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JUNE, 2026

Prelims Fact Sheet

Your Monthly Guidance for UPSC Prelims



- Current Affairs Deep Dive
- History & Culture
- Environment & Ecology
- Polity & Economy
- Science & Technology

50+ Key Facts I Segregated Section wise

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1. POLITY & GOVERNANCE

1.1. Assam Uniform Civil Code Bill and Tribal Exemptions

Context:

The Assam Assembly has passed a **Uniform Civil Code (UCC) Bill** to regulate matters such as marriage, divorce, inheritance, live-in relationships and related civil issues. The Bill has generated debate because of concerns over exemptions for tribal communities and the relationship between uniform law and customary practices.

Explanation:

- **Uniform Civil Code (UCC)** means a common set of personal laws for citizens in matters such as marriage, divorce, inheritance, adoption and succession.
- It is mentioned under **Article 44** of the Constitution as a **Directive Principle of State Policy**, asking the State to endeavour to secure a UCC.
- The Assam Legislative Assembly passed the **Uniform Civil Code (UCC) Bill, 2026** on May 27, 2026, making it the third state in India to adopt such legislation (After Uttarakhand and Gujarat).
- The bill mandates a common civil framework for marriage, divorce, succession, and live-in relationships, with a key focus on prohibiting polygamy and establishing gender-equal inheritance rights.

Key Features of the Assam UCC Bill, 2026:

- **Polygamy Ban:** Prohibits polygamy with up to 7 years of imprisonment.
- **Mandatory Registration:** Compulsory registration of marriages and divorces within 60 days.
- **Live-in Relationships:** Mandatory registration of live-in relationships within one month.
- **Marriage Age:** Sets the uniform legal age for marriage at 21 years for men and 18 years for women.
- **Inheritance:** Ensures equal property rights for sons, daughters, and spouses.
- **Exclusion of Scheduled Tribes (STs):** The Bill explicitly excludes Scheduled Tribes to respect their customary laws and protect constitutional rights.

1.2. Double Burden of Malnutrition in India

Context:

A recent Vellore-based child nutrition study has highlighted that Indian children may face both undernutrition and overweight risks early in life. The findings suggest that public health strategies designed mainly to fight undernutrition need to also address rising obesity and diet-related non-communicable diseases.

Explanation:

- Malnutrition includes both undernutrition and overnutrition, making it a broad public health challenge.
- According to WHO, undernutrition includes wasting, stunting, underweight and deficiencies of essential vitamins and minerals.
- Overnutrition includes overweight, obesity and diet-related risks that increase chances of diabetes, hypertension and cardiovascular diseases.
- India faces a double burden of malnutrition, where undernourishment and obesity can coexist within the same population, community or household.
- NFHS-6 findings indicate that child nutrition indicators have improved compared to earlier surveys, but uneven progress and regional variation continue.
- The study highlights that thinness and obesity may begin during school age, especially between seven and nine years.

- Poor diet quality, ultra-processed foods, sugary drinks, low physical activity and poverty-linked food choices contribute to this nutritional transition.
- Public health programmes such as ICDS, Mid-Day Meal/PM POSHAN, PDS and POSHAN Abhiyaan need to address both calorie deficiency and unhealthy excess calories.

1.3. National Sports Tribunal under National Sports Governance Act, 2025

Context:

The Ministry of Youth Affairs and Sports has invited applications for appointment of two Members to the National Sports Tribunal.



Explanation:

- The National Sports Tribunal (NST) is a statutory body created under the National Sports Governance Act, 2025.
- It is meant to hear and adjudicate disputes arising in the field of sports governance.
- Its headquarters is located in New Delhi.
- Members are expected to be persons of eminence with knowledge and experience in sports, public administration and law.
- Such tribunals help provide specialised, faster and institutional dispute resolution.
- Sports disputes may involve governance of sports bodies, selection issues, administrative decisions and compliance with statutory norms.
- The development reflects the increasing formalisation and regulation of sports administration in India.
- The nodal ministry is the Ministry of Youth Affairs and Sports.
- The **National Sports Governance Act, 2025** seeks to regulate sports governance, improve transparency, ensure institutional accountability and provide structured dispute resolution.

1.4. National Health Accounts and High Out-of-Pocket Health Expenditure in India

Context:

The latest National Health Accounts figures show that despite some increase in government health spending, Indian households still bear a high burden of healthcare costs. Out-of-pocket expenditure remains nearly half of current health expenditure, raising concerns over financial protection and healthcare equity.

Explanation:

- **National Health Accounts (NHA)** estimate how health expenditure flows in India across government, households, insurance and private providers.
- **Current Health Expenditure (CHE)** refers to spending on healthcare goods and services, excluding capital expenditure.
- **Government Health Expenditure (GHE)** has increased to 1.43%, but it remains below the **National Health Policy target of 2.5% of GDP**.
- **Out-of-pocket expenditure (OOPE)** means direct spending by households on treatment, medicines, diagnostics and hospitalisation.
- High OOPE can push families into **poverty, debt and delayed treatment**.
- Private hospitals and household payments still form a major part of India's health financing.
- Government schemes like **PM-JAY** aim to reduce catastrophic health expenditure but insurance coverage remains limited.
- Low spending on **preventive care** is a concern, especially with rising **non-communicable diseases**.

2. INTERNATIONAL RELATIONS

2.1. India–Venezuela Cooperation and Global South Partnership

Context:

The Acting President of Venezuela, Delcy Rodríguez, met Prime Minister Narendra Modi on June 4, 2026. The discussions focused on expanding cooperation in energy, critical minerals, technology, agriculture, health and people-to-people ties.

Explanation:

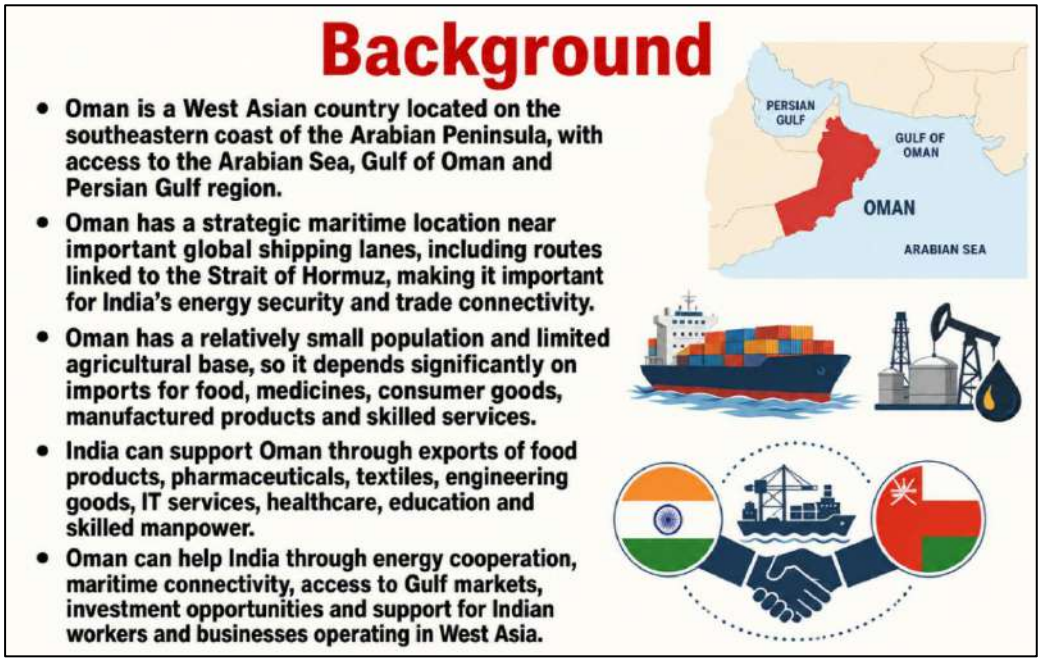


- Venezuela is a South American country located on the northern coast of the continent, with coastline along the Caribbean Sea and the Atlantic Ocean.
- Its capital is Caracas, and it is known for having one of the world's largest proven crude oil reserves.
- India–Venezuela relations are important in the context of energy security, as India has historically imported crude oil from Venezuela.
- Cooperation in critical minerals is significant because minerals are essential for renewable energy, electric vehicles, electronics and strategic technologies.
- The meeting also reflects India's wider outreach to Latin America as part of its diversified foreign policy.
- Venezuela is relevant to the Global South discourse, where developing countries seek greater voice in global trade, finance, energy and technology governance.
- People-to-people ties; health, agriculture and technology cooperation can strengthen bilateral relations beyond oil trade.

2.2. India–Oman Trade Pact and Its Economic Promise

Context:

India and Oman are moving towards a **Comprehensive Economic Partnership Agreement (CEPA)** to deepen trade, investment and services cooperation. The pact is expected to reduce tariffs, expand market access and create opportunities for Indian farmers, factories, MSMEs and professionals. It is also significant because India is seeking reliable trade partners amid global uncertainty, supply chain disruptions and rising protectionism.



2.3. Neglected Displacement Crises and Global Humanitarian Attention Gap

Context:

The Norwegian Refugee Council has listed **Sudan, Democratic Republic of Congo and Colombia** among the world's most neglected displacement crises. The report highlights that global attention and resources are often diverted towards nationalism, rearmament and conflicts in wealthy regions.

Explanation:

- Displacement crisis refers to the forced movement of people due to conflict, violence, persecution, disasters, climate stress or economic collapse.
- Displaced persons may be refugees, internally displaced persons (IDPs) or asylum seekers, depending on whether they cross an international border.
- Refugees are protected under the 1951 Refugee Convention and its 1967 Protocol, but India is not a party to these instruments.
- Internally Displaced Persons (IDPs) remain within their own country and do not receive the same international legal status as refugees.
- Norwegian Refugee Council (NRC) is an international humanitarian organisation that works for displaced people affected by conflict and crisis.
- Sudan faces displacement due to civil war and armed conflict; DR Congo due to militia violence and resource conflicts; Colombia due to armed groups, drug violence and internal conflict.
- Neglected crises receive low media attention, weak diplomatic focus and inadequate humanitarian funding.

2.4. OPCW Finds Undeclared Chemical Weapons in Syria

Context:

The Organisation for the Prohibition of Chemical Weapons has reported the discovery of undeclared chemical weapons and related equipment in Syria. The finding raises concerns about compliance with international disarmament obligations under the Chemical Weapons Convention.

Explanation:

- **Chemical weapons** are toxic chemicals or delivery systems used to cause death, injury or incapacitation through chemical action.
- They may include **nerve agents, blister agents, choking agents and blood agents.**
- The **Chemical Weapons Convention (CWC)** prohibits the development, production, stockpiling, transfer and use of chemical weapons.
- The **Organisation for the Prohibition of Chemical Weapons (OPCW)** is the implementing body of the CWC.
- OPCW conducts **inspections, verification, destruction monitoring and investigation of alleged chemical weapon use.**
- Syria joined the CWC in 2013 after allegations of chemical weapon use during its civil war.
- A country must declare its chemical weapon stockpiles, production facilities and related equipment to the OPCW.
- **Undeclared stockpiles** indicate possible violation of treaty obligations and weaken global non-proliferation norms.
- Chemical weapons are considered **weapons of mass destruction** because they can cause large-scale civilian casualties.

2.5. India expanded its nuclear arsenal in 2025, says SIPRI

Context:

According to Stockholm International Peace Research Institute (SIPRI) Yearbook 2026, India modestly expanded its nuclear arsenal in 2025, increasing its stockpile from around 180 to 190 warheads. The report highlights India's focus on longer-range delivery systems amid tensions with China and Pakistan.

Explanation:



- SIPRI is a Sweden-based institute studying arms control, disarmament and global military expenditure.
- Nuclear arsenal includes nuclear warheads and delivery systems such as missiles, aircraft and submarines.
- India follows credible minimum deterrence and a declared No First Use nuclear doctrine.
- India's nuclear delivery capability is based on the nuclear triad: land-based missiles, aircraft and sea-based platforms.
- SIPRI noted rising nuclear modernisation by all nuclear-armed states.
- India was the 5th largest military spender in 2025 after the US, China, Russia, and Germany.
- India was the second-largest importer of major arms during 2021-25 after Ukraine.

3. ECONOMY

3.1. IS 20201:2026 for Community Seed Bank Management

Context:

The Bureau of Indian Standards (BIS) has released IS 20201:2026 – Community Seed Bank Management Requirements to standardise the functioning of Community Seed Banks across India. The standard aims to conserve indigenous crop varieties, strengthen agrobiodiversity, enhance climate resilience, and contribute to Sustainable Development Goal (SDG) 2 (Zero Hunger)



Explanation:

- Community Seed Banks (CSBs) are locally managed institutions that collect, conserve, multiply and distribute traditional and indigenous seeds.
- They play a key role in conserving agrobiodiversity, genetic resources and climate-resilient crop varieties.
- Indigenous landraces often possess traits such as drought tolerance, pest resistance and adaptability to local conditions.
- CSBs support in-situ conservation, seed sovereignty, food security and sustainable agriculture.
- The new BIS standard (IS 20201:2026) provides guidelines for seed collection, storage, documentation, quality assurance and community participation.
- The initiative aligns with SDG 2 (Zero Hunger), climate adaptation, biodiversity conservation and sustainable livelihood goals.

3.2. Solar firms move High Court over 'unreasonable' ALMM List-II rule affecting new solar projects

Context:

Solar industry associations from Karnataka, Kerala and Tamil Nadu have moved the Karnataka High Court against a Centre's rule requiring most new solar projects commissioned after June 1, 2026 to use domestically made solar cells.

Explanation:

- **ALMM** stands for the Approved List of Models and Manufacturers, a compulsory regulatory framework established by India's Ministry of New and Renewable Energy (MNRE).
- ALMM framework ensures that solar and renewable equipment used in government-backed or subsidized projects meets strict quality, efficiency, and domestic-sourcing standards.
- The ALMM framework classifies components into various sub-lists.
- ALMM List-I covers approved domestic solar module manufacturers, while ALMM List-II covers domestic solar cell manufacturers.
- Solar modules are made by assembling solar cells, which convert sunlight into electricity through the photovoltaic effect.
- India has high solar module capacity, but relatively lower upstream solar cell manufacturing capacity.
- The mandate aims to reduce import dependence, especially on China, and promote Atmanirbhar Bharat, energy security and domestic value addition.
- However, India's domestic cell capacity is still limited and costlier, which may raise project costs, delay solar projects, and make earlier bids commercially unviable. Industry concerns include price disparity, supply shortage, project delays and tariff impact.

3.3. Cabinet Approves ₹10,000 Crore ATF Price Stabilisation Fund

Context:

The Union Cabinet has approved a one-time ₹10,000 crore budgetary support to oil-marketing companies to stabilise Aviation Turbine Fuel prices. The move aims to protect airlines and passengers from fuel price shocks caused by rising crude oil prices and West Asia tensions.

Explanation:

- Aviation Turbine Fuel (ATF) is the specialised fuel used by jet aircrafts and forms a major part of airline operating costs.
- ATF is formed during the refining of crude oil. Hence, ATF prices are linked to international crude oil prices and global supply disruptions.
- West Asia war tensions increasing crude oil & ATF prices because the region is central to global oil production and transport routes.
- Higher ATF prices raise airline costs and may lead to flight cancellations, reduced routes and higher airfares.
- The fund will provide interest-free advances to oil-marketing companies such as IOC, BPCL and HPCL.
- Airlines will procure ATF from participating OMCs until the support amount is recovered.
- Once ATF prices moderate, the differential amount will be recovered and returned to the government.
- The fund is designed as a self-sustaining revolving mechanism.

3.4. Index of Services Production with 2024–25 Base Year

Context:

The Ministry of Statistics and Programme Implementation will release the first Index of Services Production for April 2026 on July 14, 2026. The index will measure short-term changes in India's services-sector output with 2024–25 as the base year.

Explanation:



- Index of Services Production is a new macroeconomic indicator to track monthly growth in the services sector.
- It will act as the services-sector counterpart of the Index of Industrial Production, which measures industrial output.
- It will be released with a 60-day lag, generally on the 29th day of every month.
- The first release will cover April 2026 data and will be published on July 14, 2026.
- It is prepared by the Ministry of Statistics and Programme Implementation.
- The methodology was finalised with a Technical Advisory Committee constituted in May 2025.
- It will help improve tracking of services-led growth, GDP estimates, high-frequency economic monitoring and policy planning.

3.5. India's Aquatic Animal Production and Seafood Export Growth

Context:

The FAO's State of World Fisheries and Aquaculture 2026 report (SOFIA 2026) and MPEDA's FY 2025–26 trade data together highlight India's rising strength in aquatic production and seafood exports.

Key Concepts:

- Aquaculture means farming aquatic organisms under controlled conditions. It includes aquatic animals such as fish, shrimp, crabs and molluscs, and aquatic plants such as algae and seaweeds.
- Capture fisheries involve harvesting naturally occurring wild aquatic animals.
- Capture fisheries include marine capture from seas and oceans, and inland capture from rivers, lakes, reservoirs and wetlands.
- The FAO is a United Nations specialised agency headquartered in Rome. SOFIA is its biennial flagship fisheries report.

India's Global Position:

- India produced 9% of global aquatic animals in 2024 and ranked second after China.
- It ranked first in inland water catches with 2.2 million tonnes.
- India ranked second in aquaculture and contributed 12% of global farmed output.

Record Seafood Exports:

- India's seafood exports reached a record ₹73,890 crore ($8.46 billion) in FY 2025–26.
- Frozen shrimp remained the dominant export item because of strong global demand.
- Other major exports included fish, squid, cuttlefish and dried marine products.
- The United States, China, the European Union and Japan were major markets.
- The Marine Products Export Development Authority, under the Ministry of Commerce and Industry, promotes the sector.

Conclusion:

India's dual strength in production and exports reinforces its role in global food security and the blue economy. Sustained growth will depend on balancing export competitiveness with resource sustainability.

3.6. India to Replace WPI with Producer Price Index

Context:

India launched a new Producer Price Index (PPI) framework and a revamped Wholesale Price Index (WPI) series on June 15, 2026. The Department for Promotion of Industry and Internal Trade (DPIIT) shifted both metrics to an updated 2022-23 base year, replacing the previous 2011-12 benchmark.

Explanation:

- The government will run WPI and PPI simultaneously for five years, after which WPI will be fully discontinued by 2031.
- The new series includes Output PPI, Trial Input PPI, and Services PPI to provide a more realistic picture of price movements in the economy.
- The revised WPI basket expanded from 697 to 957 items, adding categories such as solar, wind, and nuclear electricity.
- Wholesale Price Index measures price changes at the wholesale level and was previously used for inflation tracking and price escalation clauses.
- Producer Price Index measures price changes from the producer's point of view and is considered closer to global inflation measurement practices.
- Output PPI tracks prices received by producers for goods and services they sell.
- Input PPI (trial basis) tracks prices paid by producers for raw materials and intermediate inputs.
- Services PPI covers seven services: Banking, Securities Transactions, Insurance, Pension Fund Management, Railways, Air (Passenger), and Telecom.

3.7. India Becomes the World's Leading Ship-Recycling Nation

Context:

India became the world's largest ship-recycling nation in 2025, accounting for 35.4% of global recycling, according to UNCTAD. It achieved the ship-recycling target of Maritime India Vision 2030 five years ahead of schedule.

Explanation:

- Ship recycling involves dismantling end-of-life vessels to recover steel, machinery and other reusable materials.
- It supports the circular economy by reducing waste and returning scrap metal to productive use.
- India's major ship-recycling centre is Alang-Sosiya in Gujarat, one of the world's largest ship-breaking clusters.
- The Recycling of Ships Act, 2019 regulates safe and environmentally sound ship recycling in India.
- It aligns domestic law with the Hong Kong International Convention for the Safe and Environmentally Sound Recycling of Ships.
- The Convention was adopted under the International Maritime Organization; India ratified it in 2019.

3.8. Assam - Nagaland Mineral Oil Operations MoU

Context:

The Centre, Assam and Nagaland signed a tripartite MoU to facilitate mineral oil operations in the Assam–Nagaland boundary areas. The agreement aims to promote energy exploration, investment and cooperative federalism in the Northeast.

Explanation:

- Assam and Nagaland share boundary areas that have long witnessed administrative disputes affecting oil and gas exploration.
- The MoU enables coordinated mineral oil operations in disputed/boundary areas through Centre–State cooperation.
- It is linked to India's energy security, domestic hydrocarbon production and reduction of import dependence.
- Northeast India has significant oil, natural gas and mineral reserves, especially in Assam, Nagaland and surrounding basins.
- The agreement reflects cooperative federalism, resource-sharing, conflict resolution and regional economic development.
- It also connects with Northeast development, peace accords, AFSPA reduction, investment and Act East Policy

3.9. PMKVY and Skill Development Implementation Gaps

Context:

Parliament's Public Accounts Committee has criticised the implementation of the Pradhan Mantri Kaushal Vikas Yojana after citing findings of the CAG audit report. The concerns include mismatch between training and market demand, poor placement outcomes, weak planning, and fraudulent certification cases.

Explanation:

- Pradhan Mantri Kaushal Vikas Yojana (PMKVY) is the flagship skill development scheme of the Ministry of Skill Development and Entrepreneurship (MSDE).

- It was launched in 2015 to provide industry-relevant skill training to Indian youth and improve their employability.
- The scheme is implemented mainly through training partners, sector skill councils and certification agencies under the skill development ecosystem.
- CAG is a constitutional authority under Article 148 and audits government expenditure to ensure accountability and financial propriety.

Public Accounts Committee (PAC):

- Established in 1921 under the Government of India Act, 1919.
- Comprises 22 members (15 Lok Sabha, 7 Rajya Sabha); one-year term; no Minister can be a member.
- Chairperson appointed by the Lok Sabha Speaker; convention since 1967 reserves the post for the Opposition.
- Examines Appropriation Accounts, Finance Accounts, and CAG audit reports to ensure public money is spent legally and efficiently.
- CAG is often called the committee's "friend, philosopher, and guide."

3.10. HDFC Bank's Dollar Bond Issue and Its Significance

Context:

HDFC Bank has raised $750 million, approximately ₹7,000 crore, through five-year senior unsecured dollar-denominated bonds in the international market. The successful issue reflects strong foreign-investor confidence in the bank and highlights the growing ability of Indian banks to access global debt markets.

Explanation:

- **Bond issue:** A bond is a debt instrument through which a bank borrows money from investors. The bank pays interest during the bond's tenure and repays the principal amount at maturity.
- **Key features:** The bonds mature in June 2031 and are listed on the India International Exchange and NSE IFSC at GIFT City. The proceeds will support general banking activities, particularly overseas operations.
- **Coupon rate:** The bonds carry a fixed annual coupon rate of 5.067%, payable semi-annually. Thus, an investor holding bonds worth $1,000 would receive approximately $50.67 annually as interest.
- **Senior unsecured bonds:** "Senior" means these bondholders receive repayment before subordinated or junior debt holders if the bank is liquidated. "Unsecured" means that no specific asset has been pledged as collateral; repayment depends primarily on the bank's financial strength and creditworthiness.
- **Credit quality:** The bonds received investment-grade ratings of Baa3 from Moody's and BBB from S&P, indicating a relatively low risk of default.

Advantages of Dollar-Denominated Bonds:

- Provide access to a large and diversified global investor base.
- Supply foreign currency for overseas lending, trade finance and expansion.
- Reduce dependence on domestic deposits and borrowing markets.
- Improve the international visibility of Indian banks.

Disadvantages and Risks:

- Rupee depreciation increases the domestic cost of interest and principal repayment.
- Borrowing costs are affected by US interest rates and global volatility.
- International issuance involves additional regulatory and compliance costs.

Significance:

- The issue demonstrates confidence in India's banking system and the GIFT City financial ecosystem. It may encourage other well-rated Indian banks to raise foreign funds, diversify liabilities and expand overseas, while carefully managing currency and repayment risks.

3.11. Jio Platforms Files DRHP for India's Largest Proposed IPO

Context:

Jio Platforms has filed its Draft Red Herring Prospectus (DRHP) with SEBI for an IPO comprising a fresh issue of up to 27 crore equity shares. The offering may raise ₹35,000–₹40,000 crore, potentially making it India's largest IPO.

Explanation:

- An Initial Public Offering (IPO) is the first sale of an unlisted company's shares to the public in the primary market.
- **Draft Red Herring Prospectus (DRHP):** A preliminary document filed by a company with the market regulator before an IPO, containing business and financial details but not the final issue price or number of shares.
- It is filed with the Securities and Exchange Board of India (SEBI), the statutory regulator of India's securities market.
- Under the book-building process (a market-driven price discovery mechanism), investors place bids within a specified price band. The final IPO price is determined based on the demand received at different price levels. For example, if an IPO has a price band of ₹100–₹120 and most investors bid at ₹118–₹120, the final issue price may be fixed close to ₹120.
- A fresh issue creates new shares, raises capital for the company and dilutes existing ownership.
- An Offer for Sale (OFS) involves existing shareholders selling shares; the company receives no proceeds.
- Jio proposes a fresh issue and plans to use a major part of the proceeds to repay its subsidiary's debt.
- After allotment, shares are listed and traded in the secondary market.

3.12. Price Support Scheme Procurement for Pulses and Oilseeds

Context:

The Centre has approved large-scale procurement of pulses and oilseeds under the Price Support Scheme (PSS) in Uttar Pradesh, Gujarat, Tamil Nadu and Haryana. The move aims to ensure MSP benefits to farmers and protect them from distress sales when market prices fall.

Explanation:

Understanding MSP and PSS:

- Minimum Support Price (MSP) is the assured price announced by the government before the sowing season to protect farmers from a sharp fall in market prices.
- MSP by itself is only an announced price - it does not guarantee an actual buyer. The **Price Support Scheme (PSS) is the implementation mechanism** that makes MSP effective: it is activated when market prices fall below MSP, triggering direct government procurement of the crop from farmers at the MSP rate.
- PSS mainly covers pulses, oilseeds and copra - as distinct from cereals like wheat and rice, which have separate procurement systems.
- PSS operates under the broader PM-AASHA framework, which brings together multiple price-support mechanisms for farmers.
- Procurement under PSS is carried out by designated agencies such as NAFED, along with other state/central agencies.
- Procurement of moong, urad and groundnut has been approved across the four states.
- Uttar Pradesh is the biggest beneficiary, with MSP procurement worth more than ₹1,490 crore.

3.13. Quality Control Order (QCO) on Cotton Bales

Context:

The Ministry of Textiles has rescinded the 2023 Quality Control Order on cotton bales, after the government suspended the 11% import duty on cotton till October 30, 2026.

Explanation:



- A Quality Control Order (QCO) mandates that notified products must conform to specified Bureau of Indian Standards (BIS) norms.
- QCOs are issued under the BIS Act, 2016 by the concerned Ministry or Department in consultation with BIS.
- Covered products must carry the Standard Mark / ISI Mark, where applicable.
- QCOs aim to ensure quality control, consumer safety, prevention of sub-standard imports and standardisation of products.
- Non-compliance with QCO provisions attracts penalties under the BIS Act, 2016.
- The rescinded QCO applied to cotton bales, which are compressed units of processed cotton used by the textile and spinning industry.

3.14. National Stock Exchange (NSE) IPO and India's Capital Markets

Context:

The National Stock Exchange (NSE) has revived plans for an Initial Public Offering (IPO), which could become one of India's largest public issues. Market estimates suggest the IPO may significantly increase NSE's valuation and place it among India's most valuable listed companies.

Explanation:

- The National Stock Exchange (NSE) is India's largest stock exchange and was established in 1992 to modernize the securities market.
- NSE introduced electronic screen-based trading, improving transparency, efficiency, and nationwide market access.
- The benchmark index of NSE is the NIFTY 50, which tracks the performance of major listed companies.
- An Initial Public Offering (IPO) is the process through which a private company offers its shares to the public and becomes a listed company.
- NSE's IPO is expected to be conducted through an Offer for Sale (OFS), where existing shareholders sell their shares rather than the company issuing new shares.
- Stock exchanges facilitate capital formation, price discovery, liquidity, and efficient allocation of savings into investments.
- In India, stock exchanges are regulated by the Securities and Exchange Board of India (SEBI).
- India's major stock exchanges are the National Stock Exchange and BSE.

3.15. Land Port Management System (LPMS)

Context:

Union Home Minister and Minister of Cooperation, Shri Amit Shah to launch Land Port Management System (LPMS).

Explanation:

- Land ports are designated border points on India's land boundaries where cargo and passengers cross, with customs, immigration, security and logistics facilities.
- They function like airports/seaports, but for land borders; examples include Attari on India–Pakistan border, Petrapole on India–Bangladesh border, Raxaul on India–Nepal border and Moreh on India–Myanmar border.
- The recent government decision is to launch the Land Port Management System (LPMS), a digital platform to integrate land port operations.
- LPMS will enable slot booking, payments, cargo/passenger tracking, single-window clearances and real-time information sharing, improving trade facilitation and smart border management.

3.16. LTCG Tax Waiver on FII Investments in Government Bonds

Context:

The Government of India has promulgated an ordinance waiving the 12.5% Long-Term Capital Gains tax on Foreign Institutional Investor investments in government bonds. The exemption will take effect from April 1, 2026, aiming to make Indian government securities more attractive to overseas investors.

Explanation:

- Foreign Institutional Investors / Foreign Portfolio Investors invest in Indian financial assets such as equities, bonds and government securities.
- Government Securities / G-Secs are debt instruments issued by the Central or State governments to borrow money from the market.
- Long-Term Capital Gains tax is imposed on profits earned from selling capital assets held for a specified long period.
- Waiving LTCG tax on government bonds can improve post-tax returns for foreign investors.
- This may help attract global capital into Indian debt markets and improve liquidity in G-Secs.
- Higher foreign participation can support government borrowing and deepen India's bond market.
- However, foreign bond inflows may also be affected by currency risk, interest rate movements, global liquidity and India's macroeconomic stability.

3.17. India Slips to 7th in Global Stock Market Capitalisation Ranking

Context:

India has slipped to the seventh position in global stock market capitalisation rankings, while South Korea has moved ahead due to a sharp AI-led rally. The rise of semiconductor and AI-linked firms in Taiwan and South Korea has boosted their equity markets significantly.



Explanation:

- Stock market capitalisation refers to the total value of all listed companies in a stock market and is calculated as share price multiplied by outstanding shares.
- Countries with large market capitalisation usually reflect strong corporate growth, investor confidence, liquidity and depth of financial markets.
- India's market capitalisation has been affected by foreign portfolio investor outflows, pressure on IT and AI-related sectors, and a weaker rupee.

- South Korea and Taiwan have benefited from the global Artificial Intelligence boom, especially through semiconductor companies.
- Samsung, SK Hynix and TSMC are major global players in memory chips, advanced semiconductors and AI hardware supply chains.
- Semiconductors are critical for AI, smartphones, electric vehicles, defence systems and high-performance computing.
- Rankings were compiled and reported by **Bloomberg**. The United States holds the top spot in global stock market capitalization, commanding over $75 trillion and accounting for approximately half of the world's total equity value.

3.18. Kirthai-II Hydroelectric Project on the Chenab River

Context:

The Forest Advisory Committee of Ministry of Environment has recommended in-principle forest clearance for diverting about 197 hectares of forest land for the revised 820-megawatt Kirthai-II Hydroelectric Project in Jammu and Kashmir. The clearance requires measures for biodiversity conservation, habitat management and animal movement.

Explanation:

- Kirthai-II is a run-of-the-river hydroelectric project proposed on the Chenab River in Padder tehsil of Kishtwar district, Jammu and Kashmir.
- It is situated downstream of Kirthai-I and upstream of the Kiru Hydroelectric Project, forming part of the Chenab basin's cascading hydropower development.
- The project will be implemented by Chenab Valley Power Projects Limited, a joint venture involving NHPC Limited and the Jammu and Kashmir power-development corporation.
- The Forest Advisory Committee is constituted under Section 3 of the Van (Sanrakshan Evam Samvardhan) Adhiniyam, 1980 to advise the Union Government on forest diversion.
- Stage-I clearance is conditional approval; final or Stage-II clearance follows compliance with stipulated conditions.
- Under the Indus Waters Treaty, 1960, the Chenab is classified as a Western River, along with the Indus and Jhelum.
- Key ecological concerns include tree felling, Chilgoza Pine habitat, Himalayan fauna and the need for an animal-passage plan

3.19. RBI Permits Loans Against FCNR(B) Deposits Mobilised under Swap Facility

Context:

The Reserve Bank of India has clarified that Indian banks, including their overseas branches, may extend loans to non-residents against eligible FCNR(B) deposits. This permission supplements the existing lending provisions and aims to encourage foreign-currency inflows.

Explanation:

- FCNR(B) means Foreign Currency Non-Resident (Bank) Account, a term-deposit facility available to NRIs and eligible persons of Indian origin.
- Deposits are maintained in permitted foreign currencies; therefore, depositors are protected from rupee exchange-rate risk.
- Both the principal and interest are fully repatriable, meaning they can be transferred abroad.
- FCNR(B) deposits generally have maturities ranging from one to five years.

- Banks may grant loans against such deposits by creating a lien, under which the deposit serves as collateral until repayment.
- Swap mechanism: The bank gives the foreign currency received through eligible FCNR(B) deposits to the RBI and receives rupees in return; at maturity, the RBI returns the foreign currency to the bank at the pre-agreed exchange rate, protecting the bank from exchange-rate risk.
- Under a foreign-exchange swap, currencies are exchanged temporarily and reversed later at a predetermined rate.
- The RBI's swap facility reduces banks' hedging costs, encouraging them to mobilise more foreign-currency deposits.
- Higher FCNR(B) inflows can strengthen banks' foreign-currency resources and support India's forex reserves and external-sector stability.

3.20. RBI's Record Surplus Transfer and its Fiscal Significance

Context:

The RBI has approved a record **₹2.87 lakh crore surplus transfer** to the Union government for FY26. This highlights the growing fiscal role of the central bank, as earnings from foreign assets, reserve management and securities holdings increasingly support government finances.

Explanation:

- The Reserve Bank of India (RBI) is India's central bank responsible for monetary policy, inflation control, currency management, foreign exchange reserves and financial stability.
- RBI earns income from interest on government securities, foreign currency assets, forex transactions and reserve management.
- After meeting expenses and risk provisions, the remaining amount is transferred to the Centre as surplus/dividend.
- Such transfers help the government manage fiscal deficit, borrowing needs and expenditure, but may raise debates on central bank independence.
- The RBI follows the Economic Capital Framework, revised after the Bimal Jalan Committee, to decide risk buffers and surplus transfer.
- Since RBI surplus is non-tax revenue of the Union, it is not automatically shared with States under fiscal devolution.

3.21. Central Banks to Raise Gold Reserves: World Gold Council Survey 2026

Context:

The World Gold Council's 2026 Central Bank Gold Reserves Survey says central banks worldwide are likely to accumulate more gold over the next one year. The trend is driven by geopolitical and economic uncertainty, while India's RBI has also expanded its gold reserves between FY24 and FY25.

Explanation:

- World Gold Council (WGC) is a market development organisation for the gold industry; its Central Bank Gold Reserves Survey tracks central banks' views on gold holdings. The World Gold Council (WGC) is headquartered in **London, United Kingdom**.
- India is not a member nation, as the WGC is a non-profit trade association and market development organization whose members are **gold mining companies**, rather than countries.
- The 2026 survey says central banks remain very positive on gold, seeing it as a growing part of reserve portfolios.

- Central banks have accumulated an average of 1,000 tonnes of gold annually over the past four years, much higher than the 500-tonne average of the preceding decade.
- Gold buying has increased due to geopolitical tensions, US dollar volatility, Fed rate expectations, and sustained central bank demand.
- In India, gold prices rose about 40% in 12 months, mainly due to central bank buying and rupee depreciation against the U.S. dollar.
- RBI's gold reserves rose from 822.1 tonnes in FY24 to 879.58 tonnes by end-FY25, and marginally to 880.52 tonnes in FY26.

3.22. DigiDukaan: Digitising India's Kirana-Based General Trade Ecosystem Through ONDC

Context:

DPIIT and ONDC (Open Network for Digital Commerce) convened a CPG (Consumer Packaged Goods) Roundtable to discuss DigiDukaan.

Explanation:

- DigiDukaan is an ONDC-linked initiative aimed at digitising kirana stores for B2B procurement.
- It seeks to modernise India's General Trade ecosystem, which includes over 1.4 crore kirana stores.
- General Trade accounts for nearly 75–80% of FMCG (Fast-Moving Consumer Goods) sales in India.
- The initiative helps retailers through direct procurement, better scheme visibility, improved fill rates and working capital management.
- It supports distributors by enabling order digitisation, collection digitisation, wider reach and improved retailer coverage.
- It helps FMCG brands access retailer demand signals, secondary sales data and scheme tracking.
- ONDC is an open digital commerce network designed to democratise digital commerce in India.
- ONDC is an initiative of the Department for Promotion of Industry and Internal Trade (DPIIT) launched in 2021 to create an open, interoperable digital commerce network.
- FMCG refers to products that are sold quickly at relatively low cost, such as food items, beverages, toiletries, detergents and packaged consumer goods.

3.23. Paraquat Herbicide Ban in Telangana

Context:

Telangana has banned the manufacture, sale, distribution and use of paraquat, a highly toxic herbicide linked to numerous deaths and poisoning cases, particularly among farmers and agricultural workers. The move has renewed attention on pesticide regulation, occupational safety and public health concerns associated with hazardous agrochemicals.

Explanation:

- Paraquat is a non-selective, fast-acting contact herbicide used for controlling weeds in agricultural fields, plantations and non-crop areas.
- It belongs to the bipyridyl group of herbicides and acts by disrupting photosynthesis, causing rapid destruction of plant tissues.
- Paraquat is considered one of the most toxic pesticides to humans; ingestion, inhalation or prolonged skin exposure can cause severe poisoning and death.
- The chemical primarily damages the lungs, kidneys and liver, often leading to irreversible pulmonary fibrosis and multi-organ failure.
- Due to its high toxicity, several countries have imposed restrictions or bans under pesticide safety regulations, while debates continue regarding its agricultural utility versus health risks.

- In India, pesticides are regulated under the Insecticides Act, 1968 and administered through the Central Insecticides Board and Registration Committee (CIBRC).
- The issue highlights the broader challenge of balancing agricultural productivity, weed management, farmer welfare, public health and environmental safety through evidence-based pesticide governance.

3.24. India's Record Workers' Remittances in FY26

Context:
India's inward remittances crossed $100 billion in FY26, reaching a record level and reinforcing the country's position as the world's largest recipient of remittances.

Explanation:

- Remittances are cross-border transfers of money by migrants to their families or beneficiaries in their home country.
- In the Balance of Payments (BoP), remittances are recorded under Secondary Income Transfers in the Current Account.
- The United States, United Arab Emirates, United Kingdom, Saudi Arabia, Canada, Oman, Qatar and Australia are among the major source countries.
- India has remained the world's largest remittance recipient for several years, followed by countries such as Mexico, China and the Philippines.
- Remittances help finance the Current Account Deficit (CAD), support household consumption, education, healthcare and investment.
- The Reserve Bank of India (RBI) compiles remittance data through BoP statistics and surveys on inward remittance flows.
- Long-term sustainability of external accounts requires growth in exports, manufacturing competitiveness and productive investment, as remittances are primarily income transfers rather than export earnings.

3.25. Fully Accessible Route

Context:
Foreign Portfolio Investors invested ₹8,794 crore in government securities under the Fully Accessible Route after tax exemptions on interest income and capital gains.

About Fully Accessible Route:

- Fully Accessible Route is a channel through which non-residents can invest in specified Government Securities.
- It was introduced by the Reserve Bank of India in 2020.
- Under FAR, eligible government securities are opened fully to Foreign Portfolio Investors.
- Investments under FAR are not subject to the usual investment limits applicable to FPIs in government securities.
- It covers specified Central Government securities notified by the RBI from time to time.
- FAR helped enable the inclusion of Indian government bonds in major global bond indices.
- It supports deeper bond markets by attracting foreign capital into India's government securities market.

3.26. BHAVYA Portal

Context:
Union Minister of Commerce & Industry, Shri Piyush Goyal, Launches BHAVYA Portal to fast-track the development of 100 investment-ready, world-class industrial parks across India (Under BHAVYA Scheme).

Explanation:

- BHAVYA (Bharat Audyogik Vikas Yojana) is a flagship industrial infrastructure scheme aimed at developing 100 plug-and-play industrial parks to create world-class, future-ready manufacturing ecosystems across India.
- The scheme will be implemented over a six-year period starting from 2026–27, with around 50 parks to be developed in the first phase.
- It builds upon the success of industrial smart cities under the National Industrial Corridor Development Programme (NICDP) and represents a next-generation expansion of the industrial corridor model.
- Scheme will adopt a competitive model under which States will be encouraged to submit detailed project proposals highlighting their industrial strengths, availability of land, investor interest and sectoral potential.
- It will seek to ensure that industrial parks are designed according to the specific needs of different sectors and investors, making them more attractive destinations for domestic and global investments.

3.27. Mission Senehjori for Assam Muga Silk

Context:

The Union Minister for Development of North Eastern Region launched **Mission Senehjori** to promote Assam's Muga silk as a global luxury textile brand. The mission aims to strengthen the Muga silk value chain through a cluster-based approach.

Explanation:

- Muga silk is a rare golden-yellow silk mainly produced in Assam and is known for natural shine, durability and high value (India produces four major types of natural silk: Mulberry, Tasar, Muga, and Eri).
- It is produced by the silkworm Antheraea assamensis, which is largely endemic to the North-East region.
- Assam's Muga silk has a Geographical Indication tag, linking it to its unique regional origin and traditional production system.
- Mission Senehjori focuses on making Muga silk globally competitive through branding, cluster development, value addition and luxury textile promotion.
- A cluster-based approach brings farmers, reelers, weavers, entrepreneurs and markets together for better productivity and income.
- The initiative supports Atmanirbhar North East, traditional livelihoods, women's employment and export potential.

3.28. Logistics Port Performance Index (LPPI)



Context:

The Logistics Port Performance Index (LPPI) is a national benchmarking framework launched by India's Ministry of Ports, Shipping and Waterways (MoPSW) under the Sagar Aankalan initiative.

Explanation:

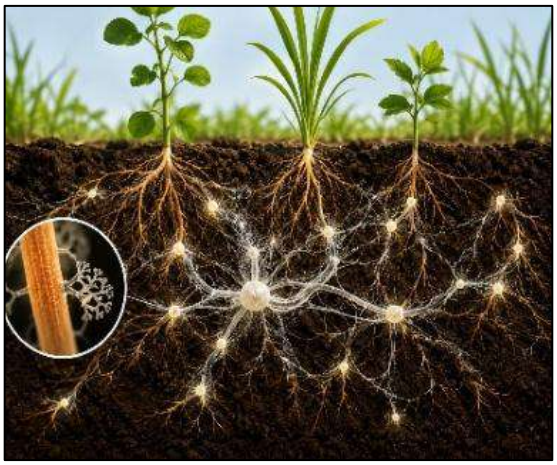
- It is designed to evaluate, rank, and improve the operational efficiency, transparency, and global competitiveness of both major and non-major Indian ports.
- The index aligns closely with the PM Gati Shakti National Master Plan and the National Logistics Policy to minimize trade bottlenecks and lower logistical costs.

4. Environment and Ecology

4.1. Arbuscular Mycorrhizal (AM) Fungi and Global Underground Fungal Networks

Context:

A recent study published in *science* has produced the first global map of underground Arbuscular Mycorrhizal (AM) fungi networks. The study highlights their crucial role in supporting plant life, nutrient cycling, carbon sequestration, and ecosystem health.



Explanation:

- Fungi are a separate biological kingdom and play a vital role as decomposers and nutrient recyclers in ecosystems.
- Mycorrhiza refers to a symbiotic association between fungi and plant roots, benefiting both organisms.
- Arbuscular Mycorrhizal (AM) fungi penetrate plant root cells and occur in association with nearly 70% of terrestrial plant species.
- AM fungi exchange water and soil nutrients (especially phosphorus and nitrogen) with plants in return for carbohydrates produced through photosynthesis.
- Their underground thread-like structures called **hyphae** form extensive networks connecting plants and soils.
- These networks improve soil fertility, drought tolerance, nutrient uptake, and ecosystem resilience.
- AM fungi act as important carbon sinks, transferring and storing significant amounts of carbon in soils.
- Grasslands, including those in the Tibetan Plateau, South Sudan, and India, are major hotspots of AM fungal diversity.
- Conversion of natural grasslands into agricultural land threatens these underground fungal networks.

4.2. Heat Stress and Asiatic Lion Cub Deaths in Gir Forest

Context:

Eight Asiatic lion cubs in Gir Forest, Gujarat reportedly died due to heat-related stress and weakened immunity, not due to Babesia or viral infection (as previously thought). The clarification came after forest authorities conducted monitoring and disease-control measures.

Explanation:

- Asiatic lions are found only in and around Gir National Park and Wildlife Sanctuary in Gujarat.
- They are listed as Endangered on the IUCN Red List and are protected under Schedule I of the Wildlife Protection Act, 1972.
- Heat stress can weaken immunity, reduce appetite, cause dehydration and increase mortality among vulnerable animals like cubs.
- Babesia is a tick-borne parasitic infection that can affect wild and domestic animals.
- Wildlife deaths require scientific investigation to distinguish between disease outbreaks, heat stress, poisoning, injury and ecological factors.
- Rising temperatures and extreme heat events make climate change an emerging wildlife conservation challenge.

4.3. Jai Prakash Narayan Bird Sanctuary Becomes India's 100th Ramsar Site

Context:

Jai Prakash Narayan Bird Sanctuary, also known as **Surha Tal** in Ballia, Uttar Pradesh, has been designated as India's **100th Ramsar site**. The wetland is important for migratory and resident birds and marks a major milestone in India's wetland conservation efforts.

Explanation:

- **Ramsar sites** are wetlands of international importance designated under the **Ramsar Convention, 1971**.
- The Ramsar Convention is an intergovernmental treaty for the conservation and wise use of wetlands.
- **Wetlands** include lakes, marshes, swamps, mangroves, floodplains, estuaries and coastal areas.
- Wetlands support **biodiversity, groundwater recharge, flood control, carbon storage and livelihood security**.
- **Jai Prakash Narayan Bird Sanctuary / Surha Tal** is located in **Ballia district, Uttar Pradesh**.
- It is rich in **avifaunal biodiversity**, including migratory and resident bird species.
- Ramsar designation helps improve conservation, monitoring, community participation and ecological management.
- India's growing Ramsar network reflects stronger focus on **wetland rejuvenation and biodiversity protection**.

4.4. Nilgiri Tahr Population Rises in Tamil Nadu

Context:

Tamil Nadu's third synchronised Nilgiri Tahr population estimation has recorded 1,364 individuals in 2026, showing a 4.68% rise over 2025. The survey was conducted under Project Nilgiri Tahr across 14 forest divisions.



Explanation:

- Nilgiri Tahr is an endangered mountain ungulate found mainly in the Southern Western Ghats of Tamil Nadu and Kerala.
- It inhabits high-altitude grasslands and rocky cliffs, especially in the Nilgiris, Anamalai and other Western Ghats landscapes.
- It is the State animal of Tamil Nadu and has ecological importance in nutrient cycling in mountain ecosystems.
- It receives the highest legal protection under Schedule I of the Wildlife Protection Act, 1972.
- Its conservation is important because the Western Ghats is a global biodiversity hotspot.
- Major threats include habitat fragmentation, invasive plants, climate change, tourism pressure and human disturbance.
- Project Nilgiri Tahr aims at population monitoring, habitat restoration and long-term conservation.

4.5. New Cascade Frog Species Recorded in Nagaland

Context:

A new-to-science cascade-dwelling frog species, Amolops kamal, has been recorded from hill-stream habitats near Singrep village in Kiphire district, Nagaland, close to the Myanmar border. The discovery by Zoological Survey of India scientists highlights the hidden amphibian diversity of Northeast India.

Explanation:



- Cascade frogs generally inhabit fast-flowing hill streams, rocky streambeds and moist forest ecosystems.
- It was earlier linked with the Amolops indoburmanensis species complex, showing the importance of identifying cryptic species.
- Cryptic species are distinct species that look very similar morphologically but differ genetically or evolutionarily.
- Northeast India is part of the Indo-Burma biodiversity hotspot, known for high species richness and endemism.

4.6. Supreme Court Directions to Protect Chambal Forest Guards and Curb Illegal Sand Mining

Context:

The Supreme Court has asked Uttar Pradesh, Madhya Pradesh and Rajasthan to consider prosecution immunity for forest guards acting bona fide against illegal sand miners in the Chambal region. The Court also directed stronger surveillance, patrolling and enforcement to protect the National Chambal Gharial Sanctuary.

Explanation:

- The **National Chambal Sanctuary** extends across **Madhya Pradesh, Rajasthan and Uttar Pradesh** and protects the Chambal River ecosystem.
- It is an important habitat for **gharial, Gangetic dolphin, mugger crocodile, turtles and migratory birds.**
- **Illegal sand mining** damages riverbeds, destroys nesting sites, alters river flow and threatens aquatic biodiversity.
- Forest guards and frontline officials often face physical attacks from mining mafias during enforcement operations.
- The Supreme Court used its extraordinary power under **Article 142** to issue directions for "complete justice" and environmental protection.
- The Court referred to **Section 218(3) of the Bharatiya Nagarik Suraksha Sanhita**, which allows protection from prosecution for certain bona fide official actions.
- Such immunity does not protect illegal or mala fide actions, but aims to prevent fear among officials acting in good faith.
- The issue connects **environmental governance, rule of law, wildlife protection, illegal mining, river ecology and frontline enforcement.**

4.7. Summer Air Pollution in Indian Cities

Context:

Summer air pollution is increasingly emerging as a major environmental challenge in Indian cities. Contrary to the common perception that air pollution is primarily a winter phenomenon, many cities experience significant deterioration in air quality during summer due to dust storms, ozone formation, vehicular emissions, construction activity and industrial pollution.

Explanation:

Nature of Summer Pollution:

- Summer pollution is mainly associated with **PM10 dust particles** and **ground-level ozone.**

- Hot and dry weather loosens soil, increases dust suspension and allows pollutants to travel with strong winds.
- Dust storms, especially from arid regions, can sharply increase PM10 levels in cities.
- Construction activity, road dust, vehicular movement and industrial emissions further worsen air quality.

Difference from Winter Pollution:

- Winter pollution is dominated by **PM2.5**, smoke and smog due to low temperature, weak winds and temperature inversion.
- In winter, pollutants remain trapped close to the ground.
- In summer, stronger winds may disperse some pollutants, but they also bring dust and resuspend particles.
- Therefore, summer pollution is less about stagnant smog and more about dust transport, heat-driven reactions and ozone formation.

Ozone Formation:

- Ground-level ozone is not emitted directly.
- It forms when **nitrogen oxides** from vehicles and industries react with **volatile organic compounds** from fuels, paints and solvents in strong sunlight.
- High temperatures accelerate this reaction, making ozone a major summer pollutant.
- Ozone can irritate the lungs, worsen asthma and reduce respiratory capacity.

Conclusion:

Cities must treat air pollution as a year-round challenge, not only a winter crisis. Summer action should include dust control at construction sites, road cleaning, restrictions on waste burning, cleaner transport, control of industrial emissions and ozone forecasting. Better early-warning systems and city-level heat-pollution plans are essential for protecting public health.

4.8. Great Nicobar Island Project and Coral Translocation

Context:

The Zoological Survey of India (ZSI) has identified four sites on the western coast of Great Nicobar Island for the translocation of coral colonies and giant clams likely to be affected by the proposed Galathea Bay transshipment port under the Great Nicobar Island Mega Project.

Explanation:

- Great Nicobar Island is the southernmost island of India and forms part of the Nicobar Group in the Andaman and Nicobar Islands.
- The island lies close to the Malacca Strait, one of the world's busiest maritime trade routes, giving it significant strategic importance.
- The Great Nicobar Island Mega Project includes a transshipment port at Galathea Bay, an international airport, power infrastructure and township development.
- Coral reefs are marine ecosystems formed by colonies of coral polyps; they support high biodiversity and provide coastal protection.
- Coral translocation involves carefully relocating coral colonies from one site to another to mitigate impacts of developmental activities.
- Giant Clams (Tridacnidae) are large reef-dwelling molluscs protected under the Wild Life (Protection) Act, 1972, and are important components of coral reef ecosystems.
- The island hosts ecologically significant species such as the Leatherback Sea Turtle, Nicobar Megapode, Nicobar Macaque, and Robber Crab.

4.9. Climate Change, Sea-Level Redistribution and Earth's Rotation

Context:

A recent study suggests that climate change-driven redistribution of water and ice may slightly affect Earth's rotation and increase the length of a day. The study links sea-level change, melting ice sheets and mass redistribution with changes in Earth's rotational speed.



Explanation:

- Earth's rotation determines the **length of a day**, but it is not absolutely fixed because mass distribution on Earth keeps changing.
- When ice sheets melt and water shifts from land-based ice to oceans, Earth's mass gets redistributed.
- This works like a **spinning skater**: when arms are extended outward, rotation slows; similarly, when Earth's mass moves farther from the axis, rotation can slow slightly.
- Slower rotation means a very tiny increase in the **length of day**, measured in milliseconds or microseconds.
- Sea-level rise is caused by **thermal expansion of oceans** and melting of **glaciers, Greenland ice sheet and Antarctic ice sheet**.
- Earth's rotation is also influenced by the **Moon's tidal forces**, atmospheric circulation, ocean currents and processes deep inside Earth.
- Scientists use **palaeoclimate records**, fossils, geological evidence, climate models and deep-learning methods to study long-term sea-level changes.
- The issue shows how climate change affects not only oceans and ecosystems but also planetary-scale processes.

4.10. Green Hydrogen Certification Portal: Strengthening India's Clean Energy Transition

Context:

Union Minister for New and Renewable Energy launched the Green Hydrogen Certification Portal to streamline transparency and regulatory compliance under the Green Hydrogen Certification Scheme

Explanation:

- The launch took place during a national workshop on the National Green Hydrogen Mission.
- Green hydrogen is clean burning hydrogen gas produced by splitting water using renewable electricity like solar or wind power.
- Green Hydrogen Certification Scheme, The Standard:
- Defines green hydrogen from plants producing hydrogen as having emissions below 2 kg CO_2 equivalent per kg of H_2.
- The Process:
- Bureau of Energy Efficiency (BEE) agencies verify plant data to issue tradeable carbon credits.

National Green Hydrogen Mission & Applications:

- The Mission India's ₹19,744 crore mission aims to produce 5 Million Metric Tonnes (MMT) of green hydrogen annually by 2030.
- It drives this transition through the SIGHT (Strategic Interventions for Green Hydrogen Transition) program, which funds local electrolyser manufacturing and clean fuel production.
- The goal is to slash fossil fuel imports and cut 50 million tonnes of annual CO_2 emissions.

Key Applications:

- Industrial Feedstock: Replaces fossil-fuel-based "grey" hydrogen in oil refineries and ammonia-based fertilizer plants.
- Green Steel: Substitutes coal and natural gas in the steelmaking process to create low-carbon metal.
- Heavy Transport: Powers long-haul trucks, buses, and trains using hydrogen fuel cells for zero-emission transit.
- Energy Storage: Stores excess solar and wind power as hydrogen gas to generate electricity when the grid peaks.
- Shipping & Aviation: Converts into green methanol or sustainable aviation fuel (SAF) for clean long-distance travel.

4.11. Compressed Biogas (CBG) Blending in India's Natural Gas Network

Context:

India is on track to achieve its target of 3% blending of Compressed Biogas (CBG) with CNG and domestic PNG by FY27. The current blending level has already reached nearly 2%, supported by the expansion of CBG production plants under the government's bioenergy initiatives.

Explanation:

- Compressed Biogas (CBG) is a purified form of biogas produced from agricultural residue, cattle dung, municipal solid waste, sewage waste and organic biomass through anaerobic digestion.
- After purification and compression, CBG has properties similar to Compressed Natural Gas (CNG) and can be used as a transport fuel or for domestic and industrial purposes.
- The SATAT (Sustainable Alternative Towards Affordable Transportation) initiative, launched in 2018, promotes CBG production and marketing across India.
- CBG contributes to the circular economy by converting waste into energy while reducing methane emissions, stubble burning and landfill pollution.
- The GOBARdhan Scheme supports waste-to-wealth projects and facilitates establishment of CBG plants.
- CBG blending with PNG (Piped Natural Gas) and CNG helps reduce dependence on imported natural gas, improves energy security, and supports India's climate commitments.
- It also aids the transition towards a gas-based economy, increases farmers' income through biomass utilization, and promotes renewable energy and sustainable transportation.

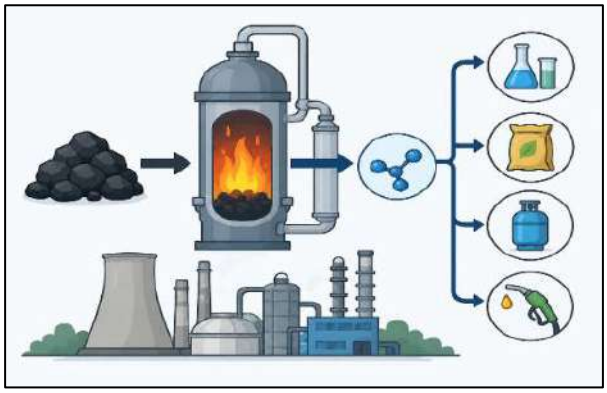
4.12. Coal Gasification and India's Import Substitution Strategy

Context:

The union Coal minister stated that coal gasification can help India substitute imports worth up to ₹3 lakh crore by producing chemicals, fertilisers and hydrogen domestically. The government has also approved a ₹37,500-crore scheme to promote surface coal and lignite gasification projects.

Explanation:

- **Coal gasification is developed to convert coal into a cleaner and more useful gaseous fuel,** instead of directly burning coal in a highly polluting manner. In this process, coal reacts with controlled oxygen/steam to produce **syngas.**
- **The main objective is to produce syngas,** which can be further used to make **methanol, ammonia, urea, hydrogen, synthetic natural gas, chemicals and liquid fuels.**



- **Syngas mainly consists of hydrogen and carbon-based gases**, especially **hydrogen (H_2), carbon monoxide (CO), carbon dioxide (CO_2)** and sometimes **methane (CH_4)**.
- **It helps India use its large domestic coal reserves more productively**, especially when India depends heavily on imports for LNG, ammonia, methanol and fertiliser-related inputs.
- **Advantages include lower direct pollution than conventional coal burning**, better utilisation of low-grade coal, production of multiple industrial products, and support for energy security.
- **It also supports import substitution**, because coal-derived syngas can reduce dependence on imported natural gas, methanol, ammonia and urea-related inputs.
- **India's major goal is to gasify 100 million tonnes of coal by 2030** under the National Coal Gasification Mission.
- India is promoting coal gasification to strengthen energy security, support fertiliser and chemical industries, reduce import bills, and create a transition pathway where domestic coal is used in a cleaner and more value-added manner.

4.13. Tata Chemicals Held Liable for Damage to Gulf of Kutch Marine Sanctuary

Context:

The Gujarat High Court dismissed Tata Chemicals' claim over legacy wastewater channels at its Mithapur plant and held it responsible for ecological damage to the Gulf of Kutch Marine Sanctuary. The Gujarat Pollution Control Board (GPCB) must assess the damage and determine restoration measures and compensation.

Explanation:

- The Gulf of Kutch is an inlet of the Arabian Sea along Gujarat's coast. Its protected marine area lies in the intertidal zone along the Jamnagar coast and islands.
- It is India's first Marine National Park and includes 42 islands, coral reefs, mangroves, mudflats, creeks, estuaries and rocky shores.
- Marine national parks and sanctuaries are protected under the Wildlife (Protection) Act, 1972.
- Industrial effluent is regulated principally through the Water Act, 1974 and Environment (Protection) Act, 1986.
- GPCB is the state authority responsible for preventing and controlling water and air pollution.
- The **Polluter Pays Principle** requires the polluter to bear both compensation and ecological-restoration costs.
- Related environmental principles include the Precautionary Principle, Sustainable Development and Public Trust Doctrine.
- Mangroves act as fish nurseries, stabilise sediments and protect coral reefs from excessive sedimentation.

4.14. INCOIS launches 'NIRMAL-Sagar' initiative to combat marine pollution on World Oceans Day (8th June)

Context:

The Indian National Centre for Ocean Information Services (INCOIS) has launched "NIRMAL Sagar", a clean-ocean initiative to track marine litter in the Indian Ocean Region. It uses ocean modelling, satellite remote sensing and AI/ML tools to identify litter hotspots and forecast debris movement.

Explanation:

- Marine litter refers to human-made waste such as plastics, fishing nets, packaging material and microplastics entering seas and oceans.

- It harms marine biodiversity, coral reefs, fisheries, coastal tourism, navigation and human health through the food chain.
- INCOIS, under the Ministry of Earth Sciences, provides ocean information services, early warnings and marine advisories.
- The initiative combines remote sensing, ocean currents, wind patterns, artificial intelligence, machine learning and ocean modelling.
- It will help in hotspot mapping, clean-up planning, debris movement forecasting and marine pollution mitigation.
- It supports India's Blue Economy, SDG 14: Life Below Water, coastal zone management and World Ocean Day objectives.

5. GEOGRAPHY

5.1. National Critical Mineral Mission and India's Critical Mineral Auctions

Context:

The Ministry of Mines has successfully auctioned 56 critical and strategic mineral blocks and 11 Exploration Licence blocks. These auctions support the National Critical Mineral Mission by expanding domestic exploration, attracting private investment and reducing India's dependence on mineral imports.

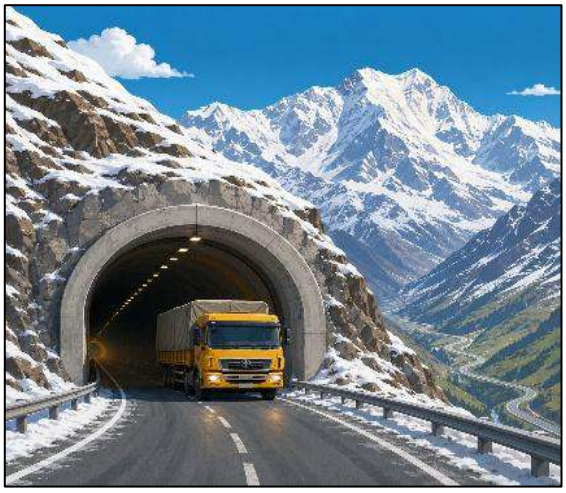
Explanation:

- The National Critical Mineral Mission (NCMM) seeks to secure minerals essential for economic development, clean energy and national security.
- Critical minerals have high economic importance but face risks of supply disruption, import dependence or geographical concentration.
- India has identified 30 critical minerals, including lithium, cobalt, graphite, nickel, rare earth elements, vanadium and titanium.
- They are used in electric vehicles, batteries, renewable energy, electronics, semiconductors, defence, telecommunications and advanced manufacturing.
- The mission promotes domestic exploration, mining, processing, recycling, overseas mineral acquisition and strategic stockpiling.
- Mineral blocks are auctioned under the Mines and Minerals (Development and Regulation) Act, 1957 and the Mineral (Auction) Rules, 2015.
- An Exploration Licence permits systematic exploration of critical and deep-seated minerals by public or private entities.
- The mission aims to strengthen mineral supply chains, promote private participation and support India's energy transition and strategic autonomy.

5.2. Zojila Tunnel: All-Weather Connectivity Between Kashmir and Ladakh

Context:

The Zojila Tunnel is set to witness its final breakthrough, marking a major step toward all-weather road connectivity between Kashmir and Ladakh. The tunnel is strategically important for civilian mobility, economic integration and military logistics near the LAC.



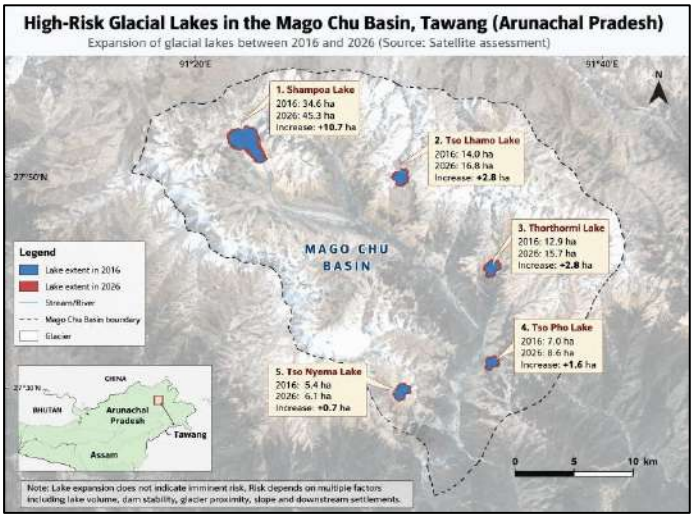
Explanation:

- Zojila Pass lies on the Srinagar–Leh route and connects the Kashmir Valley with Ladakh.
- It often remains closed in winter due to heavy snowfall, avalanches and landslides.
- The 13.14-km Zojila Tunnel is a high-altitude, single-tube, bi-directional road tunnel.
- It will reduce travel time between Ganderbal and Kargil/Drass sector from about 3 hours to 20 minutes.
- It strengthens border infrastructure, strategic mobility, logistics supply, tourism and regional integration.

5.3. Expansion of High-Risk Glacial Lakes in Arunachal Pradesh

Context:

A satellite assessment found that four of five National Disaster Management Authority (NDMA) identified high-risk glacial lakes in the Mago Chu Basin of Tawang in Arunachal Pradesh expanded between 2016 and 2026. Shampoa Lake grew by about 10.7 hectares since 2019; however, expansion alone does not indicate an imminent disaster.



Explanation:

- A glacial lake forms when glacier meltwater accumulates in depressions or behind natural ice or moraine dams.
- A Glacial Lake Outburst Flood (GLOF) is the sudden release of stored water after the lake's natural dam breaches or overflows.
- GLOFs may be triggered by ice or rock avalanches, landslides, earthquakes, intense rainfall, rapid melting or dam erosion.
- Glacial lakes are broadly classified as moraine-dammed, ice-dammed, erosion-formed and other glacial lakes.
- Risk depends on lake volume, expansion rate, dam stability, glacier proximity, surrounding slopes and downstream settlements not merely lake area.
- Satellite remote sensing, including optical and microwave imagery, enables repeated monitoring of inaccessible, cloud-covered Himalayan terrain.
- NDMA undertakes GLOF-risk assessment, while CWC and NRSC monitor changes in Himalayan glacial lakes using satellite data.

5.4. Jonnagiri: India's Largest Private Gold Mine

Context:

Commercial production has begun at the Jonnagiri Gold Mine in Andhra Pradesh, currently India's largest operating private gold mine. It is expected to produce about 400 kg in 2026–27, eventually increasing output to nearly one tonne annually.



Explanation:

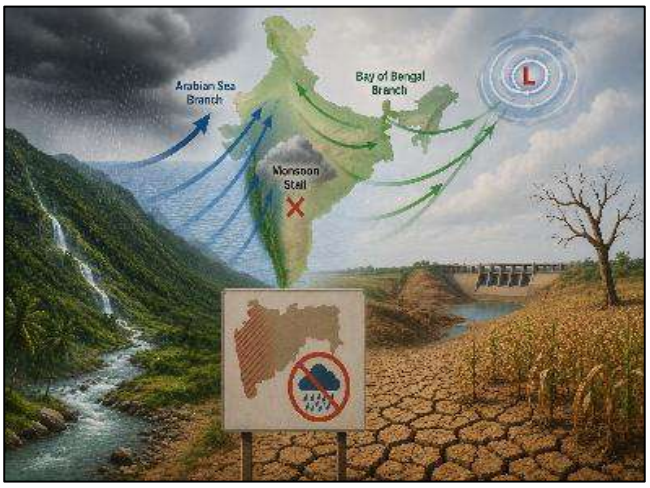
- Jonnagiri is located in Tuggali mandal, Kurnool district, in the mineral-rich Rayalaseema region of Andhra Pradesh.
- It is an open-pit mine with an integrated gold-processing facility, developed by Geomysore Services India Private Limited.
- Around 12 tonnes of mineable gold have presently been identified, while further exploration may increase the resource base.
- Mineral resources indicate geological occurrence, whereas mineral reserves are the economically and legally extractable portion.
- Gold is extracted from ore through crushing, grinding, concentration and metallurgical processing before refining.

- Gold mining is regulated principally by the Mines and Minerals (Development and Regulation) Act, 1957 and associated mineral-conservation rules.
- Primary gold attracts a 4% royalty, calculated using the London Bullion Market Association price; royalty revenue accrues to the State government.

5.5. Southwest Monsoon Progress and Rainfall Deficit over Maharashtra

Context:

The southwest monsoon has stalled over Maharashtra despite advancing rapidly across much of India. This has resulted in a significant rainfall deficit in parts of western India, raising concerns for agriculture, water availability, and reservoir storage.



Explanation:

- The Southwest Monsoon is India's primary rainy season, providing nearly 75% of annual rainfall between June and September.
- It is driven by differential heating of land and sea, creating low pressure over the Indian subcontinent and drawing in moisture-laden winds from the oceans.
- The monsoon has two branches: the Arabian Sea Branch and the Bay of Bengal Branch.
- The Arabian Sea branch first strikes the Western Ghats, causing orographic rainfall on the windward side.
- Variations in monsoon rainfall are influenced by factors such as El Niño, La Niña, Indian Ocean Dipole (IOD), Madden–Julian Oscillation (MJO), pressure systems, and monsoon depressions.
- The Madden–Julian Oscillation (MJO) is an eastward-moving atmospheric disturbance that can enhance or suppress rainfall over the Indian Ocean region.
- Monsoon progress depends on the formation of low-pressure systems and depressions, particularly over the Bay of Bengal.
- The monsoon's stagnation over Maharashtra is primarily a result of weak Arabian Sea winds, absence of monsoon surges, lack of low-pressure systems and an unfavourable The Madden–Julian Oscillation (MJO) phase. However, this is a temporary atmospheric situation and does not by itself determine the rainfall outcome for the entire monsoon season.

5.6. Basalt Fibre

Context:

China is using basalt fibre-based materials in Xinjiang to protect crops and farmland from desert winds, soil erosion and salinity near the Taklamakan Desert.



Explanation:

- Basalt fibre is an eco-friendly, high-performance material made by melting volcanic basalt rock and drawing it into thin fibres.
- It is considered a cost-effective alternative to carbon fibre and glass fibre due to its strength, durability and lower environmental impact.
- It is stronger and lighter than steel, with high tensile strength, corrosion resistance and excellent thermal insulation properties.

- It can withstand high temperatures, radiation, ultraviolet exposure and corrosive chemicals, making it suitable for harsh environments.
- China used basalt fibre in the flag deployed during the Chang'e-6 lunar mission because of its ability to withstand extreme temperature fluctuations, radiation and vacuum conditions on the Moon.
- In civil engineering, it is used as basalt rebar and basalt-fibre-reinforced polymer for concrete reinforcement, especially where steel may rust.
- In automobile, aerospace and marine sectors, it is used for lightweight panels, insulation, fireproofing, exhaust systems, boat hulls and anti-corrosive pipelines.
- It is also used in fire-safety materials, protective clothing, sports goods and environmental applications such as sand barriers, windbreaks and desertification control structures.

6. Science and Technology

6.1. Bharat Innovates 2026 and India–France Deep Tech Partnership

Context:

India and France jointly launched Bharat Innovates 2026 in Nice, France to strengthen cooperation in deep technology, innovation, education and entrepreneurship. The event showcases Indian startups and technologies for global partnerships.

Explanation:

- Deep Tech refers to advanced technologies based on scientific research and engineering innovation.
- It includes AI, semiconductors, biotechnology, healthcare technology, energy, space, defence, climate tech and advanced manufacturing.
- Bharat Innovates 2026 aims to promote Indian innovations before global investors, industries, universities and policymakers.
- The event showcases technologies developed by Indian startups, innovators and higher education institutions.
- India–France cooperation already covers space, defence, nuclear energy, climate action, digital technology and education.
- Such platforms help India integrate with global innovation networks and attract investment.
- It supports India's goals of Atmanirbhar Bharat, Startup India, Digital India, Make in India and innovation-led growth.

6.2. SpaceX Initial Public Offering and the Rise of the Commercial Space Economy

Context:

SpaceX debuted on the stock market through an Initial Public Offering (IPO), with its share price surging significantly on listing and pushing Elon Musk's net worth beyond the trillion-dollar mark.

Explanation:

- SpaceX founded in 2002 by Elon Musk, SpaceX is a private American aerospace manufacturer and space transportation company.
- Headquarters: Starbase, Texas, United States.
- Objective: Reduce the cost of space transportation and enable the long-term human settlement of Mars.
- Developed the Falcon 9 and Falcon Heavy reusable launch vehicles, significantly lowering launch costs.
- Operates the Dragon spacecraft, used for cargo and crew transportation missions to the International Space Station (ISS).
- Runs the Starlink satellite constellation, providing broadband internet services through Low-Earth-Orbit (LEO) satellites.
- Developing Starship, a fully reusable super-heavy launch vehicle designed for lunar, Mars and deep-space missions.
- Became the first private company to send astronauts to the ISS under NASA's Commercial Crew Program.

6.3. Character AI and Mental Health Risks for Young Users

Context:

Mental health professionals have warned that **Character AI platforms** may create psychological risks for young users. Such platforms allow immersive conversations with simulated personalities, which may blur the line between entertainment, companionship and emotional dependence.

Explanation:

- Character AI refers to AI chatbots that simulate personalities such as historical figures, celebrities, fictional characters or customised companions.
- Unlike ordinary chatbots, these platforms allow users to build personalised narratives and emotional interactions.
- Such AI systems are based on generative artificial intelligence, especially large language models, which generate human-like responses.
- Young users may develop strong emotional attachment because the chatbot appears responsive, personalised and always available.
- Key concerns include psychological dependence, social isolation, parasocial relationships, reduced real-world interaction and vulnerability to harmful advice.
- The issue is linked to broader debates on AI ethics, digital safety, algorithmic accountability and child protection online.
- India's governance concerns include regulation of AI platforms, data privacy, consent, age-appropriate design and online mental health safeguards

6.4. China's LineShine Tops the TOP500 Supercomputer Ranking

Context:

China's **LineShine supercomputer**, installed at the National Supercomputing Centre in Shenzhen, has reportedly secured first place in the June 2026 **TOP500** ranking. The result highlights China's growing domestic capability in high-performance computing amid technological competition with the United States.



Explanation:

- A supercomputer is an extremely powerful computing system designed to perform massive calculations at very high speed.
- Its performance is commonly measured in FLOPS—floating-point operations per second.
- Petaflop means 10^{15}operations per second, while exaflop means 10^{18}operations per second.
- Supercomputers use parallel processing, in which thousands of processors work simultaneously on different parts of a problem.
- The TOP500 is a biannual global ranking of the world's most powerful publicly benchmarked supercomputers.
- It mainly uses the LINPACK benchmark, which tests the speed of solving complex linear equations.
- Applications include weather forecasting, climate modelling, nuclear research, space science, drug discovery, artificial intelligence and fluid dynamics.
- Supercomputers require advanced processors, high-speed networks, large storage capacity and extensive cooling systems.
- Quantum computers are different: they use qubits and quantum effects rather than conventional parallel processing.

6.5. Project Nimbus and the Israel Cloud Computing Controversy

Context:

Project Nimbus, a cloud-computing contract between Israel and technology companies Google and Amazon, has sparked protests by students and employees who argue that the technology could support surveillance and military operations in the Israel–Palestine conflict.



Explanation:

- Project Nimbus is a US$1.2 billion cloud-computing and artificial intelligence (AI) contract awarded by Israel to Google Cloud and Amazon Web Services (AWS).
- The project provides cloud infrastructure, data storage, computing power and AI services to Israeli government ministries and public agencies.
- Critics allege that cloud and AI technologies may facilitate surveillance, intelligence gathering and military operations, particularly in conflict zones.

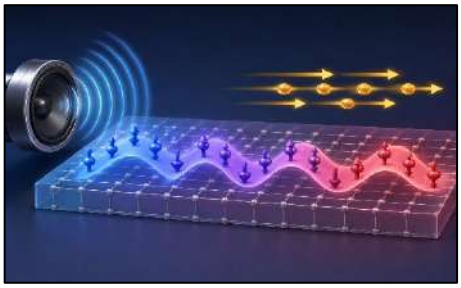
Supporters argue that cloud infrastructure is essential for government digital services, cybersecurity, public administration and data management. The companies also maintain that the project provides civilian cloud services and does not involve offensive military applications.

6.6. Sound Waves in Next-Generation Computing

Context:

Current computers waste significant energy as heat because they rely on moving electric charge through circuits. Scientists are now exploring spintronics, a technology that uses the magnetic spin property of particles instead of electric charge to carry information. A recent breakthrough shows that sound waves can generate and control this spin-based information flow, potentially revolutionising energy-efficient computing.

Explanation:



- Traditional electronics move electrons (electric charge) through circuits to process information, but this produces substantial heat and energy loss, creating a physical barrier to making devices faster and smaller.
- Spintronics bypasses this limitation by using the spin property of electrons (an intrinsic quantum magnetic property) to carry information, consuming far less energy than conventional charge-based systems.
- In spintronic systems, Magnons serve as information carriers. These are collective magnetic disturbances that propagate through magnetic materials, analogous to how electrons flow in normal circuits but with significantly lower energy dissipation.
- Phonons are quantised units of sound and vibration that travel through solid materials at the atomic level. Researchers have now established that phonons can directly excite and control magnons within magnetic materials.
- This phonon-magnon coupling is the central discovery. It means sound waves alone can trigger, direct and regulate spin currents inside materials without requiring any electric current input.
- The ability to control spin currents acoustically has direct applications in quantum computing, where low-energy, precise control of quantum states (qubits) is a critical requirement for stable operation.
- Beyond quantum computing, this mechanism supports development of next-generation communication technologies that transmit information with minimal signal loss and heat generation.

- The discovery advances the emerging field of Magnonics, where magnons replace electrons as primary information carriers, potentially forming the foundation of a completely new computing architecture that is faster, cooler and more energy-efficient than silicon-based systems.

6.7. Post-Quantum Cryptography for India's Critical Sectors

Context:

A Government task force has recommended that India's critical sectors such as government, defence, banking, telecom, transport and power should shift towards quantum-safe encryption. The warning is that future quantum computers may break present public-key encryption systems, risking confidential data and digital trust.

Explanation:

- **Encryption means converting readable information into secret code** so that only the authorised person or system can read it.
- **Example:** if India's defence forces send missile-location or border-surveillance data, encryption ensures enemies cannot understand it even if they intercept it.
- **The need for encryption is rising** because government, banking, telecom, transport and power systems now depend heavily on digital networks.
- **Today, normal mathematical encryption dominates global digital systems**, while **another type called quantum cryptography** is still limited to experimental, specialised and high-security uses.
- **A key property of quantum mechanics is that observing a quantum particle changes its state**; in cryptography, this can help detect if someone secretly tries to intercept a key.
- **But quantum cryptography is costly and hardware-heavy**, so it cannot easily protect every bank, mobile tower, website, power grid and government database.
- **A third type called Post-Quantum Cryptography is therefore needed** because it can be added through software upgrades and can protect existing digital infrastructure at large scale.
- **For India, quantum-safe encryption is important** to protect national security, financial trust, citizen data and digital sovereignty.

6.8. Rising Burden of Non-Communicable Diseases in India

Context:

Non communicable diseases accounted for around 60% of all deaths in India during 2022–2024, showing a major shift in India's mortality pattern. The rise is visible not only in urban areas but also among rural populations, women and younger age groups.

Explanation:

- **Non-communicable diseases (NCDs)** are diseases that **do not spread from one person to another** through infection.
- They are generally **long-duration diseases** that develop slowly and require continuous prevention, screening and treatment.
- Major NCDs include **cardiovascular diseases, cancer, diabetes, chronic respiratory diseases, chronic kidney diseases and digestive disorders**.
- NCDs are increasing because India is undergoing an **epidemiological transition**, where infectious disease deaths decline but lifestyle-related and age-related diseases rise.
- **Ageing population** increases NCD risk because hypertension, heart disease, diabetes and cancer become more common with age.

- **Unhealthy diet**, high salt, sugar, trans fats, processed foods and low intake of fruits and vegetables increase obesity, diabetes and heart disease.
- **Physical inactivity**, sedentary jobs, urban lifestyle and reduced manual work increase metabolic disorders.
- **Tobacco, alcohol and air pollution** raise the risk of cancer, stroke, heart disease and respiratory diseases.
- **Stress, poor sleep and mental health issues** are emerging contributors, especially among working-age groups.
- NCDs are now rising even in rural India due to changing diets, pollution, tobacco use, poor screening and weak primary healthcare.

6.9. Japanese Encephalitis (JE) and Acute Encephalitis Syndrome (AES) in India

Context:

Assam has reported seven deaths due to Japanese Encephalitis (JE) and several deaths due to Acute Encephalitis Syndrome (AES) in 2026. Health authorities have clarified that JE is one of the causes of AES, but not all AES cases are caused by JE.

Explanation:

- Acute Encephalitis Syndrome (AES) is a clinical condition characterized by acute onset of fever with altered mental status, seizures, or neurological complications.
- Japanese Encephalitis (JE) is a viral disease caused by the Japanese Encephalitis Virus (JEV) and is one of the major causes of AES in India.
- JEV belongs to the Flavivirus group, which also includes dengue, yellow fever, and West Nile viruses.
- The disease is transmitted through the bite of infected Culex mosquitoes, making it a vector-borne disease.
- Pigs act as amplifying hosts and water birds serve as reservoir hosts; humans are considered dead-end hosts.
- JE outbreaks are common during the monsoon and post-monsoon season, especially in rice-growing and waterlogged regions.
- Symptoms include high fever, headache, seizures, inflammation of the brain (encephalitis), paralysis, and neurological damage.
- Prevention relies on JE vaccination, vector control, surveillance, sanitation, and public health awareness.

6.10. Dark Patterns in India's Online Marketplaces

Context:

India's rapidly expanding digital consumer market is facing a significant threat from deceptive interface design practices known as dark patterns. A report by market research firm Datum Intelligence estimates that Indian online buyers are losing between Rs 25,000 crore and Rs 28,000 crore annually to such manipulative tactics. With 304 million online buyers, the scale of consumer harm demands urgent regulatory attention.

Explanation:

- Dark patterns are deliberately deceptive user interface designs on websites and apps that manipulate consumers into making unintended purchases, subscriptions or payments, exploiting cognitive biases rather than informing free choice.

- As per the report, 88% of India's 304 million online buyers are affected, losing approximately Rs 78 to Rs 87 per month each through practices such as hidden charges, forced add-ons, drip pricing, false urgency cues and subscription traps.
- Drip pricing is a tactic where a product is advertised at an attractively low base price, but additional mandatory charges such as platform fees, convenience fees, taxes and handling charges are revealed gradually at each step of checkout, resulting in a final price significantly higher than what the consumer originally saw. By the time the full cost is visible, the consumer is psychologically committed to completing the purchase.
- Common dark pattern tactics also include false urgency ("only 2 left!"), forced add-ons (pre-ticked items added without consent), and subscription traps (easy sign-up but deliberately difficult cancellation).
- India's Department of Consumer Affairs notified Guidelines for Prevention and Regulation of Dark Patterns in 2023 under the Consumer Protection Act, 2019, marking one of the earliest regulatory frameworks globally to specifically address dark patterns in e-commerce.

6.11. Kavach Deployment Approved for East Coast Railway

Context:

Indian Railways has approved the installation of the indigenous Kavach train-safety system across 631 route kilometres of the East Coast Railway at a cost of ₹270 crore. The project will cover six railway sections and improve the safety and reliability of passenger and freight operations.

Explanation:



- Kavach is India's indigenously developed Automatic Train Protection (ATP) and collision-avoidance system.
- It was developed by the Research Designs and Standards Organisation (RDSO) in collaboration with Indian industry.
- The system continuously exchanges information between locomotives, railway tracks and signalling infrastructure.
- It prevents Signal Passing at Danger (SPAD), which occurs when a train crosses a stop signal without authorisation.
- Kavach automatically applies brakes when the locomotive pilot fails to respond to a danger signal or exceeds the prescribed speed.
- It helps maintain a safe distance between trains and reduces the possibility of collisions.
- The system uses LTE-based communication, radio-frequency identification devices, onboard equipment and station control units.
- It improves railway operations during poor visibility, particularly dense fog.

6.12. RudraM-II Air-to-Surface Missile Flight-Tested Successfully

Context:

DRDO and the Indian Air Force have successfully conducted flight-tests of the RudraM-II air-to-surface missile from an airborne platform. The missile achieved pin-point accuracy and validated critical subsystems under extreme release conditions.

Explanation:



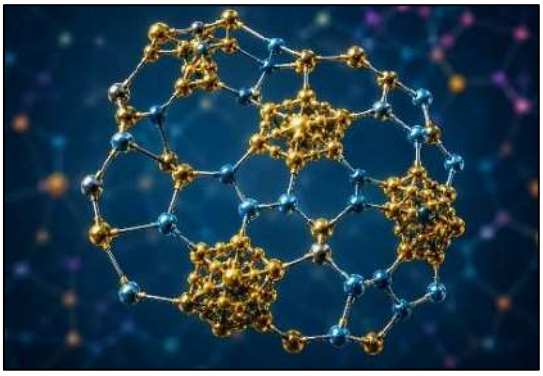
- RudraM-II is an indigenously developed air-to-surface missile meant to be launched from fighter aircraft against ground-based targets.
- It has been developed by the Defence Research and Development Organisation in collaboration with the Indian Air Force.
- Air-to-surface missiles are used to strike enemy radars, command centres, air defence systems and other strategic targets from the air.
- The RudraM missile family strengthens India's stand-off strike capability, allowing aircraft to attack targets from a safer distance.
- Such weapons improve precision strike capability, reduce pilot risk and support suppression of enemy air defences.
- Successful testing validates guidance, propulsion, control systems, release mechanism and target accuracy.

6.13. Nanographene-Based Ultra-Porous Materials and Reticular Chemistry

Context:

Scientists led by Nobel Laureate Omar Yaghi have developed new ultra-porous three-dimensional materials using nanographene-based molecular building blocks. The breakthrough could enable advanced gas storage, separation technologies, and next-generation functional materials.

Explanation:



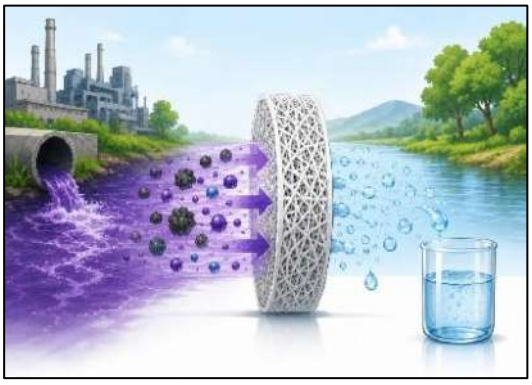
- **Nanographene** refers to very small fragments of graphene, made of carbon atoms arranged in a honeycomb-like pattern.
- **Graphene** is a single layer of carbon atoms and is known for its strength, light weight, conductivity and large surface area.
- Scientists designed a molecule called **HBC-LA12**, which has **12 connection points** arranged in a prism-like shape. These connection points allow the molecule to link with other molecules in a planned manner.
- By connecting many such molecules, scientists created two new **three-dimensional porous structures**.
- These materials are called **ultra-porous** because they contain a very large number of tiny empty spaces or pores.
- One of the new structures has a record surface area of about **5,000 square metres per gram**.
- A high surface area means more space is available for gases or molecules to attach inside the material. This is important because such materials can be used to **store gases** like hydrogen, methane or carbon dioxide.
- The breakthrough is related to **reticular chemistry**, which means designing materials by joining molecular building blocks in a planned pattern.
- Omar Yaghi is known for pioneering **metal-organic frameworks**, or **MOFs**, which are highly porous materials.
- Such materials can be useful in **clean energy, gas separation, carbon capture, water harvesting, catalysis and environmental technologies**.

6.14. Advanced Electrospun Nanofiber Membrane Technology for Sustainable Treatment of Textile Wastewater

Context:

Scientists at CSIR–Indian Institute of Chemical Technology have developed an advanced electrospun nanofiber membrane capable of efficiently removing dye pollutants from textile wastewater.

Explanation:



- Electrospun Nanofiber Membrane is developed using a blend of Polyvinylidene Fluoride (PVDF) and Polyethersulfone (PES).
- Fabricated through the electrospinning technique that produces ultrafine fibers using an electric field.
- Enhanced with Graphene Oxide (GO), Graphene Nanoplatelets (GNPs), and Metal-Organic Frameworks (MOFs).
- Achieves nearly 99.1% dye rejection efficiency against crystal violet dye.
- Possesses high surface area, interconnected porous structure, and superior permeability.
- Exhibits improved hydrophilicity, anti-fouling characteristics, and mechanical stability.
- Applications include wastewater treatment, desalination, air purification, gas separation, and biomedical filtration

6.15. Network Survey Vehicles for Safer and Smarter National Highways

Context:

The Ministry of Road Transport and Highways has announced the deployment of Network Survey Vehicles (NSVs) across India's National Highway network. These vehicles use advanced 3D laser-based systems, GPS and imaging technology to monitor road quality and improve highway safety.

Explanation:

- Network Survey Vehicles (NSVs) are specialised vehicles used for scientific assessment of road conditions.
- They are equipped with laser profilers, high-resolution cameras, GPS, imaging systems and 3D laser sensors.
- NSVs detect potholes, cracks, rutting, unevenness, surface distress and road geometry defects.
- They help create digital road-condition maps for better planning, maintenance and monitoring.
- The technology supports data-driven highway asset management and reduces dependence on manual inspection.
- It improves riding quality, road safety, accident prevention and timely maintenance of National Highways.
- The initiative aligns with smart infrastructure, digital governance, road safety, preventive maintenance and efficient public expenditure.

6.16. James Webb Telescope Captures Weather on Exoplanet WASP-94A b

Context:

The James Webb Space Telescope (JWST) has helped scientists study weather patterns on WASP-94A b, a gas-giant exoplanet about 700 light years away. The study observed changing cloud patterns, temperature differences and atmospheric composition on the planet.

Explanation:

- Exoplanets are planets located outside our Solar System, orbiting stars other than the Sun.
- JWST studies exoplanet atmospheres using spectroscopy, where starlight passing through a planet's atmosphere reveals chemical composition. The transit method is used when a planet passes in front of its star, causing a temporary dip in starlight.
- The study found weather-like patterns, including clouds of silicate, iron and magnesium sulphide.
- Understanding exoplanet atmospheres helps scientists study planet formation, atmospheric chemistry and habitability.

6.17. Carbon Isotopes Reveal the Ancient Origin of Interstellar Comet 3I/ATLAS

Context:

Scientists studying the interstellar comet 3I/ATLAS have estimated that it formed nearly 12 billion years ago in a cold planetary system outside the Solar System. Its hydrogen and carbon isotope ratios were analysed using the James Webb Space Telescope.

Explanation:

- Isotopes are atoms of the same element having the same number of protons but different numbers of neutrons.
- Examples: Hydrogen isotopes include protium or ordinary hydrogen (0 neutrons, stable), deuterium (1 neutron, stable), and tritium (2 neutrons, radioactive); Carbon includes carbon-12 (6 neutrons, stable), carbon-13 (7 neutrons, stable), and carbon-14 (8 neutrons, radioactive & used for dating); while Uranium includes uranium-234 (142 neutrons), uranium-235 (143 neutrons, fissile), and uranium-238 (146 neutrons, most abundant).
- Isotopes possess similar chemical properties but differ in atomic mass and sometimes in nuclear stability.
- Stable isotopes do not undergo radioactive decay, while radioactive isotopes decay at predictable rates.
- The relative abundance of isotopes is called the isotopic ratio or isotopic signature.
- Isotopic ratios act as natural records because they vary with temperature, radiation and the chemical environment during formation.
- Hydrogen isotopes, especially the deuterium-to-hydrogen ratio, can indicate the temperature at which water-bearing material formed.
- Carbon-isotope ratios provide clues about the gas clouds and stellar environments from which an object originated.
- Radiometric dating uses radioactive decay and half-life to determine the age of rocks and fossils.
- 3I/ATLAS is an interstellar object, meaning it originated beyond the Solar System and follows an unbound trajectory.

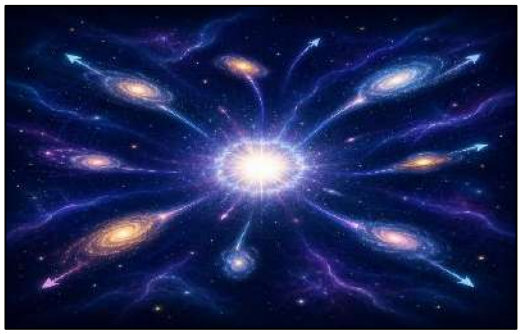
6.18. Universe's Expansion Still Accelerating: New Supernova Study

Context:

A new study using fresh supernova data has confirmed that the universe is still expanding at an accelerating rate. This supports the idea that **dark energy** continues to drive cosmic expansion, despite earlier doubts about the strength of evidence.

Explanation:

- The Big Bang theory explains that the universe began from an extremely hot and dense state and has been expanding ever since.



- In 1998, scientists discovered that the universe's expansion is not slowing down but accelerating, based on observations of distant Type Ia supernovae.
- **Type Ia** supernovae act as "standard candles" because their known brightness helps measure cosmic distances.
- The acceleration is mainly linked to dark energy, a mysterious force believed to make up nearly 68% of the universe.
- Dark matter adds gravitational pull, while dark energy pushes expansion outward.
- The study used improved calibration of supernova data, reducing doubts about earlier findings.

6.19. A Black Hole's Elusive Wind: Sagittarius A

Context:

For over 50 years, astronomers suspected that Sagittarius A, the supermassive black hole at the centre of the Milky Way, was blowing powerful winds of hot gas into space but lacked direct evidence. A new study using the ALMA telescope in Chile has now provided the first definitive proof, resolving one of astrophysics' longest-standing observational puzzles.

About Sagittarius A:

- Sagittarius A is the supermassive black hole sitting at the centre of our Milky Way galaxy, millions of times more massive than the Sun, and is now confirmed to be actively blowing a wind of hot gas outward into space.
- Researchers used five years of data from the ALMA telescope in Chile to detect a large cone-shaped clearing in the gas surrounding the black hole, at least 3.2 lightyears long, formed by this outward-blowing wind.
- When gas is pulled toward the black hole, it swirls and accelerates rather than falling straight in. Friction from these swirling heats the gas to millions of degrees, eventually turning it into a superheated plasma that gets pushed outward as wind.
- This wind acts as a natural regulator of the galaxy by blowing away gas that would otherwise form too many stars. If unchecked, excessive star formation and subsequent stellar explosions could strip the galaxy of all its gas, permanently halting the Milky Way's ability to grow and evolve.

7. HISTORY & CULTURE

7.1. Nihang Sikhs: Beliefs, Distinctive Tradition and Gatka

Context:

A group of Nihang Sikhs recently ended a three-day standoff at a gurdwara in Rudraprayag district, Uttarakhand. The incident has brought attention to the identity, beliefs, attire and martial traditions of the Nihang community.

Explanation:

- Nihang Sikhs are a traditional armed order within Sikhism, historically associated with the Khalsa and the defence of the Sikh faith.
- The term *Nihang* is commonly understood to signify a fearless, detached and courageous warrior.
- Their traditions are closely linked to Guru Gobind Singh, the tenth Sikh Guru, and the establishment of the Khalsa in 1699.
- Nihangs follow the Sikh Rehat Maryada, maintain the Five Ks and emphasise bravery, discipline, equality, service and protection of the oppressed.
- They are recognised by their blue robes, high turbans or *dumallas*, steel bracelets and traditional weapons such as swords, spears and chakrams.
- Some Nihang groups maintain mobile camps called chhaunis and participate prominently in Hola Mohalla celebrations.
- Gatka is a traditional Sikh martial art involving coordinated movements with sticks, swords and other weapons.
- Gatka combines physical training, self-defence, discipline, agility and ceremonial martial display.

7.2. Rakhigarhi Skeletons and Scientific Study of the Harappan Civilization

Context:

The Archaeological Survey of India (ASI) has sent nearly 5,000-year-old human skeletons excavated from Rakhigarhi in Haryana for DNA analysis, anthropological examination, and facial reconstruction. The study aims to provide insights into the ancestry, health, lifestyle, and physical appearance of people belonging to the Harappan Civilization.



Explanation:

- Rakhigarhi (Haryana) is the largest known site of the Indus Valley Civilization (IVC)/Harappan Civilization in India and one of the most important archaeological sites in South Asia.
- The Harappan Civilization flourished around 2600–1900 BCE and is known for urban planning, drainage systems, trade networks, and standardized weights and measures.
- Archaeological Survey of India (ASI) is the premier organization responsible for archaeological research, excavation, and conservation of heritage sites in India.
- Burial practices, grave goods, and cemetery remains are important archaeological evidence for understanding social organization, beliefs, and cultural traditions.
- Paleo-environmental studies reconstruct past climate, vegetation, and ecological conditions to understand how ancient societies adapted to their environment.

7.3. Prehistoric Rock Art and Human Activity in Aravalli Region

Context:
A wildlife trail in Gurugram's Aravalli forests has led to the discovery of cup-shaped depressions, geometric engravings, game-board-like patterns, stone tools and a large foot engraving. Experts suggest that the site shows continuity of human activity from early tool-making traditions to later symbolic, ritual and social life.
Explanation:

- Aravalli Range is one of the oldest fold mountain systems in the world and has several prehistoric and archaeological sites.
- Petroglyphs are images, symbols or designs carved, engraved or pecked on rock surfaces.
- Cupules are cup-shaped depressions made on rocks and are among the earliest forms of rock art.
- Palaeolithic tools such as hand axes and cleavers indicate early human tool-making and survival activities.
- Acheulean tradition is linked with Lower Palaeolithic stone tools, especially bifacial hand axes.
- Rock art may reflect symbolic behaviour, ritual practices, social communication and cognitive development.
- Game-board-like engravings indicate possible later social or recreational activities.
- Such findings help trace the transition from basic survival activities to complex cultural and symbolic life.

7.4. Jharkhand Megaliths and Threat from Mining

Context:
Jharkhand's megalithic sites, including **Chokahatu in Ranchi district**, are facing neglect and damage due to open-cast coal mining and developmental projects. These sites are important archaeological and sociological markers of tribal culture and ancestor worship.
Explanation:

- Megaliths are large stone structures used by ancient and tribal communities for burial, memorial and ritual purposes.
- They are found across India, especially in Jharkhand, Chhattisgarh, Odisha, Northeast India, Deccan and South India.
- Jharkhand's megaliths are closely linked with Adivasi traditions, ancestor worship, clan memory and sacred landscapes.
- Chokahatu megalithic site near Ranchi is considered one of the important tribal megalithic landscapes.
- Mining, urbanisation and infrastructure projects threaten such heritage sites.
- These sites show continuity between archaeology and living tribal culture.
- Some of the most important megalithic sites in India include Brahmagiri and Maski (Karnataka), Adichanallur (Tamil Nadu), Junapani (Maharashtra), Dolmenkal (Telangana), Hire Benakal (Karnataka), and Mao (Manipur).

7.5. India–China Joint UNESCO Nomination for Xuanzang's Records and Shared Heritage

Context:
India and China are discussing a joint UNESCO nomination of "The Great Tang Records on the Western Regions", based on the travels of the Chinese Buddhist monk Xuanzang (Hsuan Tsang) in 7th-century India. The initiative reflects efforts by BRICS countries to promote collaborative nominations for shared cultural heritage.

Explanation:

- Xuanzang (602–664 CE) was a Chinese Buddhist monk, scholar, and traveller who visited India during the reign of Harshavardhana.
- He spent about 17 years in India, studying Buddhism and collecting manuscripts.
- Xuanzang studied at Nalanda University, one of the world's greatest ancient centres of learning.
- His work, "The Great Tang Records on the Western Regions" (Da Tang Xiyu Ji), provides valuable information on the political, social, economic, and religious conditions of 7th-century India.
- UNESCO promotes protection of cultural and natural heritage through programmes such as World Heritage Sites, Intangible Cultural Heritage (ICH), and the Memory of the World Programme.
- Joint nominations allow multiple countries to safeguard and promote shared cultural traditions and historical records.
- Other heritage elements discussed include Panchatantra, Sowa-Rigpa (Traditional Tibetan Medicine), and Buddhist cultural linkages across Asia.

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