the status of the natural world; maintains the IUCN Red List of Threatened Species.
- **Global Fossil Fuel Production Data**
- **Top Oil Producers:** U.S. (17%), Saudi Arabia (13%), Russia (12%).
- **Top Coal Producers:** China (51%), India (10%), Indonesia (8%).
- **Top Gas Producers:** U.S. (23%), Russia (17%), Iran (6%). (Source: IEA, 2024)
- **Fossil Fuel Subsidies:** \$1.8 trillion globally in 2024 (IMF, 2024).
- **Emission Share:** Fossil fuels account **~75% of global GHGs** and **~90% of CO<sub>2</sub> emissions** (UNEP, 2024).
- **Biodiversity Threat:** Fossil fuel extraction is linked to **>40% of terrestrial habitat degradation** and is responsible for **80% of biodiversity loss** in key hotspots such as the **Amazon**

& Congo basins.

### Taftan Volcano

- An **Iranian volcano** appears to have woken up, **700,000 years after** its last eruption.
- **Taftan Volcano**
- **Location:** **Southeastern Iran**, near the Pakistan border in Sistan-Baluchestan province.
- **Type:** Stratovolcano (composite volcano) built by successive layers of lava & ash.
- **Elevation:** Approximately 3,940 meters (12,927 feet) above sea level.
- **Tectonic Setting:** Part of the **Makran volcanic arc**, formed by subduction of the **Arabian Plate beneath the Eurasian Plate**, within the **Alborz–Makran volcanic belt** of southern Iran.
- **Geological Features:** Hosts an **active hydrothermal system** with fumaroles emitting sulphur gases.
- **Last Known Eruption:** ~710,000 years ago (Pleistocene epoch).

- **Stratovolcano (Composite Cone)**
- **Structure:** Steep, cone-shaped volcano made of alternating layers of lava, ash, and pyroclastic material.
- **Magma Type:** Predominantly **andesitic**, sometimes ranging from basaltic to rhyolitic.
- **Eruption Style:** **Highly explosive** due to trapped gases.
- **Tectonic Setting:** Common in **subduction zones** (e.g., Pacific Ring of Fire).
- **Examples:** Mount Fuji (Japan), Mount Vesuvius (Italy), Volcán de Fuego (Guatemala).



### Godda Thermal Power Plant

- The Ministry of Power has approved Adani Power Limited (APL) to connect its **Godda Ultra Super Critical Thermal Power Plant** in **Jharkhand** to the Indian power grid.
- **Key Highlights of the Plant**
- The Godda plant was declared an SEZ in **March 2019** and has since **supplied electricity exclusively to Bangladesh** under a bilateral power purchase agreement.
- The plant will be linked to **India's Inter-State Transmission System (ISTS)** through a **Line-In Line-Out (LILO)** connection of the **Kahalgaon A-Maithon B 400 kV line**.
- The Power Ministry invoked **Section 164** of the **Electricity Act, 2003**, granting APL the **same rights** as a **telegraph authority** under the **Indian Telegraph Act, 1885**, for laying overhead lines.
- The transmission line will traverse **56 villages in Godda and Poreyahat tehsils**, requiring clearances from local bodies, Railways, and highway authorities.

### Regulatory Amendments

- The Ministry amended the **2018 Guidelines for Import/Export of Electricity** to permit domestic linkage.
- The **Central Electricity Authority (CEA)** modified procedures to facilitate **cross-border power flows**.
- The **Central Electricity Regulatory Commission (CERC)** revised **General Network Access (GNA)** and cross-border trade regulations to allow **standby connectivity**.

### E-Waste Recycling Through Urban Mining

- India generates **1.75 million tonnes of e-waste (2023-24)**, which is **16%** of Europe's total, highlighting massive untapped potential for urban mining and critical raw material (**CRM**) recovery.

*Urban mining is the process of recovering valuable materials from waste, such as electronic devices, construction debris, and other discarded products.*

- **E-Waste Data in India**
- **E-waste:** **1.75 million tonnes** in 2023-24 (↑72.5% since 2019-20).
- **Recycling rate:** Improved from **22%** (2019-20) → **43%** (2023-24).
- **Metals recovered per tonne:** **Gold:** 300 g, **Silver:** 1 kg (Circular Economy Report, 2023)
- **Significance of Urban Mining in E-Waste Recycling**
- **Economic Value:** Proper urban mining could yield **₹20,000-₹25,000 crore** annually (CPCB, 2024).
- **Green Jobs:** Urban Mining can generate **5 lakh new jobs** in recycling sectors (NITI Aayog Report).
- **Critical Resource Security:** Reduces import dependence on strategic minerals; India **imports**

90% of the lithium and cobalt used in EVs and electronics.

- **Circular Economy Boost:** Turning urban waste (1.75 MT e-waste + 62 MT municipal waste) into reusable resources supports **SDG-12 (Responsible Consumption and Production)** & **Mission LiFE** goals.
- **Challenges Faced in Urban Mining**
- **Technological Gaps:** India lacks **high-end CRM extraction** and smelting infrastructure; **only 468 authorised recyclers with 1.6 MT capacity (CPCB, 2024) vs. 3 MT generation.**
- **Fragmented Governance:** **MoHUA** handles urban sanitation; **MoEFCC** manages waste rules.
- **Poor Segregation:** **<25% source segregation** limits composting & recycling. (CPCB 2023)
- **Informal Sector Neglect:** **~15 lakh waste-pickers** excluded from formal systems.
- **Financial Gaps:** Urban local bodies **recover < 20%** of user charges for solid waste services (NIUA 2023).
- **Way Forward**
- **Urban Mining Parks:** Establish **regional CRM recovery hubs** for high-value materials. E.g. **Japan's Eco-Town Model** and **China's Urban Mining Bases.**
- **Circular Economy Push:** Promote **reuse, repair, and recycling** through a national circular resource strategy. E.g. **NITI Aayog – Circular Economy Action Plan (2021)**
- **Formalise Informal Sector:** Integrate waste-pickers via cooperatives and SHGs for safe livelihoods. E.g. **ILO Green Jobs Initiative** and **Swachhata Start-up Challenge**
- **Digital Waste Mapping:** Use **AI, GIS, and IoT** for waste flow tracking and collection optimisation. E.g. **Smart Cities Data Command Centres**
- **Unified Waste Authority:** Merge responsibilities of **MoHUA and MoEFCC** under a single nodal body similar to the **EU Waste Framework Directive (2008)**

*International E-Waste Day falls on **October 14**, with a focus on critical raw materials and responsible e-waste recycling to conserve resources and reduce environmental harm.*

### Dinosaur Superhighway

- Palaeontologists recently uncovered a **dinosaur trackway** in **Oxfordshire, England**, displaying footprints from Sauropods like Cetiosaurus and Theropods such as Megalosaurus.
- **Jurassic Site:** This site, nicknamed the “**dinosaur superhighway**,” provides insights into dinosaur coexistence, locomotion, and behavioural ecology during the **Middle Jurassic era** (166 million years ago).
- **Trackway Scale:** It features a **220-meter-long** trackway likely made by **Cetiosaurus**. This is the largest known sauropod trail in Europe.
- **Global Highways:** Other well-known dinosaur highways include **Dinosaur Valley State Park (Texas, USA)**, **Dinosaur Ridge (Colorado, USA)**, **Cal Orck'o (Bolivia)**, and **La Rioja (Spain)**.

- **Sauropod:** *Gigantic herbivorous dinosaurs characterized by **long necks**, **long tails**, **small heads**, and **four thick, pillar-like legs**. They were the **largest land animals ever**.*
- **Theropod:** ***Bipedal** dinosaurs with distinctive **three-toed feet**. While many were **apex predators**, the group also included herbivores, omnivores, and the **ancestors of modern birds**.*

### Emissions from Rocket and satellite launches pose growing environmental threat

- In 15 years, the rockets launched per year has nearly tripled, and the satellites orbiting the planet has increased 10 times.
- Space debris re-entry has doubled in decade and debris' atmospheric burning creates toxic emissions.
- **Atmospheric impact of rocket launches**
- **Alumina (Al<sub>2</sub>O<sub>3</sub>) and black carbon (soot):** Al<sub>2</sub>O<sub>3</sub> and soot absorb and trap the long-wave radiation from Earth, thus resulting in warming.
  - A warmer stratosphere results in faster ozone depletion by speeding up the chemical reactions.
- **Ozone depletion:** Alumina, chlorine, nitrogen oxides, etc in rocket launch plumes all contribute to stratospheric ozone depletion.
  - **The Montreal Protocol** for protection of the ozone, does not address rocket emissions.
- **Carbon dioxide:** Each rocket launch produces 50-75 tonnes of CO<sub>2</sub> per passenger, significantly higher than airplane flights (1-3 tonnes of CO<sub>2</sub>).
- **Upper atmospheric-level pollution:** ~2/3<sup>rd</sup> of propellant exhaust is released into the stratosphere (12-50 km) and mesosphere (50-85 km), where it persists for at least 2-3 years.
  - Even "green rockets," propelled by liquid hydrogen, produce water vapor, which is a greenhouse gas at high altitudes.
- **Metallic ash:** May disrupt Earth's magnetic field, allowing more harmful cosmic radiation to reach the planet's surface.
- **Measures for controlling Pollution**
- **Horizontal Launch of Small satellite:** From under the wing of Boeing 747. It uses about 1/2 rockets.
- **Trajectory control for reentry:** New efforts suggest burning satellites at lower altitudes (12-1 faster).
- **Alternative fuels and design improvements:** Such as Bio propane and develop reusable launch s

### Ramgarh Vishdhari Tiger Reserve

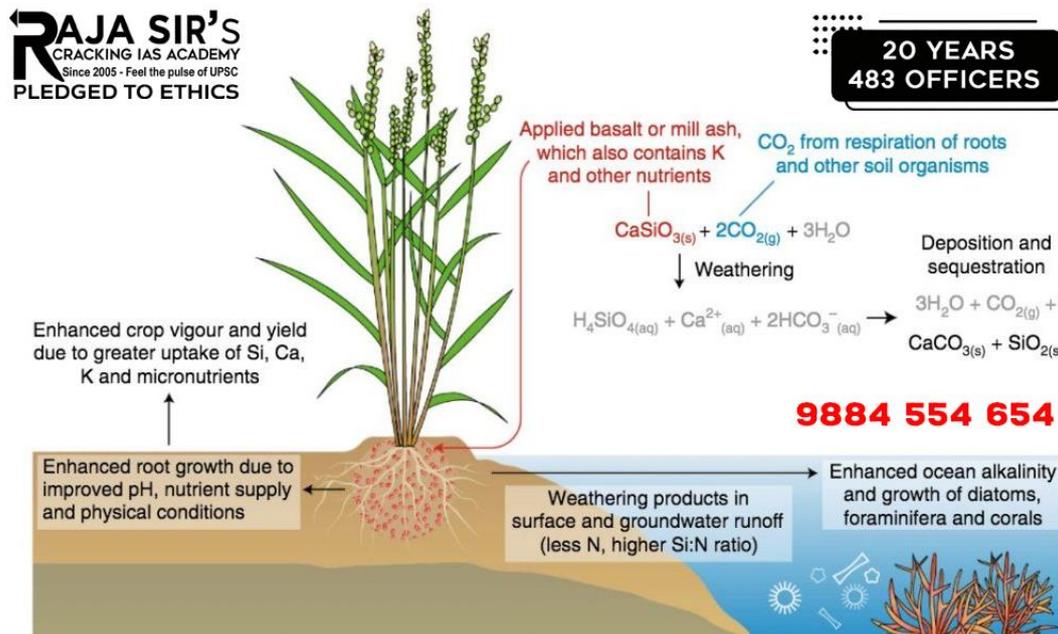
- Tigress' death and a missing cub has hit reintroduction plan in Ramgarh Vishdhari reserve
- **Status:** It is the fourth tiger reserve in Rajasthan state and the 52nd tiger reserve in the country.
- **Location: Bundi district,** Rajasthan (southeastern part of Rajasthan).
  - Represents both **Vindhyan and Aaravalli elements.**
  - It is in continuation with the **buffer area of Ranthambore tiger reserve** and **Mukundara Hills tiger reserve.**
- **River: Mez, tributary of the Chambal River,** passes through it.
- **Major tree species:** Dhok, Khair, Amaltas, etc.
- **Major Animal species:** Tigers, Panthers, Sloth Bears, etc.

## Pyromes

- Forest fire CO<sub>2</sub> emissions increased 60% globally since 2001: A Study.
- The study separated forest and non-forest fires into 12 ecoregion pyromes to analyze CO<sub>2</sub> emissions.
- 'Pyromes' are defined as **regions where forest fire patterns are affected by similar environmental, human, and climatic factors**, thereby revealing the elements pushing recent increases in forest fires.
- The term is a **blend of "pyro" (fire) and "biomes,"** reflecting that fire behaves differently across various ecological zones.
- **Significance:** help scientists and policymakers **assess fire risk, predict the impacts of climate change on fire behavior** and design fire management strategies.

## Basaltic Dust to enhance carbon capture

- **Basalt dust as organic fertiliser** can enrich soil & **accelerate carbon sequestration.**
- **Benefits of Basaltic Dust**
- Mitigate climate change by promoting a natural process called **enhanced weathering**, which captures CO<sub>2</sub> from the atmosphere and stores it in the form of stable **carbonates.**
- Adding rock dust to soil also **improves its fertility and crop yields.**
- Basalt powder undergoes decomposition in the soil solution, resulting in the formation of some weak acids and an **increase in soil pH.**
- **Basaltic rock, a kind of volcanic rock, is rich in minerals such as calcium and magnesium. It is found in parts of Maharashtra and Gujarat (where the volcanic Deccan Traps are located) and Jharkhand and West Bengal (where the Rajmahal Traps are situated).**



### Spotted Locust

- In **Idukki (Kerala)** farmers face agricultural crisis due to an infestation of **spotted locusts**.
- **Defence mechanism:** **Bright warning colours** to ward off predators. They eject **toxic foam** as a defence mechanism. Additionally, they can produce a **sharp rasping sound** as part of their defence.
- **Movement:** They have **slow movement**, thus easy to catch. It typically **jumps low** and **does not fly**.
- **Causes of Locust Swarming**
- **Gregarisation:** Triggered by excessive rainfall, flooding, and sometimes cereal crop irrigation.
- **High Rainfall:** Leads to lush foliage, increasing nymph numbers and causing them to congregate.
- **Flooding:** Expands breeding grounds.
- **Temperature:** Lower temperatures increase nutrient assimilation efficiency and slower growth.
- **Soil Moisture:** Allows continuous egg-laying post-floods during dry seasons.
- **Serotonin Surge:** Sight, smell & touch of other locusts lead to switching genes to the gregarious phase.
- **Hopper Contact:** Leads to **gregarisation** and group movement in search of food.

### African Baobab

- New research by South African ecologists **disproves claims that African Baobab trees are dying due to climate change**, noting they have survived past extreme climate fluctuations.
- **'Tree of Life':** Vital to **dry African savanna**, helping keep soil humid, recycling nutrients, and reducing erosion.
- **Trunk:** As a succulent, the tree **absorbs and stores water from the rainy season** in its massive trunk.
- **False cavities:** The bark regenerates in the space between these stems, called false cavities.
- **Flowers:** Large and whitish flowers open at night and fall within 24 hours.
- **Fruit:** Contains **tartaric acid and Vitamin C**, serving as a vital nutrient and food source for many species.

### India's \$1 Trillion "Just Energy" Coal Transition

- **India**, the **second-largest coal producer** globally, faces a significant challenge in transitioning away from coal, which will remain central to its energy mix for at least another decade.
- A study by the International Forum for Environment, Sustainability and Technology (**iForest**) estimates that a **just transition away from coal** will **require over \$1 trillion** over the **next 30 years**.

#### What is a 'Just' Energy Transition?

- A just energy transition refers to an **equitable** and **inclusive** shift towards a **low-carbon**

economy that considers the **interests of fossil-fuel-dependent workers and communities.**

- **Costs Associated with a Just Transition**
- **Mine Closures and Repurposing:** Costs associated with closing coal mines and repurposing the sites.
- **Retirement of Coal Plants:** Costs of retiring coal plants and converting the sites for clean energy.
- **Labour Skilling:** Training coal workers for green jobs.
- **Economic Diversification:** Developing new businesses to replace coal-based industries.
- **Community Support:** Providing support to communities affected by the transition.
- **Green Energy Investments:** Building new energy infrastructure to replace coal mines & coal-fired plants.
- **Revenue Substitution:** Compensating states for the loss of revenue from coal.
- **Planning Costs:** Costs associated with planning and managing the transition.
- **Funding the Transition**
- **Public Funding:** Grants and subsidies for non-energy costs like community support & worker retraining.
- **Private Investments:** Investments in green energy plants and infrastructure.
- **District Mineral Foundations Funds:** Nearly **\$4 billion** is available from funds collected from miners, which can be used to support new businesses and communities in coal districts.
- **Corporate Social Responsibility (CSR):** Additional support for new businesses & community resilience.
- **International Approaches to a Just Transition**
- **South Africa:** **Just Energy Transition Investment Plans** will require **\$98 billion** over the next two decades, with **\$8.5 billion** to be provided from various countries in **2023-2027**.
- **Germany:** Enacted laws to **phase out coal power** by **2038**, with an outlay of over **\$55 billion** to close coal mines and coal-powered plants and support coal-dependent regions.

### Azores Island

- **Azores island** created the **largest marine protected area** in the **North Atlantic**.
- The Autonomous Region of the Azores is a **Portuguese archipelago of volcanic origin** made up of nine islands in the **North Atlantic Ocean**.
- It is located at the **seismically active Azores Triple Junction plate** boundary where the **North American Plate, Eurasian Plate and African Plate** meet.
- The archipelago, alongside Madeira, Cape Verde, and the Canary Islands, is part of **Macaronesia**.
- The islands lie in a **northwest-southeast direction** and are divided into three groups: **northwest, central and eastern**. **Mount Pico**, located on Pico Island, is the **highest point** on the archipelago

### Climate Financing to Developing Nations

- The **29th COP** under UNFCCC in **Azerbaijan** will focus on establishing a **New Climate Finance**

Goal (NCQG) for the post-2025 period.

- As per the UNFCCC, climate finance involves public or private funds, national or transnational, aimed at climate mitigation and adaptation.
- **Need for Climate Finance for Developing Nations**
- **Vulnerability to Climate Change** due to their geographical location and reliance on agriculture despite contributing minimally to global emissions (IPCC 6<sup>th</sup> Assessment Report).
- **Limited Financial and Technical Resources:** India requires ₹850 lakh crore to achieve net-zero emissions by 2070, which is unmanageable without external funding.
- **Higher Cost of Capital for Clean Energy:** According to the International Energy Agency (IEA), the cost of capital for solar energy projects in developing nations is nearly twice as high.
- **Energy Access Deficit** for 675 million people in developing countries in 2021 (IEA).
- **Historical Injustice in Emissions:** The IPCC report says developed countries, despite their smaller populations, are responsible for 57% of emissions since 1850.
- **Competing Developmental Priorities** like poverty and infrastructure deficits, diverting resources from climate action. India needs ₹16 lakh crore for EVs and ₹8 lakh crore for green hydrogen.
- **India's Climate Finance Requirement**
- **Renewable Energy Targets** of 450 GW By 2030, India needs ₹16.8 lakh crore, essential for reducing fossil fuel reliance and fulfilling international climate commitments.
- **Green Hydrogen Production:** To produce 5 million metric tonnes of green hydrogen annually, India requires approximately ₹8 lakh crore for infrastructure development, critical for decarbonising.
- **Electric Vehicle (EV) Purchases:** India needs an estimated ₹16 lakh crore to support the widespread adoption of electric vehicles, with an aim of 30% of all vehicles being electric by 2030.
- **Long-Term Net-Zero Commitment:** Achieving net-zero emissions by 2070 will require about ₹850 lakh crore, underscoring the need for sustained climate financing across various sectors.
- **Climate Resilience and Adaptation:** With climate-related disaster costs projected at ₹3.2 lakh crore annually by 2030, climate finance will support vital adaptation strategies, including flood management.
- **Access to Clean Energy:** Approximately 675 million people in developing countries lacked electricity in 2021 (IEA), highlighting the need for significant funding to improve energy access.
- **Sustainable Agriculture Practices:** Investment in climate-resilient agricultural practices is essential for food security, as agriculture contributes 17-18% to India's GDP.
- **Urban Infrastructure Development:** Rapid urbanisation, projected to exceed 600 million people in cities by 2031, necessitates substantial investment in sustainable urban infrastructure.
- **International Climate Commitments:** To meet its Nationally Determined

**Contributions (NDCs) under the Paris Agreement**, including a **33-35%** reduction in emissions intensity from **2005 levels by 2030**.

- **Technology Transfer and Capacity Building:** Climate finance is crucial for facilitating technology transfer from developed nations, aiding India's target of reaching **300 GW solar capacity**.
- **Challenges Regarding Climate Finance**
- **Insufficient Funds:** Developing countries require **\$140-300 billion** annually for climate adaptation by **2030 (UNEP)**, but many struggle to access necessary finance.
- **Lack of Ambition:** Developed nations failed to meet the **\$100 billion** annual climate finance target in **2021 (OECD)**, raising concerns about their commitment to supporting developing countries.
- **Transparency and Accountability:** Many countries lack effective monitoring of climate finance commitments, with the **2022 Climate Finance Transparency Index** highlighting insufficient reporting.
- **Ensuring Equity and Justice:** Climate finance must prioritise vulnerable communities, as emphasised by the **Climate Justice Alliance**, to ensure their needs are addressed in decision-making.
- **Mobilizing Private Finance:** An estimated **\$1 trillion** annually in private investment is needed to meet **global climate goals (World Economic Forum)**, yet investor hesitation persists due to risks.
- **Capacity Building and Technology Transfer:** Climate finance should include support for capacity building and technology transfer, as highlighted by the **Green Climate Fund**.
- **Debt Burdens:** Climate action increases existing debt burdens in developing nations, with many struggling to repay loans for climate projects (**UNCTAD**).
- **Economic Impacts:** Global **economic slowdowns**, like those caused by **COVID-19**, divert resources away from climate initiatives, complicating funding efforts.
- **India's Initiatives Regarding Climate Finance**
- **National Adaptation Fund for Climate Change (NAFCC) 2015** supports adaptation activities in vulnerable regions across States and Union Territories through a project-based approach.
- **National Clean Energy Fund 2010** finances **clean energy projects** and innovative technologies, supporting initiatives like the **Green Energy Corridor** and the **Jawaharlal Nehru National Solar Mission**.
- **Perform, Achieve and Trade (PAT) Scheme 2012** is a market-based mechanism enhances energy efficiency in large industries by allowing companies to earn tradable certificates for energy savings.
- **Way Forward**
- **Reinforce Developed Nations' Commitments** of **\$100 billion** target annually set in **Paris agreement** and Leverage the **Copenhagen Accord Framework** to ensure sustained support for climate initiatives.

- **Enhance Access to Climate Funds:** Streamlining access to climate finance mechanisms like the Green Climate Fund (GCF) is vital. The GCF approved only **22 projects** in its first **four years**.
- **Innovative financial instruments,** such as **green bonds** and blended finance, can attract crucial private investments. The **World Economic Forum** estimates a need of **\$1 trillion** annually in private investment.
- **Strengthen Capacity Building:** Developing nations require targeted training and technical assistance to effectively implement climate projects. E.g. **UNDP's Climate Change Adaptation**.
- **Climate resilience projects,** particularly in agriculture and water management. Research indicates that investing **\$1.8 trillion** in climate adaptation could **yield \$7.1 trillion** in economic benefits **by 2030**.
- **Encourage Technology Transfer** from developed to developing nations. For example, India's aim to increase **solar capacity to 300 GW** requires access to advanced solar technologies.
- **International Collaboration:** The **Climate Investment Funds** have committed over **\$8 billion** for projects across various sectors, showcasing the effectiveness of pooling resources from multiple countries.

## NEELAKURINJI PLANTS

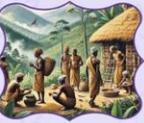
**Common Names:** Kurinji, Neelakurinji in Tamil and Malayalam, and Gurige in Kannada.



It is an **endemic shrub** of 3m height

Found only in **high-altitude Shola grassland ecosystems**. Located in five mountain landscapes of southwest India.

Tamil Nadu's **Paliyan tribe** used the Neelakurinji flowers to calculate age.





STROBILANTHES KUNTHIANA

The plant reaches **30 to 60 cm** in height and blooms **purple-blue flowers** from August to October.

The flowers give the 'Nilgiri Mountain Range' its name.



Thrives at an elevation of **2,600 metre**

**1,340 metre**

The plant flowers once every **12 years**, with the latest blooming occurring in 2018.



20 YEARS  
483 OFFICERS

THREATS

Agricultural expansion (tea/coffee plantations)

Tourism activities affecting the ecosystem



ECOLOGICAL ROLE

Key biodiversity indicator in the Western Ghats.



Attracts wildlife, including the endangered Nilgiri Tahr.

IUCN STATUS

< VULNERABLE >  
VU

9884  
554  
654

### Kurinji Flowers

- Tamil Nadu's newly notified reserve forest in Gudalur hills is covered in violet kurinji flowers, blooming after 8 years.
- Kurinji plants flowers only once in a lifetime.
- The more famous Neelakurinji (**Strobilanthes kunthiana**) blooms once every 12 years at relatively higher altitudes (>1,300 m).
- **Prominent Location:** Shola Forest, Western Ghats.
- **Significance:**
  - Kurinji flowering indicates healthy grasslands; disturbances cause patchy blooms.
  - Acts as a barometer of biodiversity and climate

change.

### Global Commission On The Economics Of Water

- The **Economics of Water report** was released by the **Global Commission on the Economics of Water**.
- **Key Findings**
- GDP losses from water scarcity could reach **8% by 2050**, with lower-income nations losing up to 15%.
- **“Atmospheric rivers”** transport moisture from one region to another. **China** and **Russia** are the main **beneficiaries** of “atmospheric river” systems. At the same time, **India** and **Brazil** are the major **exporters**, as their landmass supports the **flow of green water** to other regions.
- About 2 Bn people lack safe drinking water, and 3.6 Bn – 44% of the population – lack safe sanitation.
- More than 1,000 children under five die daily from illnesses related to unsafe water and poor sanitation, while women and girls spend 200 million hours each day collecting water.
- About **80 per cent** of the **wastewater** generated by industries worldwide is **not recycled**.

### CAQM invokes Stage-II of Graded Response Action Plan (GRAP) in entire NCR

- CAQM Sub-Committee on GRAP has directed to enforce measures outlined under Stage II due to **deterioration in NCR’s air quality index (AQI)**.
- Under GRAP-2, use of **coal and firewood** is restricted, and **diesel generator sets** will face limitations in operation.

#### GRAP

- It is an emergency response mechanism based on AQI level of Delhi. It is divided into four stages, based on AQI levels.
  - **Stage 1:** Poor category (AQI 201 to 300).
  - **Stage 2:** Very poor category (AQI 301-400).
  - **Stage 3:** Severe category (AQI 401-450).
  - **Stage 4:** Severe + category (AQI 451+).
- Commission for Air Quality Management (**CAQM**) in NCR and adjoining areas **oversees implementation of GRAP**.
  - CAQM was established under **Commission for Air Quality Management in NCR and Adjoining Areas Act, 2021**.
  - It replaced Environment Pollution (Prevention and Control Authority).
- **Reason behind rising air pollution in Delhi during winters:**
- **Wind Direction:** As monsoon withdraws, predominant direction of winds changes to north

westerly which brings dust from Rajasthan and sometimes from Pakistan & Afghanistan.

- **Temperature inversion:** Layer of cool air forms near the ground, trapping pollutants and preventing them from dispersing.
- **Low wind speeds:** Reduce the dispersion of pollutants.
- **Stubble Burning:** Farmers in neighbouring states burn crop stubble.
- **Other Factors:** Vehicular Emission, Industrial Emission, Construction dust, Garbage burning etc.

#### National Air Quality Index (AQI):

- Launched by government in 2014 to gauge air pollution levels and communicate risks to public.
- There are six categories of AQI, namely 'Good' (0-50), 'Satisfactory' (50-100), 'Moderately polluted' (100-200), 'Poor' (200-300), 'Very Poor' (300-400), and 'Severe' (400-500).
- Eight pollutants (PM10, PM2.5, NO2, SO2, CO, O3, NH3, and Pb) are considered for calculating AQI.

#### Emissions from Forest Fires

- Carbon dioxide emissions from forest fires increased by 60% between 2001-23: Study.
- The study divides the world into distinct fire regions, called '**pyromes**,' based on **environmental, human, and climatic factors** that influence fire patterns. Grouping forests into pyromes enabled isolating climate change's impacts from other influencing drivers, such as land use and vegetation.
- **Key Findings**
- **Fire emissions** spanning **boreal forests** in Eurasia and North America almost **tripled** between 2001-23.
- **Extratropical forest fire carbon emissions** have increased significantly due to climate change.
- **Carbon combustion rate**, a measure of fire severity based on how much carbon is emitted per unit of area burned, increased by almost 50% across forests globally between 2001 and 2023.

#### Major causes of increased forest fires in these areas

- Anthropogenic climate change causes favourable weather, known as '**fire weather**'.
- Increased lightning frequency.
- Increased hot and dry conditions caused by heatwaves and droughts
- Rapid warming in high northern latitudes

#### Nilgiri Tit Butterfly

- **Nilgiri tit butterfly** was noted to lay its eggs on the **inflorescence** (complete flower head) of the larval host plant, *Eulophia epidendrum*, a **terrestrial orchid** species.
- It is an **endemic** species, **first** described in **1884** from **Coonoor** in the **Nilgiris**. It has also been recorded in **Sri Lanka**. It is classified under **Schedule II** of the **Wildlife Protection Act**.
- This butterfly is predominantly found in **forested** areas, providing the **humid** and **rocky slopes** it prefers.

- It has also been recorded in various locations across the Western Ghats, including the Gedda slopes of the Nilgiris district, Kalakkad Mundanthurai Tiger Reserve, TamilNadu, Chinnar Wildlife Sanctuary, Kerala and Silent Valley National Park, Kerala.

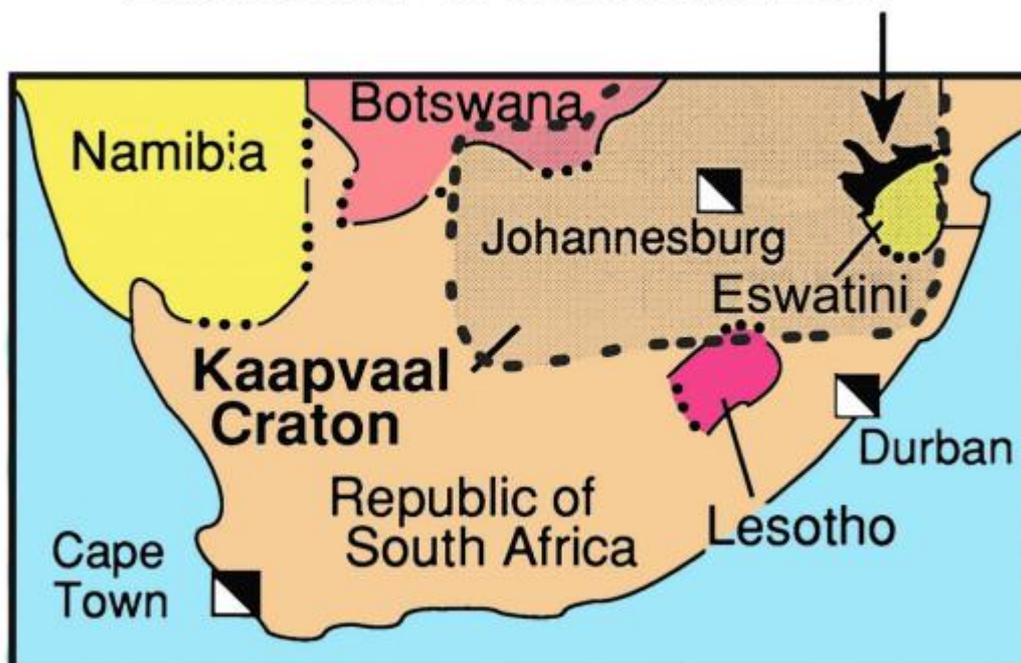
### Anguiculus dicaprio

- New snake species in the Western Himalayas named after **Leonardo Di Caprio**.
- *Anguiculus dicaprio* is a member of the **Colubridae**, the **largest family of snakes**.
- **Distribution:** Found in Chamba, Kullu and Shimla in **Himachal Pradesh**, Nainital in **Uttarakhand** and Chitwan National Park in **Nepal**.

### Barberton Greenstone Belt

- Researchers have assessed the effects of an ancient **meteorite impact** in **Barberton Greenstone Belt** that acted as a **giant fertiliser bomb** for life on Earth.
- The meteorite delivered a large amount of **phosphorous**, a nutrient for microbes crucial for the molecules central to storing and conveying genetic information.
- It also mixed **iron-rich deep waters** into **shallower waters**, creating an environment ideal for microbes.

## Barberton Greenstone Belt



- It is located in the Kapvaal craton of southeastern **Africa**.
- It is a rugged mountain terrain of substantially untransformed **Archaean rocks**.

- It contains the best-preserved, oldest (the lowermost volcanic rocks are almost 3.5 billion years old), and most diverse sequence of **volcanic** and **sedimentary rocks** on Earth **unaffected by subduction** (and metamorphism) and erosion.
- **Makhonjwa Mountains** make up 40% of the Barberton belt. **Komati River** flows through the belt.
- BGB's outcrops were added to **UNESCO's World Heritage Sites**.

### Early Warnings for All (EW4All) - WMO

- At the Congress, WMO also released "**Early Warnings for All in Focus: Hazard Monitoring and Forecasting**" report, tracking progress in **detection, monitoring, and forecasting capabilities**.
- Report highlights gaps in basic forecasting capacity, low compliance with Global Basic Observation Network (GBON), and limited satellite data usage.
- **Early Warnings for All (EW4All) initiative**
- **Aim:** Ensure **universal protection** from hazardous hydrometeorological, climatological and related environmental events through **life-saving multi-hazard early warning systems by 2027**.
- **Launched:** At **COP27** of UNFCCC in **2022** by the UN Secretary-General.
- **Organizations:** It is jointly led by **WMO, UNDRR, ITU and IFRC**.
- **Coverage:** Initially focused on **30 high-risk countries**, EW4All has since expanded to more than **100 participating nations**.
- **Early Warning System (EWS)**
- EWS is an **integrated** system of **hazard monitoring, forecasting, disaster risk assessment, communication and preparedness** which aims at enabling early action to save and protect lives, livelihoods and assets of people at risk.
- **Need for Early Warning:**
  - The damage caused by a disaster can be **reduced by 30%** if an early warning is issued within 24 hours.
  - Disaster mortality is **six times higher** and the number of people affected is four times higher in countries with limited multi-hazard early warning systems.
  - Economic damages from extreme weather events continue to **surge**, with over **US\$4 trillion in losses globally since 1970**.

### Eye on Methane

- UN Environment Programme's (UNEP) releases fifth edition of its International Methane Emissions Observatory (IMEO) publication - An Eye on Methane: From measurement to momentum.
- **Key Highlights**

- **Atmospheric methane** continues to be the **second biggest driver of climate change** after carbon dioxide, responsible for about one-third of the planet's warming.
- **High Impact Gas:** Methane is over 80 times more potent than CO<sub>2</sub> over 20 years but persists for a shorter period (7-12 years).
- **Major Sources:** About 60% of today's methane emissions result from human activities with agriculture, fossil fuels, and landfill waste being the largest contributors.
- **Natural Sources:** Natural processes contribute ~40% of emissions, with wetlands as the largest source.

### Diamond dust to cool Earth

- Spraying **diamond dust** in the Earth's upper atmosphere could help **cool down the Earth** by a significant **1.6°C within 50 years**.
- Diamond dust **reflects light and heat**. The dust could remain aloft for suitable lengths of time and is less likely to clump together to retain heat. It would **not** create **acid rain** because it is **chemically inert**.
- However, cost and logistical challenges limit its potential use.

### Clean energy accelerates for BRICS grouping

- **BRICS nations** are poised to see **fossil fuel** capacity drop **below half** of their installed power capacity by the end of 2024, as per **Global Energy Monitor** report.
- **Key Findings**
- Share of power capacity in the BRICS group fueled by **coal, oil, and gas** could fall **below 50%** by year end. However, despite fossil-fueled power capacity losing ground in the BRICS' power mix, virtually **all members** are **building additional coal, oil, or gas plants**.
- **Wind** and utility-scale **solar capacity** in development outnumber power projects fueled by coal, oil, and gas by **two to one** in the BRICS.
- BRICS nations will nearly **triple their renewable energy capacity by 2030**, aligning with the global goal set at 28th Conference of Parties or COP28
- The total renewable energy capacity could increase by more than 2.5 times by the decade's end.
- **Relevance of BRICS in clean energy transition**
- BRICS countries make up **half** of the **world's power capacity**. Amongst the top ten coal producers globally, **China, India, South Africa** and **Russia** account for 99% of operating coal capacity.
- Coal has the **largest share of total power capacity** in **China (41%), India (51%) & South Africa (70%)**.
- **Russia, Egypt, Iran**, and the **United Arab Emirates** are among the top ten oil and gas producers globally.

### Global Forest Resources Assessment (GFRA) 2025

- Report, released every five years, was published during **Global Forest Observations Initiative**

**(GFOI) Plenary in Bali, Indonesia.**

- GFOI is a **flagship programme of the Group on Earth Observations (GEO)**, which is a network of governments, academia, organizations, civil society and private sector aiming to harness the power of Earth Intelligence.

- India is a member of GEO.

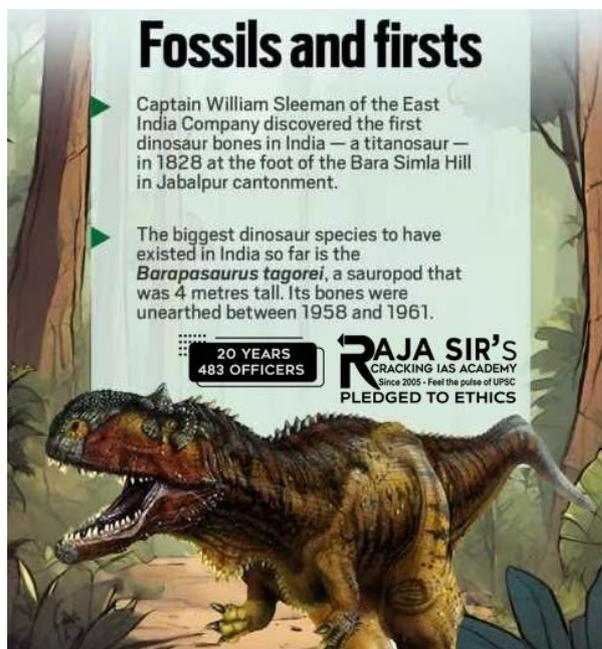
**Key highlights of GFRA 2025**

- **Forest extent:** Forests cover 4.14 billion hectares, or 32% of the global land area.
  - **Nearly half of the world's forests are located in the tropics**, followed by boreal, temperate and subtropical domains.
  - **Europe has the largest forest area**, accounting for 25% of world's total.
- **India's Forest Extent:** India moved up one rank to **9<sup>th</sup> position** in terms of total forest area globally, accounting for 2% of global forest area.
  - India ranks **5<sup>th</sup> in terms of rubber plantation**.
- **Deforestation and expansion:** Deforestation slowed to 10.9 million hectares per year in 2015–2025, down from 17.6 million in 1990–2000.
- **Natural Regeneration:** More than 90% of world's forests are regenerating naturally.
- **Carbon Stock:** Forest carbon stocks have increased, reaching 714 gigatonnes, with soil holding majority forest carbon stock, followed by living biomass, and litter and deadwood.
- **Disturbances:** **Fire** is prevalent forest disturbance in subtropics while **insects, diseases and severe weather** affect mainly the temperate and boreal domains.

**Gondwanax paraisensis**

- Fossil of a **reptile** called *Gondwanax paraisensis* was discovered in **southern Brazil**.
- *Gondwanax* means **“lord of Gondwana,”** referring to the southern part of the supercontinent **Pangaea**, *paraisensis* honors the town of **Paraiso do Sul** where the fossil was found.

- Belongs to a group of extinct reptiles, **silesaurids**.
- Lived in **Brazil** during the **Triassic period**.
- It is **small**, **four-legged** reptile, roughly the size of a small dog.



group of extinct reptiles, **silesaurids**. in **southern** the **Triassic period**. **four-legged** reptile, size of a small dog.

- **India's tryst with Dinosaurs**
- Dinosaurs in India existed from the **Late Triassic** to the **end of the Cretaceous**. Dinosaur remains have been found in Rajasthan, Gujarat, MP, Maharashtra, **Tamil Nadu, Andhra Pradesh** and **Karnataka**.
- **Biggest dinosaur** species excavated in **India** is *Barapasaurus tagorei*.

### Jumping spiders '*Tenkana*'

- A new genus of **jumping spiders**, *Tenkana*, was discovered in southern India.
- It includes two previously known species and a new species, *Tenkana jayamangali* are moved from Colopsus genus to newly introduced genus *Tenkana*.
- The name *Tenkana* is derived from the **Kannada word** for "**south**," indicating the **geographical distribution** of these spiders in southern India and northern Sri Lanka.
- ***Tenkana jayamangali***: Named after the **Jayamangali River** in **Karnataka**, where it was first discovered.
- ***Tenkana manu***: Found in south India and Sri Lanka, named after Dr. Manu Thomas.
- ***Tenkana arkavathi***: Found in Karnataka, named after **Arkavathi river**.

### Cloud Chamber (CC)

- **India** is Building a **Cloud Chamber (CC)** at the Indian Institute of Tropical Meteorology (IITM), **Pune**, as Part of **Mission Mausam**.
- CC is a **closed cylindrical or tubular structure** where water vapour, **aerosols**, and **seed particles** (for cloud formation) are injected under **controlled** humidity and temperature **conditions**.
- It is designed to study cloud droplet formation and the behaviour of ice particles and **monsoon clouds**.
- It will allow detailed studies of **cloud physics**, including cloud behaviour under both normal and extreme weather conditions. These studies will contribute to the strategic planning of weather modification, including cloud seeding.

### Tapioca

- A study highlights the successful use of wasps for pest control in tapioca plantations.
- A **tiny parasitic wasp**, *Anagyrus lopezi*, was used to target the **cassava mealybug**, an invasive pest.
- Also called **cassava**, it is a **tropical tuber crop** mainly cultivated in **Kerala, Tamil Nadu, Karnataka and Andhra Pradesh**.
  - **Kerala and Tamil Nadu** account for about **80%** of the total acreage of the crop in India.
- **Climate and Soil Requirement:**
  - Tropical, warm humid climate with well distributed rainfall of over 100 cm per annum.

- Well drained soil preferably red lateritic loam
- **Applications:** As raw material for starch extraction in yarn textile and paper industry, manufacturing sago, etc.

### State of Global Air (SoGA) 2025

- The State of Global Air (**SoGA**) 2025 report released by the Health Effects Institute (**HEI**) and the Institute for Health Metrics and Evaluation (**IHME**), United States.
- **Key findings about air pollution in India**
- **Mortality:** Around **2 million deaths in 2023** linked to air pollution, a 43% rise since 2000, and **52% of the global share**.
- **Ozone Pollution:** India has third highest exposure to ozone pollution.
- **Exposure:** 75% population exposed to **PM2.5** above WHO limits.
- **Pradhan Mantri Ujjwala Yojana (PMUY):** Modelling studies suggest that transitioning all PMUY households to **exclusive LPG use would avert more than 150,000 deaths annually**.

### Carbide Beetles as Bioindicators for Microplastics

- Scientists recently identified **Carabid beetles** as a reliable **bioindicator** for monitoring microplastic contamination in terrestrial soils.
- **Human Link:** Carabid beetles from tourism-heavy areas showed higher microplastic ingestion.
- **Bioindicator Value:** Insects like carabids are ideal bioindicators due to their **quick response** to environmental stress and **widespread distribution**.
- Carabid beetles, also known as **ground beetles**, constitute a diverse insect family (**Carabidae**) with more than **40,000 species** worldwide.
- **Physical Traits:** These beetles usually have **dark or metallic bodies** with ridged protective wing covers called **elytra**.
- **Defence Mechanism:** When threatened, many species secrete a **foul-smelling fluid** from **abdominal glands** to deter predators
- **Habitat Preference:** Highly **adaptable**, they thrive in forests, meadows, farms, wetlands, and urban landscapes in varied climates.
- **Geographical Spread:** Found in nearly every terrestrial habitat **except Antarctica**; around **2000 species** have been recorded **in India**.
- **Dietary Preference:** Exhibit a highly diverse and **opportunistic diet** that includes insects, other invertebrates, weed seeds, and decaying organic matter.
- **Ecological Role:** They aid **pest control**, improve **soil aeration**, **decompose** dead organic material, and recycle nutrients

### Anagyrus lopezi

- The National Bureau of Agricultural Insect Resources (**NBAIR**) imported the **parasitoid wasp *Anagyrus lopezi*** to deploy biological control against the **cassava mealybug pest**.

- **Pest Identity:** The cassava mealybug is a highly invasive pest native to South America that damages cassava crops by feeding on plant sap.
  - First detected in Kerala in 2020, the pest infested over 1.4 lakh hectares of cassava and lowered productivity to below 10 tonnes per hectare.
- **Wasp Role:** *Anagyrus lopezi* is a small, host-specific parasitic wasp from Central America known for suppressing cassava mealybug populations.
  - The female wasp lays eggs inside the mealybug's body. The larva then feeds on the pest from within, eventually killing it.
- **Cassava Crop (*Manihot esculenta*)**
- Cassava (also called tapioca) is a perennial woody shrub native to South America, widely cultivated for its starchy edible roots.
- **Growth Conditions:** The crop thrives in warm, humid climates (25-32°C), tolerates drought, and can grow on low-fertility lands.
- **Nutritional Value:** Cassava helps regulate blood sugar and provides prebiotic fibre that supports digestion and controls appetite (aids weight loss).
- **Industrial Uses:** Cassava starch serves as a binder in the pharmaceuticals, paper, and textiles industries, and is used to produce bioethanol and biodegradable plastics.
- **Global Standing:** Nigeria is the largest cassava producer, Thailand leads in starch exports, and Cambodia ranks first in productivity (27 tonnes/ha).
- **Indian Output:** Tamil Nadu and Kerala together account for more than 90% of India's cassava production, with Tamil Nadu leading in both yield and cultivation area.

### A trial test on Cloud Seeding in Delhi

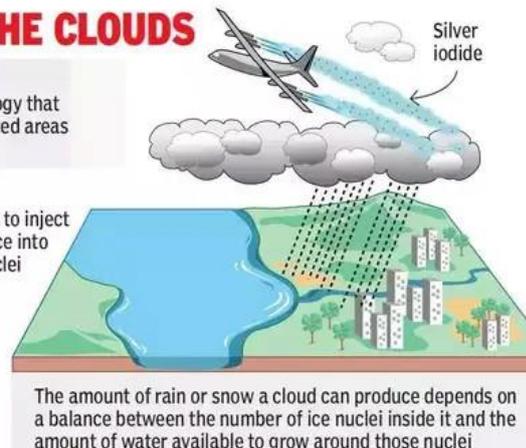
## OPENING UP THE CLOUDS

**WHAT IS CLOUD SEEDING**  
A weather-modification technology that can create rain in drought-affected areas and also help fight air pollution

**HOW IT WORKS**  
Scientists use aircraft or rockets to inject silver iodide or another substance into the atmosphere to mimic ice nuclei

**HELPING HAND**  
Clouds often lack naturally occurring ice nuclei, so injecting them with silver iodide particles (which are very similar in structure to ice) increases the number of nuclei

**HOW IT HAPPENS**  
It makes the clouds more efficient at generating ice crystals that either fall as snowflakes or melt to produce raindrops, depending on temperatures in and beneath the cloud. Cloud seeding is also used to disperse fog banks near some airports



The amount of rain or snow a cloud can produce depends on a balance between the number of ice nuclei inside it and the amount of water available to grow around those nuclei

- Conducted by IIT Kanpur, it could lead to city's first artificial rain in the coming days if the weather remains favourable.

### Cloud Seeding

- **Meaning:** It is a weather modification technique that improves a cloud's ability to produce rain or snow by introducing tiny ice nuclei into certain types of clouds.
  - It is conducted on

existing natural clouds and does not create clouds.

- **Working:** Nuclei are released into the cloud by an aircraft and/or by ground-based generators providing a base for **snowflakes to form**.
  - These newly formed snowflakes **quickly grow and fall from the clouds back to Earth**.
- **Seeding Agents: Silver Iodide (AgI)**, most common material, known for its efficient ice nucleating properties.
  - Other chemicals used are **potassium iodide (KI)**, **sulfur dioxide (SO<sub>2</sub>)**, **frozen carbon dioxide - dry ice (CO<sub>2</sub>)**, etc.

### Benefits of Cloud Seeding

- **Combating Pollution:** Regarded as the scientific method for providing **respite from pollution**.
- **Enhancing Winter snowfall and mountain Snowpack:** It **supplements the natural water supply** available to communities of surrounding area.
- **Weather Suitability:** It requires **tall, moist clouds** and **low wind conditions** to operate effectively.
- **Pollution Removal:** Artificial rain **reduces particulate matter** by washing pollutants out of the air.

### Why Delhi's Air Worsens in Winter?

After the monsoon, dry north-westerly winds and **stable air pressure trap pollutants** near the surface.

Cooler air holds **less water vapour**, preventing cloud formation and making artificial rain difficult.

Occasional rainfall occurs only due to Western Disturbances and **unreliable local systems**.

Cloud seeding is a **weather modification technology** that **artificially stimulates rainfall** by spraying **chemical substances** into the air that serve as **cloud condensation nuclei**.

Cloud condensation nuclei are small particles upon which **water vapour condenses** to form clouds.

The chemical substances used are **silver iodides, potassium iodides, dry ice (solid carbon dioxide)** or **liquid propane**.

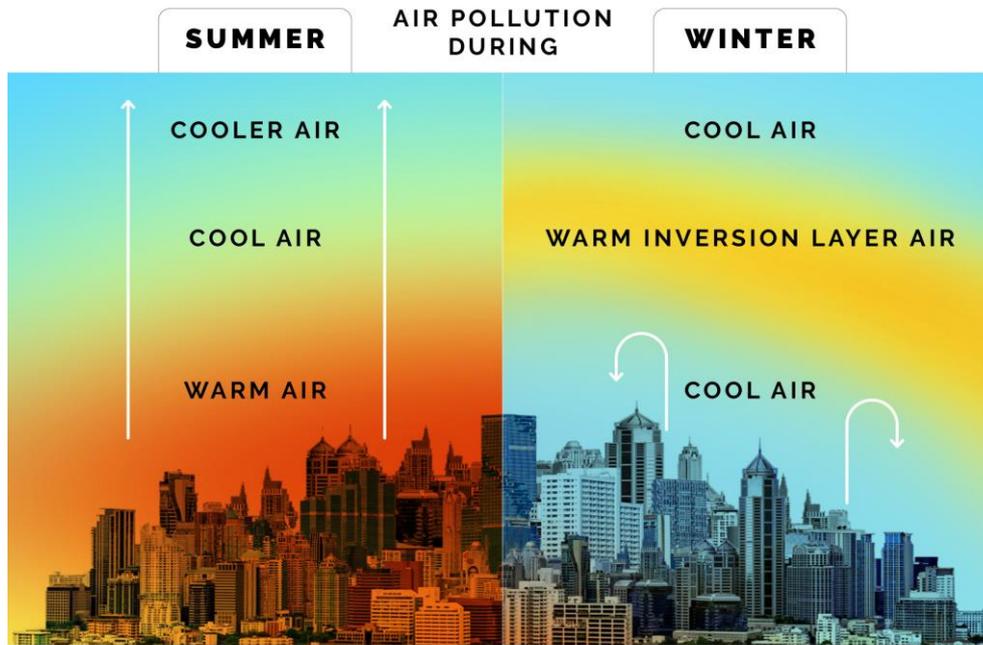
It **works** only **when there are enough pre-existing clouds** in the atmosphere.

20 YEARS  
 483 OFFICERS

THE WINTER POLLUTION CRISIS

9884 554 654

WHAT IS  
 WINTER INVERSION?



Air in the lowest part of the atmosphere is warmer and light

↓  
 It rises upwards carrying pollutants away from the ground

↓  
 Pollutants mix with cleaner air in the upper layers of the atmosphere in a process called 'vertical mixing'

Air near the earth's surface is cooler and dense

↓  
 It remains trapped under the warm upper layer, forming an atmospheric 'lid'. **This is winter inversion**

↓  
 The vertical mixing happens only within lower layers

↓  
 Pollutants released lack enough space to disperse in the atmosphere and remain closer to the ground

### Limitations of Cloud Seeding

- Cloud seeding cannot create clouds; it only works when **natural ones exist**. Its effectiveness in boosting rainfall remains **uncertain** and **inconsistent**.
- Any temporary pollution relief after rainfall lasts **only a day or two**; such short-term measures divert focus from lasting solutions like **emission control** and clean energy adoption.
- It uses chemicals such as **silver iodide** and **sodium chloride** to induce rain, which, if used repeatedly, may **accumulate** in soil and water, harming ecosystems and health.

### Triple Whammy Situation in South India

- The Northeast Monsoon (NEM) of 2025 arrived **four days earlier than usual** over Tamil Nadu, creating a “triple whammy” situation.
- **Triple Whammy Situation**
- **Early Onset of Northeast Monsoon:** Heavy, short-duration rainfall episodes due to **Bay of Bengal low-pressure systems**.
- **Simultaneous Rainfall:** Overlap between retreating **Southwest Monsoon** and the onset of **NEM**.
- **Dam and Catchment Overflow:** Rapid inflow into reservoirs like **Mullaperiyar** forces excess discharge, **aggravating flooding** in downstream Tamil Nadu districts.

### Kunar River

- Afghanistan has announced plans to construct a dam on the Kunar River, obstructing its flow into Pakistan.
- It is a **main tributary of Kabul River**, which then **merges with the Indus River in Pakistan**.
- **Origin:** from **glaciated Hindu Kush Mountains of Chitral, Khyber Pakhtunkhwa in Pakistan**
  - It then flows into Afghanistan and merges with Kabul River there.
- **Two main tributaries:** **Bashgal** (or Landiasind) and **Pech**.

### Barnawapara Wildlife Sanctuary

- Chhattisgarh's Barnawapara Wildlife Sanctuary has revived its blackbuck population nearly fifty years after local extinction.
- **Location:** Barnawapara Wildlife Sanctuary is a **tropical dry deciduous forest** situated in the **Mahanadi River basin** in **Chhattisgarh**.
- **Terrain:** The landscape comprises **rolling plains, small hillocks**, and numerous perennial streams.
  - The **Balamdehi River** defines the western boundary, & the **Jonk River** forms the northeastern border.
- **Vegetation:** **Sal** and **Teak** dominate the forest canopy, alongside Bamboo, Mahua, and Tendu.
- **Faunal Diversity:** Key species include *gaur, leopard, sloth bear, dhole, chital, sambar, nilgai, chinkara*, etc.

- The **Balar reservoir** inside the sanctuary supports diverse aquatic life and **migratory birds**.
- **Blackbuck Programme:** Following **local extinction** in the **1970s**, a state-led reintroduction program (2021-2026) successfully revived the blackbuck population in the sanctuary.
- **Archaeological Site:** The sanctuary lies near **Sirpur**, the ancient capital of the Dakshina Kosala kingdom.

### Intrusion Detection System

- Northeast Frontier Railway (NFR) is implementing an **Intrusion Detection System (IDS)** across its network **to prevent elephant deaths** on tracks.
- IDS**
- It uses **advanced optical fibre sensing technology** to **detect the vibrations generated by elephants' movement** by the sensor cables, which then transmit signals to the control room **in real-time**.
  - It enables **timely intervention** and ensuring smooth operations.

### Malabar Gliding Frog (*Rhacophorus malabaricus*)

- A **Malabar Gliding Frog** was sighted near **Belagavi in Karnataka**, marking a rare occurrence outside its typical dense forest habitat.
- The Malabar Gliding Frog is an **arboreal species** native to the **Western Ghats**. It can glide up to **12 meters** through the air using the broad webbing between its toes.
- **Distinct Appearance:** The frog has a **bright green back**, a **pale-yellow belly**, and large **orange-red webbed feet**.
- **Body Size:** With a body length of **up to 10 cm**, it is among the **largest moss frog species**; **females are bigger** than males.
- **Habitat Preference:** Inhabits the **lower canopy** of tropical evergreen and semi-evergreen forests or plantations **near streams**.
- **Regional Distribution:** Recorded across **Kerala, Karnataka, Goa, Maharashtra, and Tamil Nadu** in the Western Ghats.
- **Breeding Pattern:** Females **lay eggs in foam nests** on leaves or branches **hanging over ponds** or streams. Tadpoles drop into the water after hatching.
- **Major Threats:** Habitat loss, **pesticide contamination**, climate change, hunting, **superstition** (bad omen), and illegal pet collection.
- **Conservation Status:** IUCN: Least Concern

### Central Asian Mammal Initiative

- The **Central Asian Mammals Initiative (CAMI)** adopted its **six-year work programme** (2026-2032) at the **3<sup>rd</sup> Range States Meeting** in **Tashkent, Uzbekistan**.

### CAMI Work Programme

- **Timeframe:** The plan spans **2026-2032** and sets conservation goals for **17 Central Asian migratory mammal species**.
- **Critical Regions:** **Thirteen transboundary regions** are designated as crucial for the movement and long-term survival.
- **Threat Mitigation:** The programme addresses **poaching, illegal trade, and habitat disruption** caused by infrastructure expansion and climate change.
- **Programme Continuity:** It builds on the **2021-2026 plan** from **CMS COP13 (2020)** by including **two new species** and updating conservation measures.
- **Central Asian Mammals Initiative (CAMI)**
- CAMI operates under the Convention on Migratory Species (CMS) as a regional platform for **conserving migratory mammals** in Central Asia.
- **Establishment:** It was launched in **2014** at the 11th Conference of the Parties (**COP11**) to the CMS, held in **Quito, Ecuador**.
- **Objectives:** The initiative aims to **restore migratory mammal populations** through coordinated policies and cross-border cooperation
- **Geographical Scope:** It covers **14 range states: Afghanistan, Bhutan, China, India, Iran, Kazakhstan, Kyrgyzstan, Mongolia, Nepal, Pakistan, Russia, Tajikistan, Turkmenistan, and Uzbekistan**.
- **Species Coverage:** CAMI now protects **17 species** (up from 15), including the newly added Pallas's cat and **Eurasian lynx**.
  - Key species include the *Snow Leopard, Saiga Antelope, Chiru, Argali, Bukhara Deer, Wild Camel*, etc.

### Pilot Whales

- More than two dozen pilot whales have died after becoming stranded on a remote beach in New Zealand.
- **Scientific name:**
  - *Globicephala melas* (Long-finned Pilot Whale).
  - *Globicephala macrorhynchus* (Short-finned Pilot Whale).
- **Family:** Delphinidae (Oceanic dolphins).
- Despite their name, **they are not true whales but large oceanic dolphins**.
- They were named pilot whales because **it was thought that each pod followed a 'pilot' in the group**.
- **Distinctive Appearance:** Pilot whales have a distinctive appearance characterized by a bulbous forehead and a long, black body with a white or light-gray saddle patch behind the dorsal fin.
- **Habitat & Distribution:** **Long-finned species** prefer cooler waters (North Atlantic, Southern Ocean).
  - **Short-finned species** prefer warmer tropical and subtropical waters, including parts of

the Indian Ocean and Arabian Sea.

- **Conservation Status:**
  - The IUCN Red List for short finned whales is Least Concern.
  - The data is not sufficient for the long finned whales.

#### **IUCN World Heritage Outlook 4 report categorises Western Ghats as being of "significant concern"**

- Apart from Western Ghats, two national parks in India – Assam's Manas national park and West Bengal's Sundarbans national park – have also been categorised as being of "significant concern".
- IUCN World Heritage Outlook assesses the **conservation prospects of all World Heritage sites** inscribed for their natural values.
  - The outlook categorizes sites in **four categories - Good, Good with some concerns, Significant Concern, and Critical.**
  - **Significant concern outlook** means that site's values and underlying attributes are threatened by several current and/or potential threats, requiring additional conservation measures.

#### **Western Ghats**

- **Length:** About 1,600 km long, they are a chain of mountains older than the Himalayas and running parallel to India's western coast.
- **Spread across six states:** Gujarat, Maharashtra, Goa, Karnataka, Kerala and Tamil Nadu.
- **Ecological Significance:** A UNESCO world heritage site and one of 36 biodiversity hotspots on Earth.
  - Recognized as **one of the world's eight 'hottest hotspots'** being habitat to some 325 globally threatened (listed in IUCN's Red List) species including Nilgiri Tahr.
  - Best representative of **non-equatorial tropical evergreen forests.**
  - **Influence the Indian monsoon weather pattern**, acts as **key barrier** intercepting rain-laden monsoon winds coming from southwest, and **moderates tropical climate** of the region.

#### **Threats to Western Ghats**

- **Infrastructure Development:** Hundreds of hydropower projects including proposed Sillahalla Pumped Storage Hydroelectric project in the Nilgiris.
- **Land Use Conversion:** Large part of range converted to agricultural land for tea, coffee, rubber and oil palm or cleared for livestock grazing, reservoirs and road.
- **Human-Wildlife Conflict:** Dense population in several parts and expansion of agriculture leads to increased human-wildlife conflict.
- **Climate change:** Forcing species like Nilgiri flycatcher to move from warmer lowlands to cooler higher areas.
- **Invasive Alien Species:** Such as eucalyptus and acacia colonising natural forests.

## Cyclone Montha

- The **India Meteorological Department (IMD)** has warned that a deep depression over the **southeast Bay of Bengal** is likely to intensify into Cyclone Montha.
- The name "**Montha**" was proposed by **Thailand** and approved by the WMO panel.
- **Conditions Favourable for Tropical Cyclone Formation**
- Large sea surface with a **temperature** higher than **27° C**.
- Presence of the Coriolis force is enough to create a cyclonic vortex.
- **Small variations** in the **vertical wind speed**.
- A **pre-existing weak low-pressure area** or low-level cyclonic circulation.
- **Upper divergence** above the sea level system.

*Cyclonic wind movements, caused by the Coriolis force, blow **anti-clockwise in the Northern Hemisphere** and **clockwise in the Southern Hemisphere**.*

- A tropical cyclone is a rapidly rotating storm originating over tropical oceans from where it draws the energy to develop. It has a low-pressure centre and clouds spiralling towards the eyewall surrounding the "eye", the central part of the system where the weather is normally calm and free of clouds. Its diameter is typically around 200 to 500 km but can reach 1000 km.
- Indian Ocean cyclones often have a compact structure with a well-defined eye and can vary in intensity from weak to extremely severe cyclonic storms
- **Formation of cyclones / Cyclogenesis:** Tropical cyclones in the Indian Ocean region typically form over warm ocean waters near the equator. They require specific conditions like:
- **Good source of latent heat:** Sustained Sea surface temperature of 26-27 deg Celsius for an areal expanse of 60-70 m.
- **Presence of Coriolis force:** About 65% of cyclogenesis occurs in regions of 5-10 degrees latitude.
- Low vertical wind shearing

### Stages of development:

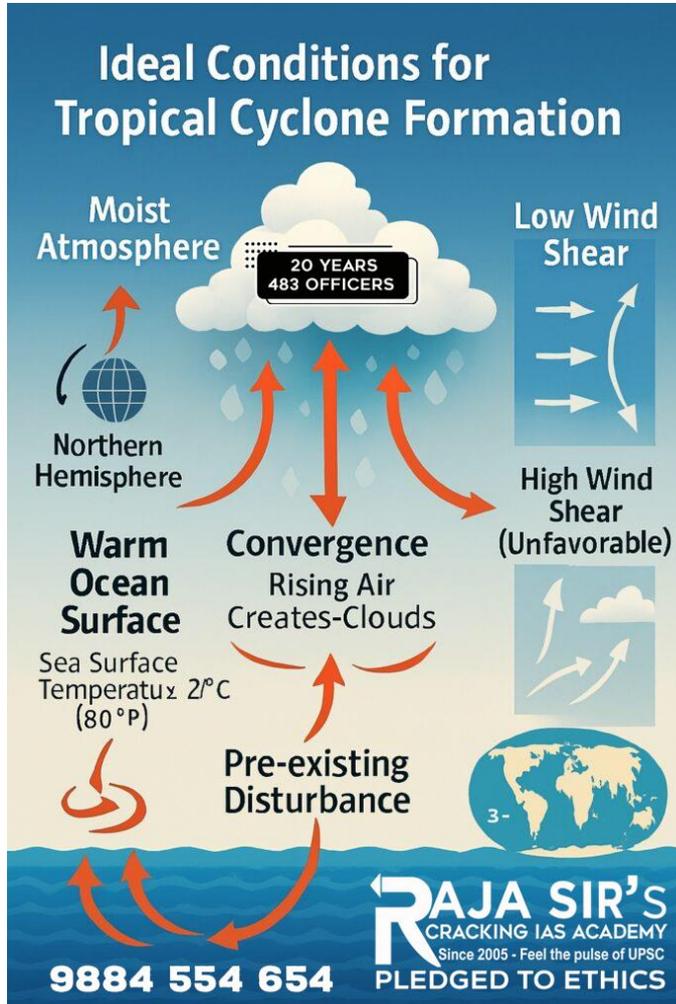
- **Tropical Disturbance:** This is the initial stage of development characterized by a cluster of thunderstorms with weak or no closed circulation.
- **Tropical Depression:** If the tropical disturbance becomes more organized with a closed circulation and sustained winds of up to 38 miles per hour (62 kilometres per hour), it is classified as a tropical depression
- **Tropical Storm:** When the sustained winds of a tropical depression reach speeds between 39-73 miles per hour (63-118 kilometres per hour), it is upgraded to a tropical storm.

- **Severe Tropical Storm:** It represents a stage between a tropical storm and a tropical cyclone, with sustained winds typically ranging from 48-63 miles per hour (78-102 kilometres per hour).

**Characteristics:**

- **Intense Convection:** Indian tropical cyclones are known for their intense convection, characterized by towering thunderstorm clouds that reach high altitudes. This convection leads to heavy rainfall, often resulting in flooding and waterlogging in affected areas.
- **Strong Winds:** These cyclones are associated with strong winds that can cause extensive damage to infrastructure, uproot trees, and disrupt the power supply. The wind speeds can vary depending on the intensity of the cyclone, ranging from moderate to extremely severe levels.
- **Well-Defined Eye:** Indian tropical cyclones typically exhibit a well-defined eye at the centre, which is a region of calm and relatively clear skies. This eye is surrounded by a spiral arrangement of thunderstorms known as the eyewall, where the most intense weather conditions occur.
- **Cyclone Tracks:** Indian tropical cyclones generally follow a predictable track pattern. They often move in a northwest direction, approaching the eastern coast of India and then curving towards the northeast or northwest. However, the exact track can vary, and cyclones can affect different regions along the Indian coastline, including the Bay of Bengal and the Arabian Sea.
- **Impacts:**  
The strong winds associated with cyclones can cause extensive damage to infrastructure, uproot trees, and disrupt power supply.
- **Loss of life and property:** Cyclones can cause widespread damage and destruction, leading to loss of life and property. The strong winds and storm surges can destroy homes, businesses, and infrastructure, and the heavy rains can cause flooding and landslides. **Example: Bhola Cyclone** – 1970 Bangladesh West Bengal in 1970. It is considered the deadliest cyclone causing around 3-5 lakh deaths.
- **Economic disruption:** Cyclones can have a devastating impact on the economy of coastal communities. The damage to infrastructure and businesses can lead to job losses and economic hardship. The loss of crops and livestock can also lead to food shortages and price increases. **Example: Cyclone Amphan 2020** was the costliest tropical cyclone on record in the North Indian Ocean costing Rs. 1.03 crores in economic loss.

- **Environmental damage:** Cyclones can cause significant environmental damage. The strong winds and storm surges can erode beaches and coastal wetlands, and the heavy rains can pollute waterways and contaminate drinking water supplies. **Example: Cyclone Nivar 2020:** Tamil Nadu coast - damaged horticultural crops and mangroves in about 23000 acres.



integrate early warning systems, disaster mitigation, response and recovery for enhancing resilience, and provide support to communities affected by cyclones.

- **Health problems:** Cyclones can lead to several health problems, including injuries, respiratory problems, and waterborne diseases. The lack of access to clean water and sanitation can also lead to the spread of diseases. **Example: Cyclone Irma (2017):** caused malaria outbreaks in Bangladesh.
- To mitigate the harmful impacts of tropical cyclones Indian Ocean littoral states should come together such as IONS 2008 to

### Kashmir's First Chrysanthemum Garden

- **Kashmir's first chrysanthemum garden**, Bagh-e-Gul Dawood, has opened to tourists.
- The garden, located within the **Nehru Memorial Botanical Garden** in **Srinagar** along **Dal Lake**, features over 100,000 plants of more than 60 varieties.
- It complements the existing Tulip Garden, encouraging **year-round floral tourism** in Kashmir.

### Chrysanthemum

- Chrysanthemums are **perennial flowering plants** native to **East Asia** and **northeastern Europe**.
- They bloom in the **autumn season** and are known for their vibrant and diverse floral display,
- **Climatic Conditions:** Chrysanthemums flourish in **moderate temperatures**, with **shorter**

days and cooler, longer nights.

- **Uses:** They are commonly used as **ornamental plants** and for medicinal purposes to treat **hypertension, fevers, and inflammation**.

### Saranda Forest

- The recent Supreme Court directive seeks to notify **856 sq km** (of which 816 sq km is reserved forest), **Saranda Forest, as a Wildlife Sanctuary**, to preserve this fragile landscape.
- It derives its name from the **Ho language**, meaning “**seven hundred hills**”, and is located in the **West Singhbhum district of Jharkhand**, within the **Eastern Himalaya Biodiversity Hotspot**.
- It is the **largest Sal forest in Asia** located in Jharkhand.
  - Sal Tree is a **moist deciduous tree**.
- Saranda means ‘**the land of seven hundred hills**’.
- **Fauna:** It is home to **endangered species** of flying lizards and elephants.
- **Flora:** Sal, Kusum, mushroom, Mahua etc.
- **Nearly 80%** of the human population belongs to **Ho, Munda, Oraon** and some primitive tribes.
- It forms one of India’s densest and most biodiverse **Sal (Shorea robusta) forests**, interspersed with **bamboo, mahua, and terminalia species**, and nourished by the **Karo and Koina rivers**.
- It hosts rich fauna, including **Asian elephants, four-horned antelopes, sloth bears and civets**, along with **elephant corridors** of **Keonjhar and Sundargarh (Odisha)** and **Hasdeo-Arand (Chhattisgarh)**.

### Wildlife Sanctuary

- A Wildlife Sanctuary is a **protected area** notified under **Section 18** of the Wildlife (Protection) Act, 1972, aimed at the protection of wild animals and their habitat
- Declared by **State Governments**, with prior consultation with the National Board for Wildlife (NBWL).
- The **Chief Wildlife Warden** may permit human activities like grazing.
- The boundaries of a wildlife sanctuary can be altered by a **resolution of the State Legislature**, but only after receiving a recommendation from the **National Board for Wildlife (NBWL)**.

### Indian Scops Owl (*Otus bakkamoena*)

- The **Indian scops owl (*Otus bakkamoena*)** was recorded for the first time near **Daroji Sloth Bear Sanctuary** in Karnataka.
- **Indian Scops Owl (*Otus bakkamoena*)**
- The Indian scops owl is a **small, nocturnal bird** of prey native to **South Asia**. It is known for its remarkable **camouflage** and **distinctive frog-like “wuatt” calls**.
- **Physical Traits:** Greyish body, dark eyes, and **ear-like tufts** enable seamless blending with tree bark.

- **Habitat Range:** Inhabits forests, woodlands, gardens, and agricultural areas with dense foliage.
- **Distribution:** Found throughout South Asia, including **Pakistan, India, Nepal, and Sri Lanka.**
- **Ecological Role:** Regulates insect populations and serves as an indicator of ecosystem health.
- **Key Threats:** Habitat degradation, pesticide exposure, illegal wildlife trade, **ritualistic hunting**, etc.
- **Conservation Status:** IUCN: Least Concern; CITES: Appendix II; WPA: **Schedule II.**

### Daroji Sloth Bear Sanctuary

- **Location:** Located in the **Ballari district** of **Karnataka** near the UNESCO World Heritage Site of **Hampi.**
- **Establishment:** Founded in **1994**, it is **Asia's first sanctuary** exclusively for Indian sloth bears.
- **Geological Features:** It features the **oldest terrain** on the Indian subcontinent, marked by rocky hills and scattered granite boulders.
- **Vegetation:** Dominated by **dry deciduous scrub** and **southern thorn** forests. **Indian jujube** is an important food source for the sloth bears.
- **Faunal Diversity:** Sloth bear, Leopards, Hyenas, Jackals, Pangolins, Monitor lizards, etc.

### National Biodiversity Authority (NBA)

- National Biodiversity Authority (NBA) released funds to Biodiversity Management Committees in UP and Sikkim.
- **Overview:** It is a **statutory, autonomous body** under the **Ministry of Environment, Forests and Climate Change.**
- **Established:** In 2003 under the **Biological Diversity Act, 2002.**
- **Headquarters:** Chennai, Tamil Nadu.
- **Functions:** Performs facilitative, regulatory and advisory functions on issues of conservation, sustainable use of biological resources and fair and equitable sharing of benefits arising out of the use of biological resources.
- **Complementary Entities:** Under the Biodiversity Act, 2002 and the Biodiversity Rules, 2004, two complementary entities – **State Biodiversity Boards** at the State level and **Biodiversity Management Committees** at the local village level – have been established to complement the NBA.

### Coal Gasification

- A **thermochemical process** that converts coal into **syngas** — a mixture of **carbon monoxide (CO), hydrogen (H<sub>2</sub>), carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>)** and other gases.
  - It involves the **partial oxidation at high temperature and pressure** often integrated with carbon capture and storage technology to reduce CO<sub>2</sub> emissions.

## Coal Gasification

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### Why in news?

Jindal Steel & Power Limited (JSPL) has plans of setting up a coal gasification plant, the second in the country at its Raigarh plant in Chhattisgarh.

### Significance

India has pledged to decrease its overall carbon footprint by half by 2030 by halving coal consumption in power plants, a major pollutant.

### Challenges

- One of the most water-intensive techniques of energy production is coal gasification.
- Concerns have also been raised about water contamination, soil subsidence, and the safe disposal of waste water.

### Benefits

- Carrying gas is far less expensive than transporting coal.
- Assist in resolving local pollution issues.

### About Coal gasification

- Syngas is a mixture of carbon monoxide (CO), hydrogen (H<sub>2</sub>), carbon dioxide (CO<sub>2</sub>), natural gas (CH<sub>4</sub>), and water vapour produced through a process called syngasification (H<sub>2</sub>O).
- During gasification, coal is cooked under high pressure while being blown with oxygen and steam.

- It enables **cleaner utilisation of coal**, producing syngas for **power generation, methanol, ammonia, urea, and liquid fuels**.
- **Challenges for Coal Gasification Technology**
- **High Project Costs:** Requires **heavy upfront investment** in gasifiers, CO<sub>2</sub> capture, and processing units.
- **Technology Adoption:** Global technologies **suit low-ash coal**, making adaptation to India's high-ash coal technically complex and expensive.
- **Uncertain Coal Supply:** Inconsistent coal quality and **absence of assured long-term supply agreements** affect operational stability.
- **Input Costs:** Combined expense of coal, oxygen, and water makes domestic gasification **costlier than using imported LNG or natural gas**.

### Government Releases Draft Guidelines for Underground Coal Gasification (UCG)

- Guidelines provide for preparation of mining and mine closure plans for UCG blocks, procedures for pilot feasibility study, groundwater monitoring, post-mining rehabilitation etc.
- To ensure **scientific mine closure**, companies will be required to maintain an **escrow account with the Coal Controller Organization (CCO)**.
  - **CCO (Ministry of Coal)** collects and maintains coal production data of all private and

public sector coal mines in the country.

- CCO also acts as the **appellate authority** in case of **disputes between consumers and owners** arising out of declaration of grade and size of coal.

### UAE Consensus

- A recent UN report highlights the UAE Consensus as a key milestone advancing global clean energy transition.
- **Adopted at COP28 (2023):** The UAE Consensus marked the **first-ever Global Stocktake** under the Paris Agreement.
- **Energy Transition:** Urges nations to transition away from fossil fuels in a just, fair, and balanced way.
- **Renewables & Efficiency:** Sets clear goals to **triple renewable energy and double energy efficiency by 2030.**
- **Climate Finance:** Calls for greater adaptation support and financial reforms to help vulnerable nations.
- **Global Goal:** Reinforces the collective aim to **keep 1.5°C** within reach and achieve **net zero emissions by 2050.**

### Keibul Lamjao National Park

- Study links land use to water pollution in Manipur's Loktak Lake which shares part with Keibul Lamjao National Park.
- Loktak lake is **largest freshwater lake in Northeast India** and is famous for its **phumdis (floating islands of vegetation).**
- It has been a **Ramsar site since 1990** and listed under the **Montreux Record since 1993** due to ecological problems.
- **Location:** Southern part of Bishnupur district and eastern part of Thoubal district of Manipur.
- Declared wildlife sanctuary in 1954 & National park in 1977. It is the **only floating park** in the world.
- The largest area of the Phumdi in the Loktak lake is in the Keibul Lamjao National Park.
- **Fauna:** Brow-antlered deer (Sangai), Hog Deer, Otter.

### Taal Volcano

- The **Taal Volcano** in the Philippines has erupted three times recently.
- The Taal Volcano is located in **Batangas province**, about 50 km south of **Manila, Philippines.**
- It is classified as a '**complex volcano**'. Its most active regions are on **Volcano Island**, an island within **Taal Lake**. The lake itself lies within a much larger ancient caldera.
  - The Caldera was formed by prehistoric eruptions between **140,000** and **5,380 years ago.**
- Taal Volcano is the **Philippines' second-most-active volcano**, with at least **38** recorded

eruptions.

- **Complex Volcano:** Also called a compound volcano, it consists of *several vents, overlapping cones, and lava domes* instead of a single peak, such as Mount Vesuvius in Italy.
- **Caldera:** A significant, cauldron-shaped **volcanic depression** formed when a magma chamber beneath a volcano empties after a major eruption.

### Bhimgad Wildlife Sanctuary

- The forest department's relocation plan at **Bhimgad Wildlife Sanctuary** faces a setback after Amagaon villagers demanded certain assurances before consenting to move.
- **Location:** Spanning the **Western Ghats** in Belagavi district, Karnataka.
- **Etymology:** Named after the **Bhimgad Fort**, built by Chhatrapati Shivaji Maharaj in the 17<sup>th</sup> century to guard against **Portuguese expansion from Goa**.
- **Boundaries:** Shares borders with **Dandeli WLS (north)**, **Bhagwan Mahaveer Sanctuary** and **Mollem NP (northwest)**, **Netravali WLS (north)**, and **Mhadei WLS (east)**. (Except Dandeli, all in Goa)
- **Hydrology:** Forms the headwaters of the **Tillari, Malaprabha, and Mhadei** rivers and includes **Vajrapoha Waterfalls**, part of the **Mahadayi River** catchment.
- **Biodiversity Hotspot:** Contains the **Barapede Caves**, the only known breeding site of the **Wroughton's Free-tailed Bat**, a critically endangered species.
- **Vegetation:** Tropical and subtropical moist broadleaf forests with Malabar teak and rosewood.
- **Fauna:** Inhabited by tigers, leopards, elephants, gaur, sloth bears, wild dogs, deer species, and king cobras, serving as a vital tiger corridor between Karnataka and Goa.

### Nationally Determined Contributions (NDCs) under the Paris Agreement Synthesis report by UNFCCC

- NDCs embody **efforts by each country to reduce national emissions and adapt to the impacts of climate change** under **Article 4 of the Paris Agreement 2015**.
- The report finds that the **NDCs submitted by 64 Parties, that account for 30% of global emissions in 2019, falls short of the emission reductions necessary to limiting global warming to 1.5 °C**.
- To achieve this goal of **1.5 °C, the required emissions cuts must be 60% by 2035**.
  - However, the NDCs are only estimated to **result in a 17% decline by 2035**.
- Additionally, **according to WMO Greenhouse Gas Bulletin, the levels carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>) and nitrous oxide (N<sub>2</sub>O) in the atmosphere, reached new records in 2024**.
- **Other Key highlights of the Synthesis Report**
- **Emission Trajectories:** Implementation of new NDCs will result in a **peaking of greenhouse gas (GHG) emissions**, followed by strong reductions until 2035.
- **Scope Progression:** New NDCs show **improved quality and credibility**, with 89% of Parties communicating economy-wide targets, compared with 81% previously.

- **Conditionality Gap:** Measures for critical mitigation options like **afforestation and reforestation and solar energy have high conditionality gaps**, indicating they depend significantly on external support.
- **Private Finance:** Difficulties persist in mobilizing **private finance due to low profitability**.

- **India's NDC:** India submitted its **Updated First NDC in August 2022, outlining ambitious targets for 2030**.
- Reduce the Emissions Intensity of its GDP by **45 percent** from the 2005 level.
- Achieve about **50 percent** cumulative electric power installed capacity from non-fossil fuel-based energy resources.
- Create an additional carbon sink of **2.5 to 3 billion tonnes of CO<sub>2</sub> equivalent** through increased forest and tree cover.

### Movement of the Cyclones

- Cyclone Montha is moving north-northwest across the west-central Bay of Bengal toward making landfall along the **Kakinada coast in Andhra Pradesh**.
- **Factors Influencing the Movement of Cyclones**
- **Atmospheric Circulation Influences**
- **Steering Effect:** Cyclones move along the prevailing path of **mid and upper troposphere winds** (5-10 km), where large-scale **horizontal atmospheric flow** influences their speed and direction.
- **Trade Winds: Easterly** (east-to-west) trade winds in tropical regions steer cyclones **westward**, pushing them toward the **eastern coasts** of continents.
  - **Example:** Bay of Bengal cyclones commonly make landfall along India's eastern coast.
- **Westerlies Influence:** Mid-latitude (30°-60°) westerly winds (west-to-east) steer poleward-moving mature cyclones **toward the northeast**.
  - **Example:** Atlantic hurricanes initially drift north from the tropics, then turn northeast toward Europe.
- **Coriolis Effect:** Earth's rotation deflects moving air in cyclones **counterclockwise** in the **Northern Hemisphere** and clockwise in the Southern Hemisphere, causing a slight poleward-westward beta drift.
- **Monsoon Wind Systems**
- **Southwest Monsoon:** Southwest monsoon winds during June-September direct **Arabian Sea cyclones north-eastward** toward India's western coast, especially Gujarat and Maharashtra.
- **Northeast Monsoon:** Northeast monsoon winds from October to December drive Arabian Sea cyclones **westward** toward the Arabian Peninsula and the eastern African coast.
- **Pressure Systems and Interactions**
- **Subtropical Ridge:** Strong high-pressure ridges act as **atmospheric barriers**, forcing cyclones to deflect around or move along their boundaries.
  - **Example:** The **Bermuda-Azores High** steers Atlantic cyclones westward toward the

Caribbean or the southeastern US.

- **Trough Interaction:** Westerly troughs in mid-latitudes create **low-pressure corridors** that attract cyclones poleward and then north-eastward.
  - **Example:** Arabian Sea cyclones often recurve northward toward India under their influence.
- Fujiwhara Effect: Two nearby cyclones **rotate around a shared centre**, mutually altering their path and speed through angular momentum exchange.

### Sunni Dam Hydroelectric Project

- The **National Green Tribunal (NGT)** has taken suo motu cognisance of a complaint alleging illegal dumping into the **Sutlej River** during the Construction of the Sunni Dam Hydroelectric Project.
- **Sunni Dam Hydroelectric Project**
- The Sunni Dam Hydroelectric Project is a **run-of-the-river hydroelectric project** under construction on the **Sutlej River** in the Shimla district, **Himachal Pradesh**.
- The project is being implemented by **Satluj Jal Vidyut Nigam (SJVN)**, a joint venture between the Government of India and the Government of Himachal Pradesh.
- It forms a component of the broader **Luhri Hydroelectric Project**, which is being executed in three separate phases along the **Sutlej River in Himachal Pradesh**.

- **Run of the River Project**
- Water coming from upstream is **utilised to rotate the turbine** to generate hydropower.
- As it involves little or no water storage, excess river flow during high discharge periods cannot be stored and thus flows downstream unused, unlike in large reservoir-based dams.
- A constant supply of upstream water is required for it.

### AmazonFACE Project

- Ahead of **COP30 in Belem (Brazil)**, the **AmazonFACE project** near Manaus simulates CO<sub>2</sub>-rich atmospheres to study how the Amazon rainforest adapts to rising carbon levels.
- It simulates future atmospheric CO<sub>2</sub> levels to observe impacts on photosynthesis, water vapour release, and carbon absorption in tropical rainforests.
- Scientists in Brazil have launched the AmazonFACE (Free-Air CO<sub>2</sub> Enrichment) project near Manaus, to study how the Amazon rainforest will respond to future atmospheric CO<sub>2</sub> levels.
- Seeks to simulate the atmosphere of the future and assess how tropical forests adapt to rising CO<sub>2</sub>, temperature, and humidity.
  - Understand carbon uptake capacity, photosynthesis, and forest resilience with Continuous monitoring (every 10 minutes) of CO<sub>2</sub> absorption.
- The project is supported by **Brazil's federal government** and the **U.K.**

#### **Working Mechanism:**

- **Six steel rings fumigate 50-70 trees** each with CO<sub>2</sub> levels projected for 2050-2060.

- Sensors record canopy gas exchange and microclimate data **every 10 minutes**.
- **Three untreated rings** serve as baselines to compare ecosystem response.

### Hurricane Melissa

- Hurricane Melissa, Jamaica's strongest-ever storm and a **Category 5 hurricane**, has battered the island with winds up to 185 mph (295 km/h) before turning toward Cuba's Santiago province.
- Hurricane Melissa is a powerful tropical cyclone that formed over the Caribbean Sea and became the strongest hurricane ever recorded in Jamaica's history, surpassing previous major storms like Hurricane Gilbert (1988).
- It originated as a tropical depression over the eastern Caribbean, gradually strengthening due to unusually warm ocean waters and favorable atmospheric conditions, evolving into a Category 5 hurricane on the Saffir-Simpson scale.

### Formation

- **Trigger:** Low-pressure disturbance developed over the central Caribbean Sea.
- **Intensification:** Warm sea surface temperatures and high humidity fueled rapid intensification.
- **Trajectory:** Moved westward across Jamaica, then curved northeast toward Cuba and the Bahamas.
- **Impact:** Winds up to **185 mph**, extensive flooding, agricultural loss, infrastructure damage, and displacement of over 1.5 million people in Jamaica.
- **Saffir-Simpson Hurricane Wind Scale:**
- The Saffir-Simpson Hurricane Wind Scale (SSHWS) is a 1-5 rating system used to classify hurricanes based on their maximum sustained wind speeds. It estimates potential property damage and impact severity, though it does not account for rainfall or storm surge.
- **Categories and Features**
- **Category 1 (74-95 mph):** Causes minor roof and tree damage; localized power outages for a few days.
- **Category 2 (96-110 mph):** Major roof and siding damage; widespread power failures lasting several days to weeks.
- **Category 3 (111-129 mph) - Major Hurricane:** Devastating structural damage; electricity and water unavailable for days to weeks.
- **Category 4 (130-156 mph) - Major Hurricane:** Catastrophic damage with severe structural failures; areas uninhabitable for weeks.
- **Category 5 (≥157 mph) - Major Hurricane:** Near-total destruction of homes; long-term power and water outages; mass displacement.

### India's total installed electricity capacity crosses 500 GW

- India has also achieved one of its major **COP26 (Panchamirit goals)** to have **50 % of installed electric power capacity from non-fossil fuel sources** by 2030 five years ahead of the schedule.

- **India's Present Energy Mix:**
  - Non-fossil fuels-51% (256 GW),
  - Fossil fuels 49% (244 GW).
- **Share of Renewables:** Solar: 127 GW, Wind: 53 GW, Hydro: 47 GW.
- **India's Key Renewable Energy Initiatives**
- **PLI Scheme:** to boost domestic manufacturing of high-efficiency **Solar PV modules**.
- **PM-KUSUM:** to install **grid-connected** solar power plants and **solarise** agricultural pumps.
- **Green Hydrogen Mission:** Aimed at making India a **global hub** for the production, utilisation, and export of Green Hydrogen.
- **Green Energy Corridor:** to strengthen the transmission network for evacuation of **large-scale** renewable power.
- **RPO Obligation:** Mandates Discoms to procure a **specified minimum percentage** of power from renewable sources.
- **Key Issues in Renewable Energy Expansion**
- **Grid & Storage Constraints:** RE sources are **variable and unpredictable** as they are dependent on fluctuating weather conditions.
- **Transmission Bottlenecks:** Solar plants can be built within a year, but transmission lines take up to two-and-a-half years.
- **Financing Risks:** Unsigned Power Purchase Agreements and financially weak discoms hinders project uptake.
- **High Import Dependence:** Reliance on foreign solar modules and critical minerals.
- **Land & Policy Delays:** Land acquisition hurdles and inconsistent state regulations slow project execution.
- **Way Forward**
- **Storage Investment:** Mandate large-scale **Battery Energy Storage Systems (BESS)**.
- **Stronger Infrastructure:** Fast-track the Green Energy Corridor and streamline land approvals.
- **Domestic Manufacturing:** Expand local production of solar modules, batteries, and green hydrogen technologies.
- **Policy Stability:** Ensure predictable regulations and promote decentralised renewable energy, especially rooftop solar.

### UNEP'S Adaptation Gap Report 2025

- **Key Findings**
- **Finance Gap:** Developing nations face an **adaptation shortfall of \$310-365 billion/year** by the mid-2030s.
  - **Current Funding:** Global adaptation finance is only **\$26 billion**, far below needs.
- **Implementation Lag:** Most nations have plans, but **execution and quality** remain weak.
- **Urgent Action:** Calls for a **major scale-up** in finance, innovative tools, and stronger resilience

planning.

- **India's Scenario:** India has advanced its **National Adaptation Fund** and **State Action Plans**, but **remains highly vulnerable** to heat stress, erratic monsoons, and coastal flooding.

### India Surpasses 500 GW Power Capacity

- India's power sector reached two major milestones as **total installed capacity exceeded 500 GW** and **renewables provided over 50%** of the national demand.
- **Total Capacity:** The total installed electricity capacity reached **500.89 GW** in **September 2025**.
  - **Energy Composition:** **Non-fossil fuel** sources contributed **256.09 GW (51%)**, while **fossil fuel** sources stood at **244.80 GW (49%)**.
- **Renewable Distribution:** **Solar energy** accounted for the **largest share** at **127.33 GW**, followed by **wind energy** at **53.12 GW**.
- **Capacity Expansion:** Between April and September 2025, India added **28 GW** of non-fossil capacity and **5.1 GW** of fossil-based capacity.
- **COP26 Milestone:** India achieved its COP26 Panchamrit target of **50% installed non-fossil fuel capacity** by 2030, **five years ahead** of schedule.
- **Government Schemes Driving Power Sector Growth**
- **PM Surya Ghar Muft Bijli Yojana (PM-SGMBY):** Expands decentralised solar capacity through **rooftop panels** on **one crore households**.
- **PLI Scheme for Solar PV Modules:** Targets **39,600 MW** of integrated domestic solar PV manufacturing capacity under Tranche-II.
- **PM-KUSUM Scheme:** Promotes **rural solar power** by developing **10,000 MW** of grid-connected plants on **farmers' land**.
- **National Green Hydrogen Mission (NGHM):** Targets to create **5 MMT annual** green hydrogen capacity **by 2030**, supported by **~125 GW** renewable energy capacity.
- **Green Energy Corridors (GEC):** Upgrades transmission networks to **absorb surplus** renewable power from **Rajasthan, Gujarat, and Ladakh**, creating over **200 GW** capacity.
- **Battery Energy Storage Systems (BESS):** Offers up to **40% early-stage capital funding** for large-scale battery storage projects.
- **Challenges of India's Power Sector**
- **Financial Distress:** State-owned DISCOMs face recurring losses due to **tariff-cost mismatches**, inefficiencies, and delays in subsidy disbursement.
- **AT&C Losses:** Aggregate Technical and Commercial (AT&C) losses due to **theft, poor metering**, and billing inefficiencies remain around **17%** (more than **twice the global average**).
- **Coal Dependency:** Heavy reliance on coal (**~75%**) for power generation exposes the sector to price volatility, supply disruptions, and logistical constraints.
- **Procedural Delays:** Slow approvals, **land acquisition disputes**, and inconsistent land records hinder timely project execution and deter private investment.
- **Insufficient Storage:** Inadequate energy storage capacity limits renewable integration and

prevents a consistent, round-the-clock electricity supply.

### New Strategic EU-India Agenda

- The EU has a proposal to link India's **Carbon Credit Trading Scheme (CCTS)** with the EU's **Carbon Border Adjustment Mechanism (CBAM)**.
- This linkage aims to shield Indian exporters from double taxation and foster equitable **North-South collaboration** in climate policy.
- **Carbon Credit Trading Scheme (CCTS)**
- Launched by the **Ministry of Power** under the Energy Conservation (Amendment) Act, 2022.
- To establish a **domestic carbon market** to incentivise and regulate the **reduction of GHG emissions**.
- The CCTS assigns a **carbon credit** to each tonne of carbon dioxide equivalent (tCO<sub>2</sub>e) reduced, effectively putting a price on emissions and encouraging businesses to adopt cleaner technologies.
- Under this initiative, **carbon credit certificates** are issued by the **BEE** to entities that exceed their **emission reduction targets**.
- **Carbon Border Adjustment Mechanism (CBAM)**
- CBAM is a **proposed EU carbon border tax on imports from countries with carbon-intensive production methods**.
- CBAM, which will start in **2026**, is a **part of the "Fit for 55 in 2030 package"**.
- Initially, it will be imposed on the **most carbon-intensive imports**, i.e., **iron and steel, cement, fertilisers, aluminium, hydrogen, and electricity**.
- **Significance of the India-EU Carbon Market Linkage**
- **Export Competitiveness:** Prevents Indian exporters from facing double penalties, vital for sectors like **steel and aluminium**, which are worth **\$8.5 billion in exports to the EU**.
- **Climate Leadership:** Helps in achieving Paris Agreement goals and targeting net-zero by 2070.
- **Green Industrial Transition:** Encourages adoption of cleaner tech in energy-intensive sectors.

### Microbial Link to Arsenic Contamination in Rice

- A recent study found that the **types of microbes in rice paddies** primarily determine arsenic contamination in rice and the resulting crop losses.
  - The study highlights the importance of monitoring various **chemical forms of arsenic in rice** to enhance **food safety standards** worldwide.
- ***Arsenic (As)** is a naturally occurring, **highly toxic metalloid** element found throughout the Earth's crust and is classified as a **Group A carcinogen**.*

### Key Findings of the Study

- **Microbial Ratio:** The balance between **arsenic-methylating bacteria** (which increase risk) and **demethylating archaea** (which detoxify) determines arsenic's toxicity more than the total

arsenic content in soil.

- **Arsenic Conversion:** Methylating bacteria convert **inorganic** arsenic into **highly toxic organic forms**, such as **dimethylarsinic acid (DMA)** and **dimethylated monothioarsenate (DMMTA)**.
- **Health and Crop Risk:** The toxic organic forms of arsenic pose significant **health risks to humans** and cause a physiological disorder called **straighthead disease in rice**.
  - Straighthead disease risk rises when the methylating-to-demethylating microbe **ratio exceeds 1.5**.

- *Straighthead disease is a global rice disorder that produces sterile, upright flowering heads resulting in severe yield losses of up to 70%.*

- **Soil Age Factor:** Younger paddy soils, **less than 700 years old**, contain **more methylating microbes**, while older soils have more detoxifying demethylating archaea.
- **India's Vulnerability:** Newly developed paddy fields in **eastern and southern states** face a **higher risk** of straighthead disease than older, microbially balanced fields.

### Loktak Hydroelectric Project

- The modernisation and repair work for the **Loktak Hydroelectric Project (LHP)** in **Manipur** has been postponed due to significant logistical challenges.
- **Loktak Hydroelectric Project (LHP)**
- The LHP is a multipurpose project located in **Manipur** with an installed capacity of **105 MW**.
- Commissioned in **1983**, it is operated by the **National Hydroelectric Power Corporation (NHPC)**.
- The project is located on Loktak Lake, which receives inflows mainly from the **Khuga and Imphal rivers**.
- The **Ithai Barrage** is a key component of the project, serving as an **artificial reservoir** to maintain consistent water levels for reliable power generation.

### Loktak Lake

- It is the **largest freshwater lake** in **Northeast India**, located about 40 km south of Imphal, **Manipur**.
- The lake is known for its **floating islands**, known as '**phumdis**', which are heterogeneous masses of vegetation, soil, and organic matter.
- It hosts the **world's only floating national park**, Keibul Lamjao, and the last natural habitat of the **endangered** Sangai deer, also called the '**dancing deer**'.
- **Conservation Status:** Designated as a **Wetland of International Importance** under the Ramsar Convention in **1990** and listed in the Montreux Record in **1993**.

### Early Triassic Species of Coelacanth

- Palaeontologists in China discovered a **new fossil species**, *Whiteia anniae*, which belongs to the

ancient coelacanth genus *Whiteia*.

- **Importance:** Found in Early Triassic marine layers (~249 million years old), it marks the first *Whiteia* fossil discovered in Asia.
- **Coelacanth**
- The coelacanth is an ancient **deep-sea fish lineage** once **thought extinct** since the Cretaceous period (~66 million years ago). A living specimen was **rediscovered** off the coast of **South Africa** in 1938.
- **Lobe-Finned:** They have **fleshy, paired fins** that move in alternating, **limb-like** motion (similar to four-limbed vertebrates).
- **Intracranial Joint:** Their skull contains a unique **hinge** that allows them to **expand** their **mouths** to **engulf large prey**.
- **Rostral Organ:** An **electrosensory snout organ** aids nocturnal hunting by detecting faint electrical fields.
- **Habitat Range:** They inhabit deep, **volcanic underwater caves** between 90 and 700 meters, often near the **Comoros** and **Indonesian** coasts.
- **Hunting Behaviour:** Coelacanths are **nocturnal ambush predators** feeding on fish and cephalopods; they conserve energy by drifting passively.
- **Living Species:** There are **two distinct** living species
  - **West Indian Ocean Coelacanth:** Found along the **Comoros Islands** and **East African** coasts. IUCN: Critically Endangered; CITES: **Appendix I**.
  - **Sulawesi Coelacanth:** Native to the waters around **Sulawesi** and **Papua** in **Indonesia**. IUCN: Vulnerable; CITES: **Appendix I**.

### Negative Effects of Antibiotic Combination Therapy

- A recent study highlighted how combining antibiotics, rather than enhancing treatment, can sometimes **reduce effectiveness** and **accelerate antimicrobial resistance (AMR)**.
- **Key Findings of the Study**
- While combining antibiotics may seem like a way to fight resistant bacteria, such combinations can sometimes result in "**antagonism**," where drugs interfere with each other's effects.
- **Different Mechanisms:**
  - **Bacteriostatic antibiotics** (like tetracycline) stop bacterial growth.
  - **Bactericidal antibiotics** (like ciprofloxacin) kill actively dividing bacteria.
  - When used together, the bacteriostatic drug **halts bacterial division**, preventing the **bactericidal** one from working effectively.
- **Study Findings:** Researchers found that **tetracycline** slowed bacterial metabolism in *E. coli*, reducing **ciprofloxacin's** ability to destroy bacterial cells, leading to **higher bacterial survival**.
- **Resistance Risk:** Using **unnecessary or poorly designed combinations** can accelerate the emergence of "**superbugs**," which are bacteria resistant to multiple antibiotics.

### Five Indian megacities face Land Subsidence threat due to Excessive Groundwater Extraction

- A study analysed the satellite radar data from **2015-23** and found land subsidence in **Delhi (National Capital Territory, NCT), Mumbai, Kolkata, Bengaluru and Chennai.**
- **Key Highlights of the Study**
- **Impact:** It has impacted nearly **80 million people** with **Delhi** recording the highest sinking rate of 51 mm annually.
- **Localised Uplift:** The study identified **localised uplift in some cities**, like areas near Dwarka in Delhi.
- **Land Subsidence**
- **Meaning:** Gradual or sudden **sinking of the earth's surface** caused by the **compression or weakening of soil** and rock layers beneath.
- **Primary Causative Factors:** Excessive **groundwater pumping, large-scale mining, rapid urbanisation, natural shifts** in earth's crust, etc.
- **Areas Witnessing Subsidence:** Areas around **Assam and Sikkim** (due to fault activity and hydrocarbon extraction), **Himalayan towns** like Joshimath and Mussoorie (unregulated development), etc.
- **Impacts of Land Subsidence**
- **Impact on Infrastructure:** Study estimates more than **2000 buildings in Delhi** are currently at high damage risk due to **differential land subsidence.**
- **Impact on Coastal Regions:** These regions witness **saltwater intrusion**, leading to freshwater contamination and crop loss.
- **Disasters:** Buildings crack or collapse, roads buckle, and drainage networks misalign, often leading to floods impacting human lives.
- **Long-term ecological risk:** It **alters river flows, affects aquatic and terrestrial habitats**, and may accelerate carbon release from peatlands and marshes.
- **Ways to Prevent Land Subsidence**
- **Innovative Solutions:** **Artificial recharge** of depleted aquifers; **deep soil mixing** involving injection of stabilising agents into the ground.
- **Advanced Monitoring Technologies:** **PSInSAR** (for cities with plenty of stable structures), **SBAS-InSAR** (for agricultural or vegetated areas), and **SqueeSAR** (for mountainous terrain), etc.

### Kunming Biodiversity Fund (KBF)

- Recently, seven countries secured funding under **Kunming Biodiversity Fund (KBF).**
- Multi-Partner Trust Fund (MTPF), supporting accelerated action to deliver the **goals of KMGBF (Kunming-Montreal Global Biodiversity Framework)**, particularly in developing countries.
  - KMGBF is a **non-binding framework** adopted at the **CoP-15 to the UN Convention on Biological Diversity (CBD) at Montreal, Canada (2022).**
  - It has **4 goals for 2050** and **23 targets for 2030.**

- Established under the leadership of **China** and **United Nations Environment Program (UNEP)**, with the **Secretariat of the CBD (SCBD)** and **United Nations Development Programme (UNDP)**.

### Venkatadri slender gecko (*Hemiphyllodactylus venkatadri*)

- Zoological Survey of India identified *Hemiphyllodactylus venkatadri*, a new slender gecko species from **Andhra Pradesh's** Seshachalam Biosphere Reserve.
- This is the **second slender gecko species** recorded from **Andhra Pradesh**, after *H. arakuensis*.
- *Hemiphyllodactylus venkatadri*
- *H. venkatadri*, also known as the **Venkatadri slender gecko**, is a **small**, slender gecko species **endemic** to the **Tirumala hills of Seshachalam Biosphere Reserve**.
  - It is named after the sacred **Venkatadri Hills**, where it was found.
- **Appearance:** The gecko has a mottled **brown to grey body** with irregular speckling; Its adhesive toe pads help it move on vertical surfaces.
- **Habitat:** It is an arboreal species that shelters **under Tendu bark during the day**, usually 1.5–3 meters above the ground.

### Seshachalam Biosphere Reserve

- Seshachalam Biosphere Reserve is a **tropical dry mixed deciduous** forest located in the **southern Eastern Ghats of Andhra Pradesh**.
- **UNESCO Status:** It was declared a Biosphere Reserve under the **UNESCO Man and Biosphere (MAB)** Programme in **2010**, making it the first such reserve in Andhra Pradesh.
- **Red Sanders:** The reserve is famous for its large population of endemic and valuable Red Sanders trees.
- **Wildlife:** Golden gecko, leopards, sloth bears, Indian giant squirrels, **slender lorises**, etc.

### Ecological Droughts

- IIT Kharagpur study highlights that **ecologically fragile forests** in Western Ghats, Himalayas, and Northeast, along with croplands in central India are increasingly facing **ecological droughts**.
- **Definition:** Ecological droughts are **prolonged moisture deficits** disrupting ecosystem structure, biodiversity, and carbon balance.
- **Causes:** Driven by **natural phenomena**, such as lack of **rainfall or warming temperatures including warming oceans**, rising atmospheric dryness, etc.
- **Impact:** Reduced Plant growth, Local species extinction, etc.
- **Other Types of Drought:** Meteorological, Agriculture, Hydrological, Socio-Economic.

## Ocean- Based Carbon Capture, Utilisation, and Storage (CCUS) could offer Strategic Decarbonisation Pathway

- **Storing captured carbon subsea**, in depleted oil and gas wells or aquifers — is ramping up as a climate solution globally.

### Ocean based CCUS

- It involves **capturing CO<sub>2</sub>** from sources (generally from large point sources like power generation or industrial facilities using fossil fuels) and storing it in **seawater or deep-sea sediments**.

### Key Techniques

- **Ocean Alkalinity Enhancement (OAE)**: It accelerates **CO<sub>2</sub> absorption** by adding **pulverized minerals (e.g., Lime)** or electrochemically boosting rock weathering.
- **Ocean fertilisation**: Promotes the **growth of phytoplankton** by adding required micronutrients, like phosphorus, nitrogen, etc., facilitating deep-ocean carbon storage.
- **Other methods: Biological Carbon Capture**, which utilizes marine ecosystems and the **Enhancement of Blue Carbon Sinks** like mangroves.

### Key Benefits of Ocean-Based CCUS

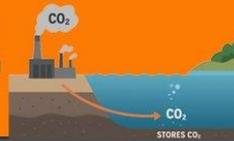
- **Durable Storage**: Techniques like OAE could store carbon for **up to 100,000 years**.
- **Vast Storage Capacity**: Ocean is the largest natural carbon sink, storing **50 times more carbon than atmosphere**.
- **Safety and Scalability**: It uses **low temperatures and high pressure** to stabilize CO<sub>2</sub> in liquid form, thus **minimizing leakage, preventing groundwater contamination**, etc.
- **Carbon Utilization**: Captured CO<sub>2</sub> can be repurposed for **industrial applications**, including **green hydrogen, biofuels, biopolymers, etc.**
- **Climate Mitigation**: It can reduce global CO<sub>2</sub> emissions by 14% by 2060.
- **Benefits for India**: Achieve its **Net-zero target by 2070**; **sustainable Blue growth**; India's vast **coastline** offers huge potential.
- Currently, the technology is in **early stages of development** and is **cost and capital intensive**. It requires suitable funds for **research, innovation with detailed techno-economic and environmental impact analysis** before implementation.

20 YEARS  
483 OFFICERS

## OCEAN BASED CCUS

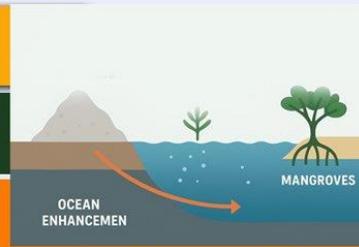
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A strategic decarbonisation pathway, Ocean-based CCUS captures CO<sub>2</sub> from large sources (like power or industrial plants) and stores it beneath the sea — in seawater, sediments, or depleted wells.



### Key Techniques:

- **Ocean Alkalinity Enhancement (OAE):** Adds minerals like lime to boost CO<sub>2</sub> absorption.
- **Ocean Fertilisation:** Stimulates phytoplankton growth for natural carbon storage.
- **Blue Carbon Enhancement:** Utilises mangroves & marine ecosystems for CO<sub>2</sub> capture.



### Why It Matters:

- **Durable storage:** Up to 100,000 years
- **Vast potential:** Oceans store 50× more carbon than air
- **Safe & scalable:** Low leakage risk
- **Climate impact:** Could cut global CO<sub>2</sub> by 14% by 2060

**For India: Aids Net Zero 2070 goal & supports sustainable blue growth.**



### National Crisis Management Committee

- Recently, the NCMC reviewed the **preparedness for the approaching cyclonic storm** over the Bay of Bengal.
- **National Crisis Management Committee (NCMC)**
- Constituted under the Disaster Management Act, 2005, the NCMC is the **apex body** for coordinating the Centre's response to major disasters and crises.
- **Chairperson:** The **Cabinet Secretary** heads the committee.
- **Members:** Union Home Secretary, Defence Secretary, Secretary (Coordination) in the Cabinet Secretariat, and a Member & Head of Department from the National Disaster Management Authority (NDMA).
- **Function:** The NCMC serves as the **highest-level body for strategic decision-making**, inter-ministerial coordination, and real-time response management during severe disaster situations.

## SCIENCE AND TECHNOLOGY

### Laser Interferometer Lunar Antenna (LILA)

Scientists proposed the **Laser Interferometer Lunar Antenna (LILA)** to detect gravitational waves from the Moon's surface.

*An interferometer is a scientific instrument that uses wave interference to detect very small changes in the distance travelled by waves.*

### Laser Interferometer Lunar Antenna (LILA)

- The Laser Interferometer Lunar Antenna (LILA) is a proposed next-generation **gravitational-wave detector**, planned for deployment on the **Moon's surface**.
- It will measure spacetime ripples caused by cosmic events through a network of lunar interferometers.
- LILA focuses on gravitational waves in the **mid-frequency band**, specifically **0.1 to 10 Hz**. This range fills the "**decihertz gap**" that LIGO and Laser Interferometer Space Antenna (**LISA**) cannot access.
- **Vanderbilt Lunar Labs** in the United States leads the project, working with international partners.

### Developmental Phases of LILA

- **Pioneer Phase:** A lunar interferometer with **3-5 km long arms** will be deployed using robotic landers to test mid-band sensitivity and technologies.
- **Horizon Phase:** A **triangular interferometer array** with 40 km-long arms will be assembled by astronauts, using quantum sensors and advanced seismic isolation.

### Lunar Suitability for LILA

- **Atmospheric Vacuum:** The lack of a lunar atmosphere creates a **natural vacuum**. This removes distortions like wind, pressure, and humidity that could interfere with gravitational-wave detectors.
- **Seismic Noise:** The Moon is far **less seismically active** than Earth, thus reducing vibrations that could mask faint gravitational-wave signals.
- **Newtonian Noise:** Without oceans or large mass movements, the Moon avoids Newtonian noise that distorts the accuracy of terrestrial detectors.
- *Newtonian noise refers to minor gravitational disturbances caused by moving masses, such as air, water, or the ground, near sensitive detectors.*

### Scientific Significance of LILA

- **Spectrum Coverage:** LILA will cover the mid-frequency gravitational-wave

range, **complementing** the high-frequency LIGO and the low-frequency ESA's LISA.

- **Astrophysical Discovery:** By filling the decihertz gap, LILA allows the study of phenomena that are hard to access, e.g., **intermediate-mass black holes**.
- **Lunar Geophysics:** LILA's sensitive instruments will collect data on the **Moon's deep interior** and develop a three-dimensional structural model.

### Agnikul Cosmos Unveils Fully Reusable Rockets

- Chennai-based spacetech startup **Agnikul Cosmos** announced that its upcoming rockets will be **fully reusable, with no part discarded**.
- Aligns with International Astronautical Congress (IAC) 2025 theme; "**Sustainable Space: Resilient Earth**".
- *The IAC is the annual global forum for over 6,000 participants, bringing together academia, industry, and agencies to share the latest space developments and forge partnerships.*

### Key Highlights

- Agnikul plans to offer globally competitive **small-satellite launch services**.
- Successfully tested **3D-printed** sub-orbital rocket **Agnibaan SOrTeD** in **2024**; orbital launch planned.
- It is supported by **IN-SPACE**, providing both policy backing and technical support.
- Innovations designed for **cost efficiency, scalability, and debris mitigation compliance**.
- **Reusable Launch Vehicles**
- *A **Reusable Launch Vehicle (RLV)** is a rocket that can be launched, recovered, and reused multiple times instead of being discarded after one use.*
- *It helps prevent **Kessler Syndrome** by reducing space debris and enabling controlled re-entry, lowering the risk of cascading collisions in orbit.*
- **India's Past Efforts: RLV-TD HEX-01 (2016), RLV LEX Series (2024) and PUSHPAK.**
- **Notable Global Missions: SpaceX Falcon 9 and Falcon Heavy (USA), China's Long March 8.**

### SARAL Tool by ANRF

The Anusandhan National Research Foundation (ANRF) has developed a tool called **SARAL** to make scientific research more accessible.

- **SARAL (Simplified and Automated Research Amplification and Learning)** is an **AI-based tool** that converts complex research papers into easy-to-understand summaries.
- **Anusandhan National Research Foundation (ANRF)**
- The ANRF is an apex body established to **promote R&D and foster a culture of research & innovation** throughout India's Universities, Research Institutions, and R&D laboratories.
- It was established by the ANRF Act, 2023, in alignment with the NEP 2020, replacing the **Science and Engineering Research Board (SERB)**.
- **Expanded Scope:** It broadens the definition of research to cover the **humanities and social**

sciences; it can also receive funding from both **public** and **private sources**, unlike the SERB.

- **Structure:** The ANRF operates under the **Department of Science and Technology**, where policies are shaped by a **Governing Board** led by the Prime Minister.

### Biomedical Research Centre Programme

- The Union Cabinet has **approved Phase III** of the Biomedical Research Career Programme.
- **Phase III of the Biomedical Research Career Programme (BRCP)**
- It is a **flagship initiative** of the **Department of Biotechnology (DBT)** in partnership with the **Wellcome Trust (UK)** and the **DBT/Wellcome Trust India Alliance** through a Special Purpose Vehicle (SPV).
- **Time Period:** The programme will run from **2025-26 to 2030-31**, with continued support till **2037-38**.
- **Funding:** **₹1,500 crore**, with DBT contributing ₹1,000 crore and Wellcome Trust ₹500 crore.

### Key Focus of Phase III

- **Early Career and Intermediate Fellowships** in basic science, clinical research, and public health are tailored to researchers' formative stages.
- **Career Development Grants** and **Catalytic Collaborative Grants** for 2-3 investigator teams with strong track records.
- **Research Management Programme**, to strengthen research, mentorship & international collaborations.

### Biomedical Research Career Programme (BRCP)

- Launched in **2008-09** as a partnership between the **Department of Biotechnology (DBT)**, Government of India, and the Wellcome Trust (UK) through SPV.
- **Aim:** To nurture **world-class biomedical research in India** by offering **competitive fellowships** and grants at par with global standards.
- In 2018-19, **Phase II** was launched, which expanded the portfolio of fellowships.

### Raksha-IBR Vaccine

- Indian Immunologicals Ltd. (IIL) has launched **India's first indigenously developed glycoprotein E (gE) deleted DIVA marker vaccine** for **Infectious Bovine Rhinotracheitis (IBR)**.
- As a subsidiary of the National Dairy Development Board (NDDB), IIL manufactures and promotes vaccines and healthcare products for **both animals** and **humans**.

### Raksha-IBR

- **First of Its Kind:** **Raksha-IBR** is **India's first indigenously developed vaccine** designed to combat Infectious Bovine Rhinotracheitis (IBR).
- **Weakened Virus:** It uses an attenuated strain of **Bovine Herpes Virus-1 (BHV-1)**, ensuring protective immunity while minimising the risk of active infection.

- **Marker Design:** As a **glycoprotein E (gE) deleted DIVA vaccine**, it also helps differentiate between vaccinated and naturally infected cattle.

### Glycoprotein E (gE)

- **Envelope Protein:** Glycoprotein E is an **envelope protein** present in the **alphaherpesvirus family**, which includes the Bovine Herpes Virus responsible for IBR.
- **Virulence Factor:** It **increases viral virulence** by helping the pathogen evade host immunity through interaction with antibodies.
- **Genetic Deletion:** Raksha-IBR **removes this gE gene** to create a marker vaccine that protects without allowing immune evasion.

### DIVA (Differentiating Infected from Vaccinated Animals)

- **Veterinary Strategy:** DIVA is a **veterinary vaccination approach** that uses special “**marker vaccines**” to **differentiate vaccinated animals** from those that are naturally infected.
- **Negative Marker:** Such vaccines **deliberately omit a specific protein** (“negative marker”) that is typically present in wild pathogens to identify true infections.
- **Targeted Culling:** It allows for the precise removal of naturally infected animals, **preventing unnecessary culling** of vaccinated livestock.

### Infectious Bovine Rhinotracheitis (IBR)

Infectious Bovine Rhinotracheitis (IBR) is a **highly contagious viral disease** in cattle caused by **Bovine Herpes Virus-1 (BHV-1)**.

**Endemic Status:** The disease is **endemic** in India, affecting domestic cattle, buffaloes, and occasionally wild bovine populations.

**Transmission:** It spreads through **aerosols, nasal discharges, genital secretions, and infected semen**, enabling quick herd-to-herd transmission.

**Symptoms:** Clinical signs include fever, eye and nasal discharges, cough, loss of appetite, **abortions**, and **decreased milk production**.

**Types:** IBR presents in **four forms: respiratory** (nasal and lung infections), **genital** (reproductive tract disorders), **ocular** (eye infections), and **neonatal** (calf mortality).

**Treatment:** Currently, there is **no curative therapy**; management depends on **supportive care** and **preventive vaccination**.

**Economic Cost:** India faces annual losses of about **₹18,000 crore** due to **infertility**, abortions, and reduced dairy productivity associated with IBR.

### Li-Fi Internet System

- **Gujarat-based** Nav Wireless Technologies announced the successful deployment of the **United States' first commercial Li-Fi internet system** in New York City.
- Li-Fi (**Light Fidelity**) is a wireless **optical communication** system that utilizes **light waves** from

Light-emitting diodes (LEDs) to transmit data at very high speeds.

- **Comparison:** Unlike **Wi-Fi**, which relies on **radio waves**, Li-Fi transmits data using visible, infrared, and ultraviolet light.
- **Mechanism:** LEDs **flicker at very high speeds**, invisible to the human eye, to transmit digital signals as **light pulses**.
- **Data Conversion:** A **photodiode receiver** converts these light pulses into electrical signals. A **processor** then transforms the signals back into usable data such as text, audio, or video.

### Advantages of Li-Fi Internet

- **High Speed:** Li-Fi offers a much higher data transmission speed, **exceeding 100 Gbps**, compared to traditional Wi-Fi systems.
- **Enhanced Security:** Since light signals cannot pass through walls, they are naturally more secure against **external snooping**.
- **Large Bandwidth:** The visible light spectrum is **10,000 times broader** than the radio spectrum, providing much more bandwidth and helping to **reduce network congestion**.
- **Electromagnetic Safety:** Li-Fi **does not interfere** with sensitive medical or electronic equipment, making it safe to use in hospitals, aircraft, and factories.
- **Energy Efficiency:** LED lighting can serve a **dual role** by transmitting data and lighting up spaces. This helps save energy and cut infrastructure costs.
- **Limitations of Li-Fi Internet**
- **Line-of-Sight Dependency:** The line of sight between the transmitter and receiver **must stay clear**. Losing sight results in a weaker signal and slower data transfer.
- **Limited Range:** Since light signals cannot pass through walls, **each room requires its own** Li-Fi transmitter to provide full coverage.
- **Ambient-Light Interference:** Bright ambient light, especially **sunlight**, can **disrupt Li-Fi signals** and restrict their outdoor use.

### Nobel Prize for 2025 in Medicine or Physiology

- The 2025 Nobel Prize in Physiology or Medicine was awarded for the discovery of regulatory T-cells and peripheral immune tolerance, explaining how the body prevents autoimmune reactions.
- **Shimon Sakaguchi (Japan)** received the award for discovering **regulatory T-cells**.
- **Mary E. Brunkow & Fred Ramsdell (USA)** were honoured for identifying **Foxp3 gene**, controls immune regulation.

### Peripheral Immune Tolerance

- **Prevailing View:** Scientists previously believed that the immune system prevented self-damage solely through **central tolerance**, which occurs in the **thymus** and **bone marrow**.
- **Peripheral Tolerance:** Some **self-reactive T cells** that escape central tolerance are **restrained in**

**peripheral tissues** (e.g., lymph nodes, spleen). This stops them from mistakenly attacking healthy tissue.

- **Regulatory T-Cells:** Sakaguchi discovered a **subtype of T-cells** called **regulatory T-cells** that identify and suppress these escaped self-reactive T-cells.
- **Foxp3 Gene Role:** Brunkow and Ramsdell showed that **mutations in the Foxp3 gene disable regulatory T-cells**, causing uncontrolled immune activation and loss of self-tolerance.
- **Therapeutic Value:** Insights into regulatory T-cells can guide new treatments for **autoimmune diseases, organ transplants, and cancer immunotherapy**.

### Nobel Prize

Nobel Prize is a set of prestigious international awards given **annually** for outstanding achievements.

**Origin:** Established by the will of Swedish inventor **Alfred Nobel**, the first prizes were awarded in **1901**.

**Categories:** Prizes are awarded in **six fields: Physics, Chemistry, Physiology or Medicine, Literature, Peace, and Economic Sciences**.

The Prize in **Economic Sciences** was introduced later in **1968** by the **Sveriges Riksbank (Swedish central bank)**

### Nobel Prize in Physiology or Medicine

- **Awarding Body:** Granted by the Nobel Assembly at the **Karolinska Institute** in **Stockholm, Sweden**, for outstanding medical research contributions.
- **First Laureate:** In 1901, **Emil von Behring** received it for developing serum therapy to treat diphtheria.
- **Indian-Origin Laureate:** In 1968, **Har Gobind Khorana** became the first Indian winner for **decoding the genetic code** guiding protein synthesis.

### National Centre for Vector Borne Diseases Control

Recently, the **National Centre for Vector Borne Diseases Control (NCVBDC)** reported over **4,000 dengue cases** in Telangana between April and August 2025.

### National Centre for Vector Borne Diseases Control

- Nodal agency under **Ministry of Health & Family Welfare** for prevention of vector-borne diseases.
- Implements the **National Vector Borne Disease Control Programme (NVBDCP)** and provides technical and financial support to States/UTs.
- Focuses on **six major diseases** — **malaria, dengue, chikungunya, Japanese encephalitis, kala-azar, and lymphatic filariasis**; **malaria, kala-azar, and lymphatic filariasis** are targeted for elimination, while others are closely monitored for outbreaks.

- Facilitates **surveillance, capacity building, entomological research, and quality control** to strengthen disease prevention and control.
- Key initiatives include the **National Anti-Malaria Programme, Kala-azar Control Programme, National Filaria Control Programme, and Dengue & Chikungunya Control Programme.**

### Viridans Streptococci Causing Heart Attacks

A study by researchers in Finland found that **viridans streptococci**, a group of common **oral bacteria**, can evade the immune system and **directly contribute to fatal heart attacks.**

#### Viridans Streptococci

- Viridans streptococci are **Gram-positive bacteria** that usually live harmlessly in the oral cavity and the digestive, respiratory, & female reproductive tracts of healthy individuals.
- They can cause **dental cavities, gum infections, and infective endocarditis** (a severe infection of the heart valves) when they enter the bloodstream through gum injuries or dental procedures.
- **Survival Mechanism:** These bacteria can form sticky layers called **biofilms**, which enable them to attach to **tissue surfaces & evade detection** by the immune system; this makes them **resistant to antibiotics.**
- **Treatment:** Preventive measures include maintaining **good oral hygiene & treating gum disease** early.

#### How Do They Trigger Heart Attacks?

These bacteria enter and stay hidden in the **fatty deposits** of the **coronary arteries** by forming biofilms.

When these fatty deposits **rupture**, bacterial fragments come into contact with the bloodstream.

This activates **Toll-Like Receptor-2 (TLR2)**, triggering inflammation and clot formation that block blood flow and cause a **heart attack.**

*Toll-Like Receptor-2 (TLR2) is a **protein on immune cells** that recognises harmful microbes and triggers inflammation to **help the body fight infection.***

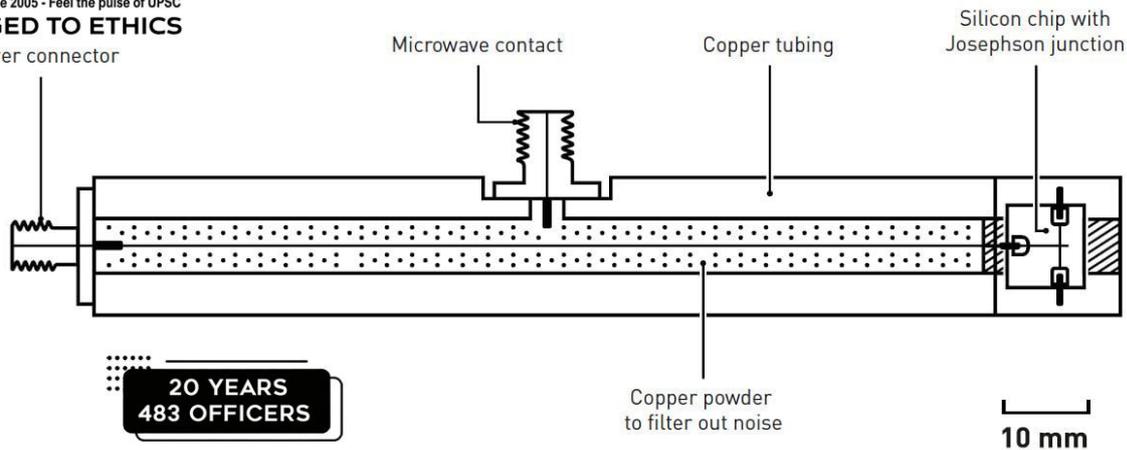
### Nobel Prize in Physics 2025

**John Clarke** (UK), **Michel Devoret** (France), and **John Martinis** (USA) won the 2025 Nobel Prize in Physics for demonstrating **Macroscopic Quantum Tunnelling** in **visible electrical circuits.**

Their discovery **confirmed that quantum phenomena**, once thought limited to subatomic particles, can also manifest in macroscopic systems, expanding the boundaries of quantum mechanics.

- **Experimental Setup:** Using a **Josephson junction**, they showed that an entire electrical circuit can exhibit **quantum tunnelling** when cooled to extremely low temperatures.

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John Clarke, Michel Devoret and John Martinis constructed an experiment using a superconducting electrical circuit. The chip that held this circuit was about a centimetre in size. Previously, tunnelling and energy quantisation had been studied in systems that had just a few particles; here, these phenomena appeared in a quantum mechanical system with billions of Cooper pairs that filled the entire superconductor on the chip. In this way, the experiment took quantum mechanical effects from a microscopic scale to a macroscopic one.

### Macroscopic Quantum Tunnelling (MQT)

- Macroscopic quantum tunnelling occurs **when a large-scale system crosses an energy barrier** (*quantum tunnelling*) without having enough classical energy to do so.
  - **Energy Barrier:** It is a region of **higher potential energy** that classically prevents particles or systems from moving across.
- **Quantum Principle:** This tunnelling phenomenon occurs because of wave-particle duality, where matter behaves both as a particle and a wave.
- **Significance:** Demonstrating MQT in visible circuits bridges the gap between quantum and classical physics, paving the way for **quantum technologies**.

### Josephson Junction

- A Josephson junction consists of **two superconductors** separated by an **ultrathin insulating layer** that allows **quantum tunnelling** of electron pairs.
  - **Mechanism:** **Cooper pairs** pass through the insulating barrier via Quantum Tunnelling, producing a **supercurrent to flow without any applied voltage**.
  - **Qubits:** These junctions form the building blocks of quantum bits (qubits) used in **quantum computers**.
  - **Innovation:** Clarke and his team **improved shielding and cooling techniques** to **precisely isolate the setup** from interference and confirm quantum effects on a macroscopic scale.
- **Cooper Pair:** Consists of **two electrons** that are **weakly bound** and move together as a **single superconductor**. This pairing enables **electrical flow without resistance**.

## Nobel Prize in Chemistry 2025

- The 2025 Nobel Prize in Chemistry was awarded to **Susumu Kitagawa** (Japan), **Richard Robson** (Australia), and **Omar M. Yaghi** (USA) for developing **metal-organic frameworks** (MOFs).

## Metal-Organic Frameworks (MOFs)

- Metal-organic frameworks (MOFs) are **crystalline, porous materials made of metal ions** as "**nodes**" connected by **organic molecules** called "**linkers**."
- Functionality:** Their **lattice structure** creates **large cavities** that can store substances, catalyse reactions, or conduct electricity.
- Porosity:** MOFs have **large internal surface areas**, often exceeding 7,000 square meters per gram, which allows for remarkable molecular adsorption and **storage capacity**.
- Tunable Design:** By modifying metal nodes and linkers, chemists can **accurately control pore size, geometry, and reactivity for specialised applications**.
- Applications of Metal-Organic Frameworks**
- Water Harvesting:** Extracts water from desert air using **temperature-driven vapour release cycles**.
- Gas Storage:** Captures and stores **carbon dioxide & hydrogen** for clean energy and climate mitigation.
- Pollution Removal:** Filters toxic substances like PFAS from contaminated water sources.

**Drug Degradation:** Breaks down residual pharmaceuticals in wastewater, preventing ecological toxicity.

**Metal Recovery:** Extracts rare earth elements from industrial wastewater for recycling and reuse.

**Catalysis:** Accelerates **decomposition** of **hydrocarbons** and **antibiotics** in polluted environments.

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## Crohn's Disease



**Crohn's disease and ulcerative colitis** are collectively referred to as inflammatory bowel diseases (IBD).

More than **5 million** people around the world live with these debilitating digestive diseases.



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Crohn's can affect anywhere in the GI tract from the **mouth to the anus**. Ulcerative colitis only affects the **colon (large intestine) and rectum**.

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Disease symptoms may include **abdominal pain, urgency, diarrhea, constipation, bloating, fatigue, weight loss, rectal bleeding, mucus in stool, and gas**.

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While the exact causes of IBD are not entirely understood, they are known to involve an interaction between **genetics, immune system, microbiome, & environmental factors**.

- Recent studies indicate that diets rich in **ultra-processed foods (UPFs)** may exacerbate gut inflammation and **increase the risk of Crohn's disease** flare-ups.
- Crohn's disease is an inflammatory bowel disease (IBD) that causes **chronic inflammation** anywhere along the **gastrointestinal (GI) tract**, most commonly in the **small intestine** and **colon**.
- Symptoms:** They include abdominal pain, diarrhoea, fatigue, weight loss, fever, mouth sores, & anaemia.
- Treatment:** This disease is most common in people **aged 20-29** and has **no cure**; management focuses on reducing inflammation, relieving symptoms, and preventing recurrence through medications.

## NASA Confirms Safe Passage of Asteroid 2025 TF

- A Near-Earth Asteroid named **2025 TF** passed just **428 km above Earth**, within the orbital range of the **International Space Station** (370–460 km).
- It was a small asteroid **measuring 9.8 feet (about 3 meters)** in diameter, with no potential danger.

## Near-Earth Asteroids (NEAs)

- Near-Earth asteroids are asteroids with orbits close to Earth, typically within **1.3 astronomical units (AU)** of the Sun.
- Origin:** Most NEAs originate in the central asteroid belt between **Mars** and **Jupiter** and are nudged toward Earth by gravitational interactions, primarily with Jupiter.
- Impact Potential:** Smaller NEAs (a few metres wide) often burn up harmlessly in the atmosphere, while **Potentially Hazardous Asteroids (PHAs)** could cause significant regional devastation if they impact.
  - PHAs are a subset of NEAs that pass **within 0.05 AU** (~7.5 million km) of Earth and are **larger than 140 meters** in diameter.
- Impact Assessment:** The threat posed by a NEA is evaluated by calculating its **impact probability** and kinetic energy; It is rated with the **Torino Scale** or the **Palermo Scale**.

### First-Ever Image of Two Orbiting Black Holes

- Astronomers have, for the first time, captured a radio image of **two black holes orbiting each other** in a distant galaxy called **Quasar OJ287**.

*Quasar OJ287 is a galaxy approximately five billion light-years away from Earth.*

- A **quasar** is the extremely **bright core of a distant galaxy** powered by a supermassive black hole. It appears so due to the **immense energy** emitted by the black hole as it pulls in surrounding gas and dust.
- The pair consists of a **massive black hole of 18 billion solar masses** and a smaller companion of 150 million solar masses, orbiting each other in a **12-year cycle**.
- The smaller black hole emits a **jet of high-energy particles** that twists like a tail due to the immense gravitational pull of its larger companion.
- **Imaging Method:** The image was captured using a network of radio telescopes, including the **RadioAstron satellite**, which provided a much **higher resolution** than standard Earth-based optical telescopes.

*A radio telescope detects **invisible radio waves from space**, while an optical telescope **collects visible light** to observe celestial objects directly.*

### Significance

- **Scientific Milestone:** This is the **first visual confirmation** of binary supermassive black holes, supporting predictions of Einstein's General Theory of Relativity.
- **Theory Validation:** The observation confirms the long-standing theory that two orbiting black holes cause the **12-year light fluctuations** observed in Quasar OJ287.
- **Gravitational Insight:** The binary system aids in studying gravitational waves, enhancing understanding of how massive bodies warp space-time.
- **India's Role:** The research team included Indian scientists, highlighting **India's growing role** in global astrophysics and space research.

### Crew Escape System in Gaganyaan Mission

- ISRO has highlighted the working of the **Crew Escape System (CES)**, a critical safety mechanism of the **Gaganyaan Mission**.
- Gaganyaan Mission aims to send Indian astronauts (**~400 km LEO orbit**) and bring them back safely.

### Crew Escape System (CES)

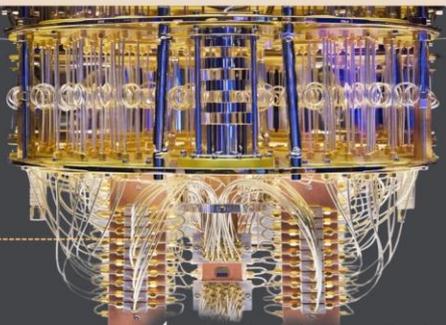
- **Purpose:** Rapidly **separates the Crew Module** from a malfunctioning **HLVM3 rocket** during launch.
- **Placement:** Mounted at the **rocket's forward end** with multiple high-burn-rate solid motors.

- **Working:** In case of rocket malfunction, the CES uses high-burn solid motors to pull the crew module away from the launch vehicle, followed by parachute descent and sea splashdown.
- **Test Vehicle:** **Vikas-engine powered**, developed for CES validation.
- **CES Types:**
  - **Puller Type:** CES **pulls** the crew module away using **solid motors** (E.g. **Gaganyaan**).
  - **Pusher Type:** CES **pushes** the module away using **compact liquid engines**. (E.g. **SpaceX Falcon 9**).

### Quantum Breakthrough in Digital Security

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# How It Works



From Quantum Physics to **Unbreakable Codes**

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Randomness is key to encryption; true unpredictability means unhackable systems.



Classical computers generate "pseudo-random" numbers that can repeat or be predicted.



Quantum systems exploit the intrinsic uncertainty of nature to produce true randomness.



Using Leggett–Garg time correlations within a single qubit, scientists achieved certified unpredictability, verified by the laws of physics.

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**Certified by Quantum Mechanics, Not Just Mathematics.**

- Indian researchers at **Raman Research Institute, Bengaluru**, achieved a global first in certifying **true random number generation** using a commercial quantum computer.
- The discovery under the **National Quantum Mission (NQM)** marks a critical leap toward **hack-proof digital security** and **quantum-safe encryption**.

### Need for True Randomness in Digital Security

- **Encryption Backbone:** Modern cybersecurity relies on random numbers for passwords and encryption keys; even a **1 % predictability** can compromise security (NIST Report 2024).
- **Current Limitation:** Existing systems use **pseudorandom numbers** generated by algorithms.
- **Economic Stakes:** Global cybercrime losses projected at **\$10.5 trillion annually by 2025**, demanding next-gen security architecture (Cybersecurity Ventures, 2025).

### How was the Breakthrough Achieved?

- **Compact & Practical Setup:** Used time separation in a **single particle (Leggett–Garg principle) instead of two-particle systems**, making the experiment smaller, cheaper, and real-world ready.
- **Device-Independent Randomness:** The randomness arises from **pure quantum behaviour**, not dependent on the machine itself, ensuring genuine, hacker-proof random numbers.
- **Real-World Demonstration:** Successfully tested on a **commercial quantum computer**, proving the technique's robustness and readiness for deployment in banking, defence, and cybersecurity systems.

### How does it impact India?

- **Strategic Security:** Enables **quantum-proof encryption** for defence, digital governance, and fintech.
- **Technological Leadership:** Positions India among the **top five nations** in quantum research.
- **Data Sovereignty:** Reduces dependence on **imported cryptographic chips**.
- **Economic Potential:** Opens up a **\$3 billion global QRNG market** (Allied Market Research, 2025).

- *QRNG (Quantum Random Number Generator) creates truly random numbers by harnessing the fundamental unpredictability of quantum phenomena, unlike pseudo-random number generators (PRNGs).*

### WHO Issues Alert on Contaminated Cough Syrups

- The **World Health Organisation (WHO)** has issued a medical alert following the deaths of children in Madhya Pradesh, allegedly linked to the consumption of **contaminated cough syrups**.

### Key Highlights

- The alert follows the **Central Drugs Standard Control Organisation (CDSCO)** report **confirming** the presence of **diethylene glycol (DEG)** in three syrups.
- This is the **fifth WHO alert on India-made syrups** since 2022, after similar incidents in Gambia and other low- and middle-income countries (LMICs).
- Through the **South-East Asia Regulatory Network**, WHO is working with the **Indian Pharmacopoeia Commission (IPC)** to strengthen **testing capacity for DEG and ethylene glycol (EG) contamination**.

### DEG Contamination

- **Source:** Contamination occurs through **polyethylene glycol**; a solvent used in syrups.

- **Grades of Material:** Industrial-grade polyethene glycol, used in **antifreeze and lubricants**, has higher DEG content than pharmaceutical-grade material.
- **Cause:** Failure to differentiate between these grades during manufacturing leads to **toxic contamination**.

#### Central Drugs Standard Control Organisation (CDSCO)

- It is the **National Regulatory Authority** responsible for regulating and controlling pharmaceuticals, **medical devices**, and cosmetics.
- It was established under the **Drugs and Cosmetics Act of 1940**, with headquarters in New Delhi.
- **Nodal Ministry:** Directorate General of Health Services, **Ministry of Health and Family Welfare**.
- **Headed By:** Drugs Controller General of India (DCGI).

#### Xenobiology

- **Xenobiology** is a branch of science that **studies and creates artificial life forms using biological systems** different from those found on Earth.
- A main area of its research focuses on making **synthetic nucleic acids (XNAs)** that can **store genetic information** instead of DNA and RNA.
- Scientists also **create new biological systems** that are chemically different and **cannot exchange genetic information** with naturally existing organisms.
- **Potential Uses:** It enables scientists to program microbes to **make medicines** while ensuring **biological safety**, as these microbes cannot live outside controlled conditions.

#### Google's AI Model Finds New Approach for Cancer Treatment

- Google unveiled an **AI model** that identified a **new drug combination** to boost the body's immune response against **cancer**.
- This is one of the rare cases where **AI has contributed directly to scientific drug discovery**.

#### Key Highlights

- The discovery was made using **Cell2Sentence-Scale 27B (C2S-Scale 27B)**, a **27-billion-parameter AI model** from Google's open-source *Gemma* family.
- **Objective:** The model was trained to find a drug that could **strengthen immune signals** when **interferon levels** (the body's first defence proteins) are low, conditions where tumours evade immune detection.
- **Discovery:** Out of 4,000 simulated drug candidates, the model identified **silmitasertib**, which enhances **antigen presentation**, making tumour cells **more visible** to the immune system.
- **Novelty:** Silmitasertib's effect on **CK2 protein** inhibition to **trigger an immune response** was **previously unknown**, demonstrating AI's capacity to generate new scientific hypotheses.

### India Sends Prussian Blue Capsules to Indonesia

- India sent **Prussian Blue capsules** to **Indonesia** to reduce health risks from **Caesium-137** contamination, following an official request from Indonesia's Ministry of Health.

*Prussian Blue is an oral prescription drug used to treat internal contamination by radioactive and non-radioactive caesium and thallium.*

- India's quick supply of medications highlights its role as a **regional first responder** for **humanitarian and health emergencies**.

### Cesium-137 (Cs-137)

- Cs-137** is a **radioactive isotope of caesium** that does not occur naturally but is instead a **byproduct of nuclear fission** in reactors.
- It has a **half-life** of about 30 years, so it takes roughly three decades for its radioactivity to halve.
- It emits **beta and gamma radiation**, exposure to which can cause **severe burns** and radiation sickness, while **ingestion** leads to serious illness and raises the **risk of cancer**.

*Caesium (Cs) is a highly reactive, soft, silvery-gold alkali metal with atomic number 55. It has only one stable naturally occurring isotope, Caesium-133, which is used in atomic clocks.*

### FSSAI Bans Misuse of 'ORS' Label

- The **Food Safety and Standards Authority of India (FSSAI)** directed that no product can use the '**Oral Rehydration Salts (ORS)**' tag unless approved by the **World Health Organisation (WHO)**.
- Violations will be considered **misbranding and misleading advertisements** and will be punishable under the Food Safety and Standards Act, 2006.
- Rationale:** Many beverage companies market sugary drinks with the ORS label; the regulation aims to **prevent consumer deception and associated health risks**.

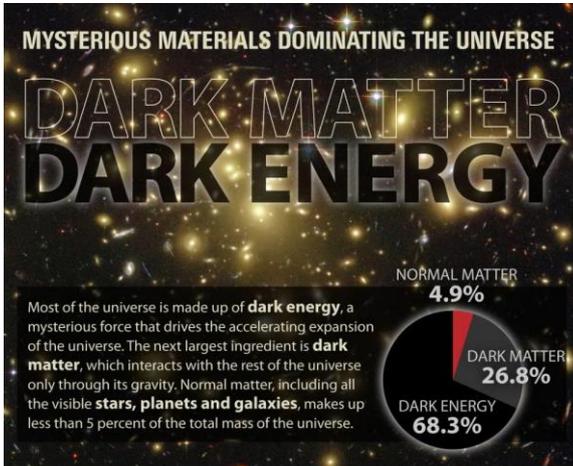
*FSSAI is a statutory body established by the Food Safety and Standards Act, 2006. under the Ministry of Health and Family Welfare. It is the country's apex food regulator.*

### ORS

- Oral Rehydration Salts (ORS) are a scientifically formulated **electrolyte-glucose solution** used to treat **dehydration** caused by **diarrhoea, vomiting, or heat stress**.
- It is a highly effective treatment for **childhood diarrhoea** but should only be used under a prescription.
- The WHO offers a standard ORS formulation that includes **sodium chloride, glucose, potassium chloride, and trisodium citrate** in specific ratios.
- Mechanism:** It works through **glucose-sodium co-transport** in the intestines, where glucose helps absorb electrolytes and water, effectively restoring hydration.

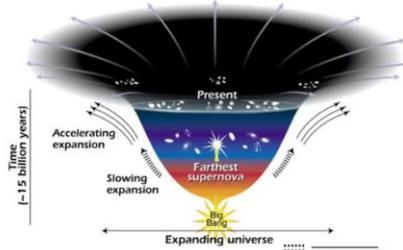
### Evidence for Dark Matter

- Scientists are examining a **diffuse glow of gamma-rays** near the center of the Milky Way, which



**WHAT IS THE EVIDENCE FOR DARK ENERGY?**

Astronomers note that the universe has expanded at different rates throughout history. For the first half of the universe's life, following the Big Bang and inflationary era, the expansion slowed down. Then, after about 7 billion years ago, the expansion began accelerating.



**WHAT IS DARK ENERGY?**

Dark energy can be thought of as "quintessence," or a fifth fundamental force following the known forces: gravity, electromagnetism, and the strong and weak nuclear forces. Possibilities include:

- 1. SCALAR FIELD:** A scalar is a value that varies, or scales, in magnitude but it does not have a direction. Examples of scalars are mass and volume.
- 2. CHAMELEON PARTICLES:** These hypothetical particles vary in mass according to the surrounding density of energy. On Earth, the particle would not be detectable. In the emptiness of intergalactic space, the particle would gain mass.

**WHAT IS THE EVIDENCE FOR DARK MATTER?**

Astronomers can see light bent from the gravity of invisible objects (a phenomenon called gravitational lensing). They can also measure stars orbiting around their galaxies faster than they should be.

This can all be accounted for if there is a large amount of invisible matter tied up in each galaxy, contributing to its overall mass and rotation rate.



**WHAT IS DARK MATTER?**

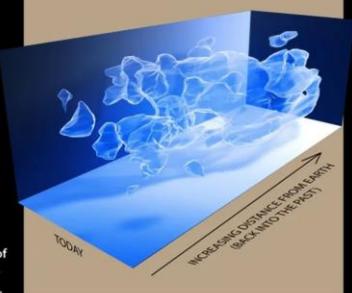
Astronomers know more about what dark matter isn't than what it is.

- 1. DARK MATTER IS DARK**  
It emits no light and cannot be seen directly, so it cannot be stars or planets.
- 2. DARK MATTER IS NOT CLOUDS OF NORMAL MATTER**  
Normal matter particles are called baryons. If dark matter were composed of baryons, it would be detectable through reflected light.
- 3. DARK MATTER IS NOT ANTIMATTER**  
Antimatter annihilates matter on contact, producing gamma rays. Astronomers do not detect enough of them to account for dark matter.
- 4. DARK MATTER IS NOT BLACK HOLES**  
Black holes are gravity lenses that bend light. Dark matter composed of black holes would create more lensing events than astronomers detect.

**DISTRIBUTION OF DARK MATTER IN 3D SPACE**

It is believed that dark matter condensed first to form a "scaffolding," with normal matter in the form of galaxies and clusters following the dark matter concentrations.

Moving **right to left** on this 3D map (from past to present), the dark matter grows clumpier as it collapses under the pull of gravity.



could potentially confirm the existence of dark matter.

- One hypothesis is that **dark matter particles collide and annihilate** near the galactic core, producing these gamma rays.
- The **Cherenkov Telescope Array Observatory**, the **world's most powerful** ground-based gamma-ray telescope under construction in **Chile**, can test the theory.

**Dark Matter**

- Dark matter is an **invisible, hypothetical form of matter** forming **~85%** of all matter and **~27%** of the universe's total mass-energy.
- It neither absorbs nor emits **electromagnetic radiation**, including **visible light**, making it undetectable with standard telescopes.
- Scientists infer its existence from **gravitational effects** unexplained by visible matter, like the high rotational speeds of galaxies, gravitational lensing, and cosmic structure formation.

*Gravitational lensing is the phenomenon where the intense gravity of a massive object, like a galaxy cluster, bends and magnifies the light from distant objects; Albert Einstein's theory of general relativity predicted it.*

**First Local Transmission of Mpx Strain in the US**

- The U.S. has confirmed the **first suspected local transmission** of the Clade I mpx strain, with no identified travel links.
- Clade I is **more severe** than the clade that predominated in the 2022 outbreak (clade II). Estimates place clade I mortality between **~1% and 10%**, versus under **1-4% for clade II**.

**Mpx Disease**

- Mpox is a **zoonotic viral disease** caused by the **Monkeypox virus (MPXV)**, an Orthopoxvirus closely related to smallpox.
- **Symptoms:** Fever, chills, body aches and painful skin lesions (face, hands, genital areas). Severe disease is more likely in children and immuno-compromised persons.
- **Treatment:** There is **no specific cure**, but antivirals such as **Tecovirimat and Brincidofovir** are used under emergency protocols for severe cases.
- **Vaccine:** The **Jynneos vaccine** (Bavarian Nordic) proved effective during the 2022 outbreak and remains the primary preventive tool for high-risk contacts and certain occupational groups.
- **India reported 10 confirmed Clade 1b Mpox cases** between December 2024 and March 2025, all linked to travel from the Gulf region, while there has been no domestic community transmission yet.

# MONKEY POX

**Mpox**



Mpox, formerly known as monkeypox, is a viral infection that can spread between people, mainly through close contact, and occasionally from the environment to people through things and surfaces touched by a person with mpox.

20 YEARS  
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**Transmission**

Direct physical contact with the infected person: Mpox primarily spreads through close skin-to-skin contact, including touching, talking, kissing, or sexual activity with an infected person.

Contact with contaminated items: Mpox can also spread by touching materials like clothing, bedding, or other surfaces that have been used by someone with the virus, especially if you have cuts or don't wash your hands before touching your face.

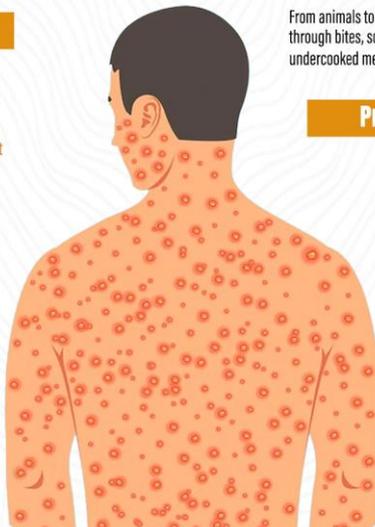
From animals to humans: Mpox can spread from infected animals through bites, scratches, contact with fluids/lesions, or consuming undercooked meat.

**Signs & Symptoms**

Mpox causes signs and symptoms that usually begin within a week but can start 1-21 days after exposure.

High Fever, Headache, muscle aches, back pain, low energy, Swollen glands (lymph nodes), Distinctive rashes on any part of the body that are usually painful, itchy, and with pustules

*\* Symptoms typically last 2-4 weeks but may last longer in someone with a weakened immune system.*



**Preventive Measure**

- Avoid close physical contact with a person having signs and symptoms
- Avoid contact with possible contaminated materials/animals
- Practice good hygiene by washing your hands regularly with soap and water
- Maintain good ventilation
- Cover your mouth when coughing or sneezing
- Sanitize your surroundings
- Boost your immune system
- Practice a healthy lifestyle



**Treatment & Management**

The goal of treating mpox is to take care of the rash, manage pain, and prevent complications. Early and supportive care, like maintaining hydration, taking pain relievers, and reducing fever, is important to help manage symptoms and avoid further problems.

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### Rising Antibiotic Resistance

- The **WHO Global Antibiotic Resistance Surveillance Report (2025)** warns that **1 in 6 bacterial infections** globally (2023) were resistant to antibiotics.

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**WHAT IS ANTIMICROBIAL RESISTANCE (AMR)?**

AMR DEVELOPS WHEN MICROBES CHANGE OVER TIME AND BECOME RESISTANT TO MEDICINES, MAKING INFECTIONS DIFFICULT TO TREAT AND RAISING THE RISK OF DISEASE SPREAD AND SEVERITY.

**MORTALITY AND MORBIDITY**  
A recent study showed that AMR is a leading cause of infectious death globally and kills many more people than HIV/AIDS and malaria. Prolonged illness due to AMR results in longer hospital stays and greater financial burden for those impacted. Without effective antimicrobials, the tools of modern medicine for treating infections or preventing them are jeopardized.

**OVERUSE OF ANTIMICROBIALS**  
The misuse and overuse of antimicrobials (primarily antibiotics) are among the leading causes of the emergence of drug-resistant pathogens. Many people do not know that antibiotics only work against bacterial illnesses and are ineffective against viral infections. Others are unaware that treatment courses with antibiotics should be completed, even after feeling better.

**ANTIBIOTIC USE IN LIVESTOCK**  
Over three-quarters of the world's antibiotics are used in food animals to speed up their growth. As a result, new strains of drug-resistant bacteria can spill over from animals to humans and make infections untreatable. Similarly, resistant strains developed in humans can also affect animals.

**NEW ANTIBIOTIC DEVELOPMENT**  
Although scientists are racing to find new antibiotics to replace old ones that no longer work, the process can take decades and cost billions of dollars. Because antibiotics are used relatively infrequently, pharmaceutical companies in this space find it difficult to survive. The future of new antibiotic development involves public-private partnerships where governments finance the development of new antibiotics but with the understanding that they will not be marketed inappropriately.

**ONE HEALTH APPROACH**  
Many of the same microbes infect animals and humans, as they share the same ecosystem. Efforts by just one sector (human, environmental, or animal health) cannot prevent or eliminate AMR. To contain drug-resistant microbes, a multisector approach is required. 'One Health' is an approach that recognizes that humans, animals, and the environment are closely linked and that by working collaboratively across these sectors, we can achieve better public health outcomes.

- Between 2018–2023, antibiotic resistance rose in >40% of pathogen-antibiotic combinations, with an annual increase of 5–15%, signalling an accelerating global health emergency.

**Antimicrobial Resistance (AMR)**

- Antimicrobials include antibiotics, antivirals, antifungals & anti-parasitic medication.
- The WHO defines antimicrobial resistance as a microorganism's resistance to an antimicrobial drug that was once able to treat an infection by that microorganism.
- E.g., In **Multi-Drug-Resistant TB (MDR-TB)**, the TB bacteria are resistant to two of the most important TB drugs, **isoniazid (INH)** and **rifampicin (RMP)**.

**Key Findings from the WHO Report**

- Scale of Resistance:** 16% of lab-confirmed infections were antibiotic-resistant in 2023. Resistance is highest in **South-East Asia & Eastern Mediterranean Regions** — 1 in 3 infections are resistant.
- Most Affected Pathogens:** *E. coli*, *K. pneumoniae*, *Acinetobacter spp.*, *Salmonella spp.*, *Shigella spp.*, *Staphylococcus aureus*, *Streptococcus pneumoniae*, *N. gonorrhoeae*. (8 Major Bacteria)
- Drug-Resistance Pattern:** >40% of *E. coli* and >55% of *K. pneumoniae* are resistant to 3rd-generation cephalosporins (mainline antibiotics).
- Poor Diagnostics:** 48% of countries didn't report data to **GLASS** (Global AMR Surveillance

System).

**Time Rondeau Crystal (TRC)**

- Scientists have discovered a new phase of matter known as a **time rondeau crystal (TRC)**, where order and disorder coexist in time.

### Phases of Matter

It is a **specific form** that a substance can take, based on **how its particles (atoms and molecules) are arranged and move**.

The most common phases are **solid, liquid, and gas**. Other phases include plasma, Bose–Einstein condensates, and now, **time crystals** and TRC.

### Time Rondeau Crystal (TRC)

- A TRC is a type of **time crystal** where atoms move in a **repeating pattern in time**, but also shows irregular, **random variations** between these repetitions.
  - A time crystal is a state of matter with a repeating pattern in time, **without randomness**.
- **Discovery:** TRC was created using diamond-based quantum systems under controlled conditions.
- **Significance:** TRC challenges the idea that **temporal order** exists only in strictly **periodic systems**, expanding the concept of 'order' in physics and advancing **quantum computation**.

### Rotavirus Vaccine Effectiveness

- A study on the effectiveness of the indigenous rotavirus vaccine, Rotavac, in **India found significant reductions** in rotavirus-based gastroenteritis nationwide.

### Key Findings

- **Effectiveness:** Rotavac showed **54% effectiveness** against severe rotavirus gastroenteritis under routine immunisation conditions.
- **Hospitalisation:** Hospital admissions for severe rotavirus infections among **children under five declined** significantly following vaccine introduction.
- **Infection Rate:** The number of hospitalised children testing positive for rotavirus fell from **40%** before vaccination to **20%** after rollout,

### Rotavirus

- Rotavirus is a contagious **double-stranded** RNA virus that mainly spreads through the **fecal-oral route**.
- **Global Burden:** It is the leading cause of **severe childhood diarrhoea** worldwide, with India accounting for nearly **one-fifth** of global rotavirus-attributed deaths.
- **Available Vaccines:** Two main vaccines exist—**Rotarix**, a **monovalent vaccine** (protecting against one strain) and **RotaTeq**, a **pentavalent vaccine** (protecting against five strains).

### Rotava

- **Rotavac** is an indigenously developed **oral rotavirus vaccine** launched in 2012 and introduced into India's **Universal Immunisation Programme (UIP)** in 2016.
- Three doses of the vaccine are given at **6, 10, and 14 weeks of age**.
- It was developed through a **public-private collaboration** among the **Department of Biotechnology, Bharat Biotech**, and international partners.
- **Significance:** It is India's **first indigenous rotavirus vaccine**, marking a major milestone toward **self-reliance** (Atmanirbhar Bharat).

*Rotavirus-based gastroenteritis is an inflammation of the stomach and intestines caused by rotavirus infection, leading to severe **diarrhoea**, vomiting, fever, and dehydration in children.*

# Rotavirus

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## ROTAVIRUS

Rotavirus is a virus that affects the stomach and intestines. It is most common in infants and young children, however, older children and adults can also get sick from rotavirus.



Since rotavirus can cause severe vomiting and diarrhea, it can lead to dehydration (loss of bodily fluids). Severe dehydration may require hospitalization.

## TRANSMISSION

Rotavirus spreads easily among infants and young children. Kids can get infected when they put their fingers in their mouths after touching a contaminated surface (like a toy) or eating contaminated food.



20 YEARS  
483 OFFICERS



## SIGNS AND SYMPTOMS

The most common symptoms of rotavirus are:

- Severe watery diarrhea,
- Vomiting,
- Fever, and
- Belly cramps.



Additional symptoms may include loss of appetite and dehydration, which can be especially dangerous for babies and young children.

## PREVENTION

Good hygiene (like handwashing) and cleaning shared toys are important, but are not enough to control the spread of disease.

Rotavirus vaccination is the best way to protect your children, family, and community from rotavirus disease.



The rotavirus vaccine is a liquid given by mouth to babies. Depending on the vaccine brand, one dose is given at:

- 2 and 4 months, or
- 2, 4, and 6 months.

### Kala Aazar and its status in India

- India is about to eliminate Kala-azar as a public health problem, with cases under one in 10,000 for two consecutive years (WHO parameters for elimination certification).
- Also known as visceral leishmaniasis. It is caused by the protozoan parasite *Leishmania*

*donovani*.

- It is the **second deadliest** parasitic disease **after malaria** in **India**.
- **Transmission:** Through the bite of an infected **female sandfly**, primarily *Phlebotomus argentipes*.
- **Affected Population:** Often linked to malnutrition, poor hygiene and weak immune systems.
- **Symptoms:** Irregular bouts of **fever**, significant **weight loss**, swelling of the spleen and liver, and

severe anaemia. If untreated, it can be **fatal within two years**.

- **Treatment:** WHO advises combining two or more drugs to reduce the risk of treatment failure.

## WHAT IS KALA-AZAR

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<ul style="list-style-type: none"> <li>▪ A slow progressing indigenous disease</li> </ul>	<p><b>Signs &amp; Symptoms</b></p> <ul style="list-style-type: none"> <li>➔ Recurrent fever</li> </ul>
<ul style="list-style-type: none"> <li>▪ Caused by protozoan parasite of genus <i>Leishmania</i></li> </ul>	<ul style="list-style-type: none"> <li>➔ Loss of appetite</li> </ul>
<ul style="list-style-type: none"> <li>▪ In India, <i>Leishmania donovani</i> is the only parasite causing the disease</li> </ul>	<ul style="list-style-type: none"> <li>➔ Weakness</li> </ul>
<ul style="list-style-type: none"> <li>▪ The parasite primarily infects reticuloendothelial system</li> </ul>	<ul style="list-style-type: none"> <li>➔ Spleen enlargement</li> </ul>
<b>Transmission</b>	
<ul style="list-style-type: none"> <li>▪ Sandfly of genus <i>Phlebotomus argentipes</i> only known vector of kala-azar in India</li> </ul>	
 <ul style="list-style-type: none"> <li>▪ Indian kala-azar has a unique epidemiological feature of being anthroponotic</li> </ul>	<ul style="list-style-type: none"> <li>▪ Female sandflies pick up parasite while feeding on infected human host</li> </ul>
<ul style="list-style-type: none"> <li>▪ Development and multiplication in the gut of sandflies and move to mouthparts</li> </ul>	
<ul style="list-style-type: none"> <li>▪ Parasite undergoes morphological change to become flagellate</li> </ul>	<ul style="list-style-type: none"> <li>▪ Healthy human hosts get infection when an infective sandfly vector bites them</li> </ul>

Historically, **Bihar, Jharkhand, West Bengal**, and parts of **Uttar Pradesh** have seen the **highest number of Kala-azar cases**, with Bihar alone accounting for over 70% of India's cases.

### Global Initiatives

- The WHO's **New Roadmap for 2021-2030** aims to **prevent, control, eliminate, and eradicate 20 neglected tropical diseases (NTDs)**, including Kala-azar, **by 2030**.
- **WHO Global Programme to Eliminate Lymphatic Filariasis (GPELF)**, which targets the elimination of **lymphatic filariasis, onchocerciasis, and Kala-azar** through the **Mass Drug Administration (MDA)**.

### India's Initiatives

- The Indian government aimed to **eliminate Kala-azar by 2023** by building pucca houses through the PM-AWAS Yojana, rural electrification, testing, treatment, and regular high-level reviews.

- The **National Kala-azar Elimination Programme** was initially set under the **National Health Policy-2002**, targeting elimination by **2010**, which is now revised to **2023**.
- India signed a Tripartite **Memorandum of Understanding (MoU)** with **Bangladesh** and **Nepal** to eliminate kala-azar from the Southeast Asia Region (SEAR).
- Programmatic activities for kala-azar elimination are currently carried out under the **National Vector Borne Disease Control Programme (NVBDCP)**, which is part of the National Health Mission (NHM).

### Gliese 229B

- **Gliese** consists of two brown dwarfs, now designated **Gliese 229Ba** and **Gliese 229Bb**.
- These two objects orbit each other closely, separated by 16 times the distance between the Earth and the moon, completing an orbit every 12 days.
- They circle a small dwarf star located **19 light-years** from our solar system in the constellation **Lepus**.

### Brown Dwarfs

- Brown dwarfs are sub-stellar objects that have **masses between** those of **stars and planets**, generally between 10 and 90 times the mass of Jupiter.
- They **form the same way as stars**, from collapsing clouds of gas and dust, but they **don't have** enough **mass** to start **nuclear fusion**, which powers real stars. Hence, can be considered **wannabe/failed stars**.
- They are formally defined as objects that can burn a heavy form of hydrogen, called **deuterium**, but **not** the most **common basic form of hydrogen**.
- Because of their **low temperatures** and small sizes, brown dwarfs have extremely **low luminosities**.

### Trojan asteroids

Discovery of a **Trojan asteroid (2019 UO14)** for Saturn establishes the presence of celestial bodies alongside all **giant planets (Jupiter, Neptune & Uranus)**.

- They occupy a stable Lagrange Point (**Usually L4 and L5**) in a planet's orbit around the sun.
- **Lagrange Point** is a position in space where objects stay in a relatively stable position without drifting away.
- **Significance:** As they remain gravitationally stable for long period of time, studying them can provide useful insights into the evolution of the solar system.
- **Mission Lucy (launched in 2021):** The first mission to explore the Jupiter Trojan asteroids.

**OSIRIS-REX**  
ASTEROID SAMPLE RETURN MISSION

EARTH-TROJAN ASTEROID SEARCH

# What is a Trojan Asteroid?

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The diagram illustrates the Earth-Trojan Asteroid Search mission. It shows the Sun (yellow circle) at the top left, Earth (blue and white globe) at the bottom center, and the OSIRIS-Rex spacecraft (green and white) orbiting Earth. A green line represents the orbit of the Earth-Trojan asteroid, which is shown as a dashed orange line. The angle between the Sun-Earth line and the Earth-Trojan asteroid orbit is marked as 60°. The OSIRIS-Rex spacecraft is shown approaching the asteroid. The text 'NOT TO SCALE' is written at the bottom right of the diagram.

Trojans asteroids are travel companions of planets as they orbit the sun, remaining near a stable point 60° in front of or behind the planet. Only one Earth-Trojan asteroid has been discovered (2010 TK<sub>7</sub>), but scientists believe there could be more.

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## UV Photodetectors

Memorandum of understanding (MoU) signed with IIT-Delhi for the development of diamond-based deep ultraviolet (UV) photodetectors for the first time in India.

- It's an **optoelectronic device** that **converts light or other electromagnetic radiation** into an **electrical signal**.
- It generates a **small current or voltage**, which can be measured.

## Diamond-based UV Photodetector

- Specifically **detects deep UV light** due to **diamond's high UV photon sensitivity**.
- Durable in **harsh conditions** (resistant to radiation and heat damage).
- Exhibit **high efficiency at room and higher temperatures**
- **Applications:** UV imaging, secure communications, biological and military detection, etc.

## Gaucher Disease

- Petition seeking sustainable treatment support for **Gaucher disease** was submitted
- It is an **inherited lysosomal storage disorder (LSD)** that leads to the **accumulation of fatty**

substances, known as **sphingolipids**, in organs like the **bone marrow, liver, and spleen**.

- It can cause the **weakening of bones** and **enlargement** of the **affected organs**. Common symptoms include an enlarged spleen and liver, **eye movement disorders**, and **yellow eye spots**.

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**Gaucher's Disease**

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**GAUCHER DISEASE**

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Gaucher's disease is a rare genetic disorder. Gaucher's disease is a condition in which glucocerebroside is formed in the bones, lungs, liver, and spleen.

### Vitiligo

- A recent Kannada film draws attention to **vitiligo**.
- **Vitiligo** is a long-term **skin disorder** that results in the loss of pigment in patches, causing white areas to appear on the skin. It is **not contagious**. Affects between 0.5 - 2% of the global population.
- **Cause:** It arises due to the **malfunction** or **destruction** of **melanocytes**, the cells responsible for producing **melanin**, the **pigment** that gives **skin** its **colour**.
- It could result from **autoimmune responses**, **genetic predispositions**, and **environmental factors** (UV radiation, chemical exposure, etc). It results in **depigmented patches** that may occur anywhere on the body, including the **skin, hair**, and even the **lining of the mouth**.

Does **not** have a **permanent cure**. Treatments aim to manage symptoms and restore skin pigmentation.

## Egypt Declared Malaria-Free

- WHO declared **Egypt malaria-free**. After **Cabo Verde**, it was the **second** country to achieve this status in **2024** and the **fifth African nation** to achieve this recognition.
- The total number of countries and territories certified **malaria-free** by WHO now stands at **44**.
- **Malaria** has plagued Egypt since 4000 BCE, particularly in **Nile river** communities. Efforts to combat malaria began in the 1920s, including banning **rice cultivation** near homes to reduce mosquito breeding.

**Malaria** is a disease caused by *Plasmodium* parasites and is typically transmitted to humans through the bite of an infected *Anopheles* mosquito.

**Potential symptoms of malaria**

UNCOMPLICATED	SEVERE
• Fever (most common)	• Decreased level of consciousness
• Muscle and joint pain	• Difficulty breathing
• Nausea and diarrhea	• Severe anemia
• Abdominal pain	• Organ failure
• Headache	• Seizures
• Coughing	

Infected liver cells release parasites into the blood, causing disease and symptom progression.

Infected blood cells

Young children, pregnant persons, older travelers to malaria-endemic areas, and immunosuppressed people are at high risk of developing severe malaria. Early diagnosis and treatment can help prevent rapid disease progression.

- Malaria cases surged during **World War II** due to population displacement and supply disruptions.
- The construction of the **Aswan Dam** in **1969** created **new malaria risks** due to **stagnant water**. **Egypt** and **Sudan** launched a **joint project** in **1970** to mitigate these risks through strict vector control and public health monitoring.
- **WHO Certification Process**
  - WHO declares a nation malaria-free upon proof that native malaria transmission has been broken for at least three years. In June 2024, WHO confirmed no local transmission of malaria in Egypt, with all cases being imported from endemic countries.

### Egypt's Geography

- **Location and Borders:** Egypt is located in the **northeastern corner of Africa** and extends into southwest Asia via the **Sinai Peninsula**. It shares borders with **Libya** to the west, **Sudan** to the south, and **Israel** and the **Gaza Strip** to the northeast. It also has coastlines along the **Mediterranean Sea** to the north and the **Red Sea** to the east.

- The **Nile River**, the **longest river** in the world, flows through **Egypt** from south to north.
- **Tourism:** Pyramids of Giza, Luxor's Temples and Tombs, Aswan High Dam, Red Sea Coast, Siwa Oasis.

#### Aswan Dam

- One of the world's largest embankment dams. It was officially **inaugurated** in **1971**.
- **Purpose and Benefits:** The dam was built to control the **Nile River's annual flooding**, store water for irrigation, and generate hydroelectric power.
- It created **Lake Nasser**, one of the world's largest artificial lakes, extending into **Sudan**.

### Chandrayaan-2 lunar orbiter has made first-ever observation of effects of Sun's Coronal Mass Ejection (CME) on Moon

The observation was made using the Chandra's Atmospheric Composition Explorer-2 (CHACE-2) instrument onboard the orbiter.

#### CHACE-2

- It is a **neutral gas mass spectrometer** to study the composition of the **lunar neutral exosphere** in the mass range 1–300 AMU (atomic mass unit).

#### Coronal mass ejections (CMEs)

- CMEs are **large expulsions of plasma and magnetic fields** from the Sun's corona (the outermost part of the Sun's atmosphere).
- **Causes:** This is often associated with **solar flares** and **active sunspot regions** where magnetic fields are strong and twisted.
- **Frequency:** CMEs occur more frequently during the **solar maximum** phase of the **11-year solar cycle**. During solar minima, they are relatively rare.
- **Possible Impacts of CME on Earth:** Damaging satellite electronics and GPS communication, Power grid failure, Communication Disruptions e.g. radio signal disruption, aurora formation, radiation hazard to astronauts etc.

#### Key findings of CHACE-2

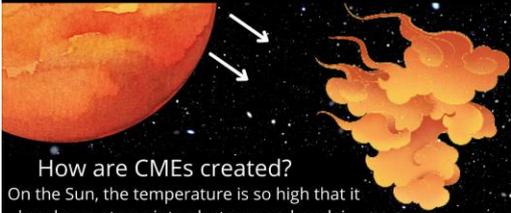
- When the Coronal Mass Ejection (CME) struck the Moon, it intensified the ejection of atoms from the lunar surface.
  - This led to a noticeable rise in number of neutral atoms per unit volume in the **dayside lunar exosphere**.
    - Lunar exosphere is **extremely thin atmosphere** around the Moon, so tenuous that its gas particles rarely collide.

#### Chandrayaan 2

- **Genesis:** It was launched by Geosynchronous Satellite Launch Vehicle, **GSLV MkIII-M1** in **2019**.
- **About:** It comprised an **Orbiter, Lander and Rover** to explore the unexplored South Pole of the Moon.
  - It was India's first attempt at a **soft landing on the Moon**.
- **Objectives :** To expand the **lunar scientific knowledge** through detailed study of

topography, seismography, mineral identification and distribution, composition of the tenuous lunar atmosphere etc.

## CORONAL MASS EJECTIONS



**How are CMEs created?**  
On the Sun, the temperature is so high that it breaks up atoms into electrons and nuclei, that flows around each other in a plasma.

↓

The electrically charged electrons and nuclei create a magnetic field as they move, and this shapes the flow of particles.

↓

The plasma flows around itself and the magnetic field gets twisted.

↓

Big loops of energy and plasma, hundreds of times the size of Earth, come out of the Sun.

↓

The loop then connects with itself, and an enormous amount of energy and plasma is released into space.

**What are CMEs?**  
Coronal mass ejections, or CMEs for short, are explosions on the Sun that hurl clouds of plasma and magnetic field into space at the speed of 250 to 3000km/s, reaching the Earth after 15 hours to a couple days depending on the size of it.

20 YEARS  
483 OFFICERS

**The Carrington Event**  
In 1859 a series of dark spots began to form on the Sun, or sunspots as we call them. These spots indicate that the magnetic field is about to emerge through the Sun's surface, which leads to the cooling and darkening of areas on the Sun.

↓

A couple days later a massive CME hits the Earth. We soon get reports of strong auroral displays on a global scale. In Carrington's time, the telegraph systems began to spark and catch fire due to the electrical interference.

**Carrington Event Today**  
CMEs, composed primarily of electrons, travel at the same wavelength as the electrons that go through ground-based technology, which is why these technologies are affected. Some of the biggest impacts would include:

- Communication would be lost, meaning global interaction and assistance would be difficult.
- Hospitals would have to do everything manually: medication, ventilation and measuring blood pressure.
- The economy would lose copious amounts of money, and small businesses would suffer the most.

### Fiji Eliminates Trachoma

- According to the **World Health Organisation (WHO)**, Fiji has become the **26<sup>th</sup> country to eliminate** trachoma as a public health problem.
- **Trachoma** is a **neglected tropical disease (NTD)** and the first such disease to be eliminated in Fiji.
- **Significance:** The achievement advances the **WHO's Roadmap for NTDs 2021-2030** to prevent, control, eliminate, and eradicate 20 diseases and disease groups by **2030**.

### Neglected Tropical Diseases (NTDs)

- NTDs are a diverse group of **communicable diseases** prevalent in **tropical and subtropical regions**, mainly impacting impoverished and marginalised populations.
- WHO currently recognises **21 diseases** as NTDs, affecting **over one billion people worldwide**.

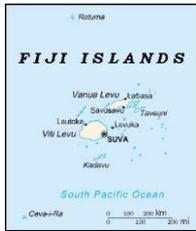
### Trachoma

- Trachoma is a **bacterial eye infection** caused by **Chlamydia trachomatis**, leading to **visual impairment** and **blindness** if untreated.
- **Transmission:** It spreads through **direct contact** with eye or **nasal discharges** of infected persons, and **indirectly** through **contaminated objects** or **eye-seeking flies** carrying the bacteria.
- **Health Burden:** It remains the **world's leading infectious cause of blindness**, mainly

impacting **women** and **preschool children** in areas with **poor sanitation**.

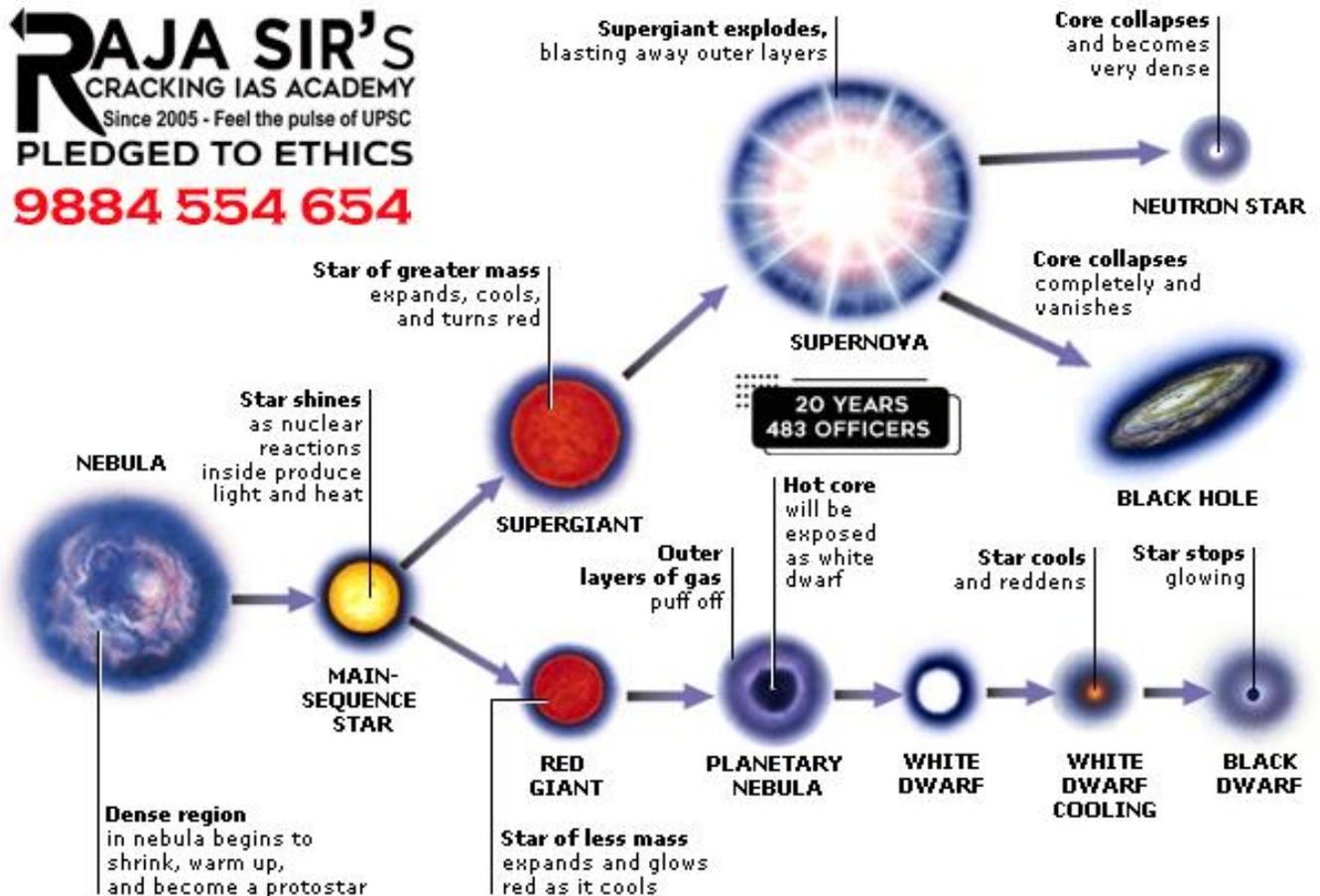
- **Prevention Approach:** The WHO-endorsed **SAFE** strategy (**Surgery, Antibiotics, Facial cleanliness, and Environmental improvement**) forms the basis of trachoma control.

**Fiji**



- The Republic of Fiji is an **island nation** in the **South Pacific Ocean** made up of over **330 islands**, about **one-third** of which are permanently inhabited.
- **Capital:** **Suva**, located on the southeast coast of the largest island, **Viti Levu**.
- **Topography:** Most large islands are **volcanic in origin**, while smaller ones are coral formations; **Mount Tomaniivi (1,324 m)** is the **highest peak**.

**Star Formation**



A study by the **Indian Institute of Astrophysics** shows that **supermassive black holes** and their **relativistic jets** suppress star formation in nearby galaxies.

- **Radiation** and **high-speed jets** eject gas from molecular clouds, preventing new stars from forming and regulating **galactic growth**.
- Stars form in **cold, dense molecular clouds** as gravity condenses gas and dust into **protostars**,

igniting **nuclear fusion**.

**Lifespan depends on mass: low-mass stars** become white dwarfs, while **high-mass stars** explode as supernovae, leaving **neutron stars or black holes**.

### Intelsat 33e Communications Satellite

- **Intelsat 33e**, a Boeing-made **communications satellite**, **disintegrated** in orbit.

It was launched in 2016 as part of the **Intelsat EpicNG series**, which provides advanced broadband and data services across Europe, Africa, the Middle East, and Asia.

## CAENORHABDITIS ELEGANS

**C. elegans**, commonly known as "the worm," is widely used to study brain and cell functions.

It is a small, transparent nematode found in temperate soil, named for its "rod-like" and "elegant" appearance.

### WHY IS IT IMPORTANT IN RESEARCH?

**SIMPLER ANATOMY**  
C. elegans lacks both respiratory and circulatory systems.

**SELF-FERTILISATION**  
Being hermaphrodites, they can produce both eggs and sperm.

**TRANSPARENCY**  
The worm's transparency allows scientists to track cell development under a microscope.

**MANAGEABILITY**  
With only 959 cells, it is an ideal model for studying fundamental biological processes.

**RAPID LIFE CYCLE**  
The worms grow quickly, reaching adulthood in 3-5 days after hatching from eggs.

**GENOME SEQUENCING**  
It was the first animal with a fully sequenced genome.

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### FOUR NOBEL PRIZES BASED ON C. ELEGANS

2002	2006	2008	2024
<b>NOBEL PRIZE IN PHYSIOLOGY OR MEDICINE</b>	<b>NOBEL PRIZE IN PHYSIOLOGY OR MEDICINE</b>	<b>NOBEL PRIZE IN CHEMISTRY</b>	<b>NOBEL PRIZE IN PHYSIOLOGY OR MEDICINE</b>
Research focused on programmed cell self-destruction, which fails in diseases like AIDS.	Acknowledged the discovery of gene silencing, resulting in a new class of drugs.	Honored the invention of cellular "lanterns" with C. elegans, enabling visualization of cellular processes.	To Gary Ruvkun and Victor Ambros for their research on microRNA and gene expression, using C. elegans.

### Caenorhabditis elegans (C. elegans)

- This year's Nobel Prize in Physiology or Medicine is the fourth Nobel Prize resulting from *Caenorhabditis elegans* (C. elegans) research.

### Caenorhabditis elegans (C. elegans)

- C. elegans, commonly known as "the worm," is widely used to study brain and cell functions.
- It is a small, transparent nematode that thrives in temperate soil

environments. Its name is derived from a combination of Greek and Latin words, meaning "rod-

like" and "elegant."

Why is it important in research?

- **Simpler anatomy:** *C. elegans* lacks both **respiratory** and **circulatory systems**.
- **Self-fertilisation:** Being **hermaphrodites**, they are capable of producing **both eggs** and **sperm**.
- **Manageability:** With only 959 cells, it is an ideal model for studying fundamental biological processes.
- **Transparency:** The worm's transparency allows scientists to track cell development under a microscope.
- **Rapid Life Cycle:** The worms grow quickly, reaching **adulthood** in **3-5 days** after hatching from eggs.
- **Genome Sequencing:** It was the **first animal** to have a **fully sequenced genome**.

Four Nobel Prizes based on *C. elegans*

- **2002 Nobel Prize in Physiology or Medicine:** Awarded for research on how healthy cells are programmed to self-destruct, a process that malfunctions in diseases like AIDS.
- **2006 Nobel Prize in Physiology or Medicine:** Recognised the discovery of **gene silencing**, which led to the development of a **new class of drugs**.
- **2008 Nobel Prize in Chemistry:** Honored the invention of **Cellular "lanterns"** using *C. elegans*, which allowed scientists to **visualise** cellular processes.
- **2024 Nobel Prize in Physiology or Medicine** to **Gary Ruvkun** and **Victor Ambros** for their work on microRNA regulating gene expression, aided by *C. elegans*.

### Quantum Echoes and Quantum Advantage

- **Google's Quantum AI team** (2025) developed a **new quantum algorithm** called **Quantum Echoes**, which they ran on their quantum processor "**Willow chip**". It is being hailed that the Willow chip has achieved **verifiable quantum advantage**.
- It is an algorithm that successfully **runs 13,000 times faster** than one of the world's most powerful **supercomputers** and is **verifiable**.
  - **Quantum verifiability** means the result can be **repeated** to get the **same answer**, confirming the result.
- **Technique** works like a highly **advanced echo**, sending a quantum signals forward, perturbing one of the qubits, and then precisely reverse the signal's evolution to listen for the "echo" that comes back.
- **Potential Applications:** Study of molecular structures, drug discovery etc.

### Quantum Advantage

- Quantum advantage is the stage where a **quantum computer performs a computational task faster or more efficiently than any known classical computer**, for a scientifically meaningful problem.
  - It shows the "**practical usefulness**" **milestone** of quantum computing.
- **Classical computers process bits (0 or 1).**

- *Quantum computers use qubits, which can exist in a superposition of states (0 and 1 simultaneously). This allows quantum systems to explore many possibilities at once, giving them massive parallel processing ability.*

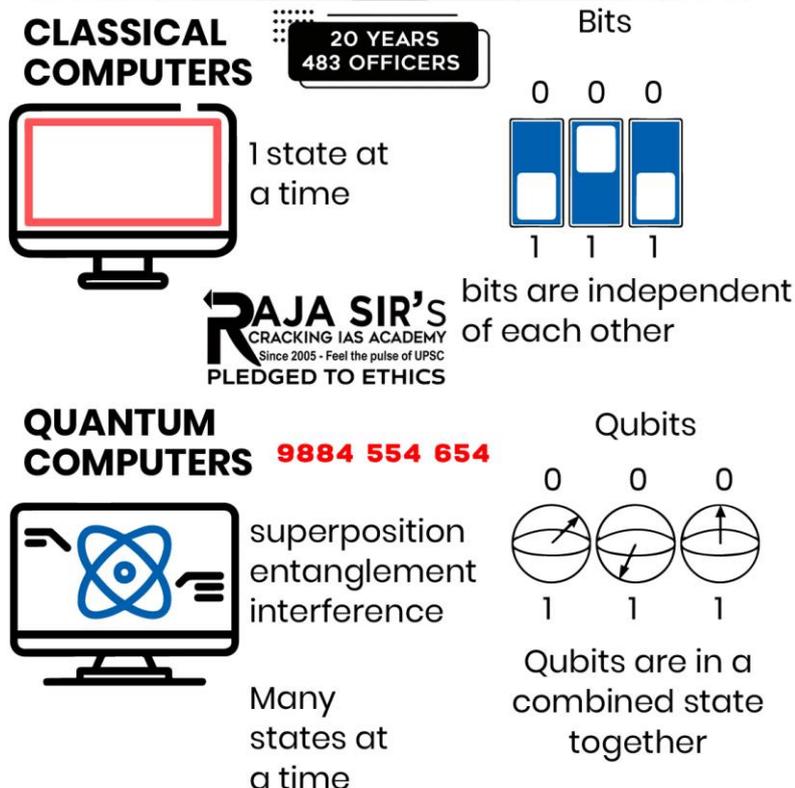
### Verifiable Quantum Advantage

- Verifiable quantum advantage means achieving quantum advantage with results that can be **independently verified or checked**, proving that the quantum computer's **output is correct & not just faster**.

### Why Verifiable Quantum Advantage Matters?

- Quantum computers are **probabilistic**; the same input can give slightly **different outputs** each time. This makes it hard to know whether a result is **correct or just a random quantum fluctuation**.
- This problem is solved by verifiable quantum advantage. When a quantum computer achieves the verifiable quantum advantage stage, scientists can **verify the outcome through theory, smaller experiments, or cross-comparison**, proving that the machine truly understands the problem, not just produces random data.

## CLASSICAL VS. QUANTUM



### Quantum Echoes

- Quantum echoes is an **algorithmic experiment** developed by **Google's Quantum AI team (2025)** that **measures how information or disturbances spread and evolve within a quantum**

**system** by running quantum operations forward and then backwards in time, observing the resulting “echo.”

- It is inspired by a concept in physics called “**Out-of-Time-Order Correlator (OTOC)**”, which tracks how chaos or disturbance evolves in quantum systems (used in quantum thermodynamics, black hole physics, condensed matter, etc.).

### How Quantum Echoes Works?

- The simplified steps to be carried out for this experiment are:
  - **Apply a sequence of operations** (quantum gates), i.e., like sending a pulse into the system.
  - Then **slightly disturb one qubit** (introduce a small change).
  - Now **reverse all earlier operations**, i.e., “rewind” the system to **see if it returns to its original state**.
- If everything were perfectly isolated (no noise, no entanglement), the reversal would yield a perfect “echo” (like shouting into a canyon and hearing our own voice back).
- But in real quantum systems, due to **quantum chaos and entanglement**, the echo decays and **studying how fast the echo decays** tells **how quantum information spreads** in a complex system.

### Chang'e-6 Lunar Samples

- Chinese scientists have discovered **rare meteorite fragments** in the lunar soil sample brought back by the Chang'e-6 mission.

### Chang'e-6 Mission

- Chang'e-6 is a **robotic spacecraft** part of China's lunar exploration program, designed to gather and **return soil samples** from the far side of the Moon.
- In 2024, it became the **first mission to return lunar soil from the Moon's far side**, collected from the South Pole–Aitken (SPA) Basin.

*The **South Pole–Aitken (SPA) Basin**, the **largest, oldest, and deepest** known basin of its kind, is a massive, **ancient impact crater** on the far side of the Moon.*

### Findings in the Lunar Samples

- Small fragments of **CI chondrites** were found in the lunar samples; they were preserved because the Moon **lacks an atmosphere** and **geological activity**.
- CI chondrites are meteorites rich in **water and organic compounds**, originating from the cold, outer regions of the **early solar system**. They act as pristine records of the solar system's chemical composition.
- **Implication:** The findings suggest that the early Earth–Moon system was struck by **more water-bearing** asteroids than believed, shedding light on the shared **origins of water** on both **Earth** and

the Moon.

### Human Immunodeficiency virus (HIV)

Maldives became **first country to halt mother-to-child transmission of HIV, syphilis and hepatitis B.**

- All of them are **Sexually Transmitted Diseases (STDs)**.
- **HIV:** It weakens the immune system by **attacking white blood cells**, and **when severely advanced, it leads to acquired immunodeficiency syndrome (AIDS)**.
- **Syphilis:** It is caused by a type of bacteria called **Treponema pallidum**.
- **Hepatitis B:** It is a viral infection that **attacks the liver and can cause both acute and chronic disease**.

### Decline of Lab-Grown Diamonds

- According to the **World Diamond Council (WDC)**, lab-grown diamonds are becoming less popular due to **oversupply**, and consumer preferences are shifting back to **natural** diamonds.

### World Diamond Council (WDC)

- The WDC is a **not-for-profit trade organization** representing the global diamond industry within the **Kimberley Process (KP)**.
- **Objective:** To uphold the **integrity of the natural diamond supply chain** and maintain consumer trust through accountability and responsible sourcing.
- **Institutional Role:** The WDC offers technical, financial, and other support to the **Kimberley Process Certification Scheme (KPCS)** to ensure that all diamonds come from **legitimate** sources.

### The Kimberley Process

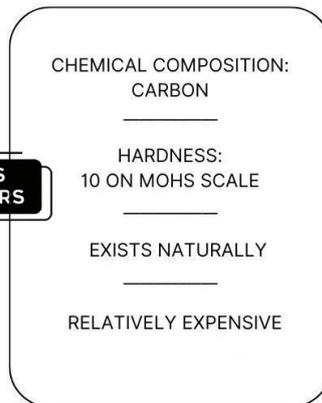
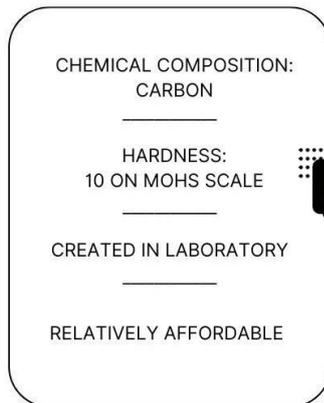
- The Kimberley Process (KP) was established in **2003** as a **tripartite initiative** involving **governments, civil society**, and the **diamond industry** to prevent trade in **conflict diamonds**.
  - Conflict diamonds are rough diamonds **used by rebel groups** or their allies to **fund armed conflicts** against **legitimate governments**.
- **Membership:** The KP currently has **60 participants** (59 countries and the European Union); **India** is a **founding member**.
- The KPCS enforces the broader KP initiative by requiring participating countries to pass **national laws** and **set up institutions** to control the import and export of **rough diamonds**.



Lab-Grown DIAMONDS



Mined DIAMONDS



20 YEARS  
483 OFFICERS

### Lab-Grown Diamonds (LGDs)

- Lab-grown diamonds are **synthetic, man-made diamonds** that are **chemically** and **optically identical** to natural ones but are created in laboratories.
- **Production Methods:** Two primary methods are used – **High-Pressure High-Temperature (HPHT)** and **Chemical Vapour Deposition (CVD)**.

- **HPHT Process:** It

replicates Earth's **natural conditions** for diamond formation and uses a **carbon source** (usually graphite), along with a **diamond seed** under extreme heat and pressure.

- **CVD Process:** It creates diamonds by heating a seed in a **vacuum chamber** with **carbon-rich gases** to produce high-purity crystals.
- **Advantages:** LGDs provide an **ethical, sustainable**, and **affordable** alternative to mined diamonds, attracting environmentally conscious buyers.

### GSAT-7R Communication Satellite-03

The Indian Space Research Organisation (ISRO) is set to launch the CMS-03 (GSAT-7R) communication satellite in November, aboard the Launch Vehicle Mark-3 (LVM-3) from Sriharikota.

- GSAT-7R, also called CMS-03, is a next-generation military communication satellite developed by ISRO to replace the aging GSAT-7A. It ensures robust, encrypted, and long-range communication links for the Indian Navy, Air Force, and Army.

**Developed by:** The Indian Space Research Organisation (ISRO).

**Aim:**

- To provide **reliable, real-time communication** for naval operations, air defence, and strategic command control across a wide oceanic and terrestrial region. It strengthens India's network-centric warfare and maritime domain awareness.

**Key Features:**

- **Multi-Band Communication:** Operates across Ku, Ka, and UHF bands to ensure redundancy and resilience against jamming.

- **Wide Coverage:** Provides secure communication coverage over the **entire Indian Ocean Region**, extending to the Eastern coast of Africa and Southeast Asia.
- **Heaviest Indian Communication Satellite:** Weighing ~4,400 kg, it is the largest ISRO-built satellite launched to Geosynchronous Transfer Orbit (GTO) from Indian soil.
- **Advanced Encryption:** Features anti-jamming, frequency hopping, and encrypted data links for secure military operations.
- **Launch Vehicle:** Deployed via LVM-3, India's most powerful operational launch vehicle, previously used in the Chandrayaan-3 mission (2023).

#### **Significance:**

- Enhances India's strategic and naval communication network across the Indo-Pacific.
- Supports jointness and interoperability among the three-armed forces under theatre commands.
- Strengthens India's maritime security, crucial amid increasing Indo-Pacific tensions and surveillance needs.
- Reinforces India's self-reliance under Aatmanirbhar Bharat in Space Defence Systems.

#### **Communication Satellite-03**

- CMS-03, also called **GSAT-7R**, is a multi-band military communications satellite equipped with advanced encryption and anti-jamming features.
- **Heaviest Satellite:** Weighing **4,400 kg**, it is India's heaviest and most powerful communication satellite launched to a Geosynchronous Transfer Orbit.
- **Maritime Connectivity:** It offers secure, high-speed voice, data, and video communication **up to 2,000 km** from India's coastline.
- **Multi-Band Capability:** Equipped with **UHF, S, C, and Ku band transponders**, it ensures reliable and uninterrupted communication links.
- **Modern Replacement:** CMS-03 replaces the decades-old **GSAT-7 (Rukmini)** satellite with upgraded technology and a broader operational reach.

#### **Launch Vehicle Mark 3 (LVM3)**

- LVM3 is a **wholly indigenous medium-to-heavy** launch vehicle developed by **ISRO**, formerly known as Geosynchronous Satellite Launch Vehicle Mark III (GSLV Mk III).
- **Payload Capacity:** Popularly called "**Bahubali**", it is **India's most powerful launcher**, capable of carrying **4,000 kg** to Geosynchronous Transfer Orbit and **8,000-10,000 kg** to Low Earth Orbit.
- **Engine Design:** LVM3 uses a **three-stage propulsion** system with **solid, liquid, and cryogenic** propellants to maximise efficiency.
- **Missions:** Chandrayaan-2, Chandrayaan-3, OneWeb satellites, and Gaganyaan mission (upcoming).

#### **CRYODIL**

Scientists at the ICAR-National Institute of Animal Nutrition and Physiology (NIANP), Bengaluru, have developed CRYODIL, India's first egg yolk-free semen preservation solution for buffalo breeding, capable of extending semen shelf life to 18 months.

- CRYODIL is a ready-to-use, egg yolk-free semen extender designed to preserve buffalo semen for long durations while maintaining fertility and motility.
- **Developed by:**
  - Developed by scientists at the National Institute of Animal Nutrition and Physiology (NIANP) under the Indian Council of Agricultural Research (ICAR), Bengaluru.
- **Aim:**
  - To provide a safe, efficient, and affordable alternative to traditional egg-yolk-based semen extenders and enhance buffalo breeding efficiency in India.
- **Features:**
  - **Long Shelf Life:** Preserves semen for up to **18 months** without contamination or loss of motility.
  - **Microbe-Free Solution:** Eliminates risk of microbial contamination associated with egg yolks.
  - **Stable Composition:** Uses purified **whey proteins** instead of egg yolk, ensuring consistent semen quality.
  - **Cost-Effective:** Cheaper and easier to produce compared to imported commercial extenders.
  - **Field-Tested Innovation:** Successfully tested on **24 buffalo bulls**, showing higher post-thaw sperm movement and fertility potential.
- **Significance:**
  - **Boosts Buffalo Breeding:** Enhances success rate of artificial insemination, crucial for India's dairy productivity.
  - **Promotes Atmanirbhar Bharat:** Reduces dependence on costly foreign extenders, fostering indigenous innovation.
  - **Improves Dairy Economics:** Increases milk yield potential by improving breeding efficiency.

### Maha MedTech Mission

- India has launched the **Mission for Advancement in High-Impact Areas (MAHA)-Medical Technology** (Maha MedTech Mission), to boost **indigenous medical-technology innovation**.

### Key Highlights of the Mission

- The mission was launched by the **Anusandhan National Research Foundation (ANRF)**, in collaboration with the **Indian Council of Medical Research (ICMR)** and the **Gates Foundation**.
- It provides ₹5-25 crore per project, extendable to ₹50 crore in exceptional cases.
- Open to academic institutions, research organisations, startups, MSMEs, and **MedTech industries**.
- Covers **medical devices, in-vitro diagnostics**, implants, surgical and assistive tools, consumables, and software-based solutions.
- It encourages innovation in advanced diagnostic imaging, minimally invasive technologies, **point-of-care molecular diagnostics**, AI/ML-based systems, and robotics.

- **Enabling ecosystem:** Patent Mitra (IP protection & technology transfer), MedTech Mitra (regulatory guidance), a Clinical Trial Network (clinical validation and evidence generation), and industry mentorship.

### Hanle Dark Sky Reserve

- The Hanle Dark Sky Reserve, **India's first dark sky area**, protects the night sky from light pollution and promotes astronomy and astro-tourism. Located in **Hanle, Ladakh**.
- It holds a **Bortle-1 rating**, denoting the **highest level of sky clarity** with minimal light pollution.
- **Location:** Situated in the **Changthang Wildlife Sanctuary** in **Ladakh**, surrounding the Indian Astronomical Observatory (IAO).
- **Partnership:** Established through an MoU between the Indian Institute of Astrophysics (IIA), the Union Territory of Ladakh, and the Ladakh Hill Development Council (Leh).
- The observatory **hosts advanced instruments** such as the **Himalayan Chandra Telescope**, **GROWTH India Telescope** (with IIT Bombay), and **two Cherenkov telescope arrays** in collaboration with Tata Institute of Fundamental Research (TIFR) and **Bhabha Atomic Research Centre (BARC)**.
- **High altitude (~4,250 m)** and **dry, low-aerosol conditions** make Hanle optimal for observing faint, elusive sky phenomena.
- To preserve sky clarity, the IIA has distributed lamp shades, blackout curtains, and warm-toned bulbs to residents, ensuring minimal artificial lighting.

### Google's 'Willow' quantum processor

- Researchers from Google Quantum AI have demonstrated a **verifiable case of quantum advantage** using Google's 'Willow' quantum processor.
- It marks a major step toward proving that **quantum computers can outperform the most powerful classical supercomputers** in solving complex problems.

### Key Highlights

- The **Willow processor** **successfully** solved complex **optimisation & information-scrambling** problems that would take conventional supercomputers over three years, completing them in just two hours.
- The research demonstrates the superior processing potential of quantum systems while also providing measurable and reproducible results, a key criterion for establishing "**quantum advantage**".
- This achievement builds on Google's earlier work from **2019**, when its **Sycamore processor** claimed a similar feat, though **without verifiable** real-world applications.

### How Quantum Computing Works?

- Quantum computers use **qubits** (quantum bits) **instead** of **binary bits** (0 or 1).
- Due to **quantum superposition**, qubits can exist in **multiple states** simultaneously,

allowing **parallel computation**.

- By manipulating **wave interference**, where correct answers reinforce and incorrect ones cancel out, quantum algorithms can **isolate optimal solutions** far more efficiently than **classical systems**.

### Rashtriya Vigyan Puraskar 2025

- The Government of India has announced the **Rashtriya Vigyan Puraskar (RVP) 2025** for **exceptional scientific achievements**.
- The award, established in **2024**, is India's **highest recognition** for outstanding contributions by **scientists, technologists, and innovators** across various fields of **science and technology**.
- **Award Categories:** It is presented in **four** categories —
  - **Vigyan Ratna (VR):** It recognises a **lifetime achievement**.
  - **Vigyan Shree (VS):** This award is given for **distinguished contributions**.
  - **Vigyan Yuva-Shanti Swarup Bhatnagar (VY-SSB):** It encourages **young scientists** up to age 45.
  - **Vigyan Team (VT):** It is given to a team of **three or more researchers** for collaborative achievements.
- **Recognition Domains:** Encompasses **13 fields**, including physics, chemistry, medicine, engineering, agricultural science, and computer science.
- **Key Awards 2025:** The Vigyan Ratna award was conferred **posthumously** on **astrophysicist Professor Jayant Vishnu Narlikar**, and the Vigyan Team award was given to **CSIR Aroma Mission**.

*The Aroma Mission, also called the "Lavender or Purple Revolution," is an initiative by the CSIR to transform the aroma sector by promoting the cultivation, processing, and marketing of **aromatic crops**.*

### Large Magellanic Cloud (LMC)

Researchers identified 5 carbon-rich compounds surrounding a nascent star called ST6 in the Large Magellanic Cloud (LMC).

- The discovery could illuminate how life's building blocks formed in the universe's infancy.

### Large Magellanic Cloud (LMC)

- It is a **satellite galaxy** of the Milky Way, floats in space nearly 200,000 light-years from Earth.
- This dwarf **galaxy looms large** on the southern nighttime sky at **20 times** the apparent diameter of the full Moon.
- **Vast clouds of gas** within it slowly collapse to form **new stars**.

### Interstellar Comet 3I/ATLAS

- Astronomers have detected **3I/Atlas**, a celestial object currently **moving toward the Sun**, with scientists estimating a ~40% chance that it is an interstellar Comet.

### Interstellar Comets

- Originate outside the solar system, likely ejected during the formation of other planetary systems.
- Travel at **hyperbolic trajectories**, not gravitationally bound to the Sun.
- Provide clues about the composition of other star systems.

### 3I/Atlas Interstellar Comet

- **Designation:** In 3I/Atlas, the "3I" denotes it as the third confirmed interstellar object after **1I/'Oumuamua (2017)** and **2I/Borisov (2019)**.
- **Discovered by:** Asteroid Terrestrial-impact Last Alert System (ATLAS), a NASA-funded survey.
- **Current Trajectory:** Moving toward **perihelion** (closest approach to the Sun), projected in 2026.
- **Speed:** Estimated to be tens of km/s, **too high** for an ordinary bound comet.

### Quantum information Scrambling

Google achieved a **verifiable quantum advantage**, proving its quantum processor "**Willow**" outperforms the fastest supercomputers.

- The team detected faint "echoes" of **scrambled data**, proving information retention through entanglement.
- **Definition:** It refers to the rapid spread of information across a quantum system, making it inaccessible to local measurements.
- **Mechanism:** It distributes quantum data among particles through entanglement, hiding information globally rather than erasing it.
  - **Analogy:** Like a **drop of dye dispersing in water**, information initially stored in one qubit gets distributed among many qubits.
- **Significance:** Demonstrates a **verifiable quantum advantage** and enhances understanding of **quantum technologies**

## HISTORY, HERITAGE AND CULTURE

### Monument Conservation Opens to the Private Sector

- For the **first time**, the government plans to allow **private players** to conserve protected monuments, **ending** the Archaeological Survey of India's (ASI) **monopoly**.
- Through a **public-private partnership (PPP)** framework, the new model involves **corporates, PSUs**, and private organisations.

### Implementation Framework

- Funds will be routed via **National Culture Fund (NCF)**, which offers **100% tax exemptions** for donations.
- Donors can select empanelled **conservation architects** (to be shortlisted by the Ministry of Culture) and hire **external implementing agencies**.

- All projects must follow the **National Policy for Conservation of Ancient Monuments, 2014**, and submit **detailed project reports (DPRs)** for ASI approval.
- Initially, a list of **250 monuments** will be offered for donor participation.  
*NCF was created in 1996 & has mobilised ₹140 crore through corporate/PSU contributions.*

### Archaeological Survey of India (ASI)

The Archaeological Survey of India (ASI) is a **statutory body (Ministry of Culture)** under the **AMASR Act 1958** for archaeological research and protection, headquartered in **New Delhi**.

Established in **1861** by **Alexander Cunningham**, its first Director-General.

ASI currently manages the conservation of **around 3,700 protected monuments**.

### 150 Years of the National Song Vande Mataram

- The Union Cabinet will celebrate **150 years** of the **national song, 'Vande Mataram'**, throughout India, honouring its role in the freedom struggle.

Prime Minister, in his Mann Ki Baat address, called for nationwide participation to celebrate the 150th anniversary of "Vande Mataram", describing it as a "mantra that unites 140 crore Indians".

- Vande Mataram (meaning "I bow to thee, Mother") is **India's national song**, symbolizing reverence to the motherland and evoking patriotism and unity among citizens.

### National Song

#### Written by:

- Composed in **Sanskritised Bengali** by **Bankim Chandra Chattopadhyay** in the **1870s**, it was first published in his novel *Anandamath* (1882).

#### History:

- The song's **first public rendition** was by **Rabindranath Tagore** at the **1896 Congress Session**.
- It became the **anthem of India's freedom struggle**, sung in protests and revolutionary gatherings despite being banned by the British.
- The **Indian National Congress (1937)** adopted its **first two stanzas** as the **National Song**, balancing inclusivity and secular appeal.
- On **January 24, 1950**, the **Constituent Assembly** accorded Vande Mataram equal honour to the **National Anthem "Jana Gana Mana."**

#### Features:

- **Spiritual Patriotism:** Depicts the nation as a nurturing mother embodying both emotional and divine strength.
- **Secular Adaptation:** Only the first two stanzas, devoid of religious imagery, are used officially to ensure inclusivity.
- **Cultural Symbolism:** Serves as a unifying call cutting across linguistic and regional divides.
- **Historical Legacy:** Its association with movements like **Swadeshi (1905)** and **Quit India (1942)** made it the lyrical soul of resistance.

#### Current Status:

- Recognized by the Government of India as equal in stature to the National Anthem.
- Instrumental version is played at the closing of every Parliament session.
- Citizens are encouraged to show equal respect to both Vande Mataram and Jana Gana Mana, as affirmed by a Delhi High Court affidavit (2022).
- 
- **Dr Rajendra Prasad** officially designated it as the national song in the Constituent Assembly on January 24, 1950, stating it would hold **equal status with the national anthem, Jana Gana Mana**.
- The Constitution of India, under Article 51A(a), requires citizens to respect the Constitution, its ideals, institutions, the National Flag, and the National Anthem, but **does not mention the national song**.

### Banni Festival

Recently, four people died during the traditional **Banni festival**, also known as **Karrala Samaram**, in Kurnool, **Andhra Pradesh**.

- The Banni festival is an annual **stick-fight ritual** celebrated in **Andhra Pradesh** on **Dussehra night**.
- It takes place at the **Mala Malleswara Swamy Temple** in Devaragattu, located on the border between Andhra Pradesh and Karnataka.
- **Mythological significance:** The festival commemorates the victory of **Lord Mala Malleswara Swamy** (a form of Shiva) and **Goddess Parvati** (Malamma) over the demonic brothers **Mani** and **Mallasura**,

**Historical origin:** The tradition is believed to have originated during the Vijayanagara Empire.

*The Vijayanagara Empire was established in 1336 A.D. by brothers **Harihara I** and **Bukka Raya I** on the southern bank of the Tungabhadra River.*

### Lord Ayyappa Temple in Sabarimala

- President Droupadi Murmu recently offered prayers at the **Ayyappa temple in Sabarimala**, becoming the first woman President to worship at the hill shrine.

### Sabarimala Temple

- President **Droupadi Murmu** recently offered prayers at the **Lord Ayyappa Temple in Sabarimala**, becoming the **first woman President** to worship at the hill shrine.
- The **Sabarimala temple** is located in the **Pathanamthitta district of Kerala**, atop **Sabarimala Hill** at an altitude of about **1,260 metres**.
- It is dedicated to **Lord Ayyappa (Dharma Shasta)**, revered as a Naishtika Brahmachari (eternal celibate).
- The temple is surrounded by **18 hills & dense forests** forming part of the Periyar Tiger Reserve in **Kerala**.

- The **Pathinettu Thripadikal (18 sacred steps)** leading to the shrine are of great spiritual significance.
- The temple was **reconstructed in 1950** after being damaged by arson; the original stone idol was replaced with a **Panchaloha (five-metal alloy)** image.
- Traditionally, **women of menstruating age (10–50 years)** were **barred from entering** the temple, a practice that sparked intense social and judicial debate.
- The **Supreme Court's 2018 verdict** allowed **women of all ages** to enter the shrine, marking a significant moment in the ongoing discussion of **faith and gender equality**.

#### Sabarimala Temple Entry Case

- A **Public Interest Litigation (PIL)** was filed in 2006 by the **Indian Young Lawyers Association (IYLA)**, challenging the ban on women's entry to the temple.
- Supreme Court Verdict: A **five-judge Bench** in **2018** declared the entry ban **unconstitutional** and **discriminatory** against women.
- **Constitutional Basis:** The bench held that the prohibition violated Article 14 (Right to Equality), Article 15 (Non-discrimination), and **Article 21** (Right to live with dignity) and infringed **Article 25(1)** (freedom of religion for all).
- **Denomination Status:** The Court held that Lord Ayyappa's devotees are **not a separate religious denomination**, thereby denying them protection under **Article 26**.
  - **Article 26** allows every **religious denomination** to **manage its religious affairs**, establish institutions, and own property, subject to public order, morality, and health.

#### Sree Narayana Guru

President of India inaugurated the observance of the Mahasamadhi centenary of **Sree Narayana Guru** at Kerala.

#### Sree Narayana Guru (1856–1928)

- Born in **Chempazhanthy** (near present-day Thiruvananthapuram) to **Ezhava family**.
- He was a **saint, philosopher, poet, and social reformer** who revolted against caste system.
- **Key Contributions**
  - Emphasized the principle of "**One caste, One Religion, One God for all human beings.**"
  - He launched the **Aruvipuram movement** for equal rights to temple entry.
  - In 1903, along with **P. Palpu**, he established an organization, later called the **Sri Narayana Dharma Paripalana Yogam** for upliftment of Ezhava community.
  - He lent support to **Vaikkom Satyagraha** for temple entry (**1924-25**) in Travancore.
  - **Works:** Anukamba Dasakam, Brahmavidya Panchakam, etc.
- **Values:** Equality, Non-violence, Compassion, Integrity, Courage etc.

#### Ningol Chakouba Festival

- **Manipur** celebrates **Ningol Chakouba**, a traditional festival celebrating the bond between

married women and their brothers.

### Key Highlights of the Festival

- The festival is **observed every year** on the **second day of Hiyangei** in the **Meitei lunar calendar**.
- The term 'Ningol Chakouba' is derived from the Manipuri words, '**Ningol**' meaning **married women** and 'Chakouba' meaning a **grand feast**.
- Every year, the **Department of Fisheries**, Manipur, organises this fair cum competition on the **day before the festival** to provide fish to the public at a minimum price.

### Rani Chennamma

Recently Birth anniversary of Rani chennamma was celebrated on 23d October.

#### Rani Chennamma (1778 - 1829)

- She was married to Raja Mallasarja of Kittur (**or Kitturu**)
- After death of her husband & only son she adopted Shivalingappa.
- However, the British rejected him as the legitimate heir to Kittur, leading to the Kittur Revolt in 1824.
- **About Kittur revolt:**
  - It is regarded as the first Indian armed rebellion against British EIC. Also, one of the earliest woman-led anti-colonial struggles.
  - Though British lost 1st battle in 1824, Rani Chennamma was later captured & imprisoned, till her death in 1829.

**Values:** courage, leadership, etc.

### Gyan Bharatam Mission

- **The Gyan Bharatam Mission on manuscripts** under the **Union Culture Ministry**, signed Memorandums of Understanding with around 20 institutes for conservation, upkeep and digitisation of manuscripts.
- National Mission for Manuscripts (NMM) is aimed to **preserve, document, and disseminate India's rich manuscript heritage**.
- The Mission has been restructured with the nomenclature '**Gyan Bharatam Mission**' as a **Central Sector Scheme** for the **period 2024-31**.
- **The key objectives of the Mission include Survey and Documentation, conservation and preservation, publication and research etc.**
- The Culture Ministry had earlier **organised the first-ever international conference on Indian manuscripts** titled "Reclaiming India's Knowledge Legacy through Manuscript Heritage".

### Vaikunthbhai Mehta (1891-1964)

Birth Anniversary of Vaikunthbhai Mehta was celebrated.

- Born in Bhavnagar Gujarat.

- Also called "Pioneer / Doyen / bhishma-pitahmah of the Co-operative Movement in India".
- **Key Contributions:**
  - Served the Maharashtra State Co-operative Bank **Chief Executive** for about 35 years.
  - He was **Minister of Finance and Co-operation of the then Bombay State** and was first **Chairman of Khadi and Village Industries Commission**.
  - Awarded **Kaiser-i-Hind medal (1916)** for his service to the co-operative movement.
  - Most trusted **lieutenant of Gandhiji** in the Khadi (homespun cotton) movement.

### India Advocates for UNESCO Recognition of Chhath Puja

- PM Narendra Modi announced that the Government of India is working to achieve **UNESCO's Intangible Cultural Heritage status** for Chhath Mahaparva.
- **Rationale:** Chhath Puja represents **ecological harmony, social inclusivity**, global presence, and unique sun-worship traditions that reflect **India's living heritage**.

*The UNESCO Intangible Cultural Heritage list was created in 2008 under the 2003 Convention for the Safeguarding of Intangible Cultural Heritage; it recognises and promotes living traditions, performing arts, rituals, and cultural practices that reflect community identity and continuity.*

### Chhath Mahaparva

- Chhath Mahaparva, also called **Chhath Puja**, is an ancient Hindu festival dedicated to the **Sun God** and his sister **Chhathi Maiya**.
- It is a **four-day festival**; First Day (**Nahay-Khay**), Second Day (**Kharna**), Third Day (**Sandhya Arghya**), and Fourth Day (**Usha Arghya**).
- During the festival, devotees observe a strict fast, abstaining from water, and make offerings to the **rising and setting Sun (Usha and Pratyusha)** while standing in a water body.
- It is celebrated during the **Kartik month**, usually occurring in October–November.
- Chhath Puja is mainly celebrated in **Bihar, Jharkhand, eastern Uttar Pradesh**, as well as in **Nepal** and among **Indian diaspora communities** worldwide.
- **Significance:** The festival encourages **gratitude toward nature**, discipline, collective cleanliness and **community participation** that transcends **caste or class divisions**.

### Discovery of Dilmun Temple

- An archaeological team has unearthed a 4,000-year-old temple of the **Bronze Age Dilmun Civilisation** on **Failaka Island, Kuwait**.
- This marks the **second Dilmun temple** discovered at the same site, indicating two temples built successively between **1900-1800 BCE**, a rare architectural phenomenon.
- The excavation revealed the complete temple layout, stone foundations, multi-room structures, and a central chamber **resembling ritual sites in Bahrain and Eastern Arabia**.
- **Artefacts Recovered:** Pottery sherds, seals and seal impressions, beads, and carved fragments.

### Failaka Island's Role in Ancient Trade

- Strategically located between **Mesopotamia, Eastern Arabia**, and the Indus Valley, Failaka

was a **maritime hub** facilitating trade in **copper, textiles, gemstones, and pottery**.

- The discovery confirms that the island functioned not merely as a trading post but as a **permanent settlement** with administrative and ritual significance.
- The findings reinforce that the **Gulf region was integrated into global trade systems** even 4,000 years ago.

### Dilmun Civilisation

- **Timeline:** Flourished between **3000-1600 BCE**.
- **Region:** Covered modern-day Kuwait, Bahrain, and parts of Eastern Saudi Arabia.
- **Cultural Significance:** Mentioned in Mesopotamian texts as a "land of purity, water, and prosperity."
  - Served as a trading intermediary between Mesopotamia and the Indus Valley.
- **People:** Settled communities of traders, sailors, and craftsmen who developed advanced administrative systems and spiritual practices.

### International Aryan Summit 2025

- The **International Aryan Summit 2025** will take place in **New Delhi** as part of the **Jyana Jyoti Festival**.
- The **Jyana Jyoti Festival**, also known as the International Arya Mahasammelan, marks the **200<sup>th</sup> birth anniversary** of **Maharshi Dayanand Saraswati** and the **150<sup>th</sup> anniversary** of the **Arya Samaj**.

### Maharshi Dayanand Saraswati

- Dayanand Saraswati was born as **Mool Shankar** on **February 12, 1824**, in **Tankara, Gujarat**.
- **Vedic Revivalism:** He founded the **Arya Samaj** in **1875** and gave the slogan "**Back to the Vedas.**"
- **National Vision:** He was the **first to use the term "Swaraj"** in **1876**; He promoted **Swadeshi** and supported Hindi as a unifying national language.
- **Social Reform:** He launched the **Shuddhi Movement** to reconvert Hindus who had embraced other religions for revival.
- **Intellectual Works:** His major writings include **Panchmahayajya Vidhi, Satyarth Prakash, Veda Bhashya**, and **Veda Bhashya Bhunikā**.

### Arya Samaj

- The **Arya Samaj (1875)** was established in **Bombay** as a significant **Hindu reform movement**.
- **Philosophy:** It **rejects idol worship**, ritualism, and **caste discrimination**, advocating a return to the moral and spiritual principles outlined in the **Vedas**.
- **Social Reforms:** The Samaj led campaigns against **untouchability, child marriage**, and promoted **widow remarriage** and **female education**.
- **Legacy:** Leaders like **Mahatma Hansraj** and **Lala Lajpat Rai** established the network of **Dayanand Anglo-Vedic (DAV) schools** to combine modern **Western education** with **traditional Vedic values**.
  - The **first DAV School** was established in **Lahore** (now Pakistan) in **1886**.

### Pasumpon Muthuramalinga Thevar

Indian Vice-President paid homage to **Pasumpon Muthuramalinga Thevar** on his birth anniversary.

#### Pasumpon Muthuramalinga Thevar (1908- 1963)

- **Born:** To a wealthy land owning family of the village Pasumpon in **Ramanathapuram District** (Tamil Nadu).
- Belonged to **Kondayankottai Marava community** of **Mukkulathor** known for their valour.

#### Key Contributions:

- Entered into politics in **1927**, **Subash Chandra Bose** was his political friend.
- Joined **national movement** and helped Congress expand influence in Tamil Nadu interior regions.
- Played role in **Temple Entry Movement** in Tamil Nadu, **Repeal of the Criminal Tribes Act, etc.**
- Served as the **Member of Legislative Assembly (MLA)** from 1952-57 and **Member of Parliament** from 1957-63.
- **Titles Earned:** An Uncrowned Monarch, Netaji of the South, The Lion of the South.
- **Key Values:** Leadership, Nationalist, Courage, Compassion, etc.

### FACTS FOR PRELIMS

#### M.S. Swaminathan Award 2025

**31<sup>st</sup> M.S. Swaminathan Award** for Environmental Protection was presented in Chennai.

#### Award Recipients:

**Sahaja Samrudha (Mysuru):** A people's movement dedicated to preserving traditional farming practices and conserving indigenous crop varieties.

**Veerappan (Tamil Nadu):** A 60-year-old fisherman recognised for propagating mud crabs and fish.

#### M.S. Swaminathan Award

- It was instituted in **2004** as a **biennial award** named after Dr M.S. Swaminathan.
- It recognises lifetime contributions to agricultural research and development.
- **Prize:** It carries a cash prize of **₹2 lakh**, a medal, and a citation; it is open to all nationalities.
- **Eligibility:** Under 65 years, with at least two decades of work in India.
- **Related awards:** M.S. Swaminathan Memorial Women Award (women scientists) and Global M.S. Swaminathan Award for Food and Peace (global hunger alleviation).

#### M S Swaminathan

- **Mankombu Sambasivan Swaminathan (1925-2023)**, renowned **Indian geneticist** and **agricultural scientist**, is hailed as the **Father of the Green Revolution** in India.
- He pioneered **high-yielding varieties of wheat and rice**, which transformed India's food security.
- Introduced the concept of the **"Evergreen Revolution"** for sustainable agriculture.
- His work helped India overcome famine threats & achieve food grain self-sufficiency by the early 1970s.

### AI Adoption in Indian Healthcare

- According to **Elsevier's Clinician of the Future 2025 report**, AI adoption among Indian clinicians has seen a **threefold rise in one year**, making India a global frontrunner in digital healthcare.
- **Key Findings in Report**
- India's adoption of **AI in health (41%)** exceeds the **global average (38%)**.
- **52%** of Indian clinicians expect patients to **self-diagnose** with AI soon.
- Around **66%** of Indian clinicians report higher patient loads; 20% consider leaving healthcare.

### Bharat Mata on Currency

- PM Modi unveiled a **₹100 commemorative coin** to celebrate the **RSS's centenary**, marking the **first time Bharat Mata** appeared on Indian currency.
  - RSS founded in **1925** in Nagpur by **Keshav Baliram Hedgewar**, the RSS has grown into the world's largest volunteer organization.

### World Para Athletics Championships 2025

- India hosted its first-ever **World Para Athletics Championships 2025** in **New Delhi**.
- The Championship featured participation from **over 100 nations**, making it the **largest para sports event** ever organised in **India**.
- **India's Performance:** India achieved its **best-ever performance**, securing **22 medals** (6 gold, 9 silver, 7 bronze) and **finishing 10<sup>th</sup> overall** in the medal tally.
- **Significance:** The event is part of India's long-term vision to host major global sporting events, including plans for the 2030 Commonwealth Games and aspirations for the 2036 Olympic Games.
- **World Para Athletics Championships** are the leading international para track & field event, held every two years by World Para Athletics under the auspices of the International Paralympic Committee (IPC).

### World Cotton Day 2025

- The *Ministry of Textiles* celebrated **World Cotton Day 2025** on **October 7** under the theme "*Cotton 2040: Technology, Climate & Competitiveness*".
- India aims for **USD 100 billion in textile exports** and a sector size of **USD 350 billion by 2030**.
- Despite cultivating **40% of global cotton area**, India's productivity is low at **450 kg/ha** compared to a global average of **2,000 kg/ha**.
- The *Kasturi Cotton Bharat* initiative aims to match the global quality standards of **Egyptian Giza** and *American Supima cotton*.
- Key schemes include **PM MITRA Parks**, *ATUFS*, **Samarth**, *NTTM*, and **Silk Samagra**, aligned with the \*5F Vision (Farm, Fibre, Factory, Fashion, Foreign)

### International Day for DRR 2025 (NOA)

The **International Day for Disaster Risk Reduction (DRR)** is observed annually on **October 13** to raise

awareness of disaster risks and their mitigation. **Theme: "Fund Resilience, Not Disasters"**.

### National Students' Day

- India observes **October 15<sup>th</sup>** as **National Students' Day** to honour the birth anniversary of former President **Dr A. P. J. Abdul Kalam**. The day recognizes his contributions to education and his dedication to empowering students.

### Left-Wing Extremism Shrinks to 11 Districts

- Union **Ministry of Home Affairs** (MHA) reported that the **number of districts affected** by Left-Wing Extremism (LWE) has decreased from **18 to 11**.
- **Most-Affected Districts:** The number of "**most-affected**" districts has decreased from **six to only three** (Bijapur, Sukma, and Narayanpur), **all located in Chhattisgarh**.
- **National Action Plan:** The reduction in LWE influence is due to a comprehensive strategy that includes **security** measures, **development** initiatives, **financial disruptions**, and a liberal **surrender policy**.
- **Timeline:** The Ministry of Home Affairs has set a target to eradicate Naxalism by **March 31, 2026**.

### Governance Laws – Section 163 of BNSS

**Section 163** of the Bharatiya Nagarik Suraksha Sanhita (BNSS) grants specific **magistrates** the authority to **issue urgent orders** to prevent nuisances or potential threats. Recently, the **Leh** District Magistrate has **lifted the restrictions** under section 163 after 22 days.

### Divya Deepawali Mela :

**Uttar Pradesh** government is organising a two-day **Divya Deepawali Mela** held across districts. It showcases handicrafts made by **Divyangjan (PWD) community**.

**Sri Lankan PM Visit** : Sri Lankan **PM Harini Amarasuriya** has arrived in New Delhi for a three-day visit. This marks **her maiden trip** to India since taking office in September 2024.

**Ahmedabad to Host 2030 Commonwealth Games:** The Commonwealth Sport Executive Board has officially recommended **Ahmedabad, Gujarat**, as proposed host city for the **2030 Centenary Commonwealth Games**. India last hosted the Commonwealth Games in **Delhi** in **2010**.

### Indian Air Force (IAF) Day

- IAF Day is celebrated annually on **October 8** to commemorate the establishment of IAF in **1932** as an **auxiliary wing** of the **British Royal Air Force**. The 2025 celebration marked the **93<sup>rd</sup> anniversary** with the theme "**Beyond Boundaries: Guardians of the Sky**."

### Interim President of Madagascar

- Colonel Michael Randrianirina has been appointed interim president of Madagascar following the impeachment of ousted President Andry Rajoelina. Randrianirina commands the elite **CAPSAT military unit** that took part in **anti-government protests**.

### Mongolian PM Resigned

- Mongolian Prime Minister **Gombojav Zandanshatar** has resigned after **losing a confidence vote** in parliament.

### Kancha Sherpa

- **Kancha Sherpa**, the last surviving member of the **1953 British Mount Everest Expedition**, recently passed away. The expedition resulted in the **first successful ascent of Mount Everest** by **Edmund Hillary** (New Zealand) and **Tenzing Norgay** (Nepali Sherpa).

### World Menopause Day

- **World Menopause Day** is observed annually on **October 18** to raise awareness about menopause. **2025 Theme:** *Lifestyle Medicine in Menopausal Health*.

### M.F Husain museum in Doha

- A museum dedicated to the life and work of **M.F. Husain** is set to open in **Doha, Qatar**. Often called "*the Picasso of India*," he co-founded the **Bombay Progressive Artists' Group**, integrating global avant-garde styles into modern Indian art.

### Defence – President on Rafale

- **Droupadi Murmu** became the **first President** of India to take a sortie (flight) in a Rafale fighter jet from Ambala Air Force Station in **Haryana**. As the **Supreme Commander of the Indian Armed Forces**, she reviewed the operational preparedness of the Rafale fleet.

### Asian Youth Games 2025

- The **3<sup>rd</sup> Asian Youth Games 2025** was held in **Manama, Bahrain**, with 45 countries competing in 26 sports. **Veer Bhadu** made history by winning India's first-ever medal (**Bronze**) in **Mixed Martial Arts (MMA)** at the Asian Youth Games.

### Huajiang Grand Canyon Bridge

- Recently, **Huajiang Grand Canyon Bridge** in **China's Guizhou province** has been opened.
- With **625 metres** above the **Beipan River**, the bridge currently stands as the **world's highest bridge**.

Its 1,420-metre main span makes it the **largest-span bridge** constructed in a mountainous terrain.

The bridge reduces cross-canyon travel time by two hours, boosting regional connectivity.

France's **Millau Viaduct bridge** remains the **tallest by structural height** with 343 metres.