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# GEOGRAPHY, ENVIRONMENT & DISASTER MANAGEMENT

## TOPICS FOR MAINS

### Tectonic Turmoil: India's Seismic Vulnerability

*Syllabus Mapping: GS I Geography, GS III, Disaster Management*

## Context

A magnitude 4 earthquake originated in Delhi, marking the strongest local tremor in the last five years.

## India's Seismic Vulnerability

The Bureau of Indian Standards (BIS) has prepared a seismic zonation map for India, which divides India into different zones of varying earthquake intensities.

- **Zone V:** It includes the region of Kashmir, the Western and Central Himalayas, North and Middle Bihar, the Northeast Indian region, the Rann of Kutch and the Andaman and Nicobar group of islands.

- **Zone IV:** It covers parts of Jammu & Kashmir and Himachal Pradesh, Delhi, Sikkim, northern parts of Uttar Pradesh, Bihar and West Bengal, parts of Gujarat and small portions of Maharashtra near the west coast and Rajasthan.

- **Zone-III:** It comprises Kerala, Goa, Lakshadweep, and the remaining parts of Uttar Pradesh, Gujarat, and West Bengal, parts of Punjab, Rajasthan, Madhya Pradesh, Bihar, Jharkhand, Chhattisgarh, Maharashtra, Odisha, Andhra Pradesh, Tamil Nadu, and Karnataka.

- **Zone-II** covers the remaining parts of the country.
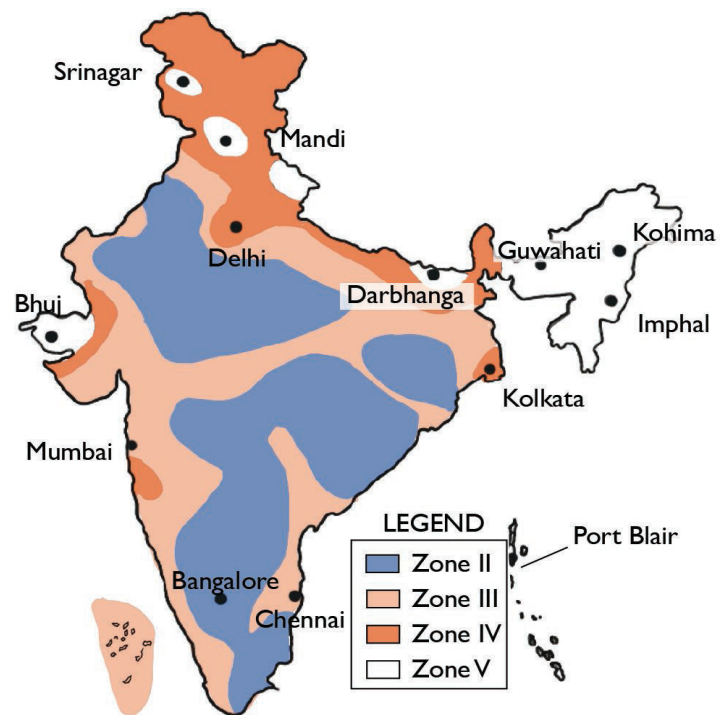


## Causes of Seismic Risk and Vulnerability in India

- **Locational Vulnerability -**
  - **Himalayas and North-eastern belt:** The entire Himalayan region is vulnerable to earthquakes due to the movement of the Indian plate into Eurasia at a rate of approximately 47 mm/year. Regions in the Himalayan foothills are vulnerable to liquefaction and landslides due to earthquakes.
  - **Andaman and Nicobar Islands:** The north-south running Andaman-Nicobar subduction system meets the onshore continuation of the Into-Burmese arc. Further, the region has heavily folded topography characterized by several longitudinal thrusts and faults.
  - **Peninsular India:** The development of a fault line and the accumulation of energy along the fault-line of river Bhima near Latur and Osmanabad in Maharashtra, makes the region vulnerable.
- **Population Density and Urbanization:** High population density, particularly in urban areas within seismic zones, increases the risk of casualties and damage.
- **Infrastructure Vulnerability:** Unscientific constructions, and non-seismic retrofitted buildings, especially in older urban centres, increases the vulnerability.

**Case Study: Why Delhi is Earthquake-Prone?**

- Delhi falls under Zone 4 of India's earthquake hazard map. This zone is classified as having a high to moderate earthquake risk, making the region more vulnerable to strong seismic activity compared to other areas in the country.
- Delhi is in an active seismic zone both because of the faults around the Delhi NCR region and its proximity to the Himalayas which are seismically active.
- Delhi is situated in the Aravalli-Delhi Fold Belt, a seismically active geological zone that stretches from Rajasthan to Haryana and Delhi.
- Major weak zones and faults include: Delhi-Haridwar ridge, great boundary fault, Mahendragarh-Dehradun subsurface fault, Moradabad fault line, Sohna fault line, Delhi-Sargodha ridge, Yamuna River lineament, Ganga River lineament.
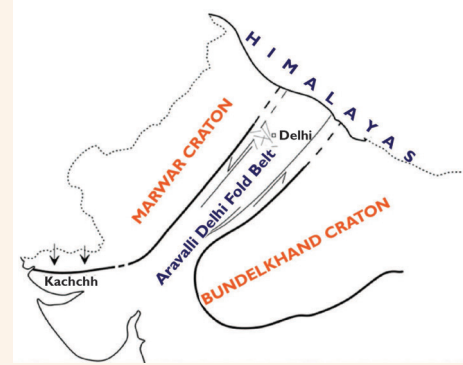
## Earthquake Risk Reduction and Mitigation in India

- **National Seismological Network (NSN):** The National Centre for Seismology (NCS), operating under the Ministry of Earth Sciences, serves as the nodal agency for monitoring earthquakes within and around the country.
  - NCS maintains the National Seismological Network (NSN), which comprises more than 100 observatories strategically located across India.
  - The NCS shares earthquake information with relevant central and state disaster authorities, enabling them to swiftly implement appropriate mitigation measures.
  - NCS installed a seismological observatory in Udhampur, Jammu and Kashmir as a part of Seismic Microzonation.

### NDMA Guidelines on Earthquake Management, 2007



  - It aims to generate vital geotechnical and seismological parameters for developing earthquake risk resilient building design codes for structures and infrastructures.
- **National Earthquake Risk Mitigation Project:** The project seeks to enhance the capacity of national and state entities in effectively planning for and responding to earthquakes.
- **Building Codes:** The Bureau of Indian Standards (BIS) has established a seismic code known as IS 1893, which serves as the Indian Standard Code of Practice for Earthquake-Resistant Design and Construction of Buildings. This code is mandatory for construction companies in India to ensure structural safety in seismic-prone areas.
  - It was first introduced in 1962, making it the first Indian seismic code, and has since undergone multiple revisions to incorporate advancements in engineering and seismology.

- **Efforts by Building Materials & Technology Promotion Council (BMTPC):** The BMTPC has undertaken projects for retrofitting of life-line structures for generating awareness among the people as well as various government agencies about the need and techniques of retrofitting.
- **Initiative by Ministry of Panchayati Raj:** The ministry has financed several district plans under the BRGF for construction of panchayat buildings, anganwadi centres, school buildings, classrooms, roads, bridges, culverts etc.
- **Indian National Centre for Oceanic Information System (INCOIS):** It gives information to all responders about the origin, time, location of the epicentre magnitude and depth of an earthquake inside the ocean and accordingly issues bulletins.

## Challenges in Earthquake Management in India

- **Urban Sprawl**: Rapid urbanization has resulted in densely populated cities with inadequate infrastructure, poorly built structures, informal settlements, and limited open spaces.
- **Non-adherence to building codes**: Many older structures in urban areas do not adhere to modern seismic standards.
  - E.g., NDMA reported that around 4,000 multi-story buildings in Ahmedabad are at risk of not surviving a high-magnitude earthquake due to their flawed architectural design.
- **Expensive Retrofitting:** Most of the regions prone to earthquakes are located in hilly and mountainous region. Retrofitting existing structures to withstand earthquakes is complex and expensive in these areas.
- **Dearth of professionals:** There is a dearth of professional who have adequate skills and expertise necessary to practise good structural engineering.

## Suggested Measures to Strengthen Earthquake Management in India

- **Hard and Soft Approaches to Earthquake Risk Mitigation:** This includes implementing robust building codes and retrofitting (hard approaches) as well as conducting inclusive risk assessments and mock drills (soft approaches) to enhance preparedness and resilience.
- **Strict Enforcement of Building Codes:** Regular inspections and strict penalties for non-compliance should be in place to encourage adherence to these codes.
- **Use of traditional earthquake resistant technologies:** Traditional earthquake resistant construction techniques such as: **taq** (timber-laced masonry) and **dhajji dewari** (timber frame with masonry infill) of Kashmir should be researched, understood and incorporated into modern practices.
- **Infrastructure Resilience:** Critical infrastructure, such as hospitals, transportation networks, and utilities, need to be designed and built with earthquake resilience in mind.
- **Cooperation and Coordination:** It is important to collaborate with neighbouring countries and international organizations to share knowledge, expertise, and resources for better earthquake management.
  - E.g., in 2019, the Shanghai Cooperation Organization Joint Exercise on Urban Earthquake Search and Rescue- 'SCOJtEx-2019', hosted by NDRF was held in New Delhi.

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**Best Practice: Japan**

Japan has taken a series of measures for earthquake risk reduction and mitigation.
- Buildings in Japan are built to comply with rigorous earthquake-proof standards that have been set by law.
  - A common system in buildings is **seismic isolation**, in which a building's foundations include layers of steel and rubber that act as a shock absorber.
- Every smartphone in Japan is installed with an earthquake and tsunami emergency alert system.
- If an earthquake hits the nation, all of Japan's TV channels immediately switch to official earthquake coverage, ensuring that that population is well-informed on how to stay safe.

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## The Dying Lifeline: Unravelling the Crisis of Yamuna River Pollution

*Syllabus Mapping: GS III, Environment*

## Context

The ongoing Yamuna water crisis has escalated into a political dispute between the Delhi & Haryana government.

## River Yamuna

- River Yamuna is fifth-longest river of India.
- It is the second-largest tributary river of the Ganga by discharge and the longest tributary in India.
- It passes through the states of Uttarakhand, Himachal Pradesh, Haryana, Delhi, and Uttar Pradesh.
    - Yamuna enters Delhi at Palla, the border between Delhi and Haryana, and exits at Jaitpur.
- The famous town/cities on river Yamuna are Vikas Nagar (Uttarakhand) Poanta Sahib (HP), Yamuna Nagar, Karnal, Panipat, Sonipat, Faridabad (Haryana), Saharanpur, Muzzafarnagar, Shamli, Meerut, Ghaziabad, Noida, Greater Noida, Virandavan, Mathura, Agra, Bateshwar, Itawa, Kanpur and Allahabad in UP.
- **Significance:**
    - **Religious:** Yamuna is worshipped in Hinduism as the 'Goddess Yamuna' and as per Hindu mythology is the daughter of the Sun and sister of the Yama the 'God of Death'.
    - **Socio-economic:** It helps create the highly fertile alluvial Yamuna- in the Indo-Gangetic plain.
        - Nearly 57 million people depend on the Yamuna's waters. With an annual flow of about 10,000 cubic billion metres, the river accounts for more than 70% of Delhi's water supply.



Yamuna River Tributaries
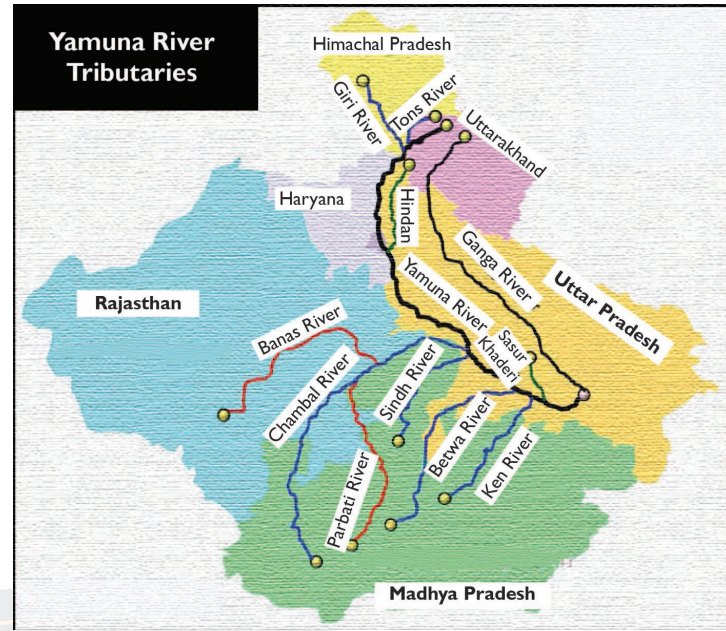
| River Name | Yamuna |
|---|---|
| **Origin** | Yamunotri glacier, Banderpunch range |
| **Length** | 1376 Km |
| **Discharge** | Ganga river |
| **Right Bank Tributaries** | Tons, Chambal, Sind, Betwa, Ken |
| **Left Bank Tributaries** | Hindon, Rind, Sengar, Varuna |

## Extent of Pollution of River Yamuna

- Only around 300km of Yamuna's 1,376km course is clear or pristine. This is predominantly the part in Uttarakhand
- 22km of Yamuna's 52km course in Delhi, from Wazirabad Barrage to Okhla Barrage, contributes 80% of its pollution.
- A study by the National Institute of Hydrology (NIH) revealed that excessive upstream water withdrawals significantly diminish the Yamuna's flow through Delhi.
    - The reduced flow leads to higher pollutant concentration and disrupts aquatic ecosystems.

## Causes of Pollution in River Yamuna

- **Poor natural flow:** About 50%-60% of the virgin flow is necessary throughout the year to maintain the health of a river system. Yamuna receives only around 16% of its original flow in non-monsoon months.
    - At the Hathni Kund Barrage in Yamunanagar, Haryana, a significant portion of the Yamuna's water is diverted into the Eastern and Western Yamuna Canals, reducing its flow by nearly 80%.



DELHI ASSEMBLY POLLS 2025
**Delhi's Toxic Flow**
Delhi Jal Board water treatment plants are designed to treat ammonia upto 1 ppm

Source: Delhi Jal Bord, Delhi Pollution Control Committee
Graphic: Sarfaraz, Subham Singh
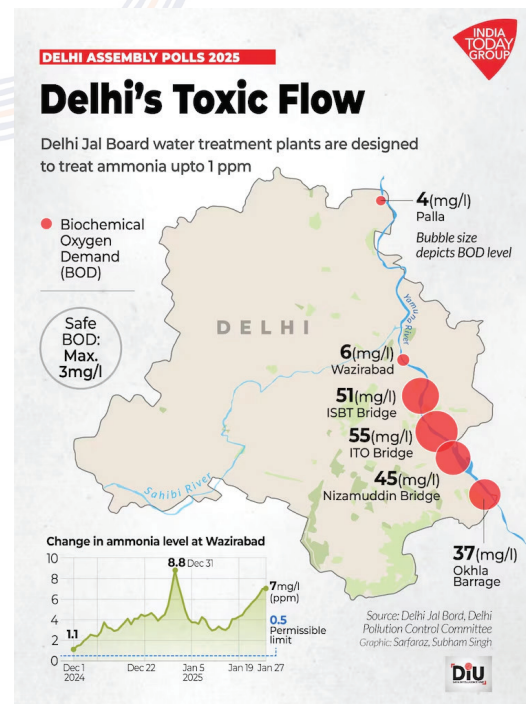
- **Untreated Sewerage:** More than 800 million litres of largely untreated sewage is pumped in the Yamuna each day.
  - The Najafgarh Drain (the biggest polluter of Yamuna) carries effluents not just from Delhi's drainage system but also Gurgaon and south Haryana.
- **Industrial waste:** Waste products and discharges from factories, especially sugar and paper industry, contribute to the pollution of River Yamuna.
  - E.g., Industrial discharge from dye units and distilleries in Panipat and Sonipat districts. A report by NGT stated the 83% of industrial units in Sonipat discharge waste into Yamuna without treatment.
- **Agricultural Run-off:** Chemicals from farms, like pesticides and fertilizers, find their way into the Yamuna, especially during rainfall.
- **Deforestation and Sedimentation:** Rampant deforestation in the Yamuna basin leads to soil erosion, increasing sedimentation in the river. This sedimentation disrupts the ecosystem and reduces water quality.
- **Cultural Practices:** The Delhi Pollution Control Committee (DPCC) has prohibited idol immersion in the Yamuna and other water bodies.
  - However, idol immersion continues in some areas despite the ban, leading to the disposal of puja materials such as polythene bags, foam cut-outs, flowers, food offerings, and decorations, which remain in the water and raise environmental concerns.

## Water Quality Indicators and Their Implications

**Dissolved Oxygen (DO)**

0 mg/l: Dead

1-4 mg/l: Varying support

5 mg/l: Bathing only

6 mg/l+: Treat for drinking

**Water Quality Indicators**

**Biochemical Oxygen Demand (BOD)**

0-2 mg/l: Pristine

3 mg/l: Bathing and treated drinking

Above 3 mg/l: Unfit

**Faecal Coliform (FC)**

Up to 500 MPN/100 ml: OK for bathing

501-2,500 MPN/100 ml: Tolerable

Above 2,500 MPN/100 ml: Contaminated
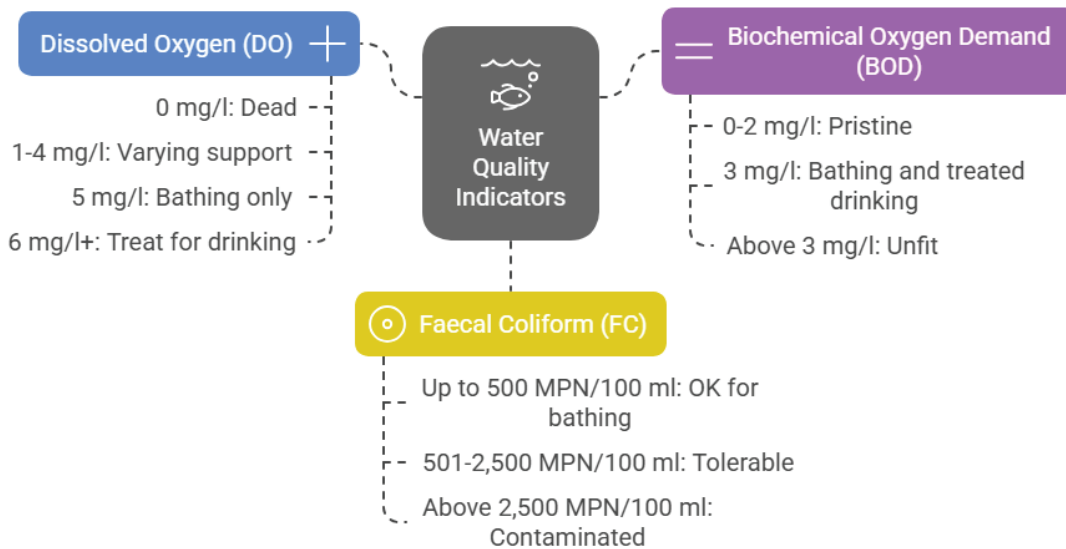
Note: Dissolved oxygen is a crucial factor in determining a river's ability to support aquatic life. It is measured in milligrams per liter (mg/l). The higher the DO value, the better the river can sustain life.

Biochemical oxygen demand represents a river's ability to heal itself and is also measured in mg/l. A lower BOD value indicates a healthier river.

Fecal coliform indicates the level of sewage contamination in the river. It is measured as the most probable number (MPN) per 100 ml of water.

## Major pollution problems associated with river Yamuna

- **Froth Formation on Downstream of Okhla Barrage in Delhi**
  - Foam is produced when organic matter decomposes and releases fatty acids that act as surfactants or surface-active agents
  - These surfactants enter water systems primarily through untreated sewage and reduce the surface tension of water, facilitating the formation and persistence of bubbles.
  - As rivers move and flow, these bubbles conglomerate into larger patches of foam.

- **Endangerment to Aquatic Life**
  - Fish kill near Agra (2021) was likely caused by the discharge of untreated or partially treated sewage and industrial effluents, along with low water flow, leading to oxygen depletion.
  - Additionally, the release of accumulated sediments from the Gokul Barrage created turbulence, further reducing dissolved oxygen levels and endangering aquatic life.
- **Rise in Ammoniacal Nitrogen**
  - Ammonia reduces the dissolved oxygen (DO) levels in water, making it unsuitable for consumption.
  - Water Treatment Plants (WTPs) in Delhi cannot process water with ammonia levels above 1 ppm. When ammonia levels spike, Delhi faces water shortages due to treatment inefficiencies.
- The situation worsens in winters, as ammonia levels increase significantly due to reduced river flow.

## Initiatives taken for Rejuvenation of Yamuna

- **Yamuna Action Plan:** It was launched by the Central Government in 1993 to supplement the efforts of State Governments in addressing the problem of pollution of river Yamuna. The action plan is implemented in various phases.
- **Yamuna Master Plan, 2025**: The Delhi Development Authority (DDA) has initiated the development of Yamuna riverfront to transform the riverbank into a tourism hub.
  - All drains in the city planned to be connected to sewage treatment plants. (STPs)
  - Special drives are being conducted to clean the riverbank and develop green zones along the river's course.
- **Namami Gange Mission** The Government of India supports State Governments by devolving finances for cleaning Ganga and its tributaries, including Yamuna. The Central Pollution Control Board (CPCB) provides technical assistance for STP design and effluent standards.
- Key interventions:
  - Wastewater treatment (STPs)
  - Solid waste management
  - Riverfront management (ghats, crematoria)
  - Continuous water flow maintenance
  - Sanitation, afforestation, biodiversity conservation, and public participation
- **Sewerage Master Plan 2031: By Delhi Jal Board:** It is a long-term plan by DJB to expand sewage infrastructure in Delhi, addressing the gap between the 720 MGD of sewage generated and the 597 MGD treatment capacity.
  - Key Actions: Plans for new STPs (e.g., Nilothi, Delhi Gate) and a 59-km interceptor sewer along major drains.

## Supreme court and tribunal judgments on the Yamuna

- **1994:** SC took note of a newspaper article titled "Quiet Flows Maily (Dirty) Yamuna" and summoned the Central Pollution Control Board (CPCB) for an explanation. Over time, various stakeholders, including the governments of Delhi, Uttar Pradesh, and Haryana, became involved in the case.
- **2015:** NGT introduced the 'Maily Se Nirmal (From Dirty to Clean) Yamuna Revitalization Plan, 2017,' which was supposed to be completed by 2017.
  - However, the deadline was not met, leading the NGT to establish a monitoring panel in 2018 to oversee the plan's implementation.
  - The committee was later dissolved in January 2021, with the responsibility of monitoring progress assigned to the Chief Secretaries of the respective states.
- **2017:** Paryavaran Suraksha Samiti Vs. UOI case: The SC ordered the setting up of common effluent treatment plants to prevent and control pollution in river Yamuna.
- **2021:** The Supreme Court took suo motu cognizance on 'Remediation Of Polluted Rivers'. Notices were issued to Haryana and Uttar Pradesh governments to explain pollution sources and coordinate with Delhi authorities. The Sc further added access to pollution-free water is a fundamental right under Article 21.
- **2024:** Agra Development Foundation v. UOI case: Court directed immediate desilting of the riverbed, targeting silt, sludge, and garbage up to 5–6 meters deep.

## Issues and Challenges with Yamuna Pollution Abatement

- **Lack of Sewerage Connectivity** – A significant portion of Delhi's population in unauthorized colonies lacks proper sewerage connections, leading to faecal sludge being dumped into drains that flow into the Yamuna.
- **Poor Governance and Misallocation of Resources** – Despite continuous spending on new infrastructure and technology, the absence of effective governance prevents funds and efforts from being directed toward the most critical solutions.
- **Lack of Transparency in STP Operations** – The opacity around sewage treatment plants (STPs) hinders accountability, and there is a need for real-time river pollution data to be publicly available, similar to air pollution monitoring.
- **Inefficient Monitoring Mechanisms** – Current monitoring methods, such as collecting just one sample a day, are inadequate, and there is no effective reverse monitoring to trace industrial effluents back to their sources.
- **Water Flow and Allocation Issues** – The desilting of Wazirabad Barrage is necessary to improve river flow, but securing a larger share of water from the Upper Yamuna Water Board remains a challenging political and logistical task.

## Suggested Measures

- **Restore Natural Flow** – It is important to ensure that at least 50-60% of Yamuna's natural flow is maintained throughout the year to help the river heal itself.
- **Develop a Waterfront** – Creating a well-planned waterfront can foster public ownership and awareness about the river's health, making conservation efforts more effective.
- **Nature-based Solutions:** It is necessary to develop wetlands and oxbow lakes that will create natural filtration systems that benefit river water quality.
- Bio-remediation techniques utilizing microorganisms to decompose harmful pollutants should be introduced.
- **Address Industrial Effluents** – Stringent regulations for industrial waste disposal should be established, complemented by initiatives to raise public awareness about sewage management.
  - Further, Industries along the Yamuna must install and maintain robust Effluent Treatment Plants (ETPs), with regular inspections to ensure compliance.
- **Ensure Transparency in STP Operations** – It is important to conduct immediate quality audits of sewage treatment plants (STPs) and make real-time data on their efficiency publicly available. **Establish Strong Leadership** – A central authority similar to Namami Gange, to work on river restoration with a strict three-year timeline, should be set up.

**Methods for Treating Ammonia-Laden Water**

- **Chlorination (Chemical Treatment):**
  - **How it works:** Ammonia is neutralized using chlorine gas ($Cl_2$) or sodium hypochlorite (NaOCl).
  - **Limitation:** Excess chlorine can lead to harmful disinfection byproducts (DBPs).
- **Biological Nitrification & Denitrification:**
  - **How it works:** Bacteria convert ammonia into nitrites ($NO_2^-$) and then nitrates ($NO_3^-$), which are removed through further biological processes.
  - **Bacteria involved:**
    ° Nitrosomonas bacteria convert ammonia to nitrite.
    ° Nitrobacter bacteria convert nitrite to nitrate.
  - **Limitation:** Requires specific bacterial cultures and controlled conditions.
- **Reverse Osmosis (RO) & Ion Exchange (Membrane-Based Treatment)**
  - **How it works:** RO membranes filter ammonia molecules, removing them from water. This method is used in Singapore's NEWater project for wastewater recycling.
  - **Limitation:** Expensive and requires high energy input.
- **Constructing Wetlands (Nature-Based Solution)**
  - **How it works:** Wetland plants absorb ammonia from water. Microbial activity in root zones promotes natural nitrification.
  - **Limitation:** Requires large areas and long-term monitoring.
- **Ammonia Stripping (Physical Process)**
  - **How it works:** Water is aerated at high pH (~10.5-11) to convert ammonium ions ($NH_4^+$) into gaseous ammonia ($NH_3$), which escapes into the air.
  - **Limitation:** Requires pH adjustment and high energy consumption.

## The Tug of War: Development vs Environmental Preservation

*Syllabus Mapping: GS III, Environment*

### Context

Citizens in Baner, Pune, staged a 'Chipko' protest against the Riverfront Development project, citing concerns over ecological damage, tree felling, and increased flood risks due to riverbank concretization.

### Importance of Development

- **Economic Growth:** Infrastructure boosts productivity, facilitates trade, and attracts investment, driving overall economic development.
- **Job Creation:** Large-scale projects in transportation, energy, and urban development generate employment across various skill levels.
- **Improved Connectivity:** Roads, railways, and digital infrastructure enhance accessibility, reducing travel time and fostering regional integration.
- **Better Quality of Life:** Infrastructure in healthcare, education, and housing improves living standards and social well-being.
- **Industrial and Technological Advancement:** Modern infrastructure supports industries, promotes innovation, and enhances global competitiveness.
- **Resilience and Disaster Management:** Robust infrastructure mitigates risks from natural disasters, ensuring safety and quick recovery.

### Impact of Reckless Development on Environment

- **Deforestation and Habitat Loss:** Expansion of cities, industries, and agriculture leads to large-scale deforestation.
  - Mature trees provide critical ecosystem services (carbon sequestration, habitat for birds and small mammals, microclimate regulation) that cannot be easily replaced.
  - E.g, Aarey Forest (Mumbai) clearance for Metro project led to protests.

- **Air and Water Pollution**: Industrialization and urbanization increase air pollution ($CO_2$, PM2.5, NOx emissions). Water bodies get contaminated due to untreated sewage and industrial effluents.
  - E.g, Ganga and Yamuna rivers face severe pollution despite cleaning efforts.

### Environmental Movements in India: A Historical Journey

| Year | Movement |
|---|---|
| 1730 | Bishnoi Movement (Rajasthan) |
| 1973 | Chipko Movement (Uttarakhand) |
| 1978 | Save Silent Valley Movement (Kerala) |
| 1982 | Jungle Bachao Andolan (Bihar, now Jharkhand) |
| 1983 | Appiko Movement (Karnataka) |
| 1985 | Narmada Bachao Andolan (Madhya Pradesh, Maharashtra, Gujarat) |
| 1999 | Koel Karo Movement (Jharkhand) |
| 2010 | POSCO Protest (Odisha) |
| 2021 | Buxwaha Forest Diamond Mine Protest (Madhya Pradesh) |
| 2023 | Save Mahadayi River Movement (Goa) |
| 2025 | Nandgaon Solar Plant Opposition (Maharashtra) |

- **Climate Change and Global Warming:** Fossil fuel consumption in industries, transport, and power plants raises greenhouse gas emissions. This leads to rising temperatures, erratic rainfall, and extreme weather events.
  - Example: Heatwaves in India (2023) linked to climate change due to urban expansion.
- **Soil Degradation and Desertification:** Overuse of chemical fertilizers, mining, and deforestation deplete soil fertility. Urban expansion and infrastructure projects reduce arable land.
  - E.g, Thar Desert is expanding due to overgrazing and deforestation in Rajasthan.
- **Water Scarcity and Groundwater Depletion:** Excessive water extraction for irrigation, industries, and urban areas lowers groundwater levels. Dams and river diversions disrupt natural water flow and aquatic ecosystems.
  - E.g, : Bangalore and Chennai face water crises due to over-extraction of groundwater.
- **Loss of Indigenous Livelihoods:** Infrastructure projects like dams, highways, and mining displace tribal and rural communities.
  - E.g, : Hasdeo Aranya (Chhattisgarh) coal mining project threatens tribal land and forests.

## Laws in India Related to Conservation of Forests and Environment

- **The Indian Forest Act, 1927**: Regulates the management of forests, categorizes forests into Reserved, Protected, and Village Forests, and provides guidelines for forest conservation and commercial usage.
- **The Wildlife Protection Act, 1972**: Establishes protected areas like national parks and wildlife sanctuaries and prohibits hunting, poaching, and illegal trade of wildlife.
- **The Water (Prevention and Control of Pollution) Act, 1974**: Regulates water pollution and establishes pollution control boards at central and state levels to monitor water quality.
- **The Forest Conservation Act, 1980**: Restricts deforestation and conversion of forest land for non-forest purposes without government approval.

- **The Environment Protection Act, 1986** : Grants the central government power to take measures for environmental protection, including setting pollution standards and conducting environmental impact assessments (EIA).
- **The Biological Diversity Act, 2002**: Aims to conserve biodiversity, regulate access to biological resources, and ensure equitable benefit-sharing from their use.
- **The Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006**: Recognizes the rights of forest-dependent communities and ensures their participation in forest conservation.
- **The Compensatory Afforestation Fund Act, 2016**: Mandates compensatory afforestation and ecosystem restoration in case of forest land diversion for development projects.
- **The Air (Prevention and Control of Pollution) Act, 1981**: Regulates air pollution, empowers pollution control boards, and restricts industrial emissions.
- **The National Green Tribunal Act, 2010**: Establishes the National Green Tribunal (NGT) to handle environmental disputes and ensure speedy resolution of cases related to environmental protection.

## Committee Recommendations on Balancing Environment and Development

- **Brundtland Commission (1987)**: Highlighted the interconnection between environmental sustainability and economic activities, leading to discussions on environmental accounting, sustainable development, and the 1992 Earth Summit in Rio de Janeiro.
- **Mishra Committee (1976)**: Reported that Joshimath in Uttarakhand is built on loose sand and stone deposits rather than solid rock, recommending a ban on new construction in the area to prevent land subsidence.
- **Dr. Kasturirangan Committee (2012)**: Proposed conservation of the Western Ghats' biodiversity while ensuring sustainable and inclusive development, recommending that 37% of the region be designated as Ecologically Sensitive Areas (ESA).
- **T.S.R. Subramanian Committee (2014)**: Suggested amendments to environmental laws to streamline regulatory processes, improve transparency, and strengthen enforcement mechanisms for effective environmental governance.
- **Justice K.S. Radhakrishnan Committee (2018)**: Focused on solid waste management in India, emphasizing improved waste disposal strategies, recycling promotion, and pollution reduction to encourage sustainable living.

## Challenges in Balancing Development and Environment Preservation

- **Lack of Holistic Planning –** Development projects frequently lack integrated environmental impact assessments, leading to unintended ecological consequences.
- **Lack of Effective Environmental Offsetting Measures:** The practice of "planting 10 times more trees" as a mitigation is misleading, since replanted trees often cannot match the ecological value of mature trees.
- **Weak Enforcement of Regulations:** Even when environmental laws exist, poor implementation and lack of accountability allow industries and projects to bypass sustainability norms.
- **Inadequate Public Participation:** Environmental decision-making often lacks meaningful involvement from local communities and environmental experts, leading to poorly planned projects with harmful consequences.
- **Greenwashing:** Many industries use sustainability as a marketing tool without making meaningful environmental commitments, misleading the public and policymakers.

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**Deep and Shallow Ecology**

**Deep ecology** is a radical approach to environmentalism. It emphasizes the intrinsic value of nature independent of human use

**Shallow Ecology** is a more anthropocentric view of environmentalism. It focuses on the preservation and protection of the natural world for the benefit of humans.

**Deep Ecologism**

**Shallow Ecologism** Advocates radical change in human's relationship with nature.

- Advocates continuing present lifestyle, which specific changes to minimize environmental effects.
- Believes in equal right to live and flourish. Nature has intrinsic value.
- Nature is valuable so far as it serves human needs.
- Rejects anthropocentricism
- Rejects ecocentrism and biocentrism.

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## Balancing Development and Environmental Preservation- The Way Forward

- **Minimize Tree Cutting:** Trees should only be felled as a last resort after thorough environmental assessment. Development plans must prioritize modifications to retain existing trees.
- **Tree Translocation & Preservation:** Instead of outright removal, suitable trees should be translocated whenever possible. Advanced technologies can help map and catalogue trees based on size, species, and health to ensure responsible planning.
- **Integrated Urban Planning:** Urban planners, environmental experts, and development authorities must collaborate from the outset to design projects that integrate sustainability into infrastructure development.
- **Sustainable Development Models:** Adopting concepts like circular economy, green infrastructure, and low-carbon development ensures that economic growth does not come at the cost of environmental degradation.
- **Stronger Governance and Coordination:** Establish better coordination among various agencies and form a dedicated tree authority to enforce tree protection laws effectively.
- **Stronger Environmental Impact Assessments (EIA):** Ensure that all major projects undergo a rigorous, transparent, and science-based EIA before approval, with strict implementation of mitigation measures.

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**Sustainable innovations enabling development without harming the environment**

1. The Netherlands has built over 600 **eco-bridges** (wildlife crossings), allowing animals to safely cross highways and reducing roadkill.
2. Japan's **turtle tunnels** under railway tracks help prevent turtles from getting crushed on train tracks.
3. Singapore's **"Garden City"** policy promotes green roofs and vertical forests, integrating plants into buildings to combat heat and pollution.
4. The Netherlands' **Zon-op-Zee project** aims to create floating solar panels in the North Sea, reducing land use conflicts.

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# Himalayan Hazards: The Rising Threat of Glacial Lake Outburst Floods

*Syllabus Mapping: GS III, Disaster Management*

## Context

The decision to rebuild the Teesta III dam has sparked concerns about the region's vulnerability to Glacial Lake Outbursts Floods (GLOFs) and the potential for future disasters.

## Mechanism of GLOFs

- A GLOF is a flood resulting from the sudden and rapid release of water from a glacial lake, often caused by the failure of a moraine dam or ice dam.
- When the glacier retreats, the meltwater can accumulate in this depression and form a lake that may be dammed by the moraine.
- A GLOF occurs when the moraine fails, which often results in the release of a catastrophic amount of water.
- Glacier Lake Outburst flood has three main features
  - Involves sudden (and sometimes cyclic) releases of water.
  - These are rapid events, lasting hours to days.
  - These result in large downstream river discharges, which often result in catastrophic flooding or disasters

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**What are glacial lakes?**

- Glacial lakes are created by moving glaciers that erode the valley bottom topography and create depressions below the glacier surface.
- ISRO has categorized glacial lakes into four types: moraine-dammed, ice-dammed, erosion-based, and others.
  - **Moraine-dammed lakes** are formed by water dammed by debris left by glaciers.
  - **Ice-dammed lakes** are formed by water dammed by ice.
  - **Erosion-based lakes** are formed by water trapped in depressions created by erosion.

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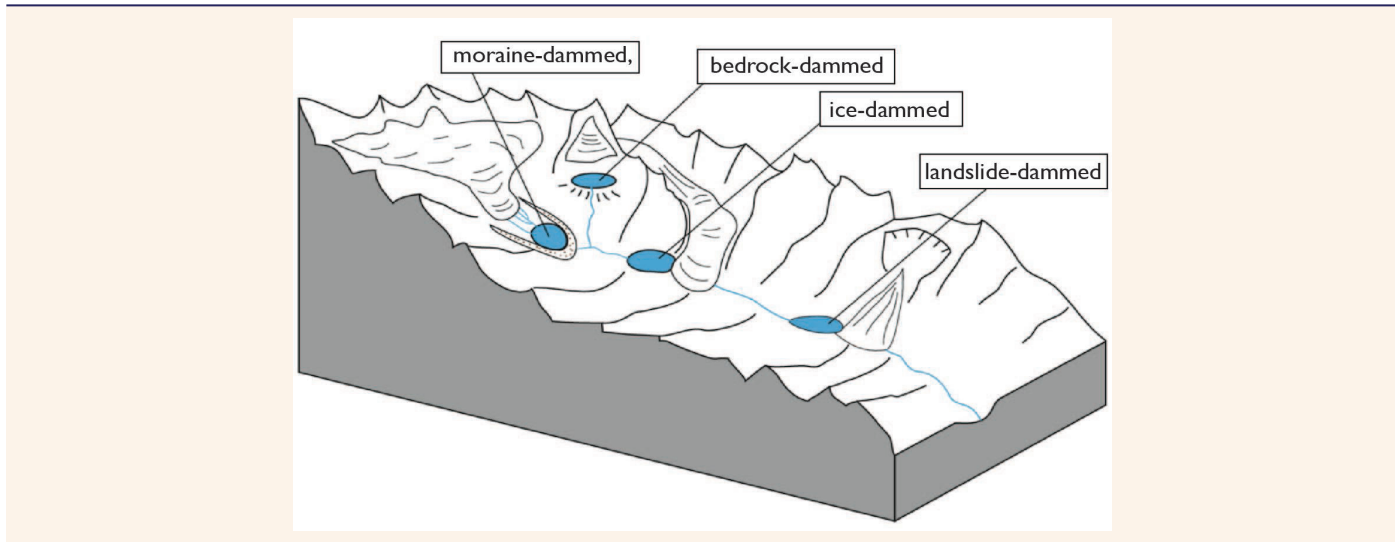
## Causes of GLOFs

- **Increased Glacier Melt:** As global temperatures rise, glaciers retreat, leading to the formation and expansion of glacial lakes.
    - E.g., Lakes like Imja Tsho in Nepal have significantly increased in size due to the melting of the Imja Glacier.
- **Thermal Expansion:** Warmer temperatures cause thermal expansion of water, contributing to higher lake levels and increased pressure on natural lake barriers such as moraines.
- **Weak Moraine Embankments**: Moraines, which are piles of debris left by glaciers, often act as natural dams for glacial lakes.
    - However, these moraines can be weak and prone to breaking, leading to GLOFs.
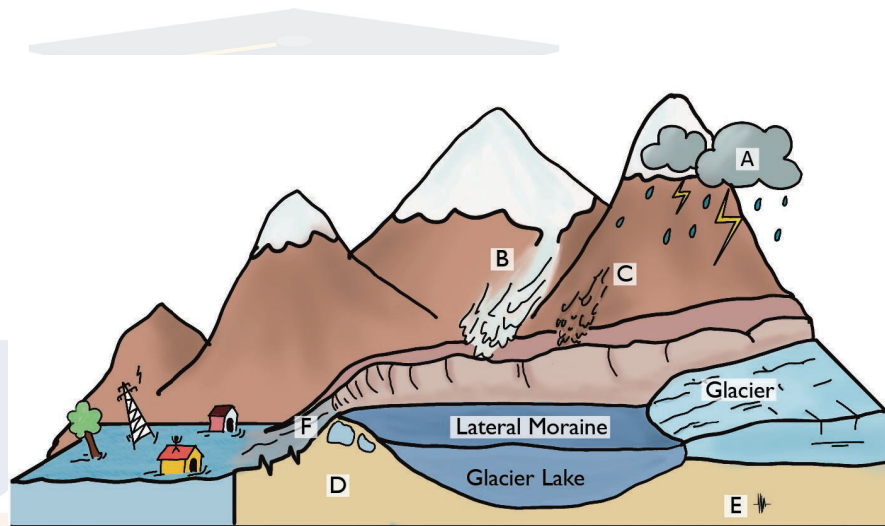


Illustrative graphic showing various reasons got GOLF occurance
(A) Cloudbrust              (B) Snow avalanche              (C) Landslide
(D) Melting of ice in moraine   (E) Earthquake                 (F) Overflow

- **Extreme Meteorological Events:** Heavy rainfall, extreme storms, cloudbursts and sudden temperature changes can influence the stability of glacial lakes and lead to GLOF.
    - E.g., South Lhonak Lake, Sikkim GLOF in 2023 was triggered by heavy rainfall.
- **Earthquakes:** Earthquakes can trigger GLOFs by shaking the ground and causing the moraine dams or ice that hold the lake waters to fail.
- **Volcanic Activity:** In regions near volcanoes, volcanic activity can heat glaciers and cause them to melt faster, increasing the risk of a GLOF.
- **Landslides and Avalanches**: They can block river flow upstream, leading to lake formation or rapid input of water and debris into existing glacial lakes, thus, increasing outburst risk.
- **Infrastructure Development:** in vulnerable regions can exacerbate the risk by destabilizing slopes and disrupting natural drainage patterns, contributing to GLOFs.
    - E.g., 2021 Chamoli GLOF, which was linked to multiple hydroelectric projects in the area.
- **Altered Drainage Patterns:** Changes in land use, such as deforestation and agricultural expansion, alter natural drainage systems, thus increasing the flow of water into glacial lakes.

## Regions vulnerable to GLOFs

According to a study published in 2023 Nature Communications,

- The majority of the globally exposed population to GLOFs, amounting to 9.3 million (62%) are located in the region of high mountain Asia (HMA).

- India, Pakistan, Peru and China account for more than 50% globally exposed population. In India, Jammu and Kashmir, Ladakh, Himachal Pradesh, Sikkim, Assam and Arunachal Pradesh are most vulnerable.

- The most dangerous glacial basins are found in Pakistan (Khyber Pakhtunkhwa basin), Peru (Santa basin) and Bolivia (Beni basin).

> **Examples of GLOF-related disasters:**
> - 1926 Jammu and Kashmir deluge
> - 1981 Kinnaur valley floods in Himachal Pradesh
> - 2013 Kedarnath outburst in Uttarakhand
> - 2023 Sikkim GLOF event: A combination of excess rainfall + series of earthquakes in Nepal may have caused the Sikkim GLOF event

## Initiatives taken by Indian Government

- **National Glacial Lake Outburst Flood (GLOF) Risk Mitigation Project (NGRMP):** Central Government has approved NGRMP for its implementation in four states namely, Arunachal Pradesh, Himachal Pradesh, Sikkim and Uttarakhand at a financial outlay of Rs.150.00 crore.
  - The **objectives** of the project are:
    - Prevent loss of life and reduce economic loss and damage to critical infrastructure due to GLOF and similar events.
    - Strengthen the early warning and monitoring capacities based on last mile connectivity.
    - Strengthen scientific and technical capabilities in GLOF risk reduction and mitigation at local levels through strengthening of local level institutions and communities.
    - Use of indigenous knowledge and scientific cutting-edge mitigation measures to reduce and mitigate GLOF risk.
- **GLOF EWS Mission:** The Indian government initiated an early warning system (EWS) for 188 critical lakes in the Indian Himalayan Region prone to glacial lake outburst floods
- **NDMA Guidelines for Management of GLOFs**
  - **Robust Hazard and Risk Mapping:** Synthetic-Aperture Radar imagery can be used to automatically detect changes in water bodies, including new lake formations, during monsoon months.
  - **Resilient Infrastructure Development:** A comprehensive framework for infrastructure development, construction, and excavation in vulnerable zones, including procedures for land use planning in GLOF prone areas, should be developed.
  - **Training First Responders:** It is important to train local manpower alongside specialized forces like NDRF, ITBP, and the Army.
  - **Awareness:**
    - **Short term public awareness strategies** for GLOF risks include initiatives in the areas at risk, such as posters, wall paintings and hoardings.
    - **Medium term strategies** involve main streaming of GLOF risks via traditional and online mass media.
    - In the **long term,** national awareness campaigns, a national data centre on GLOF with a related database and platform should be envisaged.
  - **Strengthening Early Warning Systems (EWS):** It should include four key elements :i) Risk Knowledge; ii) Monitoring and Warning Service; iii) Dissemination and Communication; and iv) Response Capability.
  - **Capacity Development:** a systematic database of past GLOF disasters and emergency situations should be developed to extract best practices and lessons learnt from past event.
  - **Regulation and Enforcement:** a robust techno-legal regime should be developed to mitigate GLOF disaster risks.

## Challenges in addressing GLOFs

- **Climate Change & Glacier Melt**: Rising temperatures and black carbon (soot) accelerate Himalayan glacier melting, leading to larger and more unstable glacial lakes.

- – A report by the Central Water Commission of last year found that the number of "glacial lakes and other water bodies" in the Indian Himalayan region had become 10.8% more numerous between 2011 and 2024 and that their combined surface area had increased by 33.7% in the same period.
- **Geological Instability**: Glacier retreat weakens surrounding landforms, increasing risks of landslides and moraine collapses.
- **Deficiencies in Risk Modelling**: Current GLOF assessment models fail to fully account for erosion, sediment transport, and riverbank collapses, making predictions unreliable.
- **Hydropower Infrastructure Risks**: Large dams in seismically active and landslide-prone regions add to vulnerabilities, as infrastructure failure can amplify disaster impacts.
- **Inadequate Early-Warning Systems**: The Himalayan region lack robust monitoring and alert mechanisms, delaying evacuation and disaster response.

## Suggested Measures

- **Holistic Risk Assessment:** Factor in climate change-driven uncertainties, including sediment dynamics, moraine stability, and extreme weather patterns.
- **Stronger Environmental Regulations:** Conduct independent impact assessments before rebuilding, considering downstream risks.
- **Community Resilience:** Strengthen disaster preparedness, evacuation plans, and compensation mechanisms for local populations.
- **Alternative Energy Solutions**: Reduce dependence on large hydro projects in high-risk areas and explore solar, wind, and smaller hydro alternatives.
- **Sustainable Development Framework**: Ensure hydropower viability without externalizing social and environmental costs, integrating local concerns into decision-making.

## Tragedies in Crowds: Understanding Repeated Stampedes in India

*Syllabus Mapping: GS III, Disaster Management*

## Context

Thirty people were killed and 60 injured in a pre-dawn stampede on January 29 at the Sangam area of the Maha Kumbh.
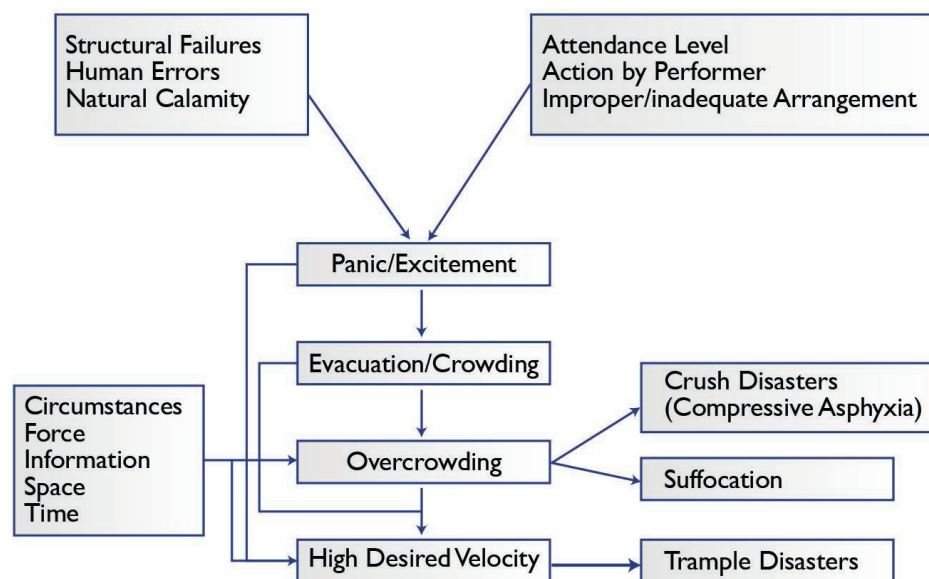


## Stampedes in India

- A stampede refers to the sudden and uncontrolled movement of a large crowd, often resulting in injuries and fatalities due to suffocation and trampling.

- Data available with the National Crime Records Bureau (NCRB) indicates that there has been a total of 3550 incidents of stampede in the country from 2001 to 2015 resulting in the death of 2901 people.
- A 2013 study published by International Journal of Disaster Risk Reduction (IJDRR) points out that religious gatherings and pilgrimages have been venues for 79% of the stampedes in India.
- Some Recent Stampedes in India
  - July 2, 2024 – Hathras, Uttar Pradesh
  - March 31, 2023 – Indore, Madhya Pradesh
  - January 1, 2022 – Vaishno Devi, Jammu & Kashmir
  - September 29, 2017 – Mumbai, Maharashtra
  - July 14, 2015 – Rajahmundry, Andhra Pradesh
  - October 3, 2014 – Patna, Bihar

## Causes of Stampedes

- **Overcrowding:** Underestimating the size of the crowd or overselling of tickets lead to overcrowded venues, increasing the risk of stampedes.
  - E.g., In 2022, 12 people died due to stampede at the famous Mata Vaishno Devi shrine in Jammu and Kashmir, triggered by a heavy rush of devotees.
- **Poor coordination and crowd management:** Lack of coordination between event organizers and authorities, along with inadequate crowd management protocols, contribute to chaotic situations and potential stampedes.
  - E.g., in 2024, over 100 people, died in a stampede at a 'satsang' (prayer meeting) organized by self-styled godman Bhole Baba (Narayan Saakar Hari) in Hatras
- **Panic and rushing behaviour:** Panicking due to rumours or a sudden rush to obtain freebies, or other incentives, create a sense of urgency and trigger stampedes.
  - E.g., In 2017, panic after unfounded rumours of the foot overbridge collapsing resulted in a major stampede at Mumbai's Elphinstone Railway Station.
- **Fires:** In the event of a fire, the panic and chaos that ensue lead to stampedes as people try to escape the danger zone.
  - E.g., In 2023, 8 people sustained injuries in a stampede triggered by a fire at a slum in Delhi
- **Structural issues:** The collapse of temporary structures, steep stairs, narrow exits due to illegal constructions, or overcrowded spaces create chaotic situations that lead to stampedes.
- **Safety hazards:** Inappropriate use of firecrackers, faulty electrical wiring, or inadequate safety measures during events trigger panic and result in stampedes.

## Impact of Stampedes

- **Loss of Life and Injuries:** Casualties occur when severe pressure on the chest or abdomen blocks breathing, leading to suffocation or restricted airflow.
  - E.g., In 2013, a stampede occurred during the festival of Navratri, near the Ratangarh Mata Temple in Madhya Pradesh, killing 115 and injuring more than 100.
- **Psychological Trauma** – Survivors and witnesses often suffer from long-term emotional distress, including Post-Traumatic Stress Disorder (PTSD), anxiety, and depression.
- **Financial distress** – Stampedes disproportionately affect economically disadvantaged families, leaving them without primary earners and pushing them into financial distress.
- **Social Impact** – Stampedes tragedies lead to public distrust in event organizers and authorities, causing social unrest, blame, and a decline in community morale.
- **Infrastructure Damage** – Stampedes can damage physical infrastructure, including collapsed barricades, broken staircases, and structural failures, leading to high repair costs.

## NDMA Guidelines on Crowd Management

The National Disaster Management Authority (NDMA) prepared **"Suggestive Framework for Preparation of Crowd Management Plan for Events/Venues of Mass Gathering"** in response to the frequent stampedes at places of mass gatherings. Major suggestions include:

- Event organizers should discourage general admissions for VIPs or restrict entry if it compromises safety.
- Install loudspeakers at crowded points for real-time announcements and crowd management.
- Maintain a 3-4 metre gap between every 5-6 shops to allow safe evacuation during emergencies.
- Authorities should create dedicated paths for pedestrians and separate routes for ponies/mules to avoid congestion.
- Event managers must develop, review, and coordinate disaster response plans with local authorities and police.
- Law enforcement should assess venues, ensure preparedness, and guide crowd and traffic movements.
- Involve NGOs and civil defence in traffic control, medical aid, sanitation, and resource mobilization.
- Set up first-aid rooms and emergency operation centres for post-disaster response.

## Issues with Crowd Management in India

- **Weak Inter-Agency Coordination –** Poor collaboration among police, emergency responders, and administrative agencies delays response efforts.
- **Ad-Hoc Planning and No Accountability** – Unstructured and last-minute planning leads to disorganized management with no accountability.
- **Inadequate Training for Response Teams** – Lack of training for security personnel and response teams results in poor handling of crisis situations.
- **Ineffective Communication Plans –** Poor communication strategies lead to misinformation and panic during emergencies.
- **Lack of Risk Assessment –** The absence of structured risk analysis and resource management increases vulnerability to crowd-related disasters.
- **Failure to Integrate Community Resources** – NGOs, medical professionals, and volunteers are not included in response efforts, reducing overall effectiveness.
- **Poor Technology Integration:** The lack of real-time crowd monitoring, GPS tracking, and AI-driven control systems slows down emergency response and crisis management.

## Way Forward

- **Understanding crowd dynamics**: Through scientific understanding of crowd dynamics, it is possible to predict crowd behaviour in normal and unexpected situations, and to control and contain their negative impact in terms of crowd risk situation.
- **Use of Technology:**
  - **Thermal and LiDAR sensors** for real-time crowd density monitoring, using AI to predict surges and issue early warnings.
  - **RFID tags in tickets or wristbands** to track movement, detect congestion, and enable targeted alerts via display screens.
  - **Drones with high-resolution cameras and thermal imaging** for surveillance, anomaly detection, and projecting announcements.
  - **Intelligent lighting systems** that adjust brightness and colour based on crowd density to guide movement and reduce panic.
  - **Bioluminescent materials in pathways** to glow brighter during emergencies, providing clear evacuation routes in low-light conditions.
- **Interagency Coordination:** A coordinated system should be developed that integrates independent agencies into the crowd management planning and command structure.
- **Legislation:** The Supreme Court, in its ruling on the Uphaar Cinema tragedy, emphasized the necessity for a well-defined legal framework addressing the state's liability in cases of negligence.
- **Stricter Compliance:** To enhance compliance and safety, stringent penalties, including harsher punishments, licence cancellations for violations related to construction and fire safety, as well as routine inspections and random checks, should be enforced.
- **Learning from Best Practices:** India should incorporate insights from best practices (e.g., Crowd Management During Hajj in Mecca, Saudi Arabia, Hold & release crowd-control method, Sabarimala, Kerala) in crowd management to enhance the effectiveness of stampede prevention and control measures.

# TOPICS FOR PRELIMS

## La Niña

### Context

The Copernicus Climate Change Service (C3S) reported that January 2025 was the hottest January on record, despite La Niña.

### About La Niña

- It refers to the periodic cooling of ocean surface temperatures in the central and east-central equatorial Pacific, coupled with changes in the tropical atmospheric circulation, such as winds, pressure and rainfall.
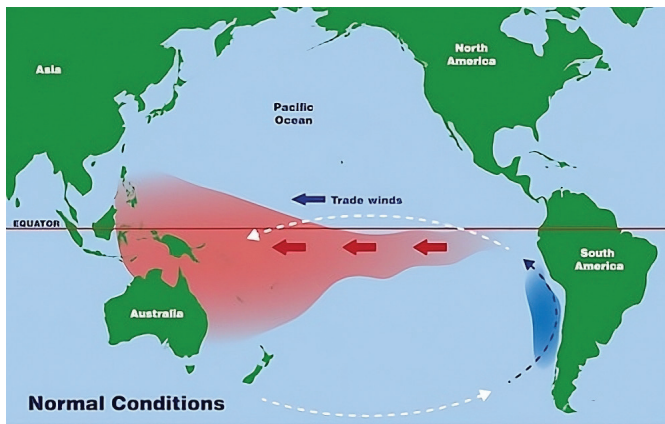


- In La Niña, trade winds strengthen, pushing more warm water toward the western Pacific, making the eastern Pacific cooler than usual.

- Together, La-Nina and El Niño are the **cold and warm phases of the ENSO** or El Niño Southern Oscillation.

- **Impact of La Niña:**
  - Rainfall associated with the summer monsoon in Southeast and South Asia tends to be greater than normal, especially in northwest India and Bangladesh.
  - Strong La Niña events are associated with catastrophic floods in northern Australia.
  - Rainier-than-normal conditions are over southeastern Africa and northern Brazil.
  - Decreased cloud production and rainfall in central and eastern Pacific.
  - Drier-than-normal conditions along the west coast of tropical South America, the Gulf Coast of the United States, and the pampas region of southern South America.
  - Upwelling brings cold, nutrient-rich waters to the surface, having positive effects on the fishing industry in western South America.

## El Niño v/s La Niña

| Basis of comparison | El Niño | La Niña |
|---|---|---|
| **Sea surface temperature** | Periodic warming of sea-surface temperatures across the east-central equatorial Pacific. | Periodic cooling of sea-surface temperatures across the east-central equatorial Pacific. |
| **Formation** | Trade winds weaken. Warm water is pushed back east, toward the west coast of the Americas, resulting in a weaker Walker cell. | Trade winds strengthen, pushing more warm water toward Asia, resulting in a stronger Walker cell. |
| **Period of occurrence** | Typically, occur every 3–5 years and lasts 9–12 months. | Typically, occur every 3–5 years and lasts 1–3 years. |
| **Impacts** | • Droughts in eastern Australia<br>• Flooding in western South America<br>• Weak upwelling over the west coast of South America. | • Excessive rainfall in the eastern Australia<br>• Drought conditions, in South America<br>• Strong upwelling over the west coast of South America. |
| **Impact on Indian Monsoon** | The winds don't carry the moisture towards Indian landmass during El Niño, causing deficiency in rainfall. | High temperatures over the Indian Ocean, off the Somalian coast, and a comparatively better monsoon rains in India. |

**Why Did La Niña Not Cool Temperatures in January 2025?**

- **Weak La Niña Development:** Not all La Niña phases have the same intensity. The ongoing La Niña cycle is weak, which reduces its overall cooling effect.
- **Increased Greenhouse Gas (GHG) Emissions:** Despite La Niña, the rate of increase in atmospheric carbon remained high in 2024 and January 2025.
- **Decline in Aerosol Concentration:** Aerosols (suspended particles in the atmosphere) have a cooling effect by:
  - Scattering solar radiation back into space.
  - Influencing cloud formation, which affects how much sunlight is absorbed or reflected.
  - Due to clean air policies in some regions, aerosol concentrations have decreased. This weakened the cooling effect, allowing temperatures to remain high.

## Marine Heatwaves

### Context

According to a study conducted by the non-profit group Climate Central, Marine Heatwaves (MHWs) off the coast of Western Australia (WA) in January 2025 led to the death of over 30,000 fish.
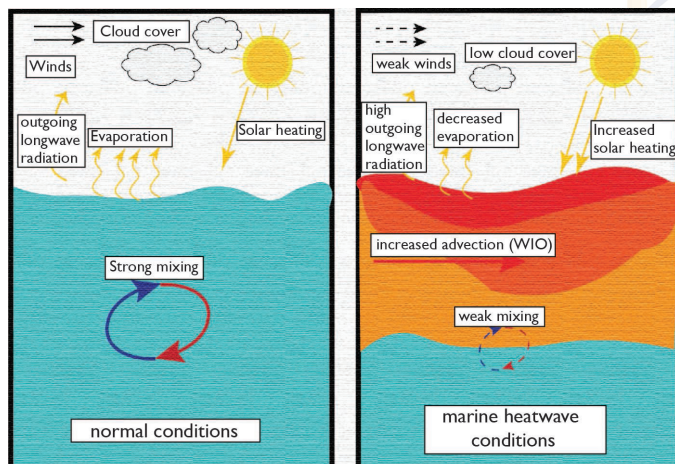


**About Marine Heatwaves**

- MHWs are extreme rises in ocean temperature for an extended period of time. It occurs when the surface temperature of a particular region of the sea rises to 3 or 4 degrees Celsius above the average temperature for at least five days.
- They can last for weeks, months, or years, affecting large marine ecosystems
- They can affect small areas of coastline or span multiple oceans.
- MHWs have been recorded in surface and deep waters, across all latitudes, and in all types of marine ecosystems.

**Climate Change and Marine Heatwaves**

- A 2021 report by the International Union for Conservation of Nature (IUCN) said MHWs have increased by 50% over the past decade and now last longer and are more severe.
- As global temperatures have soared to 1.3 degrees Celsius above the pre-industrial levels, 90% of the extra heat has been absorbed by the ocean.
- This has increased the global mean SST by close to 0.9 degrees Celsius since 1850, and the rise over the last four decades is around 0.6 degrees Celsius.

**Impact of Marine Heatwaves**

- **Mass die-offs:** MHWs can lead to the deaths of fish, marine mammals, and seabirds.
- **Coral bleaching:** Elevated temperatures stress coral reefs, causing bleaching and increased mortality rates.
  - E.g., An underwater survey showed that 85% of the corals in the Gulf of Mannar near the Tamil Nadu coast got bleached after the marine heatwave in May 2020.
- **Algal blooms**: MHWs can trigger harmful algal blooms.
- **Species distribution:** Many marine species shift their ranges to cooler waters, affecting local ecosystems and fisheries.
- **Seagrass destruction:** MHWs can destroy seagrass and kelp forests.
- **Intensified hurricanes:** MHWs can trigger intensified tropical cyclones

**Sea Surface Temperature**

- It is the water temperature close to the ocean's surface.
- It varies mainly with latitude, with the warmest waters generally near the equator and the coldest waters in the Arctic and Antarctic regions.
- As the oceans absorb more heat, sea surface temperature increases, and the ocean circulation patterns that transport warm and cold water around the globe change

## Quasars

### Context

Scientists have found the largest radio jet ever seen in the early universe, coming from a quasar.

**About Quasars**

- A quasar (short for "quasi-stellar object") is an extremely bright and active galaxy with a supermassive black hole at its centre.
- The black hole is surrounded by a huge disk of gas and dust that gets pulled in by gravity.
- As this material falls toward the black hole, it heats up and emits enormous amounts of energy, making quasars some of the brightest objects in the universe.

- A single quasar can outshine an entire galaxy with billions of stars. Some quasars are thousands of times brighter than the Milky Way.
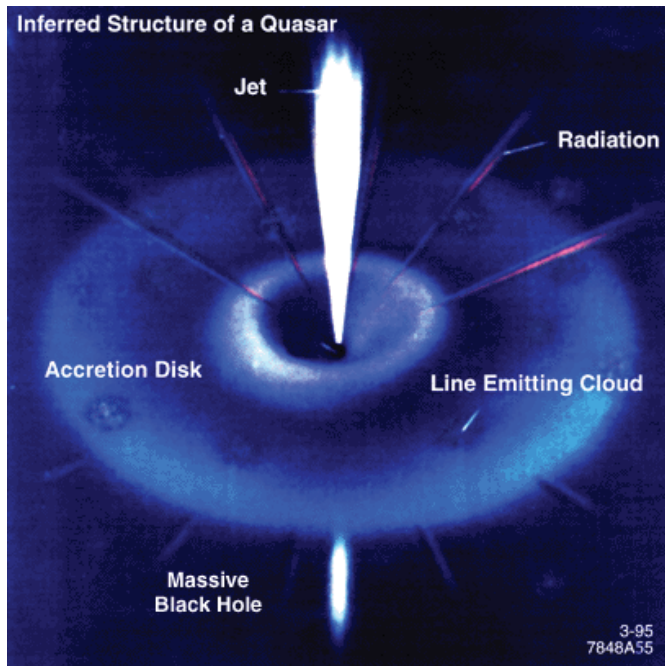


**About Radio Jets**

- A radio jet is a stream of high-energy particles shooting out from a supermassive black hole at the centre of a galaxy.

- These jets move at nearly the speed of light and can extend across hundreds of thousands of light-years.

- They release radio waves, which scientists can detect using radio telescopes.

- **Why haven't We Seen These Jets Before?**

  – Scientists expected that radio jets in the early universe would be hidden by the Cosmic Microwave Background (CMB), which is leftover radiation from the Big Bang.

  – This jet is so extreme and bright that it was still visible, even though it's incredibly far away.

## Earth's Core

### Context

Recent scientific studies suggest that Earth's inner core, previously thought to be solid and unchanging, has deformed significantly over the past 20 years.

**Key findings of the Study**

- The inner core, usually thought to be spherical, has experienced deformations of up to 100 meters in height in some regions.

- These deformations were detected using seismic wave analysis from earthquakes that occurred between 1991 and 2023.

- The most significant changes occurred around 2010, when the inner core slowed down temporarily before catching up again with Earth's rotation.

- **How Scientists Measured the Changes?**
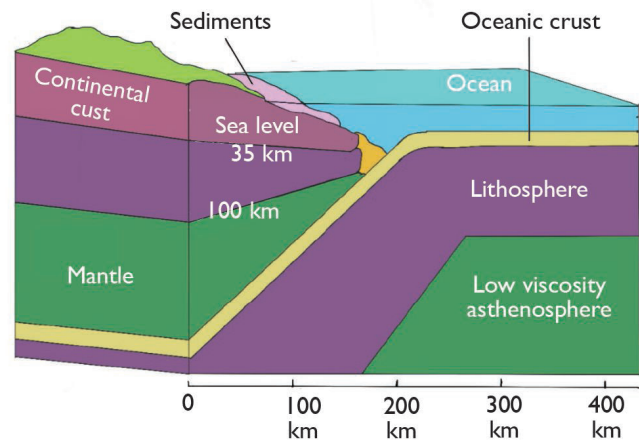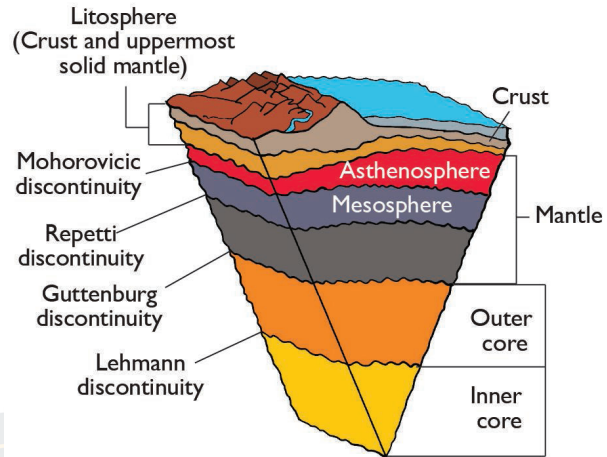




  – Since direct exploration of the core is impossible, scientists rely on seismic waves generated by earthquakes.

  – When these waves pass through different layers of the Earth, they change speed and direction based on the material composition they encounter.

  – By analysing seismic wave patterns, researchers can infer the structure and motion of the inner core.

- **Significance of finding**: Challenges previous assumptions that structural changes in inner core occur only over geological timescales.

**About Earth's Core**

- **Extent:** From 2900km to approximately, 6371km.

- **Composition:** Heaviest materials like nickel and iron and is called **"Nife"** (Ni for Nickel and Fe for iron).

- **Division of Core:**

  – **Outer Core:**

- **Thickness:** About 2,200km thick.
- **Temperature:** 4,500° and 5,500 degrees Celsius.
- **Density**: 12.6-13 g/cm3.
- The outer core is presumed to be liquid.
  - **Inner Core:**
    - **Composition:** Mainly composed of iron.
    - **Temperature** About 5,200° Celsius.
    - The inner core is assessed as solid.
    - **Density:** 9.9-12.2 g/cm3
- **Role of the Core in Earth's Magnetic Field:**
  - The motion of the liquid outer core generates Earth's magnetic field through a process called the **geodynamo effect.**
  - This magnetic field acts as a shield against harmful solar radiation, preventing the Earth's atmosphere from being stripped away.
  - If Earth's magnetic field were to weaken or disappear, life would be exposed to extreme solar radiation, making the planet uninhabitable, similar to Mars, which lost its magnetic field billions of years ago.

## Einstein Ring

### Context

The European Space Agency's (ESA) Euclid space telescope has discovered a rare Einstein ring around a galaxy 590 million light-years from Earth.

### About Einstein ring

- It is a rare ring of light that forms due to gravitational lensing.
- The first Einstein ring was discovered in 1987, and though more have been found since, they remain extremely rare.
  - Less than 1% of galaxies are estimated to have an Einstein ring.
- Einstein rings are not visible to the naked eye and can only be observed using advanced space telescopes like ESA's Euclid.

### Why Scientists Study Einstein Rings

- **Understanding Dark Matter**: Dark matter makes up 85% of the total matter in the universe, but it has never been directly observed.
  - Gravitational lensing helps indirectly detect dark matter by observing how light bends around galaxies.
- **Studying Distant Galaxies:** Some galaxies are too faint to be observed directly. Gravitational lensing magnifies their light, allowing scientists to study galaxies that would otherwise remain hidden.
- **Measuring the Expansion of the Universe:** The universe is expanding, stretching space between Earth and other galaxies.

- Einstein rings provide data on how fast galaxies are moving apart, helping refine measurements of cosmic expansion.

### Gravitational lensing

- It occurs when a massive celestial object (a galaxy or cluster of galaxies) creates a gravitational field that bends and magnifies the light from a distant object behind it.
- This was predicted by Albert Einstein's General Theory of Relativity (1915), which stated that gravity can bend light around massive objects.

## Exoplanet WASP 127-b

### Context

Recently, astronomers detected supersonic jet-stream winds at the equator of WASP-127b, recorded as the fastest winds ever observed on any known planet.

### About WASP - 127b

- WASP-127b is a gaseous exoplanet (planets outside our solar system) located in the Milky Way galaxy, approximately 520 light-years from Earth.
- It orbits a star similar to the Sun.
- **Characteristics of WASP-127b:**
  - Size and Mass:
    - Diameter: About 30% larger than Jupiter, the largest planet in our solar system.
    - Mass: Only 16% of Jupiter's mass, making it one of the puffiest planets ever discovered.
  - Orbit Period: Completes an orbit around its host star in about four days.
  - Composed mainly of hydrogen and helium, similar to Jupiter in our solar system.
- **Jet-Stream Winds**
  - The jet-stream winds on WASP-127b blow at an astonishing speed of 33,000 km per hour.
  - These are far faster than the 442 km/h jet streams on Earth and even the 2,000 km/h winds on Neptune, the fastest in our solar system.
  - These are circumplanetary jet winds, circling the planet's equator.

## Solar Coronal Holes

### Context

A new study by Indian Institute of Astrophysics (IIA) has accurately estimated the thermal and magnetic field structures of solar coronal holes.

### About Solar Coronal Holes

- Coronal holes are dark regions in X-ray and extreme ultraviolet (EUV) images of the Sun.

- They were first identified in the 1970s by X-ray satellites.
- **Characteristics:**
  - Have open magnetic field lines extending into space.
  - Are low-density regions in the Sun's atmosphere.
  - Serve as intense sources of fast solar wind (450-800 km/sec).
- **Impact of Coronal Holes:**
  - High-speed solar wind from coronal holes interacts with Earth's magnetic field, causing:
    - Geomagnetic storms.
    - Ionospheric disturbances, affecting radio communications.
- **Importance of Studying Coronal Holes:**
  - Helps estimate temperature, radiative flux and energy of coronal holes.
  - Provides insights into their depth of origin inside the Sun.
  - Determines how magnetic field strength varies across different latitudes.
  - Better prediction of space weather.

## Extreme Temperature Surge at the North Pole

### Context

Recently, temperatures at the North Pole rose more than 20°C above average. The northern Svalbard region (Norway) recorded temperatures 18°C above the 1991–2020 average.

**Why Did the North Pole Experience Such High Temperatures?**

- Low-Pressure System Over Iceland: A deep low-pressure system (an area of lower atmospheric pressure) over Iceland created conditions for warm air to move into the Arctic.
  - This system acted as a gateway for warm air from lower latitudes to enter the polar region, raising temperatures.
- Unusually Warm Sea Surface Temperatures: The northeast Atlantic Ocean experienced hotter-than-normal sea surface temperatures, which:
  - Strengthened wind-driven warming in the Arctic.
  - Contributed to the intensification of the warming event.

**Arctic's Role in Global Climate Regulation**

- The Arctic acts as a "refrigerator" for the Earth, helping to regulate global temperatures.
- If Arctic warming continues at this rate, it could lead to:
  - Rising sea levels due to ice melt.
  - Disruptions in weather patterns worldwide.
  - More extreme climate events globally.

**Why Is the Arctic Warming Faster Than the Global Average?**

- **Rapid Arctic Warming Since the 1970s:** Since 1979, the Arctic has warmed 4 times faster than the global average.
  - A 2022 study showed that the Arctic has warmed 3.8 times faster than the global mean temperature since the late 1970s.
  - In contrast, global temperatures have increased by 1.3°C compared to the 1850–1900 baseline.
- **The Albedo Effect (Sunlight Reflection Mechanism):** Sea ice reflects sunlight due to its bright white surface, keeping temperatures low.
  - As the ice melts, darker land and ocean surfaces are exposed, which absorb more heat, leading to further warming. This self-reinforcing feedback loop is accelerating temperature rise in the Arctic.
- **Weak Atmospheric Convection in the Arctic:** Convection (heat transfer via rising warm air) is weaker in the Arctic compared to the tropics.
  - In the tropics, strong convection occurs due to intense sunlight, which distributes heat throughout the atmosphere.
  - In the Arctic, weak convection means:
    - Heat from greenhouse gases remains trapped near the surface instead of being distributed upwards.
    - This results in more concentrated warming at ground level.

## International Big Cat Alliance

### Context

The International Big Cat Alliance has officially come into force as a treaty-based intergovernmental organization with its headquarters in India.

**About International Big Cat Alliance**

- It is a multi-country, multi-agency coalition of countries with an interest in big cat conservation.
- It is the First-ever global alliance for big cat conservation.
- It was proposed by India's Prime Minister in 2019 and was officially launched in April 2023 to commemorate 50 years of Project Tiger.
- **Objectives:**
  - Combat illegal wildlife trade involving the seven big cat species.
  - Promote the preservation of natural habitats.
  - Mobilize financial and technical resources for conservation efforts.
  - Mitigate climate change impacts and align biodiversity conservation with local needs, contributing to the UN Sustainable Development Goals.

- **Focus Species**: Tiger, Lion, Leopard, Snow Leopard, Cheetah, Jaguar, and Puma.
- **Governance:** Assembly of Members, a Standing Committee, and a Secretariat in India.
    - It follows a framework inspired by the International Solar Alliance (ISA), with a Director-General appointed

by the Ministry of Environment, Forest, and Climate Change (MoEFCC).

- **Members:** Membership will be open to 97 "range" countries, which host the natural habitat of these big cats, as well as other interested nations, international organizations, etc.
    - The alliance has received ratifications from India, Nicaragua, Eswatini, Somalia and Liberia.

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### Big Cats

- Big cats are large wild cat species, primarily from the Panthera genus, although some species outside this genus are also included.
- In general, scientists categorize big cats based on two specific qualities: they belong to the genus Panthera and have a special two-piece hyoid bone in their throat that allows them to roar.
- The Siberian tiger is the largest big cat.
- The Indian subcontinent has historically been home to the Bengal tiger, Asiatic lion, Indian leopard, Indian/Asiatic cheetah (extinct in 1952), and Snow leopard.

| Species | IUCN Red List Status | CITES Appendix |
|---|---|---|
| Tiger | Endangered | Appendix I |
| Lion | Vulnerable | The Asiatic Lion: Appendix I, |
| All other lion populations: Appendix II. | | |
| Leopard | Vulnerable | Appendix I |
| Snow Leopard | Vulnerable | Appendix I |
| Cheetah | Vulnerable | Appendix I (except for the populations of Botswana, Namibia, and Zimbabwe, which are included in Appendix II) |
| Jaguar | Near Threatened | Appendix I |
| Puma | Least Concern | Appendix II |

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## Environmental and Health Impact of Tanneries

### Context

Recently, on orders of NGT, UP Govt. conducted health checkups of people living in Kanpur & Fatehpur districts to assess health impacts of pollution caused by tanneries.

**Health Impacts of Heavy Metals and Toxic Elements**



### Impact of Tanneries

- Tanneries are known for their use of toxic chemicals in the leather processing industry, leading to serious health hazards for workers and nearby residents.
- **Water Pollution:**
    - Tanneries discharge untreated effluents containing chromium, sulphides, and organic matter into rivers and groundwater.
    - E.g., Kanpur's tannery waste pollutes the Ganga River, making water unsafe for drinking, agriculture, and aquatic life.
- **Soil Contamination:**
    - Chromium and arsenic seep into agricultural fields, making soil toxic and infertile.
    - Contaminated crops pose health risks to consumers.
- **Air Pollution:** Tanneries release hydrogen sulphide, ammonia and particulate matter into the air, causing:
    - Acid rain (damaging crops and water bodies).
    - Respiratory illnesses among nearby populations

## Sacred Groves

### Context

The Supreme Court has ordered the Rajasthan Forest Department to map and classify sacred groves as 'forests' and 'community reserves' under the Wildlife Protection Act.

### About Sacred Groves

- Sacred groves, also known as sacred forests, are areas of forest that are protected and preserved by local communities due to their religious, cultural, and ecological significance.

- **Significance of Sacred Groves**

- **Ecological Significance**

  - Important habitats for a wide range of plant and animal species that have been conserved by local communities sustainably.

  - Often associated with ponds, streams or springs, which provide for water to the local community.

  - The vegetation cover of the sacred groves enhances the soil stability and preventing soil erosion in the area.

- **Sociocultural Significance**

  - Hold religious and cultural significance for local communities and often associated with deities or ancestral spirits.

  - Act as repositories of traditional knowledge.

- **Distribution of Sacred Groves in India**

  - In India, Sacred Groves are found all over the country and abundantly along the Western Ghats.

  - According to some studies, the total number of sacred groves in India could be in the range of 100,000 – 150,00.

### About SC Directives on sacred groves

- The Supreme Court (SC) of India ordered the Rajasthan Forest Department to map all sacred groves using both ground surveys and satellite imagery.

- The groves must be identified based on their cultural and ecological significance, irrespective of their size.

- The court directed that these groves be classified as 'forests' and notified as 'community reserves' under the Wildlife Protection Act (WLPA) 1972.

- This ruling effectively transfers control from local communities to forest authorities for conservation.

- The decision conflicts with the Forest Rights Act (FRA) 2006, which sought to restore control over forest land to gram sabhas.

### Conflict Between the Supreme Court Order and the Forest Rights Act (FRA) 2006

- The FRA 2006 recognizes the customary rights of forest-dependent communities.

- If sacred groves were covered under FRA, they would be classified as 'community forest resources' rather than community reserves.

- Community Forest Resources (CFR) under FRA:

  - Managed by gram sabhas rather than the Forest Department.

  - Gram sabhas have statutory power to protect, regenerate, and conserve these forests.

  - Communities must develop their own conservation plans, supported by the State government.

- By classifying sacred groves as 'community reserves', the SC ruling undermines the traditional governance model and FRA provisions.

- The Union Environment Ministry has been asked to map all sacred groves in India and formulate a national policy.

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**Community Reserves and Conservation Reserves**

- Conservation Reserves and Community Reserves were first introduced in the Wildlife (Protection) Amendment Act of 2002.

- These categories were added because of reduced protection in and around existing or proposed protected areas due to private ownership of land, and land use.

**Conservation Reserves**

- The State Government can declare certain areas, especially those near national parks or sanctuaries, and those connecting protected areas, as conservation reserves under the Wildlife (Protection) Act, 1972 (Amendment 2002).

- This is done in consultation with local communities to safeguard landscapes, seascapes, plants, animals, and their habitats**.**

- **Characteristics**

  - Areas are designated as conservation reserves if they are uninhabited and completely owned by the Government of India and used for subsistence by communities.

  - Management of a Conservation Reserve is done as per provisions of the section 36B of the Wildlife (Protection) Act, 1972 (Amendment 2002).

  - The State Government shall constitute a conservation reserve management committee to advise the Chief Wildlife Warden to conserve, manage and maintain the conservation reserve.

- **Examples:** Ropar Wetland (Punjab), Anka Samudra Bird Sanctuary (Karnataka), Asan Wetland (Uttarakhand), Kanji (Ladakh), Saraswati Plantation (Haryana).

**Community Reserves**

- These are privately owned protected areas that serve as buffer zones or connectors between existing national parks, wildlife sanctuaries, and reserved forests in India.

- **Management of Community Reserves**

  - The State Government establishes a Community Reserve Management Committee to oversee the conservation, maintenance, and management of the community reserve.

  - The committee will comprise five representatives nominated by the Village Panchayat and one representative from the State Forests or Wildlife Department under whose jurisdiction the community reserve is located.

- **Examples**: Gogabil Community Reserve (Bihar), Ethungya Tongti Project (Nagaland), Singchang Begun Village (Arunachal Pradesh).

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## Inland Mangrove of Guneri

### Context

Gujarat Govt. has notified Inland Mangrove of Guneri in Kutch District as a Biodiversity Heritage Site (BHS).

**About Guneri Mangroves**

* It is Gujarat's first Biodiversity Heritage Site. It is notified under the Biodiversity Act, 2002.

* It is located at a distance of 45 km from the Arabian Sea and four km from the Kori Creek, where seawater never approaches. (No direct connection to seawater)

* The site Lacks sludgy terrain, and is located on flat land like a forest

* It is an Inland Mangroves Site. (Last remaining inland mangrove site in India).

* Inland Mangroves are found at only 8 locations worldwide.

* **Limestone Deposition:**

    – According to studies, inland mangroves survive in areas having limestone deposition which connects with the sea bed.

    – The limestone provides a continuous flow of groundwater to the mangrove ecosystem/vegetation.

    – The Western Kutch and areas surrounding the Guneri mangroves have records of limestone depositions.

* **Avifauna**: It houses around 20 migratory and 25 resident migratory species.

**Biodiversity Heritage Sites (BHS)**

* These are areas that are unique, ecologically fragile ecosystems having rich biodiversity.

* Under **Biological Diversity Act, 2002**, the State Government in consultation with local bodies may notify areas of biodiversity importance as BHS.

* The State Government in consultation with the Central Government also frame rules for the management and conservation of BHS.

* **Criteria for Declaration**

    – Contains a mix of natural, semi-natural, and man-made habitats with high biodiversity.

    – Includes significant domesticated biodiversity or representative agroecosystems.

    – Important for biodiversity and cultural heritage, such as sacred groves and community-conserved sites.

    – Serves as refuges or corridors for threatened and endemic species, including urban greens and wetlands.

    – Provides seasonal habitats for migrant species for feeding and breeding.

    – Maintained as preservation plots by the Forest Department's research division.

    – Medicinal Plant Conservation Areas.

## Ramsar sites in India

### Context

India has added 4 more sites in the Wetland list, increasing wetlands tally from 85 to 89, highest in Asia, third globally.

## New Ramsar Sites

| Site | Description |
|---|---|
| **Sakkarakottai Bird Sanctuary** <br> -Tamil Nadu | • **Type:** Natural freshwater <br> • It is located in Ramanathapuram near the Gulf of Mannar on the Central Asian Flyway. <br> • **Species Found**: Painted Stork, Black Headed Ibis etc. |
| **Therthangal Bird Sanctuary** <br> -Tamil Nadu | • **Type:** Natural freshwater <br> • It is a marshy lake located within Therthangal village in southern Tamil Nadu, near Palk Bay. <br> • The wetland is fed by two rivers during the rainy season. <br> • It serves as a stopover for migratory waders and waterfowl, particularly along the East Asia-Australasia Flyway. <br> • **Species found:** Egyptian vulture, painted stork, Black-headed ibis, Spot-billed pelican, Oriental darter etc. |
| **Khecheopalri Wetland** <br> -Sikkim | • **Type:** Natural Freshwater <br> • Originally known as Kha-Chot-Palri, meaning "the heaven of Padmasambhava," <br> • Considered sacred by both Hindus and Buddhists, known as Wishing Lake <br> • Drains water from the Ramam watershed. <br> • **Species found:** Common Crap, Giant Danio |

| Site | Description |
|------|-------------|
| **Udhwa Lake Bird Sanctuary** -Jharkhand | • **Type**: Natural Freshwater<br>• It is the first Ramsar Site of Jharkhand<br>• It comprises two interconnected wetlands, Pataura Lake and Barhel Lake, which are surrounded by the hillocks of the Rajamahal Hills and linked by a channel to the Ganga River.<br>• **Species found:** band-tailed fish eagle, common pochard, lesser adjutant stork.<br>• The area also holds historical significance, as the location of a famous battle between the King of Bengal and the British in 1763. |

Pong Dam L
Shalbugh CnR
Hokesar L
Wular L
Hygam CnR
Surinsar-Mansar L
Keshopur- Miani CmR
Beas CnR
Kanjli
Harike
Ropar
Bhindwas WLS
Keoladeo NP
Sambhar L
Sakhya Sagar
Sarsai Nawar Jeel
Thol L
Nalsarovar BS
Khijadia WLS
Wadhwana
Yashwant Sagar
Sirpur
Thane Creek
Nandur Madhyameshwar BS
Bhoj
Lonar L
Hirakud
Nanda L
Karikili BS
Ranganathittu BS
Vellode BS
Vembanad-Kol
Sasthamcotta L
Ashtamudi L
Vembannur
Suchindram Theroor
Koonthankulam BS

Nangal WLS
Chandra Taal
Tso Kar
Tsomoriri
Renuka L
Asan Barrage (UK)
Sultanpur NP
Haiderpur
Upper Ganga
Sur Sarovar
Saman BS
Sandi BS
Nawabganj BS
Samaspur BS
Parvati Arga BS
Deepor Beel
Loktak L
Rudrasagar L
Pala
Bakhira WLS
Kanwar Taal
East Kolkata
Sundarbans
Bhitarkanika
Ansupa L
Chilika L
Tampara L
Satkosia George
Kolleru L
Pallikaranai RF
Vedanthangal BS
Pichavaram Mangrove
Vaduvur BS
Point Calimere WLS & BS
Udhayamarthandapuram BS
Gulf of Mannar Marine BR
Chitrangudi BS
Kanjirankulam BS

**New Ramsar sites**

1. Sakkarakottai BS
2. Therthangal BS
3. Nanjarayan BS
4. Kazhuveli BS
5. Tawa Reservoir
6. Nagi BS
7. Udhwa Lake
8. Nakti BS
9. Khecheopalri BS
10. Magadi Kere CR
11. Ankasamudra Bird Conservation Reserve
12. Aghanashini Estuary
13. Karaivetti BS
14. Longwood Shola Reserve

### Ramsar Convention

- It an international treaty that was signed in 1971 in the Ramsar city of Iran and came into force in 1975.
- It aims to promote the conservation and sustainable use of wetlands.
- The Ramsar Convention defines **wise use of wetlands** as "the maintenance of their ecological character, achieved through the implementation of ecosystem approaches, within the context of sustainable development".
- It has been ratified by 170 countries (including India), making it one of the most successful international environmental treaties.
- **Ramsar Sites:** It is a wetland site designated to be of international importance. These wetlands are protected under strict guidelines of the Ramsar Convention on Wetlands.
  – Any wetland to be declared a wetland of international importance should support vulnerable
  – endangered or threatened species and attract more than 20,000 or more water birds.
  – **Significance:**
    ° The declaration would provide an opportunity to seek international technical support for conservation and sustainable use of wetland through participatory mechanism.
    ° It would also ensure international co-operation and financial assistance for wetland conservation.

### Montreux Record

- It was established by the Ramsar Convention on Wetlands in 1990.
- It is a register which lists wetland sites that are facing or have the potential to face significant environmental changes.
- **Significance:** Wetlands included in the Montreux Record receive international attention and assistance to ensure their conservation and sustainable use.

## Wetland City Accreditation

### Context

Indore and Udaipur have become the first two Indian cities to join the global list of wetland accredited cities.

### About Wetland City Accreditation

- It is a voluntary accreditation system that allows cities to gain international recognition for their wetland conservation efforts.
- It was launched in 2015 at **COP12 (Uruguay) of the Ramsar Convention.**
- It recognizes cities that have taken exceptional steps to safeguard their urban wetlands.
- **Validity:** Once granted, it is valid for a period of **6 years.**
- **Criteria for Accreditation -** Cities must satisfy six international criteria, including:
  – Adopting measures for wetland conservation and wise use.
  – Promoting ecosystem services provided by wetlands.

– Maintaining sustainable socio-economic practices linked to wetlands.
– Engaging local communities in conservation.
– Addressing concerns related to wetland degradation.
– Protecting both natural and human-made wetlands.

### Latest Addition from India

- **Indore, Madhya Pradesh:** Recognized for **Sirpur Lake,** a Ramsar site, developed as a bird sanctuary and water bird congregation zone.
- **Udaipur, Rajasthan:** It is known for its interconnected wetlands, including **Pichola, Fateh Sagar, Rang Sagar, Swaroop Sagar, and Doodh Talai**, which support biodiversity and ecotourism.

## Pollution from Thermal Power plants

### Context

On December 30, 2024, the Ministry of Environment, Forest, and Climate Change (MoEFCC) amended the Environment Protection Rules, delaying the compliance deadline for thermal power plants to meet sulphur dioxide ($SO_2$) emission norms by another three years.

### Pollution Burden of Thermal Power Plants (TPPs)

- **Air Pollution:** Combustion of coal at thermal power plants emits mainly carbon dioxide ($CO_2$), sulphur oxides ($SO_x$), nitrogen oxides ($NO_x$), CFCs particulates, such as fly ash and Suspended Particulate Matter (SPM)
  – Coal based TPPs are responsible for a disproportionately higher share of emissions than the industrial sector (60 per cent of PM, 45 per cent of $SO_2$, 30 per cent of $NO_2$ and 80 per cent of mercury (Hg)).
  – An analysis by CREA found that thermal power plants emit 10 times more kilotonnes of PM2.5 compared to crop residue burning, and over 200 times more kilotonnes of sulphur dioxide.
  – In 2022, India was the largest emitter of $SO_2$ globally, accounting for over 20% of the world's anthropogenic emissions.
- **Water pollution:** The dust from coal-cleaned water contaminates groundwater.
  – The hot water, if let out into water bodies without cooling, causes a rise in temperature and affects aquatic flora and fauna.
- **Land Degradation:** Untreated air and water pollutants from coal power plants affect the water and the flora and fauna of adjoining areas, making them unfit for living or livelihood activities.
- **Noise Pollution:** Regular exposure to such high noise levels emanating from power plants from the usage of equipment like boilers, turbines and crushers, affects people working in the plants

**Health Impacts of Chemical Pollutants from TPPs**
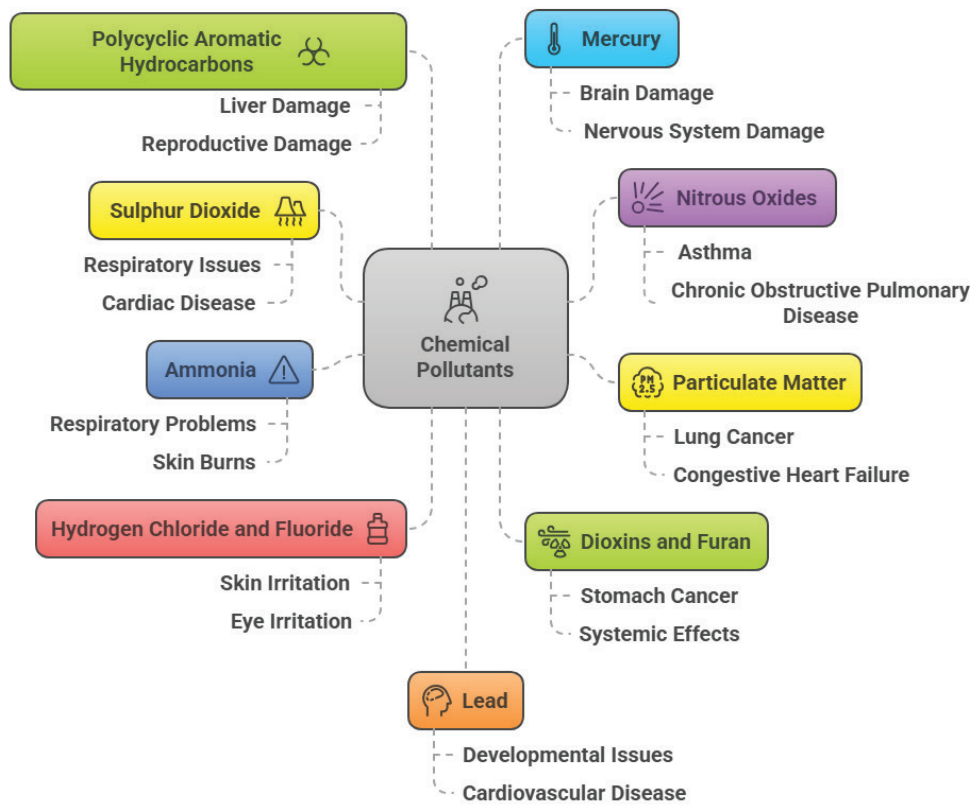


### Flue Gas Desulphurizations (FGDs)

- FGD is a technology used to remove sulphur dioxide ($SO_2$) from exhaust gases emitted by industries and power plants.

- The process can eliminate up to 95% of $SO_2$ emissions through chemical absorption.

- Common absorbents include ammonia, sodium sulphite, lime, or limestone slurry.

- Currently, FGD is being installed in 537 units in coal based Thermal Power Plants across India.

**Facts**

- India has a total installed capacity of 2,37,268.91 MW by thermal power plants.
- **Key thermal power producing states:** Maharashtra (31,510.08 MW), Uttar Pradesh (26,729.374 MW), and Gujarat (26,073.41 MW) had the highest non-renewable electricity generation capacities in 2022-23.
- **Highest share of thermal power:** Tripura (96.96%), followed by Bihar (95.57%), Chhattisgarh (94.35%), Jharkhand (92.69%), Delhi (87.96%), West Bengal (87.72%), and Uttar Pradesh (81.84%).
- **Net electricity sellers:** Chhattisgarh is the highest net seller of electricity (535.29 MW), followed by Madhya Pradesh (379.19 MW), Himachal Pradesh (153.43 MW), Rajasthan (135.14 MW), Odisha (95.40 MW) and Meghalaya (55.22 MW) in 2022-23.

- **Net electricity importers:** Gujarat is the highest importer of electricity (528.17 MW), followed by Haryana (212.63 MW), Maharashtra (187.50 MW), Delhi (162.97 MW), Punjab (160.82 MW), and Tamil Nadu (128.37 MW) in 2022-23.

## Impact of Ethanol on Environment

### Context

Concerns have been raised about the environmental impact of ethanol, particularly in regions like Andhra Pradesh.

**About Ethanol Blended Programme**

- **Background**: During 2001, pilot projects on Ethanol Blended Petrol started at 3 locations i.e. at Miraj, Manmad (Maharashtra) and Aonla/Bareilly in Uttar Pradesh.

  - Ethanol Blended Petrol programme was launched in January 2003 in 9 States i.e. Maharashtra, Gujarat, Goa, Uttar Pradesh, Haryana, Punjab, Karnataka, Andhra Pradesh, Tamil Nadu and 4 Union Territories.

- **Scope**: The programme has been extended to whole of India except Union Territories of Andaman Nicobar and Lakshadweep islands, wherein OMCs sell petrol blended with ethanol up to 10%.

- **Objective:** The programme promotes blending ethanol with petrol to reduce fossil fuel dependency and encourage renewable energy sources.
- **Targets and Progress of the EBP Programme**
  - **Current Status (2024):** The ethanol blend percentage in petrol stands at **15%** Nationwide.
  - **Target (2025-26):** Achieve **20% ethanol blending** in petrol.
  - **Requirement: 1,016 crore litres** of ethanol annually to meet the **20% blending target**.
  - **Production Capacity (2022): 947 crore litres** of ethanol in India.
  - **Key Ethanol Producing States:**
    - Andhra Pradesh
    - Maharashtra
    - Haryana
    - Punjab

**Ethanol**

- Ethanol is one of the primary biofuels, naturally produced through the fermentation of sugars by yeasts or through petrochemical processes like ethylene hydration.
- It is an anhydrous ethyl alcohol having chemical formula of $C_2H_5OH$, can be produced from sugarcane, maize, wheat, etc which are having high starch content.
- It is widely used not only as an alternative fuel source but also in various industries as a chemical solvent and in the synthesis of organic compounds.
- Ethanol also has medical applications as an antiseptic and disinfectant.

**Environmental Impact of Ethanol Production**

- **Water Resource Depletion:**
  - Ethanol factories require 8–12 litres of water per litre of ethanol.
  - Groundwater exploitation occurs, especially in perennial river basins like the Krishna, which already face water shortages.
  - Farmers in Andhra Pradesh fear ethanol production will deplete water for drinking and agriculture.
- **Air, Water, and Soil Pollution:**
  - Harmful emissions from ethanol factories include acetaldehyde, formaldehyde, and acrolein, which are known carcinogens.
  - These pollutants do not find a mention in environmental clearances, raising concerns about oversight.
  - Effluent discharge from factories has polluted canals and drinking water sources in Andhra Pradesh.
- **Factory Location & Public Concerns:**
  - Red Category Industry: Ethanol distilleries have a pollution score of 60+.

  - However, the government has exempted them from public hearings, allowing their setup near human settlements.
  - Protests have been ongoing in Gummaladoddi, Gandepalli, and Arugolanu villages of Andhra Pradesh against pollution from ethanol factories.

**Contradictions in Environmental Gains**

- A Niti Aayog report states that 20% ethanol blending reduces:
  - Carbon monoxide emissions by 30% in four-wheelers.
  - Carbon monoxide emissions by 50% in two-wheelers.
- However, environmentalists argue that the gains are negated by air and water pollution from ethanol production.

## Global ice cover dipped to record low

**Context**

Global sea ice cover dropped to a record low of 15.76 million sq km in February 2025.

**About Sea Ice**

- Sea ice refers to free-floating ice in the polar regions, formed when ocean water freezes.
- It is different from: Icebergs, glaciers, ice sheets, and ice shelves, which originate from land.
- Seasonal Changes:
  - Expands in winter and melts in summer.
  - Some sea ice remains year-round.

**Historical Trends in Sea Ice Decline**

- **Arctic Sea Ice Loss:** Shrinking at a rate of 12.2% per decade.
  - Since the late 1970s, the Arctic sea ice has been declining rapidly. An estimated 77,800 sq km of sea ice is lost every year.
  - Current Situation: Arctic sea ice at its lowest recorded extent for this time of year.
- **Antarctic Sea Ice Loss**
  - Antarctic sea ice increased slightly year-on-year until 2015
  - 2014-2017: Antarctica lost 2 million sq km of sea ice, equal to four times the size of Spain.
  - 2023: Antarctic sea ice reached historically low maximum levels.
  - 2024-2025: Ice cover improved slightly from 2023 but still 1.55 million sq km below the 1981–2010 average.

**Causes of Record-Low Ice Cover**

- **Arctic Factors:**
  - Warmer ocean waters: Oceans are taking longer to cool, delaying sea ice formation.
  - Storms in the Barents and Bering Seas: Thinner ice is more fragile and breaks apart easily.

– Higher-than-normal air temperatures: Particularly in Svalbard (Norway), Hudson Bay (Canada).

- **Antarctic Factors:**

  – Ice-breaking winds: Unlike the Arctic (surrounded by land), Antarctic sea ice is surrounded by the ocean, making it more mobile and thinner.

  – Warmer air and water temperatures: More melting at the edges of the ice sheet (ice shelves).

## Consequences of Declining Sea Ice

- Accelerated Global Warming:

  – Less ice = more heat absorption:

  – White sea ice reflects sunlight back into space.

  – Darker ocean water absorbs more heat, leading to higher temperatures.

  – Polar regions are warming faster than the rest of the world.

- **Impact on Ocean Currents & Global Climate:**

  – Melting ice releases freshwater into the ocean.

  – Lower salinity and density: Reduces the downward flow of surface water & Slows ocean overturning circulation.

## Aravalli Safari Park Project

### Context

The Haryana government has proposed a 3,858-hectare Aravali Safari Park across Gurugram and Nuh districts.

## About Aravali Safari Park Project

- It is a proposed wildlife park spanning 10,000 acres in the Aravalli hills of Haryana.

- The project would include animal cages, hotels, restaurants, botanical gardens, aquariums and more.

- After completion, it will be **the World's Largest Safari Park. (Currently in UAE)**

- **Concerns:**

  – Threat to groundwater reserves in the water-scarce districts of Gurugram and Nuh.

  – Violation of forest laws, as the project area falls under protected forest land.

  – Haryana's low forest cover (3.6%), which needs reforestation, not commercial projects.

### Ecological Importance of the Aravali Range

- The Aravali hills in southern Gurugram and Nuh form part of the oldest fold mountain range in the world.

- The Aravali range stretches 690 km from Champaner in Gujarat to near Delhi in the northeast.

- **Key ecological roles of the Aravalis:**

  – Prevents desertification – Acts as a barrier against the spread of the Thar Desert into eastern Rajasthan.

  – Groundwater recharge – The highly fractured and weathered rocks allow water to percolate, replenishing aquifers.

  – Rich biodiversity – The region is home to a diverse array of wildlife and plant species.

## Species in News

| Species | Details |
|---|---|
| **Whales**  | • **Baleen Whales (Mysticeti) – 14 species**<br>  – **E.g:** Blue whales, humpback whales, grey whales.<br>  – **Feeding mechanism:** Have baleen plates instead of teeth, used for filter-feeding small prey like krill and fish.<br>  – **Throat size:** Extremely small (size of a human fist), making it impossible to swallow a human.<br>• **Toothed Whales (Odontoceti) – Over 70 species**<br>  – **E.g:** Sperm whales, beaked whales, killer whales, dolphins. <br>• **Feeding mechanism:** Have teeth and hunt larger prey like fish and squid.<br>• **Throat size:** Larger than baleen whales, but still cannot swallow a human.<br>• **Exception:** Sperm whales have large enough throats to swallow a human. However, such encounters are extremely rare (described as a "billion to one" chance by National Geographic). |

| Species | Details |
|---|---|
| **Northern Pintail Duck**<br> | • It is a large, graceful, and migratory duck that is named for its long tail feathers.<br>• It is a wetland bird that can be found on every continent except Antarctica.<br>• It is a Long-distance migratory species, travelling thousands of kilometres south to escape freezing winters.<br>• **Breeding Regions:** Found in northern parts of Europe, Asia, Russia, Central Asia, Mongolia, China, Japan, Alaska, Canada and North America.<br>• **Winter Migration Destinations:** These birds migrate to warmer regions, including northern Africa, the Indian subcontinent, Southeast Asia.<br>• **Preferred Habitats:** Freshwater wetlands, lakes, marshes and coastal lagoons.<br>• **IUCN Status:** Least Concern. |
| **Gharials**<br> | • Has long, thin snouts which resemble a pot.<br>• Relatively harmless, fish-eating species.<br>• Indicator species as their population reflects the health of the river system.<br>• **Distribution:**<br>  – Found only in India and Nepal.<br>  – The only viable population in the National Chambal Sanctuary is spread across the states of Uttar Pradesh, Rajasthan, and Madhya Pradesh in India.<br>  – Small non-breeding populations exist in Son, Gandak, Hooghly and Ghagra rivers<br>• **Conservation Status:**<br>  – **IUCN:** 'Critically Endangered'.<br>  – **CITES:** Appendix I<br>  – **Wildlife Protection Act, 1972:** Schedule I.<br>• **Conservation Programmes:**<br>  – Indian Crocodile Conservation Project<br>  – Gharial Research and Conservation Unit (GRACU) at Tikarpada<br>  – Kukrail Gharial Rehabilitation Centre, Lucknow, Uttar Pradesh<br>  – National Chambal Sanctuary (Gharial Eco Park, Madhya Pradesh |
| **Iguana**<br> | • Iguanas are large, herbivorous or omnivorous lizards.<br>• They are cold-blooded reptiles, primarily found in tropical and subtropical regions.<br>• Most iguanas are arboreal (tree-dwelling) and have strong claws and tails for defence.<br>• They are known for their scaly skin, long tails and dewlap (flap of skin under the chin), which helps in thermoregulation and communication.<br>• Iguanas are native to tropical regions of Central and South America, Mexico, and the Caribbean.<br>• Iguanas are not naturally found in India but exist as pets and in captivity.<br>• **Iguanas spotted in India:** Green iguanas and American green iguanas.<br> |

## News in Short

| Topic | News and Details |
|---|---|
| **Taranaki Maunga mountain** | **News:** Taranaki Maunga, along with its surrounding peaks, has been granted legal personhood.<br>**Details**<br>• Taranaki Maunga is the second-highest mountain in New Zealand's North Island.<br>• It is one of the most symmetrical volcanic cones in the world, towering over the Taranaki plains on the west coast of the North Island.<br>• Te Urewera, a former national park granted legal personhood in 2014, and the Whanganui River, gained the same status in 2017. |
| **Vishwamitri river** | **News:** Counting exercise to estimate the number of crocodiles in the Vishwamitri river of Gujarat's Vadodara city concluded.<br>**Details:**<br>• The Vishwamitri originates on the hill of Pavagadh in Panchmahals district and flows some 200 kilometres into the Gulf of Khambhat.<br>• Primarily rain-fed, it flows through a 25-km stretch of Vadodara, Gujarat's third-largest city.<br>• The Vadodara stretch of the Vishwamitri is unique in that it is home to a large population of mugger or marsh crocodiles (Crocodylus palustris). |
| **Fulani** | **News:** According to a study, the Fulanis have a history going back to the 'Green Sahara' period (12,000–5,000 years before the present).<br>**Details**<br>• Fulanis are an ethnic group in the Sahara, Sahel and West Africa, widely dispersed across the region.<br>• They are one of Africa's largest pastoral populations |
| **Pastoralism** | **News**: The Himachal Pradesh Forest Department has notified traditional pastoral routes and halting sites, directing forest officers to exclude them from afforestation schemes.<br>**Details**<br>• Pastoralism is one of the oldest and most sustainable food systems in the world.<br>• It involves the seasonal migration of herders and livestock between different climatic zones in search of year-round fodder.<br>• In Himachal Pradesh, communities such as the Gaddi, Gujjar, Kinnaura, Lahaula and Pangwala have practised this system for generations. |
| **Mission Anveshan** | **News:** Year End Review 2024- Ministry of Petroleum and Natural Gas<br>**Details**<br>• It is a project of the Union Govt. to explore the country's sedimentary basins.<br>• The project aims to build a geoscientific database and improve seismic coverage of the basins.<br>• It is a phased implementation of the **National Seismic Programme (NSP).**<br>• **Nodal Ministry:** Ministry of Petroleum and Natural Gas<br>• **Significance:**<br>  – Mission Anveshan will help to improve the country's understanding of its sedimentary basins.<br>  – It will help to build a reliable database that can be used for future exploration and licensing. |
| **Earthquake Swarms** | **News:** A state of emergency has been declared on Greece's Santorini and the nearby islands of Ios, Amorgos, and Anafi after a swarm of undersea earthquakes.<br>**Details**<br>• An earthquake swarm refers to a sequence of multiple seismic events of comparable intensity that occur in a small geographic area over a short period of time.<br>• Unlike earthquake sequences, swarms lack a single large mainshock, and the tremors continue intermittently.<br>• Swarms are usually short-lived, but they can continue for days, weeks, or sometimes even months. |

| Topic | News and Details |
|---|---|
| **Trihalomethane (THM)** | **News:** According to a study, reacts with natural organic matter to form a chemical compound called trihalomethane (THM).<br>**Details**<br>• Many trihalomethanes find uses in industry as solvents or refrigerants.<br>• Some THMs are also environmental pollutants, and a few are considered carcinogenic.<br>• The four most common THMs (chloroform, bromoform, bromodichloromethane and chlorodibromomethane) may damage the DNA. |
| **Ocean Coordination Mechanism (OCM)** | **News**: OCM was launched by UNESCO's Intergovernmental Oceanographic Commission (IOC)<br>**Details**<br>• It focuses on the Caribbean and North Brazil shelf.<br>  – These areas are rich in biodiversity, their coral reefs and fisheries support local economies, contributing about $610 million each year.<br>  – The North Brazil Shelf, classified as a Large Marine Ecosystem, is home to over 500 fish species and acts as a natural barrier against storms.<br>• The initiative builds on lessons from previous projects like the Pacific Islands Regional Ocean Policy (PIROP).<br>• It has secured an initial $15 million investment from the Global Environment Facility through the UNDP/GEF PROCARIBE+ Project. |
| **Genetic Diversity** | **News:** According to a study published in the journal Nature, Genetic diversity among mammals, birds and marine species is declining worldwide.<br>**Details**<br>• The variety of genes presents within a species can be described as genetic diversity.<br>• It can be impacted by various factors such as genetic drift, mutation, natural selection, and human activities such as habitat destruction, pollution, and the introduction of invasive species.<br>• Significance: It is essential for maintaining the resilience of a species to environmental changes and disease outbreaks.<br>• Example: Genetic Diversity in humans leads to differences in eye colour, height, and susceptibility to different diseases. |
| **Asian Waterbird Census** | **News:** According to the Asian Waterbird Census, 39,725 birds belonging to 106 species have been sighted in the Coringa Wildlife Sanctuary and adjoining wetlands.<br>Details<br>• It is a citizen-driven initiative aimed at conserving and managing wetlands and waterbirds globally.<br>• Conducted annually, it is a part of the International Waterbird Census (IWC).<br>• Launched in 1987 in the Indian subcontinent, it has since expanded to include key regions across Asia, such as East Asia, Southeast Asia, Japan, and Australasia.<br>• The survey encompasses the entire East Asian–Australasian Flyway and a significant portion of the Central Asian Flyway.<br>• In India, the Bombay Natural History Society (BNHS) and the Wildlife Institute of India (WII) coordinate the census every January. |
| **Climate Risk Index** | **News**: Climate Risk Index (CRI) 2025 was released<br>**Details**<br>• It is published by Germanwatch (an independent development, environmental and human rights organization based in Bonn and Berlin).<br>• It is a backward-looking index ranking the human and economic toll of extreme weather, with the most affected country ranked highest.<br>• First Published: 2006.<br>• **CRI 2025**<br>• India is ranked the 6th most affected country during 1993-2022 in the CRI 2025.<br>• India faced over 400 extreme weather events in three decades, causing losses of USD 180 billion and at least 80,000 fatalities.<br>• Countries ahead of India: Dominica, China, Honduras, Myanmar & Italy. |

| Topic | News and Details |
|---|---|
| **Green Credit Programme (GCP)** | **News:** Seventeen States have so far set aside 57,700 hectares of degraded forest land for tree plantation under the Green Credit Programme.<br>**Details**<br>• GCP was launched by the Union Ministry of Environment, Forest and Climate Change in October 2023.<br>• It is an innovative market-based mechanism designed to incentivize voluntary environmental actions across various sectors.<br>• **Key Objectives**<br>– GCP aims to increase India's forest and tree cover by encouraging afforestation and reforestation activities.<br>– The programme plans to create an inventory of degraded forest lands suitable for plantation, accessible through a dedicated web portal.<br>– Participants engaging in approved environmental activities receive Green Credits, which serve as incentives and can be traded on a designated platform.<br>  ° **The Indian Council of Forestry Research and Education (ICFRE)** administers the programme, overseeing the verification and issuance of these credits. |
| **Bacterial cellulose** | **News:** A recent study published in Science Advances has highlighted the use of bacterial cellulose as a bandage for plants.<br>**Details**<br>• Bacterial cellulose is a natural polymer produced by certain bacteria. It is widely used in human medicine, especially for wound healing.<br>• **Potential Agricultural Applications:**<br>– **Facilitating Grafting** – Can help join plant tissues together more effectively.<br>– **Preserving Cut Plant Material** – Prevents dehydration and infection in cuttings.<br>– **Growth Medium in Laboratories** – Could serve as a substrate for plant tissue culture experiments. |
| **India's First Biannual Transparency Report (BTR)** | **News:** India is in the final stages of preparing its first-ever Biannual Transparency Report (BTR)- as a part of commitment under the 2015 Paris Agreement on climate change<br>**Details**<br>• BTR is an official document that provides details on:<br>– India's greenhouse gas emissions inventory (sectors and sources of emissions).<br>– Efforts to improve energy efficiency and shift to renewable energy sources.<br>– Availability of resources for climate action.<br>• Unlike previous submissions like National Communications and Biannual Update Reports (BURs), the BTR will be subject to technical review by UNFCCC-accredited international experts.<br>• Comparison with Previous Reports: The last BUR (submitted earlier) contained data up to 2020. The upcoming BTR will present more recent and updated figures on India's emissions and climate action efforts. |
| **Polyfluoroalkyl substances (PFAs)** | **News:** Findings of a recent study suggest that naturally sourced coatings, modeled after polar bear fur's sebum, could replace harmful PFAs in various products.<br>**Details**<br>• Polyfluoroalkyl substances (PFAs) are human-made chemicals widely used for their water, oil, and heat resistance.<br>• They are known as "forever chemicals" because they do not break down in the environment, leading to their accumulation in ecosystems, drinking water and the human body.<br>• Common Uses of PFAs: Non-stick cookware (Teflon), waterproof clothing, Grease-resistant food packaging, Fluorinated ski skins (used in skiing) etc.<br>**Note**: Polar bear fur sebum lacks squalene, a compound that is predominant in human sebum. Instead, polar bear sebum contains cholesterol and other fatty acids. |

| Topic | News and Details |
|-------|------------------|
| **Polarized Moonlight** | **News:** Scientists have discovered that two nocturnal bull ant species, Myrmecia pyriformis and Myrmecia midas, navigate at night using polarized moonlight. <br> **Details** <br> • When this light passes through the Earth's atmosphere, it scatters and becomes polarized. <br> • Polarized light means the light waves are organized in a specific direction, creating a pattern in the sky–called E-vector pattern. <br> • Some insects like ants and bees can detect and follow this pattern, helping them find their way even on dark nights. |

## Places in News

| PLACE | DETAILS |
|-------|---------|

**Panama Canal**



News: Recently U.S. President-elect **Donald Trump** called the transfer of the Panama Canal to Panama a "foolish" decision and demanded its return to the U.S

• It is an 80-kilometer artificial waterway connecting the Atlantic and Pacific Oceans through the **Isthmus of Panama.**

• It is a lock-type canal owned and administered by Panama.

• It is one of the major choke points of the world. It handles the 6% maritime trade volume of the world.

• **US-Panama Treaty**, also known as the Torrijos–Carter Treaties, was signed in 1977 by the United States and Panama to transfer control of the Panama Canal to Panama.

**North Sea**



News: U.S. President-elect Donald Trump called to "open up" the North Sea and get rid of windmills.

• **Location:** between the British Isles and the mainland of northwestern Europe. It is an **arm** of the **Atlantic Ocean.**

• **Bordering Countries:** Norway, Scotland, England, France, Belgium, Netherlands, Germany and Denmark.

• It connects to the Atlantic Ocean via the English Channel and to the Baltic Sea through the **Kattegat and Skagerrak Straits.**

• **Major Rivers draining in North Sea:** Forth, Elbe, Scheldt, Thames, Humber.

• **Major Ports: Rotterdam** (busiest port in Europe), Antwerp, Hamburg etc.

| PLACE | DETAILS |
|---|---|
| Greenland | News: President-elect Donald Trump has expressed interest in acquiring Greenland, an autonomous territory of Denmark. |

News: President-elect Donald Trump has expressed interest in acquiring Greenland, an autonomous territory of Denmark.

- **Location:** Between the Arctic and Atlantic Oceans. It is the **world's largest island.**
- Presently it is an **autonomous territory under the Kingdom of Denmark.**
- **Three-fourth** of its surface is **permanently covered by ice.**
- It is majorly inhibited by the **Inuit community.**
- **Arctic Trade Route:** Greenland lies along a **shorter Arctic Sea shipping route.** Climate change may enhance the strategic importance of this route, reducing dependence on the **Panama Canal.**
- **Mineral Resources:** Greenland has deposits of **copper, lithium and cobalt,** essential for electric vehicle batteries and other technologies.

**Sudan**
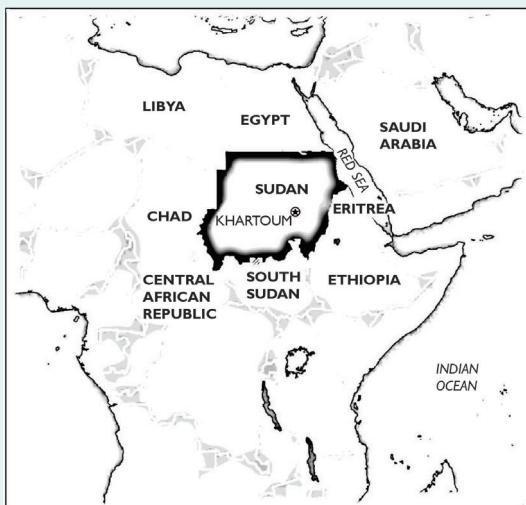
News: According to the **United Nations Children's Fund (UNICEF),** an estimated 3.2 million children under the age of five are expected to face acute malnutrition this year in war-torn Sudan.

- **Location:** Northeastern Africa. (Capital- Khartoum)
- **Bordering Countries:** Egypt, Eritrea, Ethiopia, South Sudan, Central African Republic, Chad and Libya.
- Sudan is **Africa's 3 largest** country by area.
- **Major rivers:** Blue Nile, White Nile & Arbata.
- **Nubian Desert:** Rocky, arid desert in northeastern Sudan.
- **Major Ports:** Port Sudan, Osaief Port and Suakin Port.
- **Conflict Regions:**
  - **Darfur Region:** Ongoing civil war between the Arab and African communities.
  - **Abyei Region:** Disputed between South Sudan and Sudan. It is an **oil rich region.**
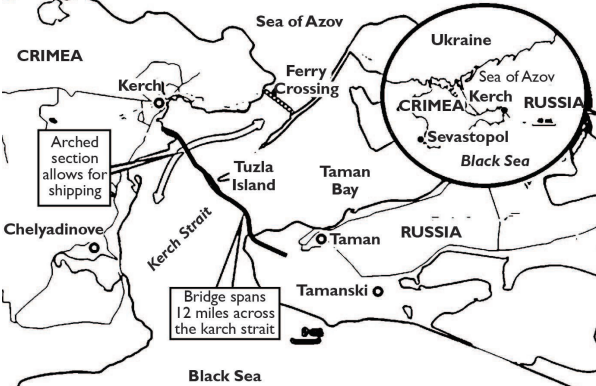
**Chad**
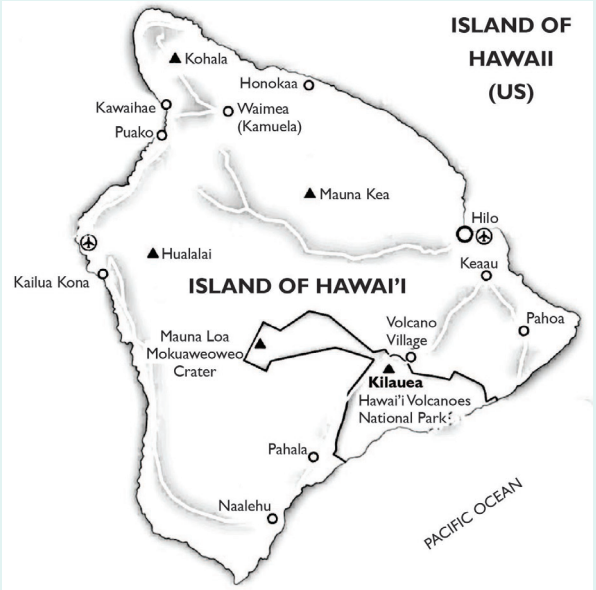
News: Recently the Presidential palace of Chad was attacked. When this incident occurred President Mahamat Deby Itno was inside the palace.

- **Location:** Landlocked country in **north-central Africa.**
- **Bordering countries:** Libya, Sudan, Central African Republic, Cameroon, Nigeria and Niger.
- It is a **semi-desert** country, rich in **gold and uranium.**
- Its **highest peak is Mount Koussi** (Emi Koussi). It is an extinct volcano.
- **Major Rivers:** Chari and Logone.
- **Lake Chad:** Located at the junction of **Nigeria, Niger, Chad and Cameroon.**

| PLACE | DETAILS |
|---|---|
| **Gulf of Mexico**  | News: Recently US President-elect Donald Trump proposed **renaming the Gulf of Mexico to the Gulf of America.** <br> • **Bordering Countries:** USA, Mexico & Cuba. <br> • It connects to the **Atlantic Ocean through the Straits of Florida** and to the **Caribbean Sea via the Yucatán Channel.** <br> • It is vulnerable to **hurricanes and twisters** due to warm waters and favourable atmospheric conditions. <br> • **Major rivers draining:** Mississippi & Rio Grande. <br> • **Resources:** Major source of petroleum and natural gas & Fishing. <br> • **The International Hydrographic Organization (IHO)** governs naming conventions for seas, oceans, and navigable waters. |
| **Kerch Strait**  | News: Recently a Russian oil tanker carrying thousands of tonnes of oil products split apart during a heavy storm, causing an oil spill in the **Kerch Strait.** <br> • It is located in **Eastern Europe** and is the only water body which **connects the Black Sea with the Sea of Azov.** <br> • It separates the **Kerch Peninsula (Crimea)** from the **Taman Peninsula (Russia).** <br> • It is an **important global shipping route &** also a key point of conflict between Russia and Ukraine <br> • **Kerch Strait Bridge:** It is also known as the **Crimean Bridge** as it links mainland Russia with Crimea. |
| **Kilauea Volcano**  | News: Recently, Kilauea volcano erupted on Hawaii's Big Island. <br> • **Location:** It is located along the southeastern shore of **Hawaii Island.** <br> • It is one of the **world's most active volcanoes.** <br> • **Volcanic Eruption:** 99% of gas molecules emitted during a volcanic eruption are Water Vapor, CO2 and SO2. <br> • The remaining 1% is composed of small amounts of **hydrogen sulfide, carbon monoxide, hydrogen chloride, hydrogen fluoride etc**. |

| PLACE | DETAILS |
|---|---|
| **Baltic Sea**<br> | News: **NATO** has announced that it will boost its presence in the Baltic Sea after the suspected sabotage of an undersea power cable and four internet lines recently.<br>• **Location:** It is an extended arm of the **Atlantic Ocean in Northern Europe.**<br>• **Bordering Countries:** Denmark, Estonia, Finland, Germany, Latvia, Lithuania, Poland, Russia and Sweden.<br>• It connects to the Atlantic Ocean through the **Danish Straits.**<br>**Other facts**<br>• **Baltic Countries:** Lithuania, Estonia and Latvia.<br>• **Nordic Countries:** Denmark, Norway, Sweden, Finland and Iceland.<br>• **Scandinavian Countries:** Denmark, Norway and Sweden. |
| **Yala Glacier**<br> | News: Yala Glacier in Nepal is predicted to disappear by the 2040s due to rapid retreat and mass loss.<br>• **Location:** Langtang Valley, central Nepal.<br>• It is one of the most studied glaciers in Nepal and represents the Hindu Kush Himalayan region in the World Glacier Monitoring Service (WGMS) database.<br>• It is the **only glacier in the Himalayas listed on the Global Glacier Casualty List.**<br>• It has retreated by **680 meters between 1974 and 2021, with a 36%** reduction in area during this period.<br>• **The Hindu Kush Himalayan (HKH)** cryosphere is warming twice as fast as the global average, leading to rapid glacial retreat.<br>• Recently, **UN has declared 2025 as the International Year of Glaciers' Preservation.**<br>• Note: Sachin glacier (in Pakistan) and Thana glacier (located in Bhutan) |
| **Mount Ibu**<br> | News: According to an official report, **Mount Ibu (Strato volcano)** has erupted at least a **thousand times this month.**<br>• **Location:** Northwest coast of **Halmahera island, Indonesia.**<br>• In 2023, Mount Ibu recorded a total of **21,100 eruptions,** making it the **2nd most** active volcano in Indonesia.<br>– **Mount Merapi** is the most active volcano in Indonesia.<br>• It stands 1,377 meters above sea level and spans 16 km east-west and 13 km north-south. |

| PLACE | DETAILS |
|---|---|
| Lesotho | News: India has sent a consignment of 1,000 metric tonnes of rice to Lesotho to assist in addressing the food security and nutritional needs of its people. |

**Lesotho**

News: India has sent a consignment of 1,000 metric tonnes of rice to Lesotho to assist in addressing the food security and nutritional needs of its people.

- **Location:** It is a landlocked country in Southern Africa. It is **completely surrounded by South Africa**, making it the largest sovereign enclave globally.
- It is situated in the **Maloti Mountains.**
- **River: Orange River (one of the longest rivers in Africa)** rises in the Lesotho Highlands as **Sinqu River.**

**Hotan Prefecture**

News: China recently announced the creation of two counties - **He'an County** and **Hekang County** in the **Hotan prefecture** of the **Xinjiang Uyghur Autonomous Region**.

India has lodged **strong diplomatic protest** against this action.

- **Location:** It is located in the **Tarim Basin** of southwestern Xinjiang, China.
- It borders **Tibet, Ladakh and Gilgit-Baltistan.**
- **Aksai Chin area was occupied by China in 1962 war but it is an Integral part of India.**

**Paktika province**

News: Recently Pakistani Army carried out air strikes in Paktika Province of Afghanistan

- **Location:** In eastern Afghanistan, on the border with Pakistan.
- **Significance:** Paktika is a strategically important province due to its proximity to the **Durand Line,** which makes it easy for militants to cross between Afghanistan and Pakistan.
- **Durand Line:** It is the international border between Afghanistan and Pakistan.

| PLACE | DETAILS |
|---|---|
| Diego Garcia | News: 15 fishermen of Kanniyakumari district who had ventured into the sea from the **Thengapattinam fishing harbour** were detained near Diego Garcia island for allegedly crossing the maritime boundary |
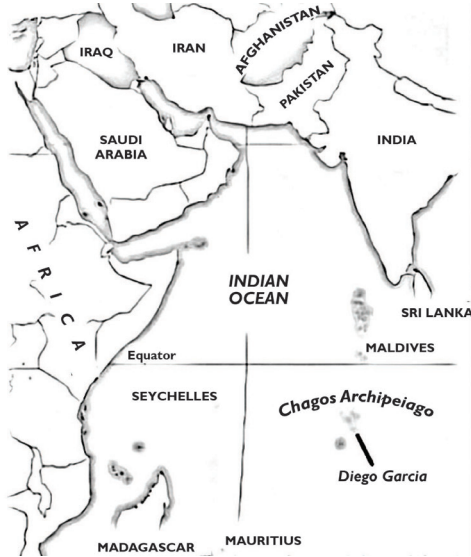


- **Location:** Central Indian Ocean, part of **Chagos Archipelago.**
- It is the largest of **55 islands** that form the Chagos Archipelago within the **British Indian Ocean Territory (BIOT).**
- It is leased to the United States for a military base.
- **Features:**
  – It is a **coral atoll** with an open lagoon at its northern end.
  – Discovered by the **Portuguese in the 16th century.**
  – Located in the **south of the equator.**
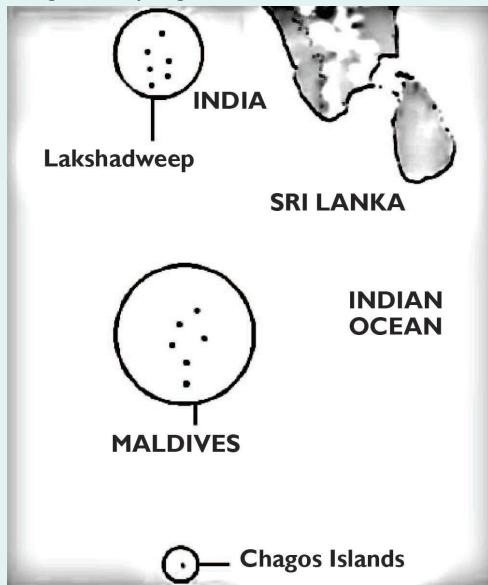
| Chagos Archipelago | News: Britain and Mauritius recently announced significant progress in their negotiations to finalise a deal regarding the sovereignty of the Chagos Islands. |
|---|---|



- **Location:** 500 km to the South of Maldives archipelago in the Indian ocean.
- It comprises around **58** islands.
- Mauritius, which gained independence from **Britain in 1968,** has consistently maintained its claim over the Chagos Islands.
- **In 2019, the International Court of Justice (ICJ)** dismissed the UK's right to govern the Chagos Islands and called on its government to withdraw from the archipelago.
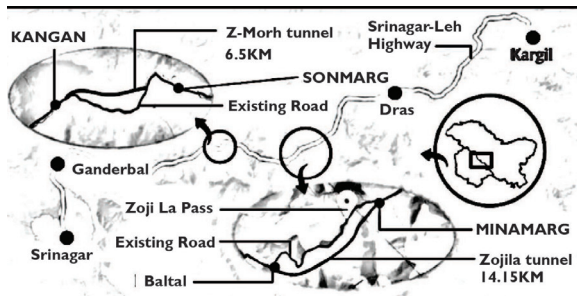
| Z Morh Tunnel | News: Z Mohr tunnel recently inaugurated by PM Modi, aims to boost year long tourism in Sonmarg, Kashmir. |
|---|---|



- It is a **6.4 km long tunnel** connecting **Kangan town to Sonmarg** in Ganderbal district (J&K).
- It is part of a larger **Zojilaa tunnel project** aimed at providing all-weather connectivity between Srinagar and Leh.
- It derives its name from the **Z-shaped road stretch** where it is being built.

| PLACE | DETAILS |
|---|---|
| **Karnali hydropower project**<br> | News: Indian Renewable Energy Development Agency (IREDA) has finalized a Joint Venture Agreement for the development of the **Upper Karnali Hydro-electric Project in Nepal.**<br>• **Karnali River:** Originates from **Macha-khabab of Tibet** and flows through Nepal and meets the Ghaghara River in India.<br>  – It is also known as **Mapcha Tsangpo in Tibet.**<br>• **Karnali Hydropower Project:**<br>  – It is a Run-of-River project that will **export power from Nepal to India and Bangladesh.**<br>  – A run of the river project uses the natural flow of a river to generate electricity.<br>• Karnali hydro-electric project is the **largest hydro-electric power project in Nepal.** |
| **Kandla / Deendayal Port**<br> | News: The Ministry of Ports, Shipping & Waterways has announced major investments at the Kandla port.<br>• **Location:** Kandla Creek in the Kachchh district of Gujarat.<br>• It is one of India's largest all-weather ports and serves as a gateway port for Punjab, Haryana, J&K.<br>• **Major Ports in India (12):** Chennai, Cochin, Deendayal (Kandla), Jawaharlal Nehru (Nhava Sheva), Kolkata, Mormugao, Mumbai, New Mangalore, Paradip, V. O. Chidambaranar (Tuticorin), Visakhapatnam and Kamarajar Port Limited.<br>  – **13th -Vadhavn Port (under construction)** |
| **Winter Char Dham Circuit**<br> | News: The Uttarakhand government has inaugurated the **Winter Char Dham Circuit** to attract tourists during the off-season winter months.<br>• During winter, heavy snowfall makes the main Char Dham shrines inaccessible.<br>• The presiding deities are moved to **lower-altitude shrines**, designated as their winter abodes:<br>  – **Gangotri Dham:** Mukhba (Uttarkashi).<br>  – **Yamunotri Dham:** Kharsali (Uttarkashi).<br>  – **Kedarnath:** Omkareshwar Temple (Ukhimath, Rudraprayag).<br>  – **Badrinath:** Pandukeshwar (Chamoli).<br>• **Environmental and Management Concerns:**<br>  – **Overcrowding and Infrastructure Strain**<br>  – **Impact on Wildlife:** Animals such as snow leopards, mountain sheep descend to lower altitudes during winter. |

| PLACE | DETAILS |
|---|---|
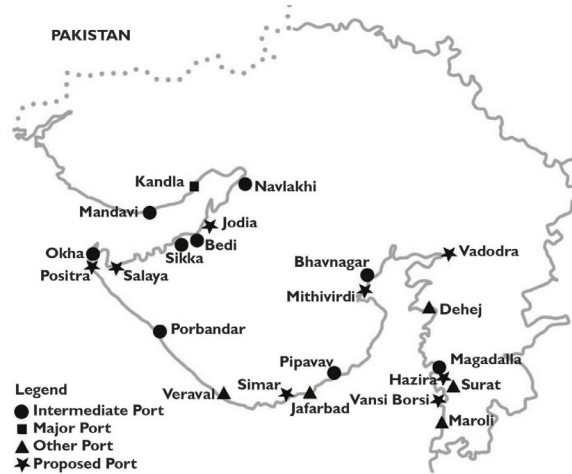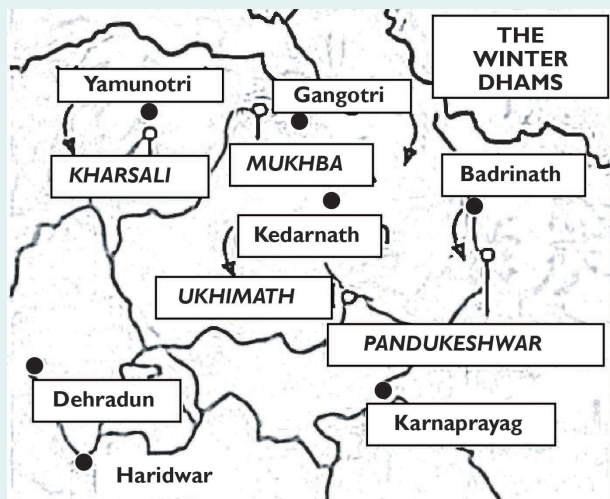
Dibru Saikhowa National Park

### NATIONAL PARKS (ASSAM)

Dibru
Saikhowa

Dihing
Patkai

Nameri

Kaziranga

Raimona    Manas    Orang
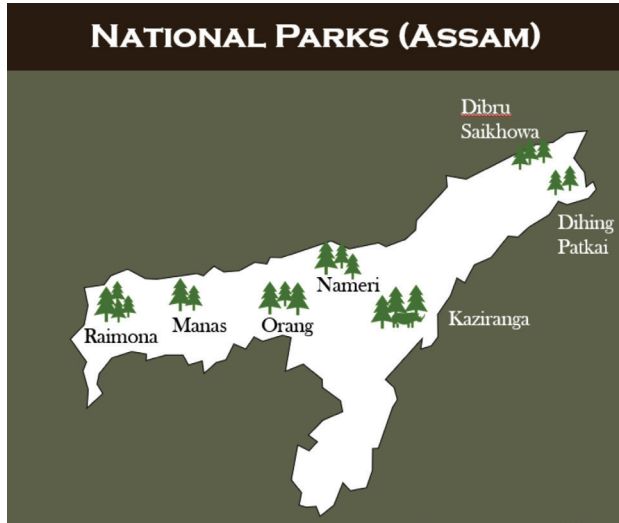
News: Oil India Limited (OIL) has urged the Environment Ministry to approve an R&D (research and development) study in Assam's Dibru Saikhowa National Park for which the extraction proposal was rejected.

- **Situated in:** Dibrugarh and Tinsukia districts of Assam, India.
- **Declared:** National park in 1999 and as a Biosphere Reserve in 1997.
- **Geography:** Bounded by the Brahmaputra and Lohit Rivers in the north and the Dibru River in the south.
- **Flora & Fauna:** Originally established to protect the rare white-winged wood duck, the park now shelters diverse species such as Bengal tigers, Indian leopards, and feral horses (descendants of horses abandoned during World War II).
  – It's an Important Bird Area with over 300 bird species recorded.

# INTERNATIONAL RELATIONS & INTERNAL SECURITY

## TOPICS FOR MAINS

### India as a bridge between Global North and South

*Syllabus Mapping: GS-Paper 2, Foreign Policy of India*

### Context

India is increasingly taking a central role in shaping the Global South in the 21st century, particularly through initiatives such as the Voice of the Global South Summits and its G20 presidency.

### About Global South

- It refers to developing and underdeveloped nations, primarily located in Africa, Asia, Latin America, and the Caribbean.
- These countries share common historical, economic, and geopolitical characteristics, often linked to colonial history, economic dependency, and developmental challenges.

### Difference Between Global North and Global South

| Aspect | Global North (Developed) | Global South (Developing/Underdeveloped) |
|---|---|---|
| Economy | Advanced, industrialized | Developing, agrarian, and industrializing |
| Living Standards | High HDI, low poverty | Low HDI, high poverty rates |
| Technology | Innovation hubs, high R&D spending | Low technology adoption, dependency on imports |
| Governance | Stable democracies and strong institutions | Political instability, weaker institutions |
| Global Power | Dominates world economy & institutions | Limited influence in global decision-making |



### India's Positioning As A Link Between Global North And Global South

India is positioning itself as the **leader and representative** of the Global South by:

- **Advocating for Global South concerns** at North-dominated forums (G20, UN, WTO). For example,
  - India **successfully pushed for the inclusion of the African Union as a permanent member of G20**, ensuring better representation of the Global South in global decision-making.
  - India advocates for the Agricultural subsidies necessary for the public distribution of food in WTO which is a major concern of the global south countries.
  - Permanent membership in the UNSC is dominated by the western developed countries. India advocates **membership reforms in the UNSC** to make it more representative to the country of the global south.

- **Maintaining economic ties with both blocs** through diversified trade and FTAs.
  - India signed a **Comprehensive Economic Partnership Agreement (CEPA) with UAE (2022)**, a key Global South economy, while simultaneously negotiating an **FTA with the European Union**, ensuring balanced trade relations with both blocs.
- **Sharing technology and development expertise** with both developed and developing nations.
  - **E.g.,** India exported **UPI (Unified Payments Interface)** technology to **France (Global North)** and **Sri Lanka & Mauritius (Global South)**, demonstrating its role as a tech provider for both.
- **Balancing strategic alliances (Quad, BRICS, NAM) without alienating any side.**
  - **E.g.,** While being part of the **Quad (aligned with US, Japan, Australia)**, India maintained **strong ties with Russia (BRICS partner)** by continuing oil imports while advocating for peaceful dialogue, showcasing its balanced diplomacy.
- **Developing platforms:** India established various platforms to act as a link between Global North and South. For example,
  - **International Solar Alliance(ISA):** It acts as a knowledge sharing platform between Global North and South countries for the global deployment of solar energy. Today, the ISA represents 120 signatories, including 102 fully ratified member countries, making it a vital global coalition in the renewable energy landscape.
  - **Coalition for Disaster Resilient Infrastructure (CDRI):** It is a multi-stakeholder global partnership to address the challenges of building resilience into infrastructure systems and development associated with it. The Coalition provides a forum for countries at all stages of development, to access knowledge and resources from other members to make their infrastructure resilient.
- **Development Partnership:** India's Development Partnership Administration (DPA) has greatly increased its development cooperation initiatives. In addition to adopting best practices from Global Northern partners in development, India exhibits leadership in South-South cooperation by lending developing countries lines of credit, sharing technical experience, and creating capacity.

## Challenges For India

- **Diverse Interests:** The Global South is a diverse region with varying economic, political, and social interests, making it difficult to align into a unified stance
- **China's Dominance:** India faces stiff competition from **China's Belt and Road Initiative (BRI)** in Africa and Asia. Many developing nations have deeper economic ties with China.
- **Diplomatic Balancing Act:** Balancing strategic partnerships with powers such as the USA and Russia while representing the Global South can be diplomatically challenging.
- **Lack of Dedicated Institutions for Global Development:** Unlike China's **AIIB** (Asian Infrastructure Investment Bank) or Western-led **World Bank**, India lacks a global development financing institution.
- **Short-term vs. Long-term Engagement:** India's initiatives like **Indian Technical and Economic Cooperation (ITEC) focus on short-term training**, but long-term partnerships for institutional capacity-building are lacking.

## Way Forward

- **Equitable Development Cooperation:** India needs to reinforce its call for an alternate paradigm of development cooperation that is not solely top-down.
  - India should be open to learning from other Global South countries to address its domestic challenges.
- **Human Resource Capacity Building:** India needs to focus on building human resources and capacity, especially to tackle future sustainability challenges.
- **Focus on Key Areas:** India should concentrate on digital infrastructure, climate and energy solutions, as well as water and food security.
- **Establishing Robust Systems**: India should establish norms, standards, and systems to work with partner countries and create its own robust domestic systems for international cooperation.
- **Promoting Inclusive Global Governance:** India should facilitate changes in established international institutions and build domestic capacity.

## India, France and AI

*Syllabus Mapping: GS-Paper 2, Bilateral Relations and Global Summits*

## Context

The Artificial Intelligence Action Summit was held in Paris, France, from 10 to 11 February 2025. The summit was co-chaired by French President Emmanuel Macron and Indian Prime Minister Narendra Modi.

## Aims of the AI Summit

*   **Built on Previous AI Summits**: Following the UK (Bletchley Park) and South Korea (Seoul), the Paris Summit aims to further AI governance and collaboration.

> **Previous AI summits**
>
> **AI Safety Summit, Bletchley Park, UK:** Bletchley Declaration was signed by 28 countries and the European Union at the AI Safety Summit in November, 2023.
>
> **AI Seoul Summit, South Korea:** The Seoul Declaration, signed by 10 countries and the EU in 2024, confirmed a shared understanding of the opportunities and risks posed by AI.

*   **Ensure Safe and Responsible AI**: Reinforcing principles of AI that are human-centric, trustworthy, and inclusive.
*   **Focus on Five Main Themes:**
    *   **Public Interest AI**: Using AI for societal benefits.
    *   **Future of Work** : Addressing AI's impact on jobs.
    *   **Innovation and Culture**: Encouraging AI-driven innovation.
    *   **Trust in AI**: Enhancing transparency and accountability.
    *   **Global AI Governance**: Coordinating efforts through UN, OECD, GPAI, G7, and G20.
*   **Promote AI for Global South**: Ensuring AI benefits are accessible to developing nations.
*   **Launch Concrete Initiatives**: Strengthening AI regulations, ethics, and inclusivity.

## India's priority in the AI summit:

*   **Problem of Bias:** AI reflects the data it is trained on, and without diverse representation, biases persist. Addressing this requires global cooperation, open datasets, and ethical AI frameworks.
*   **AI governance:** PM Modi called for a governance model that is:
    *   **Inclusive** – Addressing the needs of the Global South, where access to compute power, talent, and funding is limited.
    *   **Transparent** – Developing open-source systems and quality datasets to eliminate bias.
    *   **Trustworthy** – Tackling concerns around cybersecurity, disinformation, and deepfakes.
*   **Sustainable AI:** Beyond green energy Sustainable AI must also focus on:
    *   Optimized AI models that require less compute power
    *   Ethical data usage to prevent unnecessary resource strain
    *   Decentralized AI infrastructure to empower startups and researchers
*   **Skilling and Reskilling:** One of AI's biggest concerns is job displacement. However, it also creates new opportunities, requiring urgent investment in skilling and re-skilling**.**

> **India's AI Leadership: Public-Private Collaboration**
>
> "We have built a Digital Public Infrastructure for 1.4 billion people at a very low cost." – PM Modi
>
> India's AI strategy is built on inclusivity, accessibility, and affordability. Some key initiatives include:
>
> *   **India's National AI Mission** – Driving responsible AI innovation
> *   **Public-Private AI partnerships** – Providing compute power to startups at affordable costs
> *   **A unique Large Language Model (LLM)** – Tailored to India's linguistic diversity
> *   **IndiaAI Mission:** It isa step towards building India's AI ecosystem that includes building AI computing infrastructure, Startup Financing mechanism, IndiaAI Datasets Platform etc
>
> With one of the world's largest AI talent pools, India is positioned as a global AI hub.

## Reasons Behind Inviting India as Co-Chair in the AI Summit

- **Recognition of India's Growing AI Leadership:** India is emerging as a major player in AI and digital technology, with initiatives like the **IndiaAI Mission and National AI Strategy.**
  - As a **founding member** and **2024 lead chair of the Global Partnership on AI (GPAI)**, India has been actively shaping global AI governance.
- **India's Strategic Partnership with France:** India and France share a strong strategic, technological, and diplomatic partnership across defence, climate, space, and emerging technologies.
  - They have co-launched global initiatives like the International Solar Alliance (ISA) and the Coalition for Disaster Resilient Infrastructure (CDRI).
- **Balancing Global AI Power Dynamics:** The global AI landscape is dominated by the US and China, creating a need for a neutral, democratic, and inclusive AI governance model.
  - India, with its democratic values and digital inclusivity approach, offers an alternative AI development model that resonates with both the Global South and Global North.
- **India's Focus on AI for the Global South:** India advocates for democratizing AI and bridging the AI divide between developed and developing nations.

## Outcome of the Summit:

- **58 countries,** including **India, China, Brazil, France, Australia and the European Commission,** signed a joint statement on **"Inclusive and Sustainable Artificial Intelligence for People and the Planet." U.S. and U.K. did not sign the joint statement.**
  - The statement emphasizes AI accessibility, trust, safety, and development without market concentration.
- **Public Interest AI Platform and Incubator:** It was launched to support, amplify, decrease fragmentation between existing public and private initiatives on Public Interest AI and address digital divides.
  - **India, Kenya, Germany, Chile, Finland, Slovenia, France, Nigeria and Morocco** launched a **Public Interest AI Platform and Incubator.**
  - Key focus areas include technical assistance, capacity-building, data, transparency, auditing, computing, talent development and financing.
- **Institution:** Formation of the AI Foundation and the Council for Sustainable AImarked a new chapter in AI governance.

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**India-France Ties**

**Economic & Trade Relations**

- **India-France CEOs' Forum:** Enhancing business ties in key sectors like energy, manufacturing, and technology.
- **Supply Chain Resilience:** Strengthening Indo-Pacific trade connectivity and reducing dependence on China.
- **Key Areas of Collaboration:**
  - **Renewable Energy** (solar & nuclear).
  - **Critical Minerals** (for batteries & electronics).
  - **Pharmaceuticals & Healthcare** (joint R&D).
  - **Advanced Manufacturing & Startups** (innovation ecosystem).

**Strategic & Defence Cooperation**

- **Defence Partnership:** Annual **Defence Dialogue** (Defence Minister level) and **High Committee on Defence Cooperation** (Secretary level) to review collaboration.
- **Key Defence Deals & Projects:**
  - **Rafale Jets:** India has already procured 36 Rafale fighter jets from France, with ongoing discussions for **26 Rafale-M fighter jets** for the Indian Navy.
  - **P-75 Scorpene Project:** India is procuring **three additional Scorpene-class submarines** for the Navy.
  - **Joint Development of Fighter Jet Engines:** Collaboration on developing next-generation engines for fighter planes.
  - **DRDO Office in Paris:** Established in 2023 to enhance technology cooperation.

**Technology & Innovation Cooperation**

- **AI & Digital Technology:** France supports India's **IndiaAI Mission** and digital transformation initiatives.
- **India-France Innovation Year 2026:** To promote joint research and innovation in emerging technologies.

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- **Cybersecurity Collaboration:** Strengthening cooperation in data protection and AI governance.

**Space & Nuclear Energy Cooperation**

- **Space Collaboration:** ISRO and CNES (French Space Agency) work on space exploration and satellite technology.
- **Nuclear Energy:**
  - **Civil Nuclear Agreement:** Collaboration on peaceful nuclear technology for India's energy security.
  - **International Thermonuclear Experimental Reactor (ITER):** India is actively participating in the world's largest fusion energy project in France.

**People-to-People & Diplomatic Engagement**

- **New Indian Consulate in Marseille:** Strengthening diplomatic presence and services for the Indian diaspora.
- **Higher Education & Research:** Expanding student exchange programs and university collaborations.
- **Marseille as a Communication Hub:**
  - Marseille is a key global node for **undersea internet cables**, linking Europe with Asia and Africa.
  - India and France are exploring **digital infrastructure cooperation** in this domain.

**Indo-Pacific & Global Cooperation**

- **India-France Triangular Development Cooperation:** A new initiative to implement **climate & SDG-focused projects** in third countries in the **Indo-Pacific region**.
- **Climate Action & Sustainability:**
  - **International Solar Alliance (ISA):** Launched in 2015 by India and France to promote solar energy globally.
  - **Coalition for Disaster Resilient Infrastructure (CDRI):** Joint efforts in climate-resilient infrastructure.
- **Maritime Security:** Joint naval exercises and strategic cooperation in the Indo-Pacific region.

## China's weaponisation of e-supply chains

*Syllabus Mapping: GS-Paper 2, India's Neighbourhood*

### Context

China has restricted the travel of its engineers and technicians working in Foxconn's facilities in India. Additionally, China has imposed curbs on the export of critical, specialized manufacturing equipment over which it has a monopoly. These measures aim to disrupt India's manufacturing sector, particularly its electronics industry, by limiting knowledge transfer and halting the supply of crucial machinery.

### China's dominance over the Supply Chain:

- **Manufacturing Hub:** China has become a major global manufacturing hub, producing a vast array of products across various industries, making it a central point for sourcing components and finished goods.
  - For example, China account for 32-33% of global manufacturing Thus it is logical that several supply chains will have to go through China.
- **Dominance over Minerals:** China dominates global mineral refining, processing 68 percent of nickel, 40 percent of copper, 59 percent of lithium, and 73 percent of cobalt. It leads in producing 20 critical minerals, accounting for 60 percent of global production and 85 percent of rare earth processing.
- **Dominance over Technology and innovation industries:** China's investment in in R&D have made it a mainstay manufacturing center in numerous technologies and industries. Some companies in these sectors may find it difficult to move supply chains out of China in the short term.
- **Dominance over the electronic industry:** China is a global leader in electronics manufacturing. For example, Chinese firms has grown their market share in the LCD market dramatically, from 13 percent in 2016 to 45 percent in 2023.
- **China Expertise:** Chinese manufacturers have developed expertise across domains and strong logistics systems to support international transactions. As a result, many companies relocated their manufacturing to China during the 1990s and 2000s.

**China plus one Strategy**

The China Plus One strategy is a business strategy that encourages companies to diversify their manufacturing and sourcing away from China. It's also known as Plus One or C+1.

**Why China plus one strategy is in focus:**

- **Over- reliance on China:** Western businesses have heavily invested in China due to its low labour and manufacturing costs. However, this has led to an over-reliance on China for their business interests.
- **Geopolitical Risks:** Over reliance on China may cause the disruption the global supply chain in case of geopolitical tensions like war
- **Trade war:** Trump anti- China strategy has fueled the trade war which raised uncertainty in the markets.
- **Decline in cost advantage:** Rising labour costs in China due to its economic development and structural reforms, led to a decline in China's cost advantage.
- **Political unrest in China:** Political unrest in China, including issues such as Hong Kong's independence movement, anti-Japanese protests, and skirmishes in the South China Sea, has also contributed to the formation of the "China Plus One" strategy.

**Case Study: Apple-Foxconn in India**

Apple Inc. leading tech giant in an attempt to minimise its reliance on China is slowly shifting its device assembly processes to factories in India and Vietnam. Both India and Vietnam seem to be becoming important parties in the global value chain.

- **Expansion in India:** Apple and its contract manufacturers (Foxconn, Pegatron, Tata Electronics) have significantly expanded their presence in India.
  - Foxconn's facility in Tamil Nadu and Tata Electronics' plant in Karnataka are assembling iPhone models.
- **Production Milestones:** In FY 2023-24, Apple assembled iPhones worth $14 billion in India.
  - For the first time, iPhone 16 Pro models were assembled by Foxconn in India in 2024.
- **Government Support:** State governments in South India have prioritized Apple-Foxconn investments.
  - The Indian government conferred the **Padma Bhushan** on Young Liu, Chairman of Foxconn, in 2024, highlighting the company's strategic importance.

## Challenges due to China's restriction

- It will act against the benefit that India can drive from China plus one strategy.
- It will pose a challenge to the Atmanirbhar Bharat and Make in India Scheme.
- It will impose restrictions on India becoming the final assembly hub and becoming the full-fledged manufacturing ecosystem.
- China's restrictions on skilled labor and critical equipment supply pose serious challenges.
- China restrict also have wide consequence on the infrastructure development

## Way forward to Counter China's Actions

- **Engaging Apple & Foxconn for Negotiations:** Since both companies have stakes in India and China, they can negotiate with Beijing to ease restrictions.
- **Strengthening Domestic Supply Chains:** Incentivizing local manufacturers to produce specialized machinery and components.
  - Developing a robust domestic contract manufacturing network.
- **Expanding Technological Self-Reliance:** Encouraging private capital to invest in R&D for electronic components.
  - Promoting semiconductor and chip manufacturing under the India Semiconductor Mission.
- **Diversification of Supply Chains:** Strengthening trade partnerships with alternative supplier nations like Taiwan, Japan, South Korea, and the U.S.
- **Reducing Dependence on China:** Encouraging Indian firms to enter high-end electronics manufacturing.
  - Promoting joint ventures with non-Chinese foreign players.
- **Enhancing Infrastructure & Policy Support:** Speeding up the creation of electronics manufacturing clusters.
  - Providing tax incentives and subsidies to attract high-tech investments.

**India's Steps to Boost Electronics Manufacturing**

- **Production-Linked Incentive (PLI) Scheme:** First launched in 2020 for the electronics industry.
  - Increased budget allocation from ₹6,125 crore ($0.70 billion) in 2024 to ₹8,885 crore ($1.02 billion) in 2025.
  - Apple's contract manufacturers in India received ₹6,600 crore ($0.76 billion) over the past three years.
- **Custom Duty Reduction:** Union Budget 2025 removed basic custom duties on mobile phone components like:
  - Printed circuit boards
  - Camera modules
  - Connectors and sensors
  - Machinery for lithium-ion battery manufacturing
- **National Manufacturing Mission:** Announced in the Union Budget to support small, medium, and large industries.
  - Aims to develop industrial clusters and promote technological knowledge-sharing.
- **Skill Development Initiatives:** On-site training programs to ensure tacit knowledge transfer in electronics manufacturing.
  - Plans to integrate industry-specific specialization in skill development programs.

## India-Qatar Relations

*Syllabus Mapping: GS-Paper 2, Bilateral Relations*

## Context

India and Qatar elevated their bilateral ties to a strategic partnership, during the state visit of Amir of Qatar.



**Timeline of India-Qatar Relations**

**Emir of Qatar's First Official Visit to India**
- Strengthening bilateral trade and political relations.

**LNG Supply Agreement Signed**
- Qatar signs a 25-year LNG supply deal with India (7.5 million metric tonnes per annum).
- Qatar becomes India's largest LNG supplier.

**Release of Indian Navy Veterans**
- Diplomatic efforts lead to release of seven out of eight detained ex-Navy officers.

1973 — 1981 — 1999 — 2012 — 2015 — 2023 — 2024

**Establishment of Diplomatic Relations**
- Formal diplomatic ties established.
- Indian Embassy opened in Doha & Qatari Embassy in New Delhi.

**Agreement on Defence Cooperation**
- First formal defense agreement between India and Qatar.

**PM Modi's Visit to Qatar**
- Strengthening of economic ties and investments.
- Major focus on counterterrorism and security partnership.

**Elevation to a 'Strategic Partnership'**
- PM Modi and Emir Sheikh Tamim bin Hamad Al Thani upgrade relations to Strategic Partnership.
- Focus on trade, investment, energy and security cooperation.

## Areas of Cooperation Between India and Qatar & Key Developments

- **Trade & Economic Cooperation:**
  - **Bilateral Trade Growth:** Current Trade Volume (2024): USD 14 billion.
    - **Target (2030): USD 28 billion** (doubling in 5 years).
    - **Major Exports from India:** Machinery, food products, automobiles, electronics.
    - **Major Imports from Qatar:** Liquefied Natural Gas (LNG), petrochemicals, fertilizers, plastics.

- **Institutional Mechanism:** Joint Working Group on Trade and Commerce will be elevated to a Joint Commission on Trade and Commerce to review and monitor the entire spectrum of economic ties between the two countries.
    - **Collaboration between Industries:** first meeting of the Joint Business Council was held on 13 February 2025.
  - **Foreign Direct Investment (FDI):**
    - **Qatar Investment Authority (QIA):** It has invested **USD 1.5 billion** in India in sectors such as Retail, power, IT, education, health, affordable housing. QIA will pen office in India.
    - **New Investment Commitment: USD 10 billion** (announced in Feb 2025) in **infrastructure, ports, ship-building, smart cities, renewable energy, AI and robotics.**
    - **Revised Double Taxation Avoidance Agreement** has been signed between two. Both also agreed to expedite negotiations on the **India-Qatar Bilateral Investment Treaty.**
  - **Free Trade Agreement (FTA) Discussions:**
    - **Currently** India-GCC FTA Negotiations are in progress, also India-Qatar FTA is also being explored.
    - **Expected Benefits:** Tariff reduction, increased market access, improved investment climate.
- **Energy Cooperation:**
  - **Natural Gas Supply:** Qatar supplies over 40% of India's LNG needs.
    - India is **Qatar's third-largest export destination for LNG.**
    - **E.g.** Petronet LNG Ltd. has secured a long-term agreement with QatarEnergy for the supply of 7.5 MT per annum of LNG to India, from 2028 to 2048.
- **Labor & Diaspora Cooperation:**
  - **Indian Community in Qatar:** Over 800,000 Indian workers contribute to Qatar's economy. Qatar has acknowledged their role in national development.
  - **E.g.** Indian workers were a significant part of Qatar's FIFA 2022 World Cup construction projects.
  - **Key Developments:**
    - MoU signed for labor rights & improved working conditions.
    - Better healthcare & insurance policies for Indian workers.
    - Regular India-Qatar labor dialogue for fair wages & employment opportunities.
- **Investment in Technology & Digital Innovation:**
  - **Artificial Intelligence (AI) & Robotics:** QIA has invested $ 10 billion investment in AI, machine learning and robotics in India.
  - **Potential Collaborations:** AI-powered fintech solutions – Qatar can integrate Indian UPI and digital payments.
    - Qatar National Bank (QNB) - National Payments Corporation of India (NPCI) signed partnership to enhance digital payments through QR Code-based UPI transactions.
  - **Smart Cities & Digital Infrastructure:** Qatar to invest in India's Smart City Mission.
- **Defense & Security Cooperation:** India & Qatar share strong defense and security ties.
  - **E.g.** INS Kolkata participated in Doha International Maritime Defence Exhibition (DIMDEX).
  - **Key Developments:**
    - Agreement to combat **terrorism, cybercrime, money laundering, drug trafficking.**
    - Formation of **Joint Committee on Security & Law Enforcement.**
    - **Maritime Security:** Qatar is exploring Indian naval cooperation.
    - **Cybersecurity Cooperation:** Focus on preventing use of cyberspace for **radicalization and terrorism.**
- **Cultural & Educational Collaboration:**
  - **Education & Research Exchange:** Collaboration between Indian and Qatari universities in research & skill development. Increase in scholarships for Indian students in Qatar.
    - **E.g.** Qatar Foundation & IIT Delhi exploring joint AI research.
  - **Sports & Youth Affairs:** MoU signed on youth and sports development. Indian sports management firms collaborating with Qatari institutions.
    - **E.g.** Qatar's Aspire Academy to train Indian football coaches & athletes.

**Geopolitical & Strategic Cooperation**

- Qatar is a key player in Gulf & Middle Eastern diplomacy.
- India & Qatar cooperate on **regional security, counter-terrorism, and cyber threats.**
- Qatar's Geopolitical influence in Iran-Saudi relations, Israel-Palestine peace process and its proximity with Taliban will **help in creating diplomatic leverage for India.**
- **Support to multilateral reform:** India and Qatar emphasized the importance of a reformed and effective multilateral system, centered on a UN reflective of contemporary realities
- **Significance for India:**
  - Ensures India's **strategic interests in the Middle East**.
  - Facilitates **energy security & trade routes through the Gulf.**
  - Provides **support in international negotiations** on security issues.

## Challenges in India-Qatar Relations

- **Energy Dependence & Supply Volatility:**
  - India heavily relies on Qatar for LNG, Geopolitical disruptions or price fluctuations can impact India's energy security.
- **Labor and Migrant Worker Issues:**
  - **Indian workers** living in Qatar face periodic concerns over **labor rights, wages and working conditions**. Reforms in Qatar's labor laws have helped, but enforcement remains a challenge.
- **Geopolitical Balancing Act:**
  - India must carefully balance ties with **Qatar**, given Qatar's complex relations with Gulf neighbors.
- **Investment Barriers & Trade Deficit:**
  - While Qatar has pledged **$10 billion investment in India**, bureaucratic hurdles and regulatory concerns **delay FDI flow**.
  - India imports more from Qatar (**LNG, petrochemicals**) than it exports, leading to a **trade imbalance**.
- **Security & Terrorism Concerns:**
  - **Terror financing and radicalization concerns** remain key issues in India's engagement with Gulf nations, including Qatar.
- **Defense & Strategic Cooperation Limitations:**
  - Unlike Saudi Arabia and UAE, **Qatar's defense ties with India are still developing**.
  - Limited defense exercises and security agreements restrict deeper **military engagement**.

## Way Forward

- **Expanding Bilateral Trade & Investment:**
  - Implement the **$10 billion Qatari investment** commitment in **infrastructure, energy, and technology** sectors to strengthen economic ties.
- **Enhancing Energy Security:**
  - Deepen LNG cooperation with long-term contracts beyond the 7.5 MTPA LNG deal to ensure stable and affordable energy supply.
- **Strengthening Defense & Security Cooperation:**
  - Increase joint military exercises, intelligence sharing, and cybersecurity collaboration to counter regional threats and terrorism.
- **Expanding Horizons in Space Cooperation:**
  - ISRO (Indian Space Research Organisation) can engage with **QASA (Qatar Aeronautics and Space Agency)** for bilateral collaboration in space exploration.
- **Promoting People-to-People Ties:**
  - Ensure better rights and welfare protections for the 800,000+ Indian expatriates working in Qatar through labor agreements and social security frameworks.
  - On the lines of **UAE (BAPS temple) India can collaborate in the field of tourism with Qatar.**
- **Advancing Regional & Strategic Cooperation:**
  - Collaborate on Middle East diplomacy, including Iran-Saudi relations, Israel-Palestine peace efforts and Afghanistan stability, to safeguard mutual interests.

## Indian Diaspora in the US

*Syllabus Mapping: GS-Paper 2, Indian Diaspora*

### Context

Many Indians seek legal entry into countries like the U.S., while others may enter illegally due to limited opportunities for legal migration.

### Reason for Indians entering the US illegally:

- **Lack of Economic Opportunities**
  - **Unemployment & Underemployment:** Despite economic growth, **many Indians, especially in rural areas, struggle to find stable jobs** with decent wages.
  - **Even Developed States Face Job Shortages:** Illegal migrants often come from **economically advanced states like Gujarat and Punjab**, where **lack of high-paying jobs** pushes people to seek opportunities abroad.
  - **Labour Exploitation:** Absence of strict labor laws and fixed working hours, especially for low-skilled jobs like truck driving, leaves many workers vulnerable.
  - **Underpayment:** Underpaid employment is a major concern in India reflecting monopsony—where too many job seekers chase too few opportunities, allowing employers to exploit workers easily.
- **Better Income Prospects Abroad**
  - **Higher Wages in Developed Countries:** Even low-skilled jobs in countries like the **US, Canada, and UK** pay significantly **higher salaries** than many professional jobs in India.
  - **Aspiration for Financial Stability:** Many illegal migrants hope to **remit money back home** and improve their family's financial situation.
- **Social & Peer Pressure**
  - **Established Migrant Networks:** Communities in Punjab and Gujarat have **large overseas populations**, making migration a **social norm**.
  - **Family & Peer Expectations:** Success stories of relatives abroad create **pressure to migrate**, often leading people to take **illegal routes** if legal options are unavailable.
- **Perception of a Better Life in the West**
  - **The "First World Dream":** Many believe that countries like the **US, Canada, and Europe** offer **a better quality of life, education, healthcare, and security**.
  - **Influence of Social Media & Films:** Western lifestyles, showcased in **movies, social media, and news**, make migration **more desirable**.
- **Legal Migration Barriers & High Costs**
  - **Stringent Visa Rules:** Many Indians **fail to qualify for skilled worker visas**, forcing them to take **illegal routes**.
  - **High Costs of Legal Migration:** Student and work visas require **significant financial investment**, which many **cannot afford**.
  - **Illusion of Luxury:** Illegal immigration is also fueled by human traffickers and "fly-by-night" travel agents who promise easy entry to the U.S. for a hefty fee. Many youth fall prey to these schemes, believing in the illusion of a luxurious life abroad, only to face harsh realities.

**India Diaspora in America**

More than 2.9 million Indian immigrants lived in the United States as of 2023, making the country the second most popular global destination for Indians after the United Arab Emirates. It is approximately 1.6 % of the USA population.

**Contribution in the Economy**

- In USA, Indian community enjoys distinction of being the highest earning, best educated and fastest growing ethnic groups, and that too in the most powerful country in the world.
- Their high levels of literacy, economic success, knowledge of English and experience with democracy in their home country has eased their transition in the land of their adoption.

- Indian Americans are found in the following high-profile occupations and sectors - medicine, engineering, law, information technology, international finance, management, higher education, mainstream and ethnic journalism, writing, films and music.
  - 34% of Microsoft employees in US are of Indian origin
  - 12% scientists in USA are Indians.
  - 13% of XEROX employees are Indians.
  - 36% of NASA scientist in US are Indians
  - 28% of IBM employees are of Indian origin
  - 38% of doctors in USA are Indians
  - 17% of INTEL scientists are Indians.
- They also work in real estate, retailing and agriculture and as taxi operators, factory workers and newsstand workers. The Indo-American community in the US reflects the diversity of India.
- Several Indian IT graduates have emerged as important entrepreneurs in Silicon Valley.
- India is today one of the few developing countries which has attracted investment not in one, but scores of R & D centers funded and established by reputed MNCs like GE, CISCO, Sun Microsystems, Microsoft, IBM, Hughes Software, Intel, Oracle, Lucent Technologies, Microsoft Sun Microsystems.

**Contribution in the politics:**

- The Indian Diaspora in the U.S. is contributing in reconstructing the relation between the two countries. India recognizes the emergence of Indian-Americans as an eminent community based on following two reasons:

1. Indian Americans have surfaced as a significant vote bank in US electoral politics.

2. Secondly, the Indian-Americans are immensely educated and wealthy. With increase in population and share in economic power, the focus of the Indian American's lobby has inclined towards the concerns of India.

- Indian American community has become important for US politics reflected in focus on this community under Howdy Modi & Namaste Trump events. Various Indian played an important role in the politics of USA as follows:

1. Ex-Vice president Kamala Harris has Indian roots.

2. Other prominent leaders include - Nikki Haley and Piyush Bobby Jindal

3. Around 1.8 million Indian origin people are eligible voters.

4. Although the Indian electorate is limited is played crucial role in the swing states focused by both the democrats and the republicans.

**Contribution of the Diaspora in the India-US relationship:**

- **Importance in the foreign policy:** Diaspora is the unofficial ambassador of India abroad. It plays an important role in furthering the foreign policy goal of India.
  - **For example,** Indian-Americans played an important role in the Indo-US civil nuclear.
- **Cultural Influence and Soft Power:** Bollywood, yoga, Indian cuisine, and festivals like Diwali have gained popularity in the US, fostering cultural exchange.
  - Indian-Americans enhance India's global image and diplomatic influence.
- **Political and Strategic Influence:** Increasing political representation (e.g., Kamala Harris, Nikki Haley, and several US Congress members of Indian origin) helps strengthen India-US relations.
  - Lobbying efforts by Indian-American groups have influenced favorable US policies toward India.
- **Global Advocacy**: Indian-origin communities act as advocates for India's interests in global forums, influencing public opinion and policies.

## Impact of Indian Diaspora on India

**Positive impacts:**

- **Remittances and Knowledge Transfer:** Indian diaspora sends billions of dollars in remittances back home, supporting families and economic growth.
  - Professionals contribute through research collaborations, skill-sharing, and investments in India's startup ecosystem.
- **Philanthropic Contributions**: They support social and developmental projects in India through charity and funding for educational, health, and infrastructure initiatives.

**Negative Impacts**

- **Brain Drain from India:** Skilled professionals leaving India for better opportunities in the US weakens India's workforce and slows domestic innovation.
  - Sectors like healthcare and academia in India face shortages due to the migration of top talent.

- **Struggles of Low-Skilled Migrants:** Many Indian migrants working in low-wage jobs face exploitation, poor living conditions, and legal uncertainties.
  - Illegal migrants risk deportation and social discrimination.
- **Racial Discrimination and Xenophobia:** Despite their success, Indian-Americans face racism, hate crimes, and workplace discrimination.
  - Policies like visa restrictions (H-1B) have created uncertainty for Indian professionals.
- **US-India Trade Imbalance and Policy Conflicts:** Some Indian professionals contribute more to the US economy than they would in India, leading to economic imbalances.
  - The US government's changing immigration policies (e.g., "America First") often impact Indian workers negatively.
- **Divisions within the Indian-American Community:** Political and ideological divisions within the Indian diaspora sometimes lead to friction in shaping a unified voice in US policymaking.
  - Internal conflicts over religious, caste, and regional identities can affect collective representation.

## Conclusion

While the Indian diaspora has played a vital role in strengthening US-India relations and boosting the American economy, challenges like brain drain, discrimination, and immigration restrictions persist. A balanced approach is needed to maximize benefits for both countries.

## U.S.-India defence ties

*Syllabus Mapping: GS-Paper 2, Defence ties, Bilateral Relations and Great Powers*

## Context

Prime Minister Narendra Modi's visit to the United States was marked by significant advancements in U.S.-India defence cooperation.

## Major Defense Agreements and Initiatives

- **Defence Acquisitions & Co-production:** India is proceeding with the **purchase and co-production** of the **Javelin Anti-Tank Guided Missile (ATGM)** and **Stryker Infantry Combat Vehicles (ICVs)**, boosting domestic manufacturing.
  - Agreement to **acquire six more P-8I maritime patrol aircraft** to enhance India's **Maritime Domain Awareness (MDA)**.
- **New 10-Year Defence Framework:** India and the U.S. will sign a **10-year Framework for the U.S.-India Major Defense Partnership**, ensuring long-term cooperation.
- **Autonomous Systems Industry Alliance (ASIA):** This is an initiative for **Underwater Domain Awareness (UDA).**
- **Future Possibilities:**
  - Potential collaboration on **undersea systems and fifth-generation fighter aircraft**.
  - Accelerated engagement in **space, air defence, and anti-tank missiles**.
- **Regulatory Reforms in Defence Trade:**
  - India and the U.S. will review **arms transfer regulations including the International Traffic in Arms Regulations (ITAR)** for smoother defence trade.
  - Negotiations for a **Reciprocal Defence Procurement (RDP) agreement**, aligning acquisition mechanisms and fostering mutual defence supply.

**Defence Partnership between India and USA**

Indo-US Defence cooperation started after the collapse of erstwhile USSR and the end of cold war.

**Timeline:**

| | |
|---|---|
| **1991** | US Army chief Claude Kicklighter visited India and presented the famous Kicklighter proposals. |
| **1992** | Malabar naval exercises began between two countries |
| **1995** | Agreed minutes for expansion of defence cooperation between US and Indian defence departments and service-to-service military exchanges were undertaken |
| **2002** | General Security of Military Information Agreement (GSOMIA) as First foundational agreement was signed |
| **2005** | A 10-year framework for Indo-US defence partnership was finalised including the provision of defence trade between two countries. |
| **2010** | Indo-US counter-terrorism cooperation initiative was launched with focus areas like capacity building, mega city policing, cyber security and so forth. |
| **2012** | Defence Trade and Technology Initiative was established |
| **2013** | Joint principles for Defence cooperation were agreed to ensure technology transfer and defence trade. |
| **2015** | 10-year framework for Indo-US defence partnership was renewed. |
| **2016** | LEMOA was Signed and The US designated India as a Major Defence Partner. |
| **2017** | India was given STA-1 (Strategic Trade Authorisation) status by the USA |
| **2018** | Communications Compatibility and Security Agreement (COMCASA) was signed |
| **2019** | Industrial Security Annex (ISA) was signed |
| **2020** | BECA (Basic Exchange Cooperation Agreement) was signed |
| **2025** | Negotiation begins for a new 10-year Framework for the U.S.-India Major Defense Partnership. |

**Defense Trade and Technology Initiative**
- It was launched in 2012 with an intent to help eliminate bureaucratic obstacles and accelerate timelines and promote collaborative technology exchange and strengthening cooperative research

**STA-1 status to India**
- To give India licence free access to almost 90% of dual-use technology and are eligible to import items that are controlled for reasons of national security, chemical or biological weapons etc.

**Industrial Security Annex (ISA)**
- Signed by India and USA in 2019
- ISA is a part of the General Security of Military Information Agreement (GSOMIA), which India signed with the U.S. in 2002.
- It enable smooth transfer of classified technology and information between private entities of the U.S. and India.

**Security of Supply Arrangement (SOSA)**
- In August 2024, the U.S. Department of Defense (DoD) and Indian Ministry of Defence (MoD) signed SOSA
- It would allow both the countries to request each other for priority delivery of certain defense items.

**Defense industrial cooperation**
- India-US Defence Industrial Cooperation Roadmap provided the roadmap for industrial cooperation.
- India-US Defense Acceleration Ecosystem (INDUS X): third edition of the INDUS-X Summit mark a progress in the advancement of a joint defence innovation ecosystem in India concluded in September 2024.
  - MoU was signed between iDEX and the Defence Innovation Unit (DIU) under the US Department of Defence, to increase co-operation in defence innovation and deepen collaboration

## Hurdles in the Defence Partnership

- **Lack of Clarity on Jet Engine Transfers:** No mention of urgent delivery of **GE F-404 engines** for Tejas-Mark 1A fighter aircraft.
  - Uncertainty over **80% Transfer of Technology (ToT)** for **GE F-414 engine** to power Tejas Mark-II.
- **Challenges with F-35 Fighter Jet Offer**
  - **High integration costs** due to India's diverse aircraft fleet.

- – **Potential restrictions** on operational use by the U.S.
- – **Absence of co-production or ToT** for F-35 jets.
- **Indian Air Force's Fighter Jet Shortage**
  - – IAF's fighter squadrons may fall **below 30**, requiring urgent induction of new jets.
  - – **Medium Multi-Role Combat Aircraft (MMRCA) project** for 114 fighters still unresolved.
- **US reservation about exporting its technology:** due to restrictive US export laws like International Traffic in Arms Regulations (ITAR). Agreements like the Defence Trade and Technology Initiative (DTTI) aim to enhance cooperation, but full tech access is rare.
- **Countering China:** US defence cooperation is more aligned with the countering China in the Indo-Pacific.
- **Expensive and lack of customization:** US offers cutting-edge but high-cost equipment which is less flexible in terms of customization. On the other hand Russian equipment is more cost-effective and adaptable to Indian needs. Payment terms are flexible.
- **US national restrictions on exports of defence and dual-use technologies:** Regulated through International Traffic in Arms Regulations (ITAR) and Export Administration Regulations (EAR).

## Way Forward:

- US may also become a **partner in India's Make in India programme** in the defence sector to enhance domestic capabilities of India's defence private sector.
- For defence industrial cooperation, Reciprocal Defense Procurement (RDP) agreement will be the next logial step after SOSA.
  - – RDP would open up the defense industrial base to Indian entities since it would automatically make India a "qualifying country" under the Defense Federal Acquisition Regulation Supplement, a set of cybersecurity standards that the DoD suppliers have to adhere to.
  - – Thus, It would open up the US market to Indian original equipment manufacturers and suppliers.
- **Co-production of F-35:** Instead of straight forward sale, co-production will enable technology transfer and customisation of the fighterjet to suit the Indian defence requirements.
- **Joint defence innovation ecosystem:** Building on successful U.S.-Indian defense technology partnerships like the Initiative on Critical and Emerging Technology and the India-U.S. Defense Accelerator Ecosystem can deepen defense trade and build a joint defense innovation ecosystem.
- **Reform in procurement process:** India needs to reform its procurement process, fix its inverted tariff structure, and support Indian private sector partnerships with the U.S. defense industry for rapid scaling of capabilities.

## Conclusion

The recent India-U.S. defence deals mark a significant step in strengthening bilateral security ties, focusing on **co-production, advanced technologies, and strategic cooperation**. However, key challenges remain, particularly in **fighter aircraft procurement, technology transfer, and operational independence**. Overcoming these hurdles will require both nations to **streamline regulatory processes, ensure timely deliveries, and address India's defence capability gaps** to achieve a truly robust and self-reliant military partnership.

## India And EU

*Syllabus Mapping:GS-Paper 2: Bilateral Relations and Great Powers*

## Context

Recently, the European Commission led by President Ursula von der Leyen visited New Delhi.

## Areas Of Cooperation

- **Historical Ties**
  - – Diplomatic relations established in 1962 with the European Economic Community.
  - – Upgraded to a Strategic Partnership in 2004 at the 5th India-EU Summit.

- **Institutional Cooperation**
  - 15 India-EU Summits held so far, first in 2000 (Lisbon).
  - India-EU Strategic Partnership: Roadmap to 2025 adopted in 2020.
  - India-EU Trade and Technology Council (TTC) established in 2022, focusing on trade, technology, and security.
- **Trade & Investments**
  - EU is India's largest trading partner in goods.
  - **Bilateral trade (FY 2023-24):**
    - **Goods**: $135 billion (Exports: $76B, Imports: $59B).
    - **Services**: $53 billion (Exports: $30B, Imports: $23B).
  - **EU FDI in India (April 2000 - Sept 2024)**: $117.4 billion (16.6% of total FDI).
  - **Indian FDI in the EU**: $40.04 billion (April 2000 - March 2024).
  - Ongoing Free Trade Agreement (FTA) negotiations.
- **Technology Cooperation**

The India-EU S&T Cooperation is guided by principle of parity, symmetry, sharing of IPRs, co-investment of resources including funds. India-EU Science & Technology Cooperation is steered by India-EU Science and Technology Ministers and India-EU Joint S&T Steering Committee.

  - Science & Technology Cooperation Agreement (2007).
  - India-EU Intent of Cooperation in High-Performance Computing (HPC) (2022).
  - Semiconductor R&D MoU signed in 2023.
  - EU participation in the Global Partnership on AI Summit (2023).
- **Green Energy Collaboration**
  - India-EU Green Hydrogen Cooperation Initiative.
  - India was the exclusive partner at the European Hydrogen Week (2024).
  - European Investment Bank pledged €1 billion for India's hydrogen projects.
- **People-to-People Ties**
  - 20% of EU Blue Cards (2023-24) issued to Indian professionals.
  - 6,000+ Erasmus scholarships awarded to Indian students in 20 years.
  - 2,700+ Indian researchers funded under Marie Sklodowska-Curie Actions.
- **Defence & Security**
  - Maritime security cooperation under ESIWA+ programme.
  - First joint naval exercise (2023) in the Gulf of Guinea.
  - Collaboration on global security, piracy, counterterrorism, and disaster relief.
- **Space Cooperation**
  - ISRO launched EU's PROBA-3 mission (Dec 2024).
  - ISRO-ESA cooperation in Chandrayaan-3 and Aditya-L1 missions.
  - Signed MoU for Gaganyaan mission cooperation.

## Challenges in India-EU Relations

- **Carbon Border Adjustment Mechanism (CBAM)**: The EU's carbon tax on imports from high-emission industries (like steel) has raised concerns for India, which views it **as a trade barrier.**
  - This could **impact 0.05% of India's GDP** (Centre for Science and Environment).
- **General Data Protection Regulation (GDPR):** India's data protection laws differ significantly from the EU's stringent GDPR framework, affecting cross-border data flows.
  - India's demand for data localization and digital sovereignty has created friction with the EU's open internet policies.
- **Prolonged FTA Negotiations**: Differences on digital regulations, bilateral investment treaties, dispute resolution mechanisms, and investor protection have delayed the Free Trade Agreement (FTA).
  - The **Bilateral Trade and Investment Agreement (BTIA)** negotiations (2007-2013) remained dormant until 2021.

- **Divergences in Geopolitical Perspectives:**
  - **Ukraine Conflict:** The EU has strongly opposed Russia's invasion of Ukraine, while India has maintained a neutral stance due to its energy and defense ties with Russia. This divergence affects strategic trust.
  - **China Policy Differences:** While both India and the EU view China's rise with caution, the EU's economic engagement with China remains significant, creating a strategic gap in Indo-Pacific cooperation.
- **Defense and Security Cooperation Limits:** Unlike India's deep defense ties with the US, France, and Russia, EU-India defense cooperation remains underdeveloped due to the EU's decentralized defense policies.
  - **Maritime Security Gaps:** While the EU has increased its presence in the Indo-Pacific, it lacks a unified defense policy, making security cooperation with India less effective.
- **Visa and Mobility Restrictions:** The EU's restrictive visa policies for Indian professionals, especially under the Blue Card scheme, limit mobility despite India's skilled workforce demand in Europe.
  - While scholarships like Erasmus exist, **bureaucratic hurdles** often deter Indian students from studying in EU countries.
- **Lack of Cohesion in EU Policies:** The EU operates as a bloc of 27 member states, each with its own policies. India often finds it easier to **engage bilaterally with key European nations** (France, Germany) rather than with the EU as a whole.
- **Ethical Disparities:** Divergences on labour laws, human rights, and environmental standards create hurdles for EU investments in India.
  - **E.g.,** India's strategic autonomy, such as restrictions on Amnesty International, has also been a point of contention.

## Way Forward:

- **Fast-Track FTA Negotiations:** Both sides should resolve differences on digital regulations, investment protection, and trade barriers to finalize the Free Trade Agreement (FTA) for boosting economic ties.
- **Enhance Green & Technology Cooperation:** Strengthening collaboration in renewable energy, green hydrogen, and high-tech sectors can align with the EU's sustainability goals and India's technological ambitions.
- **Deepen Security & Maritime Collaboration:** Expanding joint naval exercises and structured defense dialogues can enhance India-EU cooperation in the Indo-Pacific.
- **Facilitate Talent & Mobility Exchange:** Simplifying visa rules under the EU Blue Card scheme and improving work-study opportunities for Indian professionals and students can strengthen people-to-people ties.
- **Strengthen Bilateral Engagements Within the EU:** While engaging with the EU as a bloc, India should deepen strategic partnerships with key EU nations like France and Germany to accelerate trade and investment cooperation.

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**India-UK resumed FTA**

- India-UK FTA was launched on January 13, 2022.
- Total 13 rounds of negotiations have been held till December 2023. The 14th round, which began on January 10, 2024, was underway when negotiations were paused by the UK side in May 2024 due to elections in that country.
- **Current Trade and Investment:**
  - Bilateral trade between India and the UK increased to USD 21.34 billion in 2023-24 from USD 20.36 billion in 2022-23.
  - United Kingdom is the sixth largest investor in India. India has received USD 35.3 billion FDI during April 2000 and September 2024.
- **Aim:** Boosting Bilateral Trade and Investment. It is expected to double or even triple bilateral trade from the current USD 20 billion in the next 10 years.
- **Concern of India:** India demands greater access for its skilled professionals from sectors like IT and healthcare in the UK market, besides market access for several goods at nil customs duty.
- **Concern of UK:** UK is seeking a significant cut in import duties on goods such as scotch whiskey, electric vehicles, lamb meat, chocolates and certain confectionary items.

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# Manipur Crisis

*Syllabus Mapping: GS-Paper 3, Insurgency in North Eastern India and Border Security*

## Context

Influx of refugees due to the Civil war in Myanmar along with the prolonged conflict between Meitei and the Kuki communities has made the internal security situation worse in the Manipur. In these consequences Article 356 of the Constitution was invoked in Manipur and the State came under President's Rule.

## Causes of the Crisis

**Political Instability in Myanmar**

*   **February 2021 coup**: Myanmar's military (Tatmadaw) overthrew the civilian government, leading to mass protests.
*   Emergence of **People's Defence Forces (PDFs)** and **Ethnic Armed Organizations (EAOs)** like the **Chin National Army (CNA)** in border regions and civil disobedience movement against the military rule.
*   **Heavy fighting** in Chin, Kachin, and Sagaing regions led to mass displacement, affecting Indian border states.

> **Impact of Myanmar's Political Crisis on Northeast India**
>
> **Influx of Refugees and Humanitarian Crisis**
> *   According to the **United Nations High Commissioner for Refugees (UNHCR)**, by **December 31, 2024**, about **95,600 refugees** from Myanmar had entered India, with **73,400 arriving post-coup**.
> *   The porous border makes it difficult to get an exact count.
> *   **Mizoram** has welcomed Myanmar refugees, as many belong to the **Mizo-Chin-Kuki ethnic group**, sharing cultural and familial ties.
> *   **Manipur**, however, has seen tensions rise, as the **Meitei community** perceives the influx as a demographic threat, worsening the ongoing **Meitei-Kuki ethnic conflict**.
>
> **Decline in Border Trade and Connectivity Projects**
> *   The violence has disrupted India's plans to use Manipur as a **gateway to Southeast Asia**.
> *   The once-thriving **Moreh border town**, a hub of India-Myanmar trade, has suffered due to conflict.
> *   The **India-Myanmar-Thailand Trilateral Highway**, a key part of India's **Act East Policy**, has been delayed.
>
> **Geopolitical Implications: India vs. China in Myanmar**
> *   **China**, facing similar spillover effects, has fenced parts of its border with Myanmar.
> *   Beijing **supports some Ethnic Armed Organizations (EAOs)** in Myanmar and has used them to combat drug syndicates.
> *   China, as a **UN Security Council (UNSC) member**, has greater diplomatic leverage in Myanmar, while India must operate within a **democratic framework**.

**Ethnic Conflicts in Manipur**

*   **Meitei vs. Kuki-Zomi conflict**: The **Meiteis (majority in Imphal Valley)** seek Scheduled Tribe (ST) status, opposed by Kuki-Zomi groups.
    *   **May 2023 violence**: Clashes between Meitei and Kuki-Zomi groups escalated, leading to deaths, displacement, and destruction of villages.

**Free Movement Regime:** It was established to enable the movement of people along the border to maintain the ethnic interactions along both sides of the India-Myanmar border. The FMR allowed people in the designated areas to move across the border without being subjected to cumbersome paperwork such as visas.

*   In **December 2024**, a **new framework** was introduced, allowing border movement only **within 10 km** and requiring permits at designated entry/exit points.
*   However, this resulted in a large-scale refugee movement into India. The movement of refugees has negatively impacted India's border management strategies.

## Humanitarian Crisis in Manipur's Conflict-Affected Areas

**Data Deficiency in the India-Myanmar Borderland**s

*   The India-Myanmar border region remains **data-deficient** despite its history of **armed conflict, displacement, and humanitarian crises**.
*   The **Manipur conflict** lacks accurate documentation due to restricted access, adverse security conditions, and misinformation.
*   Over **58,000 individuals** are **forcibly displaced** across relief camps in the **Valley and Hill districts**.
*   Nearly **12,000** people fled to **Mizoram**, while **7,000** sought refuge in **Nagaland, Assam, and Meghalaya**.
*   Data collection remains fragmented, missing many displaced individuals outside official camps.

**Zone of the Unknown: The Data Gap**

*   The separation between **Meitei and Kuki-Zomi communities** has **disrupted humanitarian information flows**.
*   **Unregistered displaced persons** living with relatives, in temporary shelters, or outside the State are unaccounted for.

- Many **youth left Manipur** for education and employment opportunities due to the conflict.
- **Health care access has been disrupted**:
  - **Kuki-Zomi-dominated districts** rely on **Mizoram (Churachandpur, Chandel, Tengnoupal)** or **Nagaland (Kangpokpi)** for medical care.
  - **Imphal's tertiary hospitals** are inaccessible to the hill district population.

**Medical Challenges and Crisis in Relief Camps**

- Displaced populations in **Imphal Valley** face **high out-of-pocket medical expenses**, leading to treatment discontinuation.
- **Health infrastructure has deteriorated** due to conflict, causing underreported **mortality, malnutrition, and disease outbreaks**.
- **Examples of Medical Emergencies & Deaths:**
  - **May 29, 2023:** A **63-year-old** displaced person died in **Kangpokpi** due to **lack of dialysis**.
  - **June 2023:** A **mother** died from **excessive bleeding** in a **relief camp in Churachandpur** after childbirth.
  - **September 22, 2023:** A **one-year-old girl** died from **pneumonia** in a relief camp in **Churachandpur**.

**Mental Health Crisis and Suicides**

- A **local media report** recorded at least **13 deaths** in **Valley relief camps**, including **suicides**.
- A **Regional Institute of Medical Sciences (RIMS) study** found:
  - **65.8% of displaced individuals** suffer from **Post-Traumatic Stress Disorder (PTSD)**.
  - **24.8% experience moderate anxiety**.
  - **15.2% have severe anxiety**.
- **Ongoing suicide study (NEST Suicide Survey) in Churachandpur** recorded cases, including a **70-year-old man** who took his life due to struggles in adapting to camp life.

## Challenges in Basic Humanitarian Needs

- **Food, water, and shelter** remain largely unmet **even after two years**.
- **22,000 children** continue to live in camps with their **education severely disrupted**.
- **Unsanitary conditions, water shortages, lack of nutritious food, and inflation** have worsened the crisis.

## Way forward:

- **Towards democratic polity:** India, in collaboration with select neighbours of Myanmar, must nudge all the stakeholders in that country to move towards a more federal democratic polity.
- **Economic Growth:** Indian government will have to spend more resources to maintain economic growth in the region. It will help deal with the refugee situation in the region.
- **Engage various ethnic organisations:** To ensure peace in the region, the consolidation of unhealthy relationships between Indian insurgent groups and armed groups across the border needs to be arrested. Therefore, it becomes imperative to engage various ethnic organisations in Myanmar.
- **Increased Humanitarian Aid:** External agencies, including **corporate social responsibility (CSR) entities**, should extend **humanitarian support**.
- **Water Supply Augmentation:** Displaced people **spend a significant portion of income** on private water sources.
- **Creation of Humanitarian Corridors:** Enable **emergency medical evacuations** via **Imphal airport**.
- **Restoring Supply Chains:** Transport **essential commodities, food, and medical supplies** across communities to **reduce inflationary pressures**.

## Conclusion

**Manipur's humanitarian crisis remains critical** due to forced displacement, health infrastructure collapse, and increasing suicides. **These exacerbates security challenges** in India's Northeast, with refugee influxes and disrupted border trade. A **comprehensive strategy** focusing on **humanitarian aid, cross-border collaboration, and economic development** is essential to mitigate **instability in Manipur and Northeast India**.

# TOPIC FOR PRELIMS

## Crisis in Congo

*Syllabus Mapping: Locations, Non-State Actors*

### Context

M23 rebels, backed by Rwanda, have intensified their offensive in eastern Democratic Republic of Congo (DRC).

**About M-23 Rebels**

- M23 and also known as the Congolese Revolutionary Army is a Congolese Tutsi-led rebel paramilitary group.
- The name "March 23" refers to the **23 March 2009 peace agreement** between the Congolese government and the National Congress for the Defense of the People (CNDP), a rebel group that later evolved into M23.
- It operates in the eastern regions of the **Democratic Republic of Congo (DRC)**, specifically in **North Kivu province**.
- M23 is primarily composed of ethnic **Tutsis** and is fighting to protect Tutsi interests, particularly against **Hutu militias such as the Democratic Forces for the Liberation of Rwanda (FDLR).**
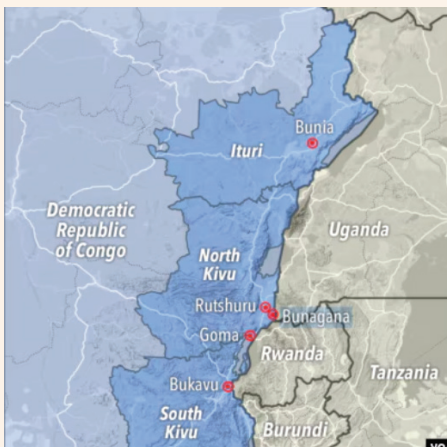


### Impact of M23's Advance

- **Population Displacement**: The latest advances of M23 have caused hundreds of thousands of people to flee their homes.
- **Economic Control**: M23 has been controlling the **coltan-mining region of Rubaya** for over a year, generating significant revenue.
  - The UN estimates that M23 earns approximately $800,000 per month through a tax on coltan production.
  - **Coltan** is crucial for the manufacture of smartphones and other electronic devices.

### Involvement of Rwanda

- **Accusations of Rwandan Support:** Congo's government, the UN, and Western powers including the United States,

accuse Rwanda of fueling the conflict by deploying troops and heavy weapons in support of M23 rebels.



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- Rwanda denies these claims, arguing that its actions are defensive and accusing the DRC of collaborating with the **FDLR**, which threatens **Tutsi communities**.
- **Risk of Regional Conflict**: Involvement of multiple countries into a regional war is deepening **instability in Central Africa.**

### About Democratic Republic of Congo (DRC)

- **Bordering Countries:** Angola, Zambia, Tanzania, Burundi, Rwanda, Uganda, South Sudan, Central African Republic and Republic of Congo.
- It is the **2nd** largest country in Africa. **(Largest - Algeria).**
- DRC is rich in minerals, such as **cobalt, gold and coltan.**
- **Important River:** The Congo River - Africa's second-longest river.
- Its capital, **Kinshasa, is located on the Congo River.**

## Trump Administration's Move to Shut Down USAID

*Syllabus Mapping: Policies of developed Countries, Regional Organisations*

### Context

The US administration has pushed to **pause foreign aid, remove key officials and cut funding** of the United States Agency for International Development.

**About United States Agency of International Development (USAID)**

- **USAID is the lead international humanitarian and development arm of the US government**.
- It funds **NGOs, foreign governments, international organizations and other US agencies** for programs related to:
  - Poverty alleviation, Education,Healthcare, Infrastructure, Democracy Building etc.
- It has played a key role in **spreading US influence abroad.**
- **USAID's Top Recipients in FY2023:** Ukraine, Ethiopia, Jordan, Democratic Republic of Congo, Somalia.

History of USAID

- **Geopolitical conditions during Cold War :**
  - US has used **international aid as a foreign policy tool since WWII.**
  - **Marshall Plan (post-WWII)** – With this the US provided economic aid to Europe to **prevent the spread of communism**.
  - During the **Cold War**, USA increased **economic, technical and military aid** to counter the Soviet Union.
- **Creation of USAID (1961):**
  - It was established by **President John F. Kennedy** under the **Foreign Assistance Act of 1961**.
  - The goal of USAID was two-pronged:
    ° to counter Soviet influence during the Cold War and
    ° to run various foreign assistance programs, based on the idea that American security was tied to stability and economic advancements in other nations.
  - Initially it focused on **preventing communism in Latin America** after the **Cuban Revolution (1959)**.
    ° Launched the **"Alliance for Progress"** – a multi-billion dollar initiative for Latin American development.

**Reason for the pausing aid:**

- U.S. policy that foreign aid helps U.S. interests by stabilizing other countries and economies and building alliances is not accepted by the Trump Administration.
- Foreign aid has not been efficiently used by the recipient countries.
- The US accuses USAID of paying media organizations to publish the propaganda of radical parties.

## Trump's Proposal on Gaza and Middle East Policy Shift

*Syllabus Mapping: Policies of developed Countries and Locations*

### Context

U.S. President Donald Trump announced a radical policy shift on the Israeli-Palestinian conflict, proposing that the United States take over the Gaza Strip.

### Key Proposals of US President

- **Palestinians Should Leave Gaza**
  - Trump suggested **Jordan, Egypt, and other Arab states** should **accept Gazan refugees**.
  - Claimed that Palestinians would not want to return as Gaza had become a **"demolition site"**.
  - He also stated that he could **convince Jordan and Egypt** to accept displaced Palestinians.
- **U.S. to 'Take Over' Gaza**
  - Declared that the **U.S. would "own" Gaza** and be responsible for:
    ▪ **Clearing unexploded bombs and weapons**.
    ▪ **Developing Gaza economically**, calling it the **"Riviera of the Middle East"**.
    ▪ Creating **thousands of jobs** to make it a model of prosperity.
- **Return of 'Maximum Pressure' on Iran**
  - Trump **signed an executive order** to **reimpose maximum pressure sanctions** on **Iran**.
  - Re-designated **the Yemeni Houthis as a terrorist organization**.

- The **"maximum pressure" policy** is a strategy where a country applies heavy economic and diplomatic sanctions to force another nation to change its behavior.
- The goal is to **force Iran to halt its nuclear activities** and curb its influence in the region.

### Widespread Global Opposition

- **Saudi Arabia:** Rejected the proposal, reaffirming its **long-standing support for an independent Palestinian state**.
- **European & Global Leaders: Australia, Ireland, Germany, China, and New Zealand** rejected Trump's plan and reiterated support for a **two-state solution**.
- **Turkey:** Forced deportations of Palestinians were unacceptable.
- **Palestinian Authority:** President **Mahmoud Abbas** urged the **UN to protect Palestinian rights**, calling Trump's plan a **violation of international law**.
- **Jordan's Strong Resistance:**
  - Jordan's Foreign Ministry warned in September 2024 that any attempt to **resettle Palestinians in Jordan would be considered a declaration of war**.

**Demographic & Political Risks in Jordan**

- Jordan already hosts **over 2 million Palestinian refugees** (1 in 5 people).

- The **rise of Palestinian nationalist groups** (e.g., the Muslim Brotherhood-linked **Islamic Action Front (IAF)**) threatens Jordan's monarchy.
- The **2024 Jordanian elections saw the IAF win 31 seats**— its **largest victory since 1992**, partly due to its **pro-Hamas stance**.

### Egypt's Concerns

- President **Abdel Fattah al-Sisi** has cracked down on the **Muslim Brotherhood** since **2013**, fearing **Islamist movements could gain influence**.
- Accepting displaced Palestinians could **strengthen opposition forces.**

## U.S.-India COMPACT Initiative

*Syllabus Mapping: Bilateral Relations*

### Context

Indian PM & US President launched the U.S.-India COMPACT initiative.

### About COMPACT Initiative

- **COMPACT** stands for (Catalysing Opportunities for Military Partnership, Accelerated Commerce, and Technology).
- It is a strategic framework to enhance bilateral cooperation in **defense, trade, technology and security.**

### Key Focus Areas of COMPACT

- **Military and Defense Partnership:**
  - **Strengthening India's defense capabilities** through increased **defense trade and technology transfers**.
  - Expansion of joint military exercises, intelligence sharing, and strategic interoperability between Indian and US armed forces.
  - Promoting **co-development and co-production of defense equipment** under **Make in India** initiatives.
  - Facilitating India's procurement of advanced military platforms, such as **F-35 fighter jets.**
- **Trade and Economic Growth:**
  - Boosting **bilateral trade and investments** between India and the US, particularly in **energy and infrastructure**.
  - Focus on reducing **tariff barriers and resolving trade disputes**, with negotiations for a **mini trade deal**.
- **Technology and Innovation Collaboration:**
  - Strengthening **technology sharing agreements** in sectors like:
    - Semiconductors, Artificial intelligence (AI) and quantum computing
    - Space technology (including satellite cooperation)

- Cybersecurity and digital infrastructure
- Cooperation in advanced civil nuclear technologies.
  - Launch of **Indus Innovation**, to promote joint research and technology development in emerging fields.
- **Security and Counterterrorism:**
  - Enhanced intelligence sharing and joint operations against terrorist networks.
  - Increased maritime security cooperation in the Indo-Pacific, particularly in countering Chinese influence.

## India-US TRUST Initiative

*Syllabus Mapping: Bilateral Relations*

### Context

India and United States have launched the TRUST initiative.

### About TRUST Initiative

- Transforming Relationship Utilizing Strategic Technology (TRUST) is a bilateral agreement to enhance cooperation in critical minerals, pharmaceuticals, and advanced materials.
- It will strengthen **bilateral collaboration** between **governments, academia and the private sector** in key technological areas such as: Defense, AI, Semiconductors, Quantum Computing, Biotechnology etc.

### Key Features of TRUST Initiative

- **Critical Minerals Cooperation:**
  - Focus on recovery and processing of critical minerals like lithium and rare earth elements (REEs).
  - Launch of the **Strategic Mineral Recovery initiative,** a new U.S.-India program to recover and process critical minerals (including lithium, cobalt and rare earths) from heavy industries like aluminum, coal mining and oil and gas.
  - The initiative aims to **reduce dependency on China**, which currently controls **nearly 70% of the global REE market**.
- **Cooperation in Pharmaceutical sector:**
  - Encourage public and private investments to expand Indian manufacturing capacity.
  - India is **the world's second-largest producer of active pharmaceutical ingredients (APIs)**, many of which depend on critical minerals like **lithium, magnesium, zinc, and selenium**.
- TRUST will complement the **Minerals Security Partnership (MSP)**, a **14-nation US-led initiative** that includes **India, Australia, Canada, Japan, Germany and UK** to catalyze investment in critical mineral supply chains.

## Economic Community of West African States (ECOWAS)

*Syllabus Mapping: Locations and Regional Groupings*

**Context**

Three military led countries Mali, Niger and Burkina Faso officially left West Africa's main political and trade group ECOWAS.

### About ECOWAS

- ECOWAS stands for the Economic Community of West African States. It is a political and economic union of 12 West African countries.
- It was established by the **Treaty of Lagos in May 1975. (HQ-Abuja, Nigeria).**
- Citizens of ECOWAS countries have the **right to live and work in all member states**, along with free circulation of goods.
- **Objectives:**
  - To achieve "collective self-sufficiency" for its member states by creating a single large trade bloc.
  - To raise living standards and promote economic development.
  - To have a **single common currency**
- **Members: 12 (After withdrawal of Mali, Niger & Burkina Faso)**
  - Benin, Cape Verde, Cote d' Ivoire, Gambia, Ghana, Guinea, Guinea Bissau, Liberia, Nigeria, Sierra Leone, Senegal and Togo.



ECOWAS members*

*Burkina Faso, Mali and Niger announced their withdrawal from ECOWAS on January 28th 2024
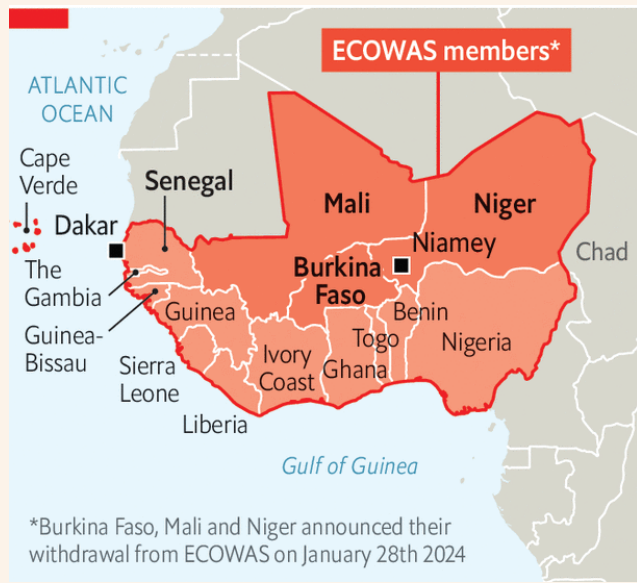
### Reason For withdrawal:

- **Strained relation:** Relations between Ecowas and the three Sahel countries have been tense since the military seized power in Niger in 2023, Burkina Faso in 2022 and Mali in 2020.
- **Geopolitical reason:** The three countries accuse Ecowas of being too close to Western powers and have instead pivoted towards Russia.

- **Against the military Rule:** ECOWAS countries voiced against the military rule in the three countries and they support the democratic setup in these countries which is opposed by the military rule.

## Russia-Syria Talks on Military Bases and Assad's Fate

*Syllabus Mapping: International event and Location*

**Context**

Russia held **discussions** with **Syria's new de facto leader, Mohammed al-Jolani (Ahmed al-Sharaa)**, regarding the future of its **military bases** in Syria.

**Russia's Military Presence in Syria**



- **Russia operates two key military bases in Syria:**
  - **Tartous (Naval Base)**
    - It is located on Syria's Mediterranean coast.
    - It is Russia's only warm-water naval base outside its territory.
    - It provides logistical support for Russian warships operating in the Mediterranean.
  - **Hmeimim Air Base (Near Latakia)**
    - It is a Strategic airbase used by Russian forces since 2015.
    - It is located in Latakia Governorate.
    - Russia launched airstrikes from here during Syria's civil war to support
- **New defacto leader's Demands from Russia:**
  - Extradition of Bashar al-Assad to Syria as Russia has been supporting his regime. After the fall of Damascus,

Bashar Al Assad and his family including his wife Asma al-Assad had fled to Moscow, Russia.

– Compensation, reconstruction, and recovery assistance from Russia to rebuild trust.

# Kurdistan Region

*Syllabus Mapping: Humanitarian aid diplomacy and Location*

## Context

India sent humanitarian assistance to support residents of the Kurdistan region in Iraq.

## About Kurdistan Region



- **Kurdistan region** is a geo-cultural area spanning across parts of **Iraq, Iran, Turkey and Syria**, where the **Kurdish people live**.
- Kurds are one of the **world's largest stateless ethnic groups.**
- This region is rich in oil and natural gas, particularly in **Iraqi Kurdistan,** making it geopolitically significant. Post World War I, under the **Treaty of Sevres (1920)**, Western powers promised the Kurds their own homeland.
- However, under **Treaty of Lausanne (1924),** which divided the Kurds among the newly formed nations of the Middle East, their hopes were dashed.

### Key Cities in the Kurdistan Region

- **Erbil (Hewlêr):** Capital of the **Kurdistan Regional Government (KRG)** in Iraq.
- Sulaymaniyah (Slemani), Dohuk, Mahadabad, Diyarbakır (Largest Kurdish-majority city in Turkey).

# Dunki Route

*Syllabus Mapping: Diaspora and Illegal Migration*

## Context

A US military plane carrying 104 Indian deportees landed in Amritsar. Many of them reached the country through multiple countries via a 'dunki route.'

## About Dunki Route

- It is a term for the journey migrants take through Latin American countries to reach the US border.
- This journey often begins in countries such as Ecuador, Bolivia, or Guyana, known for their relatively easier visa processes for Indian citizens.



- Travellers face the treacherous Darién Gap, a forested region between Colombia and Panama, known for its challenges including scarce clean water, dangerous wildlife, and criminal gangs.
- After Panama, the route typically passes through Guatemala and into Mexico, with migrants confronting obstacles like fence jumping and river crossings, including the Rio Grande.
- The journey can cost between Rs 15 lakh to Rs 70 lakh, involving dealings with human trafficking rings.
- Indian agents work in conjunction with traffickers throughout the route to facilitate the journey to the US.
- Despite the inherent risks and dangers, many migrants undertake this hazardous journey driven by the hope of achieving the American Dream.

## Iran vows to rebuild nuclear sites if attacked

*Syllabus Mapping: Global politics and Locations*

### Context

Iranian President Masoud Pezeshkian has vowed to rebuild nuclear facilities if attacked, responding to U.S. reports of a possible Israeli strike on key Iranian sites.

### Major Nuclear Facilities of Iran

- **Natanz Nuclear Facility: Uranium enrichment**



Source: New Scientist/ Global Security

  - **Location:** Isfahan Province
  - **Significance:** One of Iran's most important nuclear sites. Houses thousands of centrifuges for uranium enrichment.
- **Fordow Fuel Enrichment Plant (FFEP): Uranium enrichment**
  - **Location:** Near Qom, buried deep inside a mountain.
  - **Significance:** Highly fortified against airstrikes. Originally secret, but revealed by Western intelligence in 2009.
- **Arak Heavy Water Reactor (IR-40): Plutonium production**
  - **Location:** Markazi Province
  - **Significance:** Can produce plutonium, which can be used in nuclear weapons.
- **Bushehr Nuclear Power Plant: Civilian nuclear energy production**
  - **Location:** Southern Iran, near the Persian Gulf
  - **Significance:** Iran's only operational nuclear power plant. Built with Russian assistance.

## Arab League

*Syllabus Mapping: Regional Organisation*

### Context

Arab League has rejected U.S. President Donald Trump's Gaza relocation plan, terming it unacceptable.

### About Arab League

- **Arab League (League of Arab States)** is a regional organization of **22 Arab countries** in the Middle East and North Africa (MENA).
- It aims to promote political, economic, cultural and security cooperation.
- **Formation: March 22, 1945** (by six founding members: Egypt, Iraq, Jordan, Lebanon, Saudi Arabia, and Syria).
- **Headquarters: Cairo, Egypt**
- **Member States: 22**
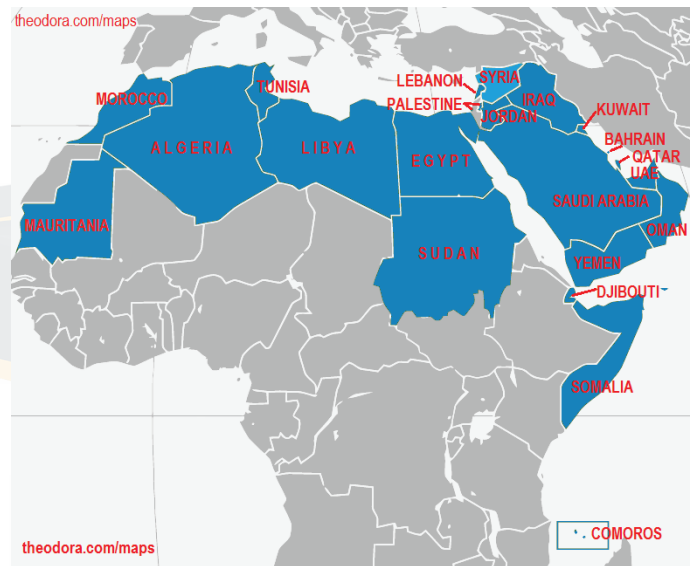


  - **North Africa:** Algeria, Egypt, Libya, Mauritania, Morocco, Sudan, Tunisia
  - **Middle East:** Bahrain, Iraq, Jordan, Kuwait, Lebanon, Oman, Palestine, Qatar, Saudi Arabia, Syria (suspended in 2011), United Arab Emirates (UAE), Yemen
  - **Horn of Africa:** Somalia, Djibouti, Comoros
  - **Observer States:** India, Brazil, Venezuela, Eritrea.

### Key Institutions & Agreements

- **Arab League Council:** Main decision-making body.
- **Economic & Social Council:** Handles trade and economic integration.
- **Arab Parliament:** Established in **2001** for legislative cooperation.
- **Arab Peace Initiative (2002):** Proposal for a two-state solution to the Palestine-Israel conflict.

## U.S. Interest in Ukraine's Minerals

*Syllabus Mapping: Policies of Developed countries*

### Context

The U.S. has proposed access to **50% of Ukraine's critical minerals** in exchange for military and economic assistance.

## Importance of Ukraine's Mineral Resources

- Ukraine is rich in minerals that are essential for:
  - **High-tech manufacturing, i**ncluding electronics and semiconductors.



A MAP OF UKRAINE'S CRITICAL MINERALS

Kyiv

- Beryllium
- Graphite
- Lithium
- Titanium, Zirconium
- Non ferrous metal (Ni, Co, Cu)
- Polymetallic (Au, Pb, Zn)
- Rare Earths
- Iron
- Manganese
- Uranium

Trump has asked for access to 50% of these mineral resources

Kherson

Crimea

Source: Ukrainian Geological Survey     Territory under Russian control
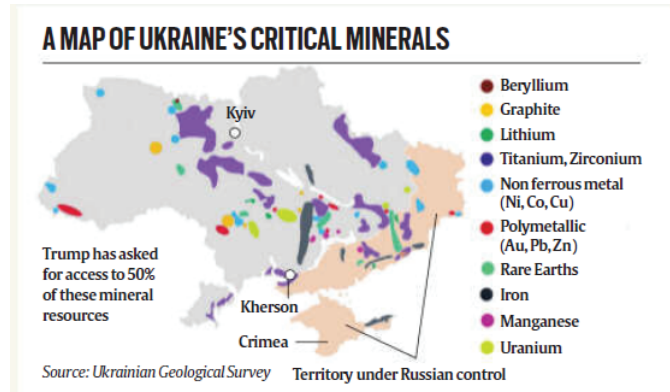
- **Defense systems**, such as missile guidance and advanced weaponry.
- **Clean energy solutions** - electric vehicles (EVs).
- **Strategic economic control**, as China dominates the global supply of many of these minerals.
- **Ukraine's Global Standing:**
  - It has **22 out of 50** strategic minerals classified as critical by the U.S.
  - **25 out of 34** minerals recognized as critical by the **European Union** (EU).

## Major Challenges Facing the U.S. Plan

- **Legal and Constitutional Barriers:**
  - Ukraine's **Constitution** states that its natural resources belong to **the Ukrainian people**.
  - Any foreign claim over these resources would require legal amendments.
- **Lack of Reliable Geological Data:**
  - Ukraine's mineral resources remain **underexplored**.
  - The most comprehensive geological surveys were conducted **before 1991** during the Soviet era.
- **Existing European Union Agreements:**
  - In **July 2021**, before Russia's invasion, Ukraine signed a **"strategic partnership on raw materials"** with the EU.
- **Russian Control Over Mineral-Rich Regions:**
  - Many of Ukraine's critical minerals are located in territories **occupied by Russia**.
  - Russian forces have taken control of **one-fifth of Ukraine**, including key rare earth deposits.

*Syllabus Mapping: Locations and Policies of Developed country*

### Context

President Donald Trump expressed interest in acquiring **Greenland** for the **protection of the free world**, stating it would be an **unfriendly act** if Denmark did not allow this.

### Reasons Behind Trump's Interest in Greenland

- **Strategic Security:** Proximity to Europe, enabling US to monitor activities of rivals like **Russia and China**. Trump has described **Greenland as "an absolute necessity" for national security.**



CANADA      Arctic Ocean

Greenland Sea

GREENLAND

Baffin Bay

Sisimiut

Davis Strait

ICELAND

REYKVAJIK

Atlantic Ocean

NUUK

- **Arctic Trade Route:** Greenland lies along a **shorter Arctic Sea shipping route.** Climate change may enhance the strategic importance of this route, reducing dependence on the **Panama Canal.**
- **Mineral Resources:** Greenland has deposits of **copper, lithium and cobalt,** essential for electric vehicle batteries and other technologies.
- **China's Role:**
  - **Chinese Presence:** China has been involved in **mining** and **infrastructure** development in Greenland, holding **11% of investments** in its mineral sector. This has raised concerns in the **U.S.** about China's growing influence in the **Arctic.**
  - **Polar Silk Road:** China's **Belt and Road Initiative** has extended to Greenland through the **Polar Silk Road**.

### Historical Context of US Interest in Greenland

- The US has shown interest in Greenland since the 1940s, initially driven by World War II security concerns.

- **In 1946,** America proposed to buy Greenland, aiming to counter Soviet influence in the Arctic.

- Although Denmark rejected the offer, subsequent agreements allowed the US to establish military bases on the island, underscoring its strategic importance.

**About Greenland**

- **Location:** Between the Arctic and Atlantic Oceans. It is the **world's largest island.**
- Presently it is an **autonomous territory under the Kingdom of Denmark.**
- **Three-fourth** of its surface is **permanently covered by ice.**
- It is majorly inhibited by the **Inuit community.**

## Riyadh Summit on Gaza Crisis

*Syllabus Mapping: Regional security and organisation*

### Context

Recently the Saudi Crown Prince hosted a summit in Riyadh bringing together the leaders of the six Gulf Cooperation Council states along with Jordan and Egypt.

### About Riyadh Summit

- The summit aimed to present a **unified Arab stance** on U.S. President Donald Trump's proposal to relocate Gaza's population and annex the territory.

- The Riyadh summit reinforced **Arab unity** in rejecting Trump's plan.

- Leaders reaffirmed their **commitment to a two-state solution**, advocating for:
  - An independent Palestinian state.
  - East Jerusalem as its capital.

### About Gulf Cooperation Council (GCC)



- **GCC** is a regional intergovernmental organization comprising six Arab states in the **Persian Gulf.**

- It was founded on **May 25, 1981. Headquarters:** Riyadh, Saudi Arabia.

- It was established to **promote economic, political, security and cultural cooperation** among its members.

- **Member Countries (6):** Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, United Arab Emirates (UAE).

- **GCC's supreme council** is the highest decision-making body.

- **Objectives of GCC:**
  - **Economic Cooperation:**
    - Formation of a **common market** and customs union.
    - Promotion of free trade and investment among member states.
  - **Security and Defense Cooperation:**
    - Protection of the region from external threats.
    - Joint military exercises (e.g., **Peninsula Shield Force**).
  - **Political Coordination:**
    - Unified positions on regional and global issues.

## India-Nordic-Baltic Ministerial Meeting

*Syllabus Mapping: Regional Organisation*



Indian PM meets President of Estonia and welcomed ministerial exchange in the India-Nordic-Baltic format.

**Facts about Estonia:**

- Estonia is a country in northeastern Europe, the northernmost of the three Baltic states (Estonia, Latvia, and Lithuania).

- India recognised the Republic of Estonia in September 1991, a month after it declared its independence from the Soviet Union.
- Diplomatic relations were established in December 1991. Bilateral relations are cordial and friendly.

### Nordic-Baltic Eight (NB-8) countries

- NB-8 is a regional cooperation format consisting of five Nordic countries and three Baltic states.
- The grouping focuses on political, economic and security cooperation in Northern Europe.
- **Member Countries:**
  - **Nordic Countries:** Denmark, Finland, Iceland, Norway, Sweden.
  - **Baltic States:** Estonia, Latvia & Lithuania.

### India and NB8

- The Nordic-Baltic cooperation with India spans fields as diverse as innovation, green transition, maritime, health, intellectual property rights, new technologies, space cooperation and artificial intelligence, student exchanges, culture and tourism.
- Trade and investment figures between the Nordic region and India are steadily increasing.
- Among NB-8 countries Sweden is India's largest trading partner.



NORDIC-BALTIC EIGHT

## African-Asian Rural Development Organization (AARDO)

*Syllabus Mapping: Regional Organisations*

### Context:

The 21st African-Asian Rural Development Organization (AARDO) conference concluded in New Delhi, reaffirming commitment to community-driven rural development and South-South cooperation.

### African-Asian Rural Development Organization (AARDO)

- **Formation:** In 1962 for the cooperation in the field of Agriculture and Rural Development
- **Status:** It is an autonomous inter-governmental Organization comprising country governments of Africa and Asia.
- It is a non-political body that enjoys observer status with various UN and other international organisations like FAO.

- It is one of the earliest examples of South-South cooperation in rural development in the Afro-Asian
- Secretariat: New Delhi

## United Nation Human Rights Council

*Syllabus Mapping: Great Powers and International organisations*

### Context:

USA and Israel came out of UNHRC after USA Citing Bias in the organisation

Reason for the exit:

- Israel accused UNHRC of anti-semintism. Antisemitism or Jew-hatred is hostility to, prejudice towards, or discrimination against, Jews.
- Both countries criticize the council for targeting Israel while allowing human rights abusers to avoid scrutiny.

For example, Israel has been subjected to over 100 resolutions at the UNHRC, making up more than 20% of all resolutions ever passed by the council.

### UN Human Rights Council

- **Establishment:** In 2006 by UN General Assembly resolution 60/251, replacing the UN Commission on Human Rights. It is a intergovernmental body within UN system.
- **Membership:** composed of 47 Member States.
- **Election:**
  - Elected directly and individually by a majority of the 193 states of the UN General Assembly.
  - Elections take place every year. Seats are equitably distributed among the five UN regional groups, with one-third of the members being renewed each year.
  - Each member serves a three-year term.
- **Responsibility:** promoting and protecting human rights through:
  - Serving as an international forum for dialogue on human rights issues
  - Holding Universal Periodic Review to access the Human Rights situation in member countries
  - Appoints the Special Procedures, independent human rights experts
- HQs: based at the United Nations Office at Geneva.

## BIMSTEC Youth Summit

*Syllabus Mapping: Regional Organisations*

### Context:

- The Union Minister for Youth Affairs and Sports officially inaugurated the first BIMSTEC Youth Summit in Gandhinagar, Gujarat.
- AIM: It focused on promoting cooperation and developing leadership abilities among the youth from BIMSTEC nations.
- **Theme:** Youth as a Bridge for Intra-BIMSTEC Exchange

## Bay of Bengal Initiative for Multi-Sectoral Technical and Economic Cooperation (BIMSTEC)

- BIMSTEC was established in 1997 with the signing of **Bangkok Declaration** by representatives of Bangladesh, India, Sri Lanka, and Thailand.
- Initially known as BIST-EC (Bangladesh-India-SriLanka-Thailand Economic Cooperation), it expanded to BIMST-EC with the inclusion of Myanmar in 1997.
- Later, Bhutan and Nepal joined in 2004 leading to the renaming of the group as **Bay of Bengal Initiative for Multi-Sectoral Technical and Economic Cooperation (BIMSTEC)** during the First Summit in Bangkok in 2004.
- **Aim:** To promote economic cooperation among countries bordering the Bay of Bengal.
- **BIMSTEC Secretariat was established in Dhaka, Bangladesh**, in 2014 following a decision at the Third BIMSTEC Summit, providing an institutionalised framework for cooperation.



BIMSTEC comprises of 7 Member Countries
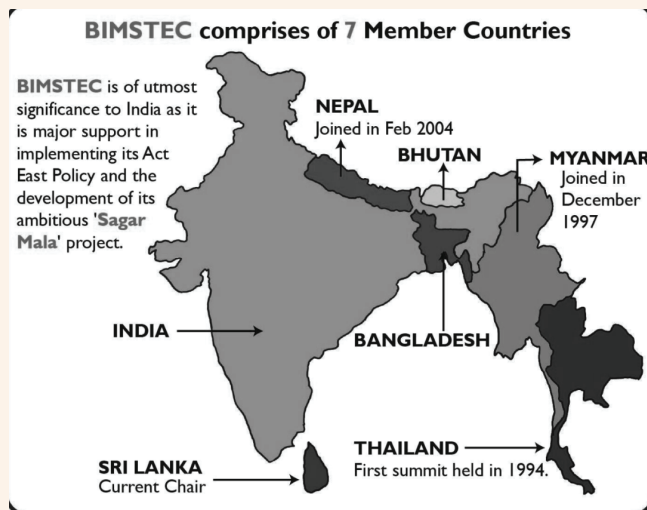
### BIMSTEC Charter

- The Charter of the BIMSTEC entered into force on 20 May 2024. It was signed by the BIMSTEC member States during the Fifth Summit held virtually in Colombo, Sri Lanka, on 30 March 2022.
- It is a Foundational document which outlines the principles and goals of BIMSTEC
- It confers legal personality on the BIMSTEC grouping which paves way for external partnerships and admission of new members.



## Bay of Bengal (BOB) Inter-Governmental Organisation

- India has assumed the chairmanship of the Bay of Bengal Inter-Governmental Organisation at the **13th Governing Council Meeting in Male, Maldives.**

### About BOB Inter-Governmental Organisation

- It is a regional fisheries advisory body established in **2003** to promote sustainable coastal fisheries development and management in the Bay of Bengal region.
- Its primary mandate is to enhance cooperation among member countries and provide technical and management advisory services.
- **Member Countries:** Bangladesh, India, Maldives & Sri Lanka.
  - **Indonesia**, **Malaysia**, **Myanmar**, and **Thailand** participate as cooperating non-contracting parties.
- BOB-IGO evolved from the Bay of Bengal Programme initiated by the Food and Agriculture Organization (FAO) of the United Nations in **1979**.



## Coalition for Environmentally Sustainable AI

- The **Coalition for Environmentally Sustainable Artificial Intelligence (AI)** was launched recently.

### About Coalition for Environmentally Sustainable AI

- It is a global initiative with 100+ partners, including 37 tech companies, 11 countries, and 5 international organizations, to promote AI's environmental sustainability.
- It was launched at the **AI Action Summit in Paris.**
- It is led by **France, United Nations Environment Program (UNEP) and International Telecommunication Union (ITU).**
- **Key objectives:**
  - Encourage AI's role in **decarbonization, pollution reduction, biodiversity preservation, and ocean protection.**
  - Develop **standardized environmental metrics** for AI.
  - Promote **comprehensive life cycle analysis frameworks** for AI technologies.
  - Prioritize **sustainable AI research.**

## IMO GreenVoyage2050 Programme

- **Nine countries** have been selected as **partners for 2025** under the **International Maritime Organization's (IMO) GreenVoyage2050 programme**.

- This is a **technical cooperation programme** supporting the **implementation of the 2023 IMO GHG Strategy** to reduce greenhouse gas (GHG) emissions in the **maritime sector**.

- **National Action Plans for GHG Reduction: Five countries** will receive assistance to develop **national action plans** to reduce **GHG emissions from shipping**:

  - **Bangladesh, Egypt, Ghana, Mexico and Nigeria**.

2023 IMO GHG Strategy

- The International Maritime Organization (IMO) adopted the 2023 IMO GHG Strategy to accelerate efforts to reduce greenhouse gas (GHG) emissions from international shipping.

- This strategy **updates and strengthens** the earlier **2018 IMO GHG Strategy** to align with the **Paris Agreement's temperature goals**.

Key Targets and Goals

- **Long-Term Net Zero Goal:** Net zero GHG emissions from international shipping by 2050.

- **Milestone Emission Reduction Targets**

  - **By 2030** – Reduce total GHG emissions by **at least 20% (aiming for 30%)**.

  - **By 2040** – Reduce total GHG emissions by **at least 70% (aiming for 80%)**.

- **Fuel-Specific Targets:**

  - **By 2030** – At least 5% (aiming for 10%) of energy used in international shipping must be from zero or near-zero GHG emission sources.

## India elected to Vice Presidency of IALA

- India has been elected Vice President of the International Association of Aids to Marine Navigation (IALA) during its first General Assembly in Singapore.

About IALA

- It is a **global organization** dedicated to harmonizing marine aids to navigation and ensuring efficient and environmentally responsible maritime operations.

- It was established in **1957**, as a Non-Governmental Organization (NGO). **HQ - Saint-Germain-en-Laye, France.**

- **NGO to IGO**: It officially changed its status from an NGO to an Intergovernmental Organization (IGO) based on a convention ratified by 34 states in 2024.

- **Objectives:**

  - Ensure safe and efficient vessel movement through marine navigation aids.

  - Standardize global maritime navigation systems.

  - Promote sustainable marine environment protection.

  - Facilitate technology-driven solutions for better navigational safety.

- India will **host the IALA Council** meeting in December 2025 and the **IALA Conference & General Assembly** in September 2027 in Mumbai.

## OPEC+

- The Brazilian government has approved its entry in OPEC+.

Organization of Petroleum Exporting Countries (OPEC):

- It is a permanent, intergovernmental organization, created at the **Baghdad Conference in 1960, by Iran, Iraq, Kuwait, Saudi Arabia and Venezuela.**

- **HQ:** Vienna, Austria.

- **Objective:** To co-ordinate and unify petroleum policies among Member Countries, in order to secure fair and stable prices for petroleum producers.

- **Members (12):** Saudi Arabia, UAE, Iran, Iraq, Kuwait, Algeria, Equatorial Guinea, Gabon, Libya, Nigeria, Republic of the Congo and Venezuela.

### OPEC+

- **OPEC Plus** was created in 2016 when OPEC countries decided to ally with other oil-producing countries outside the group to cut down the global output of oil.

- **Current OPEC+ Members:** 12 OPEC members and 10 non-OPEC oil-exporting countries.

  - Russia, Azerbaijan, Bahrain, Brunei, Kazakhstan, Malaysia, Mexico, Oman, South Sudan and Sudan.

## Caspian Pipeline Consortium (CPC)

- According to Russia, oil flows through the Caspian Pipeline Consortium were reduced by 30-40% recently after a Ukrainian drone attack on a pumping station.

About CPC

- CPC was established in **1992** to transport crude oil from the **Caspian Sea region to global markets.**

- **Pipeline Route:**

  - It starts from **Tengiz oil field, Kazakhstan** & Ends at N**ovorossiysk, Russia (Black Sea port)**

  - **Length:** 1,500 km. & **Capacity:** Over 1.5 million barrels per day (bpd)



- **Key Features of CPC Pipeline:**

  - **It is one of the largest international oil transport projects** involving both public and private sector entities.

  - **Main source of crude oil:** Kazakhstan (Tengiz, Karachaganak, and Kashagan fields).

  - **Major Export Destination:** Europe and other global markets.

– **Significance:**
  ° **Bypasses the Persian Gulf and Suez Canal**, providing a strategic alternative for oil exports.
  ° **Crucial for Kazakhstan's economy**, as over **80% of its oil exports** flow through this pipeline.

## Very Short-Range Air Defence (VSHORAD) missile system

*Syllabus Mapping: Defence Technology*

### Context

DRDO has recently conducted three successive flight-trials of the VSHORADS from Chandipur coast of Odisha.



### About VSHORAD

- It is **4th-generation**, man-portable air defence system (MANPAD)
- **Designed & Developed by:** Research Centre Imarat (RCI), Hyderabad (A DRDO facility)
- It is Designed to **neutralize aerial threats**, including **drones, helicopters, and low-flying aircraft**
- **Advanced Features**:
  – **Miniaturized and lightweight**
  – **Highly maneuverable**
  – **Pinpoint accuracy** in target destruction
  – Capable of hitting **targets with reduced thermal signatures**

## Mirage 2000 Aircraft

*Syllabus Mapping: Defence Technology*

### Context

An Indian Air Force (IAF) aircraft, Mirage 2000, crashed in Shivpuri district of Madhya Pradesh after a system malfunction.

### About Mirage 2000 Aircraft



- It is a **French multirole**, **single-engine 4th-generation** fighter jet.
- **Available:** As a **single-seater or two-seater** multirole fighter.
- **Capability**: Air-to-Air Missiles and Surface-to-Air Missiles.
- **Significance:** It played a significant role in **Operation Safed Sagar** during **1999 Kargil War.**

## Aero India 2025

*Syllabus Mapping: Defence Technology*

### Context

The U.S. will showcase some of its most advanced military aircraft at Aero India 2025.

### About Aero India

- Aero India is **Asia's biggest aerospace and defense exhibition**, held every **two years in Bengaluru, India**.
- It is organized by the **Defence Exhibition Organisation (DEO), Ministry of Defence**.
- **Aero India 2025:**
  – **Location:** Yelahanka Air Force Station, Bengaluru.
  – **Participants:** Defence companies, government officials, and military leaders from **India and over 50 countries**.
  – **Focus Areas:**
    ▪ Fighter aircraft and unmanned aerial vehicles (UAVs).
    ▪ Defense electronics, avionics, and radar systems.
    ▪ Military technology and aerospace innovation.

- **U.S. Participation at Aero India 2025:** The **United States** will showcase advanced aircraft like the F-35, F-16, B-1 bomber, and KC-135 refueling aircraft.

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**List of 5th Generation Fighter Jets**

- F-35 Lightning 2 & F-22 Raptor - USA
- Sukhoi Su-57 - Russia
- **HAL AMCA (Under Development) - India**
  – Currently India does not possess a 5th generation fighter jet.
- Chengdu J-20 - China.

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## F-35 Lightning II

- It is a **fifth-generation** multirole stealth fighter jet developed by **Lockheed Martin** for the **U.S. military and allied nations**.

- It is designed for air superiority, ground attack, reconnaissance and electronic warfare missions.

- **Key Features of the F-35: (Also Features of 5th Generation Fighter Jets)**



  – **Stealth Technology**: Jet's radar-absorbing coating and shape reduce detection by enemy radar.
- **Advanced Avionics**: It is equipped with **AESA radar, data fusion and AI-based systems** for enhanced situational awareness.
- **Supersonic Speed**: Capable of reaching **Mach 1.6** (1,960 km/h).
- **Sensor Fusion**: Integrates data from multiple sources for **better targeting and defense**.
- **Electronic Warfare Capabilities**: It can jam enemy radar and communication systems.

## Su-57:

- The Russian Sukhoi Su-57, a twin-engine stealth fighter, boasts a top speed of Mach 2, a combat range of 1,900 kilometers.

- Weaponry: Internal and external hardpoints for carrying a variety of air-to-air and air-to-ground weapons

## India-U.S. Cooperation on Underwater Domain Awareness (UDA)

*Syllabus Mapping: Defence Partnership and Defence Technology*

### Context

India and the U.S. are strengthening their **Underwater Domain Awareness (UDA)** collaboration through the **Autonomous Systems Industry Alliance.**

### About Autonomous Systems Industry Alliance (ASIA)

- ASIA is a strategic initiative launched jointly by India and the United States to enhance defense collaboration, particularly in the realm of autonomous systems and underwater domain awareness (UDA).
  – **UDA is a maritime concept that involves using technology, strategies, policies etc. to monitor everything under the sea.**
- It aims to bolster industry partnerships and production capabilities within the Indo-Pacific region.
- **Key Objectives of ASIA:**
  – **Strengthening Defense Ties:** ASIA seeks to deepen defense cooperation between India and the U.S. by focusing on the co-development and co-production of advanced autonomous technologies.
  – **Enhancing Underwater Domain Awareness:** A primary focus is on UDA technologies, which are crucial for maritime security and monitoring.

### U.S. Offerings to India

- India is the **first country** to receive U.S. industry collaboration on sensitive UDA technologies.
- **Co-development and Co-production Opportunities:**
  – **Sea Picket Autonomous Surveillance System** (ThayerMahan)
  – **Wave Glider Unmanned Surface Vehicles (USVs)** (Boeing's Liquid Robotics)
  – **Low-Frequency Active-Towed Sonar** (L3 Harris)
  – **Multistatic Active (MSA) Sonobuoys** (Ultra Maritime, co-produced with Bharat Dynamics Ltd.)
  – **Large Diameter Autonomous Undersea Vehicles** (Anduril)
  – **Triton Autonomous Underwater and Surface Vehicles** (Ocean Aero)

## Quick Reaction Surface-to-Air Missile

*Syllabus Mapping: Defence Technology*

### Context

The Army is also set to finalise a contract for the indigenously developed Quick Reaction Surface-to-Air Missile (QRSAM) system within the next four to five months.

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## About Quick Reaction Surface-to-Air Missile (QRSAM) System

- **Developed by:** Defence Research and Development Organisation (DRDO)

- It is a Short Range Surface to Air Missile system

- **Purpose:** Designed to provide **quick reaction** air defence against aerial threats such as **fighter jets, helicopters, UAVs, cruise missiles etc.**

- **Key Features & Capabilities:**
  - **Range: 30 km.**
  - **Altitude Coverage:** Capable of engaging targets at **low to medium altitudes**.

- **Mobility:** Highly mobile system mounted on **6x6 wheeled vehicles** for rapid deployment. Road, Rail and Air transportability.

- **Reaction Time:** Extremely short, making it effective against surprise aerial threats.

- **All-Weather Capability:** Can operate in **diverse weather conditions**, including desert and high-altitude terrains.

## Stryker Infantry Combat Vehicle

*Syllabus Mapping: Defence Technology*

### Context:

India-U.S. defence cooperation advances with progress in the Stryker Infantry Combat Vehicle (ICV) deal, with a plan for co-production in India.

### About Stryker Infantry Combat Vehicle:

- It is an eight-wheeled combat armored vehicle used by the US Army.

- It is an armoured personnel carrier, which can carry a squad of nine combat-equipped troops besides its crew of two.

- **Development:** jointly developed by General Dynamics Land Systems (GDLS) Canada and the General Dynamics Land Systems Division in the United States.

- **Armament:** Equipped with a 30 mm cannon and a 105 mm mobile gun.

- **Range:** 483 kilometers

- **Top speed:** Approximately 100 km/h

- **India's Plan:** India plans to procure 530 Strykers to equip 10 mechanised infantry battalions. They are primarily intended to be deployed in high altitude areas along the Line of Actual Control (LAC) in Ladakh and the north-east.



## India-UK Defence Agreements

*Syllabus Mapping: Defence agreements and Exercise*

### Context:

India and the UK have signed multiple defence agreements at Aero India 2025.

### Key Agreements:

- **Defence Partnership–India (DP-I):** Establishment of a dedicated programme office within the UK's Ministry of Defence to serve as a one-stop hub for bilateral defence collaboration.

- **Collaboration for Missiles:**
  - Thales and Bharat Dynamics Limited (BDL) signed a contract to deliver Laser Beam Riding MANPADs (LBRM), with an initial supply of High Velocity Missiles (STARStreak) and launchers in 2025
  - Both Thales and BDL will further collaborate to produce Lightweight Multirole Missiles (LMM)
  - Matra BAe Dynamics UK (MBDA UK) and BDL have been working together on the installation of a first-of-its-kind Advanced Short-Range Air to Air Missile (ASRAAM) assembly and test facility in Hyderabad.

- **Maritime Front:** signed a Statement of Intent to design and develop an Integrated Full Electric Propulsion (IFEP) system for India's next generation Landing Platform Dock (LPD) fleet.

This partnership supports India's Atmanirbhar Bharat vision and aligns with the UK's growth agenda.

## India-UK defence Ties

- India and the UK signed the Defence and International Security Partnership (DISP) in November 2015 to provide a strategic roadmap and direction to the evolving India-UK Defence Relations.

**Cooperation for the Indo-Pacific:**

- UKhas joined the Indian Navy's IOR Information Fusion Center (IFC-IOR) in Gurugram to deepen maritime domain awareness in the Indo-Pacific.

- India is a member of QUAD whereas UK is a member of AUKUS which present complementary role for the security in the Indo-Pacific to counter the Chinese aggression.

- In 2022, Britain granted India an Open General Export Licence (OGEL)—its first to a country in the Indo-Pacific—to permit the export of military technology and dual-use goods.

**Bilateral defence Projects and Joint military exercise:**
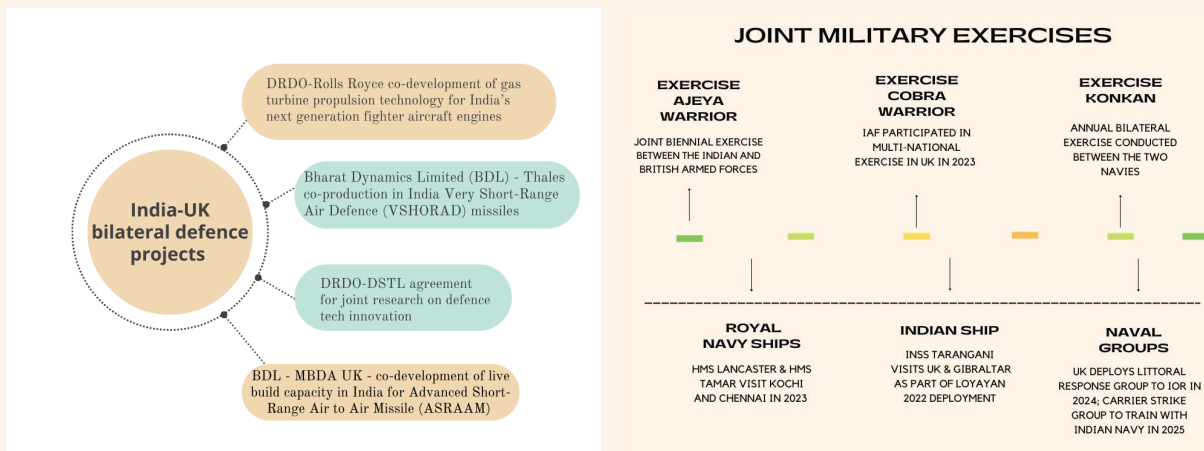


## 8th Indian Ocean Conference

- Recently the 8th **Indian Ocean Conference (IOC),** was held in **Muscat, Oman.** Its theme was "Voyage to New Horizons of Maritime Partnership.

About Indian Ocean Conference (IOC)

- IOC was started by the **India Foundation in 2016** with participation from 30 countries. The first conference was held in **Singapore.**

- It serves as a platform for nations within and beyond the Indian Ocean region to discuss and collaborate on regional affairs

India's Policy in Indian Ocean:

Considering the fact that regional security is intrinsically linked to the stability of the Indian Ocean, India is prioritising the Indian Ocean in its foreign policy as follows:

- India had a number of initiatives to help promote cooperation in the Indian Ocean region. For example,
  - **SAGAR** (Security and Growth for All in the Region)
  - **IORA:** India has been a key player in the Indian Ocean Rim Association (IORA), which aims to foster economic cooperation.
  - **Indian Ocean Naval Symposium (IONS):** established to promote cooperation among the navies of Indian Ocean rim countries.
- India as First responder: India acts swiftly during natural disasters, earthquakes, oil spills and other crises in the IOR.

### Exercise Dharma Guardian

• The **sixth edition of Joint Military Exercise Dharma Guardian** is scheduled at Mount Fuji, Japan from February 25 to March 9.

About Dharma Guardian

• It is a joint military exercise between **India and Japan.**

• It is conducted annually in India and Japan on an alternated basis.

• The exercise aims to enhance interoperability between the two forces while undertaking joint urban warfare and counter-terrorism operations under UN mandate.

• **Other Exercises between India & Japan: Veer Guardian (Air Exercise), JIMEX (Maritime)**.

### Philippines to remove U.S. missile system (Typhoon) if China stops 'sea aggression'

• Philippines has offered to remove the **Typhon mid-range missile system,** if China ceases its aggressive actions in the South China Sea.

• U.S. Army deployed the **Typhon system** in the **northern Philippines** in **April 2024** for joint readiness exercises. It enhances mobility and survivability of US amid rising tensions with China and Russia.

About Typhon mid-range missile system

• It is also known as US army's Strategic Mid-Range Fires (SMRF) System.

• Development: by US firm Lockheed Martin for the US Army.

• It is a **mobile, ground-launched missile system** developed to provide the **U.S. Army** with enhanced **long-range strike capabilities**.

• A full Typhon Weapon System battery comprises **four launchers, a command post, and reload and support vehicles**, all on trailers.

• **Missiles:** It can launch both SM-6 (Standard Missile-6) missiles and Tomahawk cruise missiles

• **Launchers:** The Typhon system consists of **launchers** capable of firing **16 missiles** (four launchers, each carrying four missiles).

• **Range:**

  – Tomahawk missiles have a range of **1,600 km** , capable of reaching parts of **mainland China**.

  – SM-6 missiles have a range of over **200 km** and can engage air and maritime threats.



### Exercise Ekuverine

• The 13th edition of the joint India-Maldives military exercise 'Ekuverin' was hosted by the Maldives in February 2025.

• It is a biennial exercise, which alternates between India and the Maldives.

**Aim:**

• Enhance the ability of both forces to work in coordination and partnership.

• Conduct counter-insurgency operations effectively.

• Carry out joint humanitarian assistance and disaster relief operations.

Other exercise between India and Maldives

• Exercise Katha: Naval Exercise between India and Maldieves

• Exercise Shield: Naval Exercise among the Navies of India, Maldives and Srilanka

• Exercise Dosti: Naval exercise among Coast Guard of India, Maldives, and Sri Lanka

### Theatre Level Operational Readiness Exercise (TROPEX-25)

**Context:** India is conducting Theatre Level Operational Exercise (TROPEX-25) in the Indian Ocean Region.

**About TROPEX**

- It is the **Indian Navy's largest biennial maritime exercise**.
  – Includes testing **Combat readiness** and **joint warfighting capabilities**.
- **Location:** Conducted across the **Indian Ocean Region (IOR)**.
- **Participation: Led by the Indian Navy** with active involvement from the **Indian Army, Air Force, and Coast Guard**.
- Duration: It is conducted over a duration of three months from Jan - Mar 25.
- **Key Features:**
  – Strengthens **maritime security** and enhances **anti-submarine, cyber, and electronic warfare** capabilities.
  – Involves **live weapon firings** and **simulated combat scenarios**.
  – Tests **integrated response strategies** against **conventional, asymmetric, and hybrid threats**.
  – Includes **joint work-up phases** and **amphibious exercises** for coordinated operations.

# POLITY & GOVERNANCE

## TOPICS FOR MAINS

### Judicial Backlog in India

*Syllabus Mapping: GS-Paper 2, Judiciary*

## Context

India's judicial system faces a significant challenge due to an enormous backlog of cases. This issue affects all levels of the judiciary, from the Supreme Court down to lower courts.

## Data

**Pendency of cases, As per the National Judicial data grid (2023)**
- **Subordinate courts:** 4.4 crore pending cases (85% of total pendency)
- **High courts:** 61 Lakh pending cases
- **Supreme court:** About 80,000 pending cases.

## Causes of judicial pendency

**Structural and Administrative inefficiencies**

- **Judge-population ratio:** According to the Law commission we need 50 judges per Million population. But in India we have 21 judges per Million population.
- **Judicial Vacancies**: Many courts operate with only half of their sanctioned strength due to unfilled positions.
- **Poor functioning of police & public prosecutors**: No differentiation between investigation & law and order. (same person involved).
- **Court halls:** Only about 20,000 court halls pan India which leads to limited access to justice in a vast country such as India.
- **Budget for justice:** The budget for the Ministry of Law & Justice budget is about 0.1% of the total budget.
  - It leads to limited infrastructure development, required to dispense justice.

**Procedural Inefficiencies**

- **Poor case clearance rate:** Misuse of judicial process by advocates & public prosecutors leads to a poor case clearance rate.
  - **Eg: Frequent adjournments.**
- **High procedural delays:** Due to securing the presence of witnesses.
  - **Eg:** About 50% of cases are pending as we are not able to secure the presence of witnesses.
- **Cumbersome Legal Procedures**: Lengthy and complex legal processes slow down case resolution.
- **Limited Technological Integration**: Insufficient use of digital tools in case management.

**Rising Case Volume**

- **Surge in Litigation**: Greater legal awareness and accessibility have led to an increase in filed cases.
- **Frivolous Lawsuits:** A significant portion of cases are unnecessary or vexatious, adding to the backlog.

**Institutional Constraints**

- **Delayed Judicial Appointments**: Procedural and political hurdles slow down the appointment of judges.
- **Inadequate Court Infrastructure:** Many courts lack essential facilities, affecting efficiency.
- **Weak Legal Aid System:** Insufficient legal support for underprivileged individuals contributes to delays.

**Societal Influences**

- **Economic and Social Disparities:** Marginalized groups encounter more obstacles in seeking justice.
  - **Eg**: The President of India highlighted the **black coat syndrome** in courts which describes the anxiety experienced by ordinary citizens in court settings.

## Impact of pendency of cases

**For Litigants:**

- **Delayed Justice**: Prolonged legal proceedings weaken the fundamental principle of timely justice.
  - In the words of **William Gladstone, "Justice delayed is justice denied"**
- **Financial Strain:** Extended litigation results in substantial legal expenses.
- **Mental health distress**: Lengthy court battles contribute to emotional and mental exhaustion.

**For the Judiciary:**

- **Declining Trust**: Persistent delays erode public confidence in the judicial system.
- **Reduced Efficiency:** An overburdened judiciary compromises the quality and speed of rulings.

**For the Society:**

- **Economic Repercussions:** Delays in commercial disputes hinder economic growth.
- **Threat to Social Harmony:** Unresolved conflicts may escalate tensions and disrupt societal stability.

## Case Laws

- **Kartar Singh Vs. State of Punjab**, SC said that 'Speedy justice is a part of FRs'
- **Babu Singh Vs. State of UP**: SC said that, 'Speedy trial is a part of social justice'

## Government Initiatives

- **Increased digitization**: **e-Courts Mission Mode Project** is a flagship initiative aimed at leveraging Information and Communication Technology (ICT) for the modernization and development of the Indian Judiciary.
- **LIMBS**: Legal information management briefing system developed by GOI.
  - **Eg**: In most cases, GOI is the litigant which involves various departments.
  - **Eg**: Under LIMBS, the case is uploaded on a platform that is accessible to all departments.
- **Alternate dispute redressal:**
  - **Lok Adalats** help in ease of communication where parties can directly interact with the judge. It further reduces the pendency of cases by reducing burden on the formal judiciary.
  - **Fast track courts**: Special courts for speedy trials to make the judiciary more effective and to avail justice as fast as possible.
- **Judicial infrastructure:** The Union government has approved the continuation of the Centrally sponsored scheme (CSS) for Development of infrastructure facilities for Judiciary at a cost of Rs 9,000 crore till 2026.

## Way Forward

- **All India Judicial services** (Proposed by President Draupadi Murmu on Constitution Day, 2023)
- Increase in the budget of the Ministry of Justice is required to improve judicial infrastructure and ultimately reduce the pendency of cases.
- **Data & Case Classification:** Sensible **categorization of cases** can prevent repetitive legal engagements and speed up disposal of cases.
- **Appointing Retired Judges on Ad-hoc Basis:** Helps **temporarily** reduce backlog but is not a long-term solution.
- **Legal Reforms: Cheque bouncing and landlord-tenant disputes** contribute heavily to the Judicial backlog.
  - Revising laws to discourage unnecessary litigation (e.g., **punitive costs for frivolous cases**) can reduce caseloads.
- **Government as a Responsible Litigant:** The **government should settle disputes amicably** instead of engaging in prolonged litigation.
  - Current efforts show **some improvement**, but reforms are needed to curb excessive legal battles.

## Panchayati Raj Institutions

*Syllabus Mapping: GS-Paper 2, Local bodies*

### Context

In present days big shifts in both technology and society are threatening to make panchayats irrelevant.

### Panchayati Raj Institution (PRI) in India

- The Panchayati Raj Institution (PRI) in India was formally introduced through the **73rd Constitutional Amendment Act, 1992**, which institutionalized a three-tier system of local governance in rural areas.
- **Objective**: To decentralize power and promote democratic self-governance at the grassroots level.

### Key features of the 73rd Amendment:

- **Three-tier system**: Gram Panchayat (village level), Panchayat Samiti (block level), and Zilla Parishad (district level).
- **Regular elections**: Every five years to ensure continuity.
- **Reservations**: 50% of seats reserved for **women, Scheduled Castes (SCs), and Scheduled Tribes (STs)** to promote inclusivity.
- **Devolution of powers**: The Eleventh Schedule of the Constitution lists **29 subjects** (e.g., agriculture, education, health, and rural development) to be managed by PRIs.

### Challenges faced by PRIs

- **Limited Autonomy:** Local institutions frequently encounter interference and control from higher levels of government, limiting their ability to make effective decisions.
- **Lack of Financial Resources:** PRIs frequently lack revenue-generating mechanisms and rely significantly on government funding.
- **Overdependence on Centrally Sponsored Schemes:** Many central government programs now **bypass PRIs** and directly deliver benefits to citizens (e.g., **PM-KISAN cash transfer scheme**)
  – PRIs are **reduced to implementation agencies** rather than decision-making bodies.
- **Absence of Political Will:** Political leaders at the local level may not prioritise community requirements or provide local institutions with the necessary support and resources.
- **Limited Public Participation**: Citizens are unaware of their rights or may not actively participate in local institutions' decision-making processes.
- **Structural Deficiencies:** Inadequate secretarial support and a lack of technical expertise can hinder the efficacy of regional institutions.
- **Emergence of Parallel Governance System:** The emergence of parallel institutions, such as **special purpose vehicles,** can cause confusion and erode the authority of local governments.
- **Proxy representation:** Due to the provision of women representation at local levels, the **Sarpanch pati and Pradhan pati syndrome** is on a rise.
- **Top-Down Approach:** A one-size-fits-all approach may not be suitable to meet the requirements of the locals, resulting in insufficient services and limited effectiveness of local institutions.
- **Rapid Urbanization:** India has experienced rapid urbanization, shifting the policy focus to cities and towns.
  – In 1990, nearly three-quarters of India lived in rural areas, which has decreased to around 60% and continues to decline.

### Government initiatives to strengthen PRIs

- **Strengthening Autonomy:** Local institutions can be given more autonomy and decision-making power, so they can function more effectively and make decisions that are in the best interests of the local community.
  – **Eg- E- Gram Swaraj**
- **Use of technology:** In order to strengthen PRIs and to provide adequate awareness to the local communities.
  – **Eg - SWAMITVA scheme** provides the survey of villages and its mapping.

- **Capacity Building**: Efforts should be made to build the capacity of PRIs through the provision of adequate financial, technical, and human resources.
    - **Eg - Rashtriya Gram Swaraj Yojana (RGSY)**
- **Bridging critical gaps in infrastructure**: In order to enhance capacity building and identify the most backward districts of the country.
    - **Eg - Backward regions grant fund (BRGF)**

## Way forward

- **New Vision for Panchayati Raj:** Adopting a new perspective on panchayats beyond being mere last-mile delivery instruments for social sector schemes.
- **Leveraging Technology:** Using technology to deepen citizen engagement in local planning, decision-making, and accountability processes. A networked Panchayati Raj system could bridge the rural-urban divide by supporting safe internal migration.
- **Focus areas:** Focusing the role of panchayats on enabling water conservation and renewable energy generation at scale.
    - **Eg:** Panchayats can reclaim their role in managing common property resources by combining scientific practices, traditional knowledge, and public finances.
- **Community-Based Disaster Risk Management:** Panchayats can play a key role in implementing community-based disaster risk management programs, integrating early warning systems, disaster-resilient infrastructure, and capacity-building for residents.
- **Reviving Local Governance**: Reviving local governance in substantive terms, as a significant proportion of India's population (94 crore people) still lives in villages, with over 45% engaged in agriculture.

## Reservation

*Syllabus Mapping: GS-Paper 2, Significant provisions of the Constitution*

## Context

- The idea that "Reservation for Muslims is a bad idea" and "Affirmative action for Muslims is necessary" may seem contradictory.
- The contradiction arises from a limited imagination of social justice, where affirmative action is equated solely with reservation in government jobs and education.
- Social justice debates in India are often reduced to battles over quotas, leading to multiple communities demanding reservations, including ex-servicemen, sexual minorities, and displaced persons.

## Quest for Justice

**"Injustice anywhere is a threat to justice everywhere" - Martin Luther King**

- Eg: Israel-Palestine war
- Eg: Rise of Naxalism (Injustice during land reforms, basic rights issue to tribals led to the rise of Naxalism)
- Eg: Caste based/gender based /religion based discrimination (threatens justice of entire community)

**"Virtue ethics" - Plato**

Virtues are moral characters and anyone with these moral characters can lead an ethical and happy life.

**Four virtues vital for Plato**

- **Wisdom**: Application of knowledge
- **Fortitude**: Balanced courage (to face adversities to take tough decisions)
- **Temperance**: Moderation (self-control) to avoid unethical actions- Bribery/corruption
- **Justice**: Actions should ensure fairness, equity and equality.

**New Approach**

- A recent report titled **"Rethinking Affirmative Action for Muslims in Contemporary India"**, authored by **Hilal Ahmed, Mohd Sanjeer Alam, and Nazima Parveen**, suggests a more nuanced approach. It makes three key arguments:
    - **Affirmative action for Muslims is necessary** due to their socio-economic disadvantages.
    - **Reservation for the entire Muslim community is not a viable solution** for legal, sociological, and political reasons.
    - **A "bouquet of policies" should be adopted** to address specific disadvantages faced by various Muslim communities.

## Demand for reservation for Muslims

- **Sachar committee report (2006):** Highlighted educational and economic disadvantages faced by Muslims.
- **National commission for linguistic and religious minorities (2007):** Suggested 15% quota for minorities, 10% for Muslims in jobs and education.

## Key Arguments Against Blanket Reservation

- **Legal-constitutional Issues:** The Indian Constitution does not explicitly allow reservations based on religion. The judiciary has historically rejected proposals to classify religious communities as "socially and educationally backward classes" due to constitutional constraints.

- **Sociological Diversity:** The Muslim community is not monolithic; it comprises numerous sub-groups with diverse socio-economic profiles. This diversity complicates the implementation of uniform reservation policies.

- **Political Ramifications:** Proposals for blanket reservations could provoke counter-mobilization against Muslims, exacerbating existing tensions in a politically charged environment.

## Recommendations for Alternative Policies

The report advocates for a multi-faceted approach rather than blanket reservations:

- **Religion-Agnostic Quota Approach:**
  - **Inclusion in OBC Lists:** Ensure that all backward Muslim communities are recognized in Other Backward Classes (OBC) lists.
    - Currently, only about half of Muslims qualify for OBC benefits, despite evidence suggesting that over 75% of Muslims meet the criteria.
  - **Segmentation of OBC Categories:** Create distinct categories within OBCs, such as "extremely backward" and "backward," to better reflect the varied socio-economic conditions among different Muslim communities.
- **Anti-Discrimination Measures:** Establish an Equal Opportunity Commission to monitor and enforce anti-discrimination laws aimed at protecting minority rights.
- **Infrastructure and Sectoral Support:** Implement a spatial approach to enhance public infrastructure in areas with high concentrations of Muslim populations.
- **Private Sector engagement:** Encourage private sector diversity through government incentives without enforcing strict quotas that may lead to backlash.
- **Community Involvement:** Foster collaboration with NGOs and community organizations to address local needs effectively without relying solely on state mechanisms.

## Conclusion

While there is a pressing need for affirmative action to address the socio-economic disadvantages faced by Muslims in India, a nuanced approach is essential. The report emphasizes that blanket reservations may not be the most effective solution due to legal, sociological, and political challenges. Instead, it proposes targeted policies that recognize diversity within the community while promoting equitable opportunities across various sectors.

## Appointment of Election Commissioners

*Syllabus Mapping: GS-Paper 2, Constitutional bodies*

## Context

The appointment process of election commissioners (ECs) has been questioned for years, raising serious concerns about the autonomy and impartiality of this vital institution.

## Process of Appointment of Election Commissioners (CEC and ECs)

| Aspect | Old Procedure | SC Verdict (Anoop Baranwal vs Union of India) 2023 | New Law |
|---|---|---|---|
| **Appointment Process** | Appointed by the President on the advice of the Union Council of Ministers, usually suggested by the Law Minister and the Prime Minister. | SC ordered that the Chief Election Commissioner (CEC) and Election Commissioners (ECs) shall be appointed on the advice of a committee comprising the **Prime Minister, Leader of Opposition in Lok Sabha and Chief Justice of India.** | Appointed by the President based on the recommendation of a Selection Committee comprising the Prime Minister, a Union Cabinet Minister, and the Leader of Opposition or leader of the largest opposition party in Lok Sabha. |
| **Selection Committee** | Not specified. | Prime Minister, Leader of Opposition in Lok Sabha and Chief Justice of India. | Includes the Prime Minister, a Union Cabinet Minister, and the Leader of Opposition/leader of the largest opposition party in Lok Sabha. |
| **Search Committee** | Not specified. | | A Search Committee led by the Cabinet Secretary will recommend a panel of names to the Selection Committee. |
| **Salary and Conditions** | Equivalent to a Supreme Court Judge. | | Made equivalent to that of the Cabinet Secretary. |
| **Removal Process** | The CEC could be removed in a manner similar to a Supreme Court judge. ECs could be removed on the CEC's recommendation. | | Retains the constitutional provision for CEC's removal like a Supreme Court Judge. ECs can only be removed on the recommendation of the CEC. |

## Challenges in the Appointment Process of Election Commissioners

- **Lack of Institutional Independence:** The executive **dominates the selection panel**, affecting the neutrality of the ECI.
  - The **2023 Act replaced the Chief Justice of India (CJI) with a Union Minister**, giving the ruling party greater control.
- **Violation of Supreme Court's Spirit: SC's 2023 ruling** recommended a balanced committee (**PM, LoP, and CJI**) until Parliament passed a law.
  - The new law **overturned the spirit of the ruling**, leading to concerns over **executive overreach**.
- **Delay in Judicial Review:** Despite the **ADR's legal challenge**, the **SC did not grant an interim stay**, allowing fresh appointments under the new law.
  - The **hearing on February 19, 2025, was adjourned without a new date**, leaving uncertainty over the legitimacy of the appointments.

**Global best practices in EC appointments**

**Brazil's Method**
Appointment by Federal Court ensures judicial independence.

**USA's Method**
Presidential appointment with Senate consent balances executive and legislative power.

**South Africa's Method**
Legislative recommendations influence appointments, reflecting democratic input.

**France's Method**
Joint appointment by President, Legislature, and Judiciary ensures multi-branch cooperation.

- **Lack of Transparency:** The **current selection process lacks public scrutiny and institutional checks**.
    - No parliamentary oversight or independent review mechanism exists.
- **Credibility Issues: Optics matter** in democracy—any perception of bias undermines the credibility of elections.
    - The **ECI's independence must not only exist but be visible** to maintain public trust.
- **Global Best Practices Ignored:** Other democracies have **more transparent, bipartisan, and institutionally balanced** selection processes.
    - India's model remains **opaque and politically controlled**, despite being a leading democracy.

## Conclusion

- **Embracing a bipartisan and neutral collegium-based appointment system** would strengthen the ECI's independence.
- The future of electoral democracy in India depends on addressing these concerns with **judicial intervention, public pressure, and political will**.
- **Institutional autonomy**: Elections are the bedrock of democracy and ECI's credibility is central to democratic legitimacy. Therefore, the guardian of elections requires institutional safeguards to protect its autonomy.

## 20 years of Right to information (RTI) Act

*Syllabus Mapping: GS-Paper 2, Significant provisions of the Indian Constitution*

## Context

Over the years since its inception, the **Right to Information (RTI) Act, 2005** has faced several challenges, leading to its **dilution and inefficiency** in achieving its original purpose.

As per the **2nd ARC** report, **'RTI is the master key for good governance'**

## Introduction to RTI

The **Right to Information (RTI) Act, 2005**, was introduced as a transformative law aimed at **empowering citizens** by granting them access to government-held information. This transparency law was seen as a step towards **true democracy**, enabling citizens to hold the government accountable.

## The Right to Information (Amendment) Act, 2019

- **Tenure:** The tenure of the commissioners has been reduced to **three years** from earlier tenure of five years or the retirement age of 65 years, whichever is earlier.
- **Salary**: Gave the authority to the **Central Government** to determine the salaries and allowances of the CIC and ICs at the Centre and the State level.
- **Pension**: The Amendment abolished the provision of pension or retirement benefits conferred to the CIC and ICs.
- **Executive**: The service condition will be notified by the executive against which the information is sought by citizens.

**Key Sections of the RTI Act**

- **Section 3:** Provides that **every citizen has the right to information** under the Act.
- **Section 8:** Lists **exemptions** under which information can be denied.
    - **Section 8(1)(j)**: Exempts disclosure of personal information unless it is in **larger public interest** or unless the same information would be provided to **Parliament or State Legislature**.
- **Section 19:** Provides for a **two-tier appellate mechanism**:
    - **First appeal** to the senior officer in the public authority.
    - **Second appeal** to the **Central or State Information Commission**.

## RTI as a Powerful Tool

- **Empowerment of Citizens**: The RTI Act recognized citizens as **rulers of the nation**, enabling them to seek information from the government with **dignity and respect**.

- **Curbing Corruption**: By making information accessible, RTI was expected to **reduce arbitrariness and corruption** in governance.
- **Transparency and Accountability**: The Act codified the fundamental right to information under **Article 19(1)(a)** of the Constitution, making India one of the countries with the **best transparency laws**.
- **Information Commissions**: The Act established **Central and State Information Commissions (CIC/SICs)** to act as appellate bodies in case of information denial.

## Case Laws

| Case Name | Year | Key Ruling | Impact |
|---|---|---|---|
| Union of India vs Association for Democratic Reforms | 2002 | Citizens have the right to know about the **criminal records, assets, and liabilities** of election candidates. | Strengthened RTI by recognizing **right to information as part of Article 19(1)(a)**. |
| CBSE vs Aditya Bandopadhyay | 2011 | Section 8 should not be interpreted **too narrowly**; RTI should not obstruct governance. | Allowed **bureaucratic reluctance** in sharing information, weakening RTI enforcement. |
| Girish Ramchandra Deshpande vs CIC | 2012 | Personal information cannot be disclosed under **Section 8(1)(j)**. | Became the **precedent for denying information** on public officials' conduct. |
| RBI vs Jayantilal N. Mistry | 2015 | RBI must disclose information about **wilful defaulters** and **banking irregularities**. | Strengthened financial transparency under RTI. |
| Subhash Chandra Agarwal vs CPIO, Supreme Court | 2019 | The Office of the **Chief Justice of India (CJI)** is under RTI. | Increased **judicial transparency**. |

## Ineffectiveness of the RTI Act

- **Bureaucratic Resistance:** Initially, **most Information Commissioners** appointed were **retired bureaucrats**, who had spent their careers working within the system.
  - Many commissioners treated their roles as **post-retirement sinecures**, working only for **a few hours a day** instead of actively enforcing transparency.
- **Timeline Issues:** As per the RTI Act:
  - Public authorities must **respond within 30 days** to an RTI request.
  - First appellate authorities must also **decide within 30 days**.
  - However, **no strict time limit was set for Information Commissioners**, leading to **delays of over a year** in several cases.
- **Weakening RTI:** Courts played a **critical role** in diluting the effectiveness of RTI through **controversial judgments**.
  - **CBSE & Anr. vs Aditya Bandopadhyay & Ors. (2011)**
    - The Supreme Court ruled that **Section 8 exemptions should not be interpreted too strictly**.
    - The judgment stated that **excessive RTI requests could obstruct national development**, which provided a **justification for restricting information**.
- **Legislative Dilution of RTI:** The **Digital Personal Data Protection Act (DPDPA), 2023**, amended the RTI Act by restricting access to **personal data**.
  - This amendment further **weakened RTI**, allowing the government to **withhold information on vague grounds of privacy**.

## Way forward

- **To fill Vacancies in Information Commissions**: Many State Information Commissions (SICs) and the Central Information Commission (CIC) face delays due to vacant posts. Appointing commissioners promptly and ensuring they are independent and competent can speed up the resolution of appeals and complaints.
- **Strict Timelines:** To enforce deadlines for Public Information Officers (PIOs) to respond to requests and for commissions to adjudicate appeals, with penalties for non-compliance.

- **Public Education Campaigns:** There needs to be increased awareness about RTI among citizens, especially in rural areas, through campaigns in local languages, workshops, and digital platforms. NGOs and civil society can play a key role here.

- **Simplify the Process:** Public outreach to file RTI requests can be easier by expanding online portals, ensuring they are user-friendly, and providing support for those without internet access (via post offices or local government offices)

- **Whistleblower Protection:** RTI activists often face harassment, threats, or violence. Enacting and enforcing a strong whistleblower protection law, along with fast-tracking investigations into attacks on activists, would bolster their safety.

- **Narrow Ambiguity:** Section 8 of the RTI Act lists exemptions (Such as national security, personal privacy). Clear guidelines and judicial oversight can prevent PIOs from overusing these exemptions to deny legitimate requests.

## Uniform Civil Code (UCC)

*Syllabus Mapping: GS-Paper 2, Significant provisions of the Indian Constitution, DPSPs*

### Context

Uttarakhand became the **first Indian State to implement the Uniform Civil Code (UCC)**, placing private relationships under state surveillance.

### Negative impacts of personal laws on the fundamental rights of citizens

- **Gender Inequality**: **E.g. - Parsi personal law** has been criticised for being discriminatory against Parsi women who marry outside the community. (Article 15)

- **Violation of Individual Autonomy**: Under the **Christian Personal Law 1872**, even when a civil divorce is awarded, an individual can't remarry in a Roman Catholic Church as the previous marriage still exists in God's eyes. (Article.21)

- **Undermining child's interests:** In Muslim, Christian and Parsis. They have to approach the **court** under **Guardianship and Wards Act** whereas Hindus are governed by Hindu Adoption and Maintenance act. (Article 23)

### Arguments in favour of UCC

- **Harmonisation with Constitutional Rights**: UCC would provide a uniform legal framework aligned with constitutional principles, such as the **freedom of religion** and **right to non-discrimination.**

- **Women's Rights and Gender Equality**: UCC can address inequalities by providing equal rights and protections to women across all religious communities.

- **Modernization and Reform**: UCC can facilitate the modernization and reform of **archaic** laws, they reflect the evolving needs and aspirations of society.

- **Adoption and Guardianship:** A UCC can establish a common framework for adoption and guardianship, ensuring that the best interests of the **child are given priority over religious or cultural considerations.**

### Arguments against UCC

- **Legal Complexity**: Drafting and implementing a comprehensive UCC that covers various personal matters such as marriage, divorce, inheritance, and adoption is a complex task.

- **Religious freedom:** Under **Article 25 and 26** the Constitution ensures the right to choose the religion of one's choice as there is no official religion for the state, implementing UCC may point towards curtailing religious freedom of citizens.

- **Tribal concerns:** To protect the ethnic diversity within the country, **Article 371A and 371G** were mentioned in the Constitution for instilling special provisions for the Northeast states. With the implementation of UCC, the tribal communities hold apprehensions over the erosion of their religious multiplicity, marginalisation and lack of representation.

### Way Forward

- **Respect for Religious Freedom**: Ensure that any reforms or implementation of a UCC do not infringe upon the individual's right to practise and follow their religious beliefs.

- **Legal Pluralism**: Work towards a UCC while respecting personal laws for religious rituals, customs, and traditions that don't violate constitutional rights.

## TOPIC FOR PRELIMS

### New rules for Aadhaar authentication: UIDAI

*Syllabus Mapping: Rules, Amendments*

#### Context

The Ministry of Electronics and Information Technology (MeitY) has notified amendments to the Aadhaar (Targeted Delivery of Financial and Other Subsidies, Benefits and Services) Act, 2016.

#### Key Amendments

- **Expanded Scope of Aadhaar Authentication:** The amendment broadens the use of Aadhaar authentication to include **both government and non-government entities** for: **Good governance, Social welfare programs, Innovation and knowledge dissemination & Ease of living.**
  - These changes will **improve service delivery** in various sectors such as: **E-commerce, Travel & tourism, Hospitality, Healthcare.**
- **New Approval Process for Aadhaar Authentication Request:**
  - **Application Submission:** Any entity (government or private) seeking Aadhaar authentication must submit an application detailing the **intended use case** to the **concerned Ministry or Department** (either Central or State Government).
  - **Review and Recommendation:** The **Unique Identification Authority of India (UIDAI)** will examine the request.
    - Approvals will be issued by MeitY based on **UIDAI's recommendation**.
  - **Final Notification:** The concerned **Ministry or Department** will notify the entity **after receiving confirmation from MeitY**
- **Key Changes in the Language of Rules:**
  - The previous rule's phrase: **"Interest of good governance, preventing leakage of public funds"** – **Removed** from the new amendment.
  - The new version states that **any non-government entity** seeking Aadhaar authentication must:
    - Justify its request under **Rule 3**
    - Demonstrate that it serves the **interest of the State**

### Supreme Court's Ruling on Forest Conservation

*Syllabus Mapping: Judiciary*

#### Context

The **Supreme Court of India** has directed the **Union government and States** to ensure that no reduction of **forest land** takes place without **providing compensatory land for afforestation**. The ruling is part of an ongoing case challenging the **2023 amendments to the Forest (Conservation) Act, 1980**.

#### Supreme Court's Key Directives

- **No reduction in forest land:** The court prohibited the use of forest land for development projects unless compensatory land is provided.
- **Linear projects require compensatory afforestation**: If forest land is used for **linear projects** (such as roads, railways, and transmission lines), an **equal amount of land must be afforested elsewhere**.
- **Dictionary meaning of 'forest' to continue:** The court reiterated that the definition of 'forest' should remain **broad and all-encompassing**, as established in the **TN Godavarman Thirumulpad case (1996)**.

#### Amendments to the Forest (Conservation) Act, 1980

- The **Forest (Conservation) Act, 1980** was enacted to **prevent deforestation** and **maintain ecological balance**.
- **What did the 2023 Amendments Change?**
  - Introduced **Section 1A**, which **narrowed the definition of 'forest'** to:
    - Declared forests
    - Lands recorded as forests in government records after 1980
- **Concerns Raised by Petitioners:**
  - Petitioners argued that **Section 1A weakened forest protection** by: Excluding nearly **1.97 lakh sq km** of undeclared forest lands

#### Supreme Court's Stand on the Definition of 'Forest'

- The **Supreme Court reaffirmed** that the term 'forest' will continue to have a **broad meaning**, as per the **TN Godavarman Thirumulpad case (1996)**
- This means forest lands will **not be limited to government-recognized forests**, but will also cover:
  - **Forest-like areas**
  - **Unclassed forests**
  - **Community forest lands**
- The **court ordered** that this broad definition **remain valid until** all States and UTs complete a **consolidated record of forest lands**.

## Foreigners Tribunals (FTs)

*Syllabus Mapping: Quasi-Judicial bodies*

### Context

While hearing a petition on illegal immigrants, SC has questioned Assam on **indefinite detention** of declared foreigners instead of deporting them.

**About Foreigners Tribunals (FTs)**

- Established by the Foreigners (Tribunals) Order of 1964 under Section 3 of the Foreigners' Act of 1946.
- **Purpose**: To enable local authorities to refer suspected foreigners to tribunals.
- **Exclusivity to Assam**: Currently, FTs operate only in Assam, while other states handle illegal immigrant cases under the Foreigners' Act.
- **Composition**: Each FT is led by a member from the judiciary, advocacy, or civil service with judicial experience.
- **Case Disposal**: FTs must conclude cases within 60 days. Failure to prove citizenship can result in detention and eventual deportation.

### Directives issued by Supreme Court

- The **Supreme Court emphasized that once a person is declared a foreigner, they must be deported immediately** and cannot be detained indefinitely.
- It cited Article **21 of the Constitution (Right to Life and Liberty)**, reinforcing that indefinite detention is unconstitutional.
- The **Union Government** has been directed to provide:
  - **Total number of declared foreigners** in Assam.
  - **Details of how many have been deported so far**.
  - **The procedure being followed** for individuals whose nationality is unknown

## Governor's Assent to Bills

*Syllabus Mapping: Executive*

### Context

The Supreme Court asked what Tamil Nadu Governor R.N. Ravi found so "gross" about the 12 Bills the State government sent him for assent that they were kept pending for over 3 years.

### Article 200: Power of Governor Related to Bill

- Grant assent to the Bill.

- Withhold assent from the Bill.
- Reserve the Bill for the President's consideration.
- Return the Bill (unless it is a Money Bill) to the legislature for reconsideration.
- If the bill is passed again, the Governor cannot withhold assent.

**Nabam Rebia & Bamang Felix Case 2016:** The Supreme Court limited the Governor's discretionary power under Article 200 to merely deciding whether a bill should be reserved for the President's consideration, asserting that such actions **are open to judicial review**.

### Article 201: Presidential Assent for Reserved Bills

- Grant assent to the Bill.
- Withhold assent from the Bill.
- Return the Bill for reconsideration.
- **Reconsideration of Reserved Bills:**
  - The legislature must reconsider a returned Bill within six months.
  - Once passed again, it is presented to the President.
  - The President is **not obligated to grant assent to a reconsidered Bill.**

### Categories of State Bills Reserved for the President

- **Mandatory Reservation**:
  - Bills that diminish the High Court's powers.
  - Bills imposing taxes on water or electricity under certain conditions.
  - Bills related to financial emergency provisions.
- **Discretionary Reservation for Specific Purposes**:
  - To grant immunity from Articles 14 and 19 for:
    - Acquisition of estates.
    - Implementing Directive Principles of State Policy.
  - To resolve conflicts with Union laws in Concurrent List subjects.
  - For trade and commerce restrictions needing Presidential sanction.
- **General Reservation**: Bills that do not fall into specific categories but are still reserved by the Governor under Article 200.

### Various Commissions Recommendations

| Commission | Recommendations |
|---|---|
| Sarkaria Commission | Governors should act on ministerial advice under Article 200, barring unconstitutional bills. |
| | Governors should be impartial, not recently politically active, and not members of the ruling party. |

| Commission | Recommendations |
|---|---|
| Punchhi Commission | Governors should decide on bills within 6 months. |
| | Governors can be impeached by the State Legislature. |
| | A committee including the state's Chief Minister should select Governors. |
| 2nd ARC | The Inter-State Council should formulate guidelines for the exercise of governors' discretionary powers. |
| Rajamannar Committee | Governors should function as constitutional heads of states, not as agents of the central government. |

## Meghalaya's Demand for Special Provisions

*Syllabus Mapping: Special provisions for certain states*

### Context

A regional party in Meghalaya has proposed bringing the state under the purview of Article 371 to help resume rat-hole coal mining. **Rat-hole mining** has been **banned since April 2014** by the **National Green Tribunal (NGT)** due to environmental and safety concerns.

### Meghalaya's Current Situation

- Meghalaya has **Autonomous District Councils (ADCs)** under the **Sixth Schedule**, which gives limited autonomy to tribal regions.

- Due to this, the **NGT ban on rat-hole mining remains enforceable** despite ADCs having control over land and resources.

### Article-371

- **Article 371** provides **special provisions** for certain states in India to address **regional concerns, cultural preservation, and economic development**.

- These provisions vary **from state to state.**

- Article 369 appears in **Part XXI** of the Indian Constitution, titled **'Temporary, Transitional and Special Provisions'**.

- It extends to **11 states**, six of them are from the Northeast, where the provisions aim to preserve tribal culture.

| State | Special Provisions |
|---|---|
| Maharashtra & Gujarat (Article 371) | • Provides special provisions for the development of tribal communities in these states, ensuring greater representation and welfare policies for Scheduled Tribes. |
| Nagaland (Article 371A) | • Protects land, resources, and Naga customary laws.<br>• No Parliamentary law related to religion, social practices, administration of civil & criminal justice or land & resource ownership applies unless approved by the Nagaland Legislative Assembly. |
| Assam (Article 371B) | • Provides for the creation of special committees within the Assam Legislative Assembly to address tribal issues in the state. |
| Manipur (Article 371C) | • Ensures special safeguards for the hill areas and tribal interests through a Hill Areas Committee in the Manipur Legislative Assembly. |
| Andhra Pradesh & Telangana (Article 371D & 371E) | • Grants special provisions for equitable opportunities in public employment and education.<br>• Establishes a special tribunal for resolving disputes related to government jobs and university admissions. Article 371E also allows for the establishment of a Central University in Andhra Pradesh by law. |
| Mizoram (Article 371F) | • Similar to Nagaland—protects Mizo customary laws, land, and religious & social practices.<br>• Parliament cannot pass laws on these matters unless approved by the Mizoram Legislative Assembly. |
| Arunachal Pradesh (Article 371G) | Special provision with respect to the state of Arunachal Pradesh |
| Goa (371I) | Special provision with respect to the state of Goa |

### How Would Article - 371 Help Meghalaya?

- **Bypass Central Laws on Mining:** Meghalaya could **regulate mining independently**, similar to Nagaland.

- **Reduce NGT's Control:** NGT's **blanket ban on rat-hole mining may not apply**, allowing controlled mining.

- **Empower Autonomous District Councils (ADCs): Land and resource control would be exclusive to local communities**, reducing state intervention.

- **Preserve Local Culture and Economy:** Coal mining is a major economic activity for locals and an Article 371 provision could protect traditional economic practices.

## Supreme Court's Stand on Death Penalty in 2024

*Syllabus Mapping: Judiciary*

### Context

The Supreme Court (SC) did not confirm a single death sentence for the **second consecutive year** in 2024.

### Rarest of Rare Doctrine

- The **Supreme Court (SC)** in the **Bachan Singh v. State of Punjab (1980)** case established the principle that the **death penalty** should only be imposed in the **"rarest of rare"** cases.

- The Court emphasized that death sentences should be imposed after considering both **aggravating** and **mitigating** circumstances surrounding the crime.

- Aggravating Circumstances (Factors that may lead to the death penalty):

  - **Pre-planned murder**: If the crime is carefully planned and executed with extreme brutality.

  - **Exceptional depravity**: If the murder involves extraordinary cruelty.

  - **Murder of public servants:** If the victim is a public servant or someone serving in the armed forces, and the crime occurs in the line of duty.

- Mitigating Circumstances (Factors that may reduce the sentence):

  - **Extreme mental or emotional disturbance**: If the accused was experiencing severe psychological distress during the crime.

  - **Age of the accused**: Very young or old defendants may be exempt from the death penalty.

  - **Threat to society**: Whether the accused poses an ongoing danger to society.

  - **Possibility of reform**: If there is a reasonable expectation of the accused's reform.

  - **Actions under duress:** If the accused was compelled by others to commit the crime.

### Evolving Interpretations of Mitigating and Aggravating Factors

- **Age as a Factor**: In previous rulings, like **Ramnaresh and Ors v. State of Chhattisgarh (2012)** and **Ramesh v. State of Rajasthan (2011)**, the Supreme Court considered the young age of the accused (below 30) as a factor suggesting they could be reformed.

  - In the **RG Kar case, the accused** is 35 years old, which is considered an age where reform is still possible, but not as a mitigating factor.

- **Nature of the Offence**: The **SC** has emphasized comparing the case at hand to others with similar offenses to determine the appropriateness of the death sentence.

  - In **Machhi Singh v. State of Punjab (1983)**, the Court considered the **collective conscience** of society to determine if a crime is shocking enough to warrant the death penalty.

- **Possibility of Reform**: In **Bachan Singh case**, the Court emphasized that there should be **clear evidence** proving the accused is beyond reformation before imposing a death sentence.

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**Death Penalty (2024)**

- **Supreme Court - Total Cases Heard**: 6
  - **5 Death Sentences Commuted** to life imprisonment & **1 Acquittal**.
- **High Courts - Total Death Sentence Cases Decided:** 87
  - Confirmed Death Sentences: 9 (highest since 2019, when 26 were confirmed).
  - Commutations to Life Imprisonment: 79
  - Acquittals: 49
  - Cases Sent Back to Trial Court: 1
- **Trial Courts:** Total Death Sentences Awarded in 2024: 139
  - Murder Cases: 87 (62%)
  - Murder involving Sexual Offences: 35 (25%)
- **Top 3 States with Highest Death Sentences in 2024:** Uttar Pradesh: 34, Kerala: 20 & West Bengal: 18.
- **Total Death Row Prisoners by End of 2024**: **564** (Highest since **200**0).

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## Protection and Enforcement of Interests in Aircraft Objects Bill, 2025

*Syllabus Mapping: Important laws*

### Context

Recently the Minister **for Civil Aviation has** tabled the **Protection and Enforcement of Interests in Aircraft Objects Bill, 2025** in the **Rajya Sabha.**

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**Cape Town Convention (CTC) - 2001**

- CTC is an international treaty that standardizes transactions involving:
  - Movable property such as aircraft, engines, and helicopters
  - Legal protection for creditors, financiers and lessors
  - Rules for asset recovery during airline defaults or insolvencies

**India's Status in CTC**

- Signed in 2008 but not ratified, so provisions are not legally binding.
- The Protection and Enforcement of Interests in Aircraft Objects Bill, 2025 aims to bridge this gap.

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**Key Provisions of the Bill**

- **Legal Implementation of CTC in India:**

– **Section 3**: The Convention and Protocol **shall have the force of law in India**.

– The **Directorate General of Civil Aviation (DGCA)** will be the **regulatory authority** for implementation.

- **Responsibilities of Debtors (Airlines):**

  – Airlines must **maintain and submit records** of **dues related to aircraft and engines**.

  – Ensures **transparency in financial transactions** between airlines and lessors.

- **Rights of Creditors (Lessors & Financiers):**

  – Creditors can **exercise asset recovery rights** under CTC.

  – Before taking action, the **DGCA must be notified** about any airline **default**.

- **Handling of Aircraft During Airline Insolvency:**

  – The **resolution professional** can **keep aircraft assets for 60 days**, provided that **usage and maintenance charges are paid**.

  – This provision is **controversial** as the **aircraft leasing industry prefers immediate asset repossession**.

- **Exclusion from the Insolvency and Bankruptcy Code (IBC), 2016:**

  – As per **Ministry of Corporate Affairs notification (April 2024)**, aircraft **should not be part of insolvency proceedings**.

## EVM verification: Apex Court directions

*Syllabus Mapping: Elections*

### Context

The Supreme Court of India asked the Election Commission of India (ECI) to ensure that polling data is not deleted from Electronic Voting Machines (EVMs) while they are being verified.

### About Supreme Court's Directions

- **No Erasing or Reloading of Data:** The court directed the ECI **not to erase or reload polling data** during verification.

- **Clarification on Verification Process:**

  – The **burnt memory/microcontroller** should be checked in the **presence of the requesting candidates**.

  – Engineers from the EVM manufacturers must **certify that no tampering** has occurred.

- **Reduction in Verification Cost**: The court observed that the **current cost of ₹40,000 per EVM verification is too high** and directed the ECI to **reduce the cost**.

- **Short Affidavit from ECI**: The court asked the **ECI to file a short affidavit** explaining its verification procedure.

### Key Aspects of the EVM Verification Process

- **Candidates eligible for verification:** Only candidates who secured **2nd or 3rd place** in an election can apply.

- **Scope of verification**: **5% of EVMs per Assembly segment** can be checked.

- **Application Process**: Candidates must submit a **written request within seven days** of result declaration.

- **Responsible Authority**: The **District Election Officer**, in coordination with engineers, will oversee the verification.

- **Cost & Refund**: Candidates must **bear the cost** of verification, but they will be **refunded** if tampering is found.

## Corruption Perception Index 2024

*Syllabus Mapping: Reports and Indices*

### Context

Transparency International released its annual **Corruption Perceptions Index (CPI) 2024**, which highlights the state of **public sector corruption worldwide.**

### About Corruption Perception Index (CPI) - 2024

- The **global average score remains 43**, unchanged from **2023**.

- **More than two-thirds of countries** scored below 50, indicating **widespread corruption.**

- India ranked **96th out of 180 with a score of 38,** a decline of one point from the previous year.

**How CPI Measures Corruption**

- The CPI ranks **180 countries and territories** based on **perceived corruption in the public sector**.

- The score is calculated on a **scale of 0 to 100**:

  – **0** = Highly corrupt

  – **100** = Very clean

- Uses **13 data sources**, including reports from the **World Bank, World Economic Forum, and private risk consulting firms**.

- **Top 5 Least Corrupt Countries (Highest Scores):** (1) Denmark (2) Finland (3) Singapore (4) New Zealand.

- Bottom 5 Most Corrupt Countries (Lowest Scores): (1) South Sudan (2) Somalia (3) Venezuela (4) Syria.

**Transparency International**

- It is a **global non-governmental organization (NGO)** headquartered in **Berlin, Germany**. It was **founded in 1993.**

- It works to combat **corruption, promote transparency, and hold governments accountable**.

- The **Corruption Perceptions Index (CPI)** is its flagship report, released annually since **1995**.

## Decriminalisation of Politics

*Syllabus Mapping: Elections, Election laws*

### Context

The Supreme Court is currently hearing petitions seeking a **lifetime ban** on convicted individuals from contesting elections. It has sought a fresh response from ECI & Union Govt. on this matter.

### ADR Report on Criminal Records

- **251 MPs (46%)** in the 543-member Lok Sabha have **criminal cases** against them.
- **171 MPs (31%) face serious criminal charges** like rape, murder, attempt to murder, and kidnapping.
- **Winning probability:** Candidates with criminal backgrounds had a 15.4% chance of winning, while clean candidates had only a 4.4% chance.

### Legal Provisions on Disqualification

**Representation of the People Act, 1951 (RP Act, 1951)**

- **Section 8(3)**: **Disqualifies** a person **convicted of a criminal offence** and sentenced to **at least two years of imprisonment** from contesting elections. The disqualification lasts for **six years** after release.
- **Section 8(1)**: Disqualifies persons convicted under laws for **heinous crimes**, including:
  - **Rape**
  - **Untouchability** under the Protection of Civil Rights (PCR) Act
  - **Unlawful activities** under UAPA
  - **Corruption** under the Prevention of Corruption Act
  - **These individuals remain disqualified for six years post-release, irrespective of their sentence duration.**
- **Section 11**: Allows the **Election Commission (EC)** to **remove or reduce the disqualification period** of a convicted person.
  - **E.g:** In **2019, Prem Singh Tamang (Sikkim CM)** had his disqualification period **reduced from six years to 13 months**, enabling him to contest a by-election despite being convicted under the **Prevention of Corruption Act.**

**Supreme Court's Past Judgments on Decriminalisation of Politics**

- **Association for Democratic Reforms (ADR) Case (2002):** The Supreme Court **mandated disclosure of criminal records** of all candidates contesting elections.
- **Lily Thomas Case (2013):** SC struck down **Section 8(4) of the RP Act, 1951**, which allowed sitting legislators to continue as members **even after conviction** if they filed an appeal.

- Now, an MP or MLA is **immediately disqualified** upon conviction.
- **Public Interest Foundation v. Union of India (2019):**
  - Political parties publish the criminal record of their candidates on their websites, social media and local newspapers.

## Removal of HC judges

*Syllabus Mapping: Judiciary*

### Context

Rajya Sabha Chairman has asserted that only Parliament has the jurisdiction to constitutionally remove a High Court judge.

### Process of HC Judge Removal

- A judge can be removed from office through a motion passed by Parliament on the **grounds** of **"proved misbehaviour or incapacity."**
- Although the Constitution does not mention the term **"impeachment,"** it is commonly used to describe the removal process under **Article 124** (for Supreme Court judges) and **Article 218** (for High Court judges).

**Procedure for Removal of Judges (as per the Judges Inquiry Act, 1968):**

- **Initiation of Impeachment Motion: (Under Section-3 of the Act)**
  - The impeachment motion can originate in either House of Parliament:
    - **Lok Sabha:** Requires a signed notice by at least **100 members**.
    - **Rajya Sabha:** Requires a signed notice by at least **50 members**.
  - The **Speaker** (for Lok Sabha) or **Chairman** (for Rajya Sabha) may consult individuals and examine relevant materials before deciding whether to admit or reject the motion.
- **Investigation Committee Formation:**
  - If the motion is admitted, the Speaker or Chairman will form a **three-member committee** to investigate the charges. The committee consists of:
    - **Chief Justice of India** or a **Supreme Court judge (Head of Committee)**
    - The **Chief Justice of a High Court**
    - A **distinguished jurist (In opinion of Speaker/Chairman)**
- **Framing of Charges:** The committee frames charges and provides a copy to the judge, who can submit a **written defence**.
- **Committee Report Submission:** After completing the investigation, the committee submits its report to the Speaker or Chairman.

- The report is then presented before the concerned House of Parliament.
- **Consideration of Motion:** If the report finds evidence of **misbehaviour or incapacity**, the motion for removal is considered and debated in the House.
- **Adoption of Motion:** The motion must be passed in each House by:
  - A **majority of the total membership** of that House.
  - A **two-thirds majority** of the members present and voting.
  - If the motion passes in one House, it is sent to the other House for approval.
- **Presidential Order:** Once both Houses adopt the motion, it is sent to the **President**, who issues an order for the judge's removal.

**Note:** Except for a **removal motion**, the legislature cannot discuss a judge's misconduct.

## President Rule in Manipur

*Syllabus Mapping: Emergency provisions*

### Context

President Rule is imposed in Manipur for the 11th time. President Droupadi Murmu issued a proclamation under Article 356 of the Constitution after receiving a report from Governor Ajay Kumar Bhalla.

### About President Rule

**Constitutional provisions regarding President Rule**

- **Article 355:** Duty of the Centre to ensure that the government of every state is carried on in accordance with the **'provisions of the Constitution'.**
- **Article 356:** President can issue a proclamation that the government of state cannot be carried in accordance with the 'provisions of the constitution'. **(can act with or without a Governor's report)**
- **Article 365:** Failure of state government to comply with the directions of the Centre – President can hold that State government cannot be carried in accordance with the 'provisions of the constitution' – President's Rule

- **Approval:** Must be approved by both houses of Parliament **within two months** with a simple **majority**.
- **Duration:** After approval by both houses' emergency continues for **six months.**
  - It can be extended for a maximum period of **three years (Parliament approval every 6 months).**
- **Revocation:** President proclamation (No Parliamentary approval is needed).

### Effects of President Rule

- The President is empowered to administer the state under the President's rule as it dismisses the State Council of ministers headed by the Chief Minister.
- The President can transfer State Legislature's powers to **Parliament.**
- It **does not impact** the functioning of the High Court.
- The President **can only dissolve a state legislative assembly after Parliament's approval of the proclamation**, and until then, the assembly remains suspended. **(SC in SR Bommai Case)**

**Facts**

- Article 356 was used for the first time while imposing the President's rule in **Punjab in 1951.**
- Laws made by Parliament, President or any other specified authority **continue to be operative** even after the end of the President's Rule. **i.e.,** Laws are not **coterminous** with the duration of President's Rule
  - However such laws can be **altered or repealed** by the state legislature.
- Manipur has undergone the **maximum number of President rule - 1**1 (Including latest).

## Living Will

*Syllabus Mapping: Terms in news*

### Context

Recently The Government Medical College Hospital (GMCH), Kollam (Kerala), established a 'Living Will Information Counter'. It is **the first hospital in India** to set up such a counter to **popularize the concept of a living will**.

### What is a Living Will?

- A **living will** is a **legal document** that records an individual's **preferences for medical treatment** in situations where they are unable to communicate their wishes due to a **terminal illness or life-threatening condition**.
- It ensures that personal healthcare choices are respected even when the individual cannot express them.
- Writing a **living will** requires the involvement of:
  - **Two or more healthcare attorneys** (can be family members or friends).
  - **A gazetted officer or a notary** to certify the document.
  - **Two witnesses** must be present during certification.
- The living will **comes into effect when the individual is incapacitated but alive**.

## Difference Between a Living Will and Euthanasia

| Aspects | Living will | Euthnasia |
|---|---|---|
| Legal Status | Legal in India | **Active euthanasia is illegal**; only **passive euthanasia** is allowed. |
| Definition | A legal document specifying a person's medical treatment preferences if they become **incapacitated**. | The act of intentionally ending a person's life to relieve suffering. |
| Effectiveness | Comes into effect when the person is incapacitated but alive. | Requires external intervention to cause death. |
| Outcome | Does not lead to death but only ensures personal choice in treatment. | Involves **medically assisted death**, which can be **active (illegal) or passive (legal under strict conditions)**. |

## Devolution Index ranking of Panchayati Raj system

*Syllabus Mapping: Local bodies, Indices*

### Context

Karnataka has topped the overall Devolution Index (DI) ranking of the Panchayat Raj system among States in India.

**Top Rankers of Devolution Index, 2024**



Top 3 States → Karnataka 72.23
Kerala 70.59
Tamil Nadu 68.38
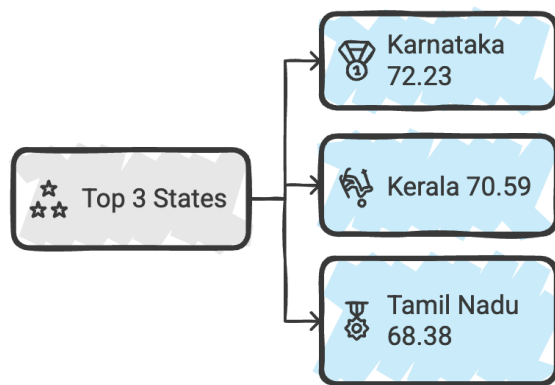
### About Devolution Index (DI) 2024

- **Purpose:** The report ranks Indian States/UTs based on their devolution (transfer of power and resources) to Panchayati Raj institutions.
- **Prepared by:** Union **Ministry of Panchayati Raj & Indian Institute of Public Administration (IIPA), New Delhi**
- **Ranking Parameters:** Overall Devolution Index (DI), Framework, Functions, Finances, Functionaries, Capacity Enhancement and Accountability.
- **Moderate Performers:** Bihar, Assam, Sikkim, Uttarakhand.

### Performance Across Key Dimensions

- **Framework** (Legal and Institutional Setup)
  - **Top Performer:** Kerala (83.56)
  - **Criteria Considered:**

    - Regular panchayat elections
    - Reservation of seats for SCs, STs, and women
    - Establishment of **State Election Commission** and **State Finance Commission**

- **Functions** (Extent of Powers Given to Panchayats)
  - **Top Performer:** Tamil Nadu (60.24) & Karnataka (57.62)
  - **Key Findings:**
    - Karnataka delegates **maximum number of functions** to panchayats.
    - Gram Panchayats (GPs) in Karnataka have **strong taxation powers**.
- **Finances** (Availability of Funds and Fiscal Autonomy)
  - **Top Performer: Karnataka (70.65)**
  - **Evaluation Factors:**
    - Timely release of **15th Finance Commission grants**
    - Financial autonomy of panchayats
- **Accountability** (Transparency, Social Audits, and Governance Mechanisms)
  - **Top Performer:** Karnataka (81.33)
  - **Key Indicators:**
    - Social audit implementation
    - Gram Sabha participation
    - Panchayat-level transparency and anti-corruption measures
    - Performance-based incentives for Panchayats
- **Functionaries** (Human Resources for Panchayat Administration)
  - **Top Performer:** Gujarat (90.94)
- **Capacity Building** (Training of Panchayat Representatives and Officials)
  - **Top Performer:** Telangana (86.19)
  - **Evaluation Based on:**
    - Presence of **Panchayat Training Institutions**

▪ Training programs for elected representatives and officials

## Immigration and Foreigners Bill, 2025

*Syllabus Mapping: Important laws*

### Context

The Immigration and Foreigners Bill, 2025, is likely to be introduced by the Union Home Minister in the ongoing Budget session of Parliament.

**Evolution of India's Immigration Laws**

| The Passport (Entry into India) Act | The Registration of Foreigners Act | The Foreigners Act | The Immigration (Carriers' Liability) Act |
|---|---|---|---|
| **1920** | **1939** | **1946** | **2000** |
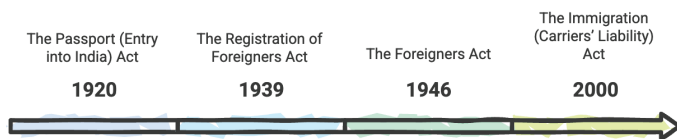
**Key Provisions of the Bill**

- **The Bill will replace the above four existing laws**
- **Roles and Functions**:
  - Defines the role of Immigration Officers and the Bureau of Immigration (BoI).
  - Specifies requirements related to passports, visas and registration of foreigners.
- **Obligations of Institutions**:
  - **Educational Institutions**: Must admit foreign nationals and follow prescribed guidelines.
  - **Hospitals and Medical Institutions**: Required to admit foreign nationals as well.
- **More Power to Immigration Officers:** Under the new law, immigration officers will have:
  - Greater authority to detain, investigate, and deport illegal immigrants.
  - The power to control movements of restricted foreigners.
  - A foreign national can be denied entry or stay if they pose a **threat to national security**, **sovereignty**, or **public health**.
    ▪ The Immigration Officer's decision regarding admissibility will be final and binding.
- **Penal Provisions:**
  - **Entering without a passport**: Penalty of **5 years imprisonment** or **fine up to ₹5 lakh** or both.
  - **Use or supply of forged documents**: Penalty of **2 to 7 years imprisonment** and a fine ranging from ₹**1 lakh to ₹10 lakh**.
  - **Overstaying beyond visa limits**: Penalty of **3 years imprisonment** and a fine up to ₹**3 lakh**.
- **State Role in Detection and Deportation:**

- **State Police Involvement**: Since there is no federal police force dedicated to detecting and deporting illegal foreigners, State police have been entrusted with this task.
- States can set up **detention centres** (though not explicitly mentioned in the Bill) for foreigners awaiting deportation.

### Other Mechanisms to Track Foreigners' Movement

- The MHA has asked States to create two committees to identify foreigners who entered India before and after **January 1, 2011**, and overstayed their visa.
- **Foreigners Identification Portal:** It allows State police to upload biometrics and details of illegal foreigners, helping prevent fraudulent document issuance (like Aadhaar cards).

## Constitutional Morality

*Syllabus Mapping: Constitution and related terms*

### Context

Recently, the concept of Constitutional Morality has been increasingly used in the Indian judiciary to interpret laws and assess the constitutional validity of statutes.
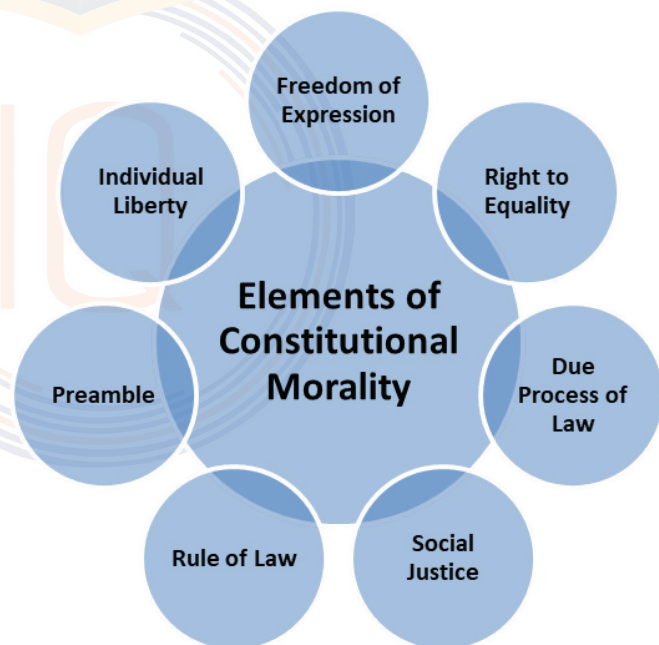


### About Constitutional Morality

- Constitutional Morality refers to the **guiding values enshrined** in the Constitution that must be protected to uphold the integrity and vision of the Constitution.
- It goes beyond the literal interpretation to encompass a commitment to values such as **sovereignty, social justice and equality in constitutional adjudication**.

- Constitutional morality offers a **mature form of constitutionalism**, balancing respect for the Constitution with the ability to challenge and reform it when necessary.
- This balance prevents a shift towards **fundamentalism** while allowing for **stability and change**.
- **Historical Origin:**
  - **Constitutional Morality** was first conceptualized by **George Grote**, a British classist, in his historical work A History of Greece.
  - **Dr. Ambedkar**, in his speech on The Draft Constitution (1948), also emphasized that **constitutional morality must be cultivated to sustain democracy.**

## Important Cases with Respect to Constitutional Morality

- **Navtej Singh Johar v. Union of India (2018):** The Supreme Court, in its judgment, invoked **constitutional morality** to argue that the law must evolve in line with the **fundamental rights** guaranteed by the Indian Constitution.
- **Joseph Shine v. Union of India (2018):** The Supreme Court struck down Section 497, holding it unconstitutional, and emphasized that **constitutional morality** mandates that laws should not infringe upon an individual's **right to equality** and **dignity**.
- **Union of India vs. Government of the NCT of Delhi (2018):** SC ruled that high-ranking officials must adhere to constitutional morality and uphold the ideals outlined in the Constitution to prevent the arbitrary use of authority.

## SC Directives in Remission

*Syllabus Mapping: Judiciary*

### Context

Recently the Supreme Court has ruled that **appropriate governments must proactively consider the premature release of eligible convicts** under remission policies.

### Key Directives from the Supreme Court Judgment

- **Mandatory Consideration of Premature Release:**
  - If the government has a policy under **Section 432 of the CrPC** or **Section 473 of the BNSS 2023**, it **must consider all eligible convicts** for premature release.
    - **Section 432 CrPC:** It empowers the appropriate government (State or Union) to suspend or remit a sentence of a convict, either wholly or partially. (Section 473 of BNSS has replaced it).
  - Authorities **cannot wait for convicts or their relatives to apply**; they must act automatically when eligibility conditions are met.

- If a state government insists on applications, it would be discriminatory and violate Article 14 of the Constitution (Right to Equality).
- **Obligation to Formulate a Remission Policy:**
  - **States and Union Territories without a remission policy** under Sections **432 (CrPC)** or **473 (BNSS)** must **formulate one within two months** from the ruling.
- **Transparent Decision-Making & Communication:**
  - Orders granting or rejecting remission must have clear reasons and be communicated to the convict through the prison office.
  - Prison authorities must inform convicts of their right to challenge rejections.
- **Conditions for Remission:** Must be reasonable, specific, & feasible, considering nature of crime & public safety.

### Related Supreme Court case laws

- **Mafabhai Motibhai Sagar v. State of Gujarat (2024):** The Supreme Court ruled that an order granting permanent remission cannot be withdrawn or canceled without first providing the convict an opportunity to be heard.
- **State of Haryana v. Mahender Singh & Ors. (2007):** The Supreme Court held that while convicts do not possess a fundamental right to remission, they are legally entitled to have their cases considered for such relief.

## Article 101(4)

*Syllabus Mapping: Legislature*

### Context

Khadoor Sahib MP Amritpal Singh, who has been detained under the National Security Act (NSA) since April 2023, has moved the Punjab and Haryana High Court seeking permission to attend the ongoing Parliament session.

### About Article 101(4) of the Constitution

- **Article 101(4) states:** "If for a period of sixty days a member of either House of Parliament is without permission of the House absent from all meetings thereof, the House may declare his seat vacant."
- However, the **60-day period does not include**:
  - Any time when **Parliament is prorogued (not in session)**.
  - Any time when Parliament is **adjourned for more than four consecutive days**.
- **Practical Implication:**
  - The **60-day absence is counted only for actual sittings of Parliament**.

– This means the calculation of Amritpal's absence is based **only on active Parliament sessions**, not on the total calendar days since his detention.

> **Vacation of seat on account of absence**
>
> • Even if an MP crosses the 60-day absence limit, his seat will not be automatically vacated.
>
> • The House **must formally vote to declare his seat vacant**.

## Process for Seeking Leave

• Article 101(4) allows MPs to seek permission from the House for prolonged absences.

• MPs must submit a request to the 'Committee on Absence of Members from the Sittings of the House', which:

– Review the leave applications.

– Recommends approval or rejection to the House.

• **E.g.** In 2023, BSP MP Atul Rai was granted leave for 23 consecutive sittings due to incarceration.

## Directives for OTT Platforms

*Syllabus Mapping: Digital Rules, laws*

### Context

The Union Information and Broadcasting (I&B) Ministry has issued an advisory to Over-the-Top (OTT) streaming services regarding the transmission of content prohibited by law.

### Key Directives to OTT Platforms

• **Content Classification:** OTT platforms must implement age-based classification of content in accordance with the IT Rules, 2021.

• **Age-Gating:** Streaming services must enforce age restrictions on content meant for mature audiences.

• **Adherence to Laws:** OTT services must ensure that their content does not violate Indian laws related to obscenity, indecency, and child protection.

• The advisory also refers to **various Indian laws** that prohibit obscene and pornographic content:

– **Indecent Representation of Women (Prohibition) Act, 1986** – Prevents the portrayal of women in an indecent manner.

– **Bharatiya Nyaya Sanhita (BNS), 2023** – It covers **obscenity-related offenses**.

– **Protection of Children from Sexual Offences (POCSO) Act** – Protects minors from sexual exploitation and prohibits child pornography.

– **Information Technology (IT) Act, 2000** – Regulates digital content and prohibits the publication of obscene or pornographic material online.

## Existing IT Rules and Content Regulations

• The **IT Rules, 2021** already prescribe **age ratings** for content on **Indian streaming services** such as Netflix, Amazon Prime Video, and Disney+ Hotstar.

• OTT platforms are required to have a **formal grievance redressal system**, structured as a **three-tier process**:

– **First level** – The complaint is handled by the streaming platform itself.

– **Second level** – The issue can be escalated to a **self-regulatory body**.

– **Third level** – If unresolved, the complaint can be referred to an **inter-departmental committee of the Union government**.

• The **IT Rules do not completely ban** swearing, sex, nudity, substance abuse, or violence, but mandate that such content be **appropriately rated for older audiences**.

## Ex-Gratia Payments

*Syllabus Mapping: Terms in news*

### Context

The Ministry of Railways disbursed ex-gratia payments in cash to the next of kin of victims of the New Delhi railway station stampede, raising concerns over the mode of payment.

### What is an Ex-Gratia Payment?

• A **payment made out of moral obligation, not legal liability.**

• **Purpose:** Shows government goodwill after tragedies, without admitting responsibility or wrongdoing.

• **No strict government guidelines** are available on the mode of payment. Generally, payments are made through **bank transfers** for **transparency & accountability**.

### How is it Different from Compensation?

| Aspect | Ex-Gratia payment | Compensation |
|---|---|---|
| **Legal Basis** | No legal obligation | Legally Mandated |
| **Purpose** | Moral support, Goodwill | Reparation for loss/ Damage |
| **Example** | Govt. aid after disasters | Court-ordered damages, insurance claims. |

## Legal Framework for Website Blocking in India

*Syllabus Mapping: Digital rules, laws*

### Context

Recently the website of Tamil magazine Vikatan became inaccessible for many users.

## About the Procedure

- **Section 69A of the Information Technology Act, 2000:** Gives the government the **power to block websites** for reasons such as:
  - Sovereignty and integrity of India.
  - Defence and security of the state.
  - Friendly relations with foreign states.
  - Public order or prevention of incitement.
  - **Blocking orders are confidential** and are not publicly disclosed.
- **The Information Technology (Procedure and Safeguards for Blocking for Access of Information by Public) Rules, 2009:**
  - Allows **Ministries or State government departments to request website blocking** through a **nodal officer**.
  - The **IT Ministry appoints a committee to review the request** and decide on blocking.
  - Once approved, the **Department of Telecommunications (DoT) informs** Internet Service Providers (ISPs) to block the site.
- **IT Rules, 2021 (Intermediary Guidelines & Digital Media Ethics Code):**
  - Governs **content removal** on websites, social media and streaming platforms.
  - Allows **the I&B Ministry and IT Ministry to issue emergency orders** to remove content.
  - Unlike full website blocking, **this rule is used to take down specific content** (posts, articles, videos, etc.).
- **Technical Challenges in Blocking Specific Content:**
  - With the rise of **secure HTTPS websites**, blocking **specific pages** is difficult.
  - ISPs can only block entire domains, not individual web pages, **unless the website cooperates.**

## Gag orders

## Context

The Supreme Court has granted interim protection from arrest to podcaster and influencer Ranveer Allahbadia in connection with multiple FIRs registered against him.

## What Are Gag Orders?

- A **gag order is a legal directive** that prohibits individuals or media outlets from publicly discussing certain matters.
- **Purpose:**
  - Protects **fair trial rights**.
  - Prevents **prejudicial media influence**.

- The Supreme Court's directive barring Allahbadia from airing any show on YouTube or other media platforms amounts to a **gag order**.
- **Legal Concept behind judgement:** Doctrine of Prior Restraint.
  - It refers to **state action prohibiting speech or expression before it occurs**.
- **Legal Basis for Gag orders in India:**
  - **Section 144 of CrPC:** Allows the government to restrict public statements in cases of law and order concerns.
  - **Contempt of Court Act, 1971:** Prohibits public discussion on ongoing legal cases to prevent judicial influence.
  - **Article 19(2) of the Indian Constitution:** Allows reasonable restrictions on free speech for security, public order, and morality.

## Interim Relief in Criminal Cases

- **Conditions for Interim Relief: No statutory guidelines** exist; courts exercise **judicial discretion** based on three key factors:
  - **Flight Risk** – Whether the accused might **abscond**.
  - **Intimidation of Witnesses** – Risk of **threats** to witnesses.
  - **Tampering with Evidence** – Possibility of **interference** with the investigation.
- **Supreme Court Rulings on Bail Conditions:**
  - **Satender Kumar Antil v. CBI (2022):** Unreasonable bail conditions can **defeat the purpose of granting bail**.
  - **Frank Vitus v. Narcotics Control Bureau (2024):** Rejected bail condition requiring accused to **share Google Maps location PIN**.
    - The court ruled it **violated the right to privacy under Article 21**.

## Report on Global Internet Shutdowns

## Context

According to **Access Now**, a digital rights advocacy group, India recorded **84 internet shutdowns** in 2024.

## Global and National Trends in Internet Shutdowns

- **India's Position Globally: 2nd**
  - India **did not** have the highest number of shutdowns worldwide for the **first time in the last six years**.
- **Decrease from Previous Years:**
  - **2023:** India imposed **116 shutdowns**.

- **2024:** India imposed **84 shutdowns**, marking a decrease.
- Despite this decline, India still **leads among democratic countries**.
- **Total Global Shutdowns in 2024:**
  - **296 government-imposed shutdowns** across **54 countries**.
  - **Asia-Pacific region:** 202 shutdowns in 11 countries/territories.
  - **India, Myanmar, and Pakistan together accounted for over 64%** of all recorded shutdowns.

**Top 10 countries with most no. of Internet shutdowns in 2024**

| Country | Shutdowns |
|---|---|
| Myanmar | 85 |
| India | 84 |
| Pakistan | 21 |
| Russia | 13 |
| Ukraine | 7 |
| Palestine | 6 |
| Bangladesh | 5 |
| Iraq | 5 |
| Jordan | 4 |
| Sudan | 4 |
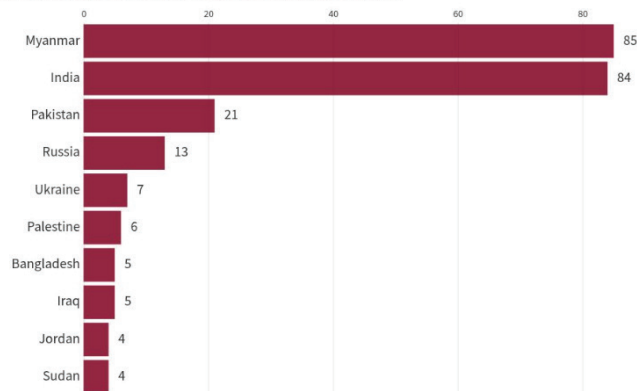
## Reasons for Internet Shutdowns in India

- **Breakdown by Cause:**
  - **Protests: 41 shutdowns** imposed to curb dissent.
  - **Communal Violence: 23 shutdowns** related to religious/ethnic conflicts.
  - **Government Job Examinations: 5 shutdowns** to prevent cheating.
- **State-wise Distribution:**
  - **Manipur: 21 shutdowns (highest in India).**
  - **Haryana:** 12 shutdowns.
  - **Jammu & Kashmir:** 12 shutdowns.

### Origin of Whip System

*Syllabus Mapping: Legislature*

### Context

Recently Vice President Mr. Jagdeep Dhankhar criticized the use of party whips, arguing they restrict MPs' freedom of expression and enforce party servility. About Whip system in India

- The **whip system** has been a part of India's parliamentary history since the country's independence.
- This post is **neither mentioned in the rules of houses nor in the constitution. It owes its origin to parliamentary conventions**.
- Whips are appointed by respective political parties.
- **Functions:**

- The whip ensures **attendance and party-line voting** during critical votes in Parliament, especially when a **division** (counting votes) is held on matters crucial to the party's agenda.
- Violating a whip, particularly a strict three-line whip, can lead to **disqualification under the Anti-Defection Law.**
- The **Minister of Parliamentary Affairs is the Chief Whip of Government.**
- **Non-applicability of Whip:** There are some cases such as Presidential elections where whips cannot direct an **MP or MLA on whom to vote.**

### Types of Whips

- **One-Line Whip:** Informs MPs about a vote but allows abstention.
- **Two-Line Whip**: Directs MPs to be present but does not instruct on how to vote.
- **Three-Line Whip**: Requires MPs to be present and vote strictly according to the party line. This is the most commonly used whip and has the strictest enforcement.

**Global Practices**

- **United Kingdom (UK):** In UK, breaking the three-line whip leads to a person's expulsion from the party; however**, the member may continue serving as an independent membe**r of Parliament until the party accepts him/her back

### Birthright Citizenship in the US and India

*Syllabus Mapping: Citizenship*

### Context

Recently a **federal judge** temporarily blocked President Donald Trump's executive order that sought to curtail birthright citizenship in the US.

### Origin of birthright citizenship in the US

- At the time of **US independence (1776)**, citizenship was largely governed by state laws. There was a general belief that citizenship could be granted to those born within US territory.
- The original **US Constitution** recognized "natural born citizens" in **Article 2**, though it did not define the term. It likely included both **jus soli** (birthright citizenship) and **jus sanguinis** (citizenship through American parents).
- **14th Amendment - 1866**: It clarified that "All persons born or naturalized in the United States, and subject to the jurisdiction thereof, are citizens of the United States and of the State wherein they reside.

## Birthright Citizenship in India

- **Constituent Assembly Debate:** When framing the Indian Constitution, there was debate over whether to grant birthright citizenship.
  - **P.S. Deshmukh** argued against it, claiming it would make Indian citizenship too easy to obtain, while **B.R. Ambedkar and Sardar Vallabhbhai Patel** supported it.
- **Constitution (1950): Article 5** of the Constitution stated that all individuals born before the commencement of the Constitution were Indian citizens. It did not establish a universal birthright to citizenship.

### Citizenship Act of 1955 and Amendments

- **Initial Provisions (1955):** The **Citizenship Act of 1955** granted **birthright citizenship** under **Section 3** to all individuals born in India after **January 26, 1950**, with exceptions for children born to foreign diplomats or enemy aliens.
- **Amendment (1986):** The **1986 amendment** restricted birthright citizenship by requiring that at least one parent be an Indian citizen for the child to automatically acquire Indian citizenship. This change targeted **migrants from Bangladesh, Sri Lanka and other regions**.
- **Further Amendment (2003):** The **2003 amendment** added a provision stating that children born in India to parents who are **illegal immigrants** would not acquire Indian citizenship at birth.

### Contempt of court

*Syllabus Mapping: Judiciary*

### Context

The Union Law and Justice Ministry has asked all Ministries to improve the compliance of judicial orders to reduce the number of such cases pending against the government.

### Types of Contempts



| **Civil Contempt** | **Criminal Contempt** |
|---|---|
| Intentional disregard of court orders or breaching a commitment made to the court. | Actions/Publications that denigrate the authority of courts, interfere with judicial proceedings or obstruct justice |

## About Contempt Of Court

- Contempt of court is a **legal provision to safeguard judicial institutions from undue attacks** and **preserve their authority**.
- The Constitution of India **does not define** Civil Contempt and/or Criminal Contempt.
- **Constitutional and Statutory Provisions:**
  - The Constitution restricts freedom of speech under Article 19(2) to include contempt of court.
  - **Articles 129 and 215** grant the Supreme Court and the High Courts the **power to punish contempts** of themselves.
  - The **Contempt of Courts Act, 1971**, provides a **statutory basis** for contempt proceedings. It was passed on recommendations made by the **H N Sanyal Committee.**
- **Exceptions:**
  - Fair and objective reporting on judicial proceedings does not constitute contempt.
  - Constructive criticism of judicial orders, post-adjudication, is allowed.
- **Punishment for Contempt:**
  - **Penalties Under the Act of 1971:** Contempt can lead to a maximum of six months imprisonment, a fine of Rs 2,000, or both.
- **2006 Amendment:**
  - "Truth and good faith" was introduced as a valid defense in contempt cases.
  - Punishment is applicable only if the contemptuous act significantly disrupts the course of justice.

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**Three-Language Formula Under NEP 2020**

- Tamil Nadu Chief Minister **M.K. Stalin** strongly opposed the **three-language policy** of the National Education Policy (NEP 2020).

**What is the Three-Language Formula?**

- NEP 2020 **recommends** that students learn **three languages**, with flexibility for States to choose which languages to teach.
- **Key provisions:**
  - At least **two out of three languages must be native to India**.
  - Implementation is left to the **States and Union Territories**.
  - **No language is mandatory,** but the policy encourages Hindi-speaking States to learn a South Indian language.
- **Tamil Nadu's Opposition to the Policy:** Tamil Nadu follows a **two-language system** (**Tamil & English**)

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### Atlas on the 2024 Lok Sabha elections expenditure by ECI

- The Election Commission of India (ECI) released an **Atlas on the 2024 Lok Sabha elections Expenditure.**
- Candidates in the **2024 Lok Sabha elections** spent an **average of ₹57.23 lakh** on their campaigns.

Election Expenditure Limits Set by the ECI

- **Lok Sabha Elections:**
  - **Bigger States** (Uttar Pradesh, Maharashtra, West Bengal, etc.): **₹95 lakh** per candidate.
  - **Smaller States & UTs** (Goa, Sikkim, Arunachal Pradesh, etc.): **₹75 lakh** per candidate.
- State Assembly Elections:
  - **Bigger States**: **₹40 lakh** per candidate.
  - **Smaller States & UTs**: **₹28 lakh** per candidate.
- **Currently, no cap exists on political parties' expenditures during election**s.

### Serious Fraud Investigation Office (SFIO)

- It is a multi-disciplinary organization that investigates corporate fraud in India.
- **Nodal Ministry:** Ministry of Corporate Affairs.
- It was established in 2003 in response to major failures in the financial sector, the stock market scam, and the phenomenon of vanishing companies.
- SFIO is headed by a **Director** who is a Joint Secretary to the Government of India
- It has regional offices in **Mumbai, Chennai, Hyderabad and Kolkata.**
- **Functions:**
  - Detects and prosecutes white-collar crimes and frauds
  - Investigates complex cases with multi-disciplinary ramifications
  - Investigates cases involving public interest
  - Investigates cases that could improve systems, laws, or procedures

# ECONOMY AND AGRICULTURE

## TOPICS FOR MAINS

### Salient Features of Union Budget 2025-26

*Syllabus Mapping: GS-Paper 3, Budget*

### Context

The Union Budget 2025-26 was presented by the Union Finance Minister in the Parliament.

### India's Union Budget: Constitutional Provisions, and Process of Preparation

- **Article 112**: Defines the **Annual Financial Statement (AFS)**, which is the Union Budget of India.
- **Article 113**: Deals with the procedure for the presentation of **Demand for Grants** by ministries.
- **Article 114**: Governs the **Appropriation Bill**, which authorizes the withdrawal of funds from the Consolidated Fund of India.
- **Article 115**: Provides for **Supplementary, Additional, and Excess Grants** if the initial budget allocation is insufficient.
- **Article 116**: Deals with **Vote on Account**, **Vote of Credit**, and **Exceptional Grants**, allowing expenditure in specific situations.
- **Article 265**: Ensures that **no tax can be levied or collected except by authority of law**.
- **Article 280**: Provides for the **Finance Commission**, which recommends financial distribution between the Union and States.

### Process of Budget Preparation

1. **Pre-Budget Consultations**
2. **Formulation of Budget Estimates**
3. **Approval by the Cabinet**
4. **Presentation in Parliament**
5. **Parliamentary Scrutiny and Approval:** The **Budget is discussed in Parliament**, followed by:
   - General Discussion (No voting, only debate).
   - Departmental Scrutiny by Parliamentary Standing Committees.
   - Demand for Grants (Detailed discussion and voting).
   - Appropriation Bill (Legal authorization for spending).
   - Finance Bill (Legislation for tax proposals).
6. **Implementation**

### Key Highlights of Union Budget 2025-26

**PRINCIPLES OF VIKSIT BHARAT**

- ZERO-POVERTY
- 100% GOOD QUALITY SCHOOL EDUCATION
- ACCESS TO HIGH-QUALITY, AFFORDABLE, AND COMPREHENSIVE HEALTHCARE
- 100% SKILLED LABOUR WITH MEANINGFUL EMPLOYMENT
- 70% WOMEN IN ECONOMIC ACTIVITIES
- FARMERS MAKING OUR COUNTRY THE 'FOOD BASKET OF THE WORLD'.

## Major Central Govt Expenditure (Budget Estimates)



**Central Govt Expenditure**

Budget Estimates for 2025-26 (in ₹ crore)

Total: **50,65,345**

| | |
|---|---|
| Interest | 12,76,338 |
| Transport | 5,48,649 |
| Defence | 4,91,732 |
| Major Subsidies | 3,83,407 |
| Pension | 2,76,618 |
| Rural Development | 2,66,817 |
| Home Affairs (including UTs) | 2,33,211 |
| Tax Administration | 1,86,632 |
| Agriculture and Allied Activities | 1,71,437 |
| Education | 1,28,650 |
| Health | 98,311 |
| Urban Development | 96,777 |
| IT and Telecom | 95,298 |
| Energy | 81,174 |
| Commerce and Industry | 65,553 |
| Finance | 62,924 |
| Social Welfare | 60,052 |
| Scientific Departments | 55,679 |
| External Affairs | 20,517 |
| Development of North East | 5,915 |
| Others | 4,82,653 |

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## Financial Trends



**Budget at a Glance**

- 2023-24 (Actuals)
- 2024-25 (Revised Estimates)
- 2024-25 (Budget Estimates)
- 2025-26 (Budget Estimates)

In ₹ crore

**Receipts**

Revenue: 27,29,036 | 31,29,200 | 30,87,960 | 34,20,409

Capital: 17,14,411 | 16,91,312 | 16,28,527 | 16,44,936

**Expenditure**

Revenue: 34,94,252 | 37,09,401 | 36,98,058 | 39,44,255

Capital: 9,49,195 | 11,11,111 | 10,18,429 | 11,21,090

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**Trends in Deficit** % of GDP

| | 2022-23 | 2023-24 | 2024-25 (Revised Estimates) | 2025-26 (Budget Estimates) |
|---|---|---|---|---|
| Fiscal Deficit | 6.4 | 5.6 | 4.8 | 4.4 |
| Revenue Deficit | 4.0 | 2.6 | 1.9 | 1.5 |
| Primary Deficit | 3.0 | 2.0 | 1.3 | 0.8 |
| Effective Revenue Deficit | 2.8 | 1.6 | 1.0 | 0.3 |

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## Major Sources Of Revenue

### Rupee Comes From

- Income Tax (22%) — 22%
- Borrowing and Other Liabilities (24%) — 24%
- Union Excise Duties (5%) — 5%
- Non-Tax Receipts (9%) — 9%
- Non-Debt Capital Receipts (1%) — 1%
- Customs (4%) — 4%
- Corporation tax (17%) — 17%
- GST & other taxes (18%) — 18%

### Rupee Goes To

- Pensions (4%) — 4%
- Other Expenditure (8%) — 8%
- Interest Payments (20%) — 20%
- Centrally Sponsored Scheme (8%) — 8%
- Central Sector Scheme (excluding capital outlay on Defence and Subsidy) (16%) — 16%
- Finance Commission and other transfers (8%) — 8%
- Major Subsidies (6%) — 6%
- States' share of Taxes and Duties (22%) — 22%
- Defence (8%) — 8%

## Four Growth Engines

### 1st Engine – Agriculture

- **PM Dhan-Dhaanya Krishi Yojana**: Targets 100 low-productivity districts, benefiting 1.7 crore farmers by improving irrigation and post-harvest storage.
- **Rural Prosperity & Resilience Program**: A state partnership initiative for skilling, investment, and technology to address agricultural underemployment.
- **Atma Nirbharta in Pulses**: A **6-year mission** focusing on **Tur, Urad, and Masoor**, ensuring climate-resilient seeds and fair prices.
- **Procurement Support for Pulses**: NAFED (National Agricultural Cooperative Marketing Federation of India) and NCCF (National Cooperative Consumers' Federation of India) to procure these pulses over the next 4 years.
- **Enhanced Kisan Credit Card (KCC) Limit**: Increased from ₹3 lakh to ₹5 lakh, benefiting 7.7 crore farmers.
- **National Mission on High-Yielding Seeds**: Aims to develop 100+ high-yielding and pest-resistant seed varieties.
- **Mission for Cotton Productivity**: A 5-year initiative to promote sustainable cotton farming and enhance Extra-Long Staple (ELS) cotton production.
- **Makhana Board in Bihar**: To boost production, processing, and value addition in the Makhana sector.

- **Fisheries Development**: A new framework for sustainable fishing in India's Exclusive Economic Zone, with a focus on Andaman & Nicobar and Lakshadweep.
- **Urea Plant in Assam**: A new facility at Brahmaputra Valley Fertilizer Corporation Ltd (BVFCL) with a 12.7 lakh metric ton capacity.
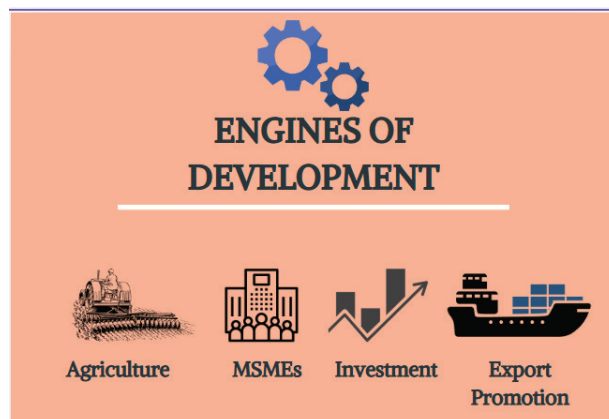


## 2nd Engine – MSMEs

- **Revised MSME Classification**: Investment and turnover limits raised, expanding credit opportunities.

| Enterprises | Investment (₹ in Crore) | | Turnover (₹ in Crore) | |
|---|---|---|---|---|
| | **Current** | **Revised** | **Current** | **Revised** |
| **Micro** | 1 | 2.5 | 5 | 10 |
| **Small** | 10 | 25 | 50 | 100 |
| **Medium** | 50 | 125 | 250 | 500 |

- **Micro Enterprise Credit Cards**: ₹5 lakh credit facility for 10 lakh micro enterprises, enhancing financial inclusion.
- **Increased Credit Cover for MSMEs**: Guarantee cover raised from ₹5 crore to ₹10 crore, enabling higher loan access.
- **Focus Product Scheme for Leather & Footwear**: Expected to generate 22 lakh jobs, achieve ₹4 lakh crore turnover, and boost exports to ₹1.1 lakh crore.
- **Toy Sector Development**: Cluster-based manufacturing to promote 'Made in India' toys globally.
- **National Institute of Food Technology (Bihar)**: To foster food processing, skilling, and entrepreneurship.
- **Fund of Funds for Startups**: Expanded scope with an additional ₹10,000 crore contribution to support startups.

## 3rd Engine – Investment

- **Urban Challenge Fund**: ₹1 lakh crore to develop cities as growth hubs, improve sanitation, and promote urban redevelopment (₹10,000 crore for FY 2025-26).
- **Jal Jeevan Mission**: Budget raised to ₹67,000 crore, extended till 2028, ensuring universal piped water access; 15 crore rural households benefited so far.
- **Maritime Development Fund**: ₹25,000 crore fund (49% government contribution) for shipbuilding, ports, and logistics infrastructure.
- **Expansion of IITs**: Additional infrastructure for 6,500 students, strengthening technical education.
- **PM Research Fellowship**: 10,000 fellowships for advanced research at IITs and IISc.
- **Day Care Cancer Centers**: 200 centers in 2025-26, with district-level expansion over the next 3 years for affordable cancer treatment.
- **Bharatiya Bhasha Pustak Scheme**: Digital books in Indian languages to enhance education accessibility.
- **Nuclear Energy Mission for Viksit Bharat**: ₹20,000 crore investment in Small Modular Reactors (SMRs), with 5 operational by 2033.
  - **Amendments to Atomic Energy laws** for private sector collaboration.

- **UDAN – Regional Connectivity Expansion**:
  - 120 new destinations added.
  - Target of 4 crore passengers over the next 10 years.
  - Support for helipads and small airports in hilly and Northeast regions.
- **Greenfield Airport in Bihar**: Development of new airports and expansion of Patna airport, with a brownfield airport at Bihta (Patna).
- **Western Koshi Canal ERM Project**: Financial support for irrigation infrastructure in Mithilanchal, Bihar.
- **Tourism Development**: Top 50 tourist destinations to be developed through a state partnership model.

## 4th Engine – Export Promotion

- **Export Promotion Mission**: Sectoral and ministerial targets led by Commerce, MSME, and Finance Ministries.
- **BharatTradeNet (BTN)**: A digital platform for international trade documentation and financing.
- **National Framework for Global Capability Centres (GCCs)**: Policy incentives for outsourcing hubs in Tier-2 cities.
- **Air Cargo Warehousing**: Infrastructure development for high-value perishable exports.

## Major Tax Proposals in the Finance bill

- **Changes in new income tax regime:** Tax slabs under the new tax regime have been modified.
- Annual income of up to Rs 12 lakh will receive 100% rebate on the taxable income.
  - Earlier, this only applied to income of up to seven lakh rupees. The old tax regime remains unchanged.
- **Compliance mechanism:** Time-limit to file updated returns for any assessment year is increased from two to four years.
  - The annual limit for TDS on rent will be six lakh rupees. The threshold for TCS on remittances has increased from seven lakh rupees to Rs 10 lakh.
  - TCS will not be levied on remittances for education upto the amount of loan taken from a specified financial institution. The minimum threshold for TDS or TCS has also been increased for interest and dividends.
- **Customs:** Customs duty has been reduced on some items but Agriculture Infrastructure and Development Cess (AIDC) has been introduced.
  - The overall tax has remained similar to earlier levels. However, there has been a shift from customs duty to cess, resulting in a lower proportion to be shared with states. Items include solar cells and motor vehicles.
- **Income tax exemption for startups:** Startups incorporated up to April 1, 2025 can currently avail income tax exemption for three consecutive years during the first ten years of operation.
- **NGOs:** Tax exemption under Section 12A is valid for five years, and requires renewal after that. The validity has been increased to 10 years for institutions with income up to five crore rupees in each of the previous two years.

## Indirect Taxes

## Rationalization of Customs Tariff Structure for Industrial Goods

- Tariff rates adjusted with appropriate cess to maintain effective duty incidence.
- Only one cess or surcharge will be levied on applicable items.
- Exemption of **Social Welfare Surcharge** on multiple tariff lines.

## Medicine Import

- **Duty Relief on Lifesaving Drugs**: **36 essential medicines** exempted from **Basic Customs Duty (BCD)**.
  - **6 additional medicines**, including those for cancer and rare diseases, subject to a concessional **5% duty**.
- **Patient Assistance Program**: **37 more medicines** and **13 new patient assistance programs** granted **BCD exemption**.

## Support for Domestic Manufacturing and Value Addition

- **Critical Minerals**: Exemption of **BCD on cobalt powder, lithium-ion battery scrap, lead, and zinc** to boost availability.
- **Textile Sector**: Inclusion of **two more shuttle-less looms** under the fully exempted textile machinery category to support domestic production.
- **Electronic Goods**: Rectifying inverted duty structure:

- – Increased **BCD on Interactive Flat Panel Displays (IFPD)**.
- – Reduced **BCD on Open Cell and other electronic components**.
- **Lithium-Ion Battery Manufacturing**: Additional **duty exemptions on capital goods** for **EV battery and mobile phone battery production**.
- **Shipping Industry**: **BCD exemption extended by 10 years** on raw materials, components, and consumables used in ship manufacturing and dismantling.

## Export Promotion Measures

- **Handicraft Sector**: Addition of **nine new items** to the **duty-free inputs list**.
- **Leather Industry**: Full **BCD exemption on Wet Blue Leather** to encourage domestic value addition and employment.
- **Marine Exports**: Reduction of **BCD on Frozen Fish Paste (Surimi)** from **30% to 5%** to boost India's seafood exports.
- **Railway Goods Maintenance (MROs)**: Time limit for **duty-free import of foreign railway goods for repairs** extended from **6 months to 1 year** to promote domestic MRO development.

## Direct Taxes

### New Income-Tax Bill

- A new bill will be introduced to simplify and streamline taxation, ensuring responsive and efficient governance in line with the spirit of "Nyaya."

### Personal Income Tax

- No Income Tax for annual incomes up to ₹12 lakh, extended to ₹12.75 lakh for salaried taxpayers with deductions.

| Total Income per Annum | Rate of Tax |
|---|---|
| ₹ 0 – 4 Lakh | NIL |
| ₹ 4 – 8 Lakh | 5% |
| ₹ 8 – 12 Lakh | 10% |
| ₹ 12 – 16 Lakh | 15% |
| ₹ 16 – 20 Lakh | 20% |
| ₹ 20 – 24 Lakh | 25% |
| Above ₹ 24 Lakh | 30% |

## TDS/TCS Rationalization

- **Reduction in TDS Rates & Thresholds**: Lower tax deduction rates and increased thresholds for better tax clarity.
  - – Senior citizen interest deduction limit increased to ₹1 lakh.
  - – TDS on rent raised to ₹6 lakh, benefiting small taxpayers.
- **Higher TCS Exemption on Remittances**: Under RBI's Liberalized Remittance Scheme (LRS), the TCS threshold will rise from ₹7 lakh to ₹10 lakh.
- **Decriminalization of TCS Payment Delay**: Relaxation provided for delayed payment of TCS until the filing deadline, without penalties.
- **Encouraging Voluntary Compliance**: Time to file updated tax returns extended from **2 years to 4 years** for taxpayers who missed reporting correct income.

## Ease of Doing Business

- **Simplified Transfer Pricing Rules**: A new mechanism for determining arm's length pricing for international transactions, covering a **3-year block period.**
- **Expansion of Safe Harbour Rules**: Broader scope to minimize litigation and enhance tax certainty for international businesses.
- **Senior Citizens' Withdrawal Exemption**: Withdrawals from **old NSS accounts** by senior citizens (post-August 29, 2024) will be tax-exempt.
  - – **NPS Vatsalya** accounts will be treated like regular NPS accounts within prescribed limits.

## Employment and Investment Incentives

* **Tax Certainty for Non-Residents**: A presumptive taxation scheme will be introduced for **non-residents** offering services in electronics manufacturing and **infrastructure sector AIFs.**

* **Tonnage Tax Scheme for Inland Vessels**: Extended to **inland vessels** under the **Indian Vessels Act, 2021.**

* **Start-Up Incorporation Extension**: The eligibility period for **start-up incorporation extended by 5 years**, covering entities incorporated before April 1, 2030.

* **Support for International Financial Services Centre (IFSC)**: Special incentives for ship-leasing units, insurance offices, and **global company treasury centers** set up in IFSC.

* **Extended Investment Period for Sovereign & Pension Funds**: **Investment window extended by 5 years** for Sovereign Wealth and Pension Funds in infrastructure.

## Key Takeaways from Economic Survey 2024-25

*Syllabus Mapping: GS-Paper 3, Budget*

### Context

Recently, Union Minister of Finance and Corporate Affairs Nirmala Sitharaman tabled the Economic Survey 2024-25 before the parliament.

**Economic Survey 2024-25: Key Highlights**



* **GDP & Growth Estimates**
  – India's **GDP is expected to grow between 6.3% - 6.8%** in FY26.
  – **Real GDP growth estimated at 6.4%** in FY25, aligning with its decadal average.
  – **Real GVA projected to grow by 6.4%** in FY25.

- **Investment & Infrastructure**
  - **Capital expenditure (Capex) grew by 8.2%** (July–November 2024) and is expected to accelerate further.
  - **₹50,000 crore 'Self-Reliant India Fund' launched** to support MSMEs.
  - The Economic Survey recommends **deregulation and sustained infrastructure investment** over the next two decades for high growth.
- **Inflation & External Sector**
  - **Retail headline inflation declined to 4.9%** (April–December 2024).
  - India's **consumer price inflation is projected to stabilize at ~4%** in FY26.
  - **Overall exports increased by 6.0% YoY** (April–December 2024).
  - **Services exports surged by 12.8%** (April–November FY25) from **5.7% in FY24**.
  - **Gross FDI inflows rose by 17.9% YoY** to **$55.6 billion** (first 8 months of FY25).
  - **Forex reserves at $640.3 billion** (December 2024), covering **10.9 months of imports** and **90% of external debt**.
- **Stock Market & Financial Sector**
  - **BSE stock market capitalization to GDP ratio at 136%** (December 2024), surpassing **China (65%)** and **Brazil (37%)**.
  - Renewable Energy & Sustainability
  - **Capacity addition in solar & wind energy grew by 15.8% YoY** (December 2024).
- **Agriculture & Rural Economy**
  - **The agricultural sector is expected to grow at 3.8%** in FY25.
  - **Kharif foodgrain production was projected at 1647.05 LMT**, marking a **rise of 89.37 LMT** over the previous year.
  - Growth in agriculture driven by **horticulture, livestock, and fisheries**.
- **Industrial & Social Sectors**
  - **Industrial sector projected to grow by 6.2%** in FY25.
  - **Social services expenditure grew by 15% annually** between FY21 and FY25.
  - **Government health expenditure increased from 29% to 48%** (FY15-FY22).
  - **Out-of-pocket health expenses reduced from 62.6% to 39.4%** during the same period.
- **Employment & AI Regulation**
  - **The unemployment rate dropped to 3.2%** in 2023-24 from **6.0% in 2017-18**.
  - Collaborative efforts between **government, private sector, and academia** needed to mitigate **AI's societal impact**.

## India's Maritime Sector

*Syllabus Mapping: GS-Paper 3, Infrastructure, Shipping*

### Context

The Indian government has demonstrated a strong commitment to developing the **maritime sector**. However, despite substantial investments, **the shipping industry continues to stagnate**. The **Union Budget 2025** has introduced some reforms, but critical issues, particularly tax disparities, remain unresolved.

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**Sagarmala Programme: Investment and Progress**

- **Sagarmala**, the government's flagship maritime programme, aims to boost port infrastructure and connectivity.
- As of **September 2024**, the programme had outlined **839 projects** requiring an investment of ₹**5.8 lakh crore** by **2035**.
- **Progress so far:**
  - **241 projects** worth ₹**1.22 lakh crore completed**.
  - **234 projects** valued at ₹**1.8 lakh crore under implementation**.
  - **364 projects** with an estimated investment of ₹**2.78 lakh crore in various stages of development**.
- **Breakdown of Investments:**
  - ₹**2.91 lakh crore** (50%) – **Port modernisation**.
  - ₹**2.06 lakh crore** (35%) – **Port connectivity**.
  - ₹**55.8 thousand crore** (10%) – **Port-led industrialisation**.
  - **Remaining 5%** – **Coastal community development, coastal shipping infrastructure, and inland water transport**.

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**Economic Growth and EXIM Trade Expansion**

- India's GDP grew from ₹**153 trillion (2016-17) to** ₹**272 trillion (2022-23)**, a **43% increase** at a **CAGR of 7%**, despite **COVID-19 setbacks**.
- Projections:
  - **$3.7 trillion** in **2024**.
  - **$5 trillion** by **2027**.
  - **$7 trillion** by **2030**.
- **India's EXIM trade:**
  - Increased from **$66 billion (2016-17) to $116 billion (2022)** – 77% cumulative increase (**12.83% annual growth**).
  - **Target: $2 trillion exports by 2030**

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## Stagnation in the Indian Shipping Industry

- **Low Growth in Cargo and Vessel Traffic: Cargo handled at major ports** increased by just **14.26%** from **1,071.76 million tons (2016-17) to 1,249.99 million tons (2020-21)** (**Annual growth: 2.85%**).
  - **The number of vessels handled declined by 5.93%**, from **21,655 (2016-17) to 20,371 (2020-21)**.
  - **Indian shipping continues to lose market share** to **foreign-flagged vessels for EXIM cargo** and **rail & road transport for domestic cargo**.
- **Lack of Competitive Financing & High Capital Costs: High borrowing costs** and **short loan tenures** discourage investment.
  - **Rigid collateral requirements** force shipowners to provide **additional security** instead of using ships as collateral.
  - **Banks lack understanding of shipping cycles**, leading to **inflexible loan restructuring policies**.
- **Tax & Regulatory Disadvantages for Indian Ships: 5% IGST on ship purchases** (not applicable to foreign-flagged ships).
  - **TDS on Indian seafarers' salaries**, while foreign ships employing Indian seafarers are **exempt**.
  - **High port charges & additional financial burdens** for Indian shipowners reduce competitiveness.
- **Over-Reliance on Foreign-Flagged Ships:** Indian shipping companies **struggle to compete globally**, leading to **loss of market share**.

**Challenges in Shipbuilding & Fleet Modernization:**

- **Aging fleet:** Average **vessel age was 26 years (2022-23)**, improved to **21 years (2024)** with **only 34 new vessels added**.
  - **India's global ranking in ship ownership fell from 17 to 19**.
- **Infrastructural gaps:** Infrastructure gaps for large vessel construction.
- **High costs of shipbuilding** due to **import dependency for key components** (steel, machinery, spare parts).
- **Costs:** Customs duties on imported shipbuilding equipment increase costs.
- **Skills gap:** Skill gaps in the workforce limit shipbuilding efficiency.
- **Investment gaps:** Limited Investment in Green & Digital Technologies
- Lack of incentives for LNG-fueled or hydrogen-based ships hinders sustainability goals.

## Government Reforms & Budget 2025 Announcements

- ₹25,000 crore Maritime Development Fund (MDF) (49% government-funded, rest from major ports).
- Infrastructure status for large vessels.
- Creation of shipbuilding clusters.
- 10-year customs duty exemption on shipbuilding spares & equipment.
- Revamped financial assistance policy for shipbuilding.
- Credit incentives for shipbreaking in Indian yards.
- Extension of tonnage tax scheme to inland vessels.

## Concerns with Budgetary Announcements

- Lack of clarity on MDF funding (single-year or multi-year allocation?).

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- ₹25,000 crore may be insufficient given the capital-intensive nature of shipping & shipbuilding.
- Need for long-term financing:
  - Lower interest rates.
  - Loan repayment tenures of 7-10 years.
- Urgent fleet replacement & green technology investments required to meet GHG emission targets.
- Need for new shipyards to construct large vessels and modernise existing ones.

## Way forward

The **Union Budget 2025** introduces some **much-needed reforms**, but **funding uncertainties and tax disparities** threaten to undermine progress. To **truly revitalize the maritime sector**, the government must:

- Ensure long-term financing at competitive interest rates.
- Expand MDF funding to meet industry needs.
- Invest in new shipyards & modernisation of existing ones.
- Remove tax disadvantages for Indian-flagged ships.
- Promote shipbuilding competitiveness through lower import duties and skill development.

## New areas of employment for Indian Economy

*Syllabus Mapping: GS-Paper 3, Economy, Employment*

## Context

With the **Union Budget 2025** presented, India must focus on **long-term job creation and real wage growth** rather than short-term demand boosts. This article focuses on the key areas where India needs to boost employment in the decades to come.

**Recent Budget Allocation For Job Creation**

- **Skill Development Expansion:** The budget for the Ministry of Skill Development has nearly doubled to ₹6,017 crore for FY26, with ₹3,000 crore dedicated to upgrading Industrial Training Institutes (ITIs) to strengthen vocational training.
- **Employment Generation Initiatives:** Aiming to generate over 21 lakh direct and indirect jobs, the budget focuses on sectors such as fisheries, tourism, food processing, textiles, and electronics. This includes 11 lakh jobs under the PM Matsya Sampada Yojana and 5.8 lakh under the PM Employment Generation Programme.
- **Industry-Specific Support:** Labor-intensive industries like footwear, leather, textiles, and electronics receive targeted assistance. Key initiatives include the Footwear Development Programme (₹350 crore) and the National Manufacturing Mission, which aims to create 2-3 million jobs.
- **Empowering Artisans:** The PM Vishwakarma Yojana is set to benefit over 61 lakh artisans, fostering self-employment and economic inclusion for marginalized communities.
- **Infrastructure & Innovation:** To boost job creation through technology and infrastructure, five National Centres of Excellence for skilling will be established. Additionally, ₹200 billion has been allocated to promote private sector-led R&D, driving innovation and employment growth.

## Climate-Resilient Jobs

- **Economic Impact of Climate Change**
  - **India ranked 7th most affected by climate change (2019)**.
  - **Loss of $159 billion in 2021** due to climate-related damages.
  - **Adaptation costs are projected to reach $1 trillion by 2030** (RBI estimate).
- **Climate-Resilient Job Creation Strategies**
  - **State-subsidised e-rickshaws for last-mile mobility**: **3**-4 e-rickshaws per village in 6,00,000 villages – Creates 2 million jobs.
    - Women-focused employment initiative.
  - **Boosting private investment in compressed biogas plants**: Only 82 plants set up vs. 5,000 target (FY23-24) – Urgent need for expansion.
  - **Accelerating 500 GW non-fossil energy target**: **Creates over 1 million jobs**.

▪ **Decentralised and rooftop solar initiatives** – **7x more labour-intensive than utility-scale solar (CEEW study)**.

## AI-Resilient Jobs

- **AI Impact on Job Market: 50% automation adoption in India expected in the next 10 years** (McKinsey Global Institute).
  - **IT and business services contribute 70%+ of India's services exports (Economic Survey 2021)** but face **AI disruption**.
  - **Examples of AI replacing jobs**:
    - **metaGPT simulating software companies**.
    - **AI writing 25% of Google's code**.
    - **Job losses due to AI-driven chatbots in India**.
- **AI-Resilient Job Creation Strategies**
  - **Education & healthcare expansion**: Plugging **millions of vacancies for healthcare professionals and teachers**.
  - **Strengthening National Rural Livelihood Mission (NRLM)**: **Facilitates global & urban market linkages** for **rural artisans, farmers, and craftsmen**.

## Aspiration-Centric Jobs

- **Challenges for Rural Youth Employment:** Despite rising **startup engagement**, rural youth face **low confidence** due to:
  - **Poor foundational education (including English proficiency)**.
  - **Lack of resources in upbringing**.
  - Leads to **dependency on government jobs & coaching culture** for exam preparation.
  - **Non-farm job growth is slow**, requiring **off-farm employment solutions**.
- **Strategies for Aspiration-Centric Job Creation**
  - **Integrated Packhouses**: **Build 70,000 packhouses** to **plug the 95%+ infrastructure gap**.
    - **Creates over 2 million jobs** in food processing & logistics.
  - **Tech-enabled agri-input manufacturing**: **Boosts high-import agricultural sectors**.
  - **Rebranding rural employment through digital media & social media**:
    - Makes **off-farm jobs aspirational** for **rural youth**.
  - **National Mission on Edible Oils – Oilseeds: Reduce India's 57% import dependence on edible oils** to pre-WTO levels.
    - **Revitalise local oilseed processing** (soybean, sunflower, cold-pressed oils).
  - **Public-Private Partnerships (PPP) for large-scale rural businesses**: Addresses **youth frustrations over exam leaks & limited recruitment**.

## Evaluating Personal Income Tax Rate Cuts

*Syllabus Mapping: GS-Paper 3, Economy, Taxation*

## Context

In the Union Budget 2025, the **Finance Minister** presented unprecedented tax rate cuts for the middle class.

## Key Highlights of rebates introduced in Income Tax:

- **Complete tax rebate** for individuals earning between ₹7-₹12 **lakh per year** (earlier applicable only for those below ₹7 lakh).
- **Increase in the basic exemption limit** from ₹3 **lakh to ₹4 lakh** for those earning above ₹12 **lakh per year**.
- **Reduction in marginal tax rates** across multiple tax slabs.
- **Estimated revenue loss of ₹1 lakh crore**, approximately **8% of total direct income tax collections** in the current fiscal year.

## Arguments in Favour of Tax Cuts

- **Increases Disposable Income:** The **Rs 1 lakh crore tax cut** gives urban middle-class households more money to spend.
- **Consumption Multiplier Effect:** With a **Marginal Propensity to Consume (MPC) of 0.7**, the **consumption multiplier is estimated at five**, leading to **Rs 5 lakh crore** in additional consumption.
- **Higher GDP Growth:** The increased consumption is projected to **raise GDP growth by 2.7%** and **consumption growth by 4.8%**, reinforcing economic expansion.
- **Demand-Driven Growth:** Higher consumer spending signals **greater demand**, encouraging businesses to **expand production and invest in new projects**.
- **Crowds in Investment:** Unlike tax cuts that increase government borrowing and crowd out private investment, this PIT cut **stimulates demand and investment simultaneously**.
- **Employment Generation:** More investment **leads to job creation**, further boosting incomes and sustaining the consumption cycle.
- **Supports Sectors like Electronics, Consumer Durables, and Entertainment:** These are **locally produced**, ensuring that **less money leaks abroad**.
- **Addresses Lagging Urban Demand:** While **rural consumption has been growing**, urban middle-class spending has been **relatively weaker**, making this tax cut well-targeted.
- **No Major Fiscal Deficit Concerns:** Despite the tax cut, the government has kept the **fiscal deficit at 4.4% of GDP**, ensuring **macroeconomic stability**.

## Arguments Against Tax Cuts

- **Limited Benefit for the Middle Class:**
  - **Not All Middle-Class Taxpayers Benefit:** The new tax slabs apply only to those opting for the **new tax regime**, leaving **2.5–3 crore taxpayers** in the **old regime** without benefits.
  - **Only 50 Lakh Taxpayers Likely to Benefit:** A **small fraction** of India's middle class will experience relief, raising doubts about its broader economic impact.
- **Overestimation of Tax Revenue Growth:** Despite an **8% fall in the effective tax rate**, the government projects a **14% increase in direct tax collections**.
  - This requires **24% income growth**, which is highly optimistic given that **nominal GDP growth is projected at just 10.1%**.
  - If income growth doesn't meet expectations, tax revenues will **fall short**, affecting government spending.
- **Exaggerated Fiscal Sacrifice by the Government:** The Claimed Rs 1 Lakh Crore Tax Relief is Overstated:
  - Despite the tax cuts, **personal income tax revenue is projected to grow by 21.15% in 2025-26**, far higher than the growth of corporate tax (6.08%) and GST (10.93%).
  - The **actual fiscal impact is estimated to be only Rs 25,000 crore**, much lower than the **claimed Rs 1 lakh crore sacrifice**.
  - **Fiscal Constraints and Spending Cuts:** If tax revenue falls short, the government will have to **cut expenditures**, especially on welfare schemes.
  - With the Fiscal **Responsibility and Budget Management (FRBM) Act** in place, the government **cannot exceed the fiscal deficit limit**, making it harder to increase spending during slowdowns.
- **Weak Impact on Consumption Growth:**
  - **Uncertain Consumption Boost from Tax Cuts:** The government expects that **lower taxes will increase disposable income, boosting consumption, and in turn, investment and growth**. However, if **people choose to save instead of spending**, the intended economic stimulus **may not materialize**.
  - **Private Consumption is Rs 200.30 Lakh Crore:** A tax relief of Rs 25,000 crore is too small to significantly **boost overall consumer spending**.
  - **Real Incomes Have Declined:** The **Economic Survey 2024-25** shows:
    - **Real earnings** of salaried male workers **fell from Rs 12,665 (2017-18) to Rs 11,858 (2022-23)**.
    - For self-employed women, real earnings **fell from Rs 4,348 to Rs 2,950** in the same period.

- **Tax Cuts Do Not Help Non-Taxpayers:** The majority of **low-income and informal workers** (who do not pay income tax) **see no benefit**, limiting the tax cut's impact on broad-based consumption..

**Chart 1: Delivery versus promises in fiscal expenditure**

(in ₹ crore)

| | RE 2024 minus BE 2024 | BE 2025 minus RE 2024 |
|---|---|---|
| Total expenditure | -1,04,025 | 3,48,858 |
| Capital expenditure | -92,682 | 1,02,661 |
| Rural development | -75,133 | 76,142 |
| Urban development | -18,907 | 33,107 |
| Education | -11,584 | 14,596 |
| Agriculture | -10,992 | 30,578 |
| Food subsidy | -7,830 | 6,000 |
| Health | -1,255 | 10,279 |
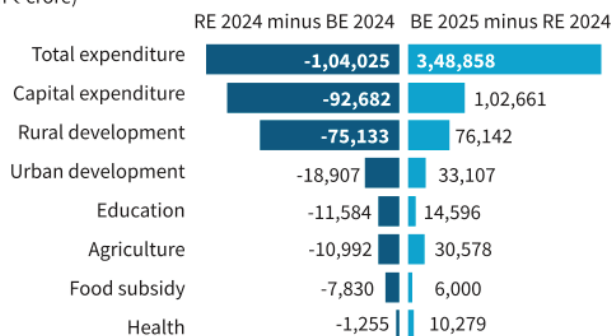
*RE: Revised Estimate; BE: Budget Estimate*

**Chart 2: Cut in expenditure of some flagship schemes**

Difference between Revised Estimate and Budget Estimate of 2024-25 (in ₹ crore)

| | |
|---|---|
| Jal Jeevan Mission | -47,469 |
| PM Awas (Grameen) | -22,074 |
| PM Awas (Urban) | -16,501 |
| PM Garib Kalyan | -8,250 |
| Swacch Bharat Mission | -2,841 |
| PM-Poshan | -2,467 |
| Rashtriya Krishi Vikas | -1,553 |
| PM Anusuchit Jati Abhudaya | -1,340 |
| PM Vanbadhu Kalyan | -670 |
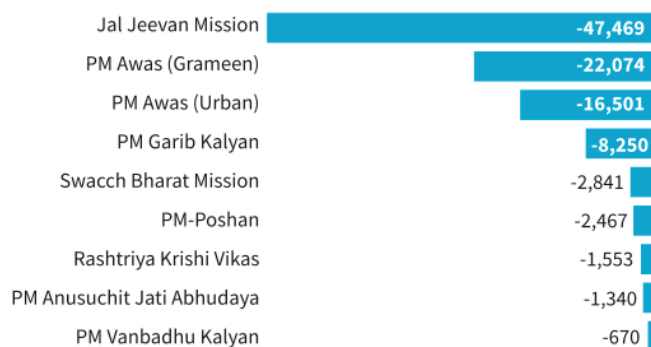
- **Urban Bias – Ignores Rural India:**
  - **Skewed Towards Higher-Income Urban Taxpayers:** The tax cuts mainly benefit urban, salaried professionals, while rural and informal sector workers **see no direct gains**.
  - **Rural Demand is a Bigger Concern:** Recent data shows **rural consumption** is growing faster than urban consumption, indicating that **supporting rural income would be a better economic stimulus** than tax cuts.
- **Risk of Widening Income Inequality (K-Shaped Growth):** If the tax revenue growth comes from **higher earnings among existing taxpayers**, it would lead to a further **concentration of wealth among upper-income groups**.
  - This would **exacerbate the K-shaped recovery,** where high-income earners thrive while lower-income groups struggle.
- **Shift to Pro-Cyclical Fiscal Policy:** The government is **reducing its fiscal deficit target from 4.8% (2024 RE) to 4.4% (2025 BE)**, signaling **fiscal contraction** instead of expansion.
  - This is problematic because fiscal policy is meant to be **counter-cyclical** (increase spending in slowdowns), but instead, it is **moving with the economic cycle**, potentially **deepening the slowdown**.
- **Dependence on Private Investment and Exports:** With **government expenditure constrained**, the government is **banking on corporate investment and exports** to drive growth.
  - However, private investment has **not increased significantly despite past tax cuts and capital expenditure efforts**.
  - The **2025 Economic Survey indicates weak global demand**, making exports an unreliable growth driver.

## How Tax Cuts in Budget Will Have Multiplier Effects

- **Increase in Disposable Income:** The increase in tax exemption limits and reduction in tax rates will put more money in the hands of around 3.1 crore taxpayers.
  - The increase in disposable income due to tax cuts is expected to enhance consumer spending.
  - However, the actual impact depends on the **marginal propensity to consume (MPC)**, which is estimated to be **around 0.5% for higher-income groups** due to their **higher savings propensity and consumption of imported goods.**
- **GDP Growth:** With a more realistic MPC, the rise in disposable income is projected to increase national income by about Rs 2 lakh crore, leading to a GDP growth of approximately 0.6%.
- **Boost to Private Investment:** Higher consumption can encourage businesses to expand production and invest in capacity-building.
  - Improved demand outlook may also attract new investments.
- **Challenges to the Multiplier Effect**
  - **Savings vs. Spending:** Higher-income groups tend to save rather than spend, reducing the overall consumption impact.
  - **Import Leakages:** Increased spending on imported goods reduces the benefits to the domestic economy.
  - **Debt Repayment:** Some of the additional disposable income may be used to repay debts, lowering its direct impact on consumption.

- **Public Capex Trade-off:** The tax cuts result in a revenue loss of ₹1 lakh crore.
  - This could either lead to **lower public capital expenditure (Capex)** or **higher government borrowing**, affecting fiscal stability.

## Key Recommendations

- **Catalyzing Private Investment:** To maximize the benefits of tax cuts, it is crucial to improve the investment climate. This can be achieved by reducing regulatory and compliance burdens for private investors.
- **High-Level Committee:** Establishing a high-level committee, chaired by the finance minister and including state finance ministers, to identify and eliminate regulatory hurdles can significantly boost investor confidence and stimulate private investment.
- **Addressing Rent-Seeking and Uncertainty:** Measures to reduce petty corruption, investor harassment, and uncertainty are essential for fostering an environment conducive to rapid and sustained economic growth.
- **Maintaining Fiscal Discipline:** While tax cuts can stimulate growth, it is important to manage the resulting revenue loss by either maintaining public capital expenditure or ensuring that increased government borrowing does not jeopardize fiscal deficit targets.

## Conclusion

The tax cuts are a **one-way gamble** because the government is **placing all bets on income growth and tax buoyancy**, with little room for alternative fiscal measures. If revenue projections fall short, **expenditure cuts will hurt economic growth and social spending**, making the economy more vulnerable.

## Gender Budget

*Syllabus Mapping: GS-Paper 3, Budgeting*

## Context

The Finance Minister in the recent Union Budget laid out a vision for Viksit Bharat (Developed India) with the goal of achieving **70% women in economic activities**.

The inclusion of women as a priority within this framework reinforces the government's pledge towards women-led development.

## Recent Budget Announcements for Women Empowerment

- **Increased Gender Budget Allocation**
  - **Gender Budget:** ₹4.49 **lakh crore**, which is **8.8% of the total Budget** (highest in two decades).
  - **49 Union Ministries and Departments** now have gender budgets.
  - **12 new Ministries** from non-conventional sectors (Railways, Ports, Shipping, Land Resources, Pharmaceuticals, etc.) have integrated gender-responsive budgeting.
- **Enhanced Funding for Women-Centric Schemes:** ₹1.24 **lakh crore (52% of these funds** directly benefit women and girls) allocated to key skilling and livelihood schemes, including:
  - Skill India Programme
  - Entrepreneurship & Skill Development Programme (ESDP)
  - National Skill Training Institutes
  - Deendayal Antyodaya Yojana - National Rural Livelihoods Mission (DAY-NRLM)
  - Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGS)
  - PM Employment Generation Programme
  - PM Vishwakarma
  - **Krishonnati Yojana**
- **Support for Women in the Gig Economy**
  - **Formalisation of gig workers** through **identity cards** and registration on the **e-Shram portal**.
  - Access to **social security benefits** and **financial inclusion** initiatives.
  - Emphasis on **labour codes enforcement** for job security, maternity benefits, and social protection.
- **Financial & Digital Inclusion:**

- – **₹600 crore dedicated gender budget under the India AI Mission**.
- – **Centre of Excellence on AI for Education** to enhance digital literacy and workforce inclusion.
- – **Easier access to credit for women entrepreneurs**, including collateral-free loans.
- – **Delinking Kisan Credit Cards from land ownership** to support **women farmers** in accessing loans and credit.

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**Periodic Labour Force Survey (PLFS) Data on Female Labour Participation**

- **India's Female Labour Force Participation Rate (FLFPR):**
  - – **2021-22:** 33%
  - – **2023-24:** ~42%
  - – **Global Average (ILO):** 47%
  - – **Gap with Male LFPR (79%):** 37%.
- **Sectoral Distribution of Working Women:**
  - – **90% of working women** are engaged in the **informal sector**.
  - – **Women-owned MSMEs:** 20.5% of all registered MSMEs employ **27 million people**.
  - – **Gig and platform economy** is emerging as a key employer for women, but challenges remain in **wages, job security, and benefits**.

## Way Forward: Realizing 70% Women's Economic Participation by 2047

- **Diversity of Economic Roles: Bridge the gender gap in leadership roles** by incentivizing companies to promote women executives.
- **Financial & Economic Inclusion: Expand credit access** with **alternative credit scoring models** and **collateral-free loans**.
  - – **Encourage Women-Led MSMEs** through targeted incentives and digital marketplaces.
    - ▪ Establishing 30 million additional women-owned businesses could generate 150-170 million jobs by 2030.
  - – **Introduce gender-disaggregated tracking** for government welfare and loan schemes.
- **Strengthening Social Protection: Extend maternity benefits and childcare support** for informal sector workers.
  - – **Strengthen social security entitlements** under **e-Shram** for gig and informal women workers.
  - – **Enhance safety and workplace rights** through better **labour law enforcement**.
- **Policy & Norm Transformation: Simplifying documentation requirements** for economic and social security provisions, such as delinking Kisan Credit Cards from land ownership, would help women farmers avail loans and credit facilities.
  - – **Promote mindset change campaigns** to shift societal attitudes toward women's economic roles.

## India's Economic Development

*Syllabus Mapping: GS-Paper 3, Economic Growth and Development*

## Context

India became a lower middle-income country in 2007 and continues to remain in that category. Over 18 years, its per capita income has grown from $1,022 to $2,700, but the threshold for upper middle-income status is $4,516. The IMF projects India's per capita income to reach $4,195 by 2029, making an upgrade likely in the next decade but not by the end of this decade.

## Challenges to India's Economic Growth

- **Middle-Income Trap:** India has remained a **lower middle-income country** since 2007.
  - – Moving to an **upper middle-income** and later **high-income** status requires sustained high growth.
  - – Many countries (e.g., Brazil, South Africa) have struggled to transition due to stagnant productivity and weak economic policies.
- **Uneven Regional Development:** Western and southern states (e.g., Telangana, Karnataka) have higher per capita incomes and are nearing **upper middle-income status**.
  - – Eastern and northern states (e.g., Bihar, Odisha, West Bengal) lag behind in industrialization and per capita income.
  - – Economic power is concentrated in industrialized states, while political power often resides in poorer regions, leading to policy misalignment.

- **Employment and Labour Force Challenges:** India's **working-age population is rising**, but job creation in the formal sector is insufficient.
  - **Agriculture employs ~45% of the workforce** but contributes only **~18% to GDP**.
  - **Female labour force participation (~25%)** is among the lowest globally.
- **Low Investment in Human Capital:** Low public spending on **education (~2.9% of GDP) and healthcare (~1.5% of GDP)**.
  - **Poor learning outcomes** in schools affect workforce productivity.
  - **Weak healthcare infrastructure**, high out-of-pocket medical expenses.
- **Slow Industrialization and Manufacturing Growth: Manufacturing contributes only ~17% to GDP**, compared to China's 28%.
  - Heavy reliance on imports in key sectors (e.g., electronics, semiconductors).
  - Labour laws and land acquisition challenges deter large-scale industrial growth.
- **Infrastructure Bottlenecks: High logistics costs (~14% of GDP)** compared to global standards (~8–10%).
  - **Power shortages** and **slow urban planning** hinder industrial growth.
- **Financial Sector Issues: Non-Performing Assets (NPAs)** reduce bank lending capacity.
  - MSMEs face **difficulty in accessing credit** due to strict lending norms.
- **Fiscal Challenges and Rising Inequality: Low tax-to-GDP ratio (~11–12%)** limits government revenue.
  - High government spending on subsidies reduces funds for infrastructure and social welfare.
  - Growing **income inequality** threatens social stability.
- **Climate Change and Environmental Issues: Rising pollution**, **water scarcity**, and **extreme weather** threaten agriculture and industry.
  - India is among the **top greenhouse gas emitters**, facing global pressure to cut emissions.
- **Global Economic and Geopolitical Risks: Supply chain disruptions**, trade restrictions, and geopolitical tensions affect exports and investments.
  - Overreliance on certain trade partners creates economic vulnerabilities.

**Challenges in India's Financial Sector**

- **Low Private Sector Investment:** Private sector investment-to-operating cash flow has dropped from **114% (2008-09) to 56% (2023-24)**.
  - **Reasons**: Uncertainty in future demand and geopolitical risks.
- **Limited Credit Access for MSMEs:** Large corporates access **bank credit, equity, and bond markets**, while **MSMEs face credit shortages**.
  - Household savings shifted to **mutual funds and pension schemes**, reducing banks' credit availability.
- **Regulatory Constraints on Banking Liquidity: 30% of bank deposits are locked in regulatory preemptions** (SLR: 26%, CRR: 4%).
  - High **Liquidity Coverage Ratio (LCR) requirements** further reduce lendable resources.
  - Banks invest ₹13 trillion in G-Secs out of ₹40 trillion deposit inflows, limiting funds for lending.
- **Outdated Priority Sector Lending (PSL) Framework: PSL requirement at 40% does not align with current economic priorities**.
  - **Pricing does not reflect credit risk**, affecting bank profitability.
- **Lower Credit Growth than Nominal GDP Growth: Credit growth lagging behind GDP growth**, impacting financing for expansion.
  - Over-regulation on interest rates and clean lending reduces financial inclusion.
- **Rupee Volatility and Liquidity Impact:** Defending the rupee against a strong dollar reduces market liquidity.
  - Leads to an **overvalued rupee without effectively strengthening forex reserves**.
- **High Bank Tech Investment with Low Returns:** Indian banks spend **5% of annual expenditure on technology**.
  - **Global comparison**: Tech investment in banking at 9%, while revenue growth is only 4%.
  - Free **UPI transactions increase operational costs** without revenue generation.
- **Underdeveloped Derivatives Market: India's government bond market share in global indices: 3% (Indonesia: 14.5%)**.
  - **Cash market liquidity is adequate, but the derivatives market remains weak**.

**Retuning India's financial sector**

- **Boost Private Sector Investment: Incentivize corporate investment** through tax benefits and ease of doing business reforms.
  - **Strengthen demand confidence** through policy stability and infrastructure growth.
- **Improve Credit Access for MSMEs:** Encourage **risk-based pricing and cash-flow-based lending** instead of collateral-heavy lending.
  - Strengthen **fintech partnerships** to expand MSME credit reach.
- **Reduce Regulatory Preemptions on Banking Liquidity: Reassess the need for both SLR and LCR**; globally, only **LCR is used**.
  - **Allow banks more flexibility** in investing funds instead of excessive G-Sec purchases.
- **Revamp Priority Sector Lending (PSL): Update PSL guidelines** to reflect changes in GDP structure and economic needs.
  - Ensure **PSL pricing reflects credit risks**, improving bank profitability.
- **Increase Credit Growth to Match GDP Growth: Expand financial inclusion** with AI-driven risk assessment and digital lending models.
  - **Reduce regulatory burdens on interest rates and clean lending**.
- **Manage Rupee Stability Without Reducing Liquidity: Avoid excessive intervention** in currency markets; instead, focus on **long-term forex management**.
  - Strengthen **domestic investment avenues** to reduce dependence on external inflows.
- **Ensure Sustainable Bank Technology Investment:** Explore **small transaction fees on UPI** to compensate for network costs.
  - Implement **global best practices for cost-recovery models**.
- **Develop India's Bond and Derivatives Market: Ease regulations** to increase India's global bond market share.
  - Encourage **institutional investors (IRDAI, PFRDA, SEBI) to use derivatives for risk management**.

## Way Forward for boosting India's economic growth

- **Adopt the "3i" Approach:**
  - **Investment**: Increase investment in key sectors such as manufacturing and infrastructure to boost economic growth.
  - **Infusion of Global Technology:** Encourage the adoption of advanced technologies to enhance productivity and competitiveness.
  - **Innovation**: Foster a culture of innovation through R&D investments and support for startups.
- **Strengthen Manufacturing Competitiveness:** Implement targeted industrial policies like expanding Production Linked Incentive (PLI) schemes to emerging sectors such as green hydrogen and AI hardware.
  - Reduce input costs by rationalizing import duties on raw materials.
- **Improve Logistics Efficiency:** Execute plans under the National Logistics Policy to reduce logistics costs from 14% of GDP to global averages around 8%.
- **Enhance Human Capital Development:** Invest in education and skill development programs that focus on creating high-productivity jobs, aligning with global value chains (GVCs).
- **Promote Export-Led Growth with Diversification:** While traditional export-driven strategies may face challenges due to global protectionism, diversifying into new markets or sectors can help maintain growth momentum.
- **Address Structural Weaknesses:** Upgrade outdated infrastructure like transportation networks and utilities.
  - Improve public institutions' efficiency by streamlining reforms.
- **Encourage Labour Intensive Manufacturing & Exports:** Focus on labour-intensive industries that can drive employment generation while enhancing exports in these sectors.
- **Strengthen Competition & Leverage Digital Technologies:** Implement strong antitrust laws to foster competition among businesses, promoting innovation.
  - Utilize digital technologies for social mobility, talent development, and access to credit facilities through platforms like Aadhaar-based financial inclusion initiatives.

## Global Talent Shortage- Opportunity For India

*Syllabus Mapping: GS-Paper 3, Skilling and Employment*

### Context

A recent FICCI-KPMG study, 'Global Mobility of Indian Workforce', has estimated that by 2030, the demand for skilled workers will exceed supply, leading to a talent shortage of over 85.2 million people.

### India's Advantages and Opportunities as a reliable talent supplier

*   **Favorable Global Perception:** Indian workers do not face significant hostility in most international markets.
    *   Skilled Indian professionals continue to find opportunities despite anti-immigration sentiments.
*   **Large and Young Workforce:** India has a demographic advantage with a large pool of skilled professionals.
    *   Ability to supply talent to aging economies in Europe, GCC, and Australia.
*   **Diverse Skill Base:** Strong presence in IT, healthcare, engineering, and emerging sectors like AI and automation.
    *   Expanding skillsets in renewable energy, sustainability, and digital economy.
*   **Strategic Geographies for Workforce Mobility:** Gulf Cooperation Council (GCC), Europe (including the United Kingdom) and Australia have high demand for skilled professionals.
    *   Healthcare, services, construction, and manufacturing remain high-demand sectors.
*   **Potential to Boost Economic Growth:** Indian workforce participation in global markets can help India reach the **$9-trillion GDP** target by 2030.
    *   Tapping into the **$8.45 trillion** unrealized global economic potential.
*   **Government's Focus on Legal Migration:** Efforts to curb illegal migration enhance India's reputation as a reliable talent supplier.
    *   Ensures better working conditions and legal protections for Indian migrants.

### Barriers to the Efficient Movement of Skilled Workers Across Borders

*   **Regulatory and Immigration Barriers:** Complex visa processes and stringent work permit regulations hinder skilled migration.
    *   Some countries have protectionist policies limiting the entry of foreign workers.
*   **Recruitment Malpractices and Trafficking:** Exploitative recruitment practices and fraudulent agents take advantage of workers.
    *   Human trafficking remains a serious concern for migrant workers' safety and rights.
*   **Policy Barriers and Skill Mismatches:** Indian degrees, especially in medicine, are not universally recognized, leading to underemployment.
    *   Some international job markets require additional certifications or licensing.
*   **Language and Cultural Barriers:** Lack of proficiency in the host country's language affects job opportunities.
    *   Cultural differences make integration challenging, reducing workforce efficiency.

### Way forward

*   **Bilateral Agreements and Free Trade Agreements (FTAs):** Agreements with GCC nations and other countries to protect Indian workers' rights.
    *   The **Joint India-UAE Vision** emphasizes skill cooperation between the two nations.
*   **Skill Development Programmes:** Training initiatives to align Indian workforce skills with global market needs.
    *   Focus on sectors like automation, AI, big data, and healthcare.
*   **Digital Platforms for Workforce Support:** Online recruitment systems ensure legal protections for workers.
    *   Helps prevent fraud, especially in GCC countries.
*   **Recognition of Qualifications:** Ongoing efforts for mutual recognition of Indian academic and professional degrees abroad.
*   **Regulation of Recruitment Practices:** Stricter oversight on recruitment agencies to prevent exploitation and trafficking.

- **Promoting Circular Migration and Mobility:** Temporary work visas and rotational workforce models to address labour shortages.

## How can India cut DAP, urea and MOP Consumption

### Context

India's agricultural sector is heavily reliant on chemical fertilizers, particularly urea, di-ammonium phosphate (DAP), and muriate of potash (MOP).

### Why India Needs to Cut DAP, Urea, and MOP Consumption?

- **Heavy Import Dependence:**
  - **MOP (Muriate of Potash):** 100% imported from countries like Canada, Russia, and Jordan.
  - **DAP (Di-Ammonium Phosphate):** Imported as finished fertiliser and raw materials from Saudi Arabia, China, Morocco, etc.
  - **Urea:** While 85% is domestically produced, its manufacturing depends on **imported Liquefied Natural Gas (LNG)** from Qatar, the US, and the UAE.
  - **Rupee Depreciation Impact:** Rising import costs put pressure on India's forex reserves.
- **High-Analysis Fertilisers Lead to Imbalanced Nutrient Use**
  - **Urea (46% Nitrogen)**, **DAP (46% Phosphorus + 18% Nitrogen)**, and **MOP (60% Potash)** provide excessive single nutrients.
  - Leads to soil degradation and reduces crop productivity over time.
  - Crops require **balanced fertilisation** with secondary (Sulphur, Calcium, Magnesium) and micronutrients (Zinc, Iron, Boron, etc.).
- **Financial Burden of Fertiliser Subsidies:** The government provides **massive subsidies** to keep prices affordable.
  - **DAP Subsidy:** ₹21,911 per tonne + ₹3,500 special concession.
  - **Urea Subsidy:** Even higher, making urea overused by farmers.
  - Reducing consumption would **cut subsidy burden** on the exchequer.

### Strategies to Reduce Dependence

- **Indigenous Production:**
  - Utilizing India's natural resources, such as phosphate rock in Rajasthan, to boost domestic fertilizer production.
  - Encouraging investments in urea, phosphatic, and complex fertilizer production under initiatives like 'Atmanirbhar Bharat'.
- **Balanced Fertilization:** Encouraging the use of complex fertilizers like 20:20:0:13 (ammonium phosphate sulphate) as alternatives to DAP.

- **Examples of Alternatives:**
  - **20:20:0:13 (APS):** This complex fertilizer has become a popular substitute for DAP, especially for crops like oilseeds, pulses, and maize. It contains 20% nitrogen, 20% phosphorus, 0% potassium, and 13% sulfur.
  - **10:26:26:0 and 12:32:16:0:** These complex fertilizers can meet the phosphorus and potassium needs of crops like potatoes, reducing direct MOP application.

## Improve Nutrient Use Efficiency:

  - **Use of Nano Urea:** Reduces traditional urea application while increasing efficiency.
  - **Drip Irrigation + Fertigation:** Reduces wastage and ensures precise nutrient delivery.
  - **Neem-Coated Urea:** Slows nitrogen release, improving absorption.
- **Farmer Awareness & Training:** Train farmers on **Integrated Nutrient Management (INM)** for sustainable soil fertility.
  - Promote **agro-advisory services** for real-time guidance on fertiliser application.
  - Strengthen Krishi Vigyan Kendras (KVKs) to educate farmers on alternative fertilisers.

## Should India Withdraw from WTO?

*Syllabus Mapping: GS-Paper 3, Foreign Trade*

### Context

A recurring demand from a section of Indian farmers is that India should exit the World Trade Organisation (WTO).

### Why Are Indian Farmers Demanding Exit from WTO?

*   **Limits on Minimum Support Price (MSP) & Subsidies:** WTO's **Agreement on Agriculture (AoA) restricts India's MSP** and other support to farmers.
    *   The **External Reference Price (ERP)**, fixed based on 1986-88 prices– **only 10% of the total value of agricultural production** as subsidies, does not account for inflation, making India's MSP seem excessive in WTO calculations.
    *   Farmers believe these restrictions hinder **their right to secure a legal guarantee for MSP**.
*   **Threat from Cheap Imports:** WTO promotes **free trade, leading to the import of cheaper agricultural goods** from developed countries.
    *   **E.g.,** India faces **cheap dairy imports from New Zealand** and **oilseeds from Argentina**, which harm domestic producers.
*   **Lack of Fair Market Access for Indian Exports:** Developed nations impose **non-tariff barriers** (e.g., strict quality standards, sanitary measures) that restrict Indian agricultural exports.
    *   India struggles to export products like **rice, wheat, and dairy** due to such restrictions.
*   **Developed Countries' Unfair Subsidies:** The **U.S. and EU heavily subsidize their farmers** (U.S. farm subsidies exceed $100 billion annually).
    *   This makes their agricultural products **artificially cheaper**, reducing the competitiveness of Indian exports.
    *   India cannot match these subsidy levels due to WTO's **trade-distorting subsidy caps**.
*   **Restrictions on Public Stockholding for Food Security:** India maintains food stocks for **welfare programs like the Public Distribution System (PDS)**.
    *   WTO rules limit food stockpiling beyond a certain level, calling it a **trade distortion**.
    *   This creates challenges for India's **food security and buffer stock programs**.
*   **Lack of Progress on "Special & Differential Treatment" (S&DT):** WTO promised **special treatment for developing countries**, allowing them to protect farmers.
    *   However, developed countries **block these reforms** while enjoying policy flexibility for their own farmers.

### What Can India Do Instead of Exiting the WTO?

*   **Utilize WTO's "Peace Clause" Effectively:** The **peace clause** protects India from legal action even if it **exceeds subsidy limits** for food security programs.
    *   India should continue using this clause to **provide MSP and stockpile food grains** while negotiating for permanent relief.
*   **Advocate for Reforming the External Reference Price (ERP):** India should push for **updating the ERP** from the outdated **1986-88 levels to current inflation-adjusted values**.
    *   This would make India's MSP **more justifiable under WTO norms**.
*   **Increase Non-Trade-Distorting Support:** Instead of relying solely on MSP, India can **expand direct income support schemes** like **PM-KISAN**, which are WTO-compliant.
    *   Other investment-based incentives (e.g., irrigation infrastructure, crop insurance) can also be **strengthened without violating WTO rules**.
*   **Strengthen Tariff and Non-Tariff Barriers on Imports:** India should **strategically use tariff and non-tariff measures** to curb excessive agricultural imports harming domestic farmers.
    *   **Sanitary and Phytosanitary (SPS) measures** can be used to set higher quality standards, restricting unfair imports.
*   **Secure Bilateral and Regional Trade Deals:** India should negotiate **fairer Free Trade Agreements (FTAs)** to **reduce dependence on WTO-led global trade rules**.

- – **E.g.,** The **India-UAE CEPA (Comprehensive Economic Partnership Agreement)** ensures better export opportunities for Indian agricultural goods.
- **Strengthen WTO Negotiations Rather Than Exiting:** India should **lead coalitions of developing nations** to push for **fairer agricultural trade policies**.
  - – Strengthening multilateralism instead of exiting will help India shape global trade rules in its favor.

## Building resilient Telecom Infrastructure

*Syllabus Mapping: GS-Paper 3, Infrastructure- Telecom*

## Context

The Coalition for Disaster Resilient Infrastructure has recently released a report assessing Indian telecom networks' preparedness in the event of disasters. The report provides recommendations for State governments to enhance disaster resilience in telecom infrastructure.

## Importance of Telecom Networks in Disaster Management

- **Telecom networks are crucial for disaster response** as they enable **quick communication** between:
  - – State & National Disaster Management Authorities.
  - – Local municipalities & State/Union governments.
- Disruptions in telecom networks can **hinder relief efforts**, putting **lives and property at risk**.

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**Coalition for Disaster Resilient Infrastructure (CDRI)**

- CDRI is an international partnership that aims to build climate and disaster-resilient infrastructure.
- It was launched in **2019 by the Government of India** at the UN Climate Summit.
- CDRI's members include national governments, UN agencies, multilateral development banks, private sector and academia.
- CDRI's goal is to help countries upgrade their infrastructure to be more resilient to climate change and disasters.

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## Key Challenges in Disaster-Prone Areas

- **High Risk in Coastal and Seismic Zones:**
  - – **Coastal regions face heightened vulnerability** as they host **undersea cable landing stations**, connecting India to the **global internet**. Disruptions in these cables can lead to **massive network failures**.
  - – **Cyclones and earthquakes pose a significant risk**, potentially damaging **telecom towers** and **cabling infrastructure**, leading to prolonged service outages.
- **Power Failures: The Biggest Issue:**
  - – **Telecom towers heavily rely on uninterrupted power supply**, but disasters often cause **long blackouts**, delaying network restoration.
  - – **According to the CDRI report** power failures are the primary cause of telecom outages, more than physical damage to towers or cables.
  - – **Restoring power to telecom towers during disasters is crucial** to maintaining communication networks for emergency response.
- **Structural Weakness of Telecom Towers:**
  - – Many towers **are not built to withstand high wind speeds**, especially in **cyclone-prone states** like Odisha, West Bengal, and Andhra Pradesh.
  - – Poorly designed **overhead telecom cables often snap during storms**, leading to **complete service breakdowns**.
  - – In **flood-prone regions, diesel generators stop working** when water levels rise, further complicating power restoration efforts.

## Solutions for Building a Disaster-Resilient Telecom Network

- **Strengthening Power Infrastructure:**
  - – **Ensuring uninterrupted power supply** to critical telecom sites.

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- **Emergency fuel reserves** should be maintained to power telecom towers in disaster-hit regions.
    - **E.g.** Odisha provides 50 litres of fuel per telecom operator during cyclones to keep networks operational.
  - **Alternative power sources like solar or hybrid energy solutions** should be implemented to reduce dependency on the electricity grid.
- **Building Stronger Telecom Towers:**
  - Towers in cyclone-prone areas should meet higher wind resistance standards to prevent collapse.
  - Mandatory disaster-proofing for new telecom infrastructure should be enforced to withstand extreme weather conditions.
- **Shifting to Underground Fiber Optic Cables & Implementing a "Dig-Once" Policy:**
  - Overhead telecom cables are highly vulnerable to storms and cyclones; shifting to underground fiber optic cables can significantly reduce disruptions.
  - **Dig-once policy** should be implemented, ensuring that underground fiber cables are laid **alongside water, gas and drainage infrastructure**.
    - This minimizes repeated disruptions and lowers long-term maintenance costs.
- **Enhancing Disaster Monitoring & Emergency Response:**
  - Real-time tracking of telecom asset damage using AI-driven software and data analytics for quick restoration.
- **Financial Resilience Through Parametric Insurance:**
  - CDRI has recommended parametric insurance to financially support telecom operators during disasters.
  - **This ensures quick compensation**, allowing operators to rapidly restore damaged infrastructure.

## Future Roadmap for Telecom Resilience in India

- **Short-Term Initiatives (1-2 Years):**
  - Strengthening backup power systems at telecom towers with solar/hybrid solutions.
  - Implementing real-time damage monitoring tools for quick response.
  - Upgrading telecom infrastructure in high-risk coastal and seismic areas.
- **Medium-Term Initiatives (3-5 Years):**
  - Expanding underground fiber optic networks nationwide.
  - Mandatory disaster-proofing of all new telecom towers in vulnerable regions.
  - Establishing a coordinated response mechanism to minimize service downtime during disasters.
- **Long-Term Vision (Beyond 5 Years):**
  - Achieving a 100% disaster-resilient telecom infrastructure across India.
  - Developing national and state-level telecom disaster preparedness frameworks.
  - Encouraging public-private partnerships (PPP) for investment in climate-resilient infrastructure.

# TOPICS FOR PRELIMS

## Dollar Index

*Syllabus Mapping: Foreign Exchange and Trade*

### Context

The Indian rupee hit a historic low of **87.29 per dollar**, triggering concerns over rising **imported inflation and trade deficit**. The decline follows a sharp **1.24% rise in the Dollar Index (DXY).**

### About Dollar Index

- **Dollar Index (DXY)** is a measure of the value of the U.S. dollar relative to a basket of foreign currencies.

- **Basket of Currencies:** DXY compares the U.S. dollar against six major currencies:
  - **Euro (EUR)** – 57.6% (highest weight)
  - **Japanese Yen (JPY)** – 13.6%
  - **British Pound (GBP)** – 11.9%
  - **Canadian Dollar (CAD)** – 9.1%
  - **Swedish Króna (SEK)** – 4.2%
  - **Swiss Franc (CHF)** – 3.6%
- **Base Year and Calculation:** It was established in **1973**, shortly after the Bretton Woods Agreement was dissolved, with a base value of **100**.

- **Factors Influencing DXY:**
  - **Monetary Policy:** U.S. Federal Reserve interest rate changes.
  - **Economic Indicators:** GDP growth, employment rates, inflation.
  - **Global Events:** Wars, recessions or financial crises impact the index.

## Reasons Behind Rupee Depreciation

- **Strengthening Dollar Index & Trade War Concerns:**
  - The **Dollar Index (DXY) surged** after the U.S. President **imposed 25% tariffs** on imports from **Canada, Mexico, and China**, escalating fears of a **global trade war**.
- **Capital Outflows:**
  - Since **October 2024, Foreign Institutional Investors (FII) have sold $11 billion** worth of Indian assets.
  - This capital outflow **reduces forex reserves** and weakens INR.
- **Widening Trade Deficit:**
  - India's **trade deficit reached $188 billion** in FY25 (so far), up **18% from FY24**.
  - Higher trade deficit increases **demand for dollars**, putting downward pressure on INR.
- **Robust U.S. Economic Data & Rising Interest Rates:**
  - **Strong U.S. job data** and expectations of **higher Federal Reserve interest rates** have made the U.S. **Treasury yields more attractive** to investors.

## Economic Impact of Rupee Depreciation

- **Negative Impact:**
  - Higher Imported Inflation.
  - Higher Loan Servicing Costs for Indian Companies.
  - Capital Flight & Lower FDI Inflow.
- **Positive Impact:**
  - **Boost to Export-Oriented Sectors-** A weaker INR makes **Indian exports cheaper** globally, benefiting sectors like **IT, pharmaceuticals, and textiles**.
  - **Higher Remittance Value:** Indians working abroad **benefit from a weaker rupee**, as **remittances fetch more INR**, supporting domestic consumption.

## Faceless Scheme of Assessment

*Syllabus Mapping: Tax Administration*

## Context

The CBI has registered a case against nine individuals for allegedly attempting to undermine the Income Tax Department's "Faceless Assessment Scheme."

## About the Faceless Assessment Scheme

- The scheme was introduced by the **Income Tax Department in 2019** as part of the **"Transparent Taxation – Honouring the Honest"** initiative.
- **Aim:** To **eliminate face-to-face interactions** between taxpayers and tax officials, reducing corruption, ensuring objectivity, and improving efficiency in the tax assessment process.
- **Legal Framework:** It is backed by **Section 144B** of the Income Tax Act, which mandates the following:
  - No physical meetings between tax officers and taxpayers.
  - All notices and responses are to be **exchanged electronically**.
  - Randomized allocation of cases to ensure neutrality.

## How the Faceless Assessment Works?

The scheme operates through a **fully digital and centralized** system, involving multiple specialized units:

- **National e-Assessment Centre (NeAC):** Acts as the **central body** for issuing notices and coordinating assessment-related communication.
  - Allocates cases randomly to **Regional e-Assessment Centres (ReACs)**.
- **Regional e-Assessment Centres (ReACs):** Located in different parts of the country to handle assessment cases assigned by NeAC.
  - Includes **Assessment Units (AUs), Verification Units (VUs), Review Units (RUs), and Technical Units (TUs)**.
- **Digital Process Flow:**
  - **Automated Case Selection:** Cases are selected through AI-driven risk analysis.
  - **Electronic Notices:** All notices are sent digitally via the Income Tax portal.
  - **Submission by Taxpayer:** Taxpayers submit responses and documents online.
  - **Assessment by Teams:** Multiple teams independently review cases for fairness and accuracy.
  - **Final Order Issued:** The final assessment order is sent electronically without any human interaction.

## RBI Slashes Rate By 0.25% To Revive Growth

*Syllabus Mapping: Interest Rate and RBI*

## Context

The RBI's Monetary Policy Committee (MPC) has reduced the repo rate to 6.25%, anticipating inflation to ease to 4.4% this quarter and 4.2% through 2025-26. Additionally, the RBI has projected a real GDP growth of 6.7% for 2025-26, with foreign exchange reserves at $630.6 billion, providing over 10 months of import cover.

## Monetary Policy Committee

- MPC was constituted in **2016 as a statutory body under the RBI Act** to formulate monetary policy in India **(on recommendation of Urjit Patel committee)**

- Composition **(Chairperson + 5 Members):** Quorum: 4 members.
  - RBI Governor - ex-officio chairperson
  - RBI Deputy Governor + 1 more member from RBI to be nominated by the Central Board of Directors.
  - 3 other members are appointed by the Central Government.

- Members of MPC hold office for a period of **4 years** and are **not eligible for re-appointment.**
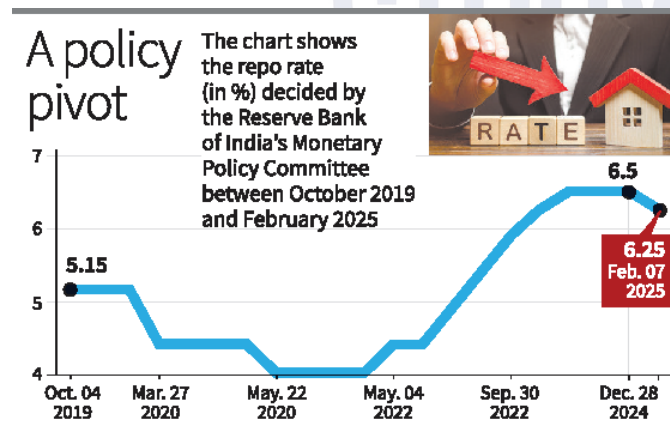
- MPC is required to **meet at least four times in a year.**

- MPC takes decisions based on **majority vote** (by those who are present and voting. In case of a tie, the **RBI governor will have the second or casting vote.**

- **The decision of the committee is binding on the RBI.**

### How is the Repo Rate Used by the MPC?

- **Inflation Control**: The MPC adjusts the repo rate to manage inflation.
  - A higher repo rate makes borrowing costlier for banks, reducing the money supply in the economy and thereby controlling inflation.
  - Conversely, a lower repo rate boosts lending and stimulates economic activity.



A policy pivot

The chart shows the repo rate (in %) decided by the Reserve Bank of India's Monetary Policy Committee between October 2019 and February 2025

- **Liquidity Management**: By altering the repo rate, the MPC influences liquidity in the financial system.
  - A higher rate tightens liquidity, while a lower rate eases liquidity conditions.

- **Economic Growth**: The repo rate affects overall interest rates in the economy.
  - Lowering the repo rate promotes borrowing and investment, supporting economic growth.
  - Raising it can slow growth to manage overheating or inflationary pressures.

- **Exchange Rate Stability**: Changes in the repo rate can impact the value of the rupee by affecting capital flows and investor sentiment.

### RBI Uses Various Tools To Achieve These Objectives

- **Repo rate:** It is the interest rate at which the Reserve Bank of India (RBI) lends money to commercial banks against government securities as collateral for short-term needs.

- **Standing Deposit Facility (SDF):** It is a monetary policy tool that RBI uses to absorb excess liquidity from commercial banks.

- **Liquid adjustment facility (LAF):** It is a facility provided by RBI to scheduled commercial banks to avail of liquidity in case of need or to park excess funds with RBI on an overnight basis against the collateral of government securities.

- **Cash Reserve Ratio (CRR):** The amount of money that banks must keep with the RBI as a percentage of their net demand and time liabilities (NDTL). A higher CRR reduces the funds available for banks to lend, tightening liquidity in the market.
  - **Statutory Liquidity Ratio (SLR):** The percentage of a bank's total deposits that must be invested in government securities or other approved securities. A higher SLR reduces the money available for banks to lend, limiting cash flow in the economy.

## Rupee Depreciation and Its Impact on Indian Corporates

*Syllabus Mapping: Rupee Depreciation and Its impact*

### Context

The Indian rupee has depreciated **by 5% since April 2024**, increasing the cost of external commercial borrowings (ECBs).

## Why Foreign Loans Have Become Costlier?

- Earlier, when the **interest rate differential between India and the US was 5% (in 2020),** foreign loans were attractive.

- Now, with the **US Federal Reserve hiking interest rates** and **the dollar appreciating**, this advantage has disappeared.

- Companies that did **not hedge** against rupee depreciation are facing increased repayment burdens.

- **E.g.** A company with $500 million in ECBs would see an additional ₹2,500 crore burden if the rupee weakens by 5% (assuming ₹75 per USD as the base).

## Impact on Different Sectors

- **Exporters (Beneficiaries of Rupee Depreciation):**
  - Export-oriented industries like **IT, pharmaceuticals, textiles and automobiles** benefit as their exports become cheaper and competitive globally.

- **Importers (Facing Higher Costs and Squeezed Margins):**
  - Import-dependent sectors like **oil & gas, electronics, and pharmaceuticals** face **rising input costs**.
  - Some firms are also **shifting to domestic financing** to avoid forex exposure.

### Insurers agree on customer-friendly Bima Vistaar plan

*Syllabus Mapping: Insurance Sector*

## Context

India's insurance companies have agreed on a simple, comprehensive and customer-friendly model for Bima Vistaar.
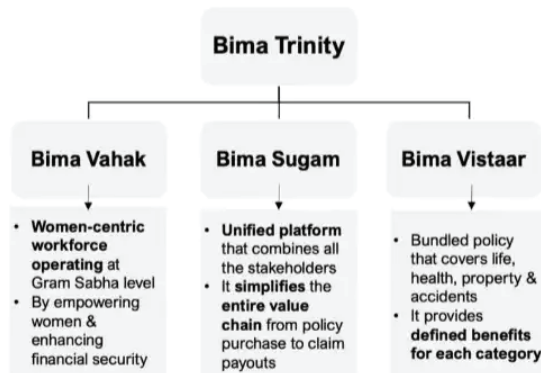


## About Bima Vistaar

- It is a simple, **comprehensive and customer-friendly** composite insurance product.

- **Initiated by:** Insurance Regulatory and Development Authority of India (IRDAI).

- **Coverage Areas:**
  - Life insurance (death coverage)
  - Personal accident insurance
  - Property insurance
  - Surgical hospitalization coverage

- **Co-Insurance Model:** Each type of risk is co-insured by **all insurers dealing with that specific insurance line** under an **omnibus co-insurance arrangement**.

### Surge in Soybean Oil Imports from Nepal to India

*Syllabus Mapping: Foreign Trade*

## Context

Imports from Nepal surged by 14 times during the April-November 2024 period compared to the same period in the previous year.

## About soyabean oil imports

- India's **total soyabean oil imports** increased by **19%** during the **April-November 2024 period**, reaching nearly **$3 billion**, up from **$2.5 billion** in 2023.

- Imports from **Brazil** (a major soyabean oil producer) declined during the same period, dropping to **$549 million** from **$849.19 million** the previous year.

- **Duty Revision and Impact on Soyabean Oil Imports:**
  - India raised the basic customs duty on refined oils like palm oil, soya oil and sunflower oil by 20% in September 2024 to protect Indian oilseed farmers.
  - This increase in duty led to a significant surge in **soyabean oil imports from Nepal** in **November 2024**, which increased to **$23.46 million**, compared to **$1.42 million** in **November 2023**.

- A report from the **International Food Policy Research Institute (IFPRI)** noted that Nepal's lower tariffs on edible oils (compared to India) allow it to refine and re-export the oil to India at a lower cost.

## Tariff Advantage for Nepal

- **Nepal enjoys a 30% tariff advantage** due to a **zero-duty access** for its products into India under the **Nepal-India Treaty of Trade (2009)**.
  - Under the **Nepal-India Treaty of Trade**, Nepal enjoys **duty-free access** to Indian markets for most of its goods, except for certain items like **cigarettes**, **alcohol** and **cosmetics**.

- **Nepal's increased soyabean oil exports** to India have raised concerns over potential misuse of trade advantages under the **Nepal-India Treaty of Trade**.

**Soybean**

- It is a leguminous crop known for its high protein and oil content.
- It is a major source of edible oil, protein-rich animal feed and industrial products like biodiesel.
- **Growing Conditions:**
  - It is a **kharif crop &** grows well in fertile, well-drained loamy soil.
  - It requires an optimal temperature of **20°C to 30°C** during the growing season.
- **Top 3 Soybean producing states of India:** Madhya Pradesh, Maharashtra & Rajasthan.
- **Top Soybean producing countries:** Brazil, USA, Argentina, China & **India**.

## Sovereign Green Bonds
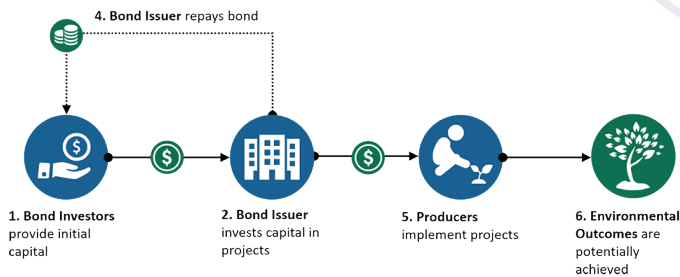
*Syllabus Mapping: Government Bonds*

### Context

India's SGrB issues have faced challenges in gaining investor interest, making it hard for the government to secure a greenium.

### About Sovereign Green Bonds

- **Sovereign Green Bonds (SGrBs)** are debt instruments issued by governments to raise funds for projects aimed at reducing emissions and enhancing climate resilience.
- **India has issued SGrBs** eight times since 2022-23, raising nearly **Rs 53,000 crore** in total.
- The government uses **around 50% of the funds** raised from SGrBs for energy-efficient projects, such as the production of **electric locomotives** under the **Ministry of Railways**.
- **Working Mechanism of SGrBs:**

Standard Green Bond



1. **Bond Investors** provide initial capital
2. **Bond Issuer** invests capital in projects
4. **Bond Issuer** repays bond
5. **Producers** implement projects
6. **Environmental Outcomes** are potentially achieved

### Challenges with India's Sovereign Green Bond (SGrB) Market

- **Lack of Investor Demand:**
  - Lower **Greenium in India**. Globally, green bonds can secure a **greenium** of **7-8 basis points**, but in India, it has often been just **2–3 basis points**.
    - Greenium refers to the savings an issuer of a green bond realises on the associated coupon payment because the bond is green.

- It is the amount by which the yield on the green bond is lower, compared with the conventional bond.

- **Liquidity Issues:**
  - **Small issue sizes** and the tendency for investors to hold the bonds until maturity have **stifled secondary market trading**.
  - Without a vibrant secondary market, SGrBs lose out on one of the advantages of conventional bonds — the ability to trade and access liquidity.

- **Lack of a Robust Ecosystem for Green Investments:**
  - India lacks a strong ecosystem for **social impact funds** and **responsible investing mandates**.

- **Post-Issuance Transparency Issues:**
  - **Lack of transparency** around how the funds raised from green bonds are being used has affected investor confidence.
  - **India's Department of Economic Affairs** has not yet released the **allocation and impact report for 2023-24**, which provides essential information to investors. This delays assessments on how funds are utilized and limits investor trust.

## SEBI's Proposed "When-Listed" Platform for Pre-Listing Trading

*Syllabus Mapping: Investment in Economy and SEBI*

### Context

**SEBI** is planning to introduce a **"when-listed" platform** to regulate the trading of shares in the period between the allotment of shares after an **Initial Public Offering (IPO) bid closure** and the official listing on stock exchanges.

### About "When-Listed" Platform

- It will allow trading of newly allotted but **yet-to-be-listed shares** in a **regulated manner**.
- It aims to **curb grey market activity**, which is the **unofficial and unregulated** trading of shares before they are listed.
- According to the SEBI **Chairperson**, the move will provide a formal alternative to **"kerb trading" (grey market trading)** and bring transparency to the process.

**Grey Market & Its Impact**

The **grey market** refers to an **unofficial cash market** where shares of an upcoming IPO are traded before official listing. Trading in the grey market happens based on **demand and supply** principles.

**How Grey Market Trading Works:**

- When a company announces an **IPO**, grey market brokers start operating.
- The IPO price band is **fixed** (e.g., ₹90-100 per share).

- A **premium** (e.g., ₹10, ₹20, ₹30) is added based on **demand expectations**.
- Investors **bid** for shares in the grey market before allotment.
- On **listing day**, if the stock opens higher than the grey market price, grey market operators **pay the profit** to the investors.
- If the stock **falls below** the purchase price, the **investor incurs a loss**.

**Issues with Grey Market Trading:**

- **Unregulated & Risky:** No legal oversight, leading to potential fraud and unfair practices.
- **Speculative & Volatile:** Can create misleading price expectations.
- **Retail Investor Risk:** Many small investors rely on grey market premiums to decide on IPO investments.

## Current IPO Timeline & SEBI's Concerns

- The existing **T+3 IPO listing system** works as follows:
  - **T (IPO Closure Day):** IPO subscription closes.
  - **T+1:** Allotment of shares takes place.
  - **T+3:** Shares officially listed on stock exchanges.
- **Problem:**
  - During the **gap between T+1 and T+3**, grey market trading booms.
  - SEBI believes **investors should trade in a regulated space** instead of engaging in **kerb trading**.
- **How Will the "When-Listed" Platform Work?**
  - Once IPO shares are **allotted (T+1)**, investors can start **officially trading them** on the "when-listed" platform.
  - It will **eliminate grey market dependency** by providing a **regulated environment** for pre-listing trades.

## Centre is planning to raise the Deposit Insurance Limit

*Syllabus Mapping: Banking Sector*

### Context

The Indian government is considering increasing the **bank deposit insurance cover** beyond the current ₹**5 lakh per depositor**.

### About Deposit Insurance and Credit Guarantee Corporation (DICGC)

- DICGC is a wholly-owned subsidiary of the Reserve Bank of India (RBI).
- It provides insurance cover to bank depositors to ensure protection in case of bank failures.
- It was established in **1978** under **Deposit Insurance and Credit Guarantee Corporation Act, 1961.**
- **Main Function of DICGC:** Deposit Insurance

  - Provides insurance coverage to depositors in case a bank fails.
  - Currently insures deposits up to ₹**5 lakh per depositor per bank** (principal + interest).
- **Banks Covered Under DICGC:**
  - Commercial Banks (Public, Private, Foreign Banks)
  - Regional Rural Banks (RRBs)
  - Local Area Banks
  - Urban Cooperative Banks (UCBs)
  - State & Central Cooperative Banks
  - **Exclusions:** Primary Cooperative Societies.
- **Deposit Insurance Coverage:**
  - **Maximum Cover:** ₹5 lakh per depositor per bank (since February 4, 2020).
  - **Covers:** Savings, Fixed, Current and Recurring Deposits.
    - **Exclusions:** Deposits in foreign branches of Indian banks, Government deposits and interbank deposits.
  - **In case of bank failure:** Depositors receive claims through DICGC within **90 days.**

**Deposit Insurance**

- Deposit insurance is a financial safety net that protects depositors from bank failures by guaranteeing a certain amount of their money.
- In India, deposit insurance is managed by **DICGC**.

## Reciprocal Tariffs

*Syllabus Mapping: Foreign Trade and Tariffs*

### Context

Recently US President Donald Trump has announced his plan to impose "reciprocal tariffs" on all countries.

### About Reciprocal Tariffs

- A **reciprocal tariff** is a tax or trade restriction imposed by one country in response to similar actions taken by another.
- The goal is to create **balance in trade** between nations by ensuring fairness in tariff rates.
- While intended to protect local industries, reciprocal tariffs can lead to **trade wars** and economic disruptions.

### Historical Context

- Since **World War II,** global trade has moved towards freer trade agreements.
- Agreements like **GATT (General Agreement on Tariffs and Trade) and WTO (World Trade Organization)** ensured that developing countries received preferential treatment.
- Under this system, **developing nations could levy higher tariffs** to protect their industries, while developed nations maintained lower tariffs.

## Trump's Approach

- Ends the preferential treatment for developing nations.
- The US will now **match tariff levels of other countries** on American exports.
- Trump calls it a **"fair" system** where the US no longer has to worry about uneven tariffs.

**Impact on Indian Exports**

- United States stands as India's largest export market, accounting for approximately **17.7% of India's total exports in the fiscal year 2024.**
- Key export sectors include pharmaceuticals, petrochemicals, textiles and machinery.
- The imposition of reciprocal tariffs could render Indian goods less competitive in the U.S. market due to increased prices, potentially leading to a decline in export volumes.

## SEBI's Proposed Framework for Fast-Track Follow-On Offerings by REITs & InvITs

*Syllabus Mapping: Investment Tools and SEBI*

## Context

The Securities and Exchange Board of India (SEBI) has proposed a framework to streamline fundraising for **REITs** and **InvITs**.

## Key Highlights of the Proposal

- **Fast-Track Follow-On Offerings (FPO) for REITs & InvITs:**
  - SEBI has proposed a **fast-track mechanism** for follow-on public offers (FPOs) to enable quicker access to capital.
  - REITs and InvITs need to **apply to all stock exchanges** where their units are listed and obtain **in-principle approval** for listing.
  - They must **designate one stock exchange** for the listing process.
- **Lock-in Period for Preferential Issue of Units:**
  - SEBI has proposed a lock-in period for units allotted to **sponsors and sponsor groups** through preferential allotment.
  - **15% of allotted units**: Locked-in for **three years** from the date of trading approval.
  - **Remaining units**: Locked-in for **one year** from the date of trading approval.
- **Due Diligence and Disclosure Requirements:**
  - SEBI has also proposed that **REITs and InvITs disclose financial information** in line with **public issue and listing norms**.
  - This move aims to improve transparency and align disclosures with established market regulations.

## What are REITs?

- **Real Estate Investment Trusts (REITs)** are companies that own or finance income-generating real estate assets.
- Investors can invest in a **diversified portfolio** of properties such as: **Office buildings, Apartments, Shopping malls, Hotels etc.**
- REITs allow individuals to invest in real estate **without owning physical properties.**

## What are InvITs?

- **Infrastructure Investment Trusts (InvITs)** are investment instruments that allow investors to invest in **infrastructure projects** like: **Roads & highways, Power distribution networks, Telecom towers etc.**
- They function similarly to **mutual funds**, pooling money from investors to finance **income-generating infrastructure assets**.
- InvITs are designed as a **tiered structure** with a sponsor setting up the InvIT which in turn invests into the eligible infrastructure projects either directly or via special purpose vehicles (SPVs).
- Some part of the investment is used by the InvIT as **loan,** while other portion is used as **capital**– Unit holders receive returns in the form of **Dividend and Interest**.
  - **Both the dividend and interest are taxed.**
- As per the SEBI regulations, **InvITs must invest at least 80% of their assets** in projects that are completed and revenue-generating– Lowers risk for Investors.
- **InvITs and REITs** are recognized as borrowers under the Securitization and Reconstruction of Financial Assets and Enforcement of Securities Interest **(SARFAESI) Act.**

## RBI to infuse liquidity via $10 bn USD-INR swap deal

*Syllabus Mapping: Foreign Trade and RBI*

## Context

The Reserve Bank of India (RBI) has announced a long-term USD-INR Buy/Sell swap auction to meet the durable liquidity needs of the financial system.

## What is a Currency Swap?

- A **currency swap** is a financial contract where two parties exchange **one currency for another** and agree to **reverse the transaction at a future date** at a pre-agreed exchange rate.
- **Purpose of RBI's USD-INR Buy/Sell Swap:**
  - **Manages liquidity** without affecting interest rates.
  - Helps **stabilize the Indian Rupee (INR)** during periods of **capital outflows**.

– Supports **foreign exchange reserves** and reduces speculative pressures.

## Types of Currency Swaps

- **Buy/Sell Swap (Liquidity Injection by RBI)**
  - **First leg (Buy Leg):** RBI buys USD from banks and gives them Rupees.
  - **Second leg (Sell Leg, after tenor ends):** RBI sells USD back and takes back Rupees at a pre-agreed exchange rate.
  - **Objective:** To **increase rupee liquidity** in the banking system.
- **Sell/Buy Swap (Liquidity Absorption by RBI)**
  - **First leg (Sell Leg):** RBI sells USD and takes Rupees from banks.
  - **Second leg (Buy Leg, after tenor ends):** RBI buys back USD and returns Rupees.
  - **Objective:** To **absorb excess rupee liquidity** and control inflation.

## Trump bans the creation of a 'digital dollar'

*Syllabus Mapping: Digital Currency*

## Context

US President Donald Trump has issued an executive order banning the establishment of a central bank digital currency.

## About Central Bank Digital Currency (CBDC)

- It is a digital form of national currency **issued and regulated by a country's central bank,** representing a digital version of physical cash and legal tender.
- **It can also be programmed** for certain selected users or within a specific region of a country.
- **Types of CBDC**
  - **Retail CBDC:** CBDC that can be used for people for day-to-day transactions.
  - **Wholesale CBDC:** CBDC that can be used only by financial institutions such as Banks, NBFCs etc.
- **Benefits of CBDC:**
  - Freely Convertible.
  - Programmable
  - Fungible Legal tender.
  - Enables direct Bilateral Currency Exchanges.
- RBI has also launched **e-rupee,** a digital version of currency notes.
- CBDC appears as a **liability on the RBI's balance sheet.**
- **Finance Act 2022** amended the **RBI Act,** enabling it to introduce Central Bank Digital Currency.

## News in Short

| | |
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| **Certificates of Origin 2.0 System** | Recently, the Directorate General of Foreign Trade (DGFT) has launched the enhanced Certificate of Origin **(eCoO) 2.0 System.**<br>**Key Features**<br>• **It is an upgraded digital platform for issuing Certificates of Origin (CoO).**<br>  – **A certificate of origin (CO) is a document that confirms the country of origin for a product being exported.**<br>• **Multi-User Access:** Exporters can authorize multiple users under a **single Importer Exporter Code (IEC)**, improving accessibility within an organization.<br>• **Aadhaar-Based e-Signing:** The system supports **Aadhaar-based e-signing** alongside **digital signature tokens**, offering exporters greater flexibility.<br>• **Integrated Dashboard:** The dashboard provides seamless access to: **eCoO services, Free Trade Agreement (FTA) information & Trade events and resources.** |
| **Reverse Flip** | Quick commerce unicorn Zepto has completed a reverse flip from Singapore to India ahead of its planned initial public offering (IPO).<br>**About Reverse Flip**<br>• Reverse Flip is the term used to describe the trend of overseas start-ups shifting their domicile to India and listing on Indian stock exchanges.<br>• It refers to a situation where a company, particularly an Indian startup, that was initially established overseas for easier fundraising and regulations, decides to move its legal headquarters and ownership back to India,<br>• **Reasons:**<br>  – To capitalize on India's large and growing economy<br>  – Venture capital access<br>  – Favourable tax regimes and favourable government policies. etc. |

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| **Middle Income Trap** | • It is a situation **where a country struggles to transition from middle-income to high-income status.** |
| | • It's characterized by slow growth, stagnant wages, and a growing informal economy. |
| | • The **World Bank's 2024 World Development Report says that over 100 countries** are stuck in the middle-income trap. |
| | • The term "middle-income trap" was coined by the **World Bank** in its report titled 'An East Asian Renaissance: Ideas for Economic Growth' (2007). |
| | **What causes the middle-income trap?** |
| | • Countries get stuck in the middle-income trap if they can't compete internationally in labour-intensive goods or higher value-added activities. |
| | • When countries don't pursue sound policies to maintain economic growth. |
| **V Anantha Nageswaran's term as CEA extended** | The government has extended the term of chief economic advisor (CEA) V Anantha Nageswaran by two years till March 2027. |
| | **About Chief Economic Advisor (CEA) of India** |
| | • CEA is a key government official responsible for providing economic analysis and policy advice to the Government of India, particularly to the Ministry of Finance. |
| | • He holds the rank of Secretary to the Government of India. |
| | • He is the ex-officio cadre-controlling authority of the Indian Economic Service. |
| | • CEA is head of the **Economic Division** of the Department of Economic Affairs, Union Ministry of Finance. |
| | • **Main Functions:** |
| | – Provides expert economic advice to the Finance Minister and the Government on key issues like: Inflation, GDP growth, Employment trends etc. |
| | – Prepares and presents the **Economic Survey of India**, which is released before the Union Budget. |
| | ° This document provides a detailed economic analysis and forecasts for policy decisions. |
| **Dabhol Breakwater Project and LNG Terminal** | The Dabhol Breakwater Project, originally part of an Enron-era initiative in the Arabian Sea, is set to be completed by March 2025 after being stalled since 2001. |
| | **About the Dabhol LNG Terminal** |
| | • **Location:** Dabhol, Ratnagiri district, Maharashtra. |
| | • **Connectivity:** Close to the **Arabian Sea**, with access to **major gas pipelines** and **industrial hubs** in western India. |
| | • **Significance:** |
| | – Provides **natural gas for power generation and industrial use**. |
| | – Enhances **energy security** by reducing dependence on coal and oil. |
| | – Serves as an **important link** in India's **LNG supply chain**. |
| | **What is an LNG Terminal?** |
| | • A **liquefied natural gas (LNG) terminal** is a **facility used to import, store, regasify and distribute LNG**. |
| | • LNG is transported via **cryogenic tankers** in its **liquid state** to **reduce volume**. Once at the terminal, it is **regasified** and fed into pipelines for **domestic and industrial consumption**. |
| | • **Major LNG Terminals in India:** |
| | – Dahej, Hazira & Mundra - Gujarat |
| | – Dabhol - Maharashtra |
| | – Kochi - Kerala |
| | – Ennore - Tamil Nadu |

| | |
|---|---|
| **Diriyah Giga project** | Several Indian companies such as Tata Group and Oberoi Hotels are keen to invest in Diriyah**.**<br><br>**About Diriyah**<br>• **Diriyah** is a **USD 63.2 billion** real estate and tourism **Giga project** in **Saudi Arabia**, located on the **outskirts of Riyadh**.<br>• It is being developed as the **"City of Earth"**, with an emphasis on **heritage, luxury, and tourism**.<br>• The project is **backed by the Public Investment Fund (PIF)** of Saudi Arabia.<br>• It includes the **UNESCO World Heritage Site of At-Turaif**, the historic birthplace of the modern Saudi kingdom.<br><br>**Saudi Arabia's Vision 2030 includes several Giga projects, such as:**<br>• **NEOM (The Line, Oxagon, Trojena)** – Futuristic smart city.<br>• **Red Sea Project** – Luxury tourism and hospitality.<br>• **Qiddiya** – Entertainment city.<br>• **Diriyah** – Cultural and heritage city. |
| **Beggar-thy-neighbour policies** | • Beggar-thy-neighbour policies are **protectionist economic strategies** that aim to **benefit a country's economy at the expense of others**.<br>• **Origin:** It was **first coined by Adam Smith** in 1776, in his book **The Wealth of Nations**.<br><br>**Common examples:**<br>– **Trade wars** – Imposing **heavy tariffs** and **strict import quotas** to protect domestic industries.<br>– **Currency wars** – Central banks **depreciating domestic currency** to boost exports and reduce imports.<br><br>**Arguments in Favor of Beggar-Thy-Neighbour Policies**<br>• **Protection of Domestic Industries–** Helps **infant industries** grow without foreign competition.<br>• **Boosts Exports & Reduces Imports–Currency depreciation** makes exports cheaper & imports **costlier**.<br>• **Leads to Trade Surplus–**Higher exports and reduced imports create a **trade surplus**.<br><br>**Criticism**<br>• **Triggers Retaliatory Actions–**Trade wars with tit-for-tat tariffs and currency devaluations hurt global trade.<br>• **Harmful to Consumers– Higher tariffs** – **Increased prices** for imported goods – Consumers **pay more**. |
| **Halal Certification** | • It is a document that confirms that a product or service adheres to Islamic law.<br>• It's often used for food, cosmetics, and pharmaceuticals.<br>• **What does halal certification guarantee?**<br>– Product is free of "forbidden" ingredients.<br>– Product hasn't been in contact with "impure" substances.<br>– Product is safe and hygienic & is suitable for consumption by Muslims.<br>• It applies primarily to food but can also extend to other products and services.<br>• In India, halal certification is provided by private companies, such as Halal India Pvt Ltd and Jamiat Ulama-i-Hind Halal Trust. |

## Maize for Ethanol Production

*Syllabus Mapping: Agriculture, Crops*

### Context

India is set to achieve **20% ethanol blending** with petrol within the next two months—**a year ahead of schedule**. This requires the production of **1,100 crore litres of fuel ethanol annually**.

### Sources of Ethanol Production

• The required **1,100 crore litres of fuel ethanol** will come from multiple sources:

– **Sugar and High-Grade Molasses** – 400 crore litres
– **Food Corporation of India (FCI) Rice** – 110 crore litres
– **Broken Rice** – Small contribution
– **Maize** – 350-400 crore litres

### Role of Maize in Ethanol Production

• India was producing little ethanol from maize before 2020. Now, maize is expected to contribute nearly 400 crore litres.

• Grain-based distilleries and dual-feed sugar distilleries (which can use maize in the off-season) are being developed.

- **Growth in Maize Production:**
    - Since 2020-21, **maize production has increased by 6 million tonnes**.
    - In **2024-25** maize production is estimated at **42 million tonnes**., Out of this **9 million tonnes will be used for ethanol** production.



Crop (sugar /sorghum) → Fermentation → Purification → Ethanol → Blending → Transport → Petrol Station
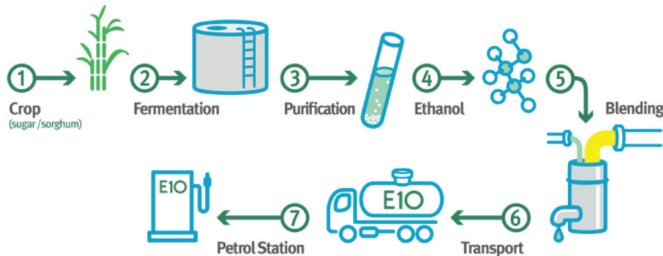
**About Maize**

- **Growing Conditions:**
    - It is primarily a rainfed Kharif crop grown in regions with **semi-arid conditions (25 - 75 cm rainfall).**
    - It cannot be cultivated in areas with more than 100 cm of rainfall.
    - It grows best in well-drained, fertile soil.
    - Maize requires consistent moisture throughout its growing season but it is highly sensitive to **water logging.**
- In India, maize is grown **in both the rainy (kharif) and winter (rabi) season.**
    - Kharif maize - 83% of maize area, while rabi maize- 17% maize area.
- **Top Maize Producing Countries:** USA, China & Brazil (India -6th).
- **Top Maize producing states in India:** Karnataka, Madhya Pradesh, Maharashtra, Rajasthan & UP.

## Extra-Long Staple (ELS) Cotton

*Syllabus Mapping: Agriculture, Crops*

### Context

The **Union Finance Minister has** announced a **five-year mission** in the **Union Budget** to improve **productivity, sustainability, and quality** in cotton farming, with a focus on **ELS cotton** varieties.

### About ELS Cotton

- It is a cotton variety with fibre lengths of 30 mm.
- **Origin**: South America, grown in **China, Egypt, Australia and Peru**.
- **Quality**: Produces premium fabric, softer, stronger and more durable.
- **Usage**: Blended with medium staple cotton to enhance textile quality.
- Key ELS types: Pima (USA), Peru (Israel), Giza (Egypt), Suvin & DCH-32 (India), Barakat (Sudan).

- In India it is grown in **Atpadi taluka (Maharashtra's Sangli district) and Coimbatore (Tamil Nadu)**.

**Classification of Cotton by Staple Length**

- Cotton is categorized based on **fibre length:**
    - **Short Staple** – Below **21 mm**
    - **Medium Staple** – **25 to 28.6 mm** (**96% of India's cotton production**)
    - **Long Staple** – **29 mm** and above
    - **Extra-Long Staple (ELS)** – **30 mm** and above

## Why is ELS Cotton Not Grown in India?

- **Lower Yields:** While medium staple cotton yields 10-12 quintals per acre, ELS cotton produces only 7-8 quintals.
- **Market Challenges:** Farmers struggle to sell ELS cotton at premium prices due to weak market linkages.

## Tea Tribes & Tea Cultivation

*Syllabus Mapping: Agriculture, Plantation Crops*

### Context

The West Bengal government has allowed **30% of tea garden land** to be used for purposes other than tea cultivation. Unions and opposition are criticizing the move, stating that it threatens indigenous groups/ Tea Tribes.

### About Tea Tribes

- Tea Tribes are **indigenous and migrant communities** mainly working in tea plantations, particularly in Assam and West Bengal.
- Many tea tribes are **descendants of Adivasis** brought from **Jharkhand, Chhattisgarh, Odisha and Andhra Pradesh** by the British during the **19th century** to work in tea plantations.
- They form a **significant portion** of the tea garden workforce.
- Despite their contribution to the tea industry, they face **poverty, illiteracy, low wages and poor living conditions**.
- **Major Tea Tribe Communities:** Munda, Oraon, Santhal, Kora, Gond, Kharia, Lohar, Bhumij.

**About Tea**

- Tea is one of the **oldest and most widely consumed beverages** in the world.
- It is made from the **leaves of the Camellia sinensis plant**.
- **Climatic conditions required:**
    - **Temperature: 20°C to 30°C** (Ideal for growth).
    - **Rainfall: 150-300 cm** annually (well-distributed).
    - **Altitude:** Grows well in **hilly regions (600-2000 m above sea level)**.
    - Tea plants are **sensitive to frost**.

- **Soil Requirements:**
  - **Well-drained loamy soil** with good aeration.
  - Rich in organic matter and iron content.
- Tea plantations use **shade trees** to protect plants from excessive sunlight.
- **Top Producing Countries:** (1) China (2) India (3) Kenya (4) Sri-Lanka
- **Top Tea Producing States:** (1) Assam (2) West Bengal (3) Tamil Nadu (4) Kerala (5)Karnataka.
  - **Other Tea producing states:** Tripura, Arunachal Pradesh, Himachal Pradesh, Meghalaya, Mizoram, Sikkim, Manipur and Nagaland.

## Cocoa Shortage

*Syllabus Mapping: Agriculture, Crops, Horticulture*

### Context

Insufficient rainfall in most cocoa-growing regions of Ivory Coast may delay the start of the mid-crop season from April to September, potentially causing a cocoa bean shortage.

### About Cocoa

- **Cocoa (Theobroma cacao)** is a tropical tree whose seeds (cocoa beans) are used to produce **chocolate, cocoa butter, and cocoa powder**.
- It is native to **South America** but is now widely grown in Africa, Asia, and Central America.
- **Climate Requirement:**
  - It requires a **hot and humid climate**.
  - **Temperature**: 21°C to 32°C (ideal is around 25°C)
  - **Rainfall**: 1,500–2,500 mm per year, well-distributed
  - **Soil Type**: Deep, well-drained, and rich in organic matter
- **Shade and Wind Protection:**
  - Cocoa trees are **shade-loving** and require **partial shade** to prevent excessive transpiration.
  - Tall trees like **banana and coconut** are often planted alongside cocoa for shade.
- **Top Producers Worldwide:** (1) Côte d'Ivoire (2) Ghana (3) Indonesia
- **Top Producers India:** (1) Kerala (2) Karnataka (3) Tamil Nadu
  - **Kerala** and **Karnataka** are the top producers, together accounting for **more than 60%** of India's cocoa production.

## International Potato Center (CIP) South Asia Regional Center in Agra

*Syllabus Mapping: Agriculture, Crops, Horticulture*

### Context

The Chief Minister of Uttar Pradesh has urged the Union Agriculture Ministry to expedite the establishment of the International Potato Center – South Asia Regional Center (CIP-SARC) in Agra.

### Importance of CIP-SARC for India and South Asia

- Agra is part of India's major 'potato belt', along with Uttar Pradesh, Bihar and West Bengal.
- A CIP center in India would benefit **Indian farmers and other South Asian countries** by:
  - Developing **new climate-resilient and disease-free potato varieties**.
  - Supporting **scientific research and global innovation** in potato farming.
  - Strengthening the **processing and export capabilities of Indian farmers**.
- **China established a similar center in 2017** in **Yanqing, Beijing**, which supports **East Asia and the Pacific region**.
- **India's Existing Potato and Tuber Research Centers:**
  - **ICAR-Central Potato Research Institute (ICAR-CPRI), Shimla** – Specializes in potato research.
  - **ICAR-Central Tuber Crops Research Institute (ICAR-CTCRI), Thiruvananthapuram** – Specializes in sweet potato research.

**International Potato Center (CIP)**

- CIP is a Peru-based research-for-development organization. It was founded in 1971 (HQ - Lima, Peru).
- **It focuses on:**
  - Potato and sweet potato research.
  - Andean roots and tubers (native to the Peruvian-Bolivian Andes in South America).
- The CIP-SARC in Agra will be the **second major international agricultural research center in India.**
- In 2017, the Agriculture Ministry supported the establishment of the **International Rice Research Institute-South Asia Regional Center (IRRI-SARC) in Varanasi.**

### Potato Production

- **Top Potato Producing Countries:** (1) China (2) India (3) Russia.
  - China and India together account for **over one-third of global potato production.**
- **Top Potato Producing States in India:** (1) UP (2) West Bengal (3) Bihar.

## India's imports of palm oil dip to a 13-year low

*Syllabus Mapping: Agriculture, Crops, Oilseeds*

### Context

For the first time in over a decade, palm oil's share of India's total edible oil imports has dropped below 30%.

### What is Palm Oil?

- **Palm oil** is an edible vegetable oil derived from the **mesocarp (pulp) of oil palm fruits**.
- It is widely used in **food products (cooking oil, processed foods), cosmetics, biofuels, and industrial applications**.
- Two main types:
  - **Crude Palm Oil (CPO)** – Extracted from the pulp.
  - **Palm Kernel Oil (PKO) –** Extracted from the seed/kernel.
- Oil palm trees are **native to Africa** but currently **Indonesia and Malaysia make up over 85% of global supply.**
- **Top Producers Worldwide:** (1) Indonesia (2) Malaysia (3) Thailand
- **Largest Importers of Palm Oil:** (1) India (2) China
- **Palm Oil Production in India:**
  - **Annual production:** 0.3-0.4 million MT (less than 2% of India's demand).
  - **States producing palm oil:** Andhra Pradesh, Telangana & Kerala.
- India has already launched the National **Mission on Edible Oils - Oil Palm (NMEO-OP)** in 2021 to promote oil palm cultivation.

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**National Mission on Edible Oils - Oil Palm (NMEO-OP)**

- **NMEO-OP** is a **Centrally Sponsored Scheme** with a special focus on the North east region and the Andaman and Nicobar Islands.
- **Aim:** To boost oil palm production in India.
- **Area Expansion:** Aims to increase oil palm cultivation by 6.5 lakh hectares by 2025-26, reaching a total of 10 lakh hectares.
- **Production Target:** Increase Crude Palm Oil (CPO) production to 11.20 lakh tonnes by 2025-26 and 28 lakh tonnes by 2029-30.

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## Makhana - Super Food

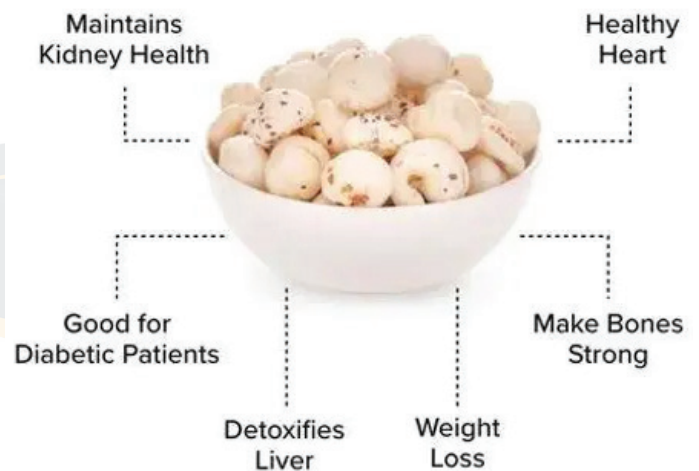*Syllabus Mapping: Agriculture, Crops, Horticulture*

### Context

Recently the Union Minister of Agriculture and Farmers' Welfare visited Bihar to interact with Makhana producers.

### About Makhana/ Fox Nut

- It is a highly nutritious aquatic crop that grows in still or slow-moving water bodies like ponds, lakes and wetlands.

- It is known for its edible seeds, which are rich in protein, fiber and antioxidants.
- It is **native to Southeast Asia and China.**
- **Climate & Soil Requirements:**
  - Grows best in a **tropical and subtropical climate**.
  - Requires a **hot and humid** environment with temperatures ranging between **20°C to 35°C**.



Health Benefits of Makhana — Maintains Kidney Health, Healthy Heart, Good for Diabetic Patients, Detoxifies Liver, Weight Loss, Make Bones Strong

  - Grows best in **smooth loamy soil.**
- **Water Requirements:**
  - Grows in **shallow water bodies** with a depth of 1-2 meters.
  - Requires clean, **nutrient-rich and stagnant water** for proper growth.

### Makhana Production in India

- **India is the largest producer of Makhana in the world.**
- The major producing states are:
  - **Bihar (90%** of India's production, mainly in the **Mithilanchal region)**
  - **Other States:** West Bengal, Assam, Madhya Pradesh, Manipur, Tripura etc.
- Despite Bihar producing 90% of the country's makhana crop, the **largest makhana exporters in India are Punjab and Assam.**
  - Punjab **does not even produce makhana.**
  - **Reason:** Bihar neither has a developed food processing industry, nor required export infrastructure.

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**Recent Developments**

- **Mithila Makhana** from Bihar was awarded the Geographical Indication (GI) tag in 2022.
- In the Union Budget 2025, establishment of **Makhana Board in Bihar** was announced to improve production, processing, value addition and marketing of makhana.
- **National Research Centre for Makhana** - Darbhanga (Bihar).

## 21st National Livestock Census

*Syllabus Mapping: Agriculture, Husbandry*

### Context

The **21st Livestock Census (LC)** of India is scheduled to take place between October 2024 and February 2025.

### About National Livestock Census

- It is conducted every **5 years (Quinquennial)** by the **Ministry of Fisheries, Animal Husbandry, and Dairying**. (First conducted in 1919-1920).
- The census will be conducted by the **Department of Animal Husbandry & Dairying (DAHD).**

### Coverage under National Livestock Mission

- The census will cover domesticated animals, poultry, and stray animals.
- It will include data on the species, breed, age, sex, and ownership status of the animals.
- The census will include data on 15 species of livestock, including cattle, buffalo, sheep, goat, pig, camel, horse and more
- The census will also include data on poultry birds, such as cocks, hens, chickens, ducks, turkeys and other poultry birds.

**Key Highlights of 20th Livestock Census**

- The total livestock population in India stands at 535.78 million, reflecting a 4.6% increase compared to the 2012 census.
- Cattle contribute the highest percentage (35.94%) to the total livestock population, followed by goats (27.80%), buffaloes (20.45%), sheep (13.87%) and pigs (1.69%).
- States with the **highest livestock populations** in India were:
  - Uttar Pradesh
  - Rajasthan
  - Madhya Pradesh

# SOCIETY, SOCIAL JUSTICE & SCHEMES

### Law to protect domestic workers' rights

*Syllabus Mapping: GS Paper 1, Social empowerment*

## Context

Recently, the Supreme Court of India ordered the Centre to **form an inter-ministerial committee** to assess the need for a **legal framework** to protect and regulate the rights of domestic workers.

## Challenges Faced by Domestic Workers

- **Lack of Legal Protection:** Domestic workers remain largely excluded from key labour laws**,** such as:
  - **Minimum Wages Act**
  - **Equal Remuneration Act**
  - Some states have regulations, but there is n**o national law binding all states**.
- **Feminised Occupation**: A significant portion of domestic workers are **women** and **migrants from marginalised communities**.
- **Wage Disparities and Poor Working Conditions**: Wages and benefits **vary** based on tasks and employment type.
  - Many workers face **low wages, job insecurity, and lack of social security measures**.
  - Increased workloads often come **without extra compensation**.
- **Social Perception & Workplace Issues**: Domestic work is **undervalued**, perceived as a **"natural skill"** for women.
  - Employers often **mistreat workers**, with cases of **harassment and humiliation** rarely making it to the media.
- **Legal Recognition Issues**: **India has not ratified ILO Convention 189**, which mandates protections for domestic workers.
  - Past **judicial interventions** for registering **placement agencies** have **not led to significant improvements**.

## Need for Separate Legislation

Despite arguments that new labour codes are inclusive, there are compelling reasons for separate legislation:

- The Code on Wages (2019) does cover domestic work but does not address the unique complexities of employment types (part-time/full-time, live-in/live-out).
- The private nature of domestic work creates an asymmetric relationship between employers and employees, making regulation challenging.

## Defining Domestic Work & Proof of Employment

- A clear and **inclusive definition of domestic work** is essential.
- **Proof of employment** is a major hurdle:
  - Experience from multiple states shows that workers struggle to provide evidence of employment for **Minimum Wages Act** enforcement.
  - **Domestic workers' unions** advocate for mandatory **employer registration** of workers to ensure compliance.
- **Resistance from Employers:** Many employers do **not see themselves as formal employers**.
  - Their resistance to **registering domestic workers** must be factored into policy decisions.

## Future Directions

- **Minimum entitlements and redressal mechanisms** could help challenge **existing power hierarchies**.
- A **national law** should take into account **regional and local conditions**, with Kerala and Delhi serving as case studies.

- **Unions' perspectives** must be included while framing the legislation.
- While a law **may not immediately** improve conditions, it could:
  - **Redefine power relations** over time.
  - **Strengthen workers' voices and unions**.
- The success of this initiative depends on:
  - The **committee's recommendations**.
  - The **Union government's follow-up actions**.

## India's diagnostics sector

*Syllabus Mapping: GS Paper 2, Health*

### Context

India's diagnostics sector is **fast-growing but remains fragmented, under-regulated, and unevenly distributed**.

Facts
- Industry experts estimate that there are **around 300,000 labs across the country**, and this number is growing.
- Within the healthcare sector, diagnostics **accounts for around 9% of the industry,** estimated to be worth ₹**860 billion in the FY 2024**, and projected to grow to about ₹**1,275 billion by the FY 202**8.

### Issues Affecting India's Diagnostics Sector

- **Shortage of Trained Personnel:** Lack of qualified pathologists, microbiologists, lab technicians, and radiologists.
  - Many labs may not be able to employ well-trained staff, affecting quality.
  - **Ghost employees and doctors**: labs obtaining licenses by falsely claiming to have qualified staff.
  - **E.g.,** Final-year MD pathology students in Kolkata report a huge workload (800+ tests/day) with serious staff shortages.
- **Under-Regulation and Poor Implementation:** Fragmented market with many small, unorganized labs.
  - **Clinical Establishments Act (Registration and Regulation) 2010** not fully adopted or implemented effectively across all states.
    - Only 12 States and all Union Territories, except Delhi, have adopted this Act.
  - Lack of a strong regulatory environment leads to varying standards.
  - Lack of proper biomedical waste management, potentially leading to outbreaks.
  - **E.g.,** Tamil Nadu government's announcement in 2009 to constitute a State Council for Laboratory Technicians is yet to be implemented.
- **Fragmented and Competitive Market**: Low barriers to entry.
  - Many standalone players.
  - This leads to inconsistent quality standards.
- **Varying Standards and Quality Concerns**: Many labs are not accredited.
  - Uneven quality standards due to a lack of resources for advanced technologies and inadequately skilled manpower.
  - Emphasis is needed on the quality and accuracy of results.
- **Ethical Issues and Fraudulent Practices:** "Bought out" signatures from doctors in exchange for money, without proper supervision.
  - Labs fraudulently using doctors' names and signatures.
  - Technician-only facilities not run or owned by qualified pathologists.
  - E-signatures by pathologists connected to multiple labs without limits on the number of labs.
- **Urban-Rural Divide**: Diagnostics concentrated in urban areas.
  - Only 24% of diagnostics revenue comes from rural areas (as of FY23), despite nearly 70% of the population residing rurally.
  - Gaps exist in government labs, making them less favored (lack of upgrades, limited operational hours, unavailability of specialists).
- **Pricing Problems:** General concern regarding pricing in the private health sector.

- Telangana Diagnostics Programme ('T-Diagnostics') provides some relief by offering tests at no cost and has saved significant out-of-pocket expenses for patients.
- However, supply issues (e.g., reagents) can mar these programs.
- **Unrealistic Requirements:** Lab representatives report that the space and educational requirements under the Kerala State Clinical Establishments Act are unviable.
  - The State government also does not recognise paramedical degrees/diplomas even from recognised institutions in other States.

## Way Forward

- **Stronger Regulations & Enforcement**: Make **NABL accreditation mandatory** for all diagnostic labs.
  - Expand **The Clinical Establishments Act** to cover all States.
  - Impose **strict penalties for fake reports and ghost pathologists**.
- **Address Manpower Shortage:** Set up **specialized training programs** for lab technicians.
  - Increase **microbiologist and pathologist recruitment** in rural areas.
  - Implement **needs-based licensing** to prevent lab saturation in urban areas.
- **Improving Rural & Public Healthcare Infrastructure: Upgrade district hospital labs** to reduce the burden on urban hospitals.
  - Ensure **free/subsidized diagnostic tests** in government hospitals.
- **Standardization of Pricing & Service Quality:** Introduce **government-regulated pricing** for common diagnostic tests.
  - Mandate **uniform testing protocols** for all labs.
- **Public Awareness & Patient Rights:** Educate patients on **lab accreditation and quality checks**.
  - Set up **grievance redressal mechanisms** for diagnostic fraud complaints.

## Mental Healthcare in India

*Syllabus Mapping: GS Paper 2, Health*

## Context

Economic Survey 2024-25 highlighted that Mental well-being encompasses all our mental-emotional, social, cognitive, and physical capabilities.

## What is Meant by Mental Health?

As per the **World Health Organization (WHO)**, mental health is a state of well-being that enables individuals to **handle life's challenges, recognize their potential, learn effectively, work productively, and contribute positively to society.**



Chart XI.9.a: Mental wellbeing

Mind-Body Connection

Mood & Outlook

Cognition

Social Self

Drive & Motivation

Mental Wellbeing

Adaptability & Resilience.
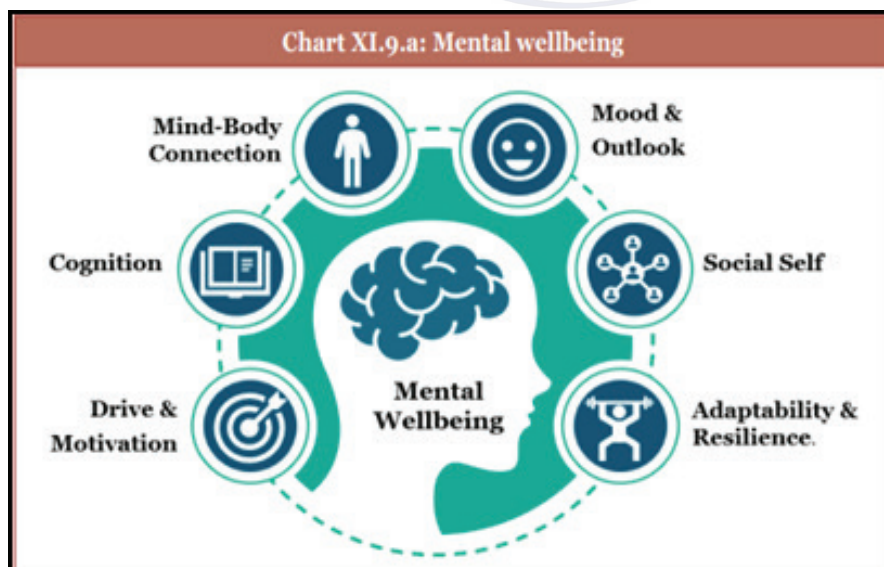
"The unexamined life is not worth living." – Socrates

## Trends of Mental Health in Workplace

**Mental Health Services integrated into Ayushman Bharat - Health & Wellness Centres (HWCs)** to provide mental health support at primary are levels.

**2024**

**2024**

**Tele MANAS App launched,** integrating self-care resources, stress management tools, and direct consultation services.

**Tele MANAS expanded** with more centers and video consultation services introduced.

**2023**

**2022**

**National Suicide Prevention Strategy (NSPS)** launched to reduce suicide mortality by 10% by 2030.

**KIRAN Helpline merged into Tele MANAS** to steamline digital mental health services.

**2022**

**2022**

**National Tele Mental Health Programme (Tele MANAS)** launched to provide free, 24/7 tele-mental health support.

**KIRAN Helpline (1800-599-0019)** launched to provide mental health support during COVID-19.

**2020**

**2018**

**Rights of persons with Disabilities Act,2016** came into full force, enhancing rights and protections for individuals with mental illness.

**National Health Policy (NHP), 2017** recognized mental health as a priority and integrated it into primary healthcare.

**2017**

**2017**

**The Mental Healthcare Act, 2017** replaced the outdated Mental Health Act of 1987, ensuring the right to mental healthcare and decriminalizing suicide.

**National Mental Health Survay (NMHS)** conducted by NIMHANS to assess the prevalence and treatment gap of mental disorders in India.

**2015-16**

**1996**

**District Mental Health Programme (DMHP)** introduced under NMHP to expand community mental health services.

**National Mental Health Programme (NMHP)** launched to integrate mental health into primary healthcare.

**1982**

- **Global Trend:** An alarming increase in suicides among young professionals has emerged, with excessive workplace stress identified as a primary cause.
- **Crisis in Japan**: The term 'karoshi' (death from overwork) is used in Japan, where 2,900 people committed suicide in 2023 due to overwork.
- **Statistics in India:** According to a Statista report, 11,486 suicides among Indian professionals in the private sector were recorded in 2022.
  - **Recent Incidents:** In July, a **26-year-old woman executive** from a multinational consulting firm took her life due to immense work pressures.

## Reasons for Rising Stress and Anxiety

- The modern emphasis on **efficiency and material wealth** leads to **disconnection from self-awareness** and contributes to the mental health crisis.
- **Urban Pressures**: The pressures of **urban living, financial instability, and fierce competition** contribute significantly to mental health issues.
  - Many individuals find that material success does not equate to true well-being, leading to **feelings of isolation and purposelessness.**
  - The focus on profit, efficiency, and cost-cutting leads to immense pressure on employees, resulting in **long working hours and stressful conditions.**
- **Consumerism:** A growing focus on consumerism fosters a culture where **status is defined by luxury goods, resulting in stress and social comparison**.
  - This cycle of chasing material wealth **neglects emotional and psychological needs**.

## Reasons for Poor Mental Health Status in India

- **Lack of Awareness and Sensitivity:** In India, mental health issues are often **not regarded as healthcare concerns**.
- **Shortage of Mental Healthcare Personnel**: India faces a severe shortage of mental health professionals.
  - **Eg**: National Mental Health Survey (2015-2016) highlighted that India has only 0.75 psychiatrists per 1 lakh population.
- **Treatment Gap: 70% to 92% of individuals** with mental disorders **do not receive treatment** due to **lack of awareness, stigma, and shortage of professionals**.
- **Low Budget Allocation:** While developed countries allocate 5-18% of their healthcare budget to mental health, India allocates just 1.11%.

## Way forward

- The **Economic Survey 2024-25 suggested:**
  - **Enhance Mental Health Education in Schools:** Early intervention strategies to address anxiety, stress, and behavioural issues in students.
  - **Improve Workplace Mental Health Policies:** Address job stress, long working hours, and burnout.
  - **Expand Digital Mental Health Services:** Strengthen Tele MANAS and integrate AI-based mental health solutions.
- **Brazil's Initiatives**: Community gardens in Brazil have successfully fostered social connections among residents. Similar initiatives in India could help mitigate the isolation caused by urban living.
- **Fostering Open Conversations**: Creating a culture that encourages open discussions about mental health can help eliminate stigma.

## Brain Drain to Brain Gain

*Syllabus Mapping: GS Paper 2, Education*

## Context

India has become the **largest source of international students in the U.S**.; with a record-breaking **3,31,602 students enrolled in 2023-24**, according to the Open Doors Report 2024.

## Challenges in Transforming India into a Global Education Hub

• **Funding Constraints:** Indian universities rely heavily on tuition fees (80% of revenue in private institutions) and government grants (90% in public institutions), while globally, tuition contributes only 15-20% (Open Doors Report 2024).

• **Quality Disparities:** Only **2 Indian universities** (IIT Bombay, IIT Delhi) feature in the **QS World University Rankings 2025 Top 200**.

  – Outdated curricula, poor student-faculty ratios (26:1 in India vs. 16:1 in the US), and low research output hinder quality.

• **Faculty Shortages:** India has a shortage of faculty members in higher education.

• **Regulatory Bottlenecks:** Lengthy approval processes and limited autonomy restrict Indian universities from innovating and forming global partnerships.

• **International Perception:** India attracts only **50,000 international students**, while the US hosts **10 lakh**, the UK **6 lakh**, and Australia **6.5 lakh**.

## Impact by Transforming Educational Institutions

• **Economic Growth:** Indian students spent **$47 billion abroad in 2022**, expected to rise to **$70 billion by 2025**.

  – Retaining even **25%** of these students could boost India's economy by **$17 billion annually**.

• **Employment Generation:** Expansion in education and research could create **5 million new jobs** by 2030.

• **Soft Power & Diplomacy:** By attracting international students, India could enhance global influence, as seen in **China's success in drawing 5 lakh students annually**.

• **Reduced Brain Drain:** India loses **over 1 lakh students annually to the US**, with 65% staying abroad after graduation. Strengthening domestic institutions can reverse this trend.

• **Global Talent Attraction:** If India increases international student intake to **5 lakh by 2035**, it can become a regional education hub like Singapore and Australia.

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Recent Announcements in Union Budget 2025-26

• **Increased Allocation for Education:** ₹1.28 trillion, a **6.5% increase** from ₹1.20 trillion in 2024-25.

• **Focus on IIT Infrastructure Expansion:** Five IITs established post-2014 will be expanded to **accommodate 6,500 more students**, addressing the rising demand for quality engineering education.

• **Establishment of National Centres of Excellence: Five National Centres of Excellence (CoEs)** will be set up to **equip youth with global skills**.

  – These centers will provide **advanced training** in future-ready skills, improving India's workforce competitiveness.

• **Centre of Excellence in AI for Education:** ₹**500 crore investment** to establish a **Centre of Excellence in AI for Education**.

  – Focus areas:

  ° **AI-driven personalized learning**

  ° **Automated assessments & skill mapping**

  ° **Integration of AI in pedagogy** to modernize curricula and teaching methods.

• **Strengthening Digital Learning & Connectivity: Expansion of Atal Tinkering Labs (ATLs)** to promote hands-on innovation in schools.

  – **Improved broadband connectivity** in government schools to **bridge the digital divide**, especially in rural areas.

• **Skill Development and Vocational Training:** Special focus on **upskilling and reskilling youth** to align with global job markets.

  – Skill India programs will be **integrated with emerging technologies** like AI, blockchain, and robotics.

• **Subsidized K-12 Education Loans & Process Streamlining:** Steps to **streamline education loans** and **provide subsidies for K-12 student**s, ensuring affordability and accessibility.

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## Way forward

• **Diversify Funding:** Increase endowments and research grants to form **30-35% of university revenue**, reducing reliance on tuition and government funding.

  – Provide **tax incentives** to encourage corporate and alumni contributions.

• **Enhance Autonomy:** Implement **National Education Policy (NEP) 2020** reforms to grant universities greater control over academic decisions.

• **Strengthen Research & Innovation:** Increase R&D spending from **0.7% to 2% of GDP**.

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–   Establish **at least 10 globally competitive research universities** by 2035.
*   **Upgrade Infrastructure:** Build **100 world-class universities** and upgrade **existing IITs/NITs** with state-of-the-art facilities.
*   **Improve Faculty Quality:** Introduce global faculty exchange programs and offer competitive salaries to attract top talent.
*   **Streamline Regulations:** Simplify approval processes for new courses, foreign collaborations, and industry partnerships.
*   **Boost Global Visibility:** Launch international branding campaigns to position Indian universities as world-class institutions.

## Globalisation of medical education

*Syllabus Mapping: GS Paper 2, Education*

### Context

*   The current landscape of medical education is marked by a paradox: a significant shortage of medical doctors exists alongside governmental and professional resistance to expanding access to medical training.
*   This situation has led to increased international mobility among medical students, with many seeking education abroad due to limited opportunities in their home countries.

### Challenges in Medical Studies in India

*   **Limited Medical Seats & High Competition:** Around **2.3 million students appear for the NEET exam annually, but only 1 in 22 secures admission.**
*   **Quality Concerns in Foreign Medical Education:** Many Indian students study in countries like Russia, pre-war Ukraine, China, and the Philippines, where education quality varies.
    –   Graduates must clear the Foreign Medical Graduate Examination (FMGE) to practise in India, but the pass rate remains low.
*   **Regulatory and Infrastructure Issues:** India faces a shortage of faculty and infrastructure in medical colleges.
    –   Many newly established medical colleges lack adequate hospital facilities and experienced faculty.
*   **Rural-Urban Healthcare Divide:** Most medical graduates prefer urban postings due to better facilities and pay, leaving rural healthcare underdeveloped.
    –   Bonded service requirements for government medical colleges often go unenforced.
*   **Internship and Residency Bottlenecks:** Even after medical graduation, securing internship and postgraduate residency seats remains highly competitive.

### Global Challenges

*   **International Student Mobility and Quality Variations:** Over 2,00,000 students study medicine outside their home countries, often in institutions with questionable training standards.
    –   European countries like Poland and Hungary attract U.S. and European students, while the Caribbean caters to U.S. aspirants.
*   **Regulatory Gaps in Foreign Medical Schools:** Many international medical schools are for-profit institutions with minimal oversight.
    –   Language barriers and cultural adjustments also impact students' learning experiences.
*   **Licensing and Accreditation Hurdles:** Medical graduates must pass licensing exams (e.g., USMLE in the U.S., FMGE in India) to practise in their home countries.
    –   Different countries have varying recognition standards, making it difficult for foreign-trained doctors to integrate into their home healthcare systems.
*   **Shortage of Medical Seats in Developed Nations:** Countries like Norway, France, and Germany have limited medical seats, forcing students to study in Central and Eastern Europe.
    –   The shortage of doctors leads to dependency on foreign-trained professionals, raising concerns about skill standardization.

### Conclusion

While the Indian government is taking steps to expand medical education, challenges such as infrastructure, quality control in foreign medical education, and licensing hurdles remain significant. The global trend of students seeking medical education abroad due to limited seats and high costs highlights the need for **better regulatory frameworks and capacity-building in domestic medical institutions**.

## India's Generic Drug

*Syllabus Mapping: GS Paper 2, Health*

### Context

The pharmacy of the global South is facing a crisis of reputation.

### Reasons

- Cough syrups made by pharmaceutical companies based in India, which had unacceptable amounts of diethylene glycol and/or ethylene glycol, killed 66 children in Gambia, 65 children in Uzbekistan in 2022, and 12 children in Cameroon in 2023.
- India-made eye drops contaminated by drug-resistant bacteria killed three persons and blinded eight in the U.S., again in 2023.

> **Facts**
> - Generic drugs account for 80% of all prescriptions in the U.S.
> - Global generic drug market to reach **$670 billion by 2030**
> - **India supplies 20%** of the global generic medicine demand

### Significance of Generic Medicines

- **Cost-Effectiveness:** Generic drugs are typically 30% to 80% less expensive than their branded counterparts, as they bypass the extensive R&D and marketing expenses associated with new drugs.
  - **E.g.,** In 2022, the U.S. healthcare system saved $408 billion through the use of generic and biosimilar medicines.
- **Patent Expirations**: Branded drugs are protected by patents for a limited time, after which generic manufacturers can produce equivalent versions, increasing competition and reducing prices.
  - **E.g.,** Between 2023 and 2030, patents for 169 commercialized drugs are set to expire, potentially opening the market for more generic alternatives.
- **Growing Burden of Chronic Diseases:** The global rise in chronic conditions such as diabetes and cardiovascular diseases necessitates affordable, long-term treatments.
- **Government Policies & Healthcare Reforms**: Many governments promote generic drug use to reduce healthcare costs.
  - **E.g.,** the U.S. FDA's Generic Drug Program expedites approvals, contributing to significant consumer savings annually
- **Increasing Awareness & Physician Acceptance**: Enhanced education and stringent regulatory standards have improved confidence in the quality and efficacy of generic drugs.
  - **E.g.,** In the U.S., 90% of prescriptions filled are for generic drugs, yet they account for only 17.5% of prescription drug spending, highlighting their cost-effectiveness.

### Why Does India Dominate the Generic Medicine Market?



Indian Generic Medicine Market Size Over the Years
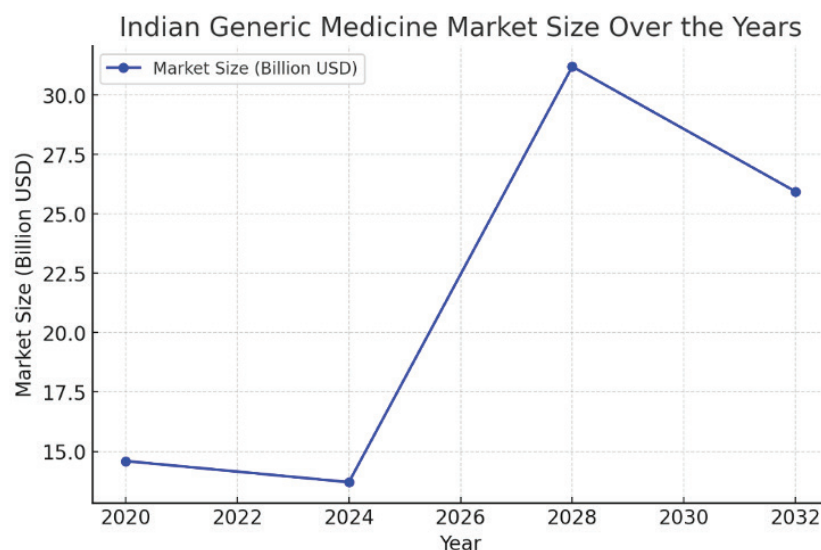
- **Robust Pharmaceutical Manufacturing Infrastructure**: India boasts over 670 U.S. FDA-approved manufacturing facilities, the highest number outside the United States, ensuring adherence to international quality standards.
- **Cost-Effective Production**: The availability of skilled labor and low production costs enable Indian manufacturers to produce high-quality generic medicines at competitive prices, making them attractive in global markets.
  - **E.g.**, Generic drugs produced in India are typically **80-90% cheaper** than their branded counterparts
- **Strong Export Performance**: In the fiscal year 2022-2023, India's pharmaceutical exports reached $25.3 billion, with the United States being a significant market, accounting for nearly 31% of these exports.
- **Favorable Regulatory Environment**: A well-established regulatory framework supports the growth of the generic drug industry, facilitating the production and export of medications that meet global standards.
- **Strategic Focus on Generics:** Approximately 70% of India's pharmaceutical revenue comes from generic drugs, highlighting the industry's strategic emphasis on this segment.

## Challenges for Indian Generic Drug Manufacturers

- **Regulatory and Compliance Challenges:** Indian manufacturers must comply with strict regulatory standards in key markets like the U.S. and EU.
  - Frequent U.S. FDA inspections result in import bans or warning letters due to GMP violations, affecting exports.
  - EU regulations require significant investments in quality control and research to meet compliance standards.
  - Adapting to evolving global regulatory frameworks increases operational costs.
- **Challenges in R&D and Innovation**: Developing complex generics and biosimilars requires heavy investments in research and clinical trials.
  - While Indian companies like **Biocon and Dr. Reddy's lead in biosimilars**, the high cost and time-intensive nature of R&D remain a challenge.
- **Supply Chain and Manufacturing Complexities:** Dependence on China for Active Pharmaceutical Ingredients (APIs) creates supply chain vulnerabilities.
  - Disruptions, such as those seen during the COVID-19 pandemic, impact production and exports.

## Way Forward

- **Strengthen Quality Control**: Implement stricter quality checks, promote Good Manufacturing Practices (GMP), and enhance regulatory oversight.
- **Improve Drug Distribution**: Develop better supply chain infrastructure, especially in rural areas, using technology-driven tracking and inventory management.
- **Promote Generic Prescriptions**: Encourage doctors to prescribe generics by enforcing prescription guidelines and limiting undue pharmaceutical influence.
- **Build Public Trust**: Launch awareness campaigns to educate patients and professionals on the efficacy and safety of generics.
- **Enhance Pharmacovigilance**: Strengthen post-marketing surveillance, reporting systems, and adverse drug reaction monitoring.
- **Simplify Regulatory Processes**: Streamline approval mechanisms for generics to reduce delays while ensuring compliance with global standards.
- **Increase Awareness Initiatives**: Conduct training programs for healthcare providers and public outreach campaigns to address misconceptions.
- **Tackle Patent Challenge** : Strengthen legal mechanisms to prevent unfair patent extensions and support faster entry of generics.
- **Ensure Sustainable Pricing**: Implement fair pricing policies, encourage government procurement of generics, and promote competition while maintaining profitability.

## Maternity Benefits

*Syllabus Mapping: GS Paper 2, Vulnerable Sections, Government schemes*

## Context

- Maternity benefits in India are a critical aspect of ensuring the health and well-being of pregnant women and their children.

– However, despite legal entitlements, many women are deprived of these benefits due to inadequate implementation and restrictive policies.
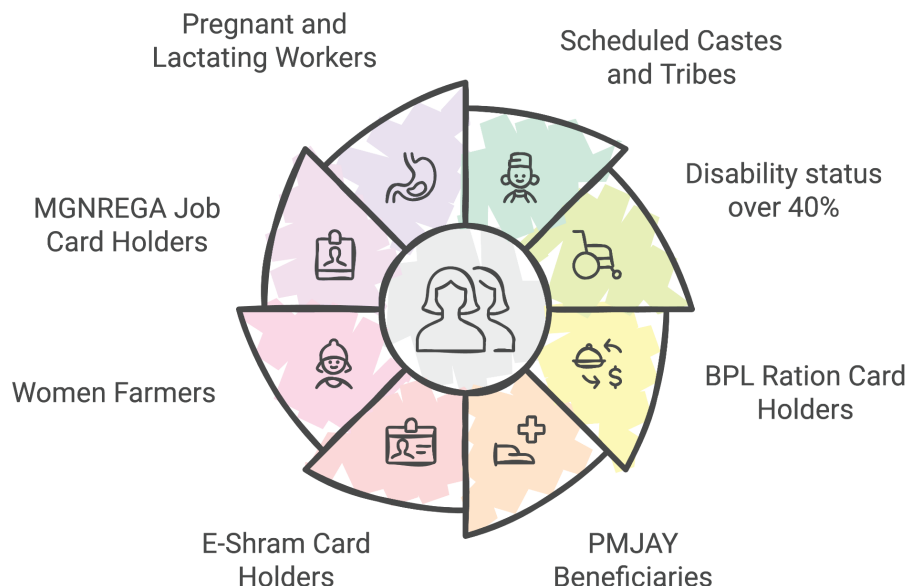
## Legal Entitlements

### Under Pradhan Mantri Matru Vandana Yojana (PMMVY)

- **Type**: Centrally Sponsored Direct Benefit Scheme.
- **Ministry**: Ministry of Women and Child Development.
- **Launch Year**: 2017.
- **Integration**: Incorporated into **Mission Shakti in 2022**.
- **Legal Basis**: Implemented under the **National Food Security Act (NFSA), 2013**.
- **Objectives:**
  - **Compensation for Wage Loss**: Provides financial assistance to ensure women can rest before and after childbirth.
  - **Improving Health-Seeking Behavior**: Encourages pregnant and lactating women to access healthcare facilities.
  - **Promoting Gender Equality**: Offers cash incentives for a second child if it is a girl.
- **Exclusions:** Women in **regular employment** with the **Central/State Government** or **Public Sector Undertakings (PSUs)**.
  - Women already **receive similar benefits** under any other law.
- **Benefits:**
  - **For the first child**: ₹5,000 in **two installments**.
  - **For the second child (if a girl)**: ₹6,000 in **one installment** after birth.
- **Exceptions:** In case of **miscarriage/stillbirth**, the beneficiary is **eligible for benefits in a future pregnancy** as a fresh applicant.

### Features of NFSA 2013 for Pregnant and Lactating Mothers

- **Nutritional Support**: Pregnant women, lactating mothers, and children (6 months to 14 years) receive **nutritious meals** under the **Integrated Child Development Services (ICDS)** and **Mid-Day Meal (MDM) schemes**.
  - **Enhanced nutritional standards** are set for **malnourished children** up to 6 years of age.
- **Maternity Benefit**: Pregnant and lactating mothers are entitled to **a minimum financial assistance of ₹6,000**.

## Beneficiary Categories (PMMVY)



Pregnant and Lactating Workers
Scheduled Castes and Tribes
Disability status over 40%
BPL Ration Card Holders
PMJAY Beneficiaries
E-Shram Card Holders
Women Farmers
MGNREGA Job Card Holders

## Mission Shakti

- **Ministry**: Ministry of Women and Child Development
- **Objective**: To enhance **women's safety, security, and empowerment** through targeted interventions.
- **Implementation Period**: **2021-22 to 2025-26** (15th Finance Commission period).
- **Structure**: Comprises **two sub-schemes**
  - **Sambal (Women's Safety & Security)**
- ° **One Stop Centres (OSC)** – Provides support to women facing violence.
- ° **Women Helpline (181-WHL)** – 24x7 assistance for women in distress.
- ° **Beti Bachao Beti Padhao (BBBP)** – Promotes education and welfare of the girl child.
- ° **Nari Adalat** – Community-based dispute resolution for women.
  - **Samarthya (Women's Empowerment)**
- ° **Pradhan Mantri Matru Vandana Yojana (PMMVY)** – Maternity benefit scheme for pregnant and lactating women.
- ° **Shakti Sadan (Ujjwala & Swadhar Greh)** – Shelter and rehabilitation for women in distress.
- ° **Working Women Hostel (Sakhi Niwas)** – Secure accommodation for working women.
- ° **National Creche Scheme (Palna)** – Childcare support for working mothers.

## Criticism of PMMVY

- **Violation of NFSA 2013**: The **NFSA mandates ₹6,000 per child**, but PMMVY provides only **₹5,000 for the first child** and ₹**6,000 for the second child (only if a girl)**, violating the Act's universal maternity benefit provision.
- **Low Coverage and Declining Reach**: **Effective coverage peaked at only 36% in 2019-20** and drastically declined to **9% in 2023-24**.
  - **Budget allocation dropped** to ₹870 crore in 2023-24, nearly **1/3rd of the amount 5 years earlier**.
- **Implementation and Technical Issues**: **Frequent software failures** and **Aadhaar-linked payment issues** have led to delays in disbursement.
  - **Excessive bureaucratic hurdles** make it difficult for women to claim benefits.
- **Discriminatory Benefits**: Women in the **formal sector receive 26 weeks of paid leave**, while those in the **unorganized sector receive only** ₹**5,000** after meeting strict conditions.
- **Lack of Transparency**: The **Ministry of Women and Child Development** does not **proactively disclose** key data on PMMVY.
  - Information regarding **applications, approvals, and disbursements** is difficult to access.
- **Insufficient Financial Assistance**: The ₹**5,000-**₹**6,000 assistance** is **inadequate** given rising inflation and healthcare costs.
  - Unlike other schemes, **PMMVY benefits have never been revised** since its launch in 2017.

## State-Level Initiatives (Alternative Models)

- **Tamil Nadu – Dr. Muthulakshmi Reddy Maternity Benefit Scheme (Since 1987)**
  - ₹**18,000 per child** provided as maternity assistance.
  - Coverage stood at **84% in 2023-24**, significantly higher than PMMVY's all-India coverage (<10%).
  - The **DMK government plans to increase it to ₹24,000**.
- **Odisha – Mamata Scheme (Since 2009)**
  - ₹**10,000 per child**, **doubled before the 2024 elections** to enhance benefits.
  - Coverage was **64% of all births in 2021-22**.
  - Follows **simplified processes**, reducing exclusion errors seen in PMMVY.

## Conclusion

The PMMVY's restrictive nature and inadequate implementation have led to significant gaps in providing maternity benefits, despite legal entitlements. States like Tamil Nadu and Odisha demonstrate that more effective and generous schemes are possible, highlighting the need for reform at the national level.

## Nutraceuticals Sector in India

*Syllabus Mapping: GS Paper 2, Hunger, Health*

### Context

The Indian government is keen to provide necessary help to the nutraceuticals sector to reach its full potential.

### What are Nutraceuticals?

- It refers to the **food-based products with medicinal benefits**, beyond basic nutritional value.
- These products are a blend of **nutrition and pharmaceuticals**, aimed at **preventing diseases and improving health**.
- **Types of Nutraceuticals:**
  - **Dietary Supplements**: Vitamins, minerals, amino acids, probiotics, etc.
  - **Functional Foods**: Fortified cereals, dairy products, energy drinks.
  - **Medicinal Foods**: Products designed for specific dietary needs (e.g., diabetic-friendly foods).
  - **Herbal Products**: Ayurvedic formulations, plant-based extracts.
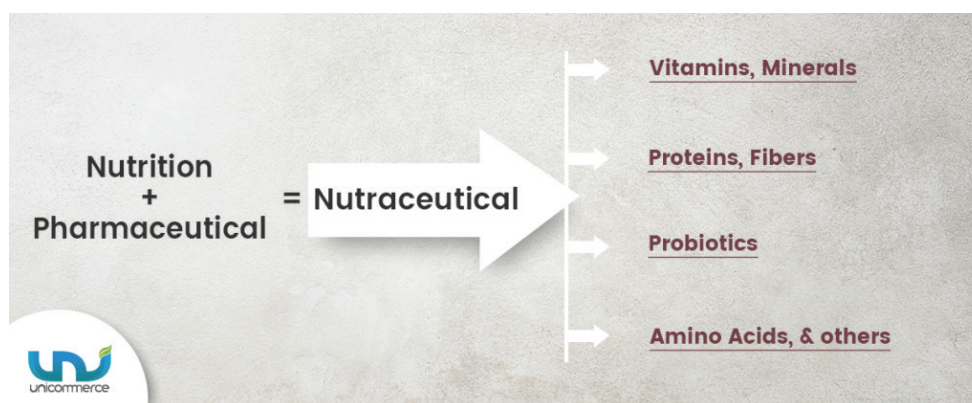


**Food Safety and Standards Authority of India (FSSAI)** is solely responsible for regulating the approvals, promotions, and labeling standards for health supplements and nutraceuticals.

### Advantages for India

- **Traditional Knowledge**: India has a deep-rooted history in **health sciences**, particularly **Ayurveda**, providing a unique edge in nutraceutical formulations.
- **Diverse Agroclimatic Conditions**: With **52 agroclimatic zones**, India is well-suited for the **cultivation of medicinal plants**, ensuring a steady supply of raw materials.
- **Abundance of Medicinal Plants**: Home to over **1,700 medicinal plants**, including **curcumin, bacopa, and ashwagandha**, many of which are globally recognized and await further **scientific validation**.
- **Pharmaceutical Expertise**: India's strong foundation in **pharmaceutical formulation** contributes to the development of **high-quality nutraceutical products**.
- **Growing Startup Ecosystem**; A thriving **nutraceutical startup landscape** and the **emergence of successful companies** are driving innovation and sectoral expansion.
- **Health Consciousness:** Post-pandemic, people are prioritizing immunity, wellness, and preventive healthcare.
  - Demand for **immunity boosters** like Vitamin C, Zinc, and herbal supplements has surged.
- **Growing Lifestyle Diseases:** Increased cases of **diabetes, obesity, hypertension, and heart diseases** have led to higher demand for **functional foods** and supplements.
  - **E.g.,** India is home to **315 million people with hypertension**, and **101 million with diabetes** (According to a study by ICMR).
- **Growing Market Potential:** The global nutrition market is valued at **$520 billion**.
  - India's share is estimated at **$8 billion**, indicating **vast growth potential**, especially in **Ayurveda-based nutraceuticals**.

### Challenges Associated

- **Overlapping Jurisdictions:** The potential **shift of regulatory oversight** from the Food Safety and Standards Authority of India (FSSAI) to the Central Drugs Standard Control Organization (CDSCO) has raised concerns.
  - Industry experts fear that such a move could **stifle innovation and lead to economic downturns** within the sector.
- **Standardization Issues:** Ensuring consistent quality across products remains a challenge due to variability in raw materials and manufacturing processes.
- **Supply Chain Management: Raw material shortages** and supply chain disruptions due to **geopolitical tensions, natural disasters, or limited geographic availability** of ingredients.
- **Global Players:** International companies are expanding their presence in India, intensifying competition for domestic nutraceutical firms.
- **Innovation Barriers: Limited investment in R&D** hampers the development of new and effective nutraceutical products, affecting the industry's ability to meet evolving consumer demands.
- **Educational Gaps:** Despite growing health consciousness, there is still a **lack of comprehensive understanding** among consumers about the benefits and proper use of nutraceuticals, leading to skepticism and underutilization.

### Solutions

- **Quality Control and Standardization:** Implement **robust quality assurance protocols** including raw material testing, **active ingredient specification**, and collaboration with reputable suppliers.
- **Regulatory Compliance:** Stay updated with **global regulations**, partner with **regulatory consultants**, and invest in **Good Manufacturing Practices (GMP)** for adherence to safety standards.
- **Ingredient Sourcing and Supply Chain Management: Diversify suppliers**, establish **long-term partnerships**, invest in **vertical integration**, and maintain **buffer stocks** for uninterrupted supply.
- **Product Stability and Shelf Life:** Use **advanced packaging technologies**, conduct **stability studies**, and invest in **R&D for stable formulations** to extend shelf life.
- **Consumer Education and Safety Concerns:** Provide **clear labeling**, offer **educational resources** on websites, and collaborate with **healthcare professionals** for consumer awareness.

## TOPICS FOR PRELIMS

### PM Dhan Dhanya Krishi Yojana

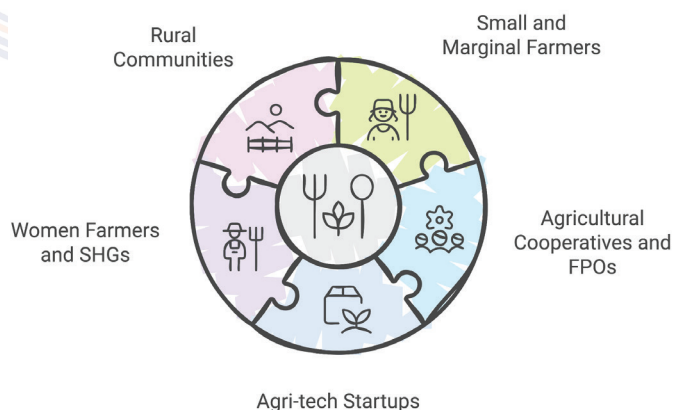*Syllabus Mapping: Government Schemes, Agriculture*

### Context

In the Union Budget 2025, the Union Finance Minister has announced a new scheme Pradhan Mantri Dhan Dhanya Krishi Yojana.

### About Prime Minister Dhan-Dhaanya Krishi Yojana (PMDKY)

#### Objectives of PMDKY:

- **Enhancing Agricultural Productivity**: The scheme targets 100 districts of low farm productivity with restricted access to credit and advanced agricultural techniques.
- **Adopting Crop Diversification and Sustainable Agriculture Practices**: Encouraging diversified cropping systems and environmentally sustainable agricultural methods.

**Target Beneficiaries of PMDKY**



Rural Communities — Small and Marginal Farmers — Women Farmers and SHGs — Agricultural Cooperatives and FPOs — Agri-tech Startups

- **Improving Irrigation Facilities:** Ensuring better irrigation systems to improve water access for farming.
- **Augmenting Post-Harvest Storage**: Strengthening storage infrastructure at the **panchayat** and **block** levels to prevent crop wastage.

- **Inspiration**: The programme is motivated by the **Aspirational Districts Programme (ADP)** which was launched in 2018 to "to quickly and effectively transform 112 most under-developed districts across the country."
  - **ADP focused on 3 Cs:** Convergence, Collaboration & Competition.
- **Parameters for Selection:**
  - **Low Productivity**: Districts with low agricultural output.
  - **Moderate Crop Intensity**: The cropping intensity, which measures the efficiency of land usage, will be considered.
    - It is defined as the ratio of the gross cropped area to the net area sown.
    - **Eg**: India's cropping intensity in 2021-22 was **155%**, showing how efficiently land was utilized.
  - **Below-Average Credit Parameters**: The financial credit available to farmers in each district will be a consideration.

## Features

- The scheme is expected to benefit **1.7 crore farmers.**
- **Budget Allocation:** No separate allocation announced; funds will be managed through the convergence of existing schemes.

## Gyan Bharatam Mission

*Syllabus Mapping: Government Schemes, Art and Culture*

### Context

The Union Budget 2025-26 announced a special mission for the survey, documentation and conservation of India's manuscript heritage.
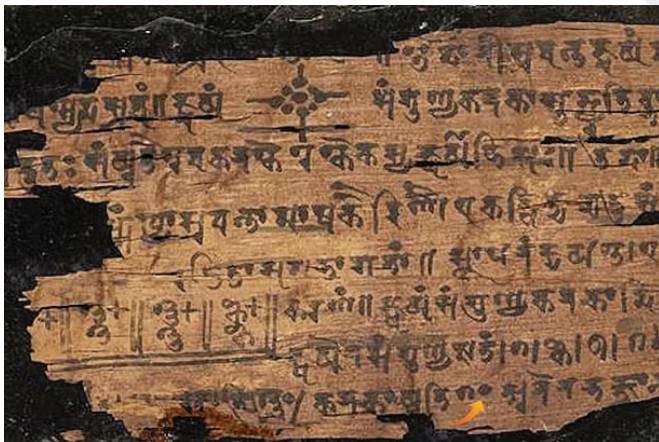


### About Gyan Bharatam Mission

- **Objective**: It is a **special mission for the survey, documentation, and conservation of India's**

**manuscript heritage** lying with academic institutions, museums, libraries and private collectors.

- **Coverage:** To cover more than one crore manuscripts.
- **Nodal Ministry:** Ministry of Culture
- A **National Digital Repository of Indian knowledge systems** for knowledge sharing will be set up.
- The mission will be executed under **National Mission for Manuscripts (NMM).**
- **Budget Allocation:** To accommodate the new mission, budget allocation for National Manuscripts Mission (NMM) has been hiked from **3.5 crore to 60 crore.**

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**What is a Manuscript?**

- It is a handwritten composition on **paper, bark, cloth, metal, palm leaf** or any other material dating back at least **75 years** that has significant scientific, historical or aesthetic value.
- **Lithographs and printed volumes are not manuscripts.**
  - A lithograph is a print made using the **lithography printing proces**s, which involves drawing an image onto a stone or metal plate and then transferring it to paper.

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## About National Mission for Manuscript (NMM)

- It was established in **2003**, by the **Ministry of Tourism and Culture (GOI).**
- **Objectives:**
  - Locate manuscripts through a national-level survey and post-survey.
  - Document each and every manuscript and manuscript repository, for **a National Electronic Database.**
    - It currently contains information on **4 million** manuscripts making this the largest database on Indian manuscripts in the world.
  - Conserve manuscripts incorporating both modern and indigenous methods of conservation and training a new generation of manuscript conservators.
  - To train the next generation of scholars in various aspects of Manuscript Studies.
- To achieve this mandate, the mission has established more than **100 Manuscripts Resource Centres and Manuscripts Conservation Centres** all over India.

## Restructuring Skill development initiatives

*Syllabus Mapping: Government Schemes, Skill development*

### Context

The Union government has decided to restructure its skilling initiatives, combining three of them into the Skill India Programme.

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## India's evolving skill landscape

According to Economic Survey 2022-23, between FY17 and FY23, under **PM Kaushal Vikas Yojana** about **1.1 crore persons** have been trained and about **21.4 lakh** being placed. This shows that skill development programmes in India are succeeding in increasing human resources supply to various sectors.

**Workforce Education & Skill Composition**

- **90.2% of the workforce** has **secondary education or less**.
- **88.2% of the workforce is engaged in low-competency jobs** (elementary & semi-skilled roles)
- **Skill mismatch**:
  - **53% of graduates & 36% of postgraduates are underemployed** in roles below their qualifications.
  - **Mismatch between academic qualifications & job market demands**.
- **Impact on earnings**:
  - **4.2% of the workforce with advanced education earn ₹4-8 lakh annually**.
  - **46% earn less than ₹1 lakh** (mainly agricultural labourers, clerical staff, factory workers, small-scale service providers)
- **Urgent need for upskilling** is required due to workforce concentration in lower-skilled jobs.

**Vocational Training & Skill Development**

- **65.3% of the workforce received no vocational training**.
- **Technical & Vocational Education and Training (TVET)** offers **industry-specific practical ski**lls, unlike general education.

## Restructuring Skill development initiatives

### Pradhan Mantri Kaushal Vikas Yojana 4.0 (PMKVY 4.0)

- **Ministry:** Ministry of Skill Development & Entrepreneurship (MSDE).
- **Implemented by:** National Skill Development Corporation (NSDC).
- **Duration**: FY 2022-2026.
- **Target beneficiary**: 15-59 years of age.
- **Objective:**
  - Aims to provide **industry-relevant skill training** to Indian youth.
  - Helps individuals secure better employment opportunities.
- **Skill Certification**:
  - Recognizes and certifies individuals with **prior learning experience**.
  - Includes **assessment under the Recognition of Prior Learning (RPL) framework**.



Figure 1: PMKVY so far

### Pradhan Mantri National Apprenticeship Promotion Scheme (PM-NAPS)

- **Objective:** Aims to facilitate a smooth transition from education to employment through apprenticeship training.
  - Provides industry-specific skills via real-world workplace exposure.
- **Financial Support:** Central Government covers **25% of the stipend**, up to ₹**1,500 per month per apprentice**, via **Direct Benefit Transfer (DBT)**.
- **Eligibility Criteria:** Open to individuals aged **14 to 35 years**.

- **Industry Alignment:** Encourages apprenticeships in **traditional manufacturing** as well as **emerging fields** like **AI, robotics, blockchain, green energy, and Industry 4.0 technologies**.
- **Support for Small Enterprises:** Promotes enrolment in **MSMEs**, especially in **aspirational districts** and the **North-East Region**, expanding opportunities in underserved areas.

### Jan Shikshan Sansthan (JSS) Scheme

- **Community-Centric Skilling Initiative:** Focuses on providing **affordable, flexible, and inclusive** vocational training.

- **Beneficiary:** Targets **women, rural youth, and economically disadvantaged groups** (15-45 years age group).

- **Accessible Training Model:** Offers **low-cost, doorstep training** with **flexible schedules** to promote both **self-employment and wage-based livelihoods**.

- **Integrated with:** Pradhan Mantri Janjati Adivasi Nyaya Maha Abhiyan (PM-JANMAN) and ULLAS (Understanding of Lifelong Learning for All in Society).

- **Certification & Formal Recognition:** Certifications aligned with **National Skills Qualification Framework (NSQF)**.

  - Integrated with **DigiLocker** and **National Credit Framework (NCrF)** to facilitate **employment and higher education opportunities**.

- **Significance:**

  - Reinforces **continuous upskilling and reskilling** under the **Skill India Programme**.

  - Contributes to **Periodic Labour Force Survey (PLFS) data** to align workforce policies with economic trends.

  - Beyond skill training, JSS promotes **social empowerment** through awareness on **health, hygiene, financial literacy, gender equality, and education**.

## Mid day meal scheme (MDM)

*Syllabus Mapping: Government Schemes, Poverty and Hunger*

### Context

The Maharashtra government has decided to withdraw ₹**50 crore in funding** for eggs and millet-based sweet dishes in State-run schools under the **Mid Day Meal (MDM) Scheme**.

### About Mid Day Meal Scheme (MDM)

- **MDM was launched in 1995** as the **National Programme of Nutritional Support to Primary Education (NP-NSPE)** & was Renamed as **Mid Day Meal (MDM) Scheme** in 2001.

- In **2021, MDM was merged into the Pradhan Mantri Poshan Shakti Nirman (PM-POSHAN) Scheme**.

- **Key Features of MDM:**

  - **Free cooked lunch** for schoolchildren in **Classes 1 to 8** in **government and government-aided schools**.

  - Jointly funded by the Central and State Governments:

    - 60% of costs borne by the Union Government

    - 40% covered by the State Governments

  - Meals must follow **nutrition guidelines** under the **National Food Security Act (2013)**

- **Inclusion of Eggs in MDM Across India:**

  - **Eggs are a rich source of protein, vitamins, and minerals**.

  - **16 States** currently **serve eggs** as part of the Mid Day Meal Scheme.

  - States that **introduced eggs in MDM** have seen **improved child nutrition** and **higher attendance** in schools.

**Pradhan Mantri Poshan Shakti Nirman (PM-POSHAN) Scheme**

- **Launched**: September 2021.
- This initiative replaces the previous Mid-day Meal Scheme and is set to run from 2021-22 to 2025-26 with a financial outlay of Rs 1.31 trillion.
- **Aim**: To provide one hot cooked meal to children in Government and Government-aided schools.
- **Objectives:**
  - **Addressing Malnutrition**: Aims to reduce stunting, under-nutrition, anaemia, and low birth weight among children.
  - **Improving Educational Attendance**: Encourages regular school attendance among disadvantaged children by providing nutritious meals.
  - **Holistic Approach**: Promotes a lifecycle approach focusing on the first 1,000 days of a child's life, emphasising adequate nutrition during pregnancy and early childhood.

## 10 Years of Soil Health Card Scheme

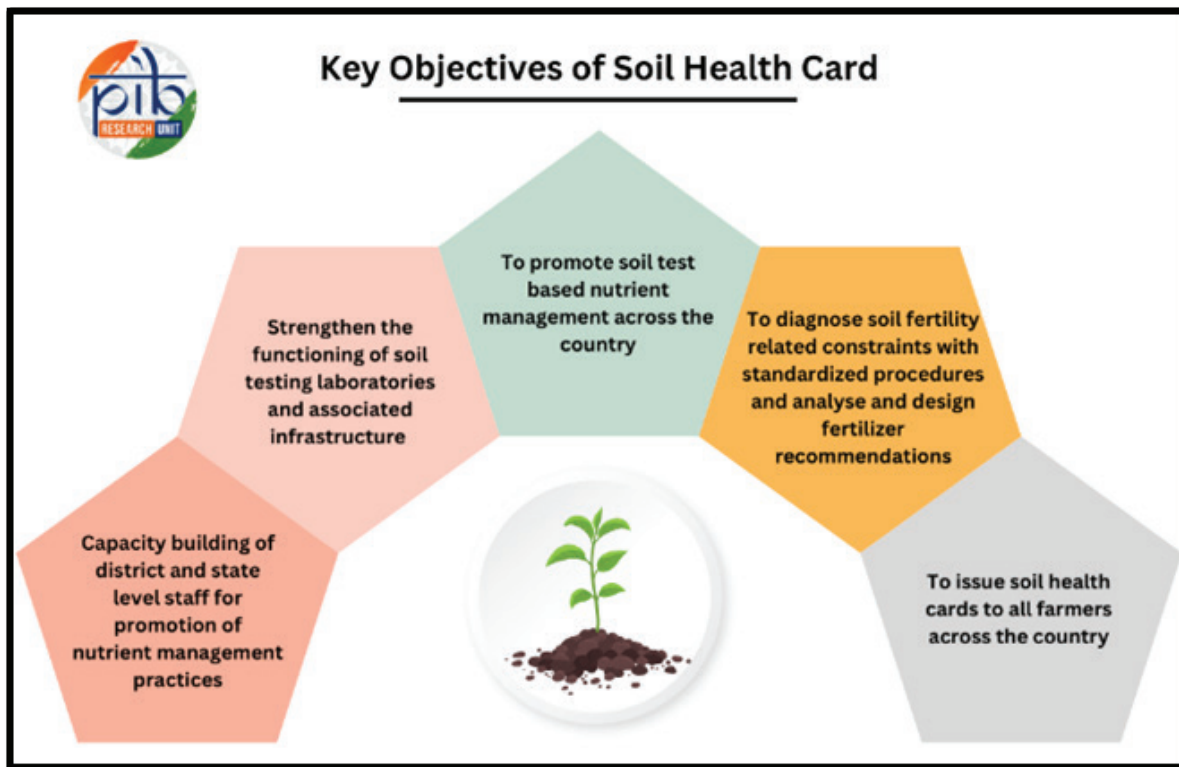*Syllabus Mapping: Government Schemes, Agriculture*

### Context

In February 2025 Soil Health Card Scheme completed 10 Years.

### About Soil Health Card Scheme (SHC)

- It was launched on **19th February, 2015 at Suratgarh, Rajasthan,** to assist State Governments to issue soil health cards to all farmers in the country.

- Soil health card provides information to farmers on nutrient status of their soil along with recommendation on appropriate dosage of nutrients to be applied for improving soil health and its fertility.

- SHC scheme has been merged in **Rashtriya Krishi Vikas Yojana (RKVY)** scheme as one of its components under name **'Soil Health & Fertility'** from the year 2022-23.

### Key Features of the Soil Health Card (SHC)

- It provides nutrient status of the soil and Fertilizer recommendations based on soil composition.

- **Parameters Covered (12 Key Indicators):**

  - **Macronutrients:** Nitrogen (N), Phosphorus (P), Potassium (K), Sulfur (S).

  - **Micronutrients:** Zinc (Zn), Iron (Fe), Copper (Cu), Manganese (Mn), Boron (Bo).

**Key Objectives of Soil Health Card**

- To promote soil test based nutrient management across the country
- Strengthen the functioning of soil testing laboratories and associated infrastructure
- To diagnose soil fertility related constraints with standardized procedures and analyse and design fertilizer recommendations
- Capacity building of district and state level staff for promotion of nutrient management practices
- To issue soil health cards to all farmers across the country

- – **Other Soil Properties: pH** (Acidity or Basicity), **EC** (Electrical Conductivity), **OC** (Organic Carbon).
- **Sampling Frequency: Twice a year** (post-harvest of **Rabi & Kharif crops**). Conducted when **no standing crop** is in the field.

**Achievement of SHC**

- As of February 2025, the Government of India has generated **24.74 crore Soil Health Cards** across the country.
- Number of SHC issued to farmers increased from **16 lakh (2020-21) to 53 lakh(2024-25).**
- Soil and Land Use Survey of India generate**d 1,987 village-level soil fertility maps for 21 States and Union Territories**.

## PM Surya Ghar - Muft Bijli Yojna

*Syllabus Mapping: Government Schemes,*

### Context

Around 8.5 lakh households have installed rooftop solar connections under PM Surya Ghar Yojna.

### About PM Surya Ghar Yojna

- **Launched:** February 15, 2024
- **Objective:** To provide free electricity to one crore households by facilitating the installation of rooftop solar electricity systems.
- **Nodal Ministry:** The Ministry of New and Renewable Energy (MNRE)

- **Implementation Agency:** Rural Electrification Corporation (REC)

### Key Features of the Scheme

- **Free Electricity Provision:** Eligible households will receive up to 300 units of electricity free every month.
- **Subsidy:** The scheme offers a subsidy of up to 60% of the cost of solar panels for systems up to 2 kW capacity, and 40% for systems between 2 to 3 kW capacity. The subsidy is capped at 3 kW capacity.
  - – **i.e.** ₹30,000 subsidy for a 1-kW system, ₹60,000 for 2-kW systems and ₹78,000 for 3-kW systems or higher.
- **Model Solar Villages:** The scheme aims to create one model solar village in each district of India to promote solar energy adoption.
  - – **Eligibility criteria for a village to be considered for Model Solar Village:**
    - ▪ **For normal states & UTs:** must be a revenue village with a population of more than 5,000 as per latest census.
    - ▪ **For Himalayan & North-Eastern States & UTs of A & N and Lakshadweep:** Revenue villages with a population size of more than 2,000 as per latest census.
- **Incentives for Urban Local Bodies and Panchayati Raj Institutions:** These institutions will receive incentives to promote rooftop solar installations in their areas.

### Legal Aid Defense Counsel System (LADCS)

- LADCS is a program that provides free legal assistance to accused people in criminal cases.
- It is funded by the **National Legal Services Authority (NALSA).**
- **Target Beneficiaries:**
  - Poor and marginalized individuals
  - People in custody (undertrials, convicts, juvenile offenders)
  - Women and children in distress
  - Victims of human trafficking

**Key Features**
- **Full-Time Legal Aid Defense Counsel (LADC):**
  - Appointed at the district level
  - Handles criminal cases from start to finish (pre-trial, trial, appeals, bail, etc.)
- **Free Legal Representation:** Legal aid provided at all stages of a criminal case, including investigation, trial, and appeal.
- **24x7 Assistance:** LADCS lawyers assist in police stations, jails, and courts.
- **Confidential & Professional Representation**: Ensures quality defense similar to private legal representation.

### NAKSHA Programme

- NAKSHA stands for **National Geospatial Knowledge-based Land Survey of Urban Habitations**.
- It aims to **create and update land records** in **urban areas** to ensure accurate and reliable documentation of land ownership.

**Objectives of NAKSHA**
- **Accurate and reliable land records:** Updating land records in urban and semi-urban areas.
- **Empowering citizens:** Reducing land disputes and improving ease of property transactions.
- **Enhancing urban planning:** Supporting infrastructure projects and smart city initiatives.
- **Ensuring transparency & efficiency:** IT-based system for property record administration.
- **Sustainable development**: Facilitating orderly urban growth and minimizing conflicts over land ownership.

# SCIENCE & TECHNOLOGY

## TOPICS FOR MAINS

### AI in School Education

*Syllabus Mapping: GS-Paper 3, ICT, AI*

### Context

The World Economic Forum 2024 in Davos focused on the theme "Collaboration for the Intelligent Age", emphasizing the integration of humanity, nature, and AI. In the context of education, this theme presents transformative opportunities to reshape learning by combining intelligence with consciousness.

### AI's Impact on Education in Current Times

- **Enhanced Learning Personalization:** AI tools adapt to individual student learning speeds and preferences.
  - Platforms like ChatGPT, Khan Academy AI, and Duolingo AI provide tailored learning experiences.
- **Automated Administrative Tasks:** AI reduces the workload of teachers by automating:
  - Grading
  - Attendance tracking
  - Administrative documentation
  - Virtual Tutoring and Smart Classrooms
  - AI-driven chatbots and virtual assistants help students with doubts in real-time.
  - Smart classrooms with AI enable interactive learning experiences.
- **Early Detection of Learning Gaps:** AI identifies student weaknesses through data analytics.
  - Allows for targeted interventions to improve performance.
- **Increased Engagement through AI-powered Content:** AI-generated quizzes, simulations, and interactive lessons make learning engaging.
  - Platforms like Google's Socratic AI and Microsoft Reading Coach enhance digital learning.

### Key Challenges of Introducing AI in Education

- **Lack of AI Literacy Among Educators:** Many teachers are not trained to integrate AI tools effectively.
  - Concerns over AI-generated misinformation (AI hallucinations).
- **Ethical and Privacy Concerns:** Risk of data breaches and misuse of student information.
  - Lack of clear policies on AI ethics in schools.
- **Over-Reliance on AI by Students:** Students using AI for homework and assignments without understanding concepts.
  - Potential decline in critical thinking and creativity.
- **Equity and Accessibility Issues:** Unequal access to AI tools due to economic disparities.
  - Rural and underprivileged students may lack digital infrastructure.
- **Standardization vs. Personalization:** AI-driven learning models may lack adaptability to different student needs.
  - Risk of bias in AI algorithms, leading to disparities in education quality.

### Solutions to Overcome AI Challenges in Education

- **AI Training for Educators:** Regular workshops and certifications on AI integration in teaching.
  - Collaboration with EdTech companies to upskill teachers.
- **Implementing AI Ethics and Data Privacy Policies:** Strong regulatory frameworks to prevent misuse of student data.
  - Transparency in AI algorithms to eliminate bias.
- **Encouraging AI-Assisted Learning, Not AI-Dependent Learning:** Schools must balance AI use with traditional teaching methods.
  - Develop AI literacy programs to guide students on responsible AI usage.

- **Bridging the Digital Divide:** Government and private sector must increase AI access in rural areas.
  – Affordable AI-driven learning tools for economically weaker students.
- **Improving AI Adaptability in Education**: AI systems should be customized for diverse learning needs.
  – Developers should eliminate biases in AI algorithms to ensure fair learning outcomes.

## Conclusion

Education must evolve by refining its vision to match a constantly changing reality.

Schools should enhance natural learning processes through collaborative intelligence, rather than replacing them with technology.

## India's voice must resonate in global AI conversations

*Syllabus Mapping: GS-Paper 3, ICT, AI*

## Context

The International Network of AI Safety Institutes was inaugurated in November 2024 in San Francisco, U.S., following the Seoul Statement of Intent, under which nations pledged to collaborate on AI safety.

## More in News

- This network aims to unify global efforts in AI safety research, technical expertise, and policy innovation to establish best practices and harmonized safety standards.
- However, India has not yet joined this international initiative, despite being a major AI adopter.

## Evolving Nature of AI

- AI is a borderless technology, rapidly advancing across sectors like healthcare, finance, agriculture, and cybersecurity.
- With 30% AI adoption in India (higher than the global average of 26%) and 10% of ChatGPT users being Indian, AI has become deeply integrated into India's economy.
- However, the geopolitical landscape is shifting, with the U.S. imposing export controls on advanced AI to restrict China's access.
- This could impact India's access to crucial AI technologies, making global participation in AI governance even more critical.

## India's Stance

- India has not yet joined the International Network of AI Safety Institutes, despite its growing AI ecosystem.
- The absence from this forum risks India losing influence over global AI regulations.
- Engaging in international AI safety initiatives is essential for:
  – Protecting India's AI ecosystem – Ensuring ethical, secure, and competitive AI development.
  – Strengthening India's global leadership – Shaping AI governance frameworks and influencing global standards.
  – Navigating geopolitical challenges – Preventing potential restrictions on AI technology access.
  – Fostering innovation & investments – Aligning policies with global norms to attract AI funding and partnerships.
- India's strengths, like its Digital Public Infrastructure (DPI) and a robust tech talent pool, position it well to lead global AI safety discussions rather than remain a passive observer.
- The need for a national AI safety institution and proactive international engagement is urgent.

## Way forward for India

- **Develop Cost-Effective AI Solutions:** India must innovate with efficiency, similar to ISRO's approach, by focusing on low-energy, cost-effective AI models that can scale rapidly.
  – This will allow India to do more with less, ensuring AI is accessible and sustainable.
- **Strengthen Open-Source AI Ecosystem:** Encouraging open-source AI models will foster innovation and democratize AI development.
  – Support startups and developers in building domain-specific AI solutions that cater to India's unique needs (e.g., healthcare, agriculture, education).

- **Build Sovereign AI Models with Indian Data:** Develop frontier AI models trained on Indian datasets to ensure they are culturally relevant and free from foreign biases.
  - Move beyond application-layer AI and develop an end-to-end AI ecosystem, including foundational models and infrastructure.
- **Invest in AI Hardware & Semiconductor Independence:** GPUs are critical for AI, but US restrictions limit India's access to advanced chips.
  - India must build domestic semiconductor capabilities through investments in chip manufacturing, AI computing power, and energy-efficient hardware.
- **Develop Multilingual & Multimodal AI Models:** India has 22 official languages and hundreds of dialects—AI models must support multilingual and multimodal capabilities to make AI truly inclusive.
  - Initiatives like BHASHINI need to be scaled up for broader reach.
- **Secure Tier-I Status in Global AI Supply Chains:** As a Quad partner, India must demand Tier-I status in AI diffusion policies to avoid restrictions on high-end GPUs and AI technologies.
  - Strengthen diplomatic and trade negotiations to ensure unrestricted access to AI hardware and software.
- **Adopt a Mission-Driven, Urgent Approach:** AI is a global strategic priority—India must act with urgency and mission-mode execution, similar to its success in UPI, Aadhaar, and digital infrastructure.
  - Establish an IndiaAI Mission Task Force to drive policy, funding, and AI research collaboration.

## Deep Seek AI

*Syllabus Mapping: GS-Paper 3, ICT, AI*

### Context

Chinese startup DeepSeek has launched AI models that compete with top U.S. models at a much lower cost.

### About DeeSeek AI

- DeepSeek AI is a Chinese artificial intelligence startup that has quickly gained prominence as a competitor to ChatGPT.
- It was founded by Liang Wenfeng in May 2023 and became widely popular in early 2025 with the release of its DeepSeek-R1 model.
- Two Powerful AI Models:
  - DeepSeek-V3: Focuses on general-purpose tasks like answering questions, generating content, and coding.
  - DeepSeek-R1: Excels in complex reasoning, logical problem-solving, and mathematical calculations.

### Features of DeepSeek AI

- **Mixture-of-Experts (MoE) Architecture:** Unlike traditional AI models, MoE ensures that only a small portion of the model's parameters are active at any time.
  - This reduces computing power requirements while maintaining high efficiency.
  - It also enables faster learning and improved performance over time.
- **Free to Use Without Limitations:**
  - Unlike ChatGPT's premium features, DeepSeek AI is completely free for regular users.
  - No restrictions on daily usage, making it accessible to everyone.
- **Cost-Effective API Pricing:**
  - DeepSeek AI offers significantly cheaper APIs compared to OpenAI's ChatGPT, making it an attractive choice for developers.
- Real-Time Web Search Capability: Users can search the web directly from DeepSeek AI to obtain real-time, updated information.

### What is the global impact of DeepSeek?

- **Market Disruption:** DeepSeek's emergence led to a historic $600 billion drop in Nvidia's market value and a 3% decline in Nasdaq.
- **Geopolitical Tensions:** The U.S. may impose stricter AI export controls to counter China's growing AI capabilities.

- **Technology Democratization:** The open-source nature of DeepSeek challenges the proprietary AI development models of Western tech giants.
- **National Security Concerns:** The strict censorship embedded in DeepSeek raises concerns regarding bias, misinformation, and control over digital discourse.

## What are the geopolitical implications of Generative AI?

- **US-China AI Rivalry:** DeepSeek's success underscores China's strategic push for AI self-reliance, reducing dependence on Western technologies.
- **Technological Colonialism:** The AI landscape is increasingly monopolized by a few nations, potentially leading to digital dependency among smaller countries.
- **Regulatory Challenges:** Governments worldwide must balance open-source AI development with concerns over misinformation, security, and ethical AI use.
- **AI Arms Race & Strategic Alliances:** Nations are integrating AI into autonomous weapons, intelligence analysis, and cyber defense. The EU, US, India, and Japan are enhancing collaborations on AI safety to address global security concerns, including China's rapid advancements in AI-driven military technology.

## India's current position in the AI Race

### Strengths:

- **Vast Talent Pool:** India produces a large number of AI engineers and researchers, with many contributing to global AI advancements.
- **Diverse Linguistic Ecosystem:** India's multilingual environment drives innovation in natural language processing (NLP) and AI applications tailored to regional languages.
- **Government Initiatives:** Programs like the IndiaAI Mission, Digital India, and National AI Strategy aim to accelerate AI adoption and research.
- **Booming Startup Ecosystem:** AI-driven startups are thriving in sectors like healthcare, finance, and agriculture.

### Weaknesses:

- **Lack of Indigenous Foundational Models:** Unlike the US (GPT-4) and China (DeepSeek), India has no homegrown large-scale AI models.
- **Dependence on Foreign AI Technology:** India relies heavily on US-based AI models, cloud services, and semiconductor imports.
- **Limited AI Hardware Infrastructure:** India lacks high-end GPUs and cloud computing infrastructure, slowing AI training and deployment.

## Way Forward

- **Boost AI Research and Funding:**
  - Increase funding for AI research through public-private partnerships.
  - Establish mission-mode projects to develop indigenous AI models.
- **Develop AI Infrastructure:**
  - Build high-performance computing facilities for AI training.
  - Expand access to GPUs and cloud-based AI platforms under the IndiaAI Mission.
- **Foster Innovation and Entrepreneurship:**
  - Promote AI hackathons and startup incubators.
  - Support collaborations between academia and industry.
- **Leverage Open-Source AI Models:**
  - Encourage the use of cost-effective AI frameworks inspired by DeepSeek.
  - Develop AI applications tailored for Indian languages and socio-economic needs.
- **Strengthen Global Partnerships:**

- Collaborate with global AI leaders through initiatives such as India-US iCET.
- Participate in international AI consortia to foster research and technology exchange.

## Technology And The Challenge Of Equitable Education

*Syllabus Mapping: GS-Paper 3, S&T in everyday life*

### Context

Technology has revolutionized education but its full potential remains untapped for the underprivileged.

### How Technology Helped in Education

- **Increased Access to Learning Materials:** Smartphones became a primary tool for education during the COVID-19 pandemic, facilitating access to texts, worksheets, and videos as substitutes for traditional textbooks.
  - Virtual training sessions for teachers and students became common.
- **Wider Smartphone Penetration in Rural India:** In 2018, 36% of rural households had smartphones, which increased to 84% by 2024 (ASER 2024).
  - More children now own personal smartphones, enhancing individual access to digital education.
- **Overcoming Language Barriers:** AI-powered tools now allow dictation, writing, and translation in local languages, making digital learning more inclusive.
- **Potential for Community-Based Learning:** Broadcast learning programs, piloted in Maharashtra during the pandemic, showed group learning models can be effective, even in remote villages.
- **Support for Mothers' Education:** A large number of mothers (40%) have very low schooling, but digital learning offers opportunities for their education, enabling them to support their children's learning.

### Challenges of Equitable Education

- **Digital Divide:** While smartphone penetration has increased, internet access and affordability remain barriers, especially in rural and low-income households.
  - Device sharing within families limits personalized learning opportunities.
- **Quality vs. Access:** Enrolment rates have surged, but learning outcomes remain poor (ASER reports).
  - Mere access to schools or digital tools does not guarantee quality education.
- **Language and Content Gaps:** While AI-driven translation has improved, many educational resources are still in English or urban-centric languages, making them less useful for rural learners.
- **Teacher Training and Integration of Technology:** Many teachers lack digital skills to integrate technology effectively into the classroom.
  - Traditional teaching methods remain dominant, limiting the impact of digital learning.
- **Gender Gap in Education:** Lower smartphone ownership among mothers and girls restricts access to online learning opportunities.
  - Societal norms and early marriages further disrupt female education.
- **Economic Constraints:** Private schools and paid digital learning platforms widen the gap between privileged and underprivileged students.
  - Lack of affordable digital education solutions for low-income families.
- **Standardization vs. Local Needs:** National or global curricula often overlook regional and local educational needs.
  - AI-driven education must adapt to cultural and contextual requirements.
- **Profit-Driven Technological Innovations:** Most ed-tech solutions are profit-driven, limiting accessibility for marginalized communities.
  - Philanthropic investments in public digital education are insufficient to bridge this gap.

### Way Forward

- Improve digital infrastructure in rural areas.

- Localize content to ensure cultural relevance.
- Train teachers to use technology effectively.
- Promote free and open-source educational platforms.
- Support female education with targeted policies and digital access programs.

## Budgetary Allocation For Scientific Research and Development (FY 25-26)

*Syllabus Mapping: GS-Paper 3, Science Ecosystem*

### Context

The Union Budget 2025-26 includes significant allocations for scientific research and development.

### Reasons for Allocations

- **Nuclear Energy Mission:** The government has allocated ₹20,000 crore for a Nuclear Energy Mission to support research and development of small modular reactors (SMRs), with a goal to operationalize at least five indigenously developed SMRs by 2033.
  - This initiative aims to boost India's energy security and shift towards cleaner power while maintaining grid stability.
  - The plan is to reach 100 GW of nuclear capacity by 2047, backed by reforms to encourage private sector involvement in nuclear projects.
- **Research, Development, and Innovation Initiative:** The budget includes a substantial allocation to the Research, Development, and Innovation initiative, intending to boost private sector-led research.
  - This is part of the Department of Science and Technology (DST)'s expected expenditure, with an overall budgetary increase to ₹23,290 crore for DST schemes.
  - The initiative builds on efforts announced in July 2024 to drive private sector-led research.
- **Deep Tech Fund:** A Deep Tech Fund of Funds has been introduced to promote next-generation start-ups in the country.
- **PM Research Fellowship Scheme:** The budget proposes 10,000 fellowships under the Prime Minister's Research Fellowship scheme over the next five years to support research at IITs and IISc.
- **National Geospatial Mission:** The Union Budget also introduced a National Geospatial Mission with an outlay of Rs 100 crore for 2025-26.
  - The mission aims to "develop foundational geospatial infrastructure and data" and will be funded under the Pradhan Mantri Gati Shakti, or the National Master Plan for Multi-modal Connectivity.

### Issues and Implications

- **Absorption Capacity:** A key concern is whether the massive investments can be effectively absorbed, given the historical challenges in translating funding into tangible results.
- **Infrastructural Support:** India still lacks essential infrastructure, such as chipsets, semiconductor fabs, a skilled engineering workforce, and a strong innovation ecosystem, which are crucial to capitalize fully on these investments.
- **Private Sector Participation:** India's R&D landscape has suffered from low private sector participation, with only 36% contribution.
  - The success of the new initiatives depends on incentivizing private innovation and ensuring long-term engagement from industry leaders.
- **Implementation Gap:** There is a widening gap between policy announcements and actual implementation, as seen in the discrepancy between the allocated and actual spending in research-related initiatives.
- Small Modular Reactors: SMRs are mostly still under development and have not been deployed commercially anywhere in the world.
  - Although a few are currently under construction in various countries like China, Russia, and Argentina, and some pilot projects are operational with limited capacity.

## Conclusion

While the massive boost in R&D funding is a positive step, its success depends on overcoming structural challenges, ensuring private sector participation, and building essential research infrastructure. Without these measures, India risks falling short of its ambitious scientific and technological goals.

## Nuclear Energy-Dangerous Concession On Liability

*Syllabus Mapping: GS-Paper 3, Nuclear Technology*

## Context

The Finance Minister announced the government's intention to amend the Atomic Energy Act and the Civil Liability for Nuclear Damage Act. This is expected to favor U.S. interests by potentially indemnifying nuclear suppliers.

The U.S. government and U.S. Ambassador Eric Garcetti has been lobbying India to amend the law to make it easier for U.S. companies to sell nuclear reactors to India. U.S. administrations have been unhappy that the law places some minimal responsibilities on nuclear manufacturers in the event of an accident.

## Incidents Influencing Laws

- **Bhopal Gas Disaster (1984):** Led to the Supreme Court's "absolute liability" ruling in the Delhi Oleum gas leak case (1986), holding enterprises engaged in hazardous activities strictly liable for harm.
- **Fukushima Nuclear Disaster (2011):** Highlighted the catastrophic economic potential of nuclear accidents. Estimated cleanup costs ranged from ¥35 trillion to ¥80 trillion (₹20 lakh crore to ₹46 lakh crore). The accident also exposed design flaws (Mark 1 containment).
- **Three Mile Island Accident (1979):** Revealed that the reactor supplier, Babcock & Wilcox, had identified a safety hazard but failed to provide operators with clear instructions to mitigate it.

## Evolution of Indian Law

- **Dilution of "Absolute Liability" (2010):** The government created a special law for nuclear accidents, diluting the principle of absolute liability.
- Channeling of Liability: Primary liability channeled to the operator (NPCIL).
- Liability Cap: Capped at ₹1,500 crore.
- **"Right of Recourse":** It allows the operator to recoup compensation from the supplier if the accident was caused by "supply of equipment with patent or latent defects or sub-standard services."

## Arguments Against Indemnifying Nuclear Suppliers

- **Reduces Accountability and Safety Standards:** If suppliers are indemnified, they have no financial incentive to ensure the highest safety standards.
  - Past accidents (Fukushima, Three Mile Island) show that design flaws in reactors can lead to catastrophic failures.
- **Violates the Polluter Pays Principle:** The "absolute liability" doctrine established by the Supreme Court (after Bhopal Gas Tragedy) holds hazardous industries fully responsible for damages.
  - Indemnifying suppliers contradicts this legal principle and shifts the burden to taxpayers.
- **Financial Burden on Indian Government & Taxpayers:** If a nuclear disaster occurs, the entire compensation and cleanup costs (potentially in lakhs of crores) would fall on the Indian government.
  - This is unfair, as foreign suppliers would walk away without any financial responsibility.
- **Dangerous Precedent for Future Industrial Accidents:** Indemnifying nuclear suppliers could set a precedent for other hazardous industries (chemical plants, oil refineries, etc.) to demand similar legal immunity.
  - This weakens corporate accountability across sectors.
- **Contradicts India's 2010 Nuclear Liability Law:** The Civil Liability for Nuclear Damage Act (2010) ensures that suppliers can be held liable for defective equipment.
  - Indemnification would completely remove this critical protection.

- **Encourages Reckless Business Practices:** When suppliers know they won't be held liable, they may cut corners in design, safety, and manufacturing to maximize profits.
  - General Electric (GE) ignored safety warnings about its Mark 1 reactor design, which contributed to the Fukushima disaster.

## Problems with American Reactors (AP1000)

- **Excessively High Costs:** The AP1000 reactors in the U.S. saw cost overruns of 250%, with a final price tag of $36.8 billion for two reactors in Georgia.
  - Given India's lower electricity tariffs, recovering such high costs would be economically unviable.
- **Unfinished and Abandoned Projects:** Two AP1000 reactors in South Carolina were abandoned after $9 billion was wasted on delays and design flaws.
  - This raises concerns about the feasibility of such reactors in India.
- **Technical and Safety Issues:** The Westinghouse AP1000 design has faced regulatory and safety challenges in multiple countries, including the U.S. and China.
  - In China, the first AP1000 reactors faced major delays due to critical component failures.
- **Dependency on Foreign Technology:** India has a strong indigenous nuclear program (PHWRs, Fast Breeder Reactors).
  - Importing AP1000 reactors makes India dependent on U.S. technology, which could be restricted due to geopolitical tensions.
- **Not Competitive with Renewables:** The per-unit electricity cost from AP1000 reactors is several times higher than that of solar, wind, and domestic nuclear reactors.
  - Investing in expensive reactors locks India into costly electricity for decades.
- **No Proven Track Record in India:** Unlike Pressurized Heavy Water Reactors (PHWRs) that India has successfully deployed, AP1000 reactors have no operational history in India.
  - This increases risks related to local adaptation, maintenance, and long-term sustainability.

## Way Forward: Strengthening India's Nuclear Liability Framework

- **Increase Liability Cap:** Adjust the compensation limit to align with real-world disaster costs, ensuring sufficient victim relief.
- **Stronger Regulatory Oversight:** Establish an independent nuclear safety authority with enforcement power over both operators and suppliers.
- **Mandatory Supplier Contributions to Insurance Pool:** Require nuclear suppliers to contribute to the liability fund, ensuring shared financial responsibility.
- **Transparency in Nuclear Agreements:** Disclose all nuclear procurement agreements to the public to ensure accountability in government decisions.
- **Focus on Indigenous Nuclear Technology:** Prioritize investment in Indian-developed reactors (e.g., PHWRs) rather than costly and risky foreign imports.
- **Public Consultation on Policy Amendments:** Before making changes to the liability law, hold public discussions to consider safety, financial, and environmental concerns.

## Enhancing the Use of Nuclear Energy

*Syllabus Mapping: GS-Paper 3, Nuclear Technology*

## Context

India has set an ambitious target to increase its nuclear power capacity to 100 GW by 2047, a significant leap from the current 8.2 GW.

**Current Status & Targets**

**Current Status**

- Installed Nuclear Capacity: ~7 GWe (as of 2024).
- Operational Reactors: 22 reactors.
- Fuel Dependence: Heavily reliant on imported uranium due to limited domestic reserves.
- Technology: Pressurised Heavy Water Reactors (PHWRs) dominate; Fast Breeder Reactors (FBRs) under development.

**Targets**

- 100 GWe by 2047 as part of "Viksit Bharat" vision.
- Expanding PHWRs: 700 MWe PHWRs are planned as the backbone of expansion.
- Fast Breeder Reactors (FBRs): To enable closed nuclear fuel cycles.
- Thorium-Based Reactors: Developing Advanced Heavy Water Reactors (AHWRs) and Molten Salt Reactors (MSRs).
- Bharat Small Reactors (BSRs): Small modular reactors for decentralized power supply.

## Challenges

- **Fuel Supply Constraints:**
  - High uranium demand: ~18,000 tons of uranium needed annually for 100 GWe capacity.
  - Limited Domestic Uranium: India has low-grade uranium deposits and relies on imports.
  - Global dependence: Countries like Canada, Kazakhstan, and Australia supply India.
- **Delays in Fast Breeder Reactors (FBRs):**
  - Prototype Fast Breeder Reactor (PFBR): 500 MWe reactor is still not operational after long delays.
  - Slow progress in large-scale deployment of breeder reactors, limiting fuel recycling.
- **Thorium Utilization Bottlenecks:**
  - Processing challenges: Thorium-uranium cycle requires advanced fuel cycle technologies.
  - Lack of Industrial-Scale Deployment: Most thorium research remains at the lab level.
- **Infrastructure & Manufacturing Gaps:**
  - Limited domestic reactor-building capacity.
  - Dependence on foreign technology for some critical components.
  - Small Modular Reactors (SMRs) lack commercial deployment experience.
- **Public & Regulatory Hurdles:**
  - Public opposition to nuclear power due to safety concerns.
  - Land acquisition & site selection issues for large-scale nuclear expansion.

## Solutions & Way Forward

- **Fuel Supply Security:**
  - Expand domestic uranium mining: Fast-track exploration and mining of reserves.
  - Increase global uranium partnerships: Long-term supply deals with Kazakhstan, Russia, Canada, Australia.
  - Accelerate Thorium Fuel Cycle: Deploy HALEU-Thorium fuel in PHWRs to reduce uranium dependency.
- **Fast Breeder & Recycling Acceleration:**
  - Operationalize PFBR: Resolve delays and expand FBR deployment.
  - Invest in spent fuel reprocessing: Large-scale recycling of uranium and plutonium.
  - Molten Salt Reactors (MSRs): Begin pilot deployment to improve fuel efficiency.
- **Infrastructure & Indigenous Manufacturing:**
  - Scale up Bharat Small Reactors (BSRs) for decentralized power.
  - Boost Private Sector Role: Involve Indian companies in reactor manufacturing and component supply.
  - Leverage Retired Coal Plant Sites for new nuclear plants, avoiding land acquisition hurdles.
- **Public Awareness & Safety Measures:**
  - Enhance safety standards: Strict regulatory oversight to build public trust.
  - Transparent communication: Educate people on nuclear energy benefits.
  - Disaster-Resilient SMRs: Deploy only designs that require minimal evacuation zones.
- **Policy & Financial Support:**
  - Simplify nuclear regulations for faster approvals.
  - Public-Private Partnerships (PPP) in Nuclear: Leverage private investment in small reactors.

– Boost R&D Funding: Increased budget for Bhabha Atomic Research Centre (BARC) and Indira Gandhi Centre for Atomic Research (IGCAR).

## SPHEREx Space Telescope

*Syllabus Mapping: GS-Paper 3, Space Technology*

### Context:

NASA launched its new space telescope, SPHEREx (Spectro-Photometer for the History of the Universe, Epoch of Reionization, and Ices Explorer), on February 28, 2025, aboard a SpaceX Falcon 9 rocket from Vandenberg Space Force Base, California.

### About SPHEREx Space Telescope

- The Spectro-Photometer for the History of the Universe, Epoch of Reionization, and Ices Explorer (SPHEREx) is a NASA space telescope designed to study the origins of the universe and map the entire sky in infrared light.
- Aim: To investigate cosmic inflation, the formation of large-scale structures in the universe, and the distribution of water and organic molecules in interstellar clouds and planetary systems.
- Goal: To map the distribution of water and organic molecules in our Milky Way galaxy, which could provide insights into the origins of life.
- NASA's Jet Propulsion Laboratory (JPL) is developing SPHEREx, with a planned launch in 2025 aboard a SpaceX Falcon 9 rocket.
- The telescope will operate in a sun-synchronous orbit around Earth, allowing it to observe the sky continuously.

### Significance:

- Insight into Cosmic Inflation: Helps scientists understand the universe's exponential expansion after the Big Bang.
- Search for Life's Building Blocks: Detects water and organic molecules in star-forming regions and planetary systems.
- Foundation for Future Missions: Provides data to guide upcoming space exploration projects.
- Global Collaboration: Involves international partners like the Korea Astronomy and Space Science Institute.

## China's Artificial Sun (EAST) Sets New Fusion Record

*Syllabus Mapping: GS-Paper 3, Nuclear Technology*

### Context

Recently China's artificial sun, known as EAST, burned for over 1000 seconds, creating a new record.

### About EAST (Experimental Advanced Superconducting Tokamak)

- EAST is China's artificial sun, designed to conduct fusion-related experiments.
- It has been operational since 2006 and serves as an open test platform for both Chinese and international scientists.



- New Fusion Record: 1066 Seconds of High-Confinement Plasma
- EAST successfully maintained a steady-state high-confinement plasma operation for 1066 seconds.
- This is the longest duration ever recorded in fusion research. Plasma temperature reached 100 million degrees Celsius.
- The previous record held by EAST was 403 seconds.
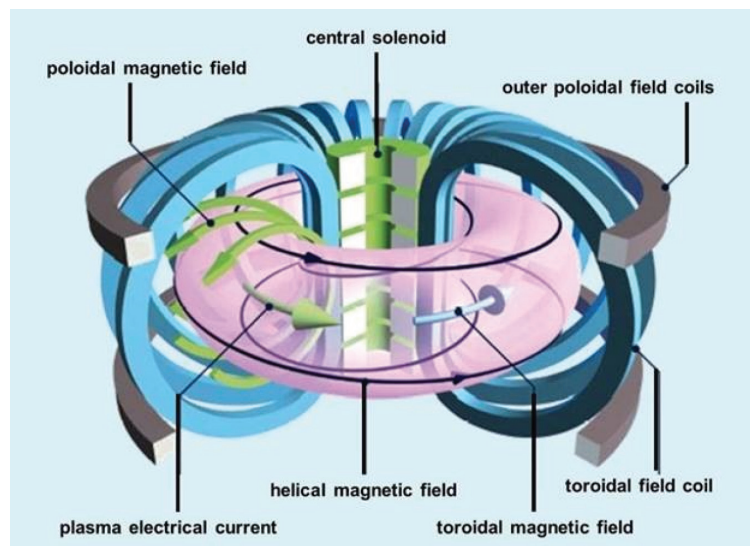
## Tokamak

- A Tokamak is a device designed to create controlled nuclear fusion by confining hot plasma using powerful magnetic fields.
- It is the most widely used experimental reactor type for studying fusion energy.
- Major Tokamak Projects Around the World:
  - EAST (China's Artificial Sun), ITER (International Thermonuclear Experimental Reactor) - France, KSTAR (Korea Superconducting Tokamak Advanced Research)

**Nuclear Fusion**

- Fusion is the source of energy for the Sun and stars.
- Fusion Process:
  - Two light nuclei merge to form a single, heavier nucleus.
  - The mass of the resulting nucleus is less than the original two nuclei, with the leftover mass converted into energy ($E=mc^2$).
- Fusion Fuel:
  - Hydrogen isotopes (Deuterium and Tritium) are used in the reaction.
  - Deuterium is extracted from seawater, making it an abundant and sustainable fuel source.
- The most efficient fusion reaction in the laboratory setting would be the reaction between two hydrogen isotopes, deuterium (D) and tritium (T).
- Conditions for nuclear fusion:
  - Very high temperature (about 150,000,000° Celsius)
  - Sufficient plasma particle density (to increase the likelihood of collisions)
  - Sufficient time of confinement (to hold the plasma)
- Benefits of nuclear fusion energy: No radioactive waste, High efficiency, Inexpensive fuel, No greenhouse gases are emitted, No risk of reactor meltdown.
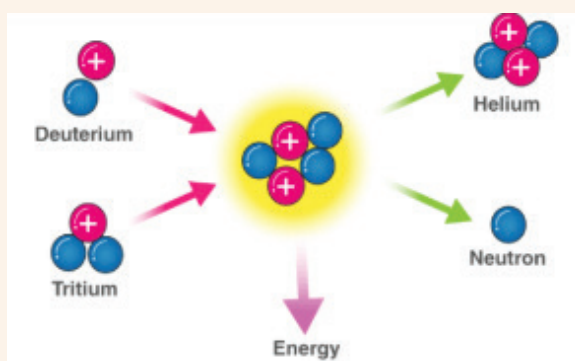


## Use of AI in Healthcare

*Syllabus Mapping: GS-Paper 3, Application of Science in Everyday life*

## Context

U.S. Food and Drug Administration (FDA) proposed draft guidelines on AI use in drug development.

## How AI Improves Drug Development

- **Drug Discovery Phase:**
  - AI scans databases containing thousands of chemical compounds.
  - It identifies hundreds of promising candidates for further testing.
- **Preclinical Research:** AI predicts human drug responses using data on:
  - How the body absorbs, distributes and eliminates drugs.
  - Vulnerable populations (e.g., children) who cannot participate in trials.

# Applications of AI in Healthcare
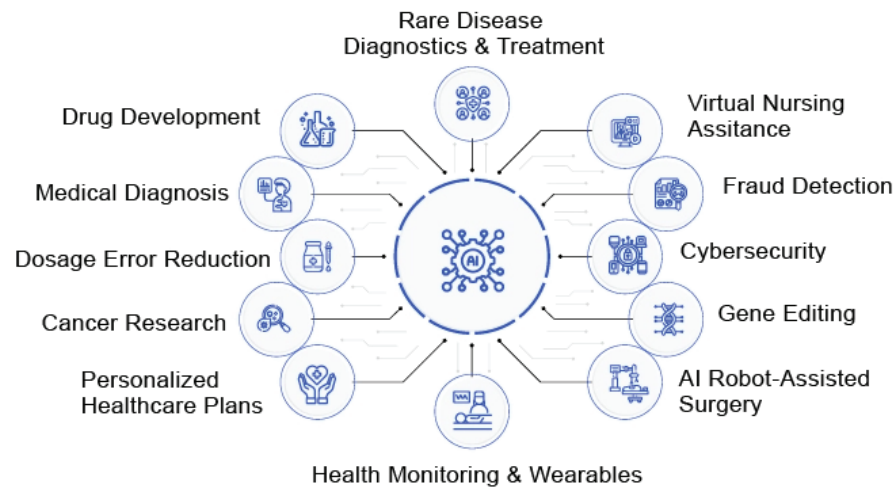


- **Toxicity prediction:**
  - AI models can predict the potential toxicity of a drug candidate based on its chemical structure, reducing the need for extensive animal testing.
- **Faster development time:**
  - AI can significantly shorten the drug discovery process by identifying promising candidates more efficiently.
- **Reduced costs:**
  - By optimizing drug design and minimizing the need for animal testing, AI can lower the overall cost of drug development.

**Challenges of AI in Drug Development**

- **Data Quality ("Garbage in, garbage out")**
  - AI models are only as good as their training data.
  - Biases in data can produce unreliable outputs.
- **Transparency Issues**
  - Many AI models operate as "black boxes", lacking independent scrutiny.
  - Training datasets are not always accessible for evaluation.
- **Risk of Incorrect Predictions**
  - Incorrect risk assessments of adverse drug reactions can be life-threatening.

**Continuous monitoring is required to ensure AI models adapt accurately over time.**

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**Other use of AI in Healthcare: AI-Driven Genetic Testing**

- AI-driven genetic testing refers to the use of artificial intelligence algorithms to analyze vast amounts of genetic data more efficiently and accurately than traditional methods.
- These tests focus on identifying patterns and variations in DNA that may indicate a predisposition to certain diseases, traits or conditions.
- Benefits of AI-Driven Genetic Testing: Faster Processing, Improved Accuracy, Personalized Health Insights, Cost-Effective.

**Challenges of AI-Driven Genetic Testing**

- **Limited Predictive Power:** Genetic tests can predict predispositions but not certainties. AI can assist in identifying risks but cannot guarantee outcomes, as genetics contribute to only 30% of certain traits (like success in school or career).
- **Ethical Concerns:** AI-driven genetic tests can reveal unexpected results, such as predispositions to mental health conditions like depression, causing anxiety or confusion for the individual. These tests often require further family testing for clarity.
- **Complex Diagnoses:** AI can assess genetic risk, but it cannot provide definitive diagnoses. Conditions like Alzheimer's or mental health diseases depend on both genetics and environmental factors, complicating the interpretation of results.
- **Data Security Risks:** Storing and processing genetic data raises privacy and security concerns. A breach, like the one at 23andMe, can expose sensitive personal information. Many companies don't operate under the strict data protection regulations that apply to healthcare providers.

# TOPIC FOR PRELIMS

## Suzetrigine – A New Non-Opioid Painkille

*Syllabus Mapping: Development of Drugs*

### Context

The United States Food and Drug Administration (FDA) has approved suzetrigine, a non-opioid painkiller developed by Vertex Pharmaceuticals.

### What Are Opioids?

- Opioids are a class of drugs that are either derived from or mimic natural substances found in the opium poppy plant.
- Common Opioids Include: Oxycodone, Morphine, Codeine, Heroin & Fentanyl
- These drugs work by binding to opioid receptors in the brain, blocking pain signals and producing a sense of pleasure or euphoria.

- This euphoric effect makes opioids highly addictive, often leading to dependence and misuse
- Opioid Crisis in the U.S.:
  - 82,000 opioid-related overdose deaths in 2022 (US Centers for Disease Control and Prevention, CDC).
  - U.S. consumes 30 times more opioid medication than necessary (BBC report).
  - In 2017, President Donald Trump declared a public health emergency due to the opioid epidemic, calling it a "national shame".

### How Does Suzetrigine Work?

- Suzetrigine targets pain signals before they reach the brain, unlike opioids, which alter pain perception in the brain.
- It interrupts the pain pathway at the nerve level, preventing the brain from recognizing pain even when tissue damage exists.

## Difference Between Suzetrigine & Opioids

| Feature | Opioids | Suzetrigine |
|---|---|---|
| Action | Blocks pain signals in the brain | Interrupts pain signals before they reach the brain |
| Addiction Risks | High – Causes euphoria & pleasure | Low/None – Does not trigger pleasure |
| Side Effects | Addiction, overdose risk, respiratory issues | Expected to be safer, but high cost |

## India to build its own foundational AI chatbot

*Syllabus Mapping: Indigenization of Technology and AI*

### Context

The Union Minister for Electronics & Information Technology has announced that India is all set to launch its own safe & secure indigenous AI model at an affordable cost.

### Features of Indian AI model - Safe, Secure & Affordable

- Graphics Processing Units(GPUs) : It will be initially launched with 10,000 GPUs with plans to expand to 18,693 GPUs.

#### Graphic Processing Unit (GPU)

- It is a computer chip that rapidly calculates mathematical operations to display graphics and images.
- It is used in Creative content creation, video editing, high-performance computing (HPC), and artificial intelligence (AI).

- Cost effective: ₹100 per GPU hour (post 40% government subsidy) vs. global cost of $2.5–$3 per hour.
- Focus Sectors: Create scalable and impactful AI solutions across sectors such as healthcare, education, agriculture, climate, and governance

### IndiaAI Mission

- It is a government initiative to promote artificial intelligence (AI) innovation in India.
- Aim: To create a robust AI ecosystem in India by democratising access to computing resources, improving data quality and fostering industry partnerships.
- Focus areas: Healthcare, education, agriculture, smart cities and infrastructure.
- Implementing Agency: 'IndiaAI' Independent Business Division (IBD) under Digital India Corporation (DIC)
- Key initiatives:
  - IndiaAI Application Development Pillar: This initiative promotes AI solutions in critical sectors by developing, scaling and promoting AI applications.
  - IndiaAI FutureSkills: This initiative aims to break down barriers to AI education by offering fellowships to students in top engineering colleges.
- INDIAai Platform: This platform serves as a one-stop portal for AI-related development in India. It provides resources such as articles, news, interviews and investment funding news and events. It also offers AI courses, both free and paid.
- Lead agencies for the mission: NITI Aayog, the Department of Science and Technology (DST), the Ministry of Electronics and Information Technology (MeitY) and the Department of Biotechnology (DBT).

## Laws Against AI-Generated Sexual Abuse Images

*Syllabus Mapping: AI, its impact and governance*

### Context

Britain to introduce landmark laws against AI-generated sexual abuse images.

### More in News

- The law aims to combat the growing misuse of AI in creating and distributing child sexual abuse material.
- Britain will become the first country to introduce laws targeting AI-generated sexual abuse content.

### Key Provisions of the New Law

- Criminalization of AI Tools for Child Sexual Abuse Images: Illegal to possess, create, or distribute AI tools used to generate sexualized images of children.
- Ban on AI "Paedophile Manuals": Paodophile Manuals are guides that teach perpetrators how to use AI for child sexual abuse.
- Ban on AI Models Used for Child Abuse: AI models used for generating child abuse content will be banned.
- Criminalization of Websites Enabling Child Abuse: Targeting website operators who provide platforms for sharing child abuse content or grooming advice.

## Role of the SRY Gene

*Syllabus Mapping: Biotechnology*

### Context

Recent studies from Italy and the USA have reported rare cases of biological females carrying the SRY gene, challenging the traditional understanding of sex determination.

### What Determines the Sex of a Baby?

- Sex determination is the biological process that decides whether a baby develops as a male or female, influenced by genetic and hormonal factors.
- The sex of a baby is determined by the SRY (Sex-determining Region Y) gene, which is located on the Y chromosome.
- If an embryo has an SRY gene, it develops as a male.
- If the SRY gene is absent, the embryo follows the default female pathway.
- In rare cases, individuals with two X chromosomes (XX) can have the SRY gene and develop male characteristics.

### How Does the SRY Gene Work?

- Every human has 23 pairs of chromosomes.
- The first 22 pairs (1-22) are the same in males and females.
- The 23rd pair is the sex chromosomes:

- – Females (XX): Receive one X chromosome from the mother and one X from the father.
- – Males (XY): Receive an X chromosome from the mother and a Y chromosome from the father.
- Role of SRY in Male Development:
  - – The Y chromosome contains the SRY gene, which triggers the formation of testes.
  - – The testes produce testosterone, leading to the development of male sexual characteristics.
  - – If the SRY gene is non-functional (due to a mutation), an XY embryo develops ovaries instead of testes, becoming a biological female.

### SRY Gene in XX Individuals (Rare Cases)

- Rarely, a mutation can transfer the SRY gene from the Y chromosome to the X chromosome. This process is called translocation.
- If a sperm carrying an SRY-positive X chromosome fertilizes an egg, an XX baby is born with the SRY gene.
- What Happens to XX Individuals with the SRY Gene?
  - – **Most cases:** They develop as males because the SRY gene triggers testis formation. However, these males are sterile since other Y chromosome genes required for sperm production are missing.
  - – **Rare cases:** Some XX individuals with the SRY gene develop as biological females.

## Bombay Blood Group

*Syllabus Mapping: Biotechnology*

### Context

Recently doctors at MIOT International, Chennai, successfully performed a cross-blood kidney transplant on a 30-year-old male with the rare Bombay blood group (HH blood group).

### About Bombay Blood Group

- It is a rare blood group, 1st discovered in Mumbai in 1952 by Y.M. Bhende.
- Prevalence:
  - – 1 in 4 million globally (~0.0004%).
  - – 1 in 1 million in Europe.
  - – 1 in 10,000 in Mumbai.

### Why Is the Bombay Blood Group Unique?

- Normal individuals have the H antigen, which forms the base for A and B blood antigens.
- Bombay blood group individuals lack the H antigen due to a gene mutation, preventing the formation of A or B antigens.
- As a result, they cannot receive blood from any ABO blood group, including O group, which contains the H antigen.
- Only another Bombay blood group donor can provide a compatible transfusion or organ.

## IIT Madras develops indigenous Shakti semiconductor chip

*Syllabus Mapping: Information Technology and Indigenization of Technology*

### Context

India's first indigenous aerospace-grade semiconductor chip, 'Shakti', has been developed by IIT Madras and ISRO.

### About SHAKTI Semi-Conductor Chips

- Shakti is an indigenous microprocessor based on the RISC-V open-source Instruction Set Architecture (ISA).

- It is designed for high security, reliability and self-reliance in microprocessor technology.

- Developed by: IIT Madras in collaboration with ISRO, supported by the Ministry of Electronics and Information Technology (MeitY) under the Digital India RISC-V (DIRV) initiative.
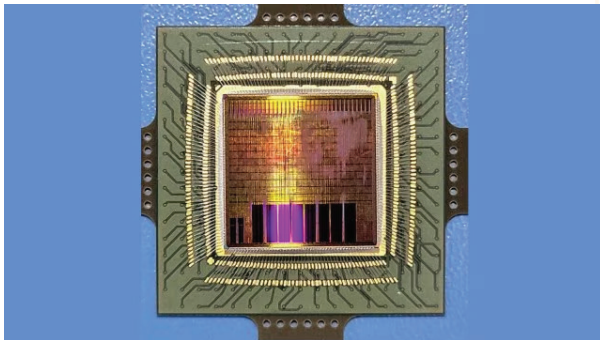


### Key Features of the IRIS Chip

- Designed for space missions: Supports ISRO's command and control systems and other critical functions.

- Fault-tolerant and highly reliable: Can withstand harsh space conditions.

- Custom-built modules: Includes WATCHDOG timers and advanced serial buses.

- Multiple boot modes: Enables expansion for future space missions.

- Hybrid memory extensions: Allows flexibility in storage and processing capabilities.

- Fully made in India.

## Detection of High-Energy Cosmic Neutrinos

*Syllabus Mapping: Space Technology*

### Context

Scientists detected a high-energy cosmic neutrino deep beneath the Mediterranean Sea near Sicily using an advanced observatory under construction.



### About Neutrino's

- Neutrinos are a type of subatomic particle.

- They don't have an electric charge. They have a small mass and are left-handed
    - Left-Handed: A physics term meaning the direction of its spin is opposite to the direction of its motion

- They are the second-most abundant particles after photons (particles of light) and the most abundant among particles that make up matter.

- They are produced in high-energy processes such as within stars and in supernovae.

- On earth, they are produced by particle accelerators and nuclear power plants

- They are very hard to detect as they hardly interact with other forms of matter due to their lack of electrical charge.

### Why is this Discovery Important?

- Unlocking Extreme Cosmic Events: Cosmic neutrinos help scientists study distant and violent events like black hole activity and supernovae.

- A New Window into the Universe: Unlike light, which can be scattered or absorbed by cosmic dust and gas, neutrinos travel undisturbed from their sources. This provides a direct and clear look at extreme cosmic events.

- Understanding the Early Universe: Neutrinos carry valuable information from the Big Bang, helping scientists understand the universe's origins.

**Neutrino observatories around world**

- **IceCube:** Located at the South Pole, this is the largest neutrino telescope in operation. It's buried 2,500 metres underground and has a surface array called IceTop and an inner sub detector called DeepCore.
- **Super-Kamiokande:** Located in Kamioka, Japan, this observatory uses 50,000 tons of pure water surrounded by 11,200 light detectors.
- **Gran Sasso National Laboratories (LNGS):** Located in the Gran Sasso mountains in Italy.
- **Underground Neutrino Observatory:** Located in Mont Blanc, France / Italy.
- **Deep Underground Neutrino Experiment (DUNE):** Located in South Dakota, USA.



## National Broadband Mission 2.0

*Syllabus Mapping: Digital India and IT*

### Context

Recently the Union Govt. has introduced National Broadband Mission 2.0 to enhance broadband connectivity, particularly in rural and remote areas.

### About National Broadband Mission (NBM) 2.0

- NBM 2.0 aims to address broadband connectivity challenges in rural, remote and difficult terrain regions through several targeted initiatives:
  - **Promoting Satellite Broadband:** Encourages the use of satellite technology to provide high-speed internet in remote areas where fiber networks are difficult to deploy.
  - **Utilizing Power Sector Infrastructure for Connectivity:** Coordination with the Ministry of Power to use Optical Ground Wire (OPGW) for broadband expansion.

### Key Objectives of NBM 2.0:

- **Expansion of Broadband Access:**
  - Village Connectivity: Aim to connect the remaining 1.7 lakh (170,000) villages, focusing on remote and economically underserved regions.
  - Optical Fiber Coverage: Expand Optical Fiber Cable (OFC) connectivity to 2.7 lakh (270,000) villages by 2030.
- **Enhancement of Internet Speed:**
  - Achieve a minimum fixed broadband download speed of 100 Mbps nationwide, a significant increase from the current average of 63.55 Mbps.
- **Affordability and Inclusivity:**
  - Provide affordable broadband services to bridge the socio-economic divide, ensuring that digital resources are accessible to all citizens.
- **Institutional Connectivity:**
  - Ensure that 90% of anchor institutions, such as schools, primary healthcare centers, and Anganwadi centers, have broadband access by 2030.

## How did a DDoS attack cripple Kaveri 2.0?

*Syllabus Mapping: Cyber Security*

### Context

Recently Karnataka's web-based portal Kaveri 2.0, which is used for property registrations, faced crippling server outages due to a Distributed Denial of Service (DDoS) attack.

#### About Distributed Denial-of-Service (DDoS) Attack

- DDoS attack is a malicious attempt to disrupt a targeted server, service, or network by flooding it with internet traffic.
- Unlike a DoS (Denial of Service) attack, which comes from a single source, a DDoS attack uses multiple compromised systems (botnets).
- While DDoS attacks do not steal data, they can be used as a distraction while other cyberattacks (such as data breaches) take place.
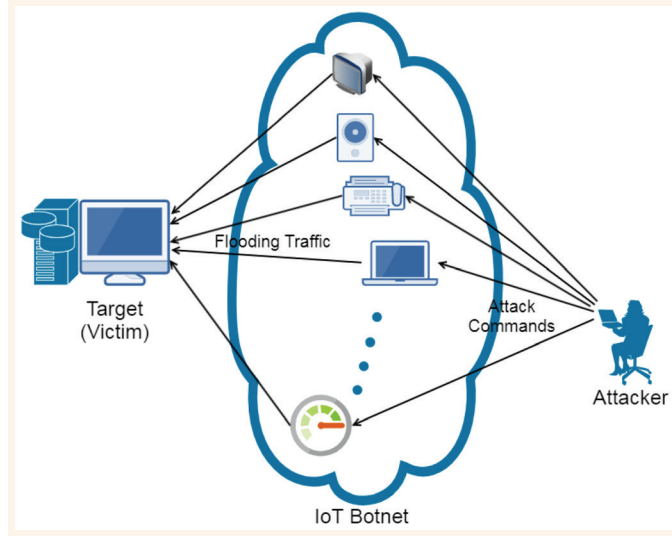


### How Can DDoS Attacks Be Prevented?

- **Traffic Filtering Mechanisms:** To differentiate between legitimate and malicious traffic.
- **Monitoring Tools:** To identify unusual traffic patterns in real time.
- **Rate Limiting:** Restricts the number of requests per user within a given time.
- **Bot Detection:** Using CAPTCHA challenges and behavioral analysis to block automated bots.
- **Regular Security Audits:** Strengthening system security against vulnerabilities.
- **Collaboration with Cybersecurity Agencies:** Sharing threat intelligence to prevent future attacks.
- **Cyber Awareness Training:** Educating users to avoid phishing and social engineering attacks that may lead to compromised accounts.

## TrailGuard AI

*Syllabus Mapping: Use of AI and New Development*

### Context

Similipal Tiger Reserve in Odisha has implemented an AI-powered anti-poaching surveillance system called TrailGuard AI.

### About TrailerGuard AI

- It is an AI-powered surveillance system designed to combat poaching and illegal wildlife trade by providing real-time monitoring in protected forests.
- It is designed by Nightjar Technologies.
- It is currently deployed in 5 states across 14 locations, including Kanha Tiger Reserve (Madhya Pradesh) and Dudhwa National Park (Uttar Pradesh).
- Key Features of TrailGuard AI:
  - Compact and Durable Design: Unique two-part design:
    - Camera unit (size of a pen) & Battery/communication unit (size of a notepad).
    - This spread-out design makes it less noticeable and harder to steal.
  - Long Battery Life: Operates for 6 months to 1 year without needing a battery replacement.
  - Affordable Cost: Costs ₹50,000-₹53,000 per unit, making it cheaper than other live transmission technologies.



### Working Mechanism of TrailGuard

- **Motion Detection:** AI-powered cameras stay in low-power mode and activate upon detecting movement.

- **Object Recognition:** An integrated AI chip processes the image and classifies it as an 'animal,' 'human,' or 'vehicle.'
- **Real-Time Alerts:** If a potential threat is identified, the camera transmits the image to a control room within 40 seconds.
- **Swift Communication:** Officials quickly relay information through WhatsApp and Very High Frequency (VHF) radio to deploy forest rangers.
- **Poacher Identification & Action:** Intelligence teams analyze images, confirm identities, conduct house raids and proceed with legal action.

## Discovery of Ovoid Cells and Their Role in Memory
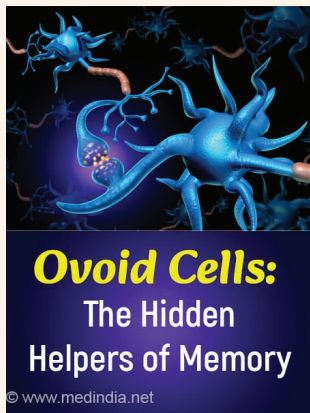
*Syllabus Mapping: Biotechnology*

### Context

Researchers have identified a new type of neuron responsible for recognition memory, the brain's ability to distinguish between new and familiar objects and form long-term memories.

### Significance of Study

- The discovery offers new insights into memory formation and could help treat brain disorders affecting object recognition, such as:
  - Alzheimer's disease.
  - Autism Spectrum Disorder (ASD).
  - Epilepsy.

#### About Ovoid Cells

- Ovoid cells are named for their distinct egg-like shape.
- They exist in relatively small numbers in the hippocampus of various mammals, including humans and mice.
- Ovoid cells become active when an individual encounters an unfamiliar object. This activation initiates the process of encoding and storing the object's details in memory, enabling recognition even after an extended period.
  - Object recognition memory is essential for daily functioning and survival, influencing behavior and decision-making.



*Ovoid Cells:*
The Hidden
Helpers of Memory
© www.medindia.net

- These neurons exhibit unique gene expression profiles and neural circuitry, setting them apart from other hippocampal neurons.

## Ban on Export of Tapentadol-Carisoprodol Drug Combinations

*Syllabus Mapping: Biotechnology and Drugs*

### Context

Recently the Health Ministry has banned Export of Tapentadol-Carisoprodol Drug Combinations.

### About

- Tapentadol:
  - It is an Opioid analgesic.
  - It is used to treat moderate to severe pain, including post-surgical pain, neuropathic pain etc.
  - Side effects: Risk of addiction and dependence (classified as a Schedule H1 prescription drug in India, requiring a doctor's prescription).
- Carisoprodol:
  - It is a muscle relaxant.
  - It is used to treat muscle spasms and pain due to injuries, sprains or musculoskeletal disorders.
  - Acts on the central nervous system (CNS) to block pain sensations between nerves and the brain.
- Tapentadol-Carisoprodol Combination: Not Approved in India
  - Both Tapentadol and Carisoprodol are individually approved by the Central Drugs Standard Control Organisation (CDSCO).
  - Risks:
    - Highly addictive due to their combined opioid + sedative effects.
    - Can cause severe respiratory depression, sedation, overdose risks.
    - Misused as a recreational drug in some regions.

## Bharat Tech Triumph Initiative

*Syllabus Mapping: Scientific Programme*

### Context

The Bharat Tech Triumph Program (TTP) was launched as part of the Create in India Challenge Season 1 to highlight India's gaming talent on a global stage.

### About Bharat Tech Triumph Initiative

- It was organized by the Interactive Entertainment and Innovation Council (IEIC) and was supported by the Ministry of Information and Broadcasting (MIB).

**Objective:**

• Identify and showcase India's gaming talent on the international stage.

• Promote homegrown innovations in gaming, esports, and tech solutions.

**Who Can Participate:**

• Open to developers, studios, startups, and tech companies in the gaming ecosystem.

• Includes individuals and organizations in game development, esports, and business solutions.

• Evaluation Criteria:

• Assesses product innovation, market potential, team strength, and pitch quality.

• Focuses on the scalability and impact of the technology.

• Winners will be fully sponsored to showcase their products at GDC 2025 in San Francisco.

• They will also present at WAVES in India, expanding their reach and networking opportunities.

**Benefits:**

• Provides access to global funding, mentorship, and export opportunities.

• Strengthens India's position as a global leader in gaming and tech innovation.

• Encourages intellectual property (IP) creation and economic growth in the sector.

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**Create in India Challenge**

• Launched by the Union Minister of Information and Broadcasting as part of WAVES 2024 in Goa.

• It hosts 25 Competitions spanning animation, filmmaking, gaming, music, and visual arts, organized by industry associations. With an Aim to boost India's cultural heritage (yoga, traditional medicine, cuisine) and generate 2-3 lakh jobs in media and entertainment.

• **National Creators Award:** Honors contributions in storytelling, social change, sustainability, education, and gaming.

• **Vision:** Aligns with PM's 'Design in India, Design for the World,' focusing on skill development and infrastructure.

• **WAVES:** A key platform for industry leaders to shape the future of media and entertainment as well as promote creators' economy.

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## Paraquat

*Syllabus Mapping: Biotechnology and its Impact*

### Context

Recently, a 24-year old woman was awarded death sentence by a Thiruvananthapuram court which found her guilty of poisoning her boyfriend with a chemical herbicide called paraquat.

### About Paraquate

• Paraquat, also known as paraquat dichloride or methyl viologen, is one of the world's most widely used herbicides.

• Primary Use: It is used to control weeds and desiccate crops like cotton before harvest.

• Hazard Classification: The WHO classifies paraquat as Category 2 (moderately hazardous and irritating) chemical.

• Global Ban: Paraquat is banned in over 70 countries, including China and the European Union, due to its high toxicity.

• **Routes of Exposure:**

  – **Ingestion:** Accidental swallowing.

  – **Skin Contact:** Prolonged skin contact.

  – Inhalation

• **Treatment for Paraquat Poisoning:**

  – There are no known specific antidotes for paraquat poisoning.

  – **Immediate Actions:** The CDC recommends swallowing activated charcoal or Fuller's earth (multani mitti) to absorb the chemical.

  – **Immunosuppression or charcoal haemoperfusion** - potential hospital treatment

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## How Stove Lighters Create Electric Sparks

*Syllabus Mapping: Use of Technology, Material Science*

### Context

How stove lighters by generating small sparks, ignites gas stoves, making cooking both easy and efficient.



### What is an Electric Spark?

• A spark is an electric charge flying between two points, where one has a surplus of electrons (negative charge) and the other has a deficiency (positive charge).

• Why it happens:

  – Electrons naturally try to balance themselves between two points of differing charges.

  – If the gap is too wide, electrons can travel through the air by ionizing molecules and creating a conductive path.

  – This creates the visible spark.

## Role of Piezoelectric Materials in Stove Lighters

- Piezoelectric materials are those materials which generate a surplus and deficiency of electrons when pressure is applied.

- Structure: Atoms in piezoelectric materials are arranged in a periodic pattern with two types of ions:
  - Positive ions (deficient in electrons).
  - Negative ions (surplus of electrons).

- Behavior under pressure: Pressure shifts the ions, creating a negative charge at one end and a positive charge at the other. This makes the material behave like a battery.

- How Stove Lighters Use Piezoelectricity:
  - The lighter contains piezoelectric material.
  - When pressure is applied by clicking the lighter:
    - A large charge difference is created, allowing electrons to fly through the air.
    - This creates the visible spark.
    - This spark ignites cooking gas, producing the flame.

**Everyday Example: Lightning**

- How it works:
  - Clouds accumulate charge as they move and collide.
  - When the charge becomes too intense, it breaks out as lightning, creating a pathway through the air for electrons to flow.
  - The spark (lightning) is followed by thunder (sound).

## Leprosy

*Syllabus Mapping: Disease*

### Context

The Union Health Ministry is shifting towards a targeted approach to controlling leprosy in India after achieving the elimination status as a public health problem at the national level in 2005.

### About Leprosy

- **Affected Areas:** Leprosy impacts the skin, peripheral nerves, mucosa of the upper respiratory tract, and eyes.

- **Transmission:** Spread through droplets from the nose and mouth, typically via close contact with untreated individuals.

- **Treatment:** Leprosy is curable with multidrug therapy (MDT).

- **Types of Leprosy:**
  - **Pauci-Bacillary (PB):** Fewer bacteria are visible, and no advanced disease signs are observed in biopsies.
  - **Multibacillary (MB):** Bacteria are visible, and biopsies may show signs of advanced disease.

### Leprosy cases in India

- India achieved leprosy elimination as a public health problem in 2005, as per WHO criteria (less than 1 case per 10,000 people).

- However, some states and districts still report high prevalence rates, requiring focused interventions.

- High-Prevalence States: Bihar, Chattisgarh, Jharkhand, Maharashtra & Odisha.

### Recent Initiatives:

- **National Strategic Plan (NSP) & Roadmap for Leprosy (2023-27):** Aims to achieve zero transmission by 2027.

- **National Leprosy Eradication Programme (NLEP):** A centrally sponsored scheme under the National Health Mission.

- **Nikusth 2.0 Portal:** An integrated platform for managing leprosy cases.

## Japan Successfully Launches Michibiki 6 Satellite on H3 Rocket

*Syllabus Mapping: Space Technology*

### Context

Japan's space agency (JAXA) has successfully launched a navigation satellite on its new **H3 rocket.** It is a flagship rocket of JAXA for heavier payloads like satellites and interplanetary missions.

### Japan's Quasi-Zenith Satellite System (QZSS)

- QZSS is a Japanese satellite system that provides positioning and communication services

- Japan currently operates a **four-satellite QZSS,** launched in 2018

- Michibiki 6's is the fifth satellite in the QZSS network

- **Primary Purpose:**
  - Supplement American GPS for improved location accuracy
  - Enhance positioning data for smartphones, car navigation, maritime navigation and drones.

## Extremely Large Telescope

*Syllabus Mapping: Space Technology*

### Context

60% Construction of the Extremely Large Telescope is completed. It is expected to make its **first scientific observations by the end of 2028**.

### About Extremely Large Telescope (ELT)

- **ELT** is an advanced ground-based astronomical observatory under construction in **northern Chile**.
- It is designed to be the **largest optical and infrared telescope in the world**, enabling deep-space exploration.
- **Project Cost**: **$1.51 billion**, funded by the **European Southern Observatory (ESO)**.
- It will be the **largest optical-infrared facility** for several decades.
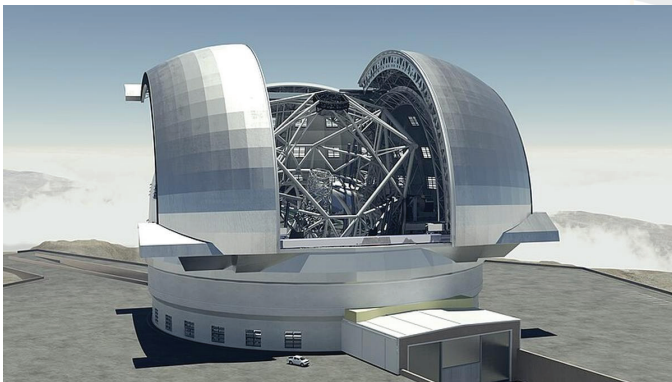
### Scientific Objectives of ELT

- **Exoplanet Exploration:**
  - Direct imaging of **Earth-like exoplanets** in habitable zones.
  - Analysis of **exoplanet atmospheres** to detect signs of **life (biosignatures)** like oxygen, water vapor and methane.
- **Understanding the Early Universe:**
  - Observing **the first stars and galaxies** formed after the Big Bang.
  - Investigating **dark matter and dark energy**, which drive cosmic expansion.
- **Detailed Study of Stars & Galaxies:**
  - Identifying **individual stars** in distant galaxies.
- **Black Holes & Cosmic Structures:**
  - Examining **supermassive black holes** at the centers of galaxies.
  - Understanding **galaxy formation and evolution** over billions of years.

### Reason behind location at Chile's Atacama Desert

- **Dry Climate:** Minimal cloud cover and humidity for clear observations.
- **High Altitude**: At **3,046 meters above sea level** (Armazones Hill), reducing atmospheric interference.
- **Minimal Light Pollution**: Remote location ensures **dark skies** optimal for deep-space imaging.

## Effects of Space Travel on Human Health

*Syllabus Mapping: Space Technology*

### Context

Space travel presents **major health risks**, including radiation exposure, microgravity effects and psychological stress.

### Challenges Faced by the Human Body in Space

- **Microgravity Effects:**
  - **Fluid Shift:** Bodily fluids move upward due to the absence of gravity, increasing intracranial pressure and affecting vision.
  - **Bone and Muscle Atrophy:** Lack of mechanical loading results in **bone density loss** and **muscle atrophy**.
  - **Cardiovascular Changes:** The heart and blood vessels struggle to regulate blood pressure upon return to Earth.
  - **Balance and Coordination Issues:** The inner ear, responsible for sensing movement and orientation, is affected, leading to balance problems.
- **Radiation Exposure:**
  - Earth's **atmosphere and magnetic field** protect humans from space radiation, but astronauts are vulnerable to high-energy cosmic radiation.
  - **Risks of Space Radiation:**
    - **DNA damage**, leading to an increased **cancer risk**.
    - **Neurodegenerative effects** that could contribute to cognitive decline.
    - **Immune system dysregulation**, potentially weakening the body's defense mechanisms.
- **Psychological and Sleep Challenges:**
  - **Isolation and Confinement:** Astronauts live in **small, enclosed spaces** with **limited social interaction** and exposure to natural stimuli.
  - **Psychological Stress:** Prolonged isolation can lead to **stress, mood disorders, and sleep disturbances**.
- **Variability in Exposure:**
  - **Low-Earth Orbit (LEO) missions** (e.g., aboard the ISS) experience some shielding from Earth's magnetosphere.
  - **Deep-space missions** (e.g., to the Moon or beyond) expose astronauts to much **higher radiation doses.**

## NASA's Bennu Asteroid Sample: Evidence of Life's Building Blocks

*Syllabus Mapping: Space Technology*

### Context

A recent study on rock and dust samples retrieved from the asteroid **Bennu** provides **strong evidence** that space rocks may have played a crucial role in **seeding early Earth** with the fundamental **chemical ingredients for life**.

**Key Findings from Bennu Samples**

- **Building Blocks of Life Found:** Scientists discovered **14 amino acids** (used to make proteins) and **all 5 nucleobases** (genetic material in DNA & RNA).
  - These are essential for life but **not actual life**—just ingredients that could help life form.
- **Water and Salty Minerals Present:** Bennu's parent body had **water** in the past.
  - Brine (salty water) evaporated, leaving behind minerals— suggesting a **wet environment** suitable for chemical reactions.
- **Supports the "Life from Space" Theory:** Asteroids like Bennu may have **brought essential molecules to early Earth**, helping life start.
  - Similar processes **might have happened on other planets** too.
- **No Earth Contamination:** Unlike meteorites, Bennu's samples were collected **directly from space** and remained untouched by Earth's environment.
  - This confirms that the organic materials truly came from **space**.

**About Bennu**

- **Bennu** is a near-Earth asteroid that **formed 4.5 billion years ago** from remnants of a larger celestial body.
- It is a **"rubble pile" asteroid**, meaning it is a loosely bound collection of rocky debris rather than a solid object.
- **Bennu's parent body** was an **icy celestial object**, estimated to be **100 km (60 miles) in diameter**, which was destroyed **1-2 billion years ago**.
- **OSIRIS-REx Mission was launched to collect the sample form Benu**

**About NASA's OSIRIS-REx Mission**

- It was launched in 2016 to study Bennu and collect samples.
- **In 2020, OSIRIS-REx successfully collected rock and dust from Bennu's surface.**
- The **samples were brought back to Earth in September 2023**, landing in the **Utah desert** via a **parachute-equipped capsule**.
- These samples are the **first pristine asteroid samples collected directly from space**, eliminating concerns about **Earthly contamination**, unlike meteorite samples.



# NEWS IN SHORT

### Microsoft Unveils New Quantum Chip: Majorana 1

- Microsoft has announced a breakthrough in quantum computing with the unveiling of a new chip, Majorana 1.

**Quantum Computing**

- Quantum Computing: Quantum computing aims to perform calculations that would take classical computers millions of years.
  - It has applications across various fields, including:
° Medicine – Drug discovery and protein folding simulations.
° Chemistry – Complex molecular simulations.
° Aerospace – Enhancing simulations for advanced materials and fuel efficiency.
- **Challenges in Quantum Computing:** The fundamental unit of quantum computing is the qubit (quantum bit).
  - Problem with existing qubits:
° They are extremely fast but difficult to control.
° They are prone to errors, which limits their reliability.

**What Makes Majorana 1 Different?**

  - The chip is built using a new material composed of indium arsenide and aluminum.
  - It uses the first-ever topoconductor ( (topological superconductor).
  - A topoconductor is a special category of material that can create an entirely new state of matter – not a solid, liquid or gas but a topological state.

- Majorana 1 relies on a subatomic particle called the Majorana fermion.
  – The Majorana fermion was first theorized by Italian physicist Ettore Majorana in 1937.
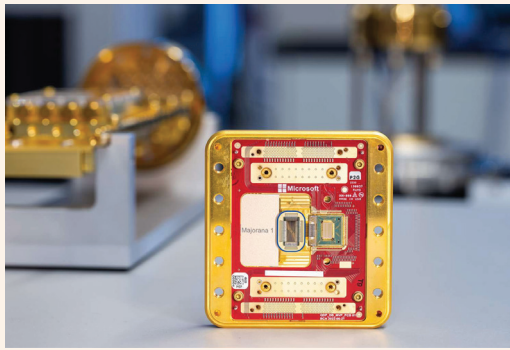


## Sudan Virus

- Recently, the Ugandan Government and the WHO confirmed an outbreak of Sudan virus disease.

**About Sudan Virus**

- It is a highly infectious pathogen from the Filoviridae family, closely related to the Ebola virus (EBOV).
- It causes Sudan virus disease (SVD), a severe hemorrhagic fever with a high fatality rate.
- It was first identified in 1976 in southern Sudan (now South Sudan).
- **Transmission:**
  – Animal to Human: Likely from fruit bats, though exact reservoirs are unclear.
  – Human to Human: Direct contact with bodily fluids (blood, vomit, saliva, sweat, urine, feces)., contaminated surfaces or objects etc.
- **Treatment:** Currently, there are no approved vaccines or antiviral treatments for Sudan Virus Disease (SVD).

## AI Diffusion Framework

- U.S. AI Diffusion Framework is a policy initiative introduced by the Biden-Harris administration in its final week in office.
- The framework aims to:
  – Maintain U.S. dominance in AI technology and its global supply chain.
  – Restrict access to advanced AI capabilities for adversaries like China, Russia, North Korea, and Iran.
  – Control the spread of AI innovations by regulating AI chips, chip-making tools, and AI model weights.
  – Ensure that future breakthroughs in AI occur only in the U.S. or trusted allies

**Country Classification System (Three Tiers of Access)**

- The framework divides countries into three tiers, determining their level of access to AI technology:
- Tier -1: Key U.S. allies (e.g., UK, Japan) - Full Access to AI technology without restrictions.
- Tier-2: Strategic partners and the rest of the world (e.g., India, Israel) - Limited access, with restrictions on compute capacity and AI models.
- Tier-3: U.S. adversaries (China, Russia, North Korea, Iran) - No access to advanced AI technology, strictest export controls apply.

## Technology Adoption Fund

- The Technology Adoption Fund (TAF) is an initiative launched by the Indian National Space Promotion and Authorization Centre (IN-SPACe) to support and accelerate the development of India's space technology sector.
- The fund is designed to assist startups, MSMEs, and larger industries in transforming their early-stage space technologies into commercially viable products.
- **Key Objectives of TAF**
  – Encourage domestic innovation in space technology.
  – Reduce India's reliance on imported space solutions.
  – Foster collaboration between government bodies and private players.
  – Enable the commercialization of cutting-edge space technologies.
- **Funding Structure**
  – Startups and MSMEs: Up to 60% of project cost covered.
  – Larger industries: Up to 40% of project cost covered.
  – Maximum funding per project: Rs 25 crore.

- **Benefits of TAF**
  - Bridges the gap between innovation and market-ready solutions.
  - Helps companies refine their technologies and production processes.
  - Positions India as a global leader in space technology.
  - Promotes the creation of intellectual property (IP) for future R&D.

## Project Waterworth

Meta has announced Project Waterworth which is its most ambitious subsea cable project.

- Aim: The project aims to enhance global internet connectivity using AI and machine learning.
- Focus: It will focus on better cable deployment and maintenance for a more reliable internet.
- It will be the world's longest and highest-capacity subsea cable. AI and machine learning will help predict and prevent disruptions.
- The cable will cover 50,000 km across five continents.



**Benefits of Project Waterworth:**
  - It will improve global digital infrastructure for faster and more reliable internet.
  - It will strengthen international digital communication across continents.
  - It helps to support AI innovation and high-speed digital services.
  - It will boost economic growth and digital inclusion in connected regions.

## Brucellosis

- Brucellosis is a bacterial infection caused by various Brucella species.
- It primarily affects livestock, including cattle, swine, goats, sheep, and dogs.
- Humans get infected through direct contact with infected animals, consuming contaminated animal products, or inhaling airborne bacteria.
- The most common transmission occurs via unpasteurised milk or cheese from infected animals.
- Human-to-human transmission is extremely rare.
- **Symptoms of Brucellosis**
  - Common symptoms include: Fever, Weakness, Weight loss and General discomfort or malaise Symptoms can be mild and often go undiagnosed.
  - The incubation period ranges from one week to two months, but typically lasts two to four weeks.
  - People working with animals are at higher risk, including: Farmers, Butchers, Hunters, Veterinarians and Laboratory personnel.
  - Exposure to infected blood, placenta, foetuses, and uterine secretions increases the likelihood of infection.
- **Prevention Measures**
  - Vaccination of Livestock – Immunising cattle, goats, and sheep reduces the spread.
  - Pasteurisation of Milk – Essential for direct consumption and dairy product manufacturing.
  - Public Awareness – Educational campaigns to discourage the consumption of unpasteurized dairy products.
  - Regulations on Dairy Sales – Policies ensuring milk and dairy products are pasteurized before sale.

## Gastroparesis

• Unsupervised use and overdose cases of weight loss drugs are leading to Gastroparesis.

**About Gastroparesis**

• Gastroparesis is a medical condition where the stomach muscles are partially paralyzed, leading to delayed gastric emptying.

• This means food remains in the stomach for longer than normal, causing digestive problems without any physical blockage.

• Gastroparesis occurs due to damage to the vagus nerve, which controls stomach muscles.

• **Causes:**

– Medical Conditions: Diabetes (Most Common Cause), Neurological Disorders & Connective Tissue Disorders etc.

– Medical Treatments: Weight Loss Drugs (Semaglutide, Tirzepatide), Opioids & Antidepressants etc.

## Black Plastic

• It is often made from recycled electronic waste, such as old computers, TVs, and appliances.

• These electronics contain substances like:

– Flame retardants (e.g., bromine-based compounds like BDE-209) – Used to prevent fire hazards.

– Heavy metals (e.g., lead, cadmium, mercury, and antimony) – Known to be toxic at high exposure levels.

• Many of these chemicals are now banned in various countries, but older plastics may still contain them.

## GARBHINI-DRISHTI

• It is a data dashboard that provides a comprehensive overview with focus on maternal and neonatal health outcomes.

• It offers access to clinical data, medical images and biospecimens.

• It is One of South Asia's largest maternal health databases. It Includes data from over 12,000 pregnant women, newborns and postpartum mothers.

• This platform developed under the GARBH-INi program.

– It is a flagship programme supported by the Department of Biotechnology (DBT).

– Aim: To reduce adverse pregnancy outcomes.

## Fentanyl

• Recently, the US President said his administration was discussing a 10% punitive duty on Chinese imports as fentanyl is being sent from China to the US via Mexico and Canada.

**About Fentanyl**

• Fentanyl is a potent synthetic opioid used as an analgesic (pain reliever) and anesthetic.

• It is 100 times stronger than morphine and 50 times more potent than heroin.

• **Health Risks:**

– Overdoses can cause: Pupil size changes, Cyanosis (blue skin due to lack of oxygen), Respiratory failure leading to death etc.

• **Other Opioids:** Oxycodone, morphine, codeine, heroin etc. They cause euphoria and pain relief but are highly addictive.

• Highly Addictive Nature:

– Opioids provide instant relief, but the effect wears off quickly, leading to frequent use and addiction.

– Many people start with prescription opioids and later move to stronger illicit drugs like fentanyl.

## Inherited Retinal Diseases (IRDs)

- IRDs are a group of genetic conditions that can cause vision loss or blindness.
- They are caused by mutations in genes that control the function of the retina.
- Retinal diseases are disorders that affect the retina.
- Prevalence of IRDs:
  - Global cases: Estimated 5.5 million people, with a prevalence rate of 1 in 3,450.
  - India (High prevalence): 1 in 372 in rural South India & 1 in 930 in urban South India.

## Retina

- It is a light-sensitive layer of tissue at the back of the eye that converts images into electrical signals that the brain can process.
- How it works:
  - Light passes through the eye's lens and focuses on the retina.
  - Photoreceptor cells in the retina convert light into coded signals.
  - The retina sends these signals along the optic nerve to the brain.
  - The brain decodes the signals and interprets them as vision.
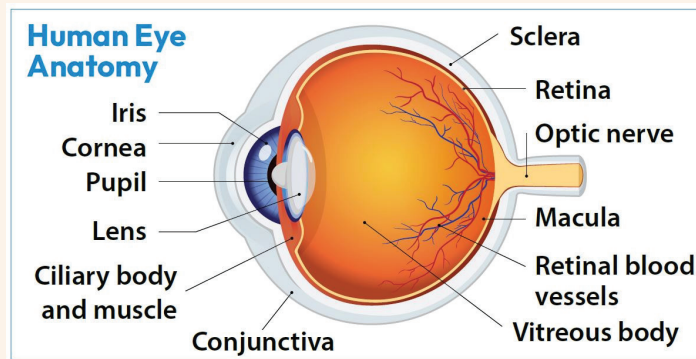


## Guillain-Barré Syndrome (GBS)

- GBS is a rare neurological disorder that occurs when the body's immune system attacks the peripheral nervous system.
- This can cause muscle weakness, tingling and sometimes paralysis.
- **Cause:** The exact cause of GBS is unknown but it is often preceded by an infection. This could be a bacterial or viral infection. This leads the immune system to attack the body itself.
  - In rare cases, it can be caused by a vaccination.
- **Treatment:** GBS treatment involves procedures like plasmapheresis, which removes plasma and replaces it with other fluids.

**Newly Discovered Asteroid 2024 YR4**

- YR4 was first detected in December 2023 by a Chilean telescope.
- It measures between 40 to 100 meters in diameter—comparable to a football field.
- Astronomers are using **powerful telescopes** to measure its **exact size and trajectory** before it fades from view in **mid-April 2024**.
  - It will not be visible again until **2028**.
- **Impact Potential (Torino Scale):**
  - The **Torino Scale** categorizes the risk of asteroid impacts (scale **0 to 10**).
  - NASA has rated **2024 YR4 as a 3** (moderate risk).

**How Often Do Asteroids Crash into Earth?**

- **Small asteroids:**
  - Thousands **enter Earth's atmosphere daily**.
  - Most **burn up due to friction**, sometimes appearing as **fireballs**.
- **Larger asteroids:**
  - Those **over 1 km in diameter** strike Earth approximately **every 260 million years**.
  - The **Solar System's vastness** makes direct asteroid impacts rare.
  - **Small asteroids (~40m)** could **devastate an entire city**, depending on **entry speed and angle**.

**Gaia BH3**

- Gaia BH3 is the **third black hole** discovered by the **European Space Agency's Gaia telescope**.
- It is **the largest stellar-mass black hole** in the Milky Way galaxy.
- It is located in the **constellation Aquila**, approximately **2,000 light years away** from Earth.



| Gaia BH1 | Cygnus X-1 | Gaia BH3 |
| 10 solar masses | 21 solar masses | 33 solar masses |
| ~1500 light-years away | ~7000 light-years away | ~2000 light-years away |

**Difference between Stellar black hole & Supermassive black hole**

- **Stellar-mass black holes originate from the gravitational collapse of a single star or the combination of two neutron stars.**
  - These black holes generally have mass that range from approximately **three to fifty times that of the sun.**
- **Supermassive black holes** are **immensely larger,** with masses starting at around 50,000 times the mass of the sun and can reach up to millions or even billions of times greater.
  - Supermassive black holes are **always found at the center of a galaxy** and almost all galaxies have a supermassive black hole at its center.
  - **However, scientists do not currently know how supermassive black holes form**.

### Kodaikanal Solar Observatory - 125 years of solar physics research in India

- The conference on 'Sun, Space Weather and Solar-Stellar Connections' was organised by the Indian Institute of Astrophysics (IIA) to commemorate the **125th anniversary of the Kodaikanal Solar Observatory.**
- It was established in **1899 and** is operated by the **Indian Institute of Astrophysics.**
- It is located in **Kodaikanal, Palani hills (Tamil Nadu).**
- It was set up to obtain more data on how the sun heats up Earth's atmosphere and to understand monsoon patterns.
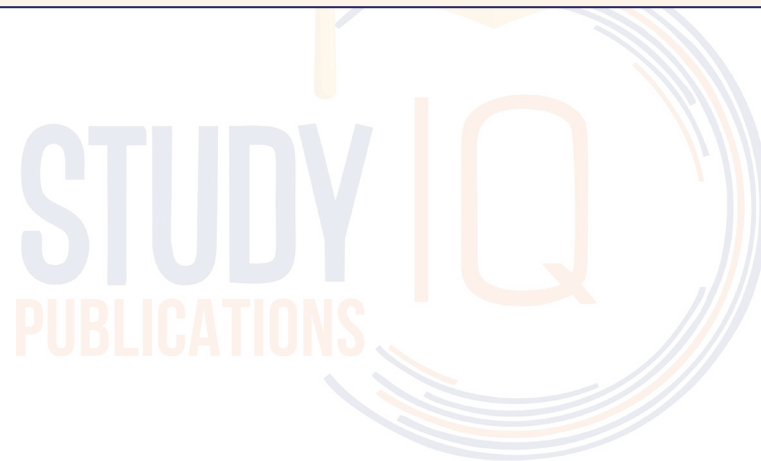
# HISTORY, ART & CULTURE

## TOPICS FOR PRELIMS

### Fort William

#### Context

Army's Fort William in Kolkata has been renamed "Vijay Durg" as part of the Indian government's efforts to shed colonial legacies and promote indigenous traditions.

#### About Fort William

- Named after **King William III of England**, it was **built by the British in 1781**.
- Located in **Kolkata**, it serves as the **Eastern Command Headquarters of the Indian Army**.
- Played a **key role during the British colonial period**, symbolizing their military control over India.
- **Architecture:**
  - Spread over 70 hectares, the fort is one of the largest British-era military structures in India.
  - It is designed in a star-shaped layout for enhanced defense capabilities.
- Fort William is the site of the infamous **"Black Hole Tragedy" incident in 1756.**



#### Key Renaming Announcements in recent times

- **Kitchener House – Manekshaw House**
  - Named after **Field Marshal Sam Manekshaw**, India's first **Field Marshal** and the architect of India's victory in the **1971 Indo-Pak War**.
- **South Gate (formerly St. George's Gate) – Shivaji Gate**
  - Honoring **Chhatrapati Shivaji Maharaj**, the Maratha ruler known for his **guerrilla warfare tactics and military strategy**.
- **Change in Indian Navy's Flag (2022):**
  - Replaced the **Saint George's Cross**, a **British colonial symbol**, with an **Indianized naval ensign inspired by Chhatrapati Shivaji's seal**.
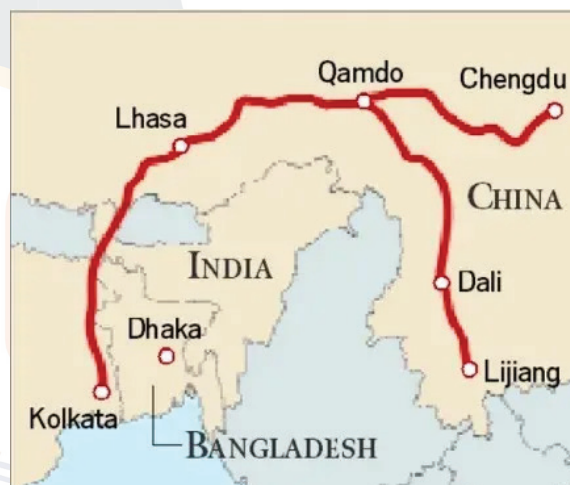
### Tea Horse Road

#### Context

Recently China's Ambassador to India Xu Feihong posted on X about the historic Tea Horse Road.

#### About Tea Horse Road

- The Tea Horse Road was a significant ancient trade route that connected China, Tibet, and the Indian subcontinent.
- It spanned over **2,000 k**m, facilitating the exchange of tea, horses, and other goods.



- The Tea Horse Road was **not a single pathway** but a network of multiple trade routes. The main routes were:
  - **Southwestern China to Tibet** (via Yunnan and Sichuan provinces).
  - **Tibet to the Indian subcontinent** (branching into present-day India, Nepal, and Bangladesh).
- **The journey was dangerous due to:**
  - Difficult terrain, including mountains reaching 10,000 feet.
  - Unpredictable weather and harsh conditions.

#### Historical Background

- **Origins (Tang Dynasty: 618–907 CE):**
  - The Tea Horse Road emerged during the **Tang Dynasty**, when **China began trading with Tibet and India**.
  - **Buddhist monk Yijing (635-713 CE)** recorded that Chinese traders transported:

- Sugar, textiles and rice noodles to Tibet and India.
- Horses, leather, gold, saffron and medicinal herbs from Tibet to China.

# NEWS IN SHORT

## Dokra Artwork

During his recent visit to France PM Narendra Modi presented the French President with a meticulously crafted Dokra artwork depicting musicians adorned with studded stonework.

About Dokra Metal Craft

- **Dokra metal craft** is an ancient form of metal casting using the **lost-wax technique (cire-perdue)**.
- It is practiced by the **Dhokra Damar tribe**, primarily in **West Bengal, Odisha, Chhattisgarh, Telangana, and Jharkhand**.
- The art form dates back **over 4,000 years** and is linked to the **Indus Valley Civilization**.
- The famous **"Dancing Girl" figurine** of Mohenjo-Daro is an example of this technique.

**Key Features of Dokra Art**

- **Nature-Inspired Motifs:** Animals, birds, trees, and deities.
- **Tribal and Folk Influence:** Figurines of tribal people, village life, and religious icons.
- **Unique Designs:** No two Dokra pieces are identical due to the handmade process.

## Gyan Bharatam Mission

- The Gyan Bharatam Mission has been launched to conduct a **comprehensive survey, documentation, and conservation of India's rich manuscript heritage.**
- It aims to **cover over one crore manuscripts** spread across academic institutions, museums, libraries, and private collections.
- A significant aspect of the Gyan Bharatam Mission is the **establishment of the National Digital Repository of Indian Knowledge Systems (IKS).**
- This digital platform will serve as a comprehensive resource for archiving and sharing traditional wisdom, making it accessible to researchers, students, and institutions worldwide.
- By integrating India's ancient knowledge—spanning fields such as Ayurveda, mathematics, astronomy, linguistics, and philosophy with modern education and technology, the mission aims to encourage research, innovation, and sustainable development.

## Lezim Dance

- Lezim is a folk dance associated with Maharashtra, traditionally performed during marriage processions and cultural festivals like **Ganesh Chaturthi**.
- It is described as both a **physical exercise** and a dance, with formations in twos, fours or circles.
- Lezim is known for **vigorous movements** like stepping, squatting and jumping, often starting with a slow rhythm and accelerating.
- **Instruments: Lezim**, a wooden mallet with metal pieces that create rhythmic sounds, and **dhol** or **dhalgi** (small drum).

Chhatrapati Sambhaji Maharaj (1657–1689)

- Sambhaji Maharaj was the **eldest son of Chhatrapati Shivaji Maharaj.**
- He ascended to power in **1681** after a succession battle with his half-brother **Rajaram**.
- He defended Maratha forts against **Mughal emperor Aurangzeb**'s expansionist ambitions in the Deccan region.
- He was captured and executed by the Mughals in **1689** for his resistance.
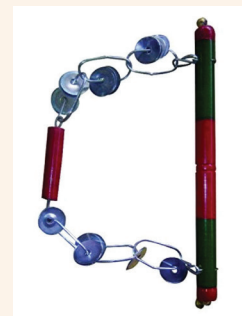
## Thiruparankundram Hill

Madras High Court has directed T.N. government to maintain communal harmony in Thiruparankundram hill.

About Thiruparankundram Hill - Madurai

- **Tirupparankundram Murugan Temple** is located here.
  - It was built here in the 8th century during the reign of Pandyas.
  - It is one among the six temples of Lord Muruga, chief deity of the ancient Tamils of South India, son of the warrior goddess Korravai.
- The **hill is also home to a dargah (mausoleum)** dedicated to **Sikandar Badhusha**, a Muslim saint.
- It also has historical importance for **Jain**s, with ancient Jain caves and inscriptions found in the region.

### Dashavatar Theatre

- Dashavatar is a **traditional folk theatre** form performed in **Maharashtra's Sindhudurg district and parts of north Goa.**
- The art form has been practiced for **over 800 years** and continues to be a key part of local temple festivals (jatras).
- This theatre originated in Maharashtra, **influenced by Karnataka's Yakshagana.**
- It was initially performed only by Brahmins, later taken up by the **Devli community** to keep the tradition alive.
- It is performed **between October (post-harvest) and May.**
- Stories are based on the Ramayana, Mahabharata, and Puranas, featuring Vishnu's ten incarnations. It includes humor, music, and moral lessons to engage audiences.
- A unique feature of Dashavatar is that **men play both male and female characters.**
- Costumes include the nauvari (nine-yard sari), heavy jewelry, and wigs. Actors carry props like dolls when playing motherly roles.



### Soliga Tribe

Prime Minister Narendra Modi praised the Soligas in his Mann Ki Baat program for their role in tiger conservation.

About Soliga Tribe

- The Soliga tribe primarily **inhabits the Biligiri Rangaswamy Temple (BRT) Tiger Reserve** in Chamarajanagar district, Karnataka. They are also found in parts of Tamil Nadu and Andhra Pradesh.
- In 2011, the **Soligas were the first tribal community in India to have their forest rights legally recognized within a tiger reserve**.
- The Soligas communicate in Sholaga, a Dravidian language, as well as Kannada and Tamil.
- The Soligas have a deep-rooted cultural connection with the forest and wildlife.
- Soligas possess extensive knowledge of medicinal plants and forest ecology which helps in conservation efforts.
- They worship tigers, referring to them as **"Dodda Nayi" (Big Dog**) and have a temple dedicated to them.
- Their lifestyle is simple, sustainable, and eco-friendly.
- They reside in simple, single-room huts made of bamboo and mud. They create distinctive utility items from natural materials, including the **'jottai,'** a cup crafted from leaves.

### Cholanaikkan Tribe

Samagra Shiksha Kerala launched a special initiative to provide education to a bed-ridden tribal girl from the Cholanaikkan tribe in Malappuram, Kerala.

About Cholanaikkan Tribe

- The Cholanaikkan tribe is classified as a Particularly Vulnerable Tribal Group (PVTG)
- They reside in the dense forests of Nilambur in Malappuram district, Kerala.
- The Cholanaikkan are among the last remaining hunter-gatherer tribes in South India.
- They traditionally live in rock shelters and caves known as Kallu Arais, which are natural formations in the forest.
- The tribe speaks a unique Dravidian language called Cholanaikkan
- The Cholanaikkan have limited interaction with mainstream society and depend heavily on forest resources for their survival.

# PERSONALITY IN NEWS

| Personalities | Details |
|---|---|
| **Chhatrapati Shivaji Maharaj (1630 - 1680)** | • He was born on **19th February 1630 at Shivneri Fort** (Maharashtra) to **Shahaji Bhosale**, a general in the Deccan Sultanates, and **Jijabai.**<br>• **Guru (Mentor):** Dadoji Kondadev (taught administration, warfare, and governance).<br>• He laid the foundation of **Hindavi Swarajya (self-rule)** against the Mughal and Sultanate rule.<br>• He was crowned as Chhatrapati on **6th June 1674 at Raigad Fort.**<br>• He established a well-organized administrative system with **Ashta Pradhan (Council of Eight Ministers).**<br>• He captured and built over **300 forts** strategically across Maharashtra.<br>• He was the First **Indian king to establish a strong navy.** He built **warships** and secured the Konkan coastline.<br>• **Major battles fought:**<br>  – **Battle of Pratapgad (1659):** Defeated Afzal Khan of Bijapur Sultanate.<br>  – **Battle of Kolhapur (1659):** Defeated Adilshahi forces. |
| **Gopal Krishna Gokhale (1866-1915)** | • He was born in 1866 in a Brahmin family in **Kotluk village, Ratnagiri, Maharashtra.**<br>• He established **the Servants of India society in 1905.**<br>• **Indian National Congress (INC)**:<br>  – Joined **INC** in 1889, later became the **President of INC in 1905 (Banaras Session)**.<br>  – He advocated **gradual reforms, self-governance (Swaraj), and dialogue with the British** rather than direct confrontation.<br>• **Mentor to Mahatma Gandhi:** Gandhi considered Gokhale his **political guru** and followed his moderate approach initially<br>• He played a leading role in bringing about **Morley-Minto reforms (1909 Act).**<br>• He was also associated with the journal **'Sudharak' (started by Gopal Ganesh Agarkar).** |
| **Ramkrishna Paramhans** | • He was born in **1836 in Kamarpukur, West Bengal.** His original name was **Gadadhar Chattopadhyay.**<br>• Ramakrishna began his career as a priest at the Dakshineswar Kali Temple in Kolkata.<br>• He advocated for **direct experience of God** rather than mere bookish knowledge and emphasized **selfless devotion (bhakti) and surrender to God**.<br>• He passed away in **1886 due to throat cancer.**<br>Influence on Swami Vivekananda<br>• Swami Vivekananda (Narendranath Datta) became his **most famous disciple**.<br>• Inspired Vivekananda to spread **Vedanta and Indian spirituality worldwide**.<br>• His teachings were later spread by **Ramakrishna Mission**, founded by **Swami Vivekananda**. |

| Personalities | Details |
|---|---|
| **Sant Ravidas (1377-1527 C.E.)**  | • He was a **Bhakti saint, poet and social reformer**. His teachings emphasized equality**, devotion to God and rejection of caste discrimination**.<br>• His devotional songs and verses made a great impact on the Bhakti Movement.<br>• He was born in a village called **Seer Govardhanpur in Uttar Pradesh.**<br>  – His birthplace is now known as **Shri Guru Ravidas Janam Asthan.**<br>• He is also known as Raidas, Rohidas and Ruhidas.<br>• He was the disciple of bhakti **poet Ramananda.**<br>• He followed the **Nirguna tradition,** which worships a formless God, and did not believe in **Saguna Bhakti,** which involves devotion to God in a physical form.<br>• **41** of his devotional songs and poems are included in the **Guru Granth Sahib.**<br>• **Association with Mirabai: Mirabai**, the Rajput princess and Bhakti poet-saint, considered Sant Ravidas as her **guru**. She wrote several hymns praising his teachings on **devotion and equality**.<br>• **Guru Ravidas Jayanti, is celebrated on Magh Purnima,** the full moon day in the month of Magh. |
| **Libia Lobo Sardesai awarded Padma Shri**  | • Libia Lobo Sardesai, a 100-year-old Goan freedom fighter, was honored with the Padma Shri for her important role in **Goa's liberation struggle.**<br>• She was born on May 25, 1924, in Portuguese-ruled Goa.<br>• **Key contribution:** She ran an **underground radio station named Voice of Freedom** with her colleague and later husband, **Vaman Sardesai**, from **1955 to 1961**, during Goa's liberation movement.<br>  – The station operated under harsh conditions in the **dense forests of the Western Ghats (Amboli)** & regular shifting locations to evade detection. |
| **Chandrashekhar Azad**  | • He was born on July 23, 1906, in Bhabhra, Madhya Pradesh.<br>• He was deeply influenced by the Jallianwala Bagh massacre and joined the Non-Cooperation Movement at a young age.<br>• When he was arrested, he boldly declared his name as "Azad" (Free) in court and was sentenced to 15 lashes as punishment.<br>• On **February 27, 1931**, he was cornered by British police in Alfred Park, Allahabad. Instead of surrendering, he shot himself with his last bullet.<br>Key Contributions to the Freedom Struggle<br>• **Joining HRA (1924):** Chandra Shekhar Azad joined the Hindustan Republican Association (HRA), led by Ram Prasad Bismil, and played a crucial role in funding revolutionary activities through daring political dacoities.<br>• **Kakori Train Robbery (1925):** Azad was a key participant in the Kakori Train Robbery, a bold operation where revolutionaries looted a British train carrying treasury money to fund their fight against colonial rule.<br>• **Reorganizing HRA into HSRA (1928)**: Azad, along with Bhagat Singh, reorganized the HRA into the Hindustan Socialist Republican Association (HSRA), adopting socialist ideals and aiming to overthrow British rule through armed resistance.<br>• **Assassination of John Saunders (1928):** In retaliation for Lala Lajpat Rai's death, Azad and his comrades planned to kill James Scott but mistakenly assassinated John Saunders, a British police officer.<br>• **Attempt to Blow Up Lord Irwin's Train (1929)**: Azad and his associates plotted to assassinate Viceroy Lord Irwin by blowing up his train, but the plan failed, showcasing their relentless revolutionary spirit. |

| Personalities | Details |
|---|---|
| **Ajit Singh**<br> | • Ajit Singh (born February 23, 1881) was the uncle of Shaheed Bhagat Singh.<br>• Ajit Singh played a key role in the **Pagri Sambhal Jatta Movement** (1907) which was **peasant agitation against the oppressive Colonisation and Doab Bari Acts**, which denied land ownership to farmers.<br>• His speech in Rawalpindi on April 21, 1907, was deemed seditious, leading to his arrest on June 2, 1907, alongside Lala Lajpat Rai. Both were deported to Mandalay prison under Regulation III of 1818.<br>• He founded the **Bharat Mata Society**<br>• Established the **Bharat Mata Book Agency,** which published anti-British literature.<br>• To evade British persecution, Ajit Singh moved to Iran and later Paris, where he founded the **Indian Revolutionary Association.**<br>• In 1913, he moved to Brazil and collaborated with the Ghadar Party and worked alongside revolutionaries such as Bhai Rattan Singh, Teja Singh Swatantra, and Baba Bhagat Singh Bilga.<br>• In 1932, he returned to Europe and **contributed to the Azad Hind Fauj in Italy,** attempting to recruit Indian soldiers.<br>• He was captured by Allied forces in 1945, he was imprisoned in Italy and Germany until December 1945. As India neared independence, he was released from jail. |