

CURRENT PULSE



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Right To Be Forgotten

Delhi High court in 'Laksh Vir Singh Yadav V. Union Of India & Ors' recognized an individual's 'Right To Be Forgotten' as an integral facet of the fundamental right to privacy under Article 21.



- **Right to be forgotten:** Right to seek removal or restricted access to personal information from public accessibility that no longer serves legitimate purpose.

Key Highlights of Judgement

- Sets out detailed principles for when **names can be de-indexed or masked in court records**.
 - **De-indexing** (to be operated globally): Removes a person's **name as a searchable key** without deleting the record, limiting access through name-based searches.
 - **Application:** Cases ending in acquittal, discharge, etc.
 - **Exceptions:** It can't be applied in **cases against women, children or breach of public trust**.
 - **Masking:** Replaces names and personal identifiers in judicial records with neutral labels (e.g. XYZ).

Right to privacy

SC balances child's right to know paternity and alleged father's right to privacy.



- The court has held that **DNA tests should not be ordered** routinely; however, when paternity is disputed, courts may direct a DNA test.

About Right to Privacy

- **The right to privacy** in India is a **fundamental right** protected under **Article 21** of the Constitution. (Justice K.S. Puttaswamy Judgment)
- **Article 12** of the **Universal Declaration of Human Rights, 1948** and **Article 17** of the **International Covenant on Civil and Political Rights (ICCPR), 1966**, legally protect persons against “arbitrary interference” with one’s privacy.
 - India signed and ratified **the ICCPR** on April 10, 1979, without reservation.

AI Use in Indian Judiciary



Supreme Court Publishes Draft Regulations on AI Use in Judiciary Prepared by the Supreme Court AI committee, 'Draft Regulations for Use of Artificial Intelligence (AI) in Courts, 2026' outlines the framework for the responsible adoption of AI in the Indian judiciary.

- **Application:** All judicial, adjudicatory, and administrative functions of the Supreme Court, High Courts, other courts, tribunals, and statutory commissions performing adjudicatory roles in India.

Key Highlights of Draft

- **Objectives:** To demonstrably improve access to justice, reduce delays, and enhance administrative efficiency.
- **Guiding Principles:** AI deployment must strictly adhere to human primacy, fairness, transparency, and data privacy (under Digital Personal Data Protection Act, 2023) and Indian Constitution.
 - Judicial officers remain entirely accountable for all decisions.
- **Permitted Uses:** AI is strictly an assistive tool allowed for administrative tasks, scheduling, legal research, translation, transcription, and accessibility services, subject to human verification.
- **Absolute Bans:** AI is strictly prohibited from deciding verdicts, evaluating bail or recidivism (risk scoring), predicting human behavior and surveillance (of judges, lawyers, litigants, or stakeholders, unless legally authorized).
- **Administration:** AI adoption, standards, and policy development will be regulated by a permanent national Apex Body, a research center (CoRE-AI), and dedicated AI Committees at every High Court.
- **Compliance & Oversight:** AI tools require pre-deployment impact assessments and annual internal audits.
 - Furthermore, lawyers and litigants must explicitly disclose any use of AI in preparing court documents.
- **Digital Inclusion:** AI tools must be accessible and should not widen digital divides.

AI Adoption in Indian Judiciary

- **Courtroom Transcription:** AI-enabled Automatic Speech Recognition (ASR) provides near real-time transcription of court proceedings.
- **Multilingual Justice:** AI-based SUVAS translates Supreme Court judgments into 18 Indian languages.
- **Filing & Registry Operations:** AI tools using Machine Learning and Optical Character Recognition automatically detect defects in e-filings.
- **Legal Research Assistance:**
 - **LegRAA (Legal Research Analysis Assistant)** analyzes documents and extracts relevant legal references.
 - **SUPACE (Supreme Court Portal for Assistance in Court Efficiency)** identifies precedents and clarifies case facts.
- **Voice-to-Text Dictation:** ASR-SHRUTI converts judges' speech into text for drafting orders and judgments.

E-governance in India

Recently the E-Jagriti platform of the Department of Consumer Affairs won the National Awards for e-Governance 2026.



- E- Jagriti is a **digital platform that computerizes and** connects Consumer Commissions nationwide to ensure transparent, efficient, and speedy consumer dispute resolution.

About E-Governance

- It refers to the use of **Information and Communication Technology (ICT)** in governance and public administration.
- It aims to improve **efficiency, transparency, accountability, responsiveness, and citizen participation.**

Transformative Role of E-Governance in India

- **Improved Service Delivery:** Faster and anytime access to government services. E.g., UMANG – single platform for multiple government services.
- **Transparency & Accountability:** Reduces corruption through digital and auditable processes. E.g., Government e-Marketplace (GeM) – **transparent public procurement.**
- **Financial Inclusion:** Expands access to digital payments and banking. E.g., UPI – **instant, cashless digital transactions.**
- **Citizen Empowerment:** Easier grievance **redressal and consumer protection.** E.g., **e-Jagriti** – online consumer complaint filing and tracking.
- **Last-Mile Connectivity:** Extends governance to remote areas. E.g., **Common Service Centres (CSCs).**
- **Capacity Building of Government Officials:** E.g., iGOT Karmayogi platform for **training and efficiency improvement of civil servants.**
- **Citizen Participation:** Encourages **public engagement** in policymaking. E.g., **MyGov platform.**



Prime Minister of India

Prime Minister Narendra Modi surpassed Jawaharlal Nehru to become India's longest-serving continuously elected Prime Minister.



Prime Minister:

- **Appointment & Role (Article 75):** Appointed by the President, the PM serves as the **real (*de facto*) executive and head of the government**.
- **Advisory Duties (Article 74):** Heads of the Council of Ministers (CoM) to aid and advise the President on various matters.
- **Link:** Acts as the **principal communication channel** between the President and CoM, advising on crucial appointments, Parliament sessions, and Lok Sabha dissolution.
- **Chairmanships:** Serves as chairman of NITI Aayog, National Integration Council, Interstate Council, etc.

Social Media and Judiciary



The Delhi High Court in a contempt petition in *Delhi High Court Bar Association v. Dr. Kapil Kakar & Ors.* (2026) held that social media cannot be used to undermine Constitutional Institutions like the Judiciary.

Key Observations

- **Judicial criticism:** Judicial decisions may be **fairly criticized**, but baseless allegations of corruption, collusion, or criminality against judges are impermissible.
 - **Re: Arundhati Roy (2002):** Fair criticism of courts is permissible, but statements **undermining judicial authority may amount to contempt**.
 - **Amish Devgan v. Union of India (2021):** Free speech cannot be used to create public disorder; constitutional institutions deserve protection.
- **Safe Harbour & Intermediary Obligations:** Social media intermediaries cannot remain “**silent spectators**” and must promptly remove unlawful content **upon actual knowledge**, without waiting for specific court orders.
 - Under **Section 79(3)(b) of the IT Act, 2000**, failure to do so may result in the loss of safe harbour protection.

Social Media and Free Speech

- **Democratization vs Misuse:** Social media democratizes public discourse but enables hate speech, cyberbullying, and misinformation.
- **Constitutional Boundaries:** **Art. 19(1)(a)** guarantees free speech, subject to reasonable restrictions **Article 19(2)**, including defamation and contempt of court.
- **Risk of Media Trials:** Social media campaigns may prejudice public opinion, undermine the presumption of innocence, and affect investigations.
- **Scandalizing the Judiciary:** Baseless allegations against judicial institutions erode public confidence and obstruct justice delivery.

Cotton

Centre has temporarily exempted customs duty on cotton imports from 1 June–31 October 2026 to improve availability for the textile sector.



Cotton

- It is also termed as “**White-Gold**”.
- A soft, fluffy natural fibre grown around seeds in a boll; a shrub (**semi-xerophytic**) crop of **tropical and subtropical regions**.
- In India it is grown in the kharif season **in semi-arid regions of India**.
- **Temperature:** Minimum 15°C for germination; 21–27°C optimal for growth.
 - It can tolerate temperature to 43°C but temperature below 21°C is detrimental to the crop.
- **Soil:** Well-drained alluvial, black, and red soils; sensitive to waterlogging.
- **Species of cotton:** There are **four cultivated species of cotton** and India is the **only country cultivating all four cotton species** on commercial scale.
- India has the **largest area under cotton cultivation** and **second largest producer** of cotton after China.

ATF Price Stabilisation Fund

Cabinet approves Price Stabilisation Fund for Scheduled Indian Airlines towards ATF pricing.

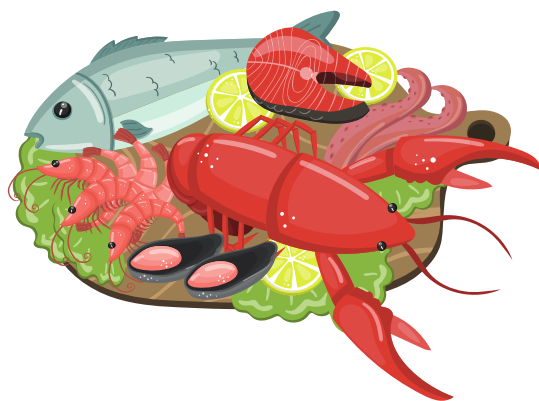


ATF Price Stabilisation Fund

About the Fund

- **Corpus:** Up to ₹10,000 crore.
- **Purpose:** Stabilise Aviation Turbine Fuel (ATF) prices amid global fuel price volatility.
- **Support Mechanism:** Interest-free advance to Oil Marketing Companies (OMCs) to compensate from losses from elevated global prices.
- **Other:** **Fixed ATF Price Arrangement** for domestic and international operations, **Exclusive rights of ATF supply to OMCs**.
- **Duration:** **36 months** (subject to annual review).
- **ATF Significance:** Accounts for nearly **40% of airline operating costs**.

India's Seafood Exports



India's Seafood Exports Reach Record High in FY 2025–26 Spanning a wide and diversified basket, the sector is a major contributor to food security, employment, export earnings and sustainable livelihoods.

Key Highlights

- **All Time High Exports (Both Volume and Value):** India exported 19,72,018 metric tonnes (MT) of seafood valued at USD 8.46 billion during FY 2025–26.
- **Leading Export Item:** Frozen shrimp remained leading export item accounting for 40.19% of total export quantity and 66.52% of total export earnings in US dollar terms.
 - It was followed by Frozen fish and Dried Seafood.
- **Top Export Destinations:** United States and China.

Key Policy Recommendations to enhance Sector Competitiveness

- **Central Scheme for Development of Indigenous Broodstock:** To reduce reliance on expensive and pathogen-prone imported broodstock.
- **Central Scheme for Meeting Global Quality Standards for Seafood Products:** To ensure that Indian seafood meets global quality standards.
- **Ease of Export:** Managing country-specific export bans and mitigating freight costs.
- **Umbrella Body for Sector:** E.g. Seafood Sector Governing Council (SSGC) for collaboration, infrastructure support and development, etc.

Key Measures taken

- **Marine Products Export Development Authority (MPEDA):** Dedicated agency to facilitate seafood export under Ministry of Commerce and Industry.
- **Flagship Scheme:** Pradhan Mantri Matsya Sampada Yojana (PMMSY); Fisheries and Aquaculture Infrastructure Development Fund (FIDF), etc.
- **Others:** Enhanced duty-free import limit of specified inputs used in seafood processing; SHAPHARI certification, etc.

Key Challenges Persisting in India's Seafood Sector	
Challenge Area	Description / Impact
 Stringent Non-Tariff Regulations	▶ Strict sanitary, phytosanitary, and quality-control requirements in international markets often hinder seafood exports. Several consignments have been declined due to non-compliance with residue standards.
 Protective Trade Measures	▶ Importing countries may impose Anti-Dumping Duties (ADD) and Countervailing Duties (CVD), increasing costs and reducing the market competitiveness of Indian seafood products.
 Supply-Side Difficulties for Exporters	▶ Seafood exporters frequently encounter challenges in securing consistent raw material supplies because of seasonal fluctuations, uneven availability, and quality inconsistencies.
 Weak Cold Chain Network	▶ Effective seafood preservation depends on reliable temperature-controlled storage and transport systems. Even slight disruptions can affect product quality, freshness, texture, and storage life.

India's New Middle Class

India's middle class is growing rapidly, driven by rising incomes, urbanisation, and economic growth.



- India's middle class expanded at **6.3% annually (1995–2021)** and constitutes **~31% of the population**.
- **India will surpass China** in middle-class population by **2030–35. (OECD)**

Economic contribution of Middle class

- **Driver of Domestic Consumption:** By **2036**, India's middle class will account for **93% of all spending** (up from 80% in 2026). (WEF)
- **Human Capital:** Investment in **education, healthcare** to enhance workforce productivity.
- **Entrepreneurship Driver:** Supports **startups, MSMEs, and innovation**.
- **Tax Contribution:** **Income tax, GST, investments** support government revenues and capital formation.
- **Social Stabiliser:** Promotes social mobility, **economic stability**.

Challenges

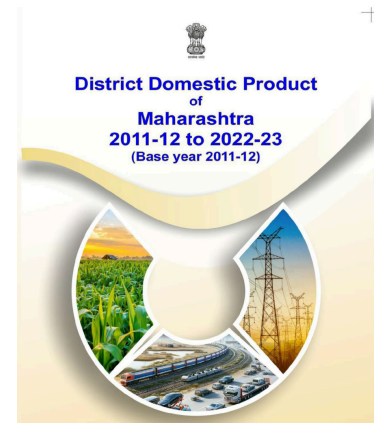
- **Stagnant Income:** **Weak real wage growth** despite overall economic expansion.
- **Rising Cost of Living:** Expensive **housing, healthcare, education**, and food.
- **Job Insecurity:** Automation, AI, gig work are **increasing employment uncertainty**.
- **Consumption-led Financial Stress:** Lifestyle inflation and consumerism are **encouraging debt-financed spending**, reducing savings.
- **Inadequate Social Security:** Lack of health insurance, pension, and unemployment protection.

Initiatives for Middle Class

- **Financial Security:** Zero Tax on earnings up to ₹12 lakh annually, GST Reforms etc.
- **Financial Inclusion & Entrepreneurship:** PM Jan Dhan Yojana (PMJDY), JAM Trinity etc.
- **Housing:** PM Awas Yojana–Urban, **SWAMIH (Special Window for Affordable and Mid-Income Housing)** fund.
- **Connectivity:** Metro Rail Expansion, UDAN Scheme etc.
- **Healthcare:** **Eat Right India**, Ayushman Bharat–PMJAY etc.

District Domestic Product (DDP)

National Statistics Office (NSO) released Guideline for Compilation of Estimates of District Domestic Product (DDP) with Base Year 2022-23.



About District Domestic Product (DDP)

- District Domestic Product (DDP) measures the **total value of goods and services produced within a district** during a given period.
 - It is the district-level counterpart of **Gross State Domestic Product (GSDP)** and **Gross Domestic Product (GDP)**.
- **Significance:** Useful for comparing economic performance between districts, identifying backward regions, planning local development programs, and assessing regional human development for computing Human Development Index.
- **Components:** Includes estimates of **Gross District Domestic Product (GDDP)**, **Net District Domestic Product (NDDP)** and **Per Capita Income**.
- **Approaches:** Income originating and Income accruing.

FCNR(B) Accounts

The RBI has announced that the full hedging cost will be borne until 30 September 2026 for Authorised Dealer (AD) banks on fresh 3–5 year Foreign Currency Non-Resident Bank (FCNR(B)) deposits.



- This will help in attracting foreign currency into India's banking system

Foreign Currency Non-Resident Bank (FCNR(B)) deposits

- These are fixed deposits that allow Non-Resident Indians (NRIs) to hold their money in foreign currencies with Indian banks.
- Unlike standard non-resident external (NRE) or non-resident ordinary (NRO) accounts, which are maintained in Indian rupees, FCNR(B) accounts can be held in currencies such as the US dollar, British pound, etc.
- Interest is also paid in that foreign currency.
- **Benefits for NRIs:** Protects the depositor from currency depreciation risks.

White Paper on Kerala's Debt Crisis



KERALA'S FISCAL HEALTH

A Status Report

Kerala faces an outstanding liability of ₹5.07 lakh crore (35.5% of GSDP) with committed expenditures (salaries, pensions, interest) absorbing 77% of revenue expenditure, compressing capital expenditure to just 1.3% of GSDP.

Debt Crisis of Indian States

- State debt now accounts for **nearly one-third of India's general government debt** (NITI Aayog's Fiscal Health Index).
 - States like **Punjab, West Bengal, Kerala, and Andhra Pradesh** face persistent revenue and fiscal deficits, elevated debt levels (35–45% of GSDP), and high interest burdens.
- According to RBI, Indian States' consolidated **gross fiscal deficit increased to 3.3% of GDP** (2024-25) and the **outstanding liabilities to ~28% of GDP** (March 2024).

Key Drivers of Rising State Debt

- **Populist measures:** High spending on subsidies, welfare, and freebies strains budgets.
- **Committed expenditure:** Salaries, pensions, and interest consume 50–60%+ of revenue receipts (e.g., over 70–80% in Punjab/Kerala), **crowding out capital investment**.
 - States like Kerala face **ageing populations** (>15% over 60), raising pension and healthcare costs.
- **Revenue weaknesses:** Heavy reliance on **central GST devolution**; sluggish growth in own-tax revenues.
- **Other factors:** **Off-budget borrowings** to bypass FRBM limits, **COVID-era emergency loans**, and **escalating borrowing costs** (higher premiums).

Way Forward

- **Enforcing Macro-Prudential Caps:** Stricter enforcement of **FRBM targets** and **state-specific debt ceilings** linked closely to realistic GSDP metrics.
- **Broadening Own Revenue Streams:** Expanding local tax bases, ensuring higher GST compliance, and optimizing non-tax revenue collections.
- **Rationalizing Public Utility Tariffs:** Imposing user charges on state utilities like electricity and water to fully recover operation and maintenance expenses.
- **Refining Welfare Delivery:** Utilizing advanced **Direct Benefit Transfer (DBT)** models to tightly target beneficiaries, erase identity duplication, and minimize leakage.

Reforms in FPI Investment and G-Secs

Government Announces Reforms to Deepen G-Sec Market and Facilitate FPI in Equity Segment The reforms aim to reduce operational complexities, simplify market access, and expand the investor base for Indian equities and Government Securities.

Key Measures

Liberalisation of investment by individual Persons Resident Outside India (PROIs)

- PROIs permitted to invest in equity instruments of listed Indian companies through the **Portfolio Investment Scheme (PIS)**. (as announced in **Union Budget FY2026-27**)
 - Earlier, only **NRIs/OCIs** were allowed to invest in PIS.
- Individual investment limit for a PROI in a company doubled from 5% to 10% (aggregate Limit raised to 24%).

Tax Exemption for Foreign Portfolio Investments (FPIs) Investing in G-Secs

- **Income Tax on Interest and Capital Gain Tax** waived on FPIs and investments by **Bank for International Settlements** in G-Secs.

Reforms in FPI Investment in Government Securities (G-Secs)

- **Fully Accessible Route (FAR)**: expanded to include 15-, 30-, and 40-year tenor G-secs and Sovereign Green Bonds.
 - **FAR** allows non-residents to invest in "specified securities" without any quantitative restrictions
- Removed three restrictions under General Route, viz. short-term investment limit, concentration limit and the security-wise limit.

Key Terms

- **FPI**: Involves investors holding financial assets, such as stocks and bonds in another country. It does not provide direct ownership of company's assets and is relatively liquid, depending on volatility.
 - Investment by a single FPI (or investor group) in any Indian company must **not exceed 10%** of total paid-up equity capital.
- **G-Sec**: It is a tradeable instrument issued by Central or State Governments. It acknowledges the government's debt obligation.

UPI Linkage with Nepal

Launch of linkage between Unified Payments Interface (UPI) of India and National Payments Interface (NPI) of Nepal for facilitating remittances; took place during the External Affairs Minister of Nepal visit to India.



About UPI

- **Launched:** on 11 April 2016 by the National Payments Corporation of India (NPCI).
- **Development:** UPI is an **instant payment system** developed by **NPCI**, under the regulatory oversight of the Reserve Bank of India (RBI).
- **Boost to digital economy:** UPI captures nearly 85% in India's **Digital Payments** and 49% of global real-time payments **promotes financial inclusion**.
- **Features:**
 - **Two-Factor Authentication:** Secure transactions using a linked mobile number and UPI PIN as dual authentication factors.
 - **24/7 and Direct Transfers:** Enables instant fund transfers anytime, including weekends and bank holidays. Allows direct payments without beneficiary registration.
 - **Multiple Bank Accounts:** Supports linking and managing multiple bank accounts through a single UPI app.
 - **Supports Bill and QR Code-Based Payments:** Facilitates utility bills, recharges, EMIs, subscriptions, and recurring payments via AutoPay.
 - **Interoperability:** Enables seamless transactions across different banks and UPI-enabled apps.
 - **Record:** UPI transactions are recorded by banks and reflected in bank statements.
 - UPI is built over the **IMPS (Immediate Payment Service) infrastructure**.
- **Other Countries UPI is linked:** UAE, Singapore, Bhutan, Sri Lanka, France, Mauritius, and Qatar.
 - Recently India Launches UPI Payments in Cambodia partially.

Other India-Nepal Initiatives Launched

- **Earthquake Reconstruction Assistance:** India handed over 72 health facilities and 12 cultural heritage sector projects.
- **MoU between Digital India Bhashini and Kathmandu University:** For co-creating National Digital Infrastructure for “Voice First” Language Translation platform.
- **India-Nepal Mutual Legal Assistance Agreement (MLAA):** Welcomed the implementation of MLAA in Criminal Matters.

FSSAI



FSSAI, citing Food Safety and Standards (Packaging) Regulations, 2018, directed to discontinue newspapers for packing food items.

- It warned that printing inks contain harmful chemicals, e.g lead and other heavy metals, which pose long-term health risks.

About FSSAI (HQ: New Delhi)

- **Established:** Under Food Safety and Standards Act, 2006 as an independent **statutory Authority**.
- **Ministry:** Ministry of Health and Family Welfare.
- **Role:** Laying down science based standards for articles of food and to regulate their manufacture, storage, distribution, sale and import.
- It is also responsible for licensing and Registration of Food Business Operators and Monitoring safety
- **Composition:** One chairman and 22 members (one-third must be women).

Insolvency and Bankruptcy Code , 2016



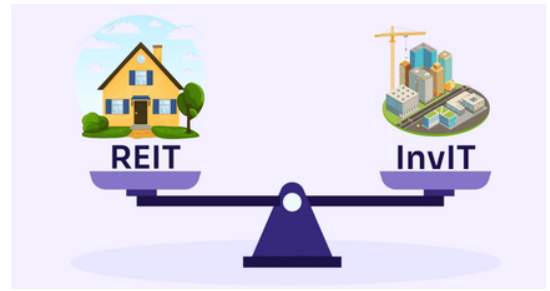
Supreme Court held that in case of conflict between the Insolvency and Bankruptcy Code, 2016 (IBC) and the Supreme Court Rules (SCR), the provisions of the IBC will prevail.

About the Insolvency and Bankruptcy Code, 2016 (IBC)

- It was enacted to **consolidate laws relating to reorganisation and insolvency resolution** of corporate persons, partnership firms and individuals in a time-bound manner.
- **Four Pillars of IBC Code:** **Insolvency and Bankruptcy Board of India** (regulator), **Insolvency Professionals** (manage resolution process), **Information Utilities** (store and authenticate financial data), and **Adjudicating Authorities** - NCLT (companies/LLPs) and DRT (individuals/partnerships).

REITs and InvITs

The Reserve Bank of India allowed banks to lend directly to REITs and InvITs.



About REITs (Real Estate Investment Trusts)

- **Definition:** Companies that own, operate, or finance income-generating real estate and raise capital by issuing shares to investors.
- **Purpose:** Enable investors to earn from real estate without directly buying or managing properties.
- **Types:** Equity REITs (rental income from owned properties), Mortgage REITs (interest income from mortgages/securities), and Hybrid REITs (combination).

About Infrastructure Investment Trusts (InvITs)

- **Definition:** Collective investment vehicles that finance, own, operate and maintain infrastructure assets while pooling capital from investors.
- **Purpose:** Enable investors to earn income from infrastructure projects without directly owning or managing assets.
- **Investment Areas:** Roads, highways, telecom towers, airports, etc.

Ethanol Blending

The Centre has exempted excise duty on petrol blends containing 22%, 25%, 27%, and 30% ethanol.



- The move is aimed at strengthening India's ethanol blending programme, which seeks to reduce dependence on imported crude oil, cut carbon emissions, and enhance demand for domestically produced ethanol.

About Ethanol Blending

- It is the process of **ethanol with petrol** to create a cleaner, more sustainable fuel.
 - **Ethanol (C₂H₅OH)** is an anhydrous **ethyl alcohol** produced from sugarcane, maize, wheat, and other crops with high starch content.
- Government Programs to boost ethanol production:
 - **Ethanol Blended Petrol(EBP) Programme**
 - **National Policy on Biofuels**
 - **Pradhan Mantri JI-VAN** (Jaiv Indhan - Vatavaran Anukool fasal awashesh Nivaran) Yojana

State Finance Commissions

Report on Datasets for State Finance Commissions (SFCs)
Released by The Ministry of Panchayati Raj The report calls for establishing a strong information architecture that enables data-driven fiscal decentralisation via SFCs and strengthens grassroots governance.



About State Finance Commissions (SFCs):

- **Mandate:** SFCs are **constitutional bodies** established under **Article 243-I** of the Indian Constitution.
- **Function:** Recommend the **distribution of state revenues** between the state government and local bodies.

Key Challenges Faced by State Finance Commission:

- **Data Fragmentation and Silos:** Preventing SFCs from accessing a holistic view performance of local bodies.
- **Lack of Disaggregated Data:** Absence of Panchayat level and sector-wise expenditure tracking limits performance-based fiscal analysis.
- **Non-Standard Accounts:** Across states and a lack of consolidated financial statements complicate cross-state comparisons.
- **Local Capacity Gaps:** Shortage of trained staff at the grassroots level hinders proper digital record-keeping.
- **Others:** Delays in setting up SFCs, lack of devolution, etc

Key Recommendations:

- **Performance Audit:** The CAG should audit the implementation of **73rd Constitutional Amendment** across states to evaluate the actual extent of local devolution.
- **Permanent SFC Cells:** States should set up **dedicated cells** to continuously maintain and update financial data.
- **Standardized Accounting:** Introduce uniform accounting heads for local transfers and adopt a common reporting template to ensure consistency and cross-state comparability.
- **Structured Performance Indicators:** Classify **Panchayat Advancement Index** metrics into "needs," "performance," and "equity" to help refine fiscal devolution formulas.

IMI-Resistant Mustard Hybrids



India is set to begin the wide-scale cultivation of Imidazolinone-Resistant (IMI-resistant) mustard hybrids.

- Mustard is a **major oilseed crop**. India imported around 16 million tonnes of edible oil, worth nearly ₹1.6 lakh crore in 2024-25.

About IMI Resistant Mustard Hybrids

- It is developed through a process called **mutation breeding**, in which scientists breed crops to preserve certain natural mutations.
- **Basis:** The process is based on an enzyme called **acetolactate synthase (ALS)**, which is essential for plant growth.
 - **Normal Plants:** IMI herbicides inhibit the ALS enzyme, disrupting growth and causing plant death.
 - **IMI-resistant Hybrids:** A mutation alters the ALS enzyme, preventing herbicide binding.
- **Advantages of IMI-Resistant Mustard Hybrids**
 - **Orobanche** is a **parasitic weed** that attaches to mustard roots and draws water and nutrients from the host plant.
- **Weed Management:** Enables efficient control of Orobanche/Phelipanche.
- **Lower Labour Dependence:** Minimizes need for labour-intensive manual weeding operations.
- **Other:** Enhanced Productivity, etc.

How are Hybrids different from Genetically Modified Crops?

- **Hybrids:** Developed by cross-breeding genetically distinct parent plants to combine desirable traits.
- **GM Crops:** Developed by directly **inserting** or **modifying genes** using **genetic engineering techniques**.
E.g., Bt cotton (gene from *Bacillus thuringiensis*), GM mustard
 - These are highly regulated due to biosafety and environmental concerns.

Crude Oil and Natural Gas in India



Union Government signs Tripartite Memorandum of Understanding (MoU) with Assam and Nagaland The MoU aims to facilitate exploration and production of crude oil and natural gas in the two states.

Crude Oil in India

- **Distribution In India** (India has **672.07 million tonnes** of estimated Reserves)
 - **Primarily concentrated** in: western offshore regions (31%) e.g. **Mumbai High field**
 - **State with the largest reserves**: Assam (21.5%), followed by Rajasthan, Gujarat
 - **Assam's** prominent oil fields: Digboi (oldest), Naharkatiya, Rudrasagar, Lakwa, and Lakhmani
 - **Rajasthan**: Barmer, etc.
 - **Gujarat**: Ankleshwar, khambat or Lunej field, Kalol, Mehsana, Aliabet etc.
- **Consumption**: India is the world's 3rd largest consumer of oil, 4th largest refiner, 3rd largest importer

Natural Gas (NG)

- **Domestic Production**: 51.4% of the total gas supply is produced domestically (gross production was 36.11 BCM in 2024)
- **Composition**: Mainly composed of **methane** (CH₄) with smaller amounts of natural gas liquids and nonhydrocarbon gases, like CO₂ and water vapor
- **Estimated reserves**: ~1,000 billion cubic meters
 - The largest reserves are in the **Western Offshore** region, followed by the Eastern Offshore.
 - **State with the largest estimated reserves**: Assam

Community Seed Banks

The Bureau of Indian Standards (BIS) has released IS 20201:2026, a voluntary standard providing guidelines for the establishment and management of Community Seed Banks (CSBs).



- BIS is India's national standards body responsible for formulating standards, certifying quality, accrediting laboratories, and promoting consumer protection.

About Community Seed Banks

- They are community-managed repositories that conserve, regenerate, and distribute local seed varieties.
- Act as an in-situ conservation mechanism for agrobiodiversity.
- Improve climate resilience and support sustainable agriculture.

Significance

- Helps conserve indigenous and traditional crop varieties.
- Enhances resilience against climate change impacts such as droughts, heat stress, and erratic rainfall.

Shangri-La Dialogue

India has signed a deal with Vietnam for supply of BrahMos at the Shangri-La Dialogue in Singapore.



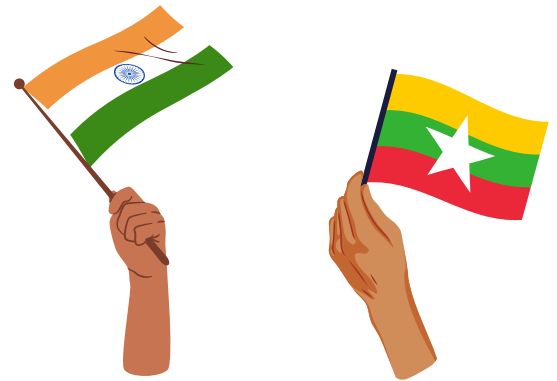
- BrahMos is a supersonic “Fire and Forget” cruise missile with Mach 2.8 speed, stealth capability and a 290 km range.

About Shangri-La Dialogue

- It is recognised as Asia's premier defence summit, held annually in Singapore and organised by International Institute for Strategic Studies (IISS).
- It brings together global defence leaders to discuss major security challenges.
- It serves as a platform for strategic debates, bilateral talks and defence cooperation.

India-Myanmar Relations

The Prime Minister of India and the President of Myanmar reviewed bilateral, regional and global issues of mutual interest including AI and Space.



- Both nations also welcomed the steady growth of the **Rupee-Kyat settlement mechanism** (operationalized in 2024) to facilitate easier bilateral trade.

Significance of India-Myanmar Relations:

- **Geo-strategic:** Myanmar lies at the confluence of India's **Neighbourhood First, Act East and MAHASAGAR** policies.
- **Connectivity:** **India-Myanmar-Thailand Trilateral Highway** and the **Kaladan Multi-Modal Project** to boost regional economic integration.
- **Security:** to manage **ethnic cross-border insurgencies** (along 1,643 km long border), check arms and narcotics smuggling (Golden Triangle) into northeastern states.
- **Cultural Soft Power:** Deep-rooted historical ties built around shared Theravada Buddhist heritage.

India–Oman CEPA



India–Oman CEPA recently entered into force.

About India- Oman CEPA

- **Oman's offer:** 99.38% of India's exports (by value) will receive immediate zero-duty access to Oman.
 - 100% FDI for Indian companies in major services sector in Oman.
- **India's offer:** Tariff liberalisation on 77.79% of tariff lines covering 94.81% of imports from Oman, while protecting sensitive sectors like dairy, oilseeds and cereals.

About India-Oman Trade Relations

- Oman is India's second-largest trading partner in Gulf with ~\$11 bn bilateral trade.
- Oman's logistics hubs at **Sohar, Duqm and Salalah** provide access to India to wider Gulf Cooperation Council and East African markets.

India-Nepal Disputed Border Areas

The Prime Minister of Nepal acknowledged encroaching on certain Indian territories.



About India-Nepal Border

- **Length:** The India–Nepal border stretches 1,751 km.
- **Boundary:** With 5 states (Sikkim, West Bengal, Uttar Pradesh, Uttarakhand and Bihar).
- **Mechi bridge** connect Panitanki Bypass(West Bengal) in India with Kakarvitta in Nepal.

Disputed Border Areas

- **West:** Kalapani-Limpiyadhura-Lipulekh tri-junction (Uttarakhand)
 - **Kalapani** is located near the India-Nepal-China tri-junction, giving it strategic importance.
 - **Limpiyadhura:** Northwest of Kalapani, claimed by Nepal as the true source of the Kali (Mahakali) River under the Treaty of Sugauli.
 - **Lipulekh** is also an important mountain pass. Used by Indian pilgrims travelling to Kailash Mansarovar in Tibet.
- **East:** Susta area (Bihar).

India–China Boundary Dispute

The 35th meeting of the Working Mechanism for Consultation & Coordination on India-China Border Affairs (WMCC) reviewed the situation in the India-China border areas.



About India-China Border Dispute

- **Origin:** Different perceptions of the Line of Actual Control as India shares second longest land boundary with China (3488 km) only after Bangladesh (4096.7 km).
 - **In 1865, when WH Johnson**, a civil servant with the Survey of India, proposed the 'Johnson Line', which placed Aksai Chin within Jammu and Kashmir which Chinese dynasty refused.
 - **In Simla meeting, 1914**, between British India, Tibet and, China; proposed line from Bhutan to Burma (now Myanmar) (McMahon Line) but opposed by China.
- **Conflict: 1962 India–China War** when China attacked India.
- **Disputed Areas:** (Along three sectors)
 - **Western Sector (Ladakh–Aksai Chin):** China controls Aksai Chin, which India claims as part of Ladakh.
 - **Middle Sector:** Kaurik Lahaul and Spiti Valley (Himachal Pradesh), Bara Hoti and Nelang Valley (Uttarakhand).
 - **Eastern Sector (Mainly Arunachal Pradesh):** China claims Arunachal Pradesh, especially the Tawang region, as "South Tibet" (Zàng Nán).
 - **Sikkim Sector:** Nathu La pass, the Naku La sector, Cho La, Mount Gipmochi, Batang La, and the Doklam Plateau (Situated at the crucial tri-junction of India, China, and Bhutan) and adjoining Jampheri Ridge.

Principles India Should Follow for Dispute Settlement

- **Preserve the 2005 Framework:** A package settlement through a three-step process: political parameters, a settlement framework, and final delineation and demarcation of the boundary.
- **Focus on LAC Stability:** Make peace and tranquility on the LAC a precondition for progress; oppose unilateral changes and persistent buffer zones.
- **Seek a Comprehensive Political Settlement:** Push for meaningful political negotiations on the entire boundary issue.

India-Middle East-Europe Economic Corridor

**Future of India-Middle East-Europe Economic Corridor (IMEC) amid the Middle Eastern War
The Iran conflict strengthens the case for the IMEC while simultaneously complicating its execution.**

About India-Middle East-Europe Economic Corridor (IMEC)

- **IMEC is a multi-modal connectivity project** aimed at developing infrastructure of ports, railways, roads, sea lines and pipelines to enhance trade **between India, the Arabian Peninsula, the Mediterranean region and Europe.**
- **Announcement:** During the G20 Summit 2023, held under the presidency of India.
- **Signatories:** India, the United States, Saudi Arabia, the United Arab Emirates, France, Germany, Italy, and the European Union.
- **Two Key Corridors:**
 - The **East Corridor** connects India to the Arabian Gulf (linking South Asia and the Middle East).
 - The **North Corridor** extends from the Gulf to European markets.
- **Significance for India:** Estimated to **reduce transportation time by 40% and logistics costs by 30%**, providing an **alternative to congested routes (such as the Suez Canal).**

Current Vulnerabilities in IMEC:

- **Escalation of Iran- Israel War:** have intensified into a broader regional war, threatening IMEC's proposed transport corridors.
- **Trade Route Disruption:** Strategic chokepoints (**Strait of Hormuz**) have triggered spikes in oil prices and shipping risks, **undermining IMEC's economic feasibility.**
- **Breakdown of Regional Cooperation:** Strained critical diplomatic ties between Israel and Arab nations, stalling coordinated infrastructure development.
- **Execution Challenges:** Diverse stakeholder interests (between UAE and Saudi Arabia) further complicate the funding and timely execution of IMEC projects.

Way Forward

- **Strengthen West Asian Diplomacy:** Promote regional dialogue and cooperation to ensure the stability required for smooth project execution.
- **Phased Development:** Prioritize key infrastructure segments first to build momentum and show early results.
- **Deepen Partnerships:** Enhance economic and trade ties with key partners like the European Union and Gulf nations.

India- Venezuela Relations



Indian Prime Minister held talks with the Acting President of Venezuela in New Delhi and reviewed the full spectrum of bilateral relations and emphasizing cooperation within the Global South.

About India- Venezuela Relations

- **Bilateral trade:** US\$ 678.94 million (FY 2025-26) with Indian exports of US\$ 210 million
 - **India's exports:** Mineral fuels & oils, pharmaceuticals, cotton, and nuclear reactors/machinery.
 - **India's imports:** Crude oil, mineral waxes, iron & steel, aluminium, vegetables, copper, lead, and zinc.
- **Energy Partnership:** Venezuela possesses one of the **world's largest proven oil reserves**, and has **emerged as the 3rd largest oil supplier to India in May 2026**.
- **Cultural & People-to-People Ties:** Several spiritual organizations such as Sathya Sai Organization, Brahma Kumaris, and Radha Soami Satsang have established centres in Venezuela.

India–UK Critical Minerals GSCO



The India–UK Critical Minerals Global Supply Chain Observatory (GSCO) was formally launched.

- It was announced during the **India–UK Prime Ministers' bilateral engagement** in 2025 and formalized through a Research Collaboration Agreement signed in March 2026.

About Critical Minerals GSCO

- It is a **joint initiative of TEXMiN (TTRP, DST), IIT (ISM) Dhanbad, and the University of Cambridge**.
- **Aim:** To create a **data-driven platform** for monitoring and analysing global critical mineral supply chains.
- **Significance:** Identify supply risks and disruptions; generate market intelligence; support informed decision-making; and advance the goals of the National Critical Mineral Mission (NCMM).

Indus Water Treaty

Pakistan has accused India of violating the Indus Water Treaty (IWT) as India plans to divert Chenab river water to the Beas river.



- India put the IWT in "**abeyance**" after the Pahalgam terror attack.

About IWT

- **Origin:** Signed in 1960 between India and Pakistan mediated by the World Bank.
- **Governs sharing of Indus Basin rivers:** Sutlej, Beas, and Ravi (Eastern Rivers), and Indus, Jhelum, and Chenab (Western Rivers).
 - **India has unrestricted rights over the Eastern Rivers**, while the Western Rivers are largely reserved for Pakistan, subject to limited uses by India.
- **Three-tier mechanism for Dispute resolution:** Permanent Indus Commission (PIC), Neutral Expert, and Court of Arbitration for unresolved disputes.

Qeshm island

The US attacked surveillance facilities on Qeshm Island.



About Qeshm Island

- **Location:** Southern edge of the Zagros Mountain range, along sides the south coastline (Hormozgan) of the Iranian mainland.
- It is the biggest island in the **Persian Gulf near the straits of Hormoz**.
- It is also known as the "**island of seven wonders**".

Cambodia

NPCI partnered with ACLEDA Bank to launch Unified Payments Interface (UPI) acceptance in Cambodia.



• Political Features

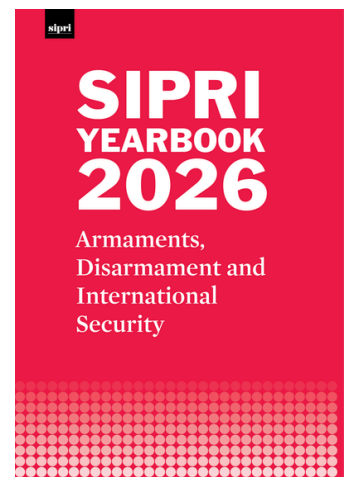
- **Location:** It is located in the **southern portion of the Indo China Peninsula in Southeast Asia**.
- **Bordering Countries:** Vietnam (east and southeast), Laos and Thailand (North).
- **Bordering Water Body:** Gulf of Thailand.

• Geographical Features

- **Major rivers:** Mekong and Tonle Sap.
- **Major mountains:** Dangrek Mountains, Krâvanh (Cardamom) and Dâmrei Mountains.
- **Highest Point:** Phnom Aural.
- **World Heritage Sites:** Angkor (including Temple of Angkor Wat), Temple of Preah Vihear (dedicated to Lord Shiva).

SIPRI Yearbook 2026 Released

Stockholm International Peace Research Institute
(SIPRI) Yearbook 2026 Released



Key Highlights of the Report

- **Total Nuclear Weapons:** approximately **12,187 nuclear warheads** as of January 2026.
 - **India** increased its nuclear warheads to an estimated **190 (China 620, Pakistan 170)**, of which **12 warheads are deployed on missiles**.
- **Global Military Expenditure:** reached a record **US\$ 2.9 trillion in 2025**, marking the **11th consecutive year of increase**.
 - India ranked as the **5th largest military spender globally with US\$ 92.1 billion in 2025 (USA-Largest at \$954 billion)**.
 - **Arms Imports:** India remained the **2nd largest arms importer (~8% share)** in the world after Ukraine.
 - **Arms Exports:** **USA (42% share)**, France, Russia, Germany and China accounted for **70%**.
- **Global Armed Conflict:** The number of interstate armed conflicts doubled from **3 in 2024 to 6 in 2025**, highlighting rising geopolitical instability.
- **Techno-Strategic Warfare:** Growing use of **AI, drone swarms, autonomous weapons, cyber tools, and weaponization of critical minerals, semiconductors and supply chains** is reshaping modern warfare and geopolitical competition.

Global Mechanisms for Nuclear Disarmament

- **UNODA (United Nations Office for Disarmament Affairs):** Promotes global disarmament and supports arms-control implementation.
- **CD (Conference on Disarmament, 1978):** Main multilateral forum for negotiating arms-control and disarmament agreements.
- **Major Treaties**
 - **NPT (Treaty on the Non-Proliferation of Nuclear Weapons, 1968):** Prevents nuclear weapon spread while promoting peaceful nuclear use and disarmament.
 - **CTBT (Comprehensive Nuclear-Test-Ban Treaty, 1996):** Bans all nuclear test explosions.
 - **TPNW (Treaty on the Prohibition of Nuclear Weapons, 2017):** Bans the development, possession, stockpiling and use of nuclear weapons.

India's FTA Challenges

With the India-Oman agreement taking effect on June 1, India now has 15 FTAs covering 27 countries.



- However, India's FTAs face scrutiny due to growing **trade deficits, increased imports, and domestic manufacturing strain.**

Challenges with FTAs

- **Rising Trade Deficit:** In FY2025, India recorded a **trade deficit of over \$50 billion** with UAE, Australia, Mauritius and EFTA countries.
 - India's **average annual trade deficit** with ASEAN, Japan and South Korea reached **nearly \$62 billion** in the last three years.
 - **South Asia remains the major exception**, where India's **trade surplus expanded from \$6.7 billion to \$20 billion** during the same period.
- **Tariff Asymmetry:** FTA reduces India's high import duties, making foreign goods cheaper in India, while Indian exports gains little in countries where tariffs were already low.
- **Low Utilisation by Indian Exporters:** Only **20-30% of eligible Indian exports** use FTA preferences because **compliance costs** often outweigh tariff benefits.
- **Inverted Duty Structure:** Higher duties on raw materials and lower duties on finished goods **increase costs for domestic manufacturers.**
- **Shift of Manufacturing Abroad:** Firms increasingly prefer **Make in ASEAN, Sell in India** due to cheaper production and duty-free access to Indian markets.

Way Forward

- **Tariff Rationalisation:** Align tariffs on industrial inputs with FTA commitments to strengthen domestic supply chains and reduce inverted duty structures.
- **Ease of Compliance:** Simplify FTA compliance rules such as rules of origin and others for Indian exporters.
- **Boost Domestic Manufacturing:** Strengthen industrial competitiveness under Make in India initiatives.

Indian Ideas Across Southeast Asia

Ancient Maritime trade connections between the two witnessed not only the establishment of key trading settlements in ports like Funan (present-day Cambodia), Srivijaya (Sumatra), but also led to exchange of ideas between 500 AD to 1500 AD.

- Inscriptions like **Veal Kantel (Cambodia)**; **Yupa (Indonesia)**; **Devanika (Laos)** bear a testimony to it.

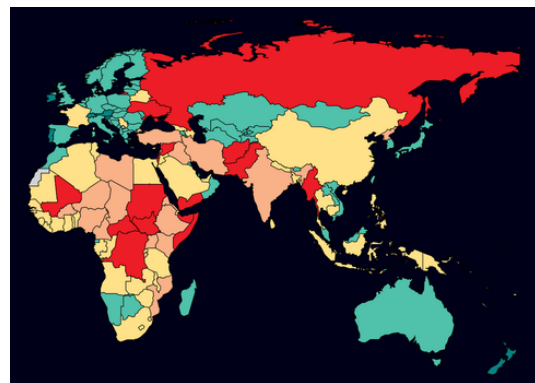
Impact of Indian Ideas in Southeast Asia in Key areas

- **Language and Literature:** Many Southeast Asian languages, including **Thai, Khmer, Malay, Javanese, and Balinese**, borrowed extensively from Sanskrit.
 - Indian epics like **Ramayana** and **Mahabharata** were translated and adapted into local literary traditions.
- **Religious Adaptations:**
 - Temple complexes built by **Cham Civilization (Vietnam)** like **My Son Sanctuary** was dedicated primarily to **Shiva** with **Sanskrit Inscriptions** and **Linga worship**.
 - **Angkor Wat Temple Complex (Cambodia)** was originally dedicated to **Vishnu**; **Angkor Thom** and the **Bayon temple** later expressed **Buddhist influence**.
 - Sites like **Dvaravati in Thailand** reflected **strong Buddhist presence**.
 - Plains of **Bagan in Burma (Mynamar)** contained thousands of temples and stupas.
 - **Borobudur**, a massive **Buddhist monument** built by **Sailendra dynasty of Java, Indonesia**.
- **Political Adaptations:** Religion legitimised kingship where king was seen as **devaraja, or god-king**, echoing Indian ideas adapted to local political needs.
- **Performing Arts:** Graceful movements, intricate hand gestures, and storytelling aspects of Indian dance were incorporated into dance forms like **Thai and Cambodian classical dance (Apsara dance)**.
 - Music and musical instruments, including **sitar, tabla, and mridangam**, also found way into **Southeast Asian musical traditions**.
- **Architecture:** Sites like **Angkor Wat, Borobudur, and My Son temples**, focused on **Indic iconography and sacred architecture**.



Global Peace Index

India is ranked 127th in the 2026 Global Peace Index.



About Global Peace Index (GPI) 2026

- **Published By:** The Institute for Economics & Peace, an independent and non-partisan think tank.
- **Coverage:** 20th edition ranking 163 countries.
- **Purpose:** Measures global peacefulness and its economic impact.
- **Top Performers:** Iceland ranked first for the 19th consecutive year, followed by New Zealand, Switzerland, Slovenia, and Ireland.
- **Bottom Performers:** Russia ranked last, followed by Sudan, the Democratic Republic of the Congo, Ukraine, and Israel.
- **Methodology:** Based on 23 indicators across three domains—Societal Safety & Security, Ongoing Domestic & International Conflict, and Militarization.

Global Economic Prospects Report

According to the latest Global Economic Prospects (GEP) report, India's 2026-27 growth forecast raised to 6.6% from 6.5%.



- India is projected to remain the world's fastest-growing major economy.

About the Global Economic Prospects Report

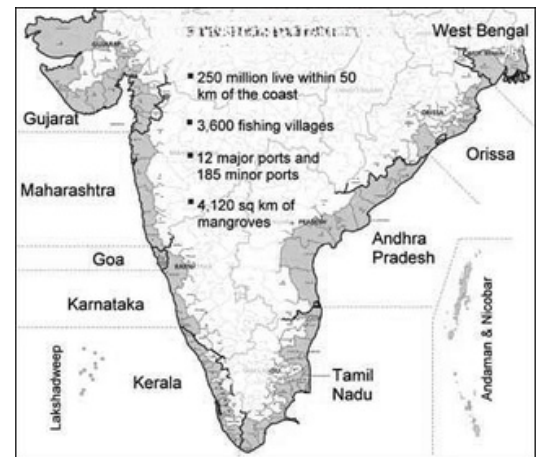
- **Published by** the World Bank Group on a semiannual basis (in January and June).
- **Purpose:** Comprehensively examines global economic developments and prospects.

Report key highlights

- **Global Forecast:** Downgraded to 2.5% (from 2.9% in 2025), marking the weakest economic expansion since the Covid-19 pandemic.
- **Rising Fiscal & External Pressures:** South Asian economies, including India may face wider fiscal deficits due to higher energy subsidies and weaker external balances.

Climate Change Impact on India's Coastal Region

Azim Premji University's recent study warns of severe, hyper-local climate shifts across India's 11,000-km coastline.



Key Highlights

- **Coastal Erosion:** A 15 cm sea-level rise by 2050 will rapidly accelerate shoreline loss.
- **Cyclones:** Rapid ocean warming ($0.27^{\circ}\text{C}/\text{decade}$) is fueling more intense tropical storms.
- **Temperature Anomalies:** Around 40 districts will see summer peaks spike by $>1^{\circ}\text{C}$, approaching unsafe humidity-heat thresholds.
- **Polarized Rainfall Pattern:** While average precipitation will increase, the growth is concentrated on the western Coast.
- **Salinity:** Cyclone-driven storm surges are forcing seawater into fresh groundwater (e.g., **Sundarbans**), ruining drinking supply.

Ground-Level Ozone (O_3)

A recent analysis highlighted that ground-level ozone is emerging as a major air pollution challenge in Delhi.



About Ground-Level Ozone (O_3)

- It is a **secondary air pollutant (found in the troposphere)** formed by reactions between **Nitrogen Oxides (NO_x)** and **Volatile Organic Compounds (VOCs)** in the presence of sunlight.
 - **Formation:** $\text{NO}_x + \text{VOCs} + \text{Sunlight} \rightarrow \text{Ozone } (\text{O}_3)$
- **Major sources:** vehicles, industries and thermal power plants.
- Peaks **during summer** due to intense solar radiation.
- **Impact:** respiratory ailments, crop damage and photochemical smog.
- Unlike **stratospheric ozone** ("Good Ozone"), which shields Earth from UV rays, ground-level ozone is a **harmful pollutant** ("Bad Ozone").
- **Safe Limit:** $100 \mu\text{g}/\text{m}^3$ for 8-hourly monitored value and $180 \mu\text{g}/\text{m}^3$ for 1-hourly monitored value, both under WHO Standards as well as National Ambient Air Quality Standard (NAAQS), 2009.

Majuli Island

Recently a study reconstructed 4,000 years of climate history of Majuli Island using sediments from Sakali Wetland.



About Majuli Island

- World's largest river island located in Assam.
- It became India's first river island district in 2016.
- Bounded by Subansiri and its tributaries Ranganadi, Dikrong, Dubla, Chici and Tuni etc. on North west;
 - Kherkatia Suli (spill channel of Brahmaputra) in northeast and Brahmaputra on South and South west.
- **Key Features:** Region of fluvial geomorphology; formation of islets locally called Chaporis, hub of Assamese neo-Vaishnavite culture (known for tradition of Satras), etc.
- Included in Tentative List of UNESCO World Heritage Sites in 2004.

Blue Micromoon

A rare Blue Micromoon was observed globally on May 31, 2026, including in India.

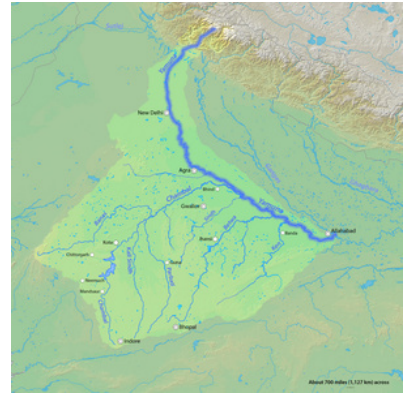


About Blue Micromoon

- **Blue Moon:** It refers to the second full moon within a single calendar month, which typically happens every 2-3 years.
- **Micromoon:** This phenomenon occurs when a full moon coincides with its 'apogee' (the farthest orbital distance from Earth) making it appear smaller and dimmer.
- **Blue Micromoon:** The simultaneous convergence of a Blue Moon and a Micromoon, it is an exceptionally rare celestial event.
 - Despite its name, the Moon does not appear blue unless unusual atmospheric conditions exist.

Yamuna River

Union Home Minister calls for joint action by Delhi, Haryana, and Uttar Pradesh to rejuvenate the Yamuna.



About Yamuna

- **Origin:** Yamunotri Glacier near Bandarpunch Peak in the Garhwal Himalayas, at an altitude of about 6,387 m.
- **Length:** 1,376 km, making it the **longest tributary of the Ganga**.
- **Confluence:** Joins the Ganga River at Triveni Sangam, Prayagraj (Uttar Pradesh).
- **Himalayan Tributaries:** Rishi Ganga, Hanuman Ganga, Tons and Giri.
- **Plain Tributaries:** Hindon, Chambal, Sind, Betwa and Ken.
- **Largest Tributary:** Tons River, contributing **nearly 60% of Yamuna's water flow**.
- **Basin States:** Uttarakhand, Himachal Pradesh, Haryana, Delhi, Uttar Pradesh, Rajasthan and Madhya Pradesh.
- **Unique Feature:** Longest river in India that **does not directly flow into the sea**.

El Niño

The World Meteorological Organization (WMO) has warned of an 80% probability of El Niño developing in the coming months.

- El Niño and La Niña are opposite phases of the **El Niño–Southern Oscillation (ENSO)**.
- **Southern Oscillation** is a coherent inter-annual fluctuation of atmospheric pressure over the tropical Indo-Pacific region.

El Niño

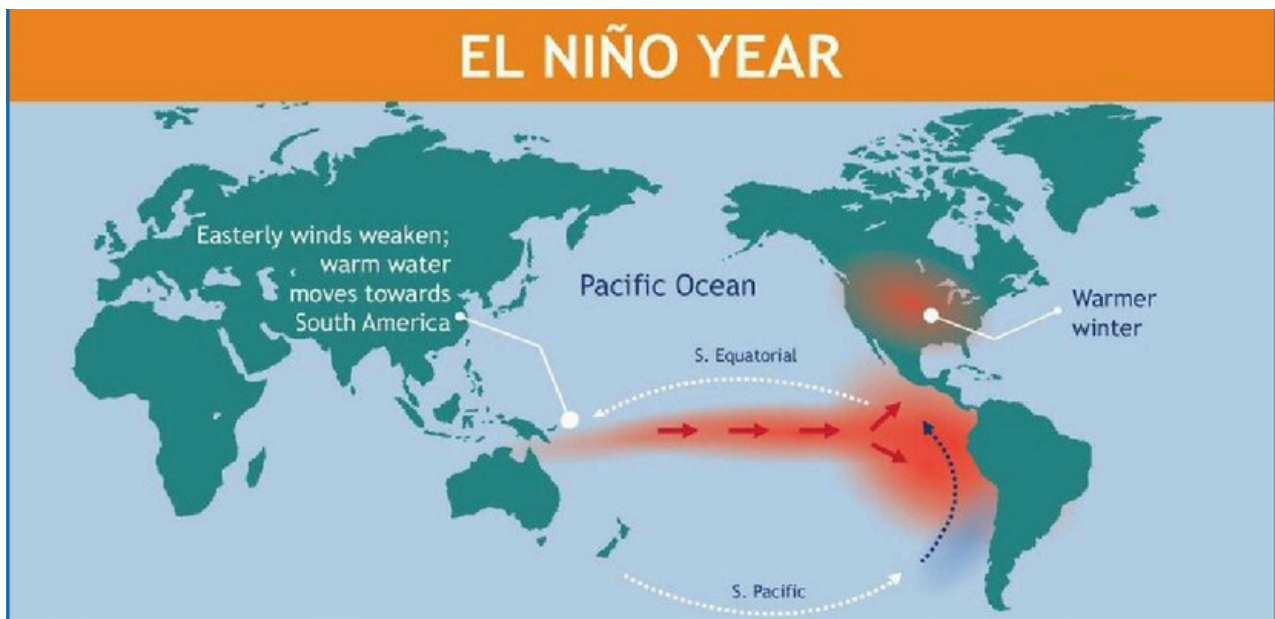
- El Niño means “Little Boy” in Spanish.
- Characterized by warming of sea surface temperatures in the **central and eastern equatorial Pacific Ocean**.
- Occurs every 2–7 years and typically lasts 9–12 months.
- Usually develops between March and June and peaks during November–February.

La Niña

- La Niña means “Little Girl” in Spanish.
- Characterized by cooling of sea surface temperatures in the central and east-central equatorial Pacific Ocean.

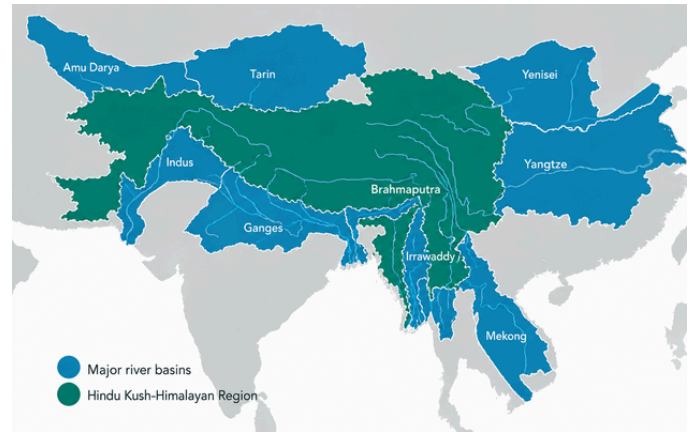
Impact of El Niño

- **Global:**
 - **Wetter conditions** in parts of southern South America, the southern United States, etc.
 - **Drier conditions** in northern South America, the Caribbean, Australia, and parts of South Asia.
 - **Weakened upwelling** (off the coast of Peru) reduces the supply of cold, nutrient-rich water, leading to lower **phytoplankton productivity** and disruption of marine food chains.
- **On India:**
 - It is associated with **below-normal southwest monsoon rainfall**, disrupting agriculture and water management.
 - On the other hand, **La Niña** strengthens the Indian monsoon, resulting in above-normal rainfall.
 - Increased risk of **extreme weather events** such as cyclones, wildfires etc., causing human and economic losses.



Hindu Kush Himalaya region

International Centre for Integrated Mountain Development (ICIMOD) released the **Climate Finance Synthesis Report (2025)** Report highlights the large climate finance requirements and funding gaps in the Hindu Kush Himalaya (HKH) region.



Key Findings of the report

- The HKH region requires **USD 12.065 trillion by 2050**, for climate mitigation and adaptation, amounting to an annual average of USD 768.68 billion.
 - China and India represent over 92.41% of these needs with India alone requiring USD 101.92 billion per year of climate finance.
- **Climate Finance Gap:** Existing climate finance flows are far below requirements despite global climate finance reaching **USD 1.3 trillion annually**.
- **Underfunded Sectors:** Sectors crucial to the region, such as adaptation, agriculture, water management, and disaster risk reduction, remain significantly underfunded despite their critical importance.
- **Recommendations:** Establishing an HKH Climate Finance Network, leveraging innovative financial instruments such as green and blue bonds, debt-for-climate swaps, and voluntary carbon markets etc.

About Hindu Kush Himalaya (HKH) region

- The Hindu Kush Himalaya (HKH) is a transboundary mountain system stretching across **Afghanistan, Bangladesh, Bhutan, China, India, Myanmar, Nepal and Pakistan**.
- Often referred to as the “**Third Pole**” as it contains the **largest ice reserves outside the Arctic and Antarctic**.
- **Extent:** Spans over **3,500 km** across Asia.
- **River Systems:** Source of **10 major Asian river systems**, including the **Indus, Ganga, Brahmaputra, Yangtze, and Mekong**.

Significance of HKH region

- **Water Security:** Sustains major river basins supporting billions of people across Asia.
- **Climate Regulator:** Influences regional climate patterns, including the Asian monsoon system.
- **Biodiversity Hotspot:** Hosts rich biodiversity and several globally important ecosystems.

Threats to HKH

- **Glacier Retreat:** Rising temperatures are accelerating glacier melt and snow loss, increasing risks of **Glacial Lake Outburst Floods (GLOFs)**.
- **Extreme Weather Events:** Rising frequency of floods, droughts, landslides and heat stress.
- **Biodiversity Loss:** Habitat degradation and climate change threaten ecosystems and species.

Illegal Sand Mining

Illegal Sand Mining in National Chambal Sanctuary SC took suo motu cognizance and severely reprimanded states of Rajasthan, Madhya Pradesh, and Uttar Pradesh over persistent illegal sand mining in and around National Chambal Gharial Sanctuary.



About Illegal Sand Mining

- **Legal Status:** Sand is classified as a **minor mineral** under Mines and Minerals (Development and Regulation) (MMDR) Act, 1957.
- **Definition:** Under **Minerals Concession Rules, 2016**, **illegal mining** means reconnaissance, prospecting, or mining without the required mineral concession.
 - As per **MMDR Act**, extraction or transportation of minerals without a valid prospecting licence, mining lease, composite licence, or in violation of rules under **Section 23C (rules made by state governments)** constitutes illegal mining.
- **Implications:** Causes ecological degradation, biodiversity loss, law-and-order challenges due to mining mafias, and socio-economic costs including revenue loss etc.

Protection Against Illegal Sand Mining

- **Guidelines:** MoEFCC's **Sustainable Sand Mining Management Guidelines (2016)** and **Enforcement & Monitoring Guidelines (2020)**.
- **Technology-Based Monitoring:** The **Mining Surveillance System (MSS)** uses satellite imagery.
- **Mineral Conservation and Development Rules, 2017:** It mandates end-to-end mineral accounting.
- **Penalties:** The **MMDR Amendment Act, 2015** provides for higher fines, imprisonment up to 5 years, and special courts for speedy trials.

National Chambal Gharial Sanctuary

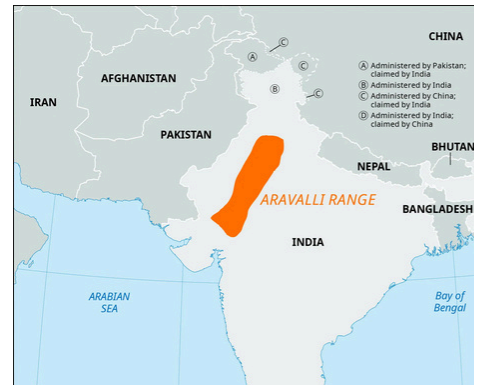
- It is a protected area **established in 1979**.
- **Location:** Located on the Chambal River near the tri-point of Rajasthan, Madhya Pradesh and Uttar Pradesh.
- **Other species:** Red-Crowned Roofed Turtle, Ganges river dolphin etc

About Gharial (*Gavialis gangeticus*)

- **Range:** In **tributaries of Ganga River** – Chambal and Girwa Rivers in India and Rapti-Naryani River in Nepal.
- **Conservation status:** IUCN (Critically Endangered); WPA (Schedule I and IV); CITES (Appendix I).

Importance of the Aravalli

Recently, massive dust storms in parts of Rajasthan highlighted the ecological importance of the Aravalli Range.



- This storm has been caused by Western Disturbances that brought high-speed winds and upward surge of hot air due to heating in Western Rajasthan.
- The Aravallis act as a **natural barrier between the Thar Desert and the Indo-Gangetic plains** whose degradation has increased intensity of such storms in Delhi and northern plains in the past.

Importance of the Aravalli Range

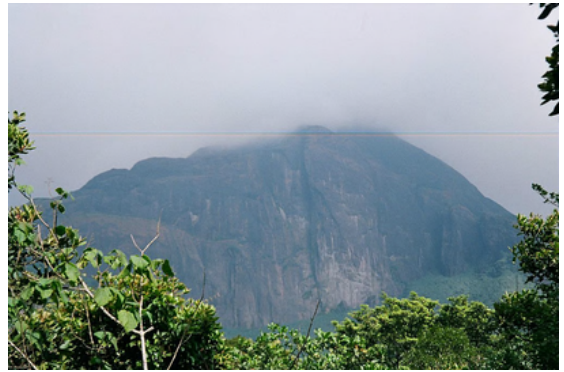
- **Geographical Importance:** It is one of the world's oldest fold mountain ranges that extends from Gujarat to Delhi over nearly 700 km.
- **Barrier Against Desertification:** The Aravallis prevent the eastward spread of the Thar Desert and reduce dust storms in northern India.
- **Ecological Importance:** The range supports rich biodiversity through forests, grasslands and wildlife habitats.
- **Hydrological Importance:** The range acts as a major watershed and is the source of rivers like Sabarmati, Luni and Banas.
- **Economic and Cultural Importance:** They support agriculture, livestock and mining while hosting important cultural and religious sites.

Measures to Protect the Aravallis

- **Aravalli Green Wall Initiative:** Large-scale restoration programme by MoEFCC focusing on Afforestation, Grassland restoration, Wetland restoration etc.
- **Control on Mining :** Strict regulation of illegal mining and encroachments along with enforcement of Supreme Court directives.
- **Soil Conservation:** Construction of check dams, contour trenches and rainwater harvesting structures.

KEY DRIVERS OF ARAVALLI ECOSYSTEM DEGRADATION		
CAUSE	EFFECT ON THE ARAVALLI ECOSYSTEM	
 UNREGULATED MINING ACTIVITIES	Extensive mining has adversely affected hills, forest cover, soil health, and groundwater reserves.	
 FOREST COVER REDUCTION	Declining forest areas have weakened the region's natural defense against desert expansion.	
 URBAN EXPANSION AND LAND ENCROACHMENT	Rapid growth of settlements has disturbed forest and grassland habitats.	
 UNSUSTAINABLE GRAZING PRACTICES	Excessive livestock grazing has diminished vegetation and accelerated land degradation.	
 ECOSYSTEM FRAGMENTATION	Breaks in habitat continuity have disrupted wildlife movement and heightened human-animal interactions.	

Agasthyamalai Biosphere Reserve



Supreme Court ordered immediate removal of encroachers and demolition of illegal structures across Agasthyamalai landscape comprising Agasthyamalai BR.

About Agasthyamalai Biosphere Reserve

- Located in southern Western Ghats, in Tamil Nadu and Kerala.
- Included in the World Network of Biosphere Reserves under UNESCO's Man and Biosphere (MAB) Programme (2016).
- The reserve includes three wildlife sanctuaries, Shendurney, Peppara and Neyyar, as well as the Kalakad Mundanthurai Tiger Reserve.

Martens

Yellow-throated marten was recently sighted for the very first time in the Kaziranga National Park and Tiger Reserve in Assam (UNESCO World Heritage Site).



Yellow-throated Marten (*Martes flavigula*)

- It is a diurnal and arboreal member of the mustelid family, a group of carnivorous mammals.
- **Features:** Golden-yellow throat, long tail, and defensive scent glands.
- **Behaviour:** Fearless, highly social, often hunts in pairs or small groups.
- **Ecological Role:** Functions as a **mesopredator**, controls rodent populations, aids **seed dispersal**, etc.
- **Distribution:** Found across Southeast Asia, eastern Russia, China, and the Korean Peninsula; in India, occurs mainly in the **Himalayas and Northeast**.
- **Conservation Status:** IUCN (Least Concern); protected under **Schedule II of the Wildlife (Protection) Act, 1972**.
- **Threats:** Habitat fragmentation, deforestation, and human encroachment.

Peatlands

On World Peatlands Day (2 June), the Food and Agriculture Organization highlighted the critical role of peatlands.



About Peatlands

- Peatlands are **waterlogged wetland ecosystems** formed from partially decomposed organic matter (peat).
 - Include **bogs, fens, mires and swamps**.
- **Functions:**
 - Cover only **3–4% of the Earth's land surface** but store nearly **30% of global soil carbon**.
 - **Carbon sinks:** Hold twice the carbon stock of the world's entire forest biomass.
 - Regulate climate, **water flow, reduce floods and droughts**, and support biodiversity.
- Degradation of peatlands releases **significant greenhouse gas emissions** and undermines ecosystem services.

Climate Finance in India

India requires adequate climate financing for energy transition, emissions reduction, climate adaptation and sustainable development.



Government Initiatives

- **National Adaptation Fund for Climate Change (NAFCC):** To support adaptation activities in the States and Union Territories (UTs) vulnerable to the adverse effects of climate change.
- **National Clean Energy and Environment Fund (NCEEF):** Finances and promotes clean energy, renewable energy technologies and related research and innovation in India.
- **Sovereign Green Bonds (SGBs):** Issuance of **₹477 billion SGBs** to finance green projects.
- **Priority Sector Lending (PSL) framework:** Includes Green activities and sovereign green bonds.
- **Others:** Climate Finance Taxonomy and Green Steel Taxonomy; RBI's Climate Finance and Climate Risk Management Directions (2025) etc.

Challenges

- **Massive financing gap** and inadequate international climate finance commitments.
- **Lack of a comprehensive climate finance architecture** and clear green classification.
- **Limited private-sector participation** due to high risks and low profitability of green technologies.
- **Inadequate integration of climate risks** into financial decision-making.
- **Other challenges:** Risk of greenwashing; limited borrowing capacity and access to states; etc.

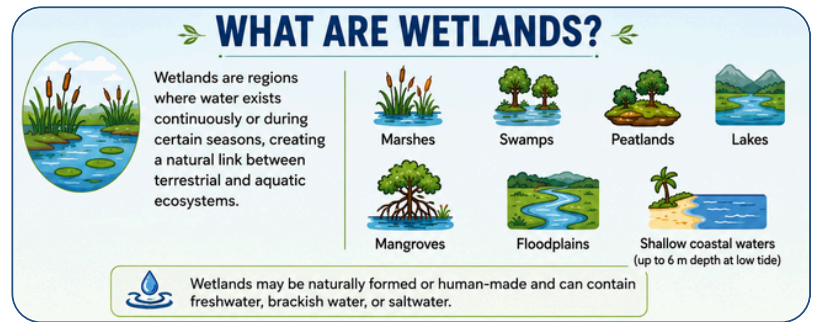
Conclusion

India can bridge its climate finance gap by swiftly implementing a robust Climate Finance Taxonomy, strengthening RBI's green finance regulations, expanding support for climate adaptation through PSL, establishing a dedicated State Climate Finance Facility and scaling up sovereign green bonds.

Major Global Climate Finance Mechanisms

- **Green Climate Fund (GCF):** Funds climate mitigation and adaptation projects.
- **Global Environment Facility (GEF):** Supports climate, biodiversity, and environmental projects.
- **New Collective Quantified Goal (NCQG):** Commits \$300 billion by 2035.
- **Others:** Adaptation Fund (AF); Least Developed Countries Fund (LDCF); Special Climate Change Fund (SCCF) etc.

Jai Prakash Narayan Bird Sanctuary



Jai Prakash Narayan Bird Sanctuary
designated as India's 100th Ramsar site

About Jai Prakash Narain Bird Sanctuary (Surha Tal)

- It is a **natural, perennial oxbow lake** (U-shaped waterbody formed when a wide meander from a river is cut off).
- Location:** Ballia district, Uttar Pradesh
- Origin:** Consolidated in **1991** from the land areas of 45 villages as Surha Tal. Renamed in 2002 to honour activist and political leader, Jai Prakash Narayan.
- Area:** ~3432 hectares which **expands to ~25,000 hectares during monsoons**.
- Significance:**
 - Rich avifaunal biodiversity:** Vital wintering ground for migratory birds traveling along the **Central Asian Flyway**.
 - Notable fish include the vulnerable **Wallago attu** and **Bagarius bagarius**.
 - The abundance of fish attracts the **vulnerable fishing cat (Prionailurus viverrinus)**.
 - Major source of **irrigation and groundwater recharge**.
 - Historical, cultural, and religious value.

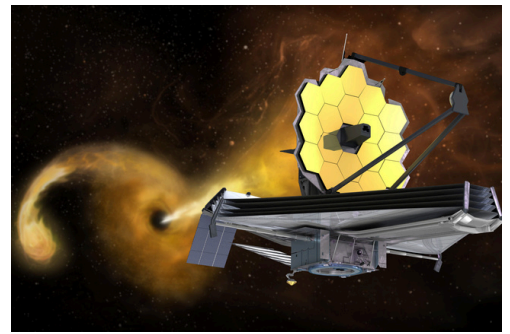
About Ramsar Convention

- It is the **intergovernmental treaty** that provides the framework for the **conservation and wise use of wetlands and their resources**.
- It was adopted in the **Iranian city of Ramsar in 1971** and came **into force in 1975**.
 - India ratified the Convention in **1982**.
- Three Pillars**
 - Conservation of **wetlands of international importance**.
 - Wise use** of all wetlands.
 - International cooperation** on shared wetlands and migratory species.
- Criteria:** A wetland must meet at least one of nine criteria established by the Convention.



James Webb Space Telescope

JWST Detects Weather Patterns on Exoplanet WASP-94A b Located 700 Light-Years Away

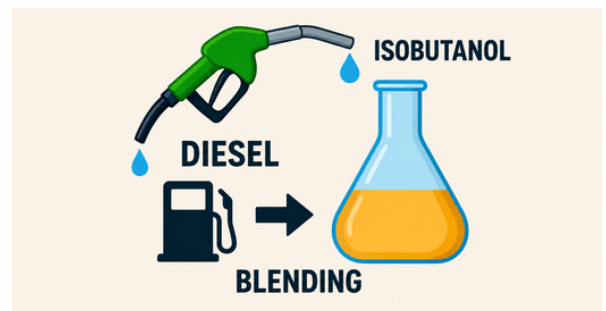


About James Webb Space Telescope (JWST)

- JWST is the largest, most powerful, and most advanced space telescope ever launched.
- **Partnership:** Joint mission of NASA, European Space Agency (ESA), and Canadian Space Agency (CSA).
- **Launch:** 25 December 2021.
- **Location:** Operates at Lagrange Point 2 (L2), about 1.5 million km from Earth.
- **Objectives:** Study the early universe, galaxy evolution, star formation and death, and exoplanets/planetary systems to understand cosmic history and the potential for life beyond Earth.

Isobutanol

India is likely to introduce blending of isobutanol with diesel.



About Isobutanol

- Isobutanol is a **four-carbon alcohol** ($C_4H_{10}O$), making it a **higher alcohol** compared to ethanol, which contains only two carbon atoms.
- Can be produced from **renewable sources** like biomass, agricultural waste, or through **processes linked to ethanol or sugarcane production**.
- **Uses:** Industrial solvents in products like paints, coatings; **potential biofuel** for transportation, etc.
- **Suitability in Blending with diesel:** Blends **uniformly without any additional additives**, **higher energy content**, **less volatile and corrosive** offering higher compatibility with existing engines and fuel infrastructure.

Rudram II

India successfully flight-tests indigenous RudraM-II Missile.

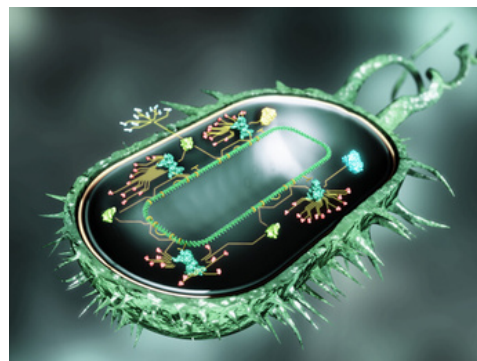


About RudraM-II

- Indigenous **air-to-surface missile** launched from an airborne platform.
- **Developed By:** Research Centre Imarat, Hyderabad a nodal laboratory of Defence Research and Development Organisation (DRDO) and other organizations.
- **Significance:** Strengthens India's indigenous defence capability and advances **Aatmanirbhar Bharat** in advanced weapon systems.

Synthetic Biology

Understanding of genes, cells, along with advances in AI have caused engineering cells and organisms on a genome-wide scale with desired properties.



About Synthetic Biology

- **Meaning:** Involves **redesigning organisms for useful purposes** by engineering them to have **new abilities**.
 - E.g. harnessing microorganisms for **bioremediation to clean pollutants**, modifying rice to **produce beta-carotene** for preventing Vitamin A deficiency, etc.
- **Comparison with Genome Editing:**
 - In synthetic biology, scientists **typically stitch together long stretches of DNA** (already found in an organism or entirely novel) and insert them into an organism's genome.
 - In genome editing, scientists **typically use tools to make smaller changes** (delete or add small stretches of DNA) to organism's own DNA.

Challenges and Concerns Associated with Synthetic Biology

- **Affordability** Personalized therapies could be **particularly expensive**.
- **Biosafety:** Potential **unintended risks of releasing genetically engineered microorganisms** into environment.
- **Biosecurity Risks:** Empower nefarious actors to **develop bioweapons** (e.g. by accelerating development of toxins).
- **Cyberbiosecurity:** Due to **growing interaction between biology and automation**.
- **Ethical challenges:** Issues regarding **engineering life, equity and distribution of risk, benefits, and access**, etc.

MAJOR APPLICATIONS OF SYNTHETIC BIOLOGY		
DOMAIN	APPLICATION AREA	BRIEF DESCRIPTION
 HEALTHCARE	 Precision Cell and Gene Treatments	Customized genetic and cellular interventions designed to address the fundamental causes of diseases.
	 Smart Drug Delivery	Engineered microbes can transport medicines directly to affected cells, improving treatment effectiveness and specificity.
	 Advanced Regenerative Therapies	Enables innovations such as biofabricated organs, tissue engineering, and cross-species organ transplantation.
 AGRICULTURE & SOIL RESTORATION	 Microbial Soil Enhancement	Designed microorganisms can act as biofertilizers, biological pest-control agents, and beneficial soil enhancers.
	 Environmental Soil Surveillance	Biosensor technologies facilitate continuous tracking of pollutants and other critical soil indicators.
 SUSTAINABILITY & EMISSION CONTROL	 Biological Carbon Capture	Synthetic biological systems can improve carbon fixation through innovative metabolic pathways.
	 Plastic Waste Reduction	Specialized enzymes and engineered microbes help decompose plastics and support the production of eco-friendly alternatives.
 DECENTRALIZED PRODUCTION SYSTEMS	 Localized Biomanufacturing	Promotes distributed production units located near biomass or raw-material sources, reducing logistical costs and emissions.

Environmental Cost of AI

UNU-INWEH report highlights threats to natural resources due to rapid growth of Artificial Intelligence (AI) use The report “Environmental Cost of AI’s Energy Use: Carbon, Water and Land Footprints” was released by the United Nations University Institute for Water, Environment and Health (UNU-INWEH) on its 30th anniversary.



- **UNU-INWEH** is one of 13 institutes comprising the United Nations University (UNU), the academic arm of UN and is headquartered in Ontario, Canada.

Environmental Cost of AI

- **Electricity:** By 2030, global data centers powering AI are projected to consume 945 Terawatt-hours (TWh) of electricity.
- **Carbon Emissions:** Producing that much electricity would have a **carbon footprint of 399 million tonnes CO₂e**, requiring 6.7 billion trees grown over 10 years to offset.
- **Resource Depletion:** Associated water footprint will equal the basic annual domestic water needs of all 1.3 billion people in Sub-Saharan Africa and land footprint will exceed 14,500 square kilometers.
- **E-Waste Crisis:** AI infrastructure could generate 2.5 million tonnes of e-waste annually by 2030, disproportionately affecting the Global South.
- **The Rebound Effect (Jevons Paradox):** Technological efficiency gains make AI cheaper, driving massive volume growth wiping out overall energy savings.
- **Global Digital Divide:** 90% of AI computing capacity is concentrated in just two countries (USA and China), shifting the environmental extraction burdens to developing nations.

Way Forward

- **Holistic Metrics:** Move beyond carbon-only assessments to require joint disclosures of carbon, water, and land footprints.
- **Demand-Side Guardrails:** Implement explicit limits on tokens, resolution, and default output lengths to curb unsustainable usage volumes.
- **Equitable Governance:** Integrate AI expansion into national water and energy planning, ensuring communities affected by data centres are engaged and protected.
- **International Standards:** International institutions should support harmonized measurement standards and disclosure practices, reduce incentives for cross-border burden shifting, and support participation and capacity in regions excluded from AI compute.

S-400 air defence system to India

The delivery is part of a \$5.43 billion agreement signed between India and Russia in 2018 for the acquisition of five S-400 regimental systems.



- Defence Acquisition Council (DAC) cleared proposal for procurement of five additional S-400 systems, which form a key pillar of **India's layered air defence architecture**.
- India's acquisition of S-400 systems from Russia triggered the threat of US' CAATSA sanctions but US has not yet imposed such sanctions on India.

About S-400

- **Origin:** Russian **Long-Range Surface-to-Air Missile (SAM)** system developed by Almaz-Antey and it is also known as SA-21 Growler (NATO Codename).
- **Integrated System:** Combines advanced **radars**, **missile launchers**, **command-and-control centre**, and autonomous **target detection** systems.
- **Layered Air Defence:** Employs **four missile types** with ranges of **40 km, 120 km, 250 km and 400 km**.
- **Target Spectrum:** Capable of engaging aircraft, stealth aircraft, UAVs, cruise missiles and ballistic missiles.
- **Detection Capability:** Can detect **aerial targets up to 600 km away** and track multiple targets simultaneously.
- **Mobility:** Road-mobile system capable of rapid deployment and redeployment.
- **AI enabled:** S-400 will be integrated with AI-enabled decision-support capabilities aimed at improving threat prioritisation and target selection.

Major Air & Missile Defence Systems

- **S-500 Prometey (Russia):** Next-generation air and missile defence system capable of intercepting ballistic missiles and hypersonic weapons, etc.
- **THAAD (USA):** Terminal High Altitude Area Defence system designed to intercept ballistic missiles during their terminal phase.
- **Iron Dome (Israel):** Short-range air defence system for intercepting rockets, artillery shells and drones.
- **Patriot PAC-3 (USA):** Air and missile defence system capable of engaging aircraft, cruise missiles and ballistic missiles.
- **HQ-9 (China):** Long-range surface-to-air missile system for air and missile defence, often compared to the S-300/S-400 family.

Flex fuel Vehicles

Hero MotoCorp launched its first flex-fuel motorcycle and Maruti Suzuki launched first flex fuel passenger vehicle.

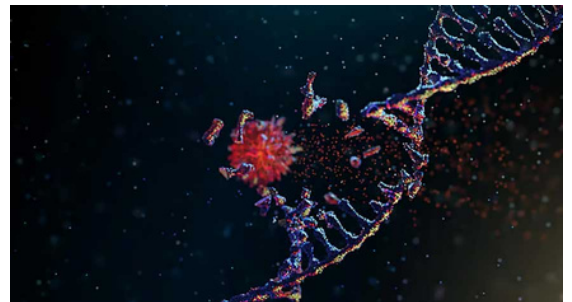


About Flex Fuel Vehicles (FFV)

- FFVs feature upgraded internal combustion engines running on petrol-ethanol blends ranging from E20 to E85 (85% ethanol).
- Flex-fuel technology can reduce carbon monoxide emissions by 77% and save ₹1.44 lakh crore in forex.
- Since 2014-15, India's ethanol blending programme has saved ₹1.84 lakh crore in forex, substituted 302 lakh metric tonnes of crude oil, and reduced CO₂ emissions by 909 lakh metric tonnes.

Gene silencing and Nanomedicine

Researchers have developed a targeted gene-silencing nanomedicine that can effectively inhibit breast cancer tumours.



About Gene silencing Technique

- It is a biological process where a **cell specifically reduces or prevents** the expression of a **particular gene**.
- This mechanism **functions by intercepting the genetic instructions encoded in DNA**, thereby stopping the **production of the corresponding protein**.
 - It is a **natural form of cellular regulation** used by organisms to manage their internal functions.

About Nanomedicine

- It is the application of **nanotechnology in medicine**, where **nanoparticles** (typically 1–100 nanometres in size).
- **Use:** Diagnose, monitor, prevent, and treat diseases with improved precision, reducing side effects.

E85 fuel

The Union Minister for Petroleum and Natural Gas launched E85 fuel.

About E85 fuel

- E85 is a fuel blend containing **80–85% ethanol** and **15–20% petrol**.
- It is designed specifically for **Flex-Fuel Vehicles (FFVs)**.
 - FFVs are vehicles whose engines can operate on varying **ethanol-petrol blends**, from **E20 up to E100 (100% ethanol)**.
- **Significance:**
 - Reduces **greenhouse gas emissions**.
 - Enhances **energy security** by **lowering crude oil imports**.
 - Supports **ethanol production from agricultural feedstock**, boosting farmers' incomes.



Abhilasha Biofuels

The Technology Development Board under the Department of Science and Technology has supported a project to establish a commercial-scale facility for producing Abhilasha Biofuels (ABF).

About ABF

- It is a **2nd Generation (2G)** diesel-equivalent biofuel and renewable **naphtha alternative**.
- 2G biofuels are biofuels produced from **non-food biomass**, such as **agricultural residues, forestry waste, crop stubble, sugarcane bagasse**, rice straw, and other lignocellulosic materials.
- Also, it is a drop-in fuel that can directly replace conventional diesel without requiring any modification to existing engines, fuel systems, or fuel distribution infrastructure.



Chloramphenicol and nitrofurans

India's shrimp exports faced export rejections in US, European Union and Japan markets due to presence of Chloramphenicol and nitrofurans.

- Both drugs are **banned in all food-producing animal rearing systems**.

About Chloramphenicol

- **Antibiotic** used in the treatment of bacterial infections.
- **Threats:** Can cause **aplastic anaemia** in humans (even if in small concentrations).

About Nitrofurans

- **Antibiotics** used for antibacterial and anti-inflammatory purposes.
- **Threat:** Banned due to **persistence** of their metabolites in animal **tissue** and their potential **carcinogenicity**.



5th Generation Su-57



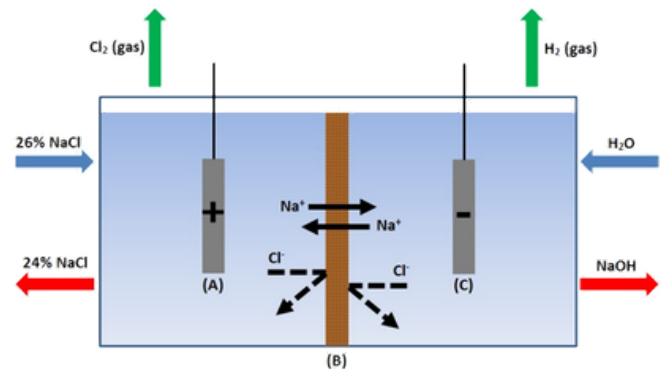
The Russian President has offered India Russia's fifth-generation stealth aircraft Sukhoi Su-57 and proposed its joint production in India.

About 5th Generation Su-57

- **Key features:**
 - **Capable of acting as an airborne command centre:** including for unmanned aerial vehicles.
 - **Stealth Capabilities:** Reduces radar, infrared, and visual signatures to evade detection.
 - **Supercruise:** Sustains supersonic speeds without afterburners, improving range and fuel efficiency.
 - **Integrated Avionics:** Fuses data from multiple sensors for superior situational awareness.
 - **Advanced Networking:** Enables secure, resilient, and real-time communication with allied platforms.
- **Other 5th Gen Jets:** US F-22 Raptor and F-35 Lightning II, China's Chengdu J-20 and Shenyang J-35, India's AMCA (Advanced Medium Combat Aircraft) in pipeline.

Membrane Cell Technology

Environment (Protection) Second Amendment Rules, 2025 require caustic soda plants using MCT to pass a fish-survival test for wastewater toxicity during laboratory-based bioassay testing.



- A **bioassay test** is intended to measure the **combined toxicity of wastewater**.

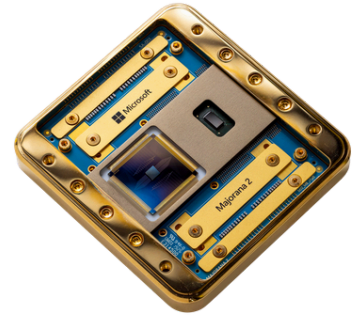
About Membrane Cell Technology (MCT)

- MCT uses a **special membrane** to control the **chemical process** and is considered less polluting than older mercury-based processes.

About Caustic Soda

- **Caustic soda**, also known as **sodium hydroxide**, is one of India's most widely used industrial chemicals.
- It is used in industries such as soap, detergents, paper, textiles, aluminium, petrochemicals and water purification.

Microsoft unveiled Majorana 2



Majorana 2 is Microsoft's next-generation topological quantum chip, developed with assistance from its Microsoft Discovery agentic AI platform.

- The chip marks a significant leap forward in quantum computing, **overcoming key barriers related to reliability, speed, and size.**
- **Agentic AI** is a system that can **independently plan, make decisions, perform tasks, and improve its actions with minimal human intervention.**

Key features of Majorana 2

- **High reliability:** $\sim 1,000\times$ more reliable than Majorana 1
- **Long coherence:** ~ 20 seconds average qubit lifetime; up to 1+ minute
- **Advanced Materials Stack:** Lead-based topological superconductor replaces aluminum for better stability and error resistance

What is a Quantum Chip?

- A quantum computing chip is the **hardware component at the heart of a quantum computer**, designed to **process and manipulate** quantum information.
- Unlike classical computing chips, **which use bits as the basic unit of information (representing either 0 or 1)**, quantum computing chips use **quantum bits or qubits**, which can represent both 0 and 1 simultaneously.
- **Other Major Quantum Chips:** Google (Willow), IBM (Condor/Heron), Intel (Tunnel Falls), Amazon Web Services (AWS) (Ocelot), etc.

Epichlorohydrin

Bureau of Indian Standards (BIS) has for the first time set norms for tea bags prohibiting harmful chemicals like epichlorohydrin.



About Epichlorohydrin

- **Meaning:** An **epoxide** in which one of methyl hydrogens is substituted by chlorine.
- **Applications:** Manufacture of **epoxy resins, synthetic glycerine, elastomers, etc.**
- **Physical Characteristics:** Volatile and flammable, clear, colourless, liquid, chlorinated cyclic ether, **chloroform-like odor** that emits toxic fumes of hydrochloric acid and other chlorinated compounds
- **Health Risks:** Classified as **probable human carcinogen**; can cause eye, skin, and respiratory, blood and reproductive issues.

Kodaikanal Solar Observatory

Kodaikanal Solar Observatory provides valuable insights into the Solar Cycle. It uncovered how supergranulations respond to solar cycles, aiding cycle prediction.



- **Supergranulations** are giant **convection** cells (or patterns) that form a vast network structure on the surface of the Sun.

About Solar Cycle

- The solar cycle is a periodic rhythm of magnetic activity that Sun undergoes every **~11 years**.
 - **Mechanism:** The Sun is composed of electrically charged gas (**plasma**) that generates a massive magnetic field.
 - Every **11 years**, this field undergoes a flip (north-south poles switch)
- This periodic cycle undergoes distinct phases:
 - **Solar Minimum:** Cycle begins at solar minimum (low activity and few sunspots)
 - **Sunspots:** Dark, cooler regions on the Sun caused by strong magnetic activity.
 - Despite being cooler, more sunspots correlate with the Sun emitting more total energy.
- **Solar Maximum:** As activity builds toward solar maximum, Sun becomes "stormy," featuring the highest number of sunspots and frequent eruptions.
- **Impact on Space Weather:** During the more active phases, the Sun also experiences an increase in giant eruptions, such as **solar flares** and **coronal mass ejections (CMEs)**.
 - **Solar Flares:** Sudden bursts of X-rays and radiation (travelling at speed of light) caused by release of magnetic energy in sunspot regions.
 - **CMEs:** Massive bubbles of plasma and magnetic fields flung into space
 - **Impact:** They can disrupt power grids, navigation systems, radio communications, and satellite operations, affect astronauts, induce geomagnetic storms affecting magnetic fields and events like Auroras etc.

About Kodaikanal Solar Observatory

- Established in 1899 and subsumed then Madras Observatory.
- **Aim:** to obtain data on how Sun heats up Earth's atmosphere and to understand monsoon patterns.
- **Location:** under Indian Institute of Astrophysics and is located in Palani range (Tamil Nadu)
 - Chosen for its proximity to equator and its dust-free high-altitude location.

Floating Solar Power Potential

The Ministry of New and Renewable Energy (MNRE) released the Floating Solar Potential Assessment Report 2026.



Floating Solar Energy in India

- Floating Solar Photovoltaic (FSPV) systems are **solar panels installed on water bodies** such as reservoirs, lakes, ponds and dams instead of land.
- **Total Floating Solar Potential:** India has an estimated **102.18 GWp floating solar potential**.
- **Total Solar Potential:** India's total assessed solar potential has increased to **3,445 GWp**.
 - India's installed solar power capacity increased from 2.8 GW in 2014 to 155 GW in 2026.
- **Highest Potential State: Maharashtra with 16.28 GW potential**, followed by Madhya Pradesh (14.89 GW) and Karnataka (13.69 GW).

Airbus C295 Aircraft

India conducted the maiden test-flight of the country's first "Made in India" Airbus C295 military transport aircraft in Vadodara.



- The **C295 India programme** is the first instance of a military aircraft being **manufactured in India by the private sector**.
- 40 C295 aircraft to be built in India under partnership between **Airbus and Tata Advanced Systems Limited** for the Indian Air Force.

About Airbus C295 Aircraft

- It is a robust, reliable and highly **versatile tactical transport aircraft**.
- It is designed to meet the diverse needs of modern militaries, including **tactical support, cargo support, surveillance, humanitarian aid and other tasks**.

Global Navigation Satellite System

The Ministry of Defence has signed a contract for the procurement of 20 Enhanced Capability Global Navigation Satellite System Jammers for the Indian Navy with minimum 75% indigenous content.



About Global Navigation Satellite System (GNSS)

- It refers to any **satellite constellation** that provides **global positioning, navigation, and timing services**.
- **Types of GNSS:**
 - GPS (Global Positioning System) of the USA,
 - GLONASS of Russia, Galileo of Europe,
 - BeiDou of China,
 - Indian Regional Navigation Satellite System (IRNSS) and
 - Japan's Quasi-Zenith Satellite System (QZSS) (4-satellite regional)

IRNSS-Navigation with Indian Constellation (NavIC)

- It is an independent regional navigation satellite system developed by ISRO.
- To provide accurate Position, Velocity and Timing (PVT) service in India and regions extending about 1500 km beyond Indian land mass

Lokmata Ahilyabai Holkar

Prime Minister pays tribute to Lokmata Ahilyabai Holkar on her birth anniversary.



About Ahilya Bai Holkar (1725 - 1795)

- She was the visionary queen of the Holkar dynasty who ruled Malwa in the 18th century.
- Known as the “Philosopher Queen”.

Early Life:

- Born in village of **Chondi, Ahmednagar (Maharashtra)**.
- Married to Malhar Rao Holkar.
- After the deaths of her husband, father-in-law and son, **she took charge of Malwa in 1767 (Indore was one of the major cities)**.

Key Contributions

- She promoted **trade, textile industries, education and public welfare**.
- Established a textile industry in **Maheshwar, famous for Maheshwari Sarees**.
- **Restored major temples like: Kashi Vishwanath Temple, Somnath Temple.**
- **Architectural Legacy:** Build Maheshwar Fort (Ahilya Fort) on the banks of Narmada River.

Jagannath temple secures Trademarks

Jagannath temple secures Trademarks for Nilachakra logo and two key terms In a first for any Indian shrine, the Shree Jagannath Temple Administration (SJTA) has obtained trademark protection for important terms and symbols.



- **Wordmarks secured (Protects specific words):** Patitapabana (Savior of the Fallen) and Ananda Bajara (the sacred Mahaprasad dining area within the temple)
- **Logomark secured (Protects visual symbols/ designs):** Neelachakra (sacred eight-spoked metal disc atop the temple spire)

Shree Jagannath Temple, Puri, Odisha (White Pagoda)

- **Architecture style:** Kalinga Architecture (sub-style of the Nagara (North Indian) temple architecture)
- **Deities:** Lord Jagannath (incarnation of Lord Vishnu), Sister Devi Subhadra and elder brother Lord Balabhadra (holy trinity).
- **Historical Background:** Believed to have been built in the 12th century CE by Anantavarman Chodaganga Deva of the Eastern Ganga Dynasty.
- **Unique Feature:** Popularly believed that the temple is designed such that its main structure does not cast a visible shadow on the ground at any time of the day.
 - The idols of the holy trinity are carved out of wood rather than stone or metal idols.
- **Religious Significance:** One of the four Char Dhams (Dwarika, Badrinath, & Rameswaram).
- **Cultural Significance:** The temple is the center of the world-famous Ratha Yatra, attracting millions of devotees every year.

About Trademark

- A trademark is an **Intellectual Property Right (IPR)** that protects a **distinctive word, logo, symbol, phrase, or sign used to identify and distinguish the goods or services** of an entity from others.
- **The Trade Marks Registry administers the Trade Marks Act, 1999 and Trade Marks Rules, 2017.**
 - It facilitates international trademark registration through the Madrid Protocol of which India is a member.
 - It functions under the **Controller General of Patents, Designs and Trade Marks (CGPDTM)**, which is attached to the DPIIT, Ministry of Commerce and Industry.
- **Time Period:** 10 years (can be renewed again)

Exercise PRAGATI

India Concludes Maiden Multilateral Exercise PRAGATI (Partnership of Regional Armies for Growth And Transformation in the Indian Ocean Region) 2026 for Indian Ocean Region Partners.



About Exercise PRAGATI

- **Duration:** Two-week exercise.
- **Participating Nations:** India, along with 12 friendly regional partners- Bhutan, Cambodia, Indonesia, Laos, Malaysia, Maldives, Myanmar, Nepal, Philippines, Seychelles, Sri Lanka, and Vietnam.
- **Objectives:** Enhance counter-terrorism capabilities, specialized tactical skills, multinational interoperability, and intelligence-sharing among participating armies.

Pradhan Mantri Kaushal Vikas Yojana (PMKVY)



The Public Accounts Committee (PAC) pulled up the government over PMKVY mismatch between training and demand.

Key Issues raised by the PAC

- **Demand-Training Mismatch:** disproportionately focused on sectors with lower employment demand, such as apparel, electronics, and retail.
- **Certification Gap:** Against a set target of training and certifying 1.32 crore candidates, 1.10 crore candidates were certified.

About PMKVY:

- It is a **flagship scheme for skill certification** to help Indian youth take up industry-relevant skill training to get better livelihoods.
- **Launched:** In 2015 by the **Ministry of Skill Development and Entrepreneurship**.
- **Implementing Agency:** National Skill Development Corporation (NSDC).

Grand Slam tournaments

125th edition of the French Open, one of the four grand slam tournaments were recently concluded



- **Men's Singles Champion:** Alexander Zverev (Germany)
- **Women's Singles Champion:** Mirra Andreeva (Russia)

About Grand Slam tournaments

- They consist of **4 major tournaments** played annually in a chronological order.
 - **Australian Open** (Hard Court), followed by **French Open** (Clay Court), **Wimbledon (Britain)** (grass), and **US open** (Hard)
- **Shared governance:** Managed through a board comprising the four Grand Slam Chairs
- **Eligibility:** Open for entry to **all internationally ranked** tennis players with a ranking of 500 or better.
 - Minors under the age of fourteen (14) are not eligible for entry.
 - **Doubles:** Uses the better of a player's individual singles or doubles ranking
 - A player **below 500 rank may still be able to compete** through wild cards.
- **Wild cards players:** Players included in a tournament drawn at the **sole discretion** of the individual Grand Slam event.
 - There is **no limit to the total number** of wild cards an individual player may receive to compete in Grand Slam Tournaments.
- **Prize:** On-site prize money based on performance of player.

Gallantry Awards

President of India presented Gallantry Awards to Armed Forces and Police Personnel.

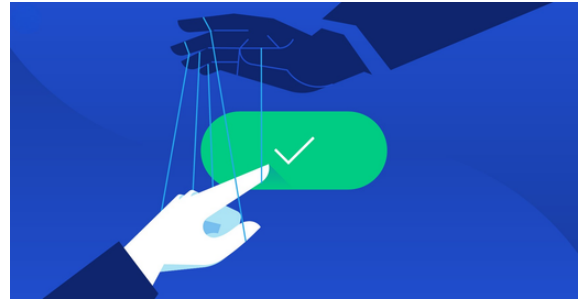


About Gallantry Awards

- **Objective:** Recognitions given for acts of bravery, valour and self-sacrifice during **both wartime and peacetime**.
- **Conferred By:** The President of India, who is the Supreme Commander of the Armed Forces.
 - Officially **announced twice a year** on the eve of **Republic Day** (January 26) and **Independence Day** (August 15).
- **Nodal Ministry:** The **Ministry of Defence** invites recommendations **twice a year** from the Armed Forces and the Ministry of Home Affairs.
- **Wartime Gallantry Awards:** Param Vir Chakra (Highest), Maha Vir Chakra and Vir Chakra.
 - **Instituted on 26 January 1950** (with effect from 15 August 1947).
- **Peacetime Gallantry Awards:** Ashoka Chakra (Highest), Kirti Chakra and Shaurya Chakra.
 - Originally, they were named **Ashoka Chakra Class I, Class II, and Class III** but were renamed in 1967.
 - Instituted on **4 January 1952** (with effect from 15 August 1947).

Dark Patterns

Reports find Indian online buyers losing huge amounts of money annually to dark patterns.



About Dark Patterns

- **Meaning:** Practices or deceptive design pattern using user interface or user experience on any platform designed to mislead or trick users to do something they originally did not intend or want to do.
- **Key Dark Patterns:**
 - **Basket Sneaking:** Automatic addition of a donation during checkout.
 - **Confirm Shaming:** Emotional messaging discouraging users from removing donation.
 - **Forced Action:** Requiring users to share personal information for subscription.
- **Regulation:** Guidelines for Prevention and Regulation of Dark Patterns, 2023 under Consumer Protection Act, 2019 issued by Central Consumer Protection Authority (CCPA).

FIFA World Cup 2026

The biggest FIFA World Cup to begin in Mexico.



About FIFA World Cup 2026

- **Edition:** 23rd edition of the men's FIFA World Cup.
- **Historic Expanded Format**
 - **Tri-Host Countries:** For the first time in World Cup history, the tournament is co-hosted by three sovereign nations: **Canada, Mexico, and the United States.**
 - **Expanded Teams:** Features a record **48 nations** (up from 32 teams in previous editions), divided into 12 groups of four teams each.
- **Mascots:** 3 official characters representing the three hosts:
 - **Maple the Moose** (Canada)
 - **Zayu the Jaguar** (Mexico)
 - **Clutch the Bald Eagle** (United States)
- India has only qualified for the FIFA World Cup once (1950 in Brazil), but ultimately did not participate.

Homemakers Contribution

Recently Supreme court in *Shish Ram and ors vs. Surjeet* case quantified homemakers' contribution at Rs 30000 Per Month.

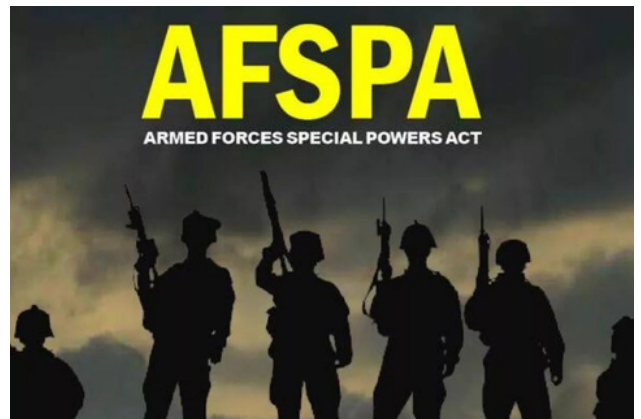


Key Highlight of Judgment

- Domestic care by a homemaker constitutes a compensable head of damages in **motor accident claims**.
- **Homemakers as nation builders:** It noted that women's unpaid caregiving work is estimated between 15%-17% of India's GDP.
- **If a homemaker is employed,** ₹30,000 for loss of domestic care is awarded in addition to their salary
- **To Maintain this value** this sum be revised by 10% cumulatively every three years.
- **Expeditious disposal:** Motor vehicle claims should not remain pending before High Courts for more than four years.

Armed Forces (Special Powers) Act (AFSPA)

Union Home Minister announced that AFSPA, 1958, will be withdrawn from most of the Northeast India by next year, except in one or two states.



- In North-east, it is currently enforced in Nagaland, Assam, Manipur, and Arunachal Pradesh.

About AFSPA

- It enables **certain special powers** to be conferred upon armed forces in the **disturbed areas** to maintain law and order.
 - E.g., Arrest and enter/Search premises without warrant based on suspicion.
- **Declaration of Disturbed Area (Section 3):** Governor, Administrator, or Central Government can declare part or whole state/UT as "disturbed" if they believe the situation requires armed forces to aid civil authorities.