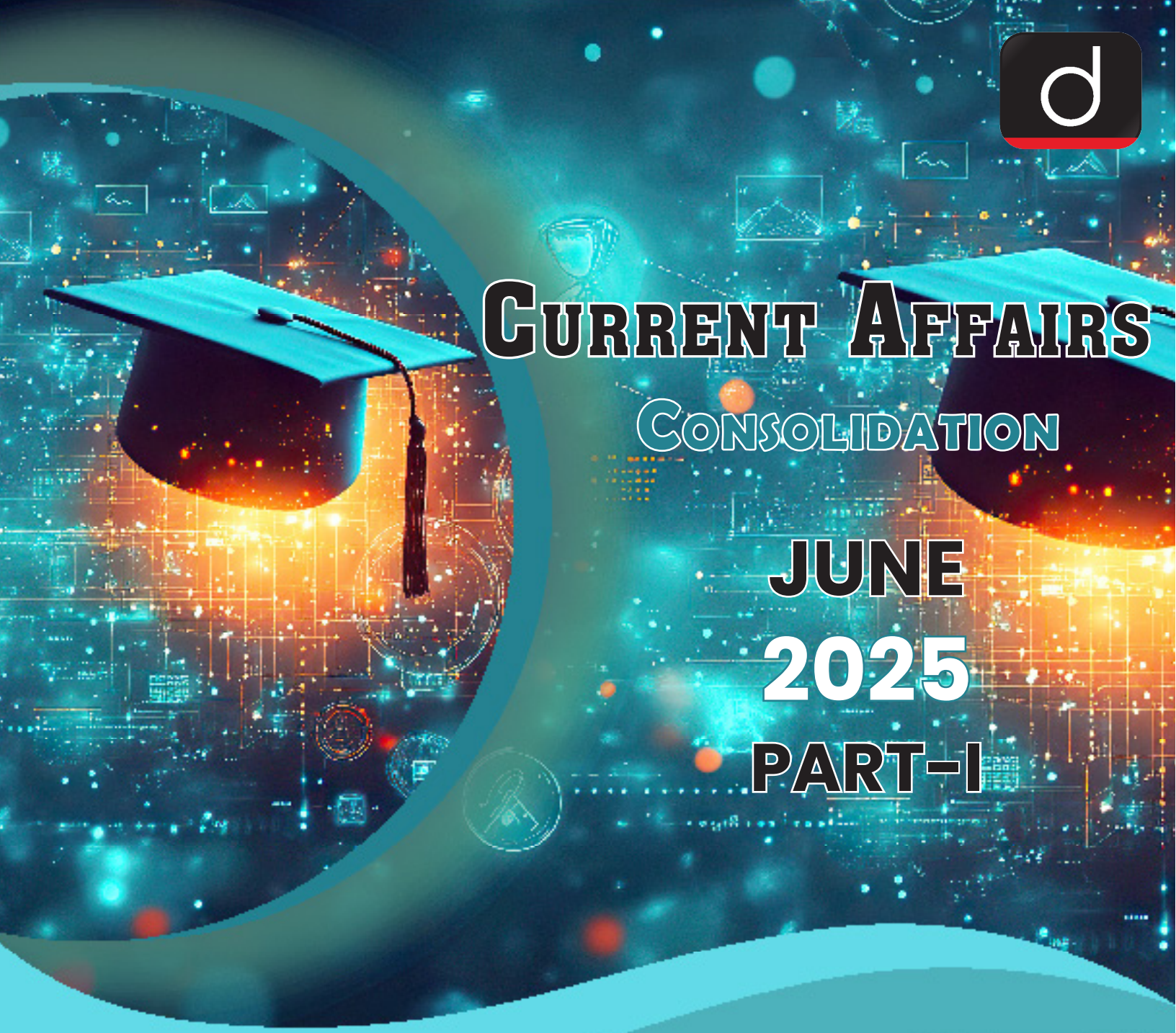

Current Affairs

Consolidation

JUNE 2025

PART–I

C-171/2, Block-A, Sector-15, Noida

641, Mukherjee Nagar, Opp. Signature View Apartment, New Delhi

21, Pusa Road, Karol Bagh New Delhi

Tashkent Marg, Civil Lines, Prayagraj, Uttar Pradesh

Tonk Road, Vasundhra Colony, Jaipur, Rajasthan

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Contents

Polity and Governance

Highlights

- *Trust-Based Regulation*
- *50 Years of National Emergency*
- *AI in Healthcare*
- *Advancing SC/ST Welfare in India*
- *Goa Achieves Full Functional Literacy*
- *World Food Safety Day 2025*
- *Regulation under Article 240 and Ladakh's Demand for 6th Schedule*
- *NITI Aayog Calls for Cooperative Federalism*
- *DPDP Act, 2023 and DPDP Rules, 2025*

Trust-Based Regulation

Why in News?

The Jan Vishwas (Amendment of Provisions) Act, 2023, effective **from August 2023**, replaces **criminal penalties** with **fines** for minor violations, **decriminalizing 183 provisions across 42 Central Acts** to promote **ease of living**, **ease of doing business**, and a **trust-based regulatory approach**.

What is Jan Vishwas (Amendment of Provisions) Act, 2023?

- **About:** It is a significant legislative reform aimed at enhancing the **ease of doing business** and promoting **trust-based regulation** in India, covering laws under **19 ministries** like **environment**, **agriculture**, and **corporate affairs.**
  - E.g., **Procedural lapses** under Environment Protection Act, 1986 are now met with **financial penalties** instead of imprisonment.
- **Objective:** The reform shifts from **punitive to reformative legal mechanisms** by replacing **jail terms** for minor, non-malicious violations with **monetary penalties**, reducing **fear and harassment**, and improving **compliance ease**, especially for MSMEs**.**
- **Need:** Many **outdated provisions** created **legal uncertainty**, disproportionately affecting **marginalised communities** and burdening businesses with fear of prosecution.
  - A **uniform compliance framework** placed unequal stress on **MSMEs**, with high costs discouraging formalisation and expansion.
  - To **unlock economic potential**, India needed a **trust-based governance model** replacing **colonial-era, fear-driven laws** that criminalised minor violations.
- **Future Steps:** The Union Budget 2025–26 proposed **Jan Vishwas Bill 2.0** to **decriminalise over 100 more provisions** and strengthen a **trust-based regulatory system**.
  - It urges **states and municipalities**, where most jail-term laws exist, to adopt reforms, **modernise legal frameworks**, and define clear **criteria for imprisonment.**

What is a Trust-based Regulatory Approach?

- **About:** It is a governance approach where the **government assumes that individuals and businesses will act in good faith** and comply with the law, instead of treating them as potential **offenders from the start**.
- **Approach:** This model focuses on **reducing unnecessary legal burdens** and **promoting voluntary compliance**, while still retaining strict penalties for serious violations.
  - It shifts from a **policing mindset** (strict penalties for minor violations) to a **partnership model** (encouraging voluntary compliance with reasonable consequences for lapses).
- **Key Features:**
  - **Decriminalization of Minor Offenses**: Replacing **jail terms** with **fines** for **procedural or technical violations**.
  - **Risk-Based Enforcement**: Strict action only for **serious violations** (e.g., **fraud**, **safety risks**).

- **Simplified Compliance**: Reducing **bureaucratic red tape** to encourage **business growth**.
- **Self-Declaration & Transparency**: Trusting **businesses/citizens** to comply with audits only for **high-risk cases**.
- **Reduced Government Interference**: Minimizing **harassment** and **rent-seeking** by officials.

Why does India Need a Trust-based Regulatory Approach?

- **Reducing Colonial-Era Punitive Measures:** Many colonial-era laws like the **Indian Forest Act, 1927** were designed to **control rather than facilitate economic activity**, imposing **criminal penalties** for minor violations that **disproportionately impacted** small businesses.
  - These laws fostered a climate of **fear, harassment, and rent-seeking**, which can be addressed through a **trust-based regulatory approach.**
- **Ease of Doing Business:** Excessive **compliance burdens** hinder **entrepreneurship**, with over **75% of MSMEs** struggling with **digital compliance** and **95%** needing more **time and resources** to adopt the **Invoice Management System (IMS)** under **GST.**
  - The **Act** helps address this by **simplifying regulations**, and making compliance **easier and less intimidating** for businesses.
- **Decongesting the Judiciary:** Over **5 crore cases** burden Indian courts, many from **minor violations** better handled with **penalties** than criminal trials.
  - Mechanisms like **arbitration, mediation and conciliation** can **ease litigation** and allow courts to focus on more **critical cases.**
- **Reducing Corruption & Harassment:** The **threat of imprisonment for procedural lapses** enabled **rent-seeking** by corrupt officials, while **mandatory attestations**, **inspections**, and **redundant data requests** wasted resources, shifting to a **trust-based system** can cut **bureaucracy** and free resources for **productive use**.
- **Economic Growth: Fear of criminal charges from unintentional non-compliance** deters **small business expansion**, but **states like Madhya Pradesh, Kerala, and Haryana** have adopted **reforms** that promote **regional growth**.
  - Building on this, **Jan Vishwas 2.0 (Budget 2025–26)** plans to **decriminalize 100+ more provisions**, further **easing compliance** and supporting **business-friendly governance**.
- **Aligning with Viksit Bharat 2047 Vision:** India's **Amrit Kaal** vision promotes **minimum government, maximum governance**, enabling citizens and businesses to operate with minimal interference. A **trust-based system** prioritizes **outcome-based governance**, encouraging **innovation** and **investment**.

What are the Challenges in India's Shift Towards Trust-based Regulation?

- **Legacy of Colonial Distrust in Governance:** India's **colonial legacy of suspicion** and **process-heavy bureaucracy** fosters **excessive oversight**, **red tape**, and **distrust**, making it hard to shift to **trust-based regulation** as systems remain focused on **control** over **facilitating compliance** and **ease of doing business**.
- **Overlapping Regulatory Framework:** India has **1,536 laws** with **69,233 compliances**, many redundant or conflicting. While the Centre decriminalizes laws (e.g., **Jan Vishwas Act**), rigid **state regulations** cause confusion, disproportionately burdening **MSMEs.**
- **Resistance to Decentralization & Autonomy:** Despite the **73rd/74th Amendments**, **local governments** lack true **autonomy** due to **top-down control**, with officials favoring **audits and penalties** over **risk-based enforcement**, sustaining **mistrust.**
- **No Trust Metrics:** A key **challenge in India's shift towards trust-based regulation** is that **trust is rarely measured** like **financial or service indicators**, making it difficult to **assess policy impact**.
  - Additionally, **implementation gaps** in initiatives like **e-Bill Systems** and **PARIVESH** lead to **delays**, weakening efforts to build a **trust-driven governance framework**.

50 Years of National Emergency

Why in News?

50 years ago, on **12th June 1975**, the **Allahabad High Court** invalidated **Indira Gandhi's 1971 election** in **Indira**

Nehru Gandhi v. Shri Raj Narain Case, 1975 leading to the declaration of a national emergency (NE) on **25th June 1975** that continued till **March 1977.**

What are Key Facts About the Indira Nehru Gandhi v. Shri Raj Narain Case, 1975?

- **About:** It is a landmark in India's **constitutional and democratic history**, arising from the **1971 general elections**, where **Prime Minister Indira Gandhi** defeated **socialist leader Raj Narain**, leading to a legal challenge on grounds of **electoral malpractices.**
- **Electoral Context and Allegations: Raj Narain** alleged that **Indira Gandhi** misused **government machinery** and **public funds** for electoral gain, violating the Representation of the People Act, 1951, and filed a **petition** in the Allahabad High Court seeking to **invalidate her election** on grounds of these alleged **malpractices.**
- **Allahabad High Court Verdict:** The court found **Indira Gandhi guilty** of **misusing government machinery** for **election campaigning.**
  - As a result, her **election was invalidated** and she was **disqualified from holding Prime Ministerial office**.
- **Appeal in Supreme Court: Indira Gandhi appealed** the **High Court's decision** in the **Supreme Court**, seeking both a **stay on the High Court's order** and an **opportunity to contest its findings.**
- **Declaration of Emergency:** Amidst **political turmoil**, on **25th June 1975**, **Indira Gandhi's government declared a** National Emergency, leading to the **suspension of civil liberties**, **press censorship**, and **postponement of elections.**

What are Key Facts About National Emergency?

- **About National Emergency:** NE is proclaimed by the President under Article 352 when the **security of India or a part of it** is threatened by **War, External Aggression (external emergency), or Armed Rebellion (internal emergency).**
  - The 38th Amendment Act, 1975 allowed the President to issue Emergency proclamations on grounds of **war**, **external aggression**, **armed rebellion**, or **imminent danger thereof**, while the 44th Amendment Act, 1978 replaced **"internal disturbance"** with **"armed rebellion"**.
- **Territorial Extent:** NE can extend to the **whole of the country or only a part of it**. 42nd Amendment Act, 1976 enabled the President to limit the operation of NE to a **specific part of India.**
- **Parliamentary Approval:** As per the **44th Amendment Act**, 1978, a **NE** must be approved by **both Houses within one month** by a special majority (originally two months).
  - If the Lok Sabha **is dissolved** at the time of declaration, the **Rajya Sabha's approval** remains valid, but the **reconstituted Lok Sabha** must approve it within **30 days of its first sitting.**
- **Duration:** It continues for **6 months**, and can be **extended to indefinite period** with **approval of Parliament** for **every 6 months** (44th Amendment Act 1978).
- **Revocation:** It can be **revoked anytime by the president** without requirement of approval by Parliament.
  - The **Lok Sabha** can pass a **resolution to disapprove the continuation** of a **National Emergency**. If **one-tenth of its total members** submit a **written notice** to the **Speaker** (if in session) or to the **President** (if not in session), a **special sitting** must be held within **14 days**. The resolution must be passed by a **simple majority.**
- **Judicial Review:** The **38th Amendment Act, 1975** made the **Emergency declaration immune to judicial review**. This was later **reversed by the 44th Amendment Act, 1978**.
  - In the **Minerva Mills case, 1980**, the Supreme Court held that a **Proclamation of NE can be challenged** if it is **mala fide**, based on **irrelevant or extraneous facts**, or is **absurd or perverse.**

What are the Implications of Imposition of National Emergency on Constitutional Framework?

- **On Centre-State Relations:**
  - **Executive:** The **Centre is empowered to issue executive directions** to states on **any matter**, bringing **state governments under complete control** of the Centre—though they are **not suspended**.

- **Legislature:** The **state legislature is not suspended**, but **Parliament can make laws on any subject in the State List**. Such laws **cease to operate six months after the Emergency ends**. If **Parliament is not in session**, the **President can issue ordinances on state subjects**. Additionally, **Parliament can confer powers and impose duties on the Centre or its authorities** regarding matters **outside the Union List.**
- **Financial:** The **President can modify the constitutional distribution of revenues** between the **Centre and states**, including **reducing or cancelling transfers**. Such modifications remain valid **till the end of the financial year** in which the Emergency ends, and **every order must be laid before both Houses of Parliament**.

- **Life of Legislature:**
  - **Lok Sabha:** It may be **extended** beyond its normal term (5 years) by a law of Parliament for **one year at a time** (for any length of time).
  - **State Legislative Assembly: Parliament** can extend the tenure of a **State Legislative Assembly** by **one year at a time**, for any duration. However, the **extension cannot go beyond six months** after the **Emergency ceases to operate**.
- **On Fundamental Rights:** Article 358 automatically **suspends** Article 19 for the **entire duration of a National Emergency** declared on grounds of **war or external aggression** (**External Emergency**). It **applies only to Article 19** and **extends to the entire country.**
  - Article 359 requires a **Presidential Order** to **suspend Fundamental Rights (FRs)** for the **entire duration** of Emergency or a **shorter period**. It applies to **all FRs mentioned in the Order**, **except** Articles 20 and 21, operates in **both internal and external emergencies**, and may extend to **part or the entire country.**

AI in Healthcare

Why in News?

Indian researchers have developed Garbhini-GA2, an **Artificial Intelligence (AI) model** that **predicts fetal age from ultrasound images** with an error margin of just half a day, outperforming current methods with an error of up to 7 days. This development highlights the **vast potential of AI** to drive advancements **in healthcare** in India.

What are the Applications of AI in Healthcare?

- **Early Disease Detection and Diagnosis: AI tools** assist doctors in analyzing **medical images** like **X-rays**, **CT scans**, and **ultrasounds** quickly and accurately—vital for countries with **limited specialists**.
  - **AIIMS Delhi** has launched an AI platform - **iOncology.ai.** - designed for the early **detection of breast and ovarian cancer**.
  - **Also,** Mumbai-based **Qure.ai** detects **TB**, **pneumonia**, and **lung cancer** from chest X-rays, while Bengaluru startup **NIRAMAI** uses **AI-powered thermal imaging** to identify **early-stage breast cancer** without radiation.
- **AI in Telemedicine and Remote Consultations: AI-driven** telemedicine is bridging gaps in rural healthcare by improving access and efficiency.
  - Tools like **Practo's AI chatbot** and **Apollo's "Ask Apollo" assistant** offer **symptom-based guidance**, **instant medical advice**, and **appointment scheduling**, reducing **unnecessary hospital visits.**
- **AI for Drug Discovery: Indian startups and research labs** are using **AI** to create **affordable, patient-specific treatments**.
  - E.g., **Bengaluru-based InnAccel** developed **SAANS**, an **intelligent, infrastructure-free, multi-therapy system** that delivers **non-invasive breathing support** for **neonatal and pediatric patients**, helping **reduce infant mortality** in **rural clinics.**
- **AI in Wearables: AI-powered wearables and apps** are enabling Indians to manage **chronic diseases** like **diabetes** and **hypertension** more effectively.
  - **E.g., Delhi-based BeatO** offers an **AI-enabled glucometer** that tracks **blood sugar levels** and gives **real-time diet and medication recommendations.**
- **AI for Hospital Efficiency: Hospitals** are using **AI** to **reduce administrative workload** and **improve operational efficiency**.

- **E.g., Microsoft's AI Network for Healthcare** has partnered with **eye hospitals** in India to **predict the progression of diabetic retinopathy**, helping prevent **blindness in high-risk patients.**

- **Enhancing Medical Education and Training: AI** is transforming **medical education and training** through **personalized learning** and **simulation of complex clinical scenarios**.
  - Platforms like **FundamentalVR** use **AI-powered VR and haptic systems** for realistic surgical practice, while **adaptive learning tools** customize curricula, enhancing **training efficiency** and **competency.**

What are the Key Initiatives Enabling the Adoption of AI in India's Healthcare System?

- **Ayushman Bharat Digital Mission (ABDM)**: ABDM provides a **unique digital health ID** for each citizen.
- **HealthLocker/Personal Health Records (PHR)**: It is a **digital national health database** backed by a **cloud-based storage system**, serving as a **single source of health data** for the nation.
- **National Health Stack (NHS)**: It includes platforms like the **National Health Analytics Platform**, supporting **data-driven healthcare solutions.**

Note: The World Health Organization has launched S.A.R.A.H. (*Smart AI Resource Assistant for Health*), a **generative AI prototype** that uses **advanced language models** to deliver reliable information on **key health topics** like **mental health**, **healthy habits**, and **non-communicable diseases** (e.g., **cancer**, **heart disease**, **lung disease**, **diabetes**).

What are the Major Challenges of AI in Healthcare in India?

- **Lack of High-Quality, Standardized Medical Data: AI models** require **large, diverse, well-labeled datasets**, but face limitations in India due to **fragmented data**—as **most hospitals still rely on handwritten prescriptions and non-digital records**.
  - Additionally, **AI trained on Western data** often performs poorly in India because of differences in **lifestyle** and **disease patterns.**
- **Limited AI Infrastructure in Rural Areas: Advanced AI tools** need **high-speed internet**, **cloud computing**, and **digital healthcare systems**, which are often lacking in **rural India**.
  - Platforms like eSanjeevani and tools like **Qure.ai's TB detection** face challenges in **remote areas** and **PHCs** due to **poor connectivity** and **lack of digital infrastructure** (e.g., **digital X-ray machines**).
- **Regulatory and Ethical Concerns:** India lacks a **clear AI governance framework**, leading to concerns over **patient privacy**, **bias**, and **accountability**.
  - While the Digital Personal Data Protection Act, 2023 sets strict rules on **health data use**, weak enforcement and cases of **AI bias** hinder safe AI deployment.
  - Also, the **Digital Information Security in Healthcare Act (DISHA)**, proposed by the **Ministry of Health & Family Welfare in 2017** to regulate digital health data, **remains unenacted**.
- **Language and Localization Issue:** India's **linguistic diversity**, with **22** official languages and numerous dialects, poses a major challenge for **AI implementation in healthcare**.
  - This **language barrier** can cause **misdiagnosis**, **miscommunication**, and reduce the **effectiveness of AI tools**.
- **Resistance from Healthcare Professionals: Doctors and nurses** often show **distrust towards AI**, fearing **job loss** or potential **misdiagnosis**.
  - Many remain **reluctant to use AI** for **critical decisions**, favoring **traditional clinical methods** instead.

ICMR Guidelines for AI Use in the Health Sector

In **March 2023**, the Indian Council of Medical Research (ICMR) released the **"Ethical Guidelines for Application of AI in Biomedical Research and Healthcare,"** outlining **10 key patient-centric ethical principles** for the use of **AI in healthcare**.

10 Guiding Principles:

- **Accountability and Liability**: Regular **audits** to ensure **optimal AI performance**, with findings **made public**.
- **Autonomy**: Mandatory **human oversight** and **informed patient consent**, including **risk disclosure**.
- **Data Privacy**: Protection of **privacy** and **personal data** at **every stage** of AI use.
- **Collaboration**: Encourages **interdisciplinary** and **international partnerships** for responsible AI development.

- **Safety and Risk Minimization**: Focus on **misuse prevention**, **data security**, and **ethical review** by committees.
- **Accessibility, Equity, and Inclusiveness**: Ensure **AI infrastructure** is accessible to all, bridging the **digital divide**.
- **Data Optimization**: Minimize **biases and errors** from **poor data quality** or lack of representation.
- **Non-Discrimination and Fairness**: Promote **universal access** to **bias-free AI technologies**.
- **Trustworthiness**: Ensure AI is **valid**, **reliable**, **ethical**, and **lawful** to build **user confidence**.
- **Transparency**: Provide **clinicians** with clear methods to test AI's **validity** and **reliability.**

Frameworks: India's frameworks supporting AI in healthcare include the Digital Health Authority under the National Health Policy (2017), DISHA 2018, and Medical Device Rules, 2017.

Advancing SC/ST Welfare in India

Why in News?

The **Ministry of Social Justice and Empowerment** held the **28th Coordination Committee meeting**, focused on strategies to **curb untouchability offences and atrocities** against Scheduled Castes (SCs) and Scheduled Tribes (STs).

- Key discussions revolved around the implementation of existing laws like the **Protection of Civil Rights (PCR) Act, 1955** and the Scheduled Castes and Scheduled Tribes (Prevention of Atrocities) Act, 1989.

What are SCs and STs and How are they Recognized in Indian Legal Frameworks?

- **About SCs and STs : Article 366** defines the term **'Scheduled Caste.'**
  - According to Article 341, the President, after consulting the Governor of the respective State, may notify the **Scheduled Castes for that state or Union Territory (UT)**. The list can be amended by **Parliament through legislation**.
  - The term "Scheduled Castes" was initially introduced in the **Government of India Act, 1935,** marking its recognition in legal and administrative frameworks.
  - **STs:** Article 366 defines **STs** as **tribes, tribal communities, or parts/groups** within them that are designated as such under **Article 342** of the Constitution.
    - Under Article 342, the **President of India**, in **consultation with the Governor** of the concerned state, is empowered to **specify the STs** for each **state or union territory**.
- **Framework to Address Caste-Based Atrocities in India:**
  - **Fundamental Rights:** Article 14, 15, 16 and 17.
  - **Directive Principles of State Policy (DPSP):** Article 46 directs the state to promote the **educational and economic interests of SCs**.
  - **Article 338** establishes the National Commission for Scheduled Castes to safeguard the rights of SCs.
  - **Legal Framework:**
    - **Untouchability (Offences) Act, 1955:** Enacted to **penalize the practice of untouchability,** which was later amended and renamed the **Protection of Civil Rights Act, 1976**, making untouchability, resulting from social and religious disabilities, **punishable**.
    - **Scheduled Castes and Scheduled Tribes (Prevention of Atrocities) Act, 1989:** A special law addressing **crimes specifically committed against SC/ST communities**, defined as "atrocities." It mandates the establishment of **Special Courts** for the speedy trial of such cases.
    - **Prohibition of Employment as Manual Scavengers and Their Rehabilitation Act, 2013:** This Act aims to **eliminate manual scavenging** and ensure the rehabilitation of those involved in the practice.
    - **Scheduled Castes and Scheduled Tribes (Prevention of Atrocities) Amendment Act, 2015:** This amendment expanded the definition of atrocities to include **sexual offences against women from SC/ST communities**, thereby strengthening legal protection.

What are the Major Issues Related to SCs and STs in India?

- **Economic Vulnerability: Land alienation and bonded labor**, coupled with the **non-payment of minimum wages**, place SCs in a disadvantaged economic position.
  - Around **34% of SCs live below the poverty line (BPL)**, compared to 9% of the general population.
- **Social Prejudices:** In regions like **Uttar Pradesh and Rajasthan**, the dominance of other castes often results in **caste-based violence**.
  - In 2022, **97.7%** of atrocities against SCs were reported in **13 states**.
- **Weak Legal Enforcement:** There is a **failure** to implement **legal protections** effectively, and educational discrimination continues, as highlighted by the **Thorat Committee in 2007.**
  - Of the **498 districts** with the highest number of reported atrocities, **only 194** had established **special courts** to handle SC/ST cases.
- **Rejection of Traditional Roles:** Rising **political influence among SCs** due to the **73rd and 74th Constitutional Amendment Acts (CAA)** has led to tensions with dominant castes.
  - This has also resulted in a **rejection of traditional works** that SCs were once obligated to perform, **fueling further conflict**.
- **State Complacency:** The lack of **Protection Cells** and the **indifference of law enforcement** hinder timely intervention. Victims of atrocities also face **insufficient relief and rehabilitation**, worsening their plight.
  - Only 5 states- **Bihar, Chhattisgarh, Jharkhand, Kerala, and Madhya Pradesh**, have set up **special police stations** to register complaints of offences against SCs and STs.
- **Systemic Failures:** Many schemes for SCs, like NAMASTE and Pradhan Mantri Adi Adarsh Gram Yojana (PMAGY) face poor implementation, leading to unmet goals like **zero fatalities** among **sanitation workers.**
  - **Fund surrender** and delays, as seen in Scheme of Residential Education for Students in High School in Targeted Area (SHRESHTA) further weaken welfare efforts.

Goa Achieves Full Functional Literacy

Why in News?

Goa has been declared **fully functionally literate** under the Ministry of Education's ULLAS (Understanding of Lifelong Learning for All in Society)-**Nav Bharat Saaksharta Karyakram** programme, also known as the **New India Literacy Programme (NILP).**

- While Goa's literacy rate was **93.60% as per PLFS 2023–24**, a **state-level ULLAS survey** confirmed it has **crossed the 95% functional literacy benchmark**.
- Earlier, Mizoram became the first state and Ladakh the first UT to achieve **full functional literacy.**

Functional literacy

- It refers to an individual's ability to apply **reading, writing, and numeracy skills** in daily life to enhance **personal development and community participation**.
- The ULLAS not only covers basic literacy but also equips learners with **critical life skills**, encouraging **lifelong learning** and **active citizenship**.

What is ULLAS- Nav Bharat Saksharta Karyakram?

- **About:** ULLAS is a **centrally sponsored scheme** being implemented from **2022 to 2027,** designed to **empower adults aged 15 years and above** who **missed out on formal schooling**.
  - It aimed at promoting **Education for All**, earlier known as **Adult Education** and it is in line with the vision of the National Education Policy (NEP) **2020.**
- **Objective:** Its target is to achieve **Foundational Literacy and Numeracy** for **5 crore learners** during **FY 2022–27** (1 crore learners per year).
- **5 Key Components of Scheme: Foundational Literacy and Numeracy, Critical Life Skills, Basic Education, Vocational Skills** & **Continuing Education.**
- **Implementation Mechanism**: Scheme is implemented through **volunteerism in hybrid (both in online and offline) mode** to instill **social responsibility** and a strong sense of **duty ('Kartavya Bodh')** among citizens.

- **Key Features**:
  - Offers access to learning resources through the DIKSHA platform and **ULLAS mobile/web portal**, with support for **22 Indian languages**, promoting inclusive and multilingual education across regions.
  - Incorporates the Foundational Literacy and Numeracy Assessment Test (FLNAT), held **twice a year** or as needed in **local schools** for evaluation and certification.

What are the Key Facts About Goa?

- Goa (capital **Panaji)**, is located on the **southwestern coast** of India in the **Konkan region**, geographically separated from the Deccan by the **Western Ghats**.
- After **India's independence in 1947**, **Portugal continued to retain control over its Indian territories** despite repeated diplomatic efforts by India. In 1961, India launched Operation Vijay, resulting in the **liberation of Goa, Daman, and Diu.**
  - **Goa Liberation Day** is observed on 1**9th December** to commemorate the event.
- On **30th May 1987**, Goa attained **statehood**, while **Daman and Diu** remained a **Union Territory** so, **30th May** is observed annually as **Goa Statehood Day**.
  - On 26th January 2020, the **UTs of Daman and Diu and Dadra and Nagar Haveli** were merged to form a **single UT named Dadra and Nagar Haveli and Daman and Diu.**

World Food Safety Day 2025

Why in News?

World Food Safety Day **2025** (7th June)**,** themed ***"Food Safety: Science in Action,"*** highlights India's shift from an **adulteration-focused regime to a science-based food safety system** led by Food Safety and Standards Authority of India (FSSAI).

- Despite progress, regulatory gaps and outdated practices persist, warranting renewed scrutiny.

Note: World Food Safety Day, observed annually on 7th June since 2019 following a resolution by the United Nations General Assembly**,** is a global campaign aimed at raising awareness and inspiring action to prevent, detect, and manage foodborne risks.

How has India's Food Safety Framework Evolved?

- **Initial Legal Framework (1954–2006):** The **Prevention of Food Adulteration (PFA) Act, 1954** treated food safety in binary terms**: food** was **either adulterated or not**, without distinguishing between different types of contaminants or considering the levels of exposure.
  - It did not account for consumption quantity, dietary patterns, or varying risk profiles of contaminants.
- **Reform with the Food Safety and Standards Act, 2006:** It established the FSSAI, aligning India's standards with global benchmarks.
  - FSSAI introduced a risk-based framework aligned with international best practices **(Codex**

Alimentarius), incorporating **Maximum Residue Limits (MRLs)** for pesticides, **Acceptable Daily Intake (ADI)** for food additives, and setting **standards for veterinary drug residues** and naturally occurring toxins.

- By 2020, India's food safety regulations were nearly on par with advanced economies.

Note: The **Codex Alimentarius, or "Food Code"** is a collection of standards, guidelines and codes of practice adopted by the **Codex Alimentarius Commission (CAC).**

- CAC is an international food standards body established jointly by the **Food and Agriculture organization (FAO)** and the **World Health Organization (WHO)** in 1963 with the objective of protecting consumer's health and ensuring fair practices in food trade. The CAC has 189 members, **India joined the Commission in 1964.**

What are the Challenges in Food Safety in India?

- **Lack of India-Specific Scientific Data:** Most safety **standards rely on international data not tailored to Indian dietary patterns**, farming practices, or environmental conditions.
  - There is an absence of comprehensive **Total Diet Studies (TDS)** to assess cumulative exposure to contaminants through typical Indian diets.
  - Lack of localized **toxicological studies** limits accurate risk assessment.
- **Ineffective Risk Communication:** Technical terms like **MRLs** and **ADI** are difficult for the general public to understand.
  - Current food **labelling in India is non-uniform** and often difficult to understand. lack of **mandatory Front-of-Pack Labelling (FOPL)** makes it hard for consumers to identify high salt, sugar, or fat content.
  - The **Indian Nutrition Rating (INR)** is still voluntary and may mislead with high star ratings despite poor nutritional quality.
- **Legacy and Outdated Regulations:** Some food regulations, such as those concerning **MSG (monosodium glutamate)**, conflict with global scientific consensus.
  - MSG has been **globally recognized as safe** by the **Joint Expert Committee on Food Additives (JECFA) since 1971,** and many countries have removed warning labels, **India still mandates a label claiming it is unsafe for infants.**
  - This **restriction is not supported by current scientific evidence.** This outdated rule misleads consumers and reflects India's reluctance to update legacy regulations.
- **Informal and Unregulated Food Sector:** A large portion of food production and distribution in **India is informal,** making monitoring difficult.
  - **Street food vendors, small food businesses, and local manufacturers** often operate outside the formal regulatory framework, lacking awareness and compliance with hygiene and food safety norms.
- **Inadequate Response to Emerging Risks:** India is slow to adapt to emerging threats such as **antimicrobial resistance (AMR), genetically modified organisms (GMOs), or climate-induced food hazards.**
- **Rising Consumption of Processed and Junk Foods:** Increased spending on processed foods is contributing to **non-communicable diseases (NCDs)** like diabetes, hypertension, and obesity.
  - Ultra-processed foods are **high in salt, sugar, and fats (HFSS)**, yet marketed as "tasty" and "affordable" options.
- **Misleading Advertising:** Fast-Moving Consumer Goods companies use aggressive and **often misleading ads**, especially targeting children and families.
  - The Supreme Court of India has raised concerns over such practices, linking them to violations of the **Right to Life (Article 21).**

Reports and Indices on Food Safety

Reports and Indices	Key Insight
State Food Safety Index (2023-2024) (FSSAI)	Shows wide **disparity across states**. Kerala, Tamil Nadu, Jammu & Kashmir, and Gujarat **lead in promoting public health through stronger food safety measures.**

The State of Food Security and Nutrition in the World 2024	India has the largest number of undernourished people globally (194.6 million), though this is an improvement from 240 million in 2004–06. Over **55.6% of Indians (790 million people)** cannot afford a healthy diet, indicating poor food affordability and accessibility.
2022 Global Food Security Index	India was ranked 68th, alongside Algeria, highlighting persistent challenges and threats to the country's food security.

Food Safety and Standards Authority of India

- The FSSAI is an **autonomous statutory body** established under the **Food Safety and Standards Act of 2006.** It operates under the **Ministry of Health & Family Welfare** and is **headquartered in New Delhi**, with eight regional offices across the country.
- FSSAI's functions include framing food regulations, granting licenses to food businesses, enforcing food safety laws, monitoring food quality, conducting risk assessments, promoting food fortification and organic foods, and providing training and awareness programs.
- It also organizes campaigns such as World Food Safety Day, Eat Right India, Eat Right Station, Food Safety Mitra, and 100 Food Streets.
- The **Right to Food** is implicit in **Article 21 of the Indian Constitution,** which guarantees the right to life with dignity. Read with **Articles 39(a) and 47,** it obligates the **State to ensure adequate livelihood, nutrition, and standard of living.** This right is enforceable through **Article 32 as a fundamental constitutional remedy.**

Regulation under Article 240 and Ladakh's Demand for 6th Schedule

Why in News?

To address the **long-standing demands** for **job reservations**, **language recognition**, and **political representation** of Ladakh's people, the Centre has issued **few regulations for Ladakh under Article 240**, rather than granting the **Sixth Schedule status** as was widely requested.

Note: Article 240 empowers the **President** to make **regulations** for the **peace and good governance** of certain **Union Territories**, with these rules having the same force as **Acts of Parliament** and the power to **amend or repeal existing laws**.

What are the Demands of the People of Ladakh and the Regulations Notified by the Government?

- **Key Demands:** After the abrogation of **Article 370** in August 2019 and the implementation of the **Jammu and Kashmir Reorganisation Act, 2019**, **Ladakh** was designated as a **Union Territory without a legislature**.
  - In response, the **Leh Apex Body (LAB)** and the **Kargil Democratic Alliance (KDA)** have been advocating for Ladakh's inclusion in the **Sixth Schedule of the Constitution** to safeguard their **land, jobs, and cultural identity**.
  - **Key Demands Included**:
    - Inclusion under the **Sixth Schedule** for constitutional protection.
    - **Land ownership restrictions** to prevent outsider influx.
    - **Legislative Assembly** for representative governance.
  - As an alternative, **the Union government** proposed extending **Article 371-like protections** to the region.
- **Key Regulations for Ladakh:**
  - **Domicile Based Protection:** For the first time, **domicile-based job reservations** for all government jobs has been introduced in Ladakh.
    - The **domicile criteria** include **15 years of residency, 7 years of education and appearance in Class 10 or 12 from Ladakh** among others.
  - **Provision for Reservations: Total reservations** for **SCs, STs, OBCs**, and other **socially and educationally backward groups** in Ladakh are capped at **85%**, while the **10% reservation for Economically Weaker Sections (EWS)** remains intact.

- These provisions are also extended to **professional colleges**, enhancing **local access** to **medical and engineering education.**

❍ **Preservation of Local Languages:** The law designates **English, Hindi, Urdu, Bhoti, and Purgi** as **official languages** of Ladakh, while promoting **Shina, Brokskat, Balti, and Ladakhi** to preserve the region's **linguistic and cultural diversity.**

❍ **Representation for Women:** Ladakh Autonomous Hill Development Councils LAHDC Act, 1997 has been amended to reserve **one-third of the seats for women** in the LAHDC of Leh and Kargil, through **rotation**.

Why are Ladakhis Demanding 6th Schedule Status of the Constitution?

➢ **Constitutional Protection: Sixth Schedule status** is being demanded because, unlike regulations issued under **Article 240**—which can be **revoked or amended unilaterally by the Centre**— the **Sixth Schedule** is **constitutionally protected**, ensuring greater **autonomy** and **security** for **local governance**.

➢ **Safeguards for Land Rights: Sixth Schedule status** is needed to **restrict non-domiciles from buying land** in Ladakh whose **fragile ecosystem** is threatened by unchecked tourism and infrastructure development.

❍ With over **97% tribal population** dependent on land for their **cultural and economic survival**, protecting land rights is critical.

➢ **Legislative Autonomy: Sixth Schedule status** provides for Autonomous District Councils (ADCs) that can legislate on **land, forests, water resources, customary laws, and education**.

❍ LAHDCs remain **administrative bodies dependent on the Centre** for major decisions, limiting true **self-governance**.

➢ **Symbolic Cultural Recognition:** Sixth Schedule status is essential **for preserving indigenous languages** such as **Bhoti, Purgi**, and others, as it ensures **education in local languages** and the **use of Ladakhi dialects in official communication**.

❍ **ADCs** under the **Sixth Schedule have constitutional authority over primary education** and cultural preservation.

What is the Sixth Schedule of the Indian Constitution?

➢ **About:** The **Sixth Schedule** (Articles 244(2)) of the Constitution provides for the **administration of** tribal areas in the **four northeastern states — Assam, Meghalaya, Tripura, and Mizoram** — where tribes have largely preserved their traditional ways, unlike other tribal populations in India.

➢ **Key Features:**

❍ **Autonomous Districts and Regions:** Tribal areas are constituted as **autonomous districts**, which remain under the executive authority of the respective state.

- The **Governor** has the power to **organize, reorganize, or redefine** the boundaries of autonomous districts and divide them into **autonomous regions** if multiple tribes coexist.

❍ **Autonomous District and Regional Councils:** The Governor is empowered to create **Autonomous District Councils (ADCs)** and **Autonomous Regional Councils (ARCs)** in these four states.

- Each autonomous district has a **district council** of 30 members (26 elected by adult franchise and 4 nominated by the Governor), and currently, there are **10 such ADCs.**
- Autonomous regions have their own **regional councils.**
- Councils hold office for 5 years unless dissolved earlier.

❍ **Legislative Powers:** Both **ADCs** and **ARCs** can **make laws** on matters like **land, forests, water, shifting cultivation, village administration, marriage, inheritance, and social customs**, subject to the **Governor's assent**.

SPECIAL PROVISIONS FOR SOME STATES

Articles 371 to 371-J in Part XXI of the constitution contain special provisions for 12 states to meet the aspirations, protect cultural & economic interests or to deal with disturbed law & order conditions in the states.

Article 371, Maharashtra and Gujarat

- Part of the Constitution since 26 January 1950
- Governor responsible*

Article 371A, Nagaland

- **Added by:** 13th Constitutional Amendment Act, 1962
- Establishment of regional council consisting 35 members for Tuensang district
- Governor can make regulations for- peace, progress, law and order & good government
- Parliament Acts*

Article 371B, Assam

- **Added by:** 22nd Constitutional Amendment Act, 1969
- President authorized creation of a committee of Legislative assembly (LA) consisting of elected members from Tribal areas

Article 371C, Manipur

- **Added by:** 27th Constitutional Amendment Act, 1971
- President authorized creation of a committee of LA consisting of elected members of hill areas
- Assigns Governor to submit an annual report to the President on the administration

Articles 371 D & E, Andhra Pradesh and Telangana

- **Added by:** 32nd Constitutional Amendment Act, 1973
- **Articles 371 D:**
  - President can provide equitable opportunities & facilities to people from Andhra Pradesh in public employment and education
  - President is empowered for establishment of administrative tribunals
- **Articles 371 E:**
  - Empowers Parliament for establishment of Central University

Article 371-F, Sikkim

- **Added by:** 36th Constitutional Amendment Act, 1975
- Provides respect and preservation of existing laws, customs, & rights by the Parliament
- One seat allotted for Sikkim in Lok Sabha and forms one parliamentary constituency
- **Members in LA:** ≥30

Article 371-G, Mizoram

- **Added by:** 53rd Constitutional Amendment Act, 1986
- Parliament Acts*
- **Members in LA:** ≥ 40

Article 371H, Arunachal Pradesh

- **Added by: 55th Constitutional Amendment Act, 1986**
- Special responsibility on Governor concerning law and order & ceases on President's direction
- **Members in LA:** ≥ 30

Article 371-I, Goa

- **Added by:** 56th Constitutional Amendment Act, 1987
- **Members in LA:** ≥ 30

Article 371J, Hyderabad-Karnataka Region (Kalyana Karnataka)

- **Added by:** 98th Constitutional Amendment Act, 2012
- Governor responsible*

NOTE:

Parliament Acts* implies:

Acts of Parliament not applicable without consent of state assembly on matters:

- Religious and social practices
- Customary law and procedure
- Land rights
- Justice

Governor responsible* implies:

Governor of the state responsible for:

- Establishment of separate development board to make a provision to place a report before state LA annually
- Equitable allocation of funds for developmental expenditure
- Equitable arrangement (Article 371)/ Reservation of seats (Article 371-J) in educational and vocational training institutions, state government posts

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- **Judicial Powers:** Councils can constitute **village councils or courts** for tribal disputes and hear appeals.
  - The **High Court's jurisdiction** over these matters is defined by the Governor.
- **Administrative Powers:** Councils can manage **primary schools, dispensaries, markets, roads, ferries, fisheries**, and regulate **money lending and trading by non-tribals** with Governor's approval.
  - They can also **assess and collect land revenue and impose certain taxes.**
- **Autonomy from State and Central Laws:** Acts of Parliament or the state legislature may **not apply or apply with modifications** to these autonomous districts and regions.
- **Governor's Oversight:** The Governor can appoint commissions to review administration and **recommend dissolution** of councils if necessary.

NITI Aayog Calls for Cooperative Federalism

Why in News?

The **10th meeting of the Niti Aayog Governing Council** was held under the theme-***Viksit Rajya for Viksit Bharat@2047***. The meeting underscored the significance of fostering **cooperative federalism** to achieve national development objectives.

What are the Key Outcomes of the 10th Meeting of NITI Aayog Governing Council?

- **State-Specific Demands: Tamil Nadu** sought a **50% share in central taxes** (vs. current 33%) and a **Clean Cauvery Mission.**
  - **Punjab** demanded **fair Yamuna water rights** and **financial aid** for **border security** & **drug control.**
- **Emphasis on Trade & Investment:** States were asked to reduce **policy bottlenecks, repeal obsolete laws**, and create **investor-friendly environments**.
  - NITI Aayog was directed to prepare an '**Investment-friendly Charter'** to attract global investments.
- **Security Preparedness:** PM emphasized the need for **long-term security preparedness** and **modernized civil defense mechanisms.**
  - **Operation Sindoor** (targeting terror infrastructure in Pakistan) received **unanimous support** from attending states/UTs.
- **Economic & Industrial Development:** Chhattisgarh CM presented a **3T model (Technology, Transparency, Transformation)** to double its **GSDP in 5 years and 10 times per capita income.**
  - **Andhra Pradesh** suggested **sub-groups** on **GDP growth**, **population management**, and **AI-driven governance.**
- **Sustainable Development & Social Reforms: PM** pushed for **global-standard tourist spots** (one per state) and **green energy/hydrogen investments.**
  - Focus on **urban planning** in **Tier 2/3 cities**, **skilling youth in cybersecurity**, and boosting **women's workforce participation.**

What is Role of NITI Aayog in Fostering Cooperative Federalism?

- **Strengthened Competitive Federalism:** It promotes **healthy competition** among states via **data-driven indexes** and transparent rankings like the **Fiscal Health Index**, **Aspirational District Programme (ADP)**, **Composite Water Management Index**, and **State Energy and Climate Index**, driving sectoral improvements.
- **Enhanced Cooperative Federalism:** It acts as a bridge between **central and state governments**, aligning regional priorities with national goals.
  - Examples include the **Team India Hub** for collective development and the **ADP** focusing on **112 underdeveloped districts** through close ministry and partner collaboration.
- **Governance & Policy Advisory:** It shifted focus from financial allocation to **policy advisory** with a decentralized governance approach.
  - It supports states in establishing **State Institutions of Transformation (SITs)** for better governance and policy execution.
- **Regional & Inter-Sectoral Social Interventions:** It leads initiatives addressing disparities such as the **NITI Forum for the North East**, **SATH-E**, **Poshan Abhiyan**, **State Health Index**, and education reforms.

NITI Aayog

(National Institution for Transforming India)

HISTORY- PLANNING COMMISSION

Set up in 1950 to direct investment activity

Replaced by **NITI Aayog** on January 1, 2015

Composition of #NITIaayog

- ***Chairperson***
  - Prime Minister
- ***Governing Council***
  - CMs (States) and Lt Governors (UTs)
- ***Regional Councils***
  - Formed on need-basis, comprising CMs and Lt Govs of the region
- ***Members***
  - Full-time basis
- ***Part-time Members***
  - Max 2, rotational, from relevant institutions
- ***Ex-officio Members***
  - Max 4 from Council of Ministers, nominated by PM
- ***Special Inviters***
  - Experts, specialists, practitioners with domain knowledge
- ***Chief Executive Officer***
  - Appointed by PM for fixed tenure (Secy rank)
- ***Secretariat***
  - As deemed necessary

OBJECTIVES

- Foster **cooperative federalism**
- Develop mechanisms to **formulate credible plans (village level)**
- Interests of **national security** in economic strategy and policy
- Special **attention to weaker sections**
- Provide advice and encouragement to partnerships between **key stakeholders, national-international Think Tanks, research institutions**
- Create **knowledge, innovation and entrepreneurial support system**
- **Platform for** inter-sectoral and inter-departmental **issues resolution**
- Maintain **state-of-the-art Resource Centre**

NITI Aayog vs Planning Commission

NITI Aayog	*Planning Commission*
Advisory Think Tank	Extra-constitutional body
Wider expertise	Limited expertise
Secretaries (CEO) appointed by PM	Secretaries appointed by usual process
Bottom-up approach	Top-Down approach
No Mandate to impose policies	Imposed policies on states
No power to allocate funds	Allocated funds to ministries/state govts

Major Initiatives

- SDG India Index
- Atal Innovation Mission
- e-AMRIT Portal (electric vehicles)
- Good Governance Index
- India Innovation Index
- Aspirational District Programme
- 'Methanol Economy' programme

Issues

- **No powers** in granting **discretionary funds** to states
- Only an **advisory body**
- **No role in influencing private or public** investment
- **Politicisation of the organisation**
- **Lacks the requisite power** to bring positive change

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- By facilitating the sharing of successful models, like Gujarat's industrial corridors and Tamil Nadu's skill development programs, and promoting Public-Private Partnership (PPP) models NITI Aayog helps bridge the gap between developed and developing states.

- **Digital Transformation:** It drives innovation through the Atal Innovation Mission (including Atal Tinkering Labs and **Incubation Centres**), the **Knowledge and Innovation Hub**, and the **National Data and Analytics Platform (NDAP)**, alongside creating a **digital payments roadmap.**
  - NITI Aayog can expand **R&D hubs** to **Tier-2 and Tier-3 cities** (e.g., Pune's tech parks extending to Nagpur) and **mentor startups** in emerging states.

What Are the Major Challenges in Advancing Cooperative Federalism?

- **Lack of Federal Dialogue: Limited NITI Aayog governing council meetings** (only once a year) and **delayed GST Council sessions** leads to a shift from **collective solutions** to **individual grievances**, causing **policy paralysis** in key areas like **GST reforms** and **compensation disputes.**
- **Undermining Federalism:** The Centre has used **financial leverage to enforce compliance,** such as **withholding Tamil Nadu's central share of Samagra Shiksha Abhiyan funds** for opposing the National Education Policy, 2020. This action undermines the spirit of cooperative federalism, reducing it to mere rhetoric.
  - States have **limited input** in national schemes like PM-KISAN and **Smart Cities**, causing **implementation challenges.**
- **Unfair Tax Devolution:** States are demanding a **50% tax share** in the Finance Commission devolution (up from 41%), citing **GST's erosion of fiscal autonomy** and **sluggish revenue growth**.
  - **Richer states** like **Tamil Nadu, Karnataka, and Maharashtra** contribute more to the central pool of taxes but receive less in devolution, while **poorer states** like **Bihar, UP, and Jharkhand** stay reliant on **central grants**, deepening **fiscal inequality.**
- **Inter-State Disparities: Developed states** like **Maharashtra, Gujarat, and Tamil Nadu** grow faster due to **strong infrastructure,** while **weaker states** lag behind amid **policy bottlenecks.**
  - **Insufficient financial transfers between states** cause many people to migrate from poorer regions to richer ones like **Mumbai** and **Delhi**.
  - States like **Chhattisgarh** and **Odisha** contribute significantly through **natural resources (like minerals and forests)** but receive **less financial support** for development, limiting their growth**.**
- **Water & Border Disputes:** Persistent river disputes between states like **Cauvery (TN-Karnataka)** and **Yamuna (Haryana-Delhi)** remain unresolved.
  - This causes **water shortages** harming farmers (e.g., **Tamil Nadu's delta**) and escalates **political tensions** (e.g., Punjab's Sutlej-Yamuna Link **canal protest**).

DPDP Act, 2023 and DPDP Rules, 2025

Why in News?

The **Ministry of Electronics and Information Technology (MeitY)** invited **public feedback** on the Draft Digital Personal Data Protection (DPDP) Rules, 2025 for implementing the Digital Personal Data Protection (DPDP) Act, 2023.

- Currently, **stakeholder input** is under review, and the **final rules** are expected to be **enforced soon.**

What is the Digital Personal Data Protection Act, 2023?

- **About:** It is **India's first comprehensive data protection law**, offering a **legal framework** for handling **digital personal data**, with the goal of **safeguarding individual privacy** while permitting **lawful data processing**.
  - Enacted nearly **6 years after** the **Supreme Court's 2017** KS Puttaswamy judgment recognizing **privacy as a fundamental right** under **Article 21**, the Act is inspired by global frameworks like the **EU's** General Data Protection Regulations (GDPR) to outline **privacy** and **data protection obligations**.

- **Applicability:** The Act applies to **digital personal data** processed **within India**, whether **collected digitally** or **digitized later**, and to **data processing outside India** if done for **offering goods or services in India.**
  - It **does not apply** to **personal data** used for **personal purposes** or data **made public** by the **Data Principal** or under a **legal obligation.**
- **Consent: Personal data** can be processed only for a **lawful purpose** with the **consent of the Data Principal**, who may **withdraw consent** anytime. For **children** or **persons with disabilities**, it must be given by a **parent or legal guardian.**
  - Under **Section 9 of the DPDP Act, 2023**, **verifiable parental consent** is mandatory before processing **children's data**, and it **prohibits harmful processing** and **advertising targeting minors under 18 years.**
  - Any user **below the age of 18** has been defined as a **child** under the Act.
  - Consent is **not required** for **legitimate uses** like **government services** or **medical emergencies.**
- **Rights and Duties of Data Principal:** Data Principals (individuals whose personal data is being processed) have the right to **access information**, **request correction or deletion**, seek **grievance redressal**, and **nominate a representative** in case of death or incapacity.
  - They must **avoid false complaints or information**, with violations punishable by a **fine up to Rs 10,000.**
- **Obligations of Data Fiduciaries:** Data Fiduciaries (entity or organization that **collects, stores, processes, or uses personal data** of an individual) must **ensure data accuracy**, implement **security measures** to prevent breaches, and **notify the DPBI and affected individuals** if a breach occurs.
  - They are also required to **erase personal data** once its purpose is fulfilled and retention is no longer legally necessary.
- **Significant Data Fiduciaries (SDF):** The Central Government may designate certain Data Fiduciaries as **SDF** based on factors like **data volume, sensitivity, risk to individual rights**, and threats to **national security, sovereignty, democracy, and public order.**
  - SDFs have extra duties, including appointing a **Data Protection Officer**, an **independent auditor**, and conducting **impact assessments.**
- **Exemptions:** Rights of the data principal and obligations of data fiduciaries **(except data security)** will not apply in specified cases, including:
  - For **notified agencies**, in the interest of **security, sovereignty, public order**, etc.
  - For **research**, archiving or statistical purposes.
  - For **start-ups** or other notified categories of Data Fiduciaries.
  - To **enforce legal rights and claims**; or Prevention and investigation of offences
  - To perform **judicial or regulatory functions**;
  - To process in India **personal data of non-residents** under foreign contract.
- **Data Protection Board of India (DPBI):** The Act provides for the establishment of the **DPBI** by the **Central Government**, with members appointed for **two years** and eligible for **reappointment**.
  - Its **functions** include **monitoring compliance**, **imposing penalties**, handling **data breach responses**, **hearing grievances**, and appeals can be made to the **Telecom Disputes Settlement and Appellate Tribunal**.

Note: Section 44(3) of the DPDP Act amends **Section 8(1)(j) of the RTI Act**, removing the **"larger public interest"** test. Now, government bodies can **withhold personal information** under RTI requests **without considering public benefit**, simply by labeling it as **personal data.**

What are the Key Provisions of the Draft DPDP Rules, 2025?

- **Data Transfer:** The rules allow the transfer of **certain personal data outside India**, as approved by the government.
- **Data Erasure:** Data retention is allowed for up to **three years** from the last interaction with the **Data Principal** or the effective date of the rules, whichever is **later.**
  - The **Data Fiduciary** must notify the Data Principal **at least 48 hours before erasure.**

- **Digital-First Approach**: The rules also prescribe a **"digital by design" Data Protection Board of India** (DPBI) for consent mechanisms and grievance redressal, for **faster resolution of complaints** and grievances online.
- **Graded Responsibilities:** Graded responsibilities cater to **startups and MSMEs** with **lower compliance** burden, while **Significant Data Fiduciaries** have higher obligations.
  - Digital platforms with a large number of users such as **Facebook, Instagram, YouTube, Amazon, Flipkart, Netflix,** etc, will qualify as significant data fiduciaries.
- **Consent Managers:** The digital platform may also collect consent through **consent managers.**
  - A **Consent Manager** must be an Indian company with a minimum net worth of **Rs 2 crore**, responsible for managing the collection, storage, and use of user consent in data privacy and digital interactions.

What are the Key Concerns Associated with the Digital Personal Data Protection Act?

- **Excessive State Exemptions**: The Act grants **many exemptions to the State**, enabling **data collection, processing, and retention** beyond necessity, potentially **violating the fundamental right to privacy**.
- **Absence of Crucial Data Rights**: The Act **omits essential rights** like the **right to data portability** (to obtain and transfer one's personal data).
- **Unrestricted Cross-Border Data Flow**: It permits **free transfer of personal data to most countries**, with restrictions only at the discretion of the government—raising **data security and sovereignty concerns**.
- **Lack of Harm Prevention Measures**: The legislation fails to explicitly address **harms such as identity theft, financial fraud, or discriminatory profiling**, leaving data principals vulnerable.

Evolution of Right to Privacy in India

- **AK Gopalan Case, 1950:** The Supreme Court rejected the argument regarding the right to privacy.
- **Kharak Singh Case, 1962:** It was the first instance where the **Supreme Court of India granted relief based on the Right to Privacy**, though it did **not formally recognize it as a fundamental right** at the time.
- **A.P. Shah Committee 2011:** It recommended comprehensive **privacy legislation**, proposing a unified law to protect **privacy** and **personal data** in both **private and public sectors.**
- **B.N. Srikrishna Committee 2017:** It recommended stronger **privacy laws** in India, including **data processing restrictions**, a **Data Protection Authority**, the **right to be forgotten**, and **data localization.**
- **Justice K S Puttaswamy (Retd) vs Union of India Case, 2017:** The Supreme Court unanimously affirmed that the **right to privacy** is a **fundamental right** inherent to life and liberty under **Article 21.**

Global Practices on Data Governance

- **European Union(EU):** The EU's **General Data Protection Regulation (GDPR)** is a **comprehensive law protecting personal data**, recognizing privacy as a **fundamental right** that safeguards individual dignity and control over personal information
- **China:** The **Data Security Law (DSL)** mandates **classifying business data** by importance and imposes **new restrictions on cross-border data transfers**.
  - The **Personal Information Protection Law (PIPL)** grants Chinese data principals new rights to prevent the misuse of personal data.
- **United States:** The US lacks a **comprehensive privacy law** like the EU's GDPR, relying instead on **sector-specific regulations**. Government data use is governed by broad laws like the **Privacy Act**, while the private sector follows limited, sector-specific rules.

Economic Scenario

Highlights

Revamping India's BFSI Sector

Why in News?

India's **Banking, Financial, Services and Insurance (BFSI)** sector faces ongoing **structural challenges**, including **fragmented regulations, a shallow corporate bond market,** and **unregulated shadow banking**, highlighting the need for **comprehensive reforms** to **strengthen and stabilize** the financial system for sustainable growth.

What is the Current Status of India's BFSI Sector?

- **About:** The BFSI sector refers to **Banking, Financial Services, and Insurance**, which collectively form the backbone of a country's financial infrastructure.
  - It includes institutions such as **banks, non-banking financial companies (NBFCs), insurance firms, mutual funds, pension funds,** and **fintech companies** that provide financial products and services to individuals and businesses.
- **State of India's BFSI Sector:**
  - **Rapid Expansion and Changing Sector Dynamics:** India's BFSI sector saw a **50-fold surge in market capitalisation**, from **Rs 1.8 trillion in 2005** to **Rs 91 trillion in 2025**, with a **CAGR of around 22%**.
    - While **banks remain foundational,** their **share in total market cap dropped** from **85% to 57%**, as **Non-Banking Financial Companies (NBFCs) and fintechs** gained ground through agility, innovation, and targeted financial solutions.
  - **Rise of Fintechs and NBFCs:** Since **2015,** the fintech sector has **grown exponentially**, now valued at over **Rs 12 trillion**.
    - Alongside, **NBFCs have expanded significantly**, bridging credit gaps for underserved populations, particularly in **rural and informal sectors,** thereby enhancing **financial inclusion.**
  - **Resilience & Financial Strength:** The **BFSI sector's contribution** to **Nifty-50** earnings (share of profits made by companies in the BFSI industry within the total earnings of the top-50 companies listed on the stock market) **increased from 16% in FY10 to 33% in FY24,** supported by **better asset quality, strong credit demand, and lower provisioning**.
    - By FY24, banks' net worth reached Rs 26 trillion and NBFCs' Rs 12.4 trillion, strengthening the sector's resilience.

What are the Key Challenges Related to India's BFSI Sector?

- **Fragmented Regulatory Framework:** India's BFSI sector faces challenges due to a **fragmented regulatory structure,** with different regulators like **RBI, SEBI, and IRDAI** overseeing various segments.
  - This leads to **overlapping jurisdictions, regulatory gaps, and inconsistent supervision**, resulting in **compliance complexities** and **operational inefficiencies for financial institutions.**
    - The **RBI's directive to the National Stock Exchange (NSE) to build a secondary bond**

market was ignored, as **equity trading offers higher profits**—often through **opaque algorithmic strategies** that have drawn scrutiny.

- **Underdeveloped Corporate Bond Market:** India's corporate bond market remains **shallow, illiquid, and opaque** which **keeps the cost of capital high, hampering business viability** and economic growth.
  - India's **domestic corporate bond market,** valued at around **Rs 64 trillion,** represents only **18–20% of the country's nominal GDP.**
- **Opacity in Ownership and UBO Disclosure** India faces challenges in **ensuring transparency of capital flows** and **ownership in its financial markets** due to **lack of effective disclosure of the Ultimate Beneficial Owner (UBO)**.
  - Current **thresholds for UBO disclosure** (10% for companies and 15% for partnerships) **allow investors to structure their holdings just below the limit to avoid reporting.**
    - Investors **often keep holdings just below disclosure limits (e.g., 9.9%)** to **evade UBO rules**, hindering SEBI's ability to trace actual control.
  - Some **Foreign Portfolio Investors (FPIs) resist sharing detailed ownership data**, weakening SEBI's oversight. Despite India's **Financial Action Task Force (FATF)** commitments, **poor implementation** hampers enforcement, transparency, and investor trust.
- **Weak Insurance Penetration:** Despite rising awareness, **insurance penetration in India remains low** by global standards. As of 2023, it stood at just **4.2% of GDP,** indicating **limited coverage and underutilization of insurance** as a financial safety net.
- **Non-Performing Assets (NPAs):** Despite recent declines, **Non-Performing Assets** remain a key challenge for Indian banks, especially **public sector banks. High levels of bad loans** constrain their lending capacity to productive sectors.
  - Measures like the **Insolvency and Bankruptcy Code (IBC)** and **bank recapitalization** have been undertaken, yet the **NPA ratio continues to affect the overall efficiency** and **stability of the banking system**.
- **Shadow Banking Risks:** Shadow banking (where **NBFCs, margin lenders, and brokers** provide **banking-like services without comprehensive regulation)**, poses a significant **threat to India's financial stability**.
  - Retail investors **frequently end up paying high interest rates (over 20%)** on **margin loans,** as brokers lend back the investor's own funds and charge interest on the entire amount.
  - The scale of such unregulated lending remains unclear to regulators, raising concerns about **financial stability akin to the 2008 global financial crisis** triggered by unregulated derivatives.
- **Cybersecurity Threats:** With growing digital adoption in the BFSI sector, cybersecurity **risks have intensified**. The **rise in online banking and digital payments** has **increased vulnerability to data breaches,** fraud, and cyber-attacks.
  - In 2024, over **1.35 lakh phishing attacks targeting India's financial sector** were reported by cybersecurity firm Kaspersky.

What are the Key Committees Related to Financial Sector Reforms in India?

Area	Committee	Key Focus
Banking Reforms	**Narasimham Committee**	Banking sector reform, Asset Reconstruction
Financial Sector Reforms	**Raghuram Rajan Committee**	Overall financial sector reform
Bank Licensing	**Bimal Jalan Committee**	New bank licenses
NBFC Regulation	**A.C. Shah Committee**	Regulation of NBFCs
Cooperative Finance	**R.N. Mirdha Committee**	Cooperative societies
	Marathe Committee	Licensing of Urban Cooperative Banks
Banking Technology	**Rangarajan Committee**	Computerization of banks

NPAs & Credit Issues	**Khanna Committee**	Non-performing assets (NPAs)
	S.S. Kohli Committee	Willful defaulters
Financial Inclusion	**Nachiket Mor Committee**	Payment banks
	H.R. Khan Committee	Business Correspondent (BC) model
Rural & Priority Sector Banking	**M.L. Dantwala Committee**	Regional Rural Banks (RRBs)
	Gadgil Committee	Lead banking scheme
Capital Markets & Investment	**Sodhani Committee**	Forex & NRI investments
	Y.V. Reddy Committee	Small savings reform

Digital Platforms to Enhance India's PDS System

The **Union Minister for Consumer Affairs, Food and Public Distribution** has launched 3 digital initiatives- **Depot Darpan Portal**, **Anna Mitra Mobile App**, and **Anna Sahayata Grievance Redressal System**.

- These initiatives aim to improve **transparency, efficiency, and accessibility** within India's Public Distribution System (PDS), benefiting over 81 crore people under the National Food Security Act.

What are Depot Darpan Portal, Anna Mitra Mobile App and Anna Sahayata?

- **Depot Darpan Portal:** Depot Darpan is a **self-assessment and monitoring portal** for food grain depots managed by the Food Corporation of India (FCI) and Central Warehousing Corporation (CWC).
  - **Key Features:**
    - **Tech-Driven Ratings:** It uses a **composite rating system** evaluating **occupancy, profitability, storage efficiency, safety, environmental sustainability**, and **statutory compliance**, supported by **IoT sensors, CCTV, live video feeds**, and **real-time analytics**.
    - The portal is expected to result in **Rs 275 crore in savings for FCI** and generate **Rs 140 crore additional revenue for CWC** by **optimizing storage space and operations**.
- **Anna Mitra App:** Anna Mitra is a **mobile app** designed for Fair Price Shop (FPS) **dealers**, **District Food & Supply Officers (DFSO)**, and **Food Inspectors** under the Public Distribution System (PDS).
  - **Key Features:**
    - **Role-Based Functionalities:** It enables **FPS dealers** to track stock receipts, sales, and alerts; **DFSO** to monitor FPS performance, handle grievances, and access beneficiary data; and **inspectors** to conduct **geo-tagged inspections**.
    - Aimed at **enhancing transparency and accountability**, the app is **piloted in Assam, Uttarakhand, Tripura, and Punjab**, and is available in **Hindi and English**.
- **Anna Sahayata Platform:** Anna Sahayata is a **grievance redressal platform** for beneficiaries of **PMGKAY** and the National Food Security Act (NFSA), 2013, covering over **81 crore people**.
  - It enables grievance registration via **WhatsApp, IVRS,** and **Automatic Speech Recognition (ASR)**, improving **accessibility, accountability, and efficiency**.

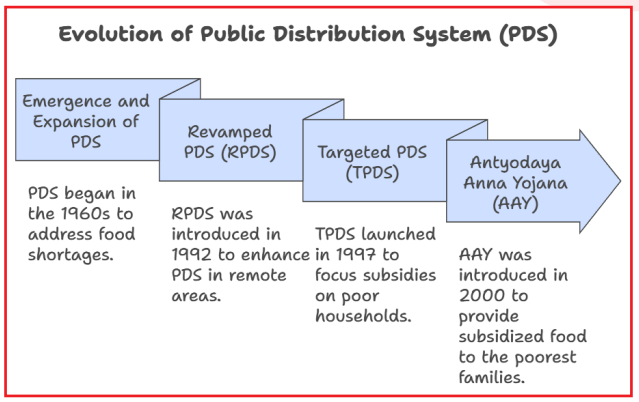
What is the Public Distribution System (PDS)?

- **About:** The PDS is a **food security mechanism** that provides **essential foodgrains at subsidized rates** to vulnerable populations.
  - It is governed by the **NFSA, 2013** covering about **two-thirds of the population** based on **Census 2011**.
  - PDS mainly supplies **wheat, rice, sugar, and kerosene**, with some states also distributing **pulses, edible oils, and salt.**
- **Implementation:** Jointly managed by the **Centre and States/UTs,** the **Central Government (through FCI) overseas procurement, storage, transportation, and bulk allocation of foodgrains**.

- While **State Governments handle local distribution, beneficiary identification, ration card issuance, and Fair Price Shop (FPS) operations**.

➢ **Initiatives to Reform India's PDS:**

- Anna Chakra is a **supply chain optimization tool** for the **PDS** to reduce transport distances by 15–50% and save Rs 250 crore annually.
- **SCAN (System for Computerized Allocation and Notification) streamlines food subsidy claims** through a **unified, automated, rule-based portal.**
- One Nation One Ration Card (ONORC)
- **Technology-Driven Reforms in PDS:**
  - **SMART-PDS Scheme (2023–2026)** to upgrade technology in **End-to-End Computerization and Integrated Management of PDS (ImPDS).**
  - **Computerized FPS** and use of **POS machines for real-time authentication** and tracking of grain distribution.
  - **Aadhaar linkage** improves beneficiary identification; **DBT enables cash transfers.**
  - **GPS tracking** of grain delivery and **SMS alerts** to update citizens on dispatch and arrival.



Reforming Special Economic Zones in India

Why in News?

The **Ministry of Commerce & Industry** has introduced key amendments to the Special Economic Zones (SEZ) Rules, 2006, to encourage **investment and streamline operations** in **semiconductor and electronics** component manufacturing.

➢ These changes aim to **foster high-tech sector growth**, which is **capital-intensive, import-dependent**, and requires **long gestation periods** to become profitable.

➢ Following recent amendments, **Micron will develop a semiconductor SEZ in Sanand, Gujarat**. Aequs Group will also set up an electronics component **SEZ in Dharwad, Karnataka.**

What are the Key Changes in SEZ Rules for Semiconductor and Electronics Manufacturing?

➢ **Reduced Land Requirement for SEZs:** The **minimum land requirement** for SEZs in semiconductor and electronics manufacturing has been **reduced from 50 Ha to 10 Ha**, lowering **entry barriers** and facilitating the setup of **high-tech units.**

➢ **Relaxation in Land Encumbrance Rules:** The Board of Approval can now **relax the encumbrance-free land requirement** if land is **mortgaged or leased** to the **Central/State governments or their agencies**, offering **greater flexibility** in **land acquisition and financing.**

- The **Board of Approval** is the **apex body** for SEZs and is headed by the **Secretary, Department of Commerce** (**Ministry of Commerce and Industry**).

➢ **Inclusion of Free-of-Cost Goods in Net Foreign Exchange:** The amended rule allows **free-of-cost goods** to be included in **Net Foreign Exchange (NFE) calculations** i.e., their value **can be added to exports or subtracted from imports**, improving the SEZ unit's **NFE performance.**

➢ **Allowance to Domestic Sales: SEZ units** in **semiconductor and electronics manufacturing** can now **supply to the Domestic Tariff Area (DTA)** after paying duties, **enhancing viability** by **accessing the Indian market** and **reducing export dependence.**

What are Special Economic Zones (SEZ)?

➢ **About:** A **SEZ** is a **duty-free enclave** treated as **foreign territory** for the purpose of **trade, tariffs, and operations**. Any **private/public/joint sector or State Government** or its **agencies** can set up SEZ.

- SEZs were first introduced in **India in 2000** under the Foreign Trade Policy, replacing the earlier **Export Processing Zones (EPZs)**. They are governed by the **SEZ Act, 2005** and **SEZ Rules, 2006**.
- The **Development of Enterprise and Service Hubs (DESH) Bill, 2022** aims to replace the **SEZ Act, 2005** and **transform SEZs** into more flexible and inclusive **Development Hubs**.
  - These hubs will be **exempt from many existing regulatory restrictions** and will support **both export-oriented and domestic investments**, functioning as **integrated zones** for international and domestic trade.

- **SEZ Types:** The area under **SEZ** includes a wide range of **zone types**, such as **Export Processing Zones (EPZ)**, **Free Zones (FZ)**, **Industrial Estates (IE)**, **Free Trade Zones (FTZ)**, **Free Ports**, **Urban Enterprise Zones**, and others.
  - Currently, **276 SEZs** are **operational in India. Total exports from SEZs** in **2023-2024** stood at **USD 163.69 billion.**
  - E.g., Gujarat International Finance Tec-City **(GIFT City, India).**
- **Objective:**
  - To create **additional economic activity**
  - To boost the **export of goods and services**
  - To generate **employment**
  - To boost **domestic and foreign investments**
  - To develop **infrastructure facilities**
- **Incentives offered to SEZs:**
  - **Duty-free import/domestic procurement** of goods for the **development, operation, and maintenance** of SEZ units
  - **Exemption** from **Central Sales Tax**, **Service Tax**, and **State Sales Tax** (now **subsumed under GST**)
  - Other **levies exempted** by respective **State Governments**
  - **Supplies to SEZ** are **zero-rated** under the **IGST Act, 2017**
  - **Single-window clearance** for **Central and State level approvals**
  - External Commercial Borrowing (ECB) by **SEZ units** is allowed **up to USD 500 million per year** with **no maturity restriction**, through **recognized banking channels**.

What are the Key Challenges Faced by SEZs in India?

- **Declining Cost Competitiveness:** Indian SEZs face declining cost competitiveness mainly due to rising input costs such as raw materials, energy, and logistics, which are significantly higher than in competing countries like China and Vietnam.
  - **OECD tax norms** (15% minimum corporate tax) may further **reduce SEZ incentives** for multinational companies in SEZs.
  - **SEZ subsidies** are under **World Trade Organization (WTO) scrutiny**, with rising pressure to **phase out export-linked incentives** to align with global trade rules.
- **Land Acquisition & Infrastructure Issues:** SEZs face challenges such as **high land costs**, **poor connectivity and logistics**, and **irregular power and water supply**, all of which hinder timely development and reduce manufacturing efficiency.
- **Regulatory & Compliance Burdens:** Despite **single-window clearance**, SEZs face **delays from multiple agencies**, while **positive forex obligations**, **frequent audits**, and **high compliance costs** burden startups and R&D-focused firms.
- **Limited Domestic Market Access:** SEZ units face **high duties on Domestic Tariff Area (DTA) sales** and **unequal competition** from **non-SEZ firms receiving Production Linked Incentive (PLI) Scheme benefits**, reducing their overall attractiveness.
  - Furthermore, with **around 70% of SEZs concentrated in IT and related services,** manufacturing occupies a much smaller portion, potentially hindering wider industrial development goals.
- **Underutilization & Vacant SEZs:** A **40% gap** between approved and notified SEZs and over **60% gap** between notified and operational ones highlight **long gestation periods**, **poor viability assessment**.
  - Some SEZs are misused for **real estate development**, shifting focus from **export-oriented manufacturing** to **commercial hubs.**
- **Environmental & Sustainability Concerns: Rapid industrialization in SEZs** often causes **pollution and resource depletion**, worsened by **weak enforcement of environmental regulations.**

Baba Kalyani Committee (2018)

- The **Ministry of Commerce and Industry** constituted a committee in **June 2018**, chaired by **Mr. Baba Kalyani** to review India's **SEZ policy** and recommend strategic measures to align with global opportunities and domestic economic goals.
- **Major Recommendations:**
  - **Rename SEZs as 3Es – Employment and Economic Enclaves:** Shift focus from **export-centric** zones to **employment and economic growth** hubs.
    - Target **domestic demand**, not just exports.
  - **Delink from Net Foreign Exchange (NFE) Performance:** Allow **domestic supplies and payments in Rupees**
    - Incentives to be based on **investment, job creation**, **women employment**, **value addition**, and **technology differentiation.**
  - **Separate frameworks for manufacturing and services SEZs**: Create **sector-focused enclaves** for better demand and synergy
  - **Ease of Doing Business (EoDB):** Establish **one integrated online portal** for investment, operations, and exits
  - **Infrastructure Development:** Develop high-quality infrastructure including **high-speed rail**, **expressways**, **ports**, **warehouses**, and **airports.**
    - Enable **walk-to-work zones** for integrated **industrial-urban development.**

What are the Other Key Government Initiatives Related to Industrial Development?

- **National Investment and Manufacturing Zones (NIMZ):** NIMZs (like **Prakasam** in Andhra Pradesh and **Sangareddy** in Telangana) are **large, integrated industrial townships** developed under India's **National Manufacturing Policy (NMP), 2011** to **boost manufacturing growth**, **create jobs**, and enhance **global competitiveness.**
- **Industrial Parks: Industrial Parks** (or **Industrial Estates** or **Industrial Zones**) are **designated areas** developed with **infrastructure**, **utilities**, and **policy incentives** to promote **manufacturing**, **logistics**, and **industrial activities**.
  - They provide businesses with **ready-to-use facilities**, reducing **setup costs** and **operational hassles**.
  - E,g., **Manufacturing Parks** (for factories & production units), **Food Processing Parks** (for agri-based industries).
- **National Industrial Corridor Development Programme (NICDP):** NICDP aims to develop **world-class industrial nodes**, **smart cities**, and **logistics hubs** along key transport routes, with **11 industrial corridors** planned to connect major **economic hubs** across India.

World Energy Investment Report 2025

Why in News?

The International Energy Agency (IEA) released the **10th edition of its World Energy Investment Report**, revealing critical insights into worldwide energy investment trends.

What are the Key Highlights of the World Energy Investment Report 2025?

- **Energy Investment Trends: Global energy investment** is projected to reach a **record USD 3.3 trillion**. Of this, **clean energy technologies** will attract **USD 2.2 trillion**, **twice the investment** in fossil fuels (**USD 1.1 trillion**).
  - This surge reflects efforts to **cut emissions**, enhance **energy security**, and leverage the **cost competitiveness** of **electricity-based solutions.**
- **Clean Energy Investment: Global spending on low-emissions power generation** has nearly **doubled in five years**, led by solar PV, with **solar investment** expected to reach **USD 450 billion in 2025**. Battery storage is also rising sharply, surpassing **USD 65 billion** this year.
  - Nuclear power **investment** has grown by **50%**, projected to reach **USD 75 billion** in 2025.
- **India Stand in Global Energy Investment:** India's **renewable power investment** rose from **USD 13 billion (2015)** to **USD 37 billion (2025)**.

- **Fossil fuel investments** also increased, from **USD 41 billion to USD 49 billion**, while **nuclear and other clean sources** grew from **USD 1 billion to USD 6 billion**.
- However, **grid and storage investments** declined from **USD 31 billion to USD 25 billion** over the same period.

- **Regional Investment Patterns:**
  - **China:** China is set to account for **over 25%** of **global energy investments** in **2025**, surpassing all other countries.
    - Overall, **China's total energy spending** equals that of the **US and EU combined.**
  - **Africa: Fossil fuel investments** fell while **clean energy investment** grew marginally.
    - Despite having **20% of the world's population**, **Africa accounts for only 2%** of **global clean energy investment**.
- **Fossil Fuel Investments:** Investment in **oil exploration and production** is expected to **drop by 6% in 2025**, while **LNG investments** are rising sharply, driven by **major projects in the US, Qatar, and Canada**.
  - **Coal investment** stays strong, with **China starting 100 GW** of new coal power in **2024**, pushing **global approvals** to the **highest since 2015.**
- **Grid Infrastructure Investment:** While **generation investment** is set to hit **USD 1 trillion in 2025**, **grid spending lags behind** at just **USD 400 billion**.
  - This gap is widening as **material costs** for grid infrastructure have **nearly doubled** in five years due to **soaring demand.**

International Energy Agency (IEA)

- **About: IEA** is a **Paris-based intergovernmental organization** established in **1974** by the **Organisation for Economic Co-operation and Development (OECD)** countries in response to the 1973 **oil crisis**.
  - It serves as a **key global energy policy advisor**, providing **data, analysis, and recommendations** to ensure **affordable, secure, and sustainable energy** for its **member countries and beyond**.
- **Focus:** It has four main areas of focus: **energy security, economic development, environmental awareness, and engagement worldwide**.
- **Members:** The IEA is made up of **32 Member countries** and **13 Association countries** including **India**. 4 countries are currently seeking IEA membership: **Chile, Colombia, Israel and Costa Rica.**
  - A candidate country to the IEA **must be a member country of the OECD.**
- **Major Publications:** **World Energy Outlook Report, India Energy Outlook Report**, **World Energy Investment Report**.

Foreign Direct Investment in India

Why in News?

According to the **Reserve Bank of India (RBI),** India's **net foreign direct investment (FDI) crashed** from **USD 10.1 billion** in **2023–24**, and just **USD 0.4 billion** in **2024–25.**

- The sharp decline in net FDI is mainly due to **increased repatriation and disinvestment** by foreign firms, totaling **USD 51.5 billion** in 2024-25, coupled with a rise in **Outward FDI (OFDI)** by Indian companies.

What is Foreign Direct Investment?

- **About: FDI** refers to **investment** made by a **person residing outside India** through **capital instruments** in either an **unlisted Indian company** or in at least **10%** of the **post-issue paid-up equity capital** (on a fully diluted basis) of a **listed Indian company**.
  - It is typically a **long-term investment** and mainly represents a **non-debt capital flow**.
- **FDI Routes:** Under the **FDI Scheme**, non-residents can invest in **shares**, **fully convertible debentures**, and **preference shares** of Indian companies through **two routes**:
  - **Automatic Route:** An overseas investor is **only required to inform the RBI** after the investment is made.
    - E.g., **Agriculture & Animal Husbandry**, Air-Transport Services, Auto-components, Automobiles, Biotechnology (Greenfield) etc.

FDI and FPI

Foreign Direct Investment (FDI)

- ***About:***
  - Investment made by foreign entities/individuals in businesses and assets located in a different country
- ***FDI Routes:***
  - Automatic Route:
    - No prior government approval required
    - Up to 100% allowed in non-critical sectors
  - Government Approval:
    - Necessary in certain sectors or for investments above specific thresholds
    - Administered by Department for Promotion of Industry and Internal Trade (DPIIT) and RBI
- ***Examples of Approval via Auto and Govt Route:***
  - Banking (Private sector): up to 49% (auto) + above 49% and up to 74% (Govt)
  - Defence: up to 74% (auto) + above 74% (Govt)
  - Healthcare (Brownfield): up to 74% (auto) + above 74% (Govt)
  - Telecom Services: up to 49% (auto) + above 49% (Govt)
- ***Foreign Investment Promotion Board (FIPB):***
  - Comes under Ministry of Finance
  - Responsible for processing FDI proposals - facilitated by Foreign Investment Facilitation Portal (FIFP)
  - Making recommendations for Government approval

Govt's prior approval is mandatory for FDIs from countries sharing land border with India (China, Bangladesh, Pakistan, Bhutan, Nepal, Myanmar and Afghanistan)

- ***India's Top 5 FDI Sources (FY 2022-23):***
  - Mauritius
  - Singapore
  - USA
  - Netherland
  - Japan
- ***India's Top Sectors Attracting FDI (FY 2022-23):***
  - Services Sector
  - Computer Software & Hardware
  - Trading
  - Telecommunications
  - Automobile Industry

Foreign Portfolio Investment (FPI)

- ***About:***
  - Investments made by foreign individuals, institutions, or funds in financial assets
  - Known as Fly by Night or Hot Money
- ***Imp Features:***
  - Purchase of financial assets occur without gaining ownership
  - Passive investment approach
  - Investors earn returns through dividends, interest, and capital appreciation
- Example:
  - Stocks, Bonds etc.
- Regulatory Body:
  - Securities and Exchange Board of India (SEBI)

Difference between FDI and FPI

Features	*FDI*	*FPI*
Nature of Investment	Long-term	Short-term
Objective	Long-term presence in a foreign country	Earning quick returns on investments
Control	Significant (over the invested entity)	No or limited control
Investments in	Tangible assets (e.g., factories, buildings)	Financial assets (e.g., stocks, bonds)
Returns	Profits, Dividends, and Capital appreciation	Dividends, Interest, and Capital appreciation
Policy Regulations	Govt policies and sector -specific regulations	Flexible regulations and easier entry/exit
Impact on Economy	Job creation, technology transfer, and economic growth	Short-term liquidity and impact on stock market performance

Drishti IAS

- **Government Approval Route:** A **foreign investor** must obtain **prior approval** from the relevant **Ministry or department** before proceeding.
  - Banking & Public Sector, **Broadcasting Content Services**, Food Products Retail Trading, Uploading/Streaming of 'News & Current affairs' through digital media etc.

➢ **FDI Regulation:** Currently, **FDI in India** is regulated by the **FDI Policy 2020** and the **FEMA (Non-debt Instrument) Rules, 2019** under the Foreign Exchange Management Act (FEMA), 1999.

- The **Department for Promotion of Industry and Internal Trade (DPIIT)**, under the **Ministry of Commerce and Industry**, is the main regulator of **FDI in India**.
- **RBI** also plays a key role by enforcing the **FDI Rules.**

➢ **FDI Prohibition in India:** FDI is **strictly prohibited** in sectors like **atomic energy generation, gambling and**

betting, lotteries, chit funds, real estate, and the **tobacco industry.**

- **Current Status of FDI in India:**
  - **Strong Gross FDI Inflows: Gross FDI** rose to **USD 81 billion** in **2024–25**, up from **USD 71.3 billion** in **2023–24** and **$71.4 billion** in **2022–23**.
    - Key sectors attracting FDI were **manufacturing**, **financial services**, **energy**, and **communication services**, together making up **over 60%** of total inflows.
    - Top investing countries—**Singapore**, **Mauritius**, **UAE**, **Netherlands**, and the **United States**—contributed **over 75%** of gross FDI.
  - **Outward FDI by Indian Companies: Outward FDI** by Indian companies surged to **USD 29.2 billion** in **2024–25**, a **75% increase** from 2023-24.
    - Top destination countries for Indian OFDI were **Singapore**, **United States**, **UAE**, **Mauritius**, and the **Netherlands.**
    - The sectors driving over **90%** of OFDI growth included **financial, banking and insurance services**, **manufacturing**, and **wholesale and retail trade, restaurants, and hotels.**
  - **Mature Investment Ecosystem: Repatriation and disinvestment** by foreign companies in India rose to **USD 51.5 billion** in **2024–25**, indicating a **mature market** that allows **smooth entry and exit**, reflecting positively on the **Indian economy.**

Note: To prevent opportunistic takeovers or acquisitions of Indian companies amid the Covid-19 pandemic, the Government amended the **FDI Policy 2017.**

- It mandates that entities from countries sharing a **land border with India**, or whose **beneficial owners** are from such countries, can invest in India **only with prior government approval.**
- For the above purposes, India identifies **Pakistan**, **Afghanistan**, **Nepal**, **Bhutan**, **China (including Hong Kong)**, **Bangladesh**, and **Myanmar** as **countries sharing a land border** with India (**Bordering Countries**).

What are the Primary Drivers Behind the Growing Trend of Outward FDI by Indian Companies?

- **Global Expansion for Market Diversification:** Indian firms are **investing abroad** to access **new markets** in **Africa**, **Southeast Asia**, and **developed economies**, with companies like **Tata**, **Reliance** expanding globally to **reduce reliance on the Indian market.**
  - In April 2025, India's **outward FDI** rose sharply by 90% YoY to **USD 6.8 billion**, led by **Tata Communications, LIC, and JSW Neo Energy**.
- **Securing Access to Critical Resources:** Resource acquisition is a **key driver** for outward FDI by Indian firms, as they look to secure **essential natural resources like oil, gas, minerals, and agricultural products** to ensure long-term supply chains.
  - Companies like **ONGC Videsh and Adani Group** have actively invested in international resources, particularly in **oil and gas fields** and **mining operations**, to meet both domestic and international demands.
- **Gaining a Competitive Edge through Cost Efficiency:** Firms like **Infosys**, **TCS**, and **Sun Pharma** expand to **low-cost countries** (e.g., **Eastern Europe**, **Mexico**), while Indian auto firms invest in **ASEAN** to **bypass strict non-tariff barriers of** developed countries.
  - Also, Companies like **Havells and Dixon Technologies** have expanded their manufacturing units and export operations to the US, aiming to tap into the **North American market.**
- **Capitalizing on Trade Agreements:** As India increasingly signs **Free Trade Agreements (FTAs)** with countries and regional blocks such as the **India-UAE FTA** and **Australia-India Economic Cooperation and Trade Agreement (ECTA)**, Indian firms are positioning themselves to benefit from reduced tariffs, easier market access, and improved business relations with trading partners.
- **Globalization of Service Sector: Globalization** of Indian service sector **firms**—especially in **IT, fintech, and banking**—drives **outward FDI** as companies expand into developed markets to **strengthen client ties**, **ensure regulatory compliance**, **improve service delivery**, and **access new customer bases** for long-term growth**.**

Why is Foreign Direct Investment Pivotal to India's Sustainable Economic Transformation?

- **Macroeconomic Growth:** FDI contributes to **capital formation, infrastructure development, and industrial expansion**.

- In 2020, Facebook invested **USD 5.7 billion** in Jio Platforms, marking the largest deal in India's tech sector and strengthening the digital economy.

- **Employment Opportunities:** Foreign investments have been pivotal in driving job creation across various sectors. By funding startups, establishing factories, offices, and R&D centers, foreign companies generate millions of jobs.
  - E.g., India's **startup ecosystem**, heavily supported by **FDI**, has generated over **1.6 million jobs** across the country.
- **Advanced Technology & Innovation:** FDI brings **advanced technology**, **automation**, and **R&D** to India, enhancing global competitiveness through **technology transfer** and **best practices** from multinational corporations.
  - E.g., Tesla's proposed EV and **battery plant in India** could introduce **advanced battery technology** like **Powerwall**, supporting **India's renewable energy goals**.
- **Infrastructure Development:** FDI has been instrumental in financing large-scale projects that enhance the country's infrastructure capacity such as **roads**, **ports**, **airports**, and **smart cities**.
  - **E.g., Japan** is investing in the Mumbai-Ahmedabad Bullet Train, and **Singapore's** sovereign wealth fund**, GIC, is investing** over **USD 615 million** in Indian roads.
- **Enhanced Exports:** FDI plays a **crucial role** in transforming India into a **key export hub,** helping reduce the **trade deficit** by boosting **foreign exchange earnings**. Foreign companies set up **production facilities** in India that cater to both d**omestic and global markets,** enhancing India's export capacity.
  - **E.g., iPhone exports** from India surged to **USD 12.1 billion in 2023-24**, while **Toyota** and **Hyundai** export cars from India to **Africa** and **Europe.**
- **Encourages Competition & Efficiency:** The influx of **FDI** encourages **domestic companies** to enhance their **competitiveness** by adopting **international standards** of **quality**, **efficiency**, and **customer service.**
  - **E.g., Amazon** and **Flipkart** encouraged Indian retailers to **go digital**, while **Starbucks** and **McDonald's** raised **food service standards** in India.

What are the major barriers to attracting and sustaining FDI in India?

- **Challenging Regulatory Environment: Complex regulations** such as **tax laws** and **transfer pricing** create **compliance challenges** for foreign investors, leading to **legal disputes**, **financial losses**, and **loophole exploitation**.
  - E.g., **Vodafone** faced legal issues due to **retrospective taxation.**
- **Infrastructural Deficiencies:** Although there has been **significant progress**, India still faces **challenges related to inadequate infrastructure**, especially in sectors like **transportation**, **power supply**, and **logistics** (**14–18% of GDP** as per Economic Survey 2022–23).
  - **Poor infrastructure** can **increase the cost of doing business**, cause **delays in supply chains**, and **discourage FDIs.**
- **Challenges in Market Competition:** Structural challenges in India's market, such as **predatory pricing** by **e-commerce platforms**, hinder **fair competition** and pressure traditional retailers.
  - Although **regulations exist**, bodies like the Competition Commission of India (CCI) struggle to effectively curb **anti-competitive practices** and ensure a **level playing field**.
- **Uneven Distribution of FDI: FDI inflows** are heavily concentrated in a few **sectors** like **services** and in **urban areas** of states such as **Maharashtra** and **Karnataka**, causing unequal **development opportunities**.
  - Additionally, **inadequate infrastructure**, especially in **rural areas**, deters **FDI attraction.**
- **Environmental and Sustainability Concerns:** As global investors prioritize **sustainability** and **environmental responsibility**, India's **environmental regulations** and **enforcement mechanisms** have raised concerns.
  - While India has improved its **environmental laws**, the **implementation** of rules on **pollution**, **waste management**, and **resource conservation** remains **inconsistent**.
  - E.g., **Mining** in the Niyamgiri Hills faced strong opposition from **activists.**

PM-PRANAM Scheme

Why in News?

The PM-PRANAM scheme, aimed at **reducing synthetic fertilizer use**, has shown **initial success** with a **reduction of 15.14 lakh tonnes** of fertilizers in **2023–24**, resulting in **substantial subsidy savings**.

Note: Karnataka alone accounted for **30% of total savings**, followed by **Maharashtra, West Bengal, and Andhra Pradesh**, which together contributed **58% more.**

What is the PM-PRANAM Scheme?

- **About: PM-PRANAM** (Programme for Restoration, Awareness, Nourishment, and Amelioration of Mother Earth) was approved in **June, 2023** to **reduce chemical fertilizer use** by incentivizing states to adopt **alternative fertilizers.**
  - It is operational for a period of **3 years** (FY 2023-24 to FY 2025-26).
- **Target Savings:** The ultimate goal of PM-PRANAM is to **achieve a ₹20,000 crore reduction in fertilizer spending,** a significant target that reflects the long-term strategy to reduce chemical fertilizer dependency while promoting sustainable agriculture.
  - It encourages the **balanced use of chemical fertilizers** alongside **biofertilizers and organic fertilizers** through **organic and natural farming practices.**
- **Tracking Mechanism:** The **Integrated Fertilisers Management System (iFMS)** is the platform envisaged to track the use of fertilisers.

How Can the PM-PRANAM Scheme Contribute to Sustainable Agricultural Practices in India?

- **Reduction in Chemical Fertilizer Use:** PM-PRANAM encourages States to minimize excessive chemical inputs like urea, **DAP (Diammonium Phosphate)**, **NPK (Nitrogen, Phosphorus, Potassium)**, and **MOP (Muriate of Potash)**, thereby reducing environmental risks like **soil degradation, water contamination,** and **biodiversity loss.**
  - A state's **urea consumption reduction** will be measured against its **three-year average** to determine **eligibility for subsidy savings and grants.**
- **Resource Conservation Technologies:** The Centre grants **50% of subsidy savings** to states, with **70% allocated for assets** supporting **alternative fertilizer technology and production**, and **30% for rewarding farmers, panchayats, and stakeholders** involved in fertilizer reduction and awareness.
- **Organic and Alternative Farming:** The scheme strongly supports the shift towards **organic farming** and sustainable alternatives, aiming to improve soil health and decrease dependency on synthetic fertilizers.
- **Positive Environmental Impact:** The scheme is being financed by **savings from existing fertilizer subsidies from the Ministry of Chemicals & Fertilizers**, with **no separate budget** allocated for PM-PRANAM.
  - It helps **mitigate water contamination, soil salinity, and biodiversity loss** associated with **electricity subsidy to farmers**.

Synchronising Irrigation and Cropping

Why in News?

India's agriculture has long assumed that expanding irrigation automatically changes cropping patterns

toward water-intensive crops, but 2011-12 to 2022-23 data shows **irrigation and cropping decisions are made together,** driven by immediate factors like rainfall and market conditions.

- Understanding this dynamic is critical to **making irrigation investments more effective and sustainable.**

What is the Relationship Between Irrigation and Cropping?

- **Irrigation and Cropping Patterns:** Reliable irrigation enables farmers to shift from traditional subsistence crops (like millets) to high-value crops (like fruits, vegetables, and cash crops such as **sugarcane and cotton**).
  - Irrigation facilitates multiple cropping (double or triple cropping) by reducing **dependence on monsoons,** thereby increasing land use efficiency.
  - Areas with **better irrigation infrastructure (e.g., Punjab, Haryana)** , supported by Green Revolution **investments** in canals and tube wells, benefit from **flat terrain and fertile soil.**
    - These regions exhibit more intensive and commercialized cropping patterns compared to largely rain-fed areas in Central and Eastern India.
  - High-Yielding Varieties (HYVs) require assured water supply. Irrigation supports the adoption of such varieties, especially in the Green Revolution regions (Punjab, Haryana, and western Uttar Pradesh).
- **Timing of Irrigation:** Irrigation is most effective when it **aligns with the sowing season.** When infrastructure becomes available with a delay of one or two years, its **impact weakens or turns negative.**
  - Farmers consider **present-day rainfall, prices, seed and fertiliser availability, and policy signals** when deciding what and when to plant. Delayed irrigation doesn't help them in such scenarios.
- **Crop Choices Beyond Irrigation Infrastructure:** Though irrigation is vital, farmers' crop choices often depend on real-time factors like **water availability, weather, input accessibility, and market prices,** not solely just irrigation infrastructure.

What are the Trends in Irrigation and Cropping in India?

- **Gross Irrigated Area (GIA):** It was increased from 91.8 million hectares in 2011-12 to **122.3 million hectares in 2022-23.**
  - GIA is the **sum total of the areas irrigated under all crops over the various seasons** in the agricultural year, under GIA, area irrigated twice/thrice in the same year is counted as two/three times.
- **Gross Sown Area (GSA):** It rose from 195.8 million hectares to 219.4 million hectares during the same period.
  - The share of sown area under irrigation grew from 46.9% to 55.8%.
  - GSA is the **sum total of the areas under all crops over the various seasons in an agriculture year**, under GSA, area sown twice/thrice in the same year is counted as two/three times.
- **Crop Yields:** Improved from 841 kg/acre to 1,009 kg/acre, with an average annual growth rate of 1.67%.

What are the Different Irrigation Systems?
Click here to Read: Different Irrigation Systems

What is the Need for Synchronising Irrigation and Cropping?

- **Efficient Water Use**: Aligning irrigation with **actual crop cycles** helps reduce water **losses and prevents over-irrigation**.
  - In Punjab, farmers use **drip irrigation** with **soil moisture sensors** for cotton and maize, reducing water use by up to 30% and increasing yields by targeting key crop stages
- **Higher Productivity**: Timely irrigation supports optimal crop growth, especially for high-yielding and water-sensitive varieties.
- **Adaptation to Climate Risks**: With erratic monsoons and rising extreme weather events, synchronised planning ensures that **irrigation buffers crop failure** during dry spells.
- **Cost-Effective Infrastructure**: Investments in canals, micro-irrigation, or groundwater systems yield better returns when they meet farmers' real-time cropping needs.

- **Environmental Sustainability**: Reduces risks of waterlogging, salinization, and groundwater depletion caused by poorly timed irrigation.

What are the Flaws in Traditional Irrigation Planning?

- **Mismatch with Sowing Cycles:** Long gestation infrastructure projects (like Maharashtra's long-delayed Gosikhurd irrigation project) often miss peak sowing windows, leading to **underutilised systems.**
  - Canal repair or desilting works under **centrally managed schemes** are often completed post-monsoon, making them redundant for the kharif season.
- **Top-Down Approach Ignores Local Context:** Centralised irrigation planning does not reflect **local agro-climatic conditions or cropping preferences.**
  - In **Punjab and Haryana**, continued government support for water-intensive paddy, combined with canal irrigation, has led to alarming **groundwater depletion** (the total estimated groundwater depletion in India is in the range of **122–199-billion-meter cubes**), showing the ecological cost of rigid planning.
    - Excessive borewells use, due to free electricity has led to **critical aquifer depletion,** especially in Punjab, Haryana, and western UP.
  - Additionally, poor maintenance, seepage, and theft cause up to 40% water loss in canal-fed areas. There is very little integration of traditional water harvesting structures in formal irrigation planning.
- **Lack of Input Convergence:** Irrigation alone doesn't raise productivity unless combined with **quality seeds, fertilisers, credit, and extension services.**
  - In Uttar Pradesh, irrigation expansion did not boost yields significantly due to poor access to certified seeds and soil health inputs.
- **Absence of Real-Time Data Use:** Irrigation planning rarely incorporates timely weather forecasts, soil moisture maps, or cropping patterns to guide water allocation.
  - States like **Andhra Pradesh and Karnataka** have begun integrating **remote sensing and crop water requirement data** to make irrigation more adaptive, but such models are still not widespread.
- **Technological and Financial Barriers:** Traditional planning does not integrate modern **micro-irrigation or renewable-powered systems.** Poor farmers are often excluded from drip irrigation due to high costs.
- **Soil Salinization:** Lack of efficient drainage planning causes **waterlogging and soil salinization** in irrigated areas.
  - By 2025, around **13 million hectares of irrigated land in India may be affected by waterlogging and soil salinity**, worsened by saline groundwater use and climate change.
  - These conditions can reduce crop yields by up to **80%** and lead to land abandonment.
  - In Haryana alone, waterlogged saline soils cause annual losses of over 2 million tons of crops.

Note: Irrigation is a **State subject** and planning, execution, funding as well as priority of execution and completion of irrigation projects is within the purview of respective State Governments.

- However, the Central Government provides financial assistance to State Governments under **Pradhan Mantri Krishi Sinchayee Yojana (PMKSY)** for expeditious completion of selected projects as per guidelines of the Programme.
- PMKSY is amalgamation of various schemes viz. **Accelerated Irrigation Benefits Programme (AIBP), PMKSY –Har Khet Ko Pani (HKKP)** , **PMKSY - Per Drop More Crop (PDMC)** (Implemented by Ministry of Agriculture & Farmers Welfare) and **PMKSY - Watershed Development (WD)** (Implemented by Department of Land Resources).

World Milk Day 2025

Why in News?

World Milk Day is celebrated to highlight the **nutritional, economic, and environmental** significance of **milk**, as well as the role of the dairy industry in the economy.

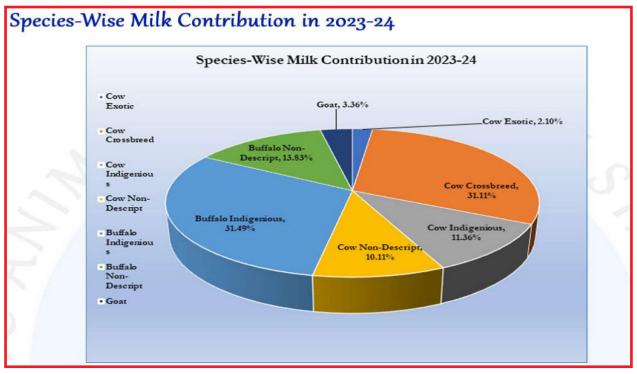
- Established by the **Food and Agriculture Organization (FAO)** in **2001**, World Milk Day 2025 is themed **"Let's Celebrate the Power of Dairy,"** highlighting dairy's role in **nutrition, rural livelihoods, economic growth, and sustainability**.

Note: In India, National Milk Day (NMD) is celebrated on **26th November** to commemorate the birth anniversary of **Dr. Verghese Kurien**.

- Dr. Verghese Kurien, known as the **Father of the White Revolution or Operation Flood**, transformed India from a **dairy-deficient nation into the world's top milk producer.**

What is the Current Status of Milk Production in India?

- **Global Ranking:** India has been the **world's top milk producer since 1998**, now producing **25% of global milk**. Between **2014-15 and 2023-24**, milk production rose **63.56%**, from **146.3 million tonnes to 239.2 million tonnes.**
  - In **1950-51**, India produced less than **21 million tonnes** of milk annually.
- **Top Milk-Producing States:** As per the Basic Animal Husbandry Statistics (BAHS) 2024, top 5 Milk producing States are **Uttar Pradesh (16.21%), Rajasthan (14.51%), Madhya Pradesh (8.91%)**, Gujarat (7.65%), Maharashtra (6.71%).
- **Per Capita Availability of Milk:** In 2023-24, the per capita availability of milk was over **471 grams of milk daily**, well above the world average of **322 grams**.
- **Milk Production by Animal Type:**



What is White Revolution 2.0?
Click Here to Read: White Revolution 2.0

What is the Significance of the Dairy Industry in India?

- **Backbone of Rural India:** Dairy industry contributes **over 6%** to the **country's GDP** and supports the livelihoods of **over 80 million dairy farmers**. Around **12-14%** of agricultural income comes from dairying.
- **Nutritional Security:** At **471 grams/day** (vs. global average of 322 grams), milk is a **critical protein** source, especially in **vegetarian diets.**
  - Dairy provides **calcium, Vitamin B12, and high-quality protein**, addressing deficiencies like **anemia and stunting**.
- **Women Empowerment:** India's dairy industry sees strong **female participation**, with **35% women in cooperatives** and **48,000 women-led societies**, driving **inclusive growth** and **rural empowerment.**
- **Supports Integrated Farming:** India's **large livestock population** (around **303.76 million bovines** and **74.26 million goats)** supports **integrated farming** by providing **manure** for crop **fertilization**, enhancing **soil fertility**, and enabling **biogas production** for energy.
- **Sustainability & Climate Resilience:** The Gobar-Dhan scheme boosts **farmers' income** by converting **cattle dung** and **agricultural waste** into **bio-CNG** and **organic fertilizers** for **commercial sale**, creating an **additional revenue stream**.
  - It reduces reliance on **chemical fertilizers**, lowers **input costs**, and promotes **waste-to-wealth** practices—supporting **clean energy**, **emission reduction**, **rural entrepreneurship**, and **economic resilience**.
- **Future Growth:** White Revolution 2.0 aims to boost milk procurement by cooperatives from **660** to **1,000 lakh litres per day**, targeting **100 million kg daily** by year five.
  - It focuses on **milk production**, **women's empowerment**, and **combating malnutrition.**

What are the Challenges in the Dairy Industry in India?

- **Environmental & Climate Pressures: Heatwaves may reduce milk yields by 10–30%**, especially in **northern states**, which contribute **30% of India's total milk production**, posing a significant threat to the **dairy sector's productivity and income stability.**
- **Rising Production Costs**: **Quality cattle feed prices** have surged by **246% over the last 30 years**, while milk prices have only increased by **68%**, reducing profit margins for farmers.
- **Productivity Challenges:** India's **dairy productivity** is low, with **50 million cows** and **40 million buffalo** in 2014 producing **140 million tons of milk**.

- **Disease Outbreaks & Animal Health:** Recent outbreaks like Lumpy Skin Disease **(2022–23)** led to a **10% drop in milk output**, while mastitis causes annual losses of **Rs 14,000 crore**.
  - **Heatwaves and humidity** fuel diseases like **haemorrhagic septicaemia**, with treatment costs eroding **farmers' incomes.**
- **Unorganised Sector Dominance:** Only **28% of milk** in India is handled by the **organised sector**, including cooperatives, while over **70% remains in the unorganised sector**.
  - This results in **poor quality control**, **lack of cold chain infrastructure**, and **limited market and credit access** for small producers.
- **Threat to Indigenous Breeds: Crossbreeding** boosts productivity, but **over-reliance on crossbred cattle** risks the survival of **native breeds**.
  - With **Kerala leading at 96%** and a **national average of 30%** in crossbreed adoption, conserving indigenous breeds is vital for **biodiversity**, **disease resistance**, and **sustainable dairying.**
- **Marketing and Misleading Narratives:** Marketing hype around **A2 milk (opposed to A1 milk)** may unfairly **criticize crossbred cows**, which produce **30%** of India's milk, despite little scientific proof.
  - **A1 and A2 milk** differ by a small genetic change in **beta-casein protein**.

Schemes Related to the Livestock Sector

- Animal Husbandry Infrastructure Development Fund (AHIDF)
- National Animal Disease Control Programme
- Rashtriya Gokul Mission
- National Artificial Insemination Programme
- National Livestock Mission

India's Renewable Energy Revolution

Why in News?

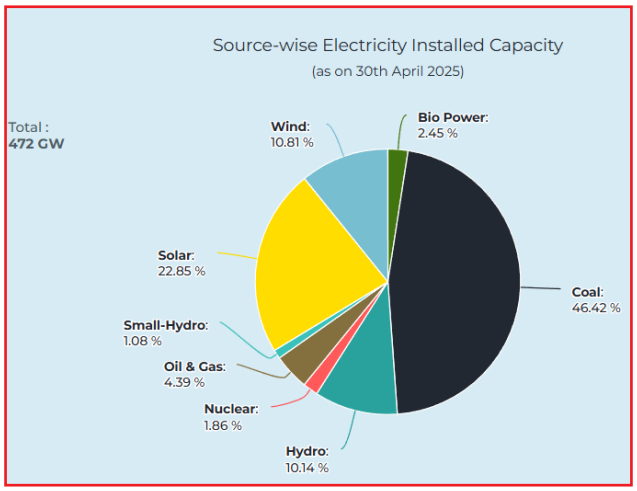
India has emerged as a **global** clean energy **leader**, adding a **record 29 GW of renewable energy** in the year 2024 alone.

- With **232 GW installed capacity** and **176 GW under construction**, India's energy transition is driving **global sustainability efforts**, powered by **bold reforms** and **visionary leadership.**

What Is the Current State of Renewable Energy Development in India?

- **Status:** India ranks **3rd in solar**, **4th in wind**, and **4th in total renewable energy capacity** globally. Solar capacity surged from **2.63 GW in 2014 to 108 GW in 2025** (a **41-fold increase**), while wind capacity has crossed **51 GW.**
  - It aims to achieve **500 GW of non-fossil** capacity by **2030** and **1,800 GW by 2047**.
- **Reforms Undertaken:**
  - **Market-Driven Bidding:** India **replaced feed-in tariffs with transparent bidding**, leading to a sharp decline in solar tariffs from **Rs 10.95/unit in 2010** to **Rs 1.99/unit in 2021.**
  - **Waiver of ISTS Charges: Waiver of inter-state transmission system (ISTS) charges** has removed geographical barriers, enabling **nationwide renewable energy flow**.
  - **Flagship Programs and Initiatives:**
    - Due to PLI Scheme for Solar Manufacturing, India's **solar module manufacturing** capacity nearly doubled from **38 GW in March 2024 to 74 GW in March 2025.**
    - PM Surya Ghar: Muft Bijli Yojana targets **30 GW decentralized capacity** across **1 crore households**, with **more than 10 lakh houses** already onboarded.
    - Under PM-KUSUM, Farmers get up to **60% subsidy** on **solar pumps** under PM Kusum Yojana, ensuring **daytime power and extra income**.
    - The National Green Hydrogen Mission (NGHM) aims to produce **5 MMT of green hydrogen annually by 2030**, backed by investments in Green Energy Corridors and a robust **2030 transmission roadmap** to ensure efficient grid integration.
    - Under the Ethanol Blended Petrol (EBP) Programme, ethanol blending in petrol rose from **1.5% (2013)** to **15% (2024)**.

- This saved **Rs 1.26 lakh crore in foreign exchange**.
  - The **Sustainable Alternative Towards Affordable Transportation (SATAT)** initiative has commissioned over **100 compressed biogas (CBG) plants** and aims for a **5% CBG blending mandate by 2028.**
- **Emerging Energy Frontiers: Offshore wind initiatives** plan **37 GW of tenders by 2030**, supported by **viability gap funding,** with pilot projects underway in **Gujarat and Tamil Nadu.**
  - **Hybrid and round-the-clock power policy** promotes **wind-solar hybrids** and **firm & dispatchable renewable energy (FDRE)** to develop **24/7 clean energy solutions.**
- **Investment and Global Leadership:** The **International Solar Alliance**, launched by **India**, unites over **100 countries** under the vision of **One Sun, One World, One Grid**.
  - India's renewable energy sector accounted for nearly **8%** of total **foreign direct investment** inflows in the financial year **2024-25**, up from about **1% in FY21**.
  - At RE-Invest 2024, global investors committed **Rs 32.45 lakh crore by 2030** to India's clean energy future.



What are the Key Issues Associated with India's Renewable Energy Sector?

- **Roadblocks in Shifting from Coal to Renewables:** India's transition from **coal to renewable energy** faces major hurdles, including **heavy dependence on coal for employment and local economies** in states like **Jharkhand and Chhattisgarh**, and an **infrastructure** tailored to **coal-based power**.
  - Further, **policy inconsistency**, such as continued coal plant approvals, **undermines investor confidence in renewables.**
- **Financing Gaps:** To build its targeted **500 GW** of renewable energy capacity by 2030, India needs **Rs 2 trillion in funding annually**—that is **half its entire 2023-24 Union budget.**
  - Additionally, the **high capital costs** for renewable energy infrastructure, coupled with the **relatively slow return on investment**, create a barrier for many investors.
- **Grid Integration & Storage Challenges:** The **intermittent nature** of **renewable energy**, especially **solar** and **wind**, challenges **grid stability**, demanding robust **energy storage** and improved **infrastructure**.
  - As of March 2024, the cumulative **installed energy storage capacity** stood at **219.1 MWh** versus a requirement of **411 gigawatt-hours (GWh)** of energy storage capacity by 2032, while renewable-rich states like **Maharashtra** and **Rajasthan** face high **AT&C losses** of **18.9%** and **18%**, respectively.
- **Supply Chain Vulnerabilities:** China remains India's largest solar cell supplier, accounting for nearly 56% share in FY2024, which also dominates **wind turbine** supplies.
  - India is **heavily dependent on China for critical minerals**, importing **majority** of its **lithium and cobalt requirement**, with **over 70% of lithium sourced from China**, which are essential for manufacturing **renewable energy components**.
- **Land & Environmental Constraints:** The rising **demand for solar and wind farms** brings significant **land challenges**, with **solar power needing 4–5 acres/MW** and **wind energy requiring 2–40 acres/MW**, based on location and infrastructure.
  - The need for large tracts of land often leads to **competition with agricultural use, urban development, and natural habitats,** causing potential conflicts with local communities and ecosystems.

- E.g., the **Sillahalla Hydro Project (Tamil Nadu)** highlights concerns over **biodiversity loss** and **resettlement**, underscoring the challenge of balancing **clean energy goals** with **social and environmental sustainability.**

- **E-waste and End-of-Life Management Issues:** The growing volume of **e-waste**, particularly from solar panels, poses a significant challenge for **sustainable development**, as improper disposal can release **toxic materials like cadmium and lead** into the environment.
  - As per the **International Renewable Energy Agency**, **India may become the 4th-largest producer of solar panel waste by 2050**.
  - There is **no comprehensive solar recycling policy**, and the **lack of large-scale recycling facilities** poses serious **environmental risks.**

How can India Accelerate Renewable Energy Adoption to Meet Rising Energy Demand?

- **Optimize Land and Water Resources:** Leverage **reservoirs, lakes, and coastal areas** to implement the **floating solar revolution** by installing **floating solar panels** (e.g., **Omkareshwar Floating Solar Park** in MP), which **conserve land**, **reduce water evaporation**, and **improve energy efficiency**.
  - Simultaneously, promote **land leasing** and **agrivoltaics** to enable **dual land use** for **clean energy generation** and **agriculture** through **long-term solar farming leases.**
- **Develop Renewable Energy Clusters:** Establish **Renewable Energy Special Economic Zones (RE-SEZs)** with **streamlined clearances**, **fiscal incentives**, and **integrated value chains** from **R&D to manufacturing** to boost clean energy growth.
  - Promote **Renewable Energy Parks** on **degraded or non-agricultural land** with **integrated transmission access** to optimize land use without impacting agriculture.
- **Leverage Digital and Emerging Technologies:** Adopt **blockchain-enabled peer-to-peer renewable energy trading** to decentralize markets and empower **prosumers**.
  - Concurrently, **invest in smart grids, pumped hydro, and battery storage** to effectively manage the **variability** of renewable energy supply.
- **Expand Renewable Infrastructure:** India can boost renewable energy by installing **Vertical Axis Wind Turbines (VAWTs)** on rooftops to capture urban wind, alongside decentralized solutions like **rooftop solar**, **microgrids**, and **solar irrigation pumps**.
  - These systems enhance **rural electrification**, reduce **carbon footprints**, and provide reliable energy to **off-grid areas**.
- **Promote Waste-to-Energy and Bioenergy:** Develop **Circular Waste-to-Energy Parks** (e.g., **Jamnagar Waste-to-Energy Park**) using anaerobic digestion, gasification, and pyrolysis to convert waste into energy and valuable byproducts.
  - Scale up **biofuels** and **compressed biogas (CBG)** through ethanol blending and SATAT to boost rural income and diversify energy sources.
- **Expand Global Engagement:** India can tap into **global financing tools** like the **Loss and Damage Fund** and **Green Climate Fund** to **secure financial resources** for large-scale renewable projects.
  - Strengthen **technology transfer** through partnerships with **G20**, **International Solar Alliance (ISA)**, and other international institutions to boost renewable energy deployment and technology adoption.
  - India can collaborate with international bodies like **IRENA** to establish global standards for renewable energy, including shared frameworks for **financing**, **technology adoption**, and **capacity building.**

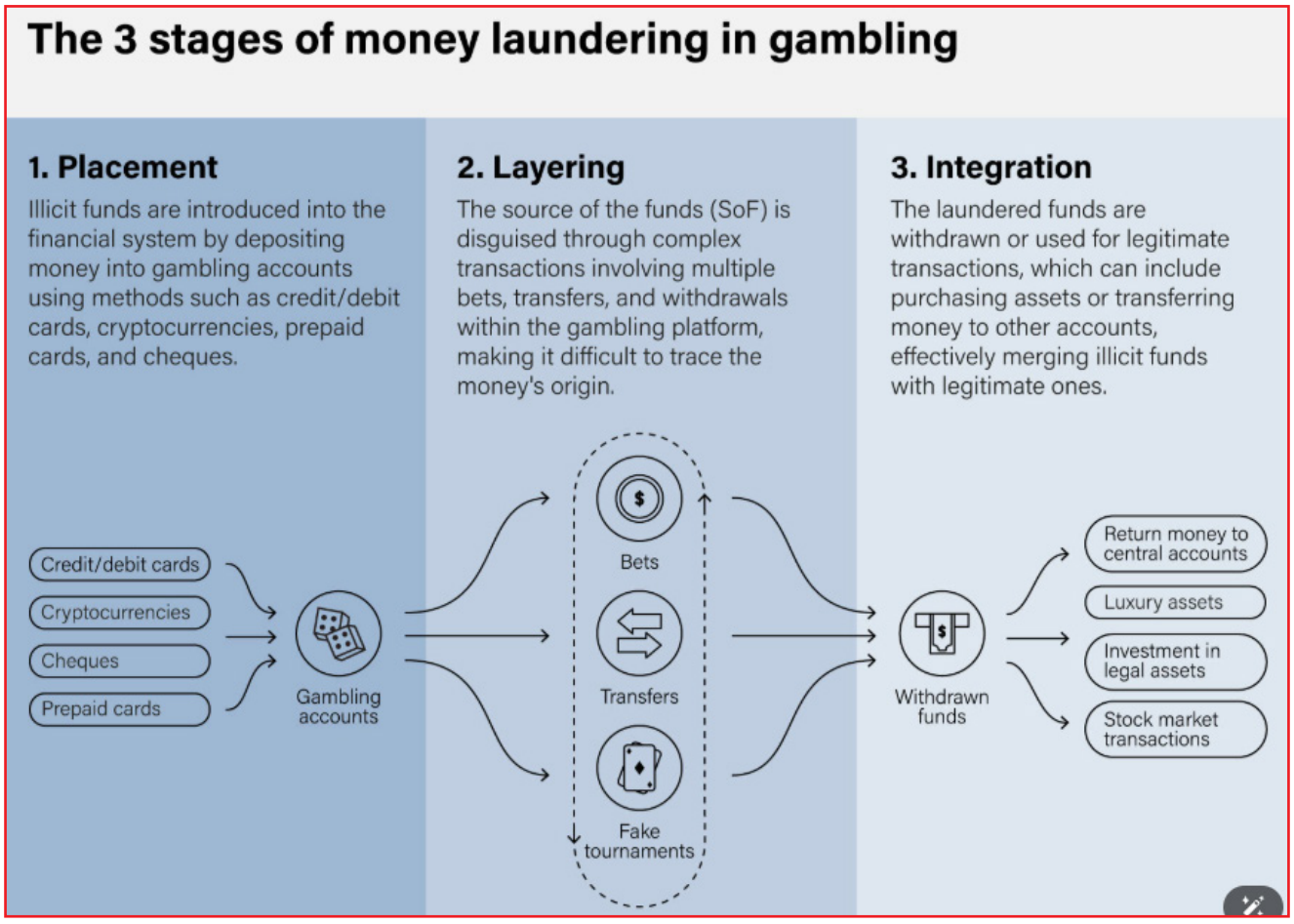
Money Laundering in Online Gaming

Why in News?

In a move to ensure financial integrity and protect users, India is planning to bring online **real money gaming (RMG)** under the ambit of the **Prevention of Money Laundering Act, 2002 (PMLA).**

What is the Landscape of Online Real Money Gaming in India?

- **Definition:** RMG platforms allow users to stake real money for potential winnings in games like fantasy sports, poker, and skill-based contests.



- **Market Momentum:** India became the **world's largest gaming market** in 2023 with 568 million gamers and 9.5 billion app downloads. The market was valued at **USD 2.2 billion in 2023, projected to reach USD 8.6 billion by 2028.**
- **Key Growth Drivers: Cheap internet data** and increasing **smartphone penetration** have made online gaming more accessible, especially to India's large and young population.
  - The **rise of digital payments** has made transactions seamless, while domestic gaming studios have flourished with technological advancements.
  - Due to **high unemployment and limited earning opportunities,** many seek quick money, making betting apps highly attractive.
  - Additionally, **popular sporting tournaments** like the **Indian Premier League**, combined with **celebrity promotions,** lure gullible youth into these platforms. **Poor digital literacy** (only **38% of households in India are digitally literate**) further increases their vulnerability.
- **Regulation:** In India, **State legislatures** have the exclusive authority to make laws on gaming, betting, and gambling under **Entry 34 of the List II (State List) of the Seventh Schedule of the Indian Constitution**.
  - At the national level, the **Public Gambling Act, 1867 exempts skill-based games** from penalties, while the Prize Competitions Act, 1955 regulates prize-based competitions.
  - The **Information Technology (Intermediary Guidelines and Digital Media Ethics Code) Amendment Rules, 2023** introduced definitions for key terms such as online game, online gaming intermediary, online real-money games (RMG), permissible games, and self-regulatory bodies, aiming to bring more structure to the rapidly evolving digital gaming landscape.

- In India, foreign investment and technology collaboration are **completely banned** in the lottery, gambling, and betting sectors.

- **Taxation:** A 28% Goods and Services Tax (GST) is levied on legal RMG firms, Under the Income Tax Act, 1961, winnings above Rs 10,000 from lotteries, card games, or any game (including skill-based games) are taxed at 30% (excluding surcharge and cess).
- **Money Laundering Mechanism in RMG:** The money laundering process in online gaming typically unfolds in three stages.
  - The first stage, **Placement**, involves **injecting illicit funds** into the gaming ecosystem through deposits or virtual credit purchases.
  - This is followed by **Layering**, where the origins of the funds are obscured using in-game transfers, currency conversions, and a series of complex transactions.
  - Finally, in the **Integration stage,** the "cleaned" money is withdrawn as **legitimate earnings,** such as winnings or refunds, often through cryptocurrency channels or cross-border payment systems.

Why is Regulation of Online Gaming Under PMLA Necessary?

- **Current Regulatory Gaps:** India's **Public Gambling Act (1867)** bans public gambling but **exempts** games of skill.
  - States regulate betting and gambling **differently,** resulting in a fragmented legal environment that illicit operators exploit.
  - Illegal offshore operators exploit India's regulatory gaps, evading taxes and perpetrating large-scale fraud by siphoning user funds abroad. Cases like **Mahadev app (Rs 6,000 crore suspected proceeds) and Fiewin (Rs 400 crore fraud)** exemplify the scale of illicit operations.
    - Unscrupulous operators use **shell companies, crypto wallets, and digital channels** to launder illicit money.
  - This complex scenario highlights the **need to bring online gaming under the stringent regulatory ambit of the PMLA to curb financial crimes** and enhance oversight.
- **Strengthening Accountability:** The 2023 PMLA rules extended regulatory oversight to **virtual asset service providers,** enabling the Financial Intelligence Unit-India (FIU) to better monitor and penalize violations.
  - By integrating virtual assets in online RMG under this framework helps to maintain transaction records and report suspicious activities, further enhancing **accountability in the gaming ecosystem.**
- **Terror Financing:** Online RMG poses a serious threat of **terror financing** due to its **anonymous and borderless nature.** Terror operatives may exploit gameplay as a covert channel to communicate and facilitate illicit transactions within the RMG ecosystem.
  - By integrating RMG under PMLA, it can be effectively secured and monitored by national security authorities.
- **Cyber Security:** India's cybersecurity infrastructure **remains inadequate** to fully safeguard emerging digital platforms, including online gaming.
  - Online gaming platforms can be exploited to **deploy** trojans or malware, potentially compromising users' bank accounts and causing financial losses.
  - Integrating under the PMLA will enhance regulatory oversight and reduce risks of cyber fraud and bank-related losses.

What are the Challenges in Enforcing Anti-Money Laundering Regulations on Online Gaming Platforms?

- **Use of Mule Accounts and Proxy Payment Channels:** Illicit gaming platforms frequently use "mule" bank accounts or third-party wallets to route payments.
  - These accounts are often registered in the **name of unrelated individuals or shell entities**, obscuring the transaction's origin and purpose.
  - Online gaming platforms process thousands of **micro-transactions every minute**, making it difficult to detect suspicious patterns in real time. Automated systems must be **exceptionally robust to flag illicit activity** without disrupting legitimate gameplay.
- **Misuse of In-Game Purchases and Digital Wallets:** Players can convert **real money into in-game assets or** digital currencies, which can be exchanged, gifted, or withdrawn as real money often without traceability.

- **Multiple funding methods** (Unified Payments Interface, cards, wallets, crypto, etc.) create unstructured inflow and outflow patterns that are hard to monitor comprehensively. Integration with banking systems for AML checks remains inadequate or inconsistent.

- **Cross-Border and Jurisdictional Issues:** Gaming platforms may be registered in **foreign countries,** making coordination between regulatory authorities across borders difficult.
  - Different jurisdictions have varying AML laws, complicating enforcement and compliance monitoring.
  - Offshore sites like **1xBet frequently change domains and bank partners**, making enforcement and prosecution highly complex.
- **Difficulty in Proving Intent:** Distinguishing between **high-stakes gaming and deliberate money laundering** can be difficult.
  - Players might claim high volumes or rapid transactions are part of legitimate gameplay.
- **Evolving Fraud Techniques:** Money launderers are constantly adapting, exploiting loopholes like **refund abuse, referral bonuses, or dummy gameplay** to clean money.
  - Keeping up with new typologies of laundering requires constant regulatory and technological upgrades.
- **Ineffective Penalties and Enforcement:** The absence of a **central gaming regulator in India** creates a fragmented enforcement environment. With multiple agencies (ED, MHA, RBI, MeitY) sharing partial responsibilities, regulatory overlaps and gaps hinder timely and coordinated AML enforcement.
  - Even after failing AML checks, major **gambling firms often treat fines as routine costs, not deterrents**, leading to repeated violations.

Reforming Agricultural Subsidies

Why in News?

The Vice President stated that **direct transfer of** agricultural subsidies could significantly boost **farmers' income**, estimating each could receive at least **Rs 35,000 annually** if all aid reaches them directly (instead of indirect subsidies).

What are the Various Types of Agricultural Subsidies in India?

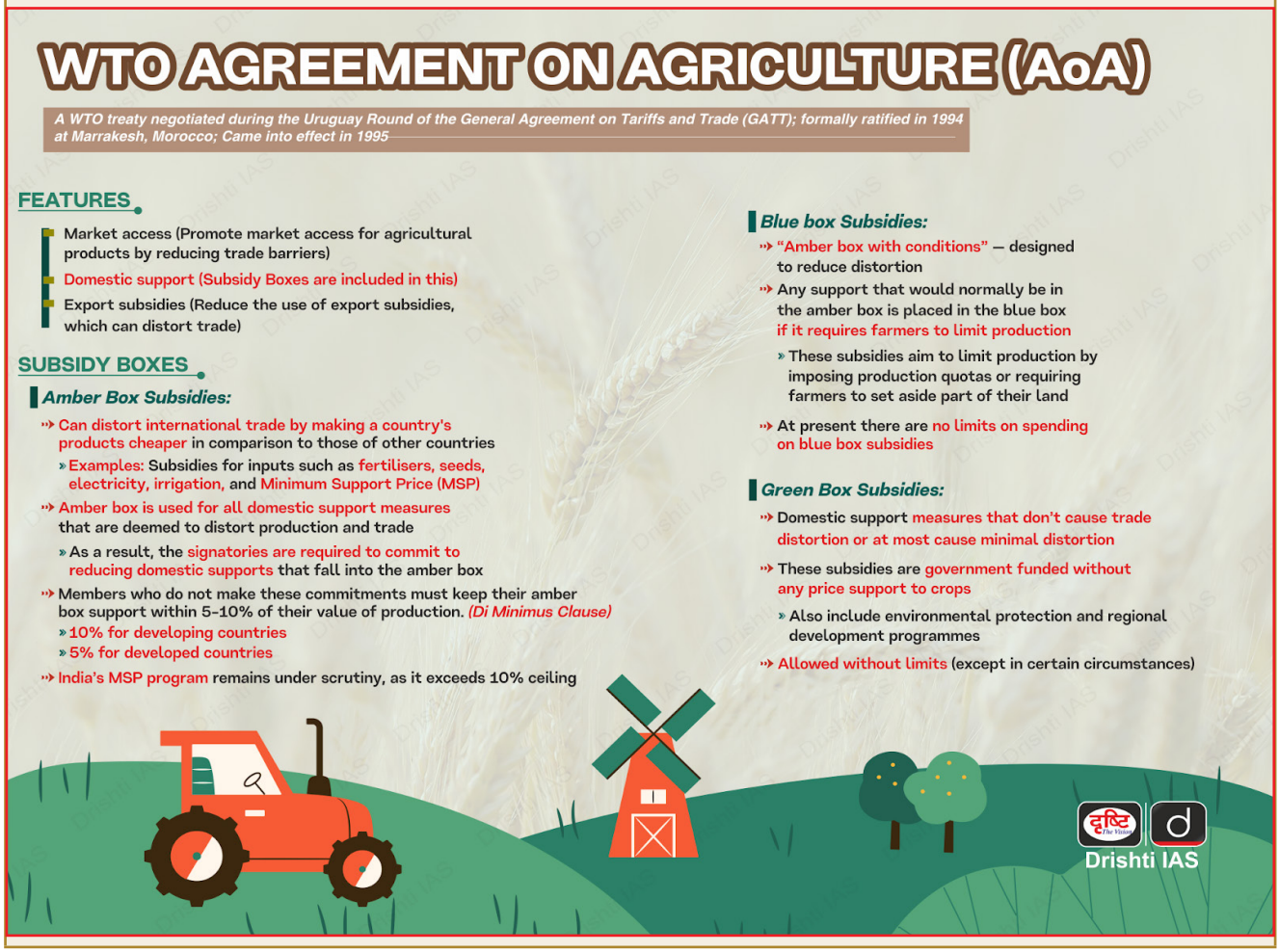
- **Direct Benefit Transfer (DBT):** It provides **direct income support** in form of cash transfers to farmers. E.g., **PM KISAN,** Rythu Bandhu **(Telangana),** KALIA **(Odisha)**.
- **Input Subsidies:**
  - **Fertilizer Subsidy:** It makes fertilizers like **urea** affordable by paying the **difference** between **production cost and selling price**. E.g., Di-Ammonium Phosphate (DAP) fertiliser, Nutrient-Based Subsidy (NBS) scheme for **non-urea fertilizers**.
  - **Seed Subsidy:** It offers **high-yielding, disease-resistant seeds** at subsidized rates, e.g., **Seed Village Program**, Seed Bank, **Mukhyamantri Beej Swavalamban Yojana** in Rajasthan.
  - **Irrigation Subsidy:** The **irrigation subsidy**, under **PM Krishi Sinchai Yojana (PMKSY)**, offers up to **55% support** for **drip and sprinkler systems** to promote **water conservation.**
  - **Power Subsidy:** It provides **free or subsidized electricity** for agricultural pumps, with **states like Punjab offering free electricity to tubewell irrigation**, though this has raised concerns about **groundwater depletion**.
- **Credit & Insurance Subsidies:**
  - **Pradhan Mantri Fasal Bima Yojna (PMFBY):** PMFBY protects farmers from crop failure by requiring them to pay a **1.5-5% premium**, with the government covering the remaining cost.
  - **Interest Subvention Scheme:** Under the Modified Interest Subvention Scheme, farmers get short-term loans up to **Rs 3 lakh** via Kisan Credit Card at a **7% subsidised interest rate,** with a **1.5% subvention** to eligible lending institutions.
- **Output Subsidies (Price Support):**
  - **Minimum Support Price (MSP):** MSP guarantees minimum prices for **22 crops** like **wheat, rice, pulses, and oilseeds**, and fair and remunerative price (FRP) for sugarcane, procured by agencies such as Food Corporation of India (FCI) and NAFED.

- Also, **state level** schemes like **Bhavantar Bhugtan Yojana (Madhya Pradesh)** compensate farmers if market prices fall below MSP.

➢ **Infrastructure & Post-Harvest Subsidies:**

❍ **Warehouse & Cold Storage Subsidy:** The National Horticulture Board (NHB) offers a **capital investment subsidy** scheme providing a credit-linked back-ended subsidy of **35% in general areas and 50% in North East, hilly, and scheduled areas** for building or modernizing cold storage facilities with capacities between **5,000 and 10,000 million tonnes.**

Agriculture Subsidies and WTO



What are the Consequences of Agricultural Subsidies in India?

➢ **Fiscal Burden on Government:** The Union Budget 2025–26 has allocated **Rs 3.71 lakh crore** for **food and fertiliser subsidies** and as of **January 2025**, over **Rs 3.46 lakh crore** has been disbursed to more than **11 crore PM-KISAN** beneficiary farmers.

❍ **It strains public finances** and worsen the **debt crisis** for fiscally stressed states like **Punjab.**

➢ **Soil Degradation:** India's consumption ratio of **nitrogen, phosphorus and potassium (NPK) is 6.7:2.4:1** (ideal of 4:2:1), leading to **soil toxicity** & declining yields.

❍ **Punjab & Haryana** have the highest urea consumption, causing **groundwater pollution & cancer clusters.**

➢ **Groundwater Depletion:** Free electricity encourages **excessive tube-well use**, depleting groundwater table.

- Agriculture consumes **87% of India's groundwater**, with **extraction exceeding 100%** in states like **Punjab, Rajasthan, Haryana**, and **Delhi** in **2024.**

➢ **Market Distortions:** The **Shanta Kumar Committee (2015)** reported that only **6% of farmers**—mainly in **Punjab, Haryana, and Andhra Pradesh**—actually benefit from **MSP**. This skewed procurement has led to **overproduction of rice and wheat** while **pulses and oilseeds remain underproduced**.

- In **2024**, the **FCI had to dispose of 18 million tonnes of rotting grains**, causing a **waste of taxpayer money.**

➢ **Hurt Export Competitiveness: World Trade Organization (WTO)** rules **limit India's farm export subsidies**, affecting trade.

- **Developed countries, led by the US**, accuse **India** of providing **up to 93.9% subsidy** to **rice farmers** in **2020–21**, breaching the **10% limit** set under **WTO rules.**

What are the Advantages and Limitations of Replacing Agricultural Subsidies with Direct Benefit Transfers?

Advantages	Limitations
Improved Targeting: Ensures subsidies reach **only eligible farmers**, **reducing leakage and inefficiency**.	**Exclusion Risks: Small or marginal farmers** without proper documentation may be **left out**.
Increased Transparency: Direct payments **reduce intermediaries**, lowering corruption and misallocation.	**Digital Divide:** Reliance on banking and digital infrastructure may **disadvantage remote or unbanked farmers**.
Promotes Farmer Autonomy: Farmers have **freedom** to decide **how to use funds**, encouraging diversified investment.	**Misuse of Funds:** Transfers may be spent on **non-agricultural needs**, diluting the intended impact on productivity.
Reduces Market Distortion: Avoids **overuse or misuse of inputs** like fertilizers and power by unlinking subsidies from physical inputs.	**Price Volatility Exposure:** Without input subsidies, farmers may **face higher costs** during **price spikes**, increasing vulnerability.
Administrative Efficiency: Lowers cost and complexity of managing large input subsidy programs.	**Implementation Challenges:** Requires **robust beneficiary identification**, grievance redressal, and monitoring systems.

Technologies Shaping the Pharma Industry

Why in News?

The **pharmaceutical industry** is evolving rapidly with **biologics, AI, and automation** driving changes in **drug development and manufacturing**. To stay competitive globally, India must foster specialized skills in these technologies and address key challenges like regulatory compliance, infrastructure, and innovation capacity.

What are the Major Technologies Shaping the Pharmaceutical Industry?

➢ **Artificial Intelligence (AI) and Machine Learning (ML): AI** and **ML speed up drug discovery** by **predicting molecular behavior,** identifying **new uses for existing medicines**, and **personalizing treatments.**

- **Generative AI,** especially **Large Language Models LLMs)**, enhances **understanding of biology** and helps **design more effective clinical trials** using data such as genetics.
- In India, the **Centre for AI and Robotics (CAIR)** under **DRDO**, is actively developing **AI applications** that can also be beneficial for the pharmaceutical sector.
- In India, leading pharmaceutical companies like Sun Pharma and Dr. Reddy's Laboratories are **deploying AI to tackle diseases** with high national burdens, such as **tuberculosis** and **diabetes.**

➢ **Internet of Medical Things (IoMT): IoMT** integrates **IoT devices and mobile apps** to monitor health parameters like **heart rate, blood pressure, and glucose levels** in **real time.**

- It enables **personalized treatment** and supports **decentralized clinical trials (DCTs),** enhancing patient access, convenience, and trial efficiency.

- IoT-enabled packaging **monitors storage conditions** like temperature and light exposure, ensuring **compliance with regulatory standards** and preventing spoilage.

➢ **Blockchain for Data Transparency:** Blockchain technology ensures **privacy, transparency, and traceability** in the **pharmaceutical supply** chain.
- It enables **secure access to medical records, accredits suppliers, tracks drug prices**, and helps **detect counterfeit or substandard medicines,** improving **regulatory compliance and patient safety.**
- For instance, **Indian Institute of Technology Madras** researchers have developed **'BlockTrack',** a first-of-its-kind **blockchain-based secure medical data and information exchange.**

➢ **Biologics and Biosimilars:** Biologics are complex medicines derived from **living organisms**, such as vaccines, monoclonal antibodies, recombinant proteins, and cell therapies.
- Biosimilars are **cost-effective, clinically equivalent versions of biologics** developed **after patent expiry**.
- **Organ bioprinting** uses **3D printing technology** to create **living, functional organs** from **bioinks** containing **cells and other biomaterials.**
- **Biocon** is a leading Indian biotech company working on **biosimilars** and **insulin products.**

➢ **Digital Twin Technology:** Digital Twin Technology uses **real-time data to create virtual simulations of physical processes**.
- In pharmaceuticals, it **helps simulate drug production lines** to improve **manufacturing efficiency, reduce downtime, and optimize operations.**

What is the State of Pharmaceutical Industry in India?

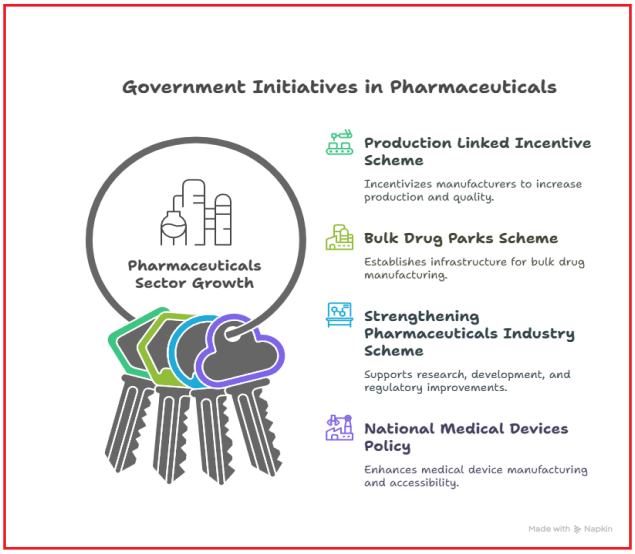
➢ **About: India** ranks as the world's **3rd-largest producer of pharmaceuticals by volume** and stands **14th globally by value**.
- It supplies over **50% of the global vaccine demand** and nearly **40% of generic medicines in the US market**.

➢ **Market Size:** For FY 2023-24, India's pharmaceutical market is valued at approximately **USD 50 billion**, contributing about **1.72% to the national GDP**.
- It is projected to grow to **USD 130 billion by 2030**. India's **biotechnology sector**, valued at **USD 137 billion in 2022**, aims to reach **USD 300 billion by 2030**.

➢ **Key Segments:**
- **Generic Medicines:** India is the world's largest supplier, fulfilling **20% of global demand**.
- **Active Pharmaceutical Ingredients (APIs):** India manufactures over **500 APIs**, accounting for **8% of the global API market**.
- **Medical Devices:** The sector is expected to expand from **USD 11 billion to USD 50 billion by 2030**.

➢ **Growth Drivers:**
- **Affordable Pricing:** Indian pharmaceuticals are significantly more cost-effective compared to Western counterparts.
- **Government Support:** Initiatives like the **Production-Linked Incentive (PLI) scheme** encourage domestic manufacturing.
- **Robust R&D:** India boasts a strong scientific and engineering workforce, ranking **6th globally in patent filings** with **64,480 patent applications in 2023**.

➢ **Related Government Initiatives:**



What are the Key Concerns Associated with Recent Technological Breakthroughs in the Pharma Sector?

- **Data Privacy & Cybersecurity Challenges:** The use of **AI, big data analytics**, and **cloud systems** in pharma has led to a **surge in sensitive patient and clinical data.** This raises serious concerns about **data privacy, cybersecurity risks, and potential breaches,** which may compromise patient confidentiality and public trust in healthcare systems.
- **Escalating Costs & Barriers to Access:** Technologies like **biologics, AI platforms, and automation** need **heavy investment in infrastructure, equipment, and skilled workforce**. This high cost **burdens small and medium enterprises (SMEs), widening the gap** with larger firms and **limiting the affordable and widespread adoption** of innovations across the pharma sector.
- **Regulatory Complexities and Delays:** Rapid technological progress in pharma often **outpaces regulatory reforms,** making it **challenging to ensure both patient safety and swift approvals.** The **absence of clear and globally harmonized guidelines** leads to **confusion and delays** in bringing new therapies and innovations to market.
- **Skill Deficits & Workforce Preparedness:** The adoption of AI, biotech, and automation in pharma demands **interdisciplinary skills.** However, **India faces a major talent gap in areas like data science, bioinformatics, and robotics,** which hampers effective implementation of these technologies.
- **Ethical, Social, & Equity Concerns:** Innovations like **gene editing, AI diagnostics,** and **personalized medicine** raise **ethical issues around consent, data bias, and fair access.** These challenges call for **strong ethical frameworks** to prevent societal harm and ensure inclusive healthcare delivery.

India Achieves Fiscal Deficit Target of 4.8% for FY25

Why in News?

The Government of India has successfully met its fiscal deficit target of **4.8% of Gross Domestic Product (GDP)** for the financial year 2024–25, as revealed in the provisional data released by the **Controller General of Accounts (CGA).**

Note: The CGA, under the **Department of Expenditure, Ministry of Finance**, is the Principal Accounting Adviser to the Government of India.

- The CGA manages the **government's accounting system,** prepares fiscal reports, and submits **Union Finance and Appropriation Accounts** to Parliament under **Article 150.**
- It also enhances transparency and efficiency in **public fund management** through integrated, IT-enabled financial systems and conducts internal audits to assess risk management, control mechanisms, and governance processes.

What is the Fiscal Deficit?

- **About:** Fiscal Deficit is the difference between the **government's total expenditure and its total receipt (excluding borrowings)** in a given fiscal year.
  - **Fiscal Deficit= Total Expenditure- Total Receipts (excluding borrowings).** Total receipts include **revenue receipts and capital receipts** (both debt and non-debt creating).
    - **Non-debt creating capital receipts** are those that neither involve borrowings nor result in future repayment obligations. Examples include recovery of loans and proceeds from **disinvestment** of Public Sector Undertakings (PSUs).
  - Fiscal Deficit is usually expressed as a percentage of GDP to assess its impact on the broader economy.
  - It indicates how much the government needs to borrow to meet its expenses when its income is insufficient.
- **Implications of Fiscal Deficit:** A manageable fiscal deficit helps **ensure macroeconomic stability.**
  - A higher fiscal deficit increases **borrowing needs,** leading to a **rising debt burden and inflationary pressures**.
    - It can cause the **crowding out effect,** where private investment declines due to **higher borrowing costs.**

- Over time, it reduces **fiscal space,** limiting the government's ability to spend on development, and may weaken investor confidence and macroeconomic stability, potentially increasing debt levels.

➢ **India's Fiscal Deficit:** In FY 2024–25 fiscal deficit stood at **Rs 15.77 lakh crore, amounting to 4.8% of GDP.**
  ❍ **Revenue Collections**: Total revenue receipts, comprising tax, non-tax, and capital revenues, amounted to **Rs 30.78 lakh crore.**
  ❍ **Expenditure:** Total expenditure for 2024–25 stood at Rs 46.55 lakh crore. Capital expenditure reached Rs 10.52 lakh crore, while revenue expenditure (salaries, subsidies, pensions) was Rs 36.03 lakh crore.
  ❍ The government has now laid out a tighter target of **4.4% fiscal deficit for FY 2025–26.**

➢ **Fiscal Deficit and National Debt:** National debt represents the cumulative borrowing by a government to finance past **fiscal deficits**.
  ❍ It includes liabilities like **domestic/external loans, small savings, provident funds, and special securities** requiring regular interest and principal repayments.
  ❍ India's total outstanding debt is projected to rise to **Rs 196.78 lakh crore by end of FY 2025–26, up from Rs 181.74 lakh crore in FY 2024–25**.

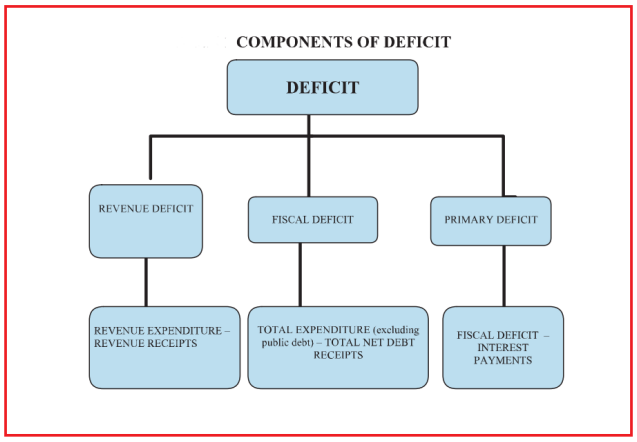
Types of Deficit

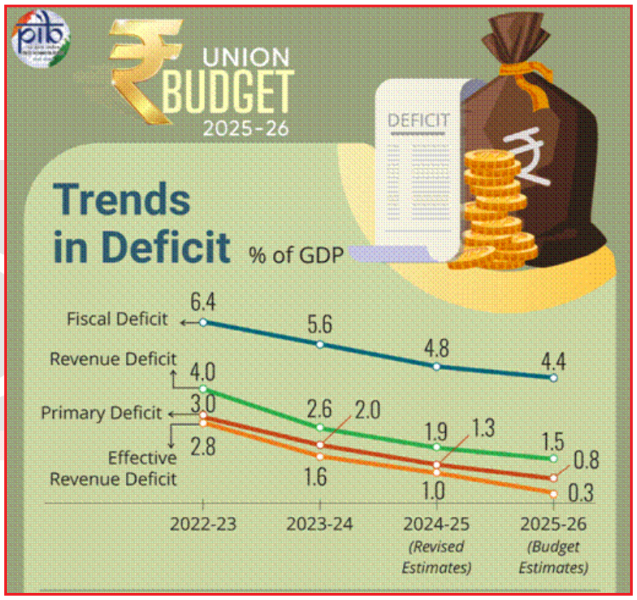
➢ **Revenue Deficit:** This deficit of a government or business can be determined by subtracting the total revenue receipts from the total income expenditure.
  ❍ **Revenue deficit = Total revenue receipts – Total revenue expenditure.**

➢ **Effective Revenue Deficit = Revenue Deficit - grants for capital asset creation.**

➢ **Primary Deficit:** It occurs when a government's spending, excluding interest payments, is greater than its revenue from non-interest sources.
  ❍ **Primary Deficit = Fiscal Deficit – Interest Payments.**

➢ **Twin Deficits:** It refers to a situation where a country simultaneously experiences a **fiscal deficit** and a **current account deficit** (when imports exceed exports).





What are the Factors that Influence the Fiscal Deficit?

➢ **Fiscal Policy:** It involves government decisions on taxation and spending, directly impacting the fiscal deficit.
  ❍ **Expansionary Fiscal Policy (More Spending / Less Taxes):** Used when the economy is slow or in recession. The government spends more (like on jobs or infrastructure) or reduces taxes to increase people's income.
    - But this leads to a **higher budget deficit,** since earnings (revenue) are lower than expenses.
  ❍ **Contractionary Fiscal Policy (Less Spending / More Taxes):** Used when the economy is

overheating or when debt is too high. The government spends less or increases taxes.
    - This helps to reduce the deficit, as spending and income become more balanced.
- **Economic Cycles:** During recessions, deficits increase as governments spend more and tax revenues fall. During **booms, higher revenues** and controlled spending help reduce deficits.
- **Unexpected Events: Natural disasters,** wars, or **pandemics** often cause sudden rises in government spending, increasing the deficit.
- **Inefficient Tax Collection:** When **tax systems are weak or compliance is low,** governments collect less revenue than expected, widening the fiscal deficit.
- **Global Factors:** Inflation, commodity price shifts, and changes in trade affect revenues and spending, influencing deficits.

What are India's Initiatives to Achieve Fiscal Consolidation?

- **Fiscal Responsibility and Budget Management (FRBM) Act, 2003:** It was enacted to institutionalize **financial discipline by setting targets** for fiscal deficits and public debt.
    - FRBM Act amended in 2018, it defined the **debt-to-GDP ratio (total debt of a country relative to its GDP)** as the primary fiscal anchor, aiming to reduce the **fiscal deficit** and the **debt-to-GDP ratio.**
- **Glide Path for Fiscal Deficit Reduction:** Following the Covid-19 pandemic, India adopted a **"glide path" approach to fiscal consolidation**, in line with the recommendations of the **N.K. Singh Committee (2017).**
    - This approach aims for a **gradual reduction of the fiscal deficit**, balancing the need for economic support with long-term fiscal discipline.
    - It led to a planned decrease in the fiscal deficit from **6.7% of GDP in 2020-21 to 4.8% in 2024-25**.
- **Increased Capital Expenditure (Capex):** India has significantly increased its capital expenditure (capex) over the past few years, rising from 1.6% of GDP in FY 2014-15 to a planned 3.1% of GDP in FY 2025-26.
    - This focus on infrastructure development aims to stimulate economic growth and improve long-term fiscal health.
- **Revenue Mobilization:** Efforts to enhance revenue collection include implementing the Goods and Services Tax (GST) to create a unified tax base and digitizing the tax system.
    - As a result, India's direct tax collections rose **16.15% year-on-year to Rs 25.86 lakh crore in FY 2024-25**.
- **State-Level Fiscal Responsibility:** States have been encouraged to adopt their own fiscal responsibility legislations (FRLs) to complement the central government's efforts.
    - The **Reserve Bank of India (RBI)** has recommended that states with elevated debt levels establish a path for debt consolidation aligned with macroeconomic objectives.

Fiscal Consolidation

- It refers to the responsible management of government finances to ensure long-term economic stability.
- It aims to **balance revenue (tax and non-tax) with expenditure**, minimizing fiscal deficits and maintaining sustainable public debt.
- Fiscal consolidation promotes **macroeconomic stability** by controlling inflation and exchange rate volatility, reduces the debt burden on future generations, builds investor confidence, and ensures efficient use of public resources for development.

RBI Annual Report 2024-25

Why in News?

The Reserve Bank of India (RBI) released its **Annual Report 2024-25,** providing a comprehensive overview of the country's monetary policy, financial stability, regulatory initiatives, and key economic developments.

What are the Key Takeaways from RBI Annual Report 2024-25?

- **Global Economic Growth:** Global growth slowed to **3.3% in 2024**, below the historical average of 3.7%

(2000-19). Growth in 2025 expected at **2.8%** and 3.0% in 2026 amid geopolitical tensions, trade protectionism, and elevated public debt.

- Global inflation moderated to **5.7% in 2024** from 6.6% in 2023, but services inflation remained sticky in major advanced economies.

- **Indian Economy Resilience:** India's Gross Domestic Product (GDP) growth moderated to **6.5% in 2024-25**, yet it remained the fastest-growing major economy globally.
  - Agricultural Gross Value Added (GVA) grew by **4.6%** (up from 2.7% in previous year), driven by record foodgrain production and favourable weather.
  - Industrial sector growth slowed to **4.3%** and the services sector remained strong with a **7.5% growth** and accounted for 64.1% of GVA.
- **RBI Balance Sheet:** As of March, 2025, the RBI's balance sheet grew by **8.2% year-on-year**.
  - Its income rose by **22.77%** (driven by a ~33% surge in forex transaction gains and higher returns from investments), while expenditure increased by 7.76%.
    - This led to a record surplus of **Rs 2.68 lakh crore, up 27.37% from Rs 2.11 lakh crore in the previous year.**
  - On the assets side, **gold rose by 52.09%, domestic investments by 14.32%, and foreign investments by 1.70%**.
  - Liabilities expanded due to **higher notes issued**, revaluation accounts, and other liabilities.
  - As of March, 2025, foreign assets (including gold and loans) made up 74.27% of total assets, with domestic assets at 25.73%. Gold holdings rose by 57.48 metric tonnes to 879.58 metric tonnes.
- **Inflation Trends:** Headline inflation moderated to **4.6% in 2024-25** from 5.4% in 2023-24.
  - **Core inflation** stood at **3.5%**, with food inflation falling to 2.9% by March 2025.
  - **Fuel prices** saw deflation of **2.5%** due to softer global energy prices.
- **Monetary Policy and Liquidity:** The Monetary Policy Committee (MPC) maintained the repo rate at 6.50% through much of 2024-25 but shifted the stance from **"withdrawal of accommodation" to "neutral" in October 2024.**
  - The cash reserve ratio (CRR) was reduced to 4% in December 2024 to ease liquidity pressures.
- **External Sector:** Merchandise exports grew marginally by **0.1%**, while imports rose by **6.2%**, widening the trade deficit to **USD 282.8 billion**.
  - Current Account Deficit (CAD) remained manageable at **1.3% of GDP**. Foreign exchange reserves stood at **USD 668.3 billion**, **covering 11 months of merchandise imports.**
- **Increased Household Savings:** Net household savings increased to 5.1% of **Gross National Disposable Income (GNDI)** (measures the income available to the nation for final consumption and gross saving) in FY24.
- **Financial Sector Health:** Bank credit growth outpaced deposit growth, improving credit-to-deposit ratio slightly.
  - Gross Non-Performing Assets (NPA) ratio and Net NPA ratio declined further. Urban Cooperative Banks (UCBs) showed improved credit growth and lower GNPA ratios.
- **Digital Payments and Financial Inclusion:** Digital payments volume grew by **34.8%**, value by **17.9%** in 2024-25.
  - Unified Payments Interface (UPI) accounted for **48.5%** of global real-time payments by volume.
  - The RBI's Financial Inclusion Index rose from 60.1 in 2023 to 64.2 in 2024, reflecting deeper usage of financial services.
    - Efforts to boost financial literacy continued through initiatives like **Financial Literacy Week 2025**, and new campaigns for children featuring mascots **"Junior Money" and "Mini Money."**
    - Consumer grievance redressal was also strengthened with expanded RBI Ombudsman offices and a nationwide financial awareness drive.
- **Regulatory and Technological Initiatives:** RBI introduced '**bank.in**' domain to enhance digital banking security, and expanded the Central Bank Digital Currency (CBDC) pilot to 17 banks and 60 lakh users.

- RBI launched the **FinTech Repository and EmTech Repository** to track tech adoption by FinTechs and regulated entities. Managed by **RBI Innovation Hub,** these platforms capture data on technologies like Machine Learning and Artificial Intelligence, aiding policy and industry insights.

- **Fiscal Situation:** Gross Fiscal Deficit (GFD) of the central government reduced to **4.7% of GDP in 2024-25** from 5.5% in 2023-24.
  - Capital expenditure grew by **5.2%**; revenue expenditure grew by **5.8%**. States' consolidated fiscal deficit is likely to remain within **3.2% of GDP**.
- **Outlook for 2025-26:** India projected to sustain GDP growth at **6.5%** with risks balanced.
  - Inflation expected at **4.0%**, with easing supply pressures but upward risks from global uncertainties.
  - The central government aims to reduce the fiscal deficit to **4.4% of GDP** in 2025-26 and target a declining public debt-to-GDP ratio reaching 50% by 2031.

What are the Challenges Highlighted in RBI Annual Report 2024-25?

- **Counterfeit Notes:** Although overall **fake note detection** has declined, counterfeit Rs 200 and Rs 500 notes rose by 13.9% and 37.3% respectively, requiring continued vigilance.
- **Surge in Bank Fraud Amounts:** The RBI highlights a sharp rise in bank fraud amounts, which nearly tripled to Rs 36,014 crore despite fewer cases reported.
  - This surge is largely due to reclassification and delayed reporting of old frauds.
  - **Public sector banks saw the highest fraud value**s, mainly in loan portfolios, while private banks reported more cases, mostly digital payment frauds. Card/internet frauds decreased in value but remained common by number.
- **Global Uncertainties:** Rising protectionism, and geopolitical tensions (e.g., Russia-Ukraine) risk destabilizing trade and causing market volatility.
  - Evolving **US tariff policies and reciprocal actions** by other countries may cause sporadic market volatility.
- **Inflation Management:** Inflation management faces challenges as rising input costs and **weak global demand threaten India's industrial growt**h. While headline inflation eased, volatile food prices continue to slow disinflation.
- **Fiscal Consolidation and Capital Expenditure Balancing:** GFD reduced to 4.7% of GDP in 2024-25, but this requires balancing fiscal consolidation with the need for increased capital expenditure to boost growth.
  - Capital expenditure grew by 5.2% in 2024-25 but still requires further enhancement to sustain growth momentum.
- **Climate Change and Sustainability Risks:** Increasing climate shocks threaten agricultural productivity and food price stability. Efforts to expand renewable energy and green technology adoption are ongoing but require scaling to meet long-term sustainability goals.

International Relations

Highlights

- *Revitalising UN for the 21st Century*
- *World Economic Situation and Prospects-2025*
- *New Non-Permanent Countries to UNSC*
- *India Rolls Over USD 50 Million Treasury Bill to Support Maldives*

Revitalising UN for the 21st Century

Why in News?

Global conflict levels have reached their **highest since** World War II, with **over 233,000 lives lost and 120 million people displaced** in 2024. This escalating violence and instability is revealing the limitations of the **United Nations (UN)**, highlighting the need for **essential reforms** to strengthen its ability to **address such global challenges**.

What are Key Achievements of the United Nations in the Contemporary World?

- **Climate Leadership:** The **UN played a key role** in the **2015 Paris Agreement** and continues to **mobilise global cooperation** on **climate goals**, **sustainability**, and **green transitions** through its **global convening power.**
- **Food Security:** The **UN's World Food Programme (WFP)** is the **largest global food aid initiative**, providing **life-saving assistance** in **emergencies** and making a **transformational impact** on **hunger reduction**, **nutrition**, and **disaster response.**
- **Post-Conflict Reconstruction:** The UN and its agencies, particularly the **United Nations Development Programme (UNDP)**, have supported **post-conflict states** by **rebuilding governance**, promoting **entrepreneurship**, and **investing in infrastructure**—as seen in **Liberia**, where UNDP aided **economic recovery and stability**.
  - **UNDP's microfinance programmes** have been vital in **restoring local trade**, **revitalising conflict-affected economies**, and **enhancing household resilience and livelihoods.**
- **Peacekeeping and Security Enhancement: UN Peacekeeping Missions** have helped **restore peace** in volatile regions like **South Sudan**, enhancing **security perceptions** and improving **local economic** and **household well-being.**
- **Promotion of Human Rights:** The UN has played a key role in advancing global human rights through the **Universal Declaration of Human Rights (UDHR)** and the **UN Human Rights Council**, tackling **discrimination**, **oppression**, and **violence against minorities.**

What are the Limitations of the United Nations in the Contemporary World?

- **Inability to Prevent or Resolve Conflicts: Global conflict** is at its highest since **World War II**, with **56 ongoing wars** involving **92 countries**, highlighting the **UN's declining role** in **conflict prevention and resolution**—as seen in its limited impact on the **Russia-Ukraine** and **Israel-Hamas** conflicts.
  - Conflicts are undermining progress in poverty reduction, education, health, and infrastructure, with 40% of the world's poor (455 million) living in war-torn countries. This threatens th**e UN's Sustainable Development Goals (SDGs) for 2030.**
- **Weak Enforcement of Peace and Security: Over 233,000 deaths** and **120 million displaced** in 2024 due to war and persecution reflect the **UN's limited effectiveness** in ensuring **peace and human rights**, and **undermining the UN Charter's core goals.**
  - Reliance on **voluntary troops** causes delays (e.g., **Rwanda genocide**), and **sanctions** often hurt **civilians more than regimes** (e.g., **Iraq in the 1990s**).

UN Security Council (UNSC)

The UN Charter vests the primary responsibility for maintaining international peace and security to the UNSC

About
One of the **6 principal organs** of UN; established in **1945 by UN Charter**

Headquarters
New York City

First Session
17 January 1946 at Church House, Westminster, **London**

Membership
- 15 members - 5 Permanent Members **(P5)**, **10 Non-Permanent Members** elected for **two-year terms** (5 elected each year)
- P5 - the **US**, the **UK**, **Russia**, **France and China**

Presidency
- **Rotates every month** among the 15 members
- **India's** Presidency for year **2022 - December**

Voting Powers
- 1 member = 1 vote
- P5 have **veto power**
- Members of UN sans membership of UNSC **participate without vote**

UNSC Committees/Resolutions

Terrorism
- **Resolution 1373** (Counter Terrorism Committee)
- **Resolution 1267** (Da'esh and Al Qaeda Committee)

Non-Proliferation Committee
- **Resolution 1540** (against nuclear, chemical and biological weapons)

India and UNSC
- Served **7 times** as non-permanent member; elected for the **8th time** for 2021-22; **advocates for a permanent seat**
- Arguments for a permanent seat:
  - **43 peacekeeping missions**
  - Active participation in **formulating Human Rights Declaration (UDHR)**
  - India's **population, territorial size, GDP, economic potential, cultural diversity, political system** etc.

G4
Group of 4 countries (Brazil, Germany, India and Japan) which advocate each other's bids for permanent seats in the UNSC

Uniting for Consensus (UfC) Movement
- Informally known as the **Coffee Club**
- Countries **oppose the expansion Permanent Seats** of UNSC
- **Prime movers of the club** - Italy, Spain, Australia, Canada, South Korea, Argentina and Pakistan
- Italy and Spain are opposed to Germany's bid; Pakistan - India's bid; Argentina - Brazil's bid and Australia - Japan's bid

Major Challenges in UNSC
- Usual UN rules don't apply to UNSC deliberations; **no records of meetings kept**
- Powerplay in UNSC; **anachronistic veto powers** of P5
- **Deep polarisation** among P5; frequent divisions end up blocking key decisions
- **Inadequate representation** of many regions among of the world

Drishti IAS

- Massive humanitarian breakdowns in **Yemen (only 54% health facilities functional)**, **Sudan (15 million lacking water and sanitation)**, and **Nigeria (economic loss of USD 91.2–USD 112.8 billion)** highlight the UN's **limited influence in securing human rights and basic services** in fragile and war-torn states.

➢ **Insufficient Response to Economic and Environmental Fallout:** Violence cost the global economy **USD 19.3 trillion in 2023** (13.5% of GDP), yet the **UN lacks tools** to address economic fallout like **trade disruption** and **investment losses**.

- **Climate impacts of war**, including **5.5% of global emissions from military activity** and **ecosystem destruction**, remain **largely excluded** from global climate frameworks, exposing a major policy gap.

➢ **Eroding Influence and Outdated Structure:** Formed in 1945, the **UN's structure**, particularly the **P5 veto power,** often blocks **timely and impartial action**.

- For instance, the **veto power of the UN Security Council's P5** has often blocked resolutions in conflicts like **Israel-Hamas** favoring **national interests over global justice.**
  - **India and Brazil's exclusion** from permanent membership in the UN Security Council reflects a **power imbalance** within the UN system.
- Its **failure to adapt** to modern challenges—like **climate-conflict links**, **asymmetric warfare**, and **transnational extremism**—makes it seem **outdated and rigid.**

➢ **Rise of Minilateral Forums:** The rise of **minilateral forums** like **Quad, BRICS, G7, and G20**, **EU, African Union**, undermines the UN by **bypassing its inclusive framework**, weakening its **legitimacy** and **consensus-building role**.

- These groups often **divert focus and resources**, operate with **less transparency**, and **exclude smaller nations**, sidelining the UN's **"one country, one vote" principle** and reinforcing **power hierarchies** in global decision-making.

➢ **Chronic Underfunding:** The UN has repeatedly highlighted **underfunding**, which hampers **peacekeeping, climate resilience**, and **humanitarian aid**, as major economies often **delay or cut contributions**—e.g., **US funding cuts to United Nations Relief and Works Agency (UNRWA)**.

World Economic Situation and Prospects-2025

Why in News?

India's GDP growth forecast for 2025 has been revised down to 6.3%, from the previous projection of 6.6%, in the mid-2025 update of the "**World Economic Situation and Prospects" (WESP) report.**

➢ **The report is released by the United Nations Department of Economic and Social Affairs** , in collaboration with **UNCTAD** and 5 UN regional commissions and it provides **global and regional economic outlooks** to support **SDG-oriented, equitable growth policies.**

What are the Key Takeaways From the World Economic Situation and Prospects Report?

➢ **India-Specific Observations:**

- **Fastest-Growing Major Economy:** India's GDP growth, though revised down to **6.3% in 2025** from **7.1% in 2024**, remains the **highest among major global economies** and it is expected to reach **6.4% in 2026**.
- **Inflation, Monetary Policy, & Employment Outlook: Inflation** is projected to decline from **4.9% in 2024 to 4.3% in 2025**, remaining within the **RBI's 2–6% target range**, reflecting effective monetary management.
  - **Unemployment** remains broadly **stable**, though **gender disparities** in labour force participation continue to pose a **structural challenge**.
- **Key Drivers of India's Growth:**
  - **Manufacturing & Exports:** Manufacturing GVA grew to **Rs 27.5 lakh crore (2023–24)**. Total exports hit a **record USD 824.9 billion** in 2024–25 with **services exports at USD 387.5 billion** and **non-petroleum merchandise exports at USD 374.1 billion**.
  - **Defence Production:** Defence exports value also **increased around 3 times** with India now exporting to **nearly 100 countries**, signaling rising global trust in Indian defence capabilities.

➢ **Global Economic Outlook:** Global GDP growth is projected to slow to **2.4% in 2025** (from **2.9% in 2024**), and **2.5% in 2026**, which spans both advanced and emerging economies.

- **US** growth is projected to **fall** due to **tariffs and policy uncertainty,** while **China's growth** is estimated at **4.6% in 2025,** impacted by **weak demand, export disruptions,** and **real estate stress.**.
- **Other EMEs**: Economies like **Brazil, Mexico, and South Africa** face downgrades driven by tepid trade, falling investment, and commodity price volatility.
- Growth in **Least Developed Countries (LDCs)** is projected to decline from **4.5% in 2024 to 4.1%**

in 2025, amid falling export revenues, tighter financial conditions, reduced **Official Development Assistance (ODA),** and rising debt distress risks.

- **Major Global Economic Issues:**
  - **Food Inflation and Insecurity: Food inflation,** driven by **climate shocks, currency depreciation, trade protectionism**, and **supply chain disruptions**, remains above the **headline inflation**.
  - Globally, **343 million** people face **acute food insecurity**, with **1.9 million at famine risk** in conflict zones like Gaza, Haiti, Mali, South Sudan, and Sudan.
    - Countries like **India,** where food forms a **large part of household spending, are worst affected.**
  - **Rising Trade & Global Risks:** Rising US tariffs have triggered a **"tariff shock"**, raising **global trade costs, disrupting supply chains**, and **disproportionately impacting developing economies**.
    - The escalating trade tensions are **weakening multilateralism and widening global inequality.**

United Nations Department of Economic and Social Affairs

- **UNDESA** is a core department of the **UN Secretariat**, formed in 1948, that **leads the development pillar of the United Nations**, supporting countries in implementing the **2030 Agenda for Sustainable Development** and achieving the **Sustainable Development Goals (SDGs)**.
  - It functions **under the UN Secretary-General** and provides **data, analysis, and policy guidance** to Member States on economic, social, and environmental issues.
- As the **secretariat to major UN bodies** like **ECOSOC**, the **General Assembly**, and the **High-Level Political Forum on Sustainable Development (HLPF)**, UN DESA helps coordinate global efforts in **poverty eradication, inclusive growth, environmental protection, and good governance**.
  - It acts as a **bridge between global commitments and national action**, helping countries translate UN-level agreements into actionable national policies and reforms.

Key Economic Reports and Publishers	
Publishing Body	**Report**
World Bank	Global Economic Prospects, World Development Report
International Monetary Fund (IMF)	World Economic Outlook, Global Financial Stability Report
World Economic Forum (WEF)	Global Competitiveness Report, Global Risks Report
UN Conference on Trade and Development (UNCTAD)	World Investment Report

New Non-Permanent Countries to UNSC

Why in News?

The **United Nations General Assembly (UNGA)** has elected **Bahrain, Colombia, the Democratic Republic of the Congo (DRC), Latvia, and Liberia** as **non-permanent members** of the **UN Security Council (UNSC)** for a 2-year term starting **1st January 2026**.

- They will join **Denmark, Greece, Pakistan, Panama, Somalia** (elected in 2024, serving through 2026).
- Also, **Pakistan** has been appointed as the **Chair of the UNSC 1988 Taliban Sanctions Committee** for 2025 and will also serve as **vice-chair of the UNSC Counter-Terrorism Committee** during its 2025–26 tenure as a **non-permanent member** of the Council.

What is the United Nations Security Council (UNSC)?

- The **United Nations Security Council (UNSC)**, established in **1945** under the **UN Charter**, constitutes one of the **UN's six principal organs,** entrusted with the **primary responsibility of maintaining international peace and security**.
- The Council comprises **15 members**, including **5 permanent members (P5)- China, France, Russia, the United Kingdom, and the United States**—who possess **veto power**, and **10 non-permanent members** elected for **2-year terms** by the **UN General Assembly (UNGA)**.

- These non-permanent seats are allocated on a **regional basis**: **5** for African and Asian States, **1** for Eastern European States, **2** for Latin American and Caribbean States, and **2** for Western European and Other States.
- Elections are held **annually** through a **secret ballot**, requiring a **two-thirds majority** vote, even when candidates are unopposed.
- The UNSC remains the only UN body whose **decisions member states are obligated to implement under the UN Charter.**
- India's participation in the Security Council has been as a non-permanent member during the periods of **1950-51, 1967-68, 1972-73, 1977-78, 1984-85, 1991-92, 2011-12,** and **2021-22.**

What is the 1988 Taliban Sanctions Committee?

- **About:** Also known as the **UNSC 1988 Sanctions Committee**, it was established under **UNSC Resolution 1988 (2011)**.
  - It includes **all 15 UNSC members,** makes **decisions by consensus**, and is supported by the **Analytical Support and Sanctions Monitoring Team.**
- **Mandate**: It focuses on monitoring and enforcing **targeted sanctions**- including **asset freezes, travel bans, and arms embargoes** against individuals and entities **associated with the Taliban** that threaten the **peace, stability, and security of Afghanistan**.
- **Chairs: India** chaired the Committee until **December 2021**.

What is the UNSC Counter-Terrorism Committee (CTC)?

- **About**: The **UNSC Counter-Terrorism Committee (CTC)** was established through **Resolution 1373**, unanimously adopted in **2001** in the aftermath of the **9/11 terrorist attacks** in the US.
- **Members:** It comprises **all 15 UNSC members-5 permanent** and **10 non-permanent** members.
- **Mandate: Monitor and promote the implementation of Resolution 1373**, which obligates member states to:
  - **Criminalize terrorism financing** and **freeze related assets**,
  - **Deny financial and material support** to terrorists,
  - **Suppress safe havens**, training, and sustenance for terrorist groups,
  - **Enhance international cooperation** by sharing intelligence on terror activities.
- **2025 Chairman:** In **2025**, **Algeria will chair the CTC**, with **France, Russia, and Pakistan** as vice-chairs.
  - **India chaired the CTC in 2022**, during its **2021–22 UNSC tenure,** and actively highlighted concerns regarding **Pakistan's sheltering of UN-designated terrorists**.

India Rolls Over USD 50 Million Treasury Bill to Support Maldives

Why in News?

India has extended financial support to the **Maldives** by **rolling over (renewing) a USD 50 million Treasury Bill,** under a special **government-to-government (G2G) framework** that began in 2019.

What are the Significant Dimensions of India-Maldives Bilateral Relations?

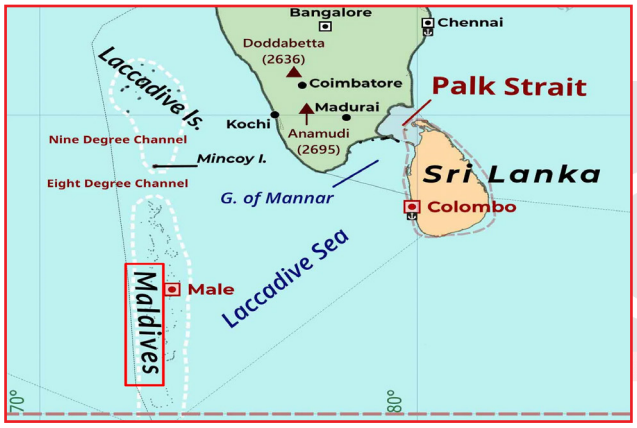
- **Historical Ties: India recognized Maldives in 1965** and established its **mission in Malé in 1972**. Both are founding members of SAARC and signatories to SAFTA.
- **Trade and Economy:** India and Maldives signed a trade agreement in 1981, boosting bilateral trade.
  - In 2024, India extended **USD 400 million** in support and a **bilateral currency swap of Rs 3,000 crore to the Maldives**, reinforcing its economic assistance.
  - Additionally, the SBI rolled over **USD 100 million of Treasury Bills** for the Maldives.
  - India became the **Maldives' 2nd largest trade partner in 2022** and the largest in 2023.
  - Visa-free entry for Indian business travelers in 2022 further enhanced commercial relations.

- In 2024, India and the Maldives have finalized a framework to promote the use of local currencies for cross-border trade.

➢ **Tourism & Culture: Tourism forms 25% of Maldives' GDP** and **70% of employment**, with **India as the top tourist source since 2020.** The **2022 open skies agreement** enhanced air connectivity.

➢ **Defence Partner:** Under India's **Neighborhood First policy** and **SAGAR** (now MAHASAGAR) initiatives, India has provided **critical defence support** including **Operation Cactus (1988).**

- **Defence infrastructure, joint exercises (Ekuverin, Ekatha, Dosti)**, and **training** over 70% of Maldives National Defence Force personnel.



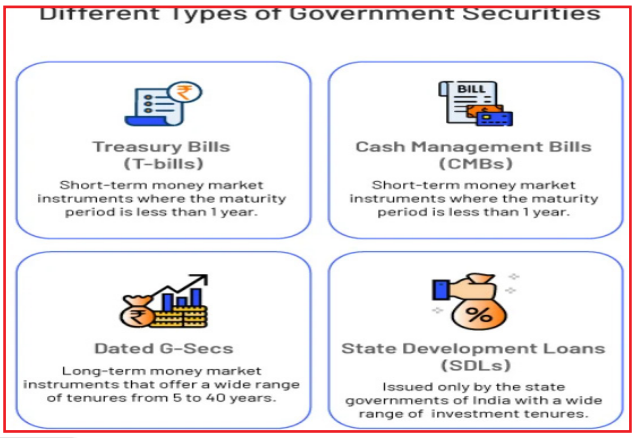
Note: Eight Degree Channel separates **Indian Minicoy** (part of Lakshadweep Islands) from that of **Maldives.**

What are Treasury Bills (T-Bills)?

➢ **T-Bills** are **short-term debt instruments** issued by the **Government of India** through the **Reserve Bank of India (RBI).**

- They form part of **Government Securities (G-Secs)** and help raise short-term funds.
- These are **zero-coupon securities**, meaning they **do not pay periodic interest.** Instead, they are issued at a discount and redeemed at face value on maturity.

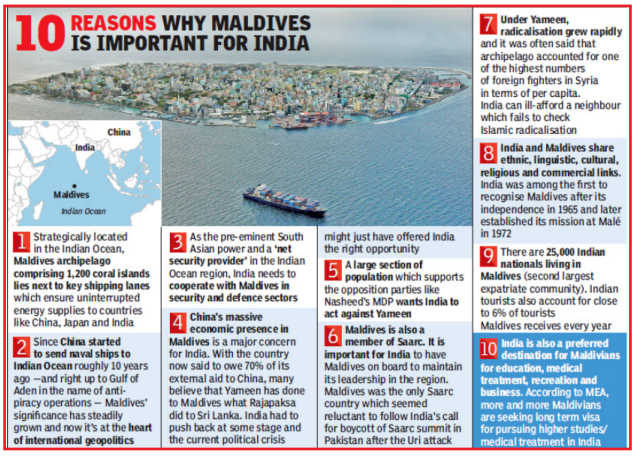
- **G-Secs** are **tradable debt instruments** issued by the **Central or State Governments** to **borrow funds** from the public with a contractual obligation to **repay the principal on a specified date.**



➢ They are issued with **maturities of 91, 182, and 364 days** and are **sold at a discount from their face value.** Investors **earn returns from the difference between the purchase price and maturity amount.**

➢ They are **issued through RBI auctions via competitive and non-competitive bidding** and **offer high liquidity** due to their **short tenure.**

➢ Gains from T-Bills are **taxable as short-term capital gains,** and their fixed returns may be eroded by **inflation.**



Social Issues

Highlights

- *Global Gender Gap Report 2025*
- *UNFPA State of World Population Report 2025*
- *Strengthening Women's Role in Agriculture*

Global Gender Gap Report 2025

Why in News?

India ranked **131st out of 148 countries** in the Global Gender Gap Report **2025** by the World Economic Forum, down from **129th in 2024**, with a **gender parity score** of **64.1%**,

- The report comprehensively evaluated gender parity across 148 countries.

What is the Global Gender Gap Index?

- **About:** Published annually since **2006**, it is the **longest-standing global index** for **assessing gender equality**, measuring **countries' progress** in **closing gender gaps** across **4 key dimensions:**
  - **Economic Participation and Opportunity**
  - **Educational Attainment**
  - **Health & Survival**
  - **Political Empowerment**
- **Rating Mechanism:** Each dimension is scored on a scale from **0 to 1**, where **1 represents full gender parity** and **0 denotes complete inequality**.
  - The index aims to act as a **strategic benchmarking tool**, enabling countries to assess and compare gender disparities.
- **Objectives:** To act as a **guiding tool for tracking progress on gender gaps** in **health, education, economy, and politics.**
  - This annual benchmark helps stakeholders in each country **set priorities suited to their specific economic, political, and cultural contexts.**

What are the Key Findings of the Global Gender Gap Report 2025?

- **India Performance:**
  - In subindices, India shows gains in **Economic Participation** (40.7%) with improvement in income parity from **28.6% to 29.9%**, and **Educational Attainment** at a high **97.1%,** indicating near-parity in literacy and tertiary education enrolment.
  - **Health and Survival** improved with **better sex ratio and life expectancy.** However, **Political Empowerment** fell by **0.6 points**, with women's representation in Parliament down from **14.7% to 13.8%** and ministerial representation fell from **6.5% to 5.6%**.

- **South Asia's Performance: Bhutan (119), Nepal (125),** and **Sri Lanka (130)** ranked better than India.
  - **Bangladesh** is the region's top performer, rising **75 places to 24th globally**, driven by gains in **political empowerment** and **Pakistan** remains the lowest globally, ranked **148th**.

- **Global Trends: Top 5 countries** in Global Gender Gap Index 2025 were **Iceland** (for the 16th consecutive year), **Finland**, **Norway**, **UK** and **New Zealand**.
  - The **global gender gap** has closed by **68.8%**, marking the **strongest post Covid-19-pandemic progress**, yet **full parity is still 123 years away** at the current rate.

What are the Key Strides of India in Bridging the Gender Gap?

- **Policy and Legislative Reforms:** India has enacted **progressive policies**, including the **Nari Shakti Vandan Adhiniyam (2023)**, **reserving seats for women** in legislatures, boosting gender-sensitive governance.
- **Education and Skill Development:** Programs like **Beti Bachao Beti Padhao** and **Vigyan Jyoti** have improved girls' access to education, especially in **STEM**.
  - Female **Gross Enrolment Ratio (GER)** in higher education **rose from 42.5% (2017-18) to 46.3% (2022-23).**
- **Economic Participation:** Female **labor force participation increased from 23.3% (2017-18) to 41.7% (2023-24)**. Schemes like **Stand-Up India** and **Mahila e-Haat** promote women entrepreneurship.
- **Shifting Social Norms:** Changing **societal attitudes and gender-neutral portrayals** in media have enabled **greater acceptance of women in leadership and non-traditional roles.**
- **Financial Inclusion:** Over **28 crore women** have **Jan Dhan accounts**, enhancing **autonomy.** Schemes like **PMJDY** and Stand-Up India **support financial independence and entrepreneurship.**
- **Health and Reproductive Rights**: Initiatives like **PM Matru Vandana Yojana** and **National Health Mission (NHM)** have **improved maternal care**.
  - **Maternal Mortality Rate (MMR)** dropped from **174 (2013-15)** to **97 (2018-20),** indicating **better health outcomes for women.**

What are the Major Challenges Contributing to the Gender Gap in India?

- **Low Female Labor Force Participation:** India's **Female Labour Force Participation Rate** is just **41.7%** (PLFS 2023–24), with most women in **informal and undervalued roles**, especially in agriculture.
  - **Patriarchal norms, unsafe workplaces**, and **lack of childcare support** continue to restrict women's access to formal, secure employment.
- **Education and Literacy Disparities:** Female literacy stands at **around 65%** vs **82%** for males (Census 2011), a **17% point gap**.
  - Nearly **40% of girls aged 15–18** are out of school, with **23 million** dropping out due to **menstruation-related stigma and lack of facilities.** The **Education Parity Index** declined to **0.964** in 2024, reversing earlier progress.
- **Economic Participation and Wage Inequality:** Women spend **nearly 289 minutes/day** on unpaid domestic work, **3 times more** than men and earn only **around 73%** of male wages on average, with **lower parity in sectors like tech (as low as 60%).**
  - The **Economic Survey 2022–23** estimated the value of women's unpaid care work at **Rs 22.7 lakh crore**, roughly **7.5% of India's GDP**.
    - Despite its massive economic contribution, this work remains invisible in labour statistics, undervaluing women's time and restricting their participation in paid employment.
  - Also, only **17%** of **Chief-roles** and **20%** of board positions in corporate India are held by women.
- **Implementation Gaps in Schemes:** While multiple government schemes target gender equity, **poor awareness, weak last-mile delivery, and lack of gender-sensitive monitoring** hinder their real impact, especially in **rural and marginalised populations.**

What are the Key Initiatives of Government of India to Reduce Gender Gap?

- **Beti Bachao Beti Padhao**
- **Mahila Shakti Kendra**
- **Mahila Police Volunteers**
- **Rashtriya Mahila Kosh**
- **Political Reservation:** The government has reserved 33% of the seats in **Panchayati Raj Institutions** for women.
  - The Constitution **(106th Amendment) Act, 2023,** has also reserved one-third of all seats for women in **Lok Sabha**, State legislative assemblies, and the Legislative Assembly of the National Capital Territory of Delhi, including those reserved for SCs and STs.

- **Female Entrepreneurship**: To promote female entrepreneurship, the Government has initiated Programmes like Stand-Up India and Mahila-e-Haat (an online marketing platform to support women entrepreneurs/SHGs/NGOs), Entrepreneurship and Skill Development Programme (ESSDP).

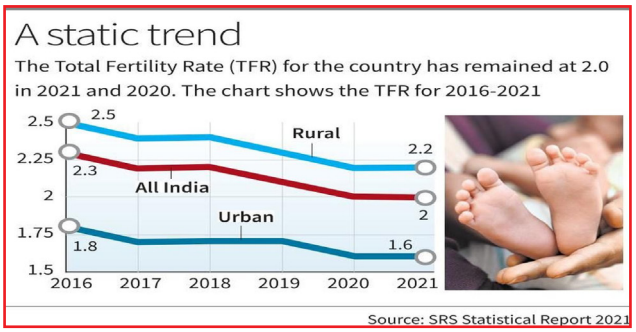
UNFPA State of World Population Report 2025

Why in News?

The United Nations Population Fund (UNFPA) has released its **State of World Population (SOWP) 2025 report** titled **"The Real Fertility Crisis".** It reaffirms India as the **world's most populous country** and highlights **critical shifts** in **fertility, ageing, and reproductive autonomy,** urging focus on **people's unmet fertility goals** instead of fear of population decline.

What are the Key Highlights of the UNFPA Report 2025 Related to India?

- **Population Size and Projections:** India's population in **April 2025** is estimated at **146.39 crore**, the **highest in the world.** It is expected to **peak at 170 crore in the early 2060s,** then gradually decline.
  - **Life expectancy** is projected at **71 years for men** and **74 years for women.**
- **Fertility Rate Trends & Gaps:** India's Total Fertility Rate (TFR) has dropped to **1.9**, below the replacement level of 2.1.
  - As per Sample Registration System (SRS) 2021, TFR was **2.0,** showing national-level achievement.
    - However, states like **Bihar (3.0), Meghalaya (2.9), and Uttar Pradesh (2.7)** still have high TFRs. **31 States/UTs are below replacement level,** with urban-rural gaps in 7 states.
  - India's **fertility divide** reflects **regional inequality**, **high-fertility states** like Bihar, UP, and Jharkhand **contrast with low-fertility ones** like Kerala, Delhi, and Tamil Nadu, due to **gaps in education, healthcare, development, and gender norms.**



- **Youth and Working-Age Demographics:** India has a **strong demographic advantage** with **68% of its population in the working-age group (15–64).** Children aged **0–14 make up 24%**, while **26% are in the 10–24 age group**.
  - The elderly **(65+) account for 7% of the population.**
- **Barriers to Reproductive Autonomy: Reproductive choices in India are hindered** by **financial (40%), housing (22%), job (21%), and childcare (18%) constraints**, along with **health issues like infertility (13%) and poor maternal care (14%).**
  - **Social pressure (19%)** and rising **anxiety over climate, politics, and economy** also impact decisions.
- **Policy Recommendations for India:** The report urges India to **prioritise reproductive rights over population control** by ensuring **universal access to contraceptives, maternal and infertility care, and safe abortion.**
  - It recommends **removing structural barriers** like housing, childcare, and job insecurity, extending services to **unmarried,** LGBTQIA+, **and marginalized groups, improving data on unmet needs,** and **promoting gender equality and social change** through community initiatives.

What are the Key Demographic Statistics for India?

Indicator	Value/Estimate
Median Age	The median age of India's population is **28.2 years** (World Population Prospects).
Working-Age Population (15-64 years)	**68%** of India's population, approximately 961 million, falls within the working-age group.

Literacy Rate	According to the **National Family Health Survey 2019–21** (NFHS-5), adult men and women (15–49 years old) have literacy rates of **87.4%** and **71.5%**, respectively
Labor Force Participation Rate (LFPR)	Male LFPR is 78.8% while female LFPR is 41.7% for the population aged 15 years and above. Overall LFPR for India is 60.1%
Overall Literacy Rate (ages 15+)	The overall literacy rate for individuals aged 15 and above is 77.7% (NSO, 2021).
Dependency Ratio	The dependency ratio stands at 47%, meaning there are 47 dependents for every 100 working-age individuals.
Population in Climate-Vulnerable Areas	Over **80% of India's population resides in areas vulnerable to climate change** impacts.
Prevalence of NCDs and Mental Health Issues	Over **20% of the population** suffers from non-communicable diseases (NCDs), and around 15% face mental health issues.

What is the United Nations Population Fund?

- **About: UNFPA** is a subsidiary body of the **UN General Assembly** and serves as the UN's key agency for **sexual and reproductive health**.
  - It operates in over 150 countries, covering 80% of the global population.
- **Establishment:** Started in **1969** as the **United Nations Fund for Population Activities**, renamed in **1987** as **United Nations Population Fund** (UNFPA acronym retained).
  - Guided by the **ICPD Programme of Action (1994, Cairo)** and the **2019 Nairobi Statement**, focusing on **women's empowerment** and **reproductive rights**.
- **Objective:** UNFPA aims to ensure **every pregnancy is wanted**, **every childbirth is safe**, and **every young person's potential is fulfilled**.
  - It supports SDGs, particularly **SDG 3 (Good Health and Well-being), SDG 4 (Quality Education), and SDG 5 (Gender Equality).**
  - UNFPA's **3 transformative goals by 2030 are**: **achieving zero unmet need for family planning, zero preventable maternal deaths,** and **zero gender-based violence and harmful practices** such as child marriage and female genital mutilation.
- **Organisational Structure:** UNFPA is guided by **UN Economic and Social Council (ECOSOC),** reports to the **UNDP/UNFPA Executive Board (36 members)**, and collaborates with **WHO, UNICEF, UNDP, and UNAIDS**.
- **Funding:** UNFPA is **not funded by the UN regular budget**. It is supported entirely through **voluntary contributions** from governments, private sector, and civil society.

Strengthening Women's Role in Agriculture

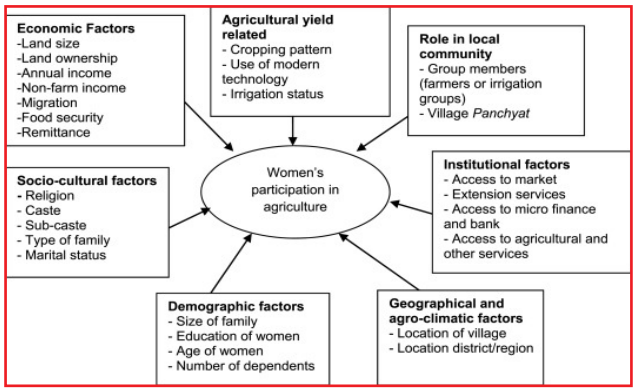
Why in News?

The **United Nations General Assembly (UNGA)** has declared **2026** as the **International Year of the Woman Farmer,** recognising the **critical yet often overlooked role of women in global agriculture.**

- **Women** contribute nearly **half of the global food supply**, making up **60% to 80% of food production** in developing countries and **39% of the agricultural labor force** in South Asia.

What is the State of Women in Indian Agriculture?

- **High Participation Rate:** Around **80% of rural women** are engaged in **agriculture,** with **3.6 crore women farmers** and **6.15 crore women agricultural labourers** (**Census 2011**).
  - They form **33% of the agricultural labour force** and **48% of self-employed farmers**.
  - With **rising male migration**, women increasingly manage farms independently, marking the **feminisation of Indian agriculture.**
- **Community Management:** Women serve as key facilitators for **agricultural extension, information dissemination, and community-based natural resource management**.



What are the Challenges Faced by Women in Agriculture?

- **Gender Inequality in Land Ownership:** Despite constituting a significant portion of the agricultural workforce, **women own only 14% of agricultural land**, just **8.3% as per NFHS-5.** This severely **limits their access to institutional credit, subsidies, technology, and extension services**, curbing their productivity and decision-making power.
- **Barriers to Technology, Educational and Skill Adoption:** Women farmers face **limited access to credit, financial services, and modern technology,** restricting their ability to invest in improved agricultural practices.
  - Additionally, **low levels of formal education, financial literacy, and technical skills** hinder their capacity to adopt innovations or scale up agri-enterprises.This limits their capacity to adopt **modern and efficient agricultural practices.**
- **Overburdened & Unrecognised Workload:** Women simultaneously manage **farming responsibilities, household chores, and childcare**, leading to physical exhaustion and time poverty. Their **contributions in livestock care, seed preservation, and food processing often go unpaid and unacknowledged**.
- **Market Exclusion: Limited mobility, lack of transport, and gender-based discrimination** in market spaces prevent women from accessing fair markets and remunerative prices. **Information asymmetry** further marginalises them from value chains.
- **Vulnerabilities Due to Climate Change: Climate change** exacerbates existing challenges for women farmers by **increasing the frequency and severity of natural disasters,** such as **floods and droughts**. It also **increases their domestic responsibilities,** further limiting their time and resources for farming.

What are India's Initiatives to Support Women in Agriculture?

- **Mahila Kisan Sashaktikaran Pariyojana (MKSP) & Sub-Mission on Agricultural Mechanisation: MKSP** & **SMAM** initiatives focus on **enhancing the skills of women farmers** and provide **subsidies for the purchase of agricultural machinery,** enabling them to **improve productivity and reduce manual labor.**
- **National Food Security Mission (NFSM): NFSM allocates 30% of its budget to support women farmer**s across various states and union territories, aiming to improve food security and support women's participation in agriculture.
- **Innovative Projects and Initiatives:**
  - **ENACT Project in Nagaon District**: By **connecting women farmers with agricultural and climate experts** via technology, the ENACT project provides **weekly advisories, improving access to important agricultural knowledge** and strategies to cope with changing weather patterns.
  - **Promotion of Flood-Resistant Crops and Market Linkages**: Initiatives like **promoting flood-resistant rice varieties** and **diversifying livelihoods** help mitigate the impact of natural disasters. Additionally, **improving market linkages** ensures that women farmers can access better markets for their produce.
- **Other Initiatives:**
  - **Self-Help Groups (SHGs) and Microfinance** promote **women's collective action and rural financial inclusion.**
  - **Lakhpati Didi Scheme** promotes **entrepreneurship, credit access, and financial inclusion** for SHGs and rural women entrepreneurs.
  - **Namo Drone Didi Initiative (2024–26)** aims to equip **15,000 women SHGs** with drones for providing agricultural services.

- Focus on **micro-irrigation and integrated farming**, with **30% allocation for women** within 50% earmarked for small and marginal farmers under **Per Drop More Crop** & **Rainfed Area Development (RAD)**.
- **Mahila Kisan Yojana** provides **loans to SC women for self-employment** in agriculture and allied sectors.
- **Rashtriya Mahila Kisan Diwas** is celebrated annually on **15th October** to **recognize and appreciate the valuable contribution of women farmers** in agriculture.

Science & Technology

Highlights

- *Core-Mantle Connectivity*
- *Tardigrades Aboard Axiom-4 Mission to Test Space Resilience*
- *Stratospheric Aerosol Injection*
- *Building-Integrated Photovoltaics*
- *IoT Revolution and Smart Future*
- *Neurodegenerative Diseases*

Core-Mantle Connectivity

Why in News?

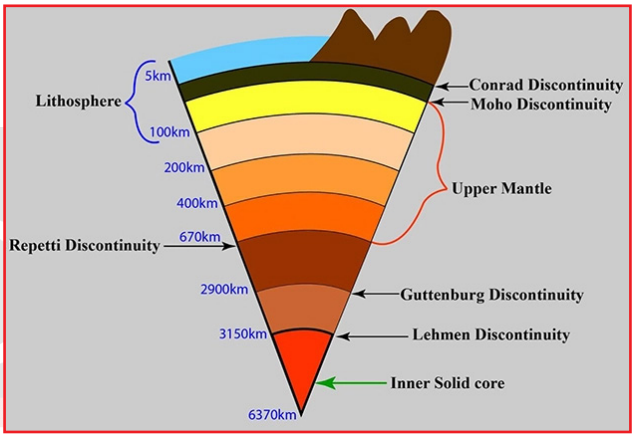
A study by **German researchers** reveals that **precious metals** like **gold, platinum, and ruthenium** are **leaking from the Earth's core to the surface** via **volcanic activity,** challenging the long-standing belief that the **core is geochemically isolated.**

What are the Key Insights from Recent Studies on the Interaction Between Earth's Core and Mantle?

- **Core-Mantle Material Exchange:** Researchers studied **volcanic rocks** from **Hawaii,** created by **mantle plumes (hot rock columns)** rising from the **core-mantle boundary**.
  - They detected **high levels of ruthenium-100 (^100Ru),** an isotope mainly found in the **Earth's core**, showing that **core materials travel upward through mantle plumes.**
    - This reveals **greater connectivity between the core and mantle** than earlier assumed.
- **Precious Metals Locked in Earth's Core:** The **Earth's core** contains over **99.999% of the planet's gold** along with other **siderophile (iron-loving) elements** like **platinum, iridium, and ruthenium**.
  - These metals were **traditionally thought to be inaccessible** due to a **thick rock barrier separating the core** from the mantle and crust.

What are the Key Facts About Earth's Mantle & Core?

- **Mantle:**
  - **Structure:** The mantle constitutes about **83% of Earth's volume** and **67% of its mass**, extending from the **Moho discontinuity (around 7-35 km depth)** down to the **core-mantle boundary at 2,900 km depth**.



    - It is primarily composed of **silicate rocks rich in iron and magnesium**, with elemental composition approximately **45% oxygen, 21% silicon, and 23% magnesium.**
- Common silicates found in the mantle include **olivine, garnet, and pyroxene.**
  - **Density and State:** The **upper mantle's density** ranges from **2.9 to 3.3 g/cm³**, while the **lower mantle's density** varies from **3.3 to 5.7 g/cm³**.
    - The **asthenosphere** is a layer of the **upper mantle**, while the l**ower mantle extends deeper** into the Earth.
    - While the **asthenosphere is partially molten** and can flow, the immense pressure in the **lower mantle** keeps it in a solid state, despite the high temperatures.
    - **Temperature Gradient and Convection:** Temperatures increase from around **200°C near the crust** to nearly **4,000°C at the core-mantle boundary**.

INTERIOR OF THE EARTH

1 THE CRUST

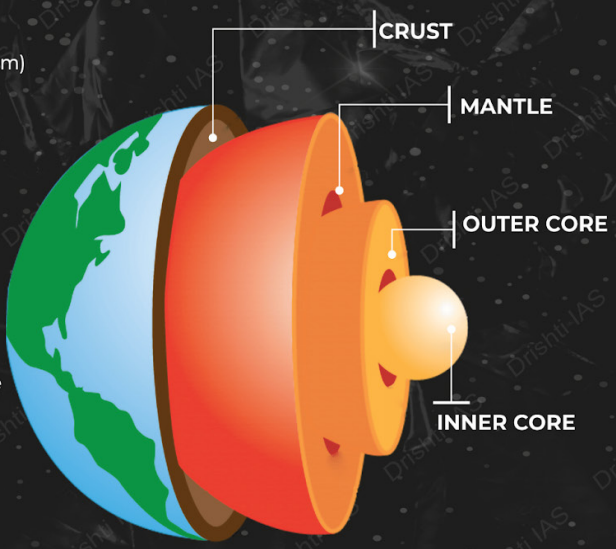
- Thin, outermost layer
- Oceanic crust – thinner
  - Mean thickness -5 km
  - Made up of Silica and Magnesium (SiMa)
- Continental crust – thicker
  - Mean thickness - 30 km
  - Made up of Silica and Aluminum (SiAl)
  - Thicker in the areas of major mountain systems.
    - Around 70 km thick in the Himalayan region.
- Temperature increases with depth (rises by up to 30° C for every km)

Lithosphere

- Rigid outer layer, thickness: 100 km
- Consists of the crust and the upper mantle
- Divided into tectonic plates responsible for large-scale changes in the earth's geological structure (folding, faulting)

2 THE MANTLE

- Extends from Moho's discontinuity to a depth of 2,900 km
- Upper portion is called asthenosphere
  - Zone of weak rocks; in semi molten or jelly like state
  - Extends upto 400 kms
  - Main source of magma that comes out of volcanic eruptions



3 THE CORE

- Lies between 2900-6370 km below the earth's surface
- Made up of heavy materials, primarily nickel (Ni) and iron (Fe) - NiFe
- Outer core –
  - Between 2900-5100 kms
  - Liquid because of not enough pressure to solidify
- Inner core –
  - Between 5100-6370 kms
  - Solid – it can transmit secondary waves (earthquake) which outer core can't
- Denser than Mantle

Boundaries/discontinuities between Earth's layers

1. Conorod Discontinuity– between upper and lower crust
2. Mohorovicic Discontinuity (Moho) – separates the crust rom the mantle, its average depth being about 35 km.
3. Repiti Discontinuity – between the upper and lower mantle
4. Gutenberg Discontinuity – lies between the mantle and the outer core.
5. Lehman Discontinuity- between inner and outer core

Drishti IAS

- This temperature difference drives **mantle convection**, where solid silicate rock behaves plastically and circulates slowly.
- This convection is fundamental to the **movement of tectonic plates** at the surface.

❍ **Seismicity:** Despite **high-pressure conditions** that normally inhibit **seismic activity,** earthquakes occur in **subduction zones** down to depths of **670 km,** within the mantle.

➢ **Earth's Core:**

❍ **Structure:** The Earth's core **lies beneath the mantle**, starting at about **2,900 km** depth and extending to the planet's center at approximately **6,371 km.**

- It is primarily composed of **iron and nickel,** with some lighter elements.

- **Outer Core**: Extending from **2,900 km to about 5,150 km depth,** the outer core is a **molten, liquid layer** approximately **2,250 km thick,** with temperatures ranging between **4,000°C and 6,000°C.**
  - The **movement of its liquid iron generates Earth's magnetic field** through the **geodynamo process.** Its **density is lower than the inner core** due to its liquid state.
- **Inner Core:** Located from approximately **5,150 km depth to the Earth's center**, the inner core is a **solid sphere** with a **radius of about 1,220 km**.
  - Despite extremely high temperatures ranging from **5,000°C to 7,000°C**, it remains **solid** due to the **immense pressure** exerted by the overlying layers.
  - Composed primarily of an **iron-nickel alloy**, the inner core is **highly dense** and plays a critical role in **Earth's internal heat transfer**.
  - It also influences the planet's **magnetic field**, although the **geodynamo effect** (magnetic field generation) is primarily driven by the **swirling liquid iron** in the outer core.
  - The inner core exhibits **high thermal and electrical conductivity and rotates eastward slightly faster** than the Earth's surface, completing an extra rotation approximately every **1,000 years**.
  - It is **separated from the outer core** by a boundary known as the **Lehmann Discontinuity**.

Asthenosphere

- The asthenosphere is the **upper mantle layer from 80 to 200 km depth**, located **beneath the rigid lithosphere.**
- It is **ductile, mechanically weak, and highly viscous**, with **density greater than the crust**. These properties **facilitate tectonic plate movement and isostatic adjustments**.
  - It is also the **main source of magma** for volcanic eruptions.

Tardigrades Aboard Axiom-4 Mission to Test Space Resilience

Why in News?

Indian astronaut, **Shubhanshu Shukla**, will pilot the **Axiom-4 mission** to the **International Space Station (ISS)** while **Peggy Whitson (USA)** will **command** the mission.

- As a part of the mission, ISRO is sending **tardigrades (water bears)**—microscopic, hardy organisms—to the **ISS** to study how life can survive in **extreme space conditions.**

What is the Axiom-4 Mission?

- **About: Axiom Mission 4 (Ax-4)** is the **4th private spaceflight to the ISS**, operated by **Axiom Space**, a US-based space company, using the **SpaceX Crew Dragon** spacecraft.
  - With this, **Shubhanshu Shukla** will become the **2nd Indian** to travel to **space** (after **Rakesh Sharma** in 1984) and the **1st Indian** to set foot on the **ISS.**
- **Key Features: Axiom Space's 14-day mission aboard the ISS** will conduct **scientific experiments**, **tech demonstrations**, and **educational outreach**, advancing its goal to build the **first commercial space station** and transition from **ISS reliance to an independent orbital platform.**
  - It features an **international crew** comprising members from the **United States, India, Poland, and Hungary.**
- **Key Experiment:**
  - **Physical and cognitive impact** of using computer screens in microgravity.
  - **Behaviour and response of tardigrades** (water bears) in space
  - Impact of spaceflight on **six varieties of crops** specifically on **moong dal**.
  - Growth rate, cellular responses, and biochemical activity of **cyanobacteria** (a group of bacteria that are known to produce energy through **photosynthesis** just like plants).

- **Significance for India: Strengthens Indo-US space collaboration** through **ISRO-NASA partnership** while conducting **10 critical experiments** (microgravity, seed growth, tardigrade studies) to validate research for **Gaganyaan mission (2027).**
  - Boosted the success of **Gaganyaan mission** by providing **hands-on experience** for **Gaganyaan crew training**, advancing **astrobiology research**, and positioning India as a key player in future **commercial space stations**.

Note: Zero-G indicator is a **small item**, often a plushie (soft, stuffed toy), that provides astronauts a **visual cue** that they have entered a **state of weightlessness**. The zero-G indicator for the Axiom-4 mission is a **swan plushie named 'Joy'.**

What are Key Points About Tardigrades?

- **About: Tardigrades** (also known as **water bears** or **moss piglets**) are **microscopic, eight-legged organisms** about **0.5 mm** long that feed on plant and algae fluids.
  - They've existed for **~600 million years** and **survived all five mass extinctions**, making them one of the **most resilient life forms on Earth**.
  - They are found in **diverse moist habitats**—from mountaintops to deep seas—and are known for their **extreme durability.**
- **Survival Abilities: Tardigrades** can **survive extreme conditions**—from **temperatures of –272.95°C to 150°C**, intense **UV radiation**, **vacuum of space**, and **pressures up to 40,000 kilopascals**, even **reviving after 30 years in frozen states.**
- **Survival Mechanisms:**
  - **Cryptobiosis:** Near-complete **metabolic shutdown** in harsh conditions.
  - **Anhydrobiosis:** Reduces water content by **>95%**, entering a durable **shrunken state** called **tun**.
  - **Unique Proteins (CAHS): Cytoplasmic-abundant heat soluble (CAHS)** proteins form a **protective gel** within their cells, protecting essential cellular components from destruction.
- **Scientific Importance:** Research on tardigrades could lead to **climate-resilient crops**, **advanced UV-protective sunscreens**, and **improved organ preservation techniques** for transplants.
- **Space Survivors:** Tardigrades made history in **2007** as the **first animals to survive direct exposure to space** during **ESA's Foton-M3 mission**, proving their extraordinary resilience beyond Earth's atmosphere.

Note: Batillipes chandrayaani is a newly discovered species of **marine tardigrade** found along India's southeast coast of **Tamil Nadu**.

- It was named in honour of **India's Chandrayaan-3 moon mission**, reflecting a symbolic connection between India's advancements in **space exploration and marine biology.**

Stratospheric Aerosol Injection

Why in News?

Scientists are exploring new methods to combat **climate change** such as **Stratospheric Aerosol Injection (SAI)**, a **geoengineering technique** inspired by **volcanic eruptions** that could **cool the planet faster and more affordably**.

What is Stratospheric Aerosol Injection?

- **About: SAI** is a proposed **solar geoengineering** (or **solar radiation modification**) **technique** designed to **cool** the Earth's **climate** by **reflecting a small fraction of sunlight** back into **space**.
  - It **mimics** the **natural cooling effects** observed after **large volcanic eruptions**, such as the **1991 eruption of Mount Pinatubo** (Philippines), which **injected sulfate aerosols** into the **stratosphere** and **temporarily lowered global temperatures** by **0.5°C that year**.

GEO-ENGINEERING

Geoengineering means manipulating the earth's climate to lower its temperature to counter global warming

TYPES OF GEO-ENGINEERING

CARBON DIOXIDE REMOVAL

Technology/ Method Proposed	*Proposed Effects/actions*	*Potential Side Effects*	*Feasibility/Cost Effectiveness*
Land Use Management	Afforestation/ Reforestation	Minimum Side Effects	High feasibility, Low Cost
Bio-energy with carbon capture and storage (BECCS)	Biomass harvested and used as fuel	Potential land use conflict	Comparatively expensive
Direct CO_2 Capture	Industrial Process	Minimal	High technical feasibility
Fertilization of the ocean	Increased CO_2 absorption by promoting algae growth	High potential for adverse side effects	Feasible but not cost-effective
Accelerated Weathering	Pulverization of silicate rocks	Potential respiratory health impact	Could be combined with crop production, a feasible option at scale

SOLAR RADIATION MANAGEMENT

Stratospheric aerosol Injection	For reflecting sunlight back into space	Likely impact on the hydrological cycle	Feasible and potentially highly effective
Marine cloud brightening	Seeding of marine clouds with seawater aerosol	Likely impact on precipitation pattern	Low to medium cost and feasible at scale
Giant deflectors in outer space	Mirror placed in near earth orbit	Regional climate effects	Capital-intensive and long gestation
Surface albedo approaches	Painting the roof of the building bright white, Installing desert reflector	Major Impact on Desert Ecosystem	High labor and maintenance cost

REGULATION

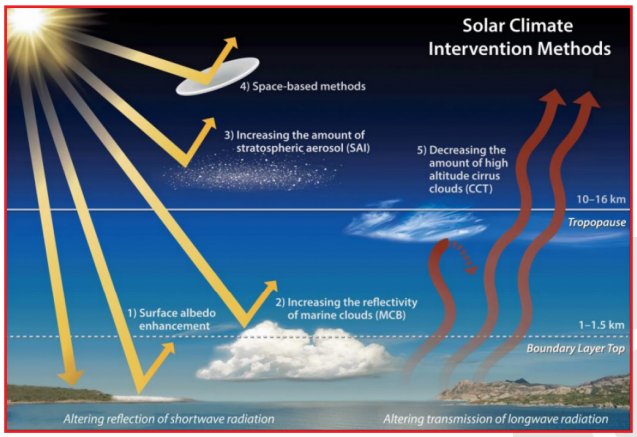
- No specific international or Indian regulations on geoengineering.

INDIA'S EFFORTS

- **Department of Science and Technology:**
  - Geoengineering climate-modelling research programme (since 2013)
- **IISc:**
  - Initiative to understand the implications of solar geoengineering for developing countries
  - Scientists simulated injecting 20 million tonnes of sulphate aerosols into the Arctic stratosphere

Drishti IAS

- **Working of SAI: SAI** involves releasing **small reflective particles** (typically **sulfate aerosols** or alternatives like **calcium carbonate**) into the **stratosphere (10–50 km altitude)**.
  - These particles **scatter and reflect** a portion of **incoming solar radiation**, thereby **reducing the amount of heat** that reaches the Earth's surface.
  - By **increasing the planet's albedo** (reflectivity), SAI can potentially **offset some of the warming** caused by greenhouse gases.



- **Effectiveness: SAI** is generally **more effective** as particles remain in the **stratosphere for months to years**. In contrast, particles released at **lower altitudes** are often **washed out by rain** after being trapped in **clouds**.
  - The **cooling effect** is typically **more pronounced in polar regions**, while the **tropics**, despite experiencing **more severe warming**, show **less impact** from SAI.
- **Associated Risks:**
  - **Environmental Risks:** Ozone layer **damage** (delaying its recovery), Acid rain from sulfur dioxide and **Uneven cooling** (stronger in polar regions, weaker in tropics).
  - **Long Term Impacts:** It only **masks warming**, doesn't solve the root cause (CO_2 emissions). It can **alter precipitation patterns** and **air circulation**, with **adverse effects on monsoon regions**.
    - It may also **disrupt stratospheric chemistry**, impacting **methane lifespan**, **ice formation**, and **cloud microphysics.**

What are Other Methods of Solar Radiation Modification?

- **Marine Cloud Brightening (MCB):** It involves spraying **fine seawater droplets** into **low-level ocean clouds** (marine stratocumulus), enhancing their **reflectivity** and **persistence** by acting as **cloud condensation nuclei**.
  - MCB is seen as **more localized and reversible** than SAI, but is also **more technically challenging** and **weather-dependent.**
- **Space Sunshades:** It involves placing **large mirrors or screens** in **orbit** or at **Lagrange Point 1** (**Point** where **Earth** and **Sun gravity balance** each other) to **block or deflect incoming solar radiation**, reducing the **solar energy** reaching Earth's surface.
- **Cirrus Cloud Thinning (CCT): CCT** aims to reduce **global warming** by modifying **high-altitude cirrus clouds**, which **trap heat** due to their **high ice content.**
  - CCT injects **ice-nucleating particles** like **bismuth triiodide** to **enlarge ice crystals**, making cirrus clouds **less persistent**, **enhancing heat escape**, and **reducing their warming effect** by **accelerating crystal fall.**
- **Spraying Diamond Dust:** It suggests spraying **synthetic nanodiamonds (1–100 nm)** into the **stratosphere**.
  - Being **highly reflective** and **chemically inert**, they **scatter solar radiation**, reducing **Earth's heat absorption** and **cooling the planet.**

Building-Integrated Photovoltaics

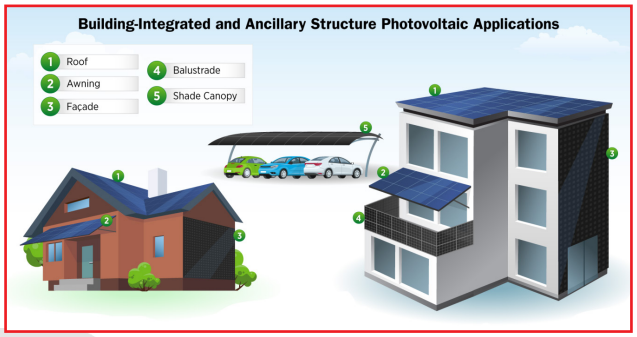
Why in News?

As India's cities grow vertically and space for conventional rooftop solar panels becomes limited, experts are turning to **Building-Integrated Photovoltaics (BIPV)** as a scalable, land-neutral alternative.

- According to the World Bank, 70% of the urban infrastructure needed for India to become a developed country by 2047 is yet to be built. Integrating BIPV from the design stage can fast-track clean energy goals.

What is Building-Integrated Photovoltaics?

- **About:** BIPV incorporates solar energy-generating components **(photovoltaic (PV) cells)** directly into a building's structure such as façades, roofs, windows, and railings, replacing conventional materials like tiles, glass, or cladding.
  - Unlike **traditional rooftop solar (RTS) systems** that sit atop buildings, BIPV becomes part of the building's design.
  - BIPV modules generate electricity while meeting the building's structural and aesthetic needs.
- **Need of BIPV in India: Rooftop solar systems** need ~300 sq. ft for 3 kilowatt (kW), but many urban homes and high-rises lack shadow-free rooftops.
  - For instance, a 16-storey building may only support ~40 kWp via RTS, whereas a **BIPV-integrated façade could generate up to 150 kWp.**
    - With the urban population projected to reach 850 million by 2051, energy demand in cities is set to soar, but RTS alone cannot bridge the gap.
  - Due to space limitations, implementation delays, and low awareness, India missed its **2022 target of 40 GW RTS under the 100 GW solar goal,** now extended to 2026. BIPV can help bridge this gap while supporting ecological sustainability.
  - India can't rely solely on **ground-mounted and rooftop systems** to meet its goal to install **300 GW of solar capacity by 2030.** Land-neutral solutions like BIPV need to be prioritised.
- **Status of BIPVs in India:** Falling **solar costs and rising demand** for sustainable architecture are driving BIPV adoption in India.
  - Notable installations include an 863-kWp system at **CtrlS Datacenters in Navi Mumbai,** a **solar dome at the Renewable Energy Museum in Kolkata,** and large **BIPV setups at Vijayawada and Sahibabad railway stations** highlighting BIPV's scalability across **public and commercial spaces.**
- **Barriers to Scaling BIPV in India:** The **high upfront investment** required for BIPV installations remains a significant hurdle, limiting widespread adoption.
  - Absence of **dedicated policies and insufficient financial incentives** discourage builders and developers from integrating BIPV early in building designs.
  - Limited expertise in BIPV and reliance on imported technology hinder local manufacturing and deployment.
  - Many stakeholders, including architects, planners, and consumers, lack awareness of BIPV benefits and applications.

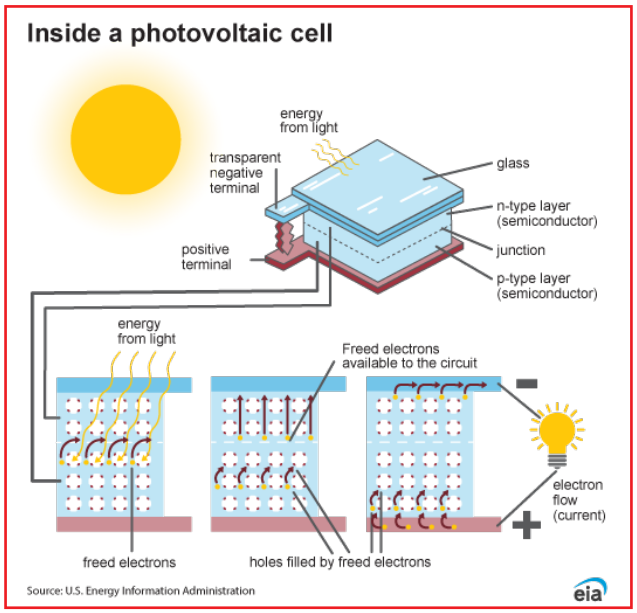


Building-Integrated Photovoltaics and Traditional Rooftop Solar

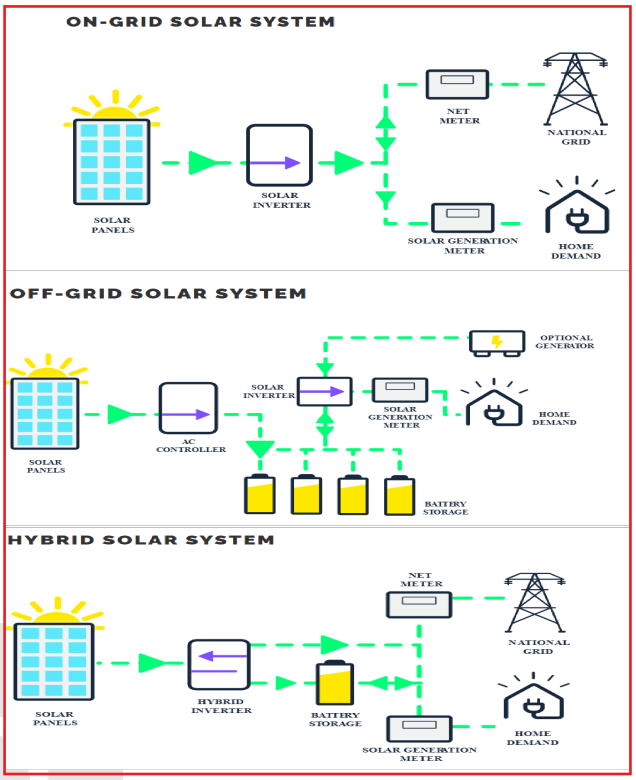
Feature	BIPV	RTS
Integration	Integrated into building design	Installed on top of the roof
Functionality	Dual-purpose (building material + power)	Solely for energy generation
Installation	Complex, part of building design	Easier, retrofit to existing buildings
Cost	Higher due to integration	Relatively lower
Maintenance	Complex and expensive	Relatively low-cost

What is Solar Photovoltaics?

- **About: Solar PV (Photovoltaic)** refers to a technology that converts sunlight directly into electricity using photovoltaic cells made from semiconductor materials.
  - When **sunlight (photons) hits a PV cell,** it excites electrons in the material, generating a flow of direct current (DC) electricity.
  - Devices called inverters are used to convert this DC electricity into alternating current (AC) for use in homes and the power grid.



- **Key Materials Used in PV Cells:** PV cells primarily use semiconductors such as **silicon, cadmium telluride, and perovskite** to convert sunlight into electricity
  - Conductive materials like **silver and copper** enable the flow of electricity, while glass provides structural support and encapsulation.
  - Encapsulants like **EVA (Ethylene Vinyl Acetate)** and backsheets such as **TPT (Tedlar Polyester Tedlar)** protect the cells from moisture, dust, and physical damage, ensuring durability and efficiency.
- **Types of Solar PV Systems:**
  - **On-Grid Solar System:** Connects directly to the national grid without battery storage. It powers home and exports excess energy back to the grid, reducing bills and carbon footprint.
    - However, it stops working during grid outages but can be upgraded to a hybrid system by adding batteries.
  - **Off-Grid Solar System:** Fully **independent from the grid**, ideal for remote locations or energy self-sufficiency. Includes batteries and often backup generators to ensure continuous power.
  - **Hybrid Solar System:** Combines solar panels with battery storage while remaining grid-connected.
    - It stores excess energy for use during the outages, offering backup power and flexibility.



IoT Revolution and Smart Future

Why in News?

The Internet of Things (IoT) has become a **transformative force**, infusing intelligence into everyday things around us, thereby profoundly **impacting our daily lives**. From **smart refrigerators** that monitor **food freshness** to **security systems** that provide **real-time alerts**, IoT is making our homes **more intuitive, efficient, and secure**.

What is the Internet of Things (IoT)?

- **About:** The Internet of Things (IoT) refers to a **network of physical devices**—embedded with **sensors, software, and connectivity**—that **collect, exchange, and act** on data.
  - These smart devices range from everyday household objects (like **refrigerators and thermostats**) to **industrial machines, vehicles, and wearable technology**.

- **Key Features of IoT:**
  - **Connectivity:** It enables **device communication** over networks (**Wi-Fi**, **Bluetooth**, **5G**), working with both **wired** and **wireless connections.**
  - **Automation & Intelligence: Devices** make decisions **autonomously**, such as **self-driving cars** responding to traffic.
  - **Remote Monitoring:** Users can **remotely access** and **manage devices**, such as viewing **home security cameras** on **smartphones**.
  - **Interoperability:** Different devices work together using **standardized protocols**, **compatible software**, and **open APIs (Application Programming Interfaces)** for integration.
  - **Scalability: Systems grow** by adding **devices** like **smart cities** adding **sensors** and **factories** connecting **machines.**
  - **Data Analytics & AI Integration:** It transforms raw data into actionable insights e.g., **traffic analysis** in smart cities.
  - **Customization & Personalization:** It adapts to user preferences e.g., **smart homes**, **wearable health devices**, and **personalized retail.**
- **Major Components of IoT:**
  - **Sensors & Actuators (The Physical Layer):** These are the **eyes and hands** of IoT, interacting with the real world.
    - **Sensors detect changes** in the environment (temperature, motion, light, humidity, etc.) e.g., Temperature sensors in **smart thermostats**.
    - **Actuators perform actions** based on sensor data e.g., **Smart locks** that open via an **app**.
  - **Connectivity (Network Layer):** IoT devices rely on various communication protocols to **send and receive data**, chosen based on their power, range, and bandwidth requirements. E..g,
    - **Bluetooth** (Short-range) for smart homes and **wearable devices**
    - **Wi-Fi** (Medium-range) for **smart building** applications
    - **Cellular** (4G/5G) (Long-range) for **smart cities**, agriculture, and logistics solutions.
  - **IoT Gateways (Bridge Between Devices & Cloud):** They serve as **intermediaries between local devices and cloud servers**, performing **data preprocessing** to reduce cloud load and **enhancing security** by encrypting data before transmission.
    - E.g., **Edge computing processes** data locally to reduce latency.
  - **Cloud Computing & Data Processing (Brain of IoT): Raw sensor data** is sent to the **cloud**, where platforms like **Google Cloud IoT** handle **data storage** and **AI/ML algorithms** analyze it to enable insights like **predictive maintenance.**
    - E.g., A **smart farming** system collects soil moisture data → Cloud AI analyzes it → Sends irrigation commands to actuators.
  - **User Interface (Human Interaction with IoT):** Users control and monitor IoT systems through various interfaces, including **mobile apps** like **voice assistants** for hands-free commands, and **automated alerts** such as notifications about low fridge supplies

What are the Key Applications of the Internet of Things?

- **Smart Cities:** IoT sensors optimize **traffic management** by reducing congestion and accidents, while **smart streetlights** adjust brightness based on movement to save energy and enhance safety.
  - Additionally, **smart bins** alert authorities for timely waste collection, and **disaster monitoring sensors** provide early warnings for **floods** and **earthquakes.**
  - E.g., The city of **Jaipur** has launched the **"Jaipur Smart City" project**, featuring **smart lighting systems** and **intelligent traffic management solutions.**
- **Smart Homes: Automated lighting and appliances**, such as **smart thermostats** and **lighting systems**, adjust based on usage to **save energy**, while **IoT-enabled security devices**—including **cameras**, **door locks**, and **motion sensors**—offer **real-time alerts** and **remote monitoring**.
  - E.g., **Google's Nest Thermostat** uses **AI**, **sensors**, and **machine learning** to optimize **home heating and cooling** for **energy efficiency**, **cost savings**, and **convenience.**
- **Healthcare: Remote patient monitoring** uses IoT-enabled medical devices (glucose monitors) to send real-time data to doctors, and **emergency alert systems** notify services if a patient is in distress.
  - **Wearable devices** like **smartwatches (e.g., Apple Watch)** monitor **heart rate**, and sleep cycle.

- **Smarter Transportation: Fleet tracking** helps logistics companies monitor vehicle health, fuel use, and driver behavior, while **smart parking sensors** guide drivers to open spots, easing congestion.
  - **Connected vehicles** use IoT to predict **maintenance, prevent collisions,** and support **self-driving** features.
  - E.g., **Tesla's Autopilot** is an **advanced driver-assistance system (ADAS)** that uses **AI, cameras, radar**, and **sensors** to automate driving tasks like **adaptive cruise control**, **lane-keeping**, and **self-parking**, enhancing **safety** and **convenience.**
- **Industrial & Workplace Safety:** Factories use IoT for **predictive maintenance**, monitor hazards like **gas leaks** and **extreme temperatures** to ensure **worker safety**, and track assets in real time to reduce theft and loss.
  - E.g., **Siemens IoT-enabled fire safety systems** improve **fire prevention, detection, and emergency response** in **buildings and critical infrastructure.**
- **Agriculture & Food Safety: Precision farming** uses IoT sensors to monitor **soil moisture, weather, and crop health**, optimizing water and pesticide use, while **livestock monitoring** tracks animal health and location with IoT tags.
  - Additionally, **food supply chain** sensors maintain safe storage temperatures during transport to reduce spoilage.
  - E.g., **Fyllo** empowers farmers with **IoT** and **data-driven precision agriculture** to improve **crop quality**, boost **yield**, and reduce **production costs**.

What are Risks and Challenges in the Internet of Things?

- **Cybersecurity Vulnerabilities:** Many IoT devices use **weak default passwords**, making them vulnerable to **botnet attacks**, like the **Mirai botnet** that hit major websites in **2016** and resurfaced in **2025**.
  - Additionally, **insecure APIs** can expose IoT ecosystems to hackers by allowing **unauthorized access** or **data interception.**
  - E.g., **Amazon Ring**, a popular **smart doorbell**, faced criticism for **security flaws** in its API.
- **Unauthorized Access:** IoT devices collect vast **sensitive data**, raising **privacy concerns** like **eavesdropping** (secretly listening to private conversations) through hacked **smart speakers or cameras**, and **data leaks** from **unencrypted transmissions** exposing personal or corporate information.
- **Lack of Standardization and Interoperability:** IoT ecosystems face **fragmentation** due to **diverse communication protocols** (e.g., Zigbee, LoRaWAN, cellular) and **proprietary ecosystems**, leading to **compatibility issues** and limited **scalability.**
  - **Amazon Alexa** and **Google Assistant** often struggle to integrate with **ZigBee** or **Z-Wave** devices, hindering seamless operation in **multi-brand smart home ecosystems.**
- **Scalability and Infrastructure Demands:** Managing billions of IoT devices causes **data overload**—with 73 **zettabytes/year** generated—requiring **advanced cloud/edge computing**, while **energy consumption** remains a challenge for **battery-powered sensors** in remote areas.
- **AI-Powered Cyber Threats:** Attackers now use **AI to exploit IoT vulnerabilities** like **deepfake** attacks manipulating sensor data to cause **false alarms** or **system failures.**

What are Indian Government Initiatives Related to IoT?

- Draft IoT Policy (2015)
- Digital Personal Data Protection (DPDP) Act, 2023
- 5G Rollout
- BharatNet
- Future Skills Prime

Neurodegenerative Diseases

Why in News?

Recent research by **National Centre for Biological Sciences (NCBS-TIFR)** and other studies has revealed that **neurodegenerative diseases** may **start long before symptoms appear,** driven by **blood vessel dysfunction** and **abnormal protein activity** in the brain.

- This new understanding moves the focus from direct **neuron** damage to **early vascular and molecular changes**, paving the way for earlier diagnosis and prevention.

What are Neurodegenerative Diseases?

- **About:**
  - **Neurodegenerative Diseases** are a group of disorders in which the **brain and nerve cells (neurons)** gradually **break down or die over time.**

- This leads to **problems with memory, movement, speech**, and other important body functions.

❍ These diseases usually **get worse over time** and currently have **no complete cure**, though treatments can help manage symptoms.

➢ **Common Examples:**

❍ **Alzheimer's Disease,** which affects memory and thinking.

❍ **Parkinson's Disease**, which affects movement and balance.

❍ **Amyotrophic Lateral Sclerosis (ALS)**, which affects **nerve cells (motor neurons)** in the brain and **spinal cord,** which control voluntary muscle movement.

❍ **Huntington's Disease**, which causes nerve cells in the brain to decay over time

❍ **Guillain-Barre syndrome**, a serious **autoimmune disorder** that **affects the peripheral nervous system.**

What does Recent Research Reveal about Early Causes of Neurodegenerative Diseases?

➢ **Vascular Dysfunction and Blood-Brain Barrier (BBB) Breakdown:** The **BBB** is a **protective layer formed by tightly connected cells lining brain blood vessels,** regulating what enters the brain. **Damage to this barrier,** caused by **dysfunction of the protein TDP-43,** leads to **leakage** that allows **harmful substances to enter**, causing **inflammation and neuron loss**.

❍ Studies in mice show these **vascular changes occur early,** before symptoms, suggesting **blood vessel damage is a key early factor in neurodegeneration.**

➢ **Intracellular Membrane Signaling Failure (Esyt Protein Dysfunction):** Neurons depend on **membrane contact sites** between the p**lasma membrane and endoplasmic reticulum** for transferring essential molecules like **lipids and calcium**, crucial for cell signaling and survival.

❍ The **Esyt protein** regulates this process by **binding calcium**. When Esyt function is impaired, this **signaling breaks down, disrupting neuron health and potentially initiating degeneration.**

What are the Key Factors Contributing to Neurodegenerative Diseases?

➢ **Genetic Factors: Mutations in specific genes** disrupt normal neuronal function and repair, **increasing susceptibility to degeneration.** These mutations **may be inherited or arise spontaneously.**

➢ **Protein Abnormalities: Misfolded proteins,** such as **amyloid-beta in Alzheimer's disease or alpha-synuclein** in Parkinson's disease, accumulate and interfere with cell function, triggering **neuronal toxicity and progressive damage.**

➢ **Oxidative Stress: Excess free radicals** cause **damage to neuronal DNA, proteins, and membranes**. When antioxidant defenses are overwhelmed, this accelerates neuronal cell death.

➢ **Mitochondrial Dysfunction: Impaired mitochondria** produce **insufficient energy and release harmful byproducts**, compromising neuron survival and promoting degeneration.

➢ **Chronic Inflammation: Persistent inflammation in the brain** activates immune cells that can damage neurons, exacerbating disease progression.

➢ **Environmental Factors: Exposure to toxins** like **pesticides, heavy metals, or infections** can induce cellular stress and damage, raising the risk of neurodegeneration.

➢ **Ageing:** The **natural ageing process weakens cellular repair and waste clearance systems**, making neurons more vulnerable to damage and loss over time.

Neurodegenerative Diseases V/s Neurological Disorders

➢ **Neurological disorders** are a **broader category of disorders affecting the nervous system**, including the **brain, spinal cord, and peripheral nerves** and **may be acute or chronic**.

❍ **Eg: Stroke, epilepsy, and meningitis.**

❍ Many **neurological conditions are treatable** or **reversible** with timely intervention. Eg: **Stroke (Ischemic Stroke)**.

➢ **Neurodegenerative diseases** are a subset of **neurological disorders** characterized by the **progressive and irreversible loss of structure or function of neurons**, often due to **abnormal protein accumulation, genetic factors,** or oxidative stress.

❍ They are **largely incurable and managed symptomatically.**

Environment and Ecology

Highlights

- *Call for Amendment in WPA,1972*
- *World Environment Day 2025*
- *Primates in Peril*

Call for Amendment in WPA,1972

Why in News?

Kerala has requested the Union Government for an **amendment** to the **Wildlife (Protection) Act, 1972** to allow **controlled killing of wild animals** that **threaten human life or agriculture.**

- **Human-wildlife conflict** has intensified, with Kerala observing several casualties between 2016 and 2025.

What are the Challenges with the WPA,1972?

- **Restrictions under the Act**: The **Wildlife Protection Act of 1972** offers **high protection to species listed under Schedule I,** making it difficult to take swift action against dangerous animals.
  - Before **lethal measures can be considered**, approval must be obtained after confirming that capturing or relocating the animal is not feasible.
- **Lack of Immediate Action**: Although the **district collector can declare a public nuisance,** court orders **limit their ability to act promptly in wildlife conflicts**.
  - For **Schedule I animals,** such as **bonnet macaques**, the law prevents **wildlife wardens from taking proactive action**, thus delaying necessary intervention.

What is the Wildlife (Protection) Act, 1972?

- **About:** It provides a **comprehensive legal framework** for the **protection of wild animals, birds, and plants**, the management of their habitats, and the regulation of trade in wildlife and related products.
  - The act **lists schedules of plants and animals** that are afforded varying degrees of protection and monitoring by the government.
- **Schedules:** Initially, the WPA consisted of **six schedules** that classified flora and fauna based on levels of protection. This was streamlined to **four schedules** through the **Wild Life (Protection) Amendment Act, 2022**, to enhance clarity and align with international commitments. New Classification (Post-2022 Amendment):
  - **Schedule I – Species granted the highest level of protection.**
  - **Schedule II – Species under a lower degree of protection.**
  - **Schedule III – Protected plant species.**
  - **Schedule IV – CITES listed specimens, regulating international trade.**
- **Key Provisions:**
  - **Section 9**: No person shall hunt any wild animal listed in **Schedules I, II, III, and IV,** except as permitted under Sections 11 and 12.
  - **Section 11**: **Chief Wildlife Warden** may permit killing if the animal threatens human life or is incurably diseased, and cannot be captured or relocated.
  - **Section 62**: The Central Government may, through a notification, declare any **wild animal (excluding those in Schedule I and Part II of Schedule II)** as vermin for a specific area and period. While the notification is in force, the animal will be deemed to be **included in Schedule V.**
  - **Section 50**: Forest officers/police can **seize items used in illegal hunting,** no emergency powers for local authorities.

WILDLIFE CONSERVATION INITIATIVES

Constitutional Provisions for Wildlife

- **42nd Amendment Act, 1976:** Forests & Protection of Wild Animals and Birds (moved from State to Concurrent List)
- **Article 48 A:** State shall endeavor to protect & improve environment and safeguard forests and wildlife of country
- **Article 51 A (g):** Fundamental duty to protect & improve natural environment including forests and Wildlife

Legal Frameworks

- Wildlife (Protection) Act, 1972
- Biological Diversity Act, 2002

Major Conservation Initiatives

- **Integrated Development of Wildlife Habitats (IDWH):**
  - Financial assistance provided to State/UT Governments for protection and conservation of wildlife
  - A Centrally Sponsored Scheme
- **National Wildlife Action Plan (2017-2031)**
- **Guidelines for Eco-tourism in Protected Areas**
- **Human-Wildlife Conflict Mitigation**
- **Wildlife Crime Control Bureau:** To combat wildlife-related crimes
- **Wildlife Division (MoEFCC):**
  - Policy and law for conservation of biodiversity and Protected Area network
  - Technical and financial support to the State/ UTs under IDHW, Central Zoo Authority and Wildlife Institute of India
- **Wildlife Crime Control Bureau (WCCB):** Collection, collation of intelligence & its dissemination, establishment of centralized Wild Life crime databank, coordination etc.
- **Wildlife Crime Control:**
  - Operation Save Kurma
  - Operation Thunderbird

Species-Specific Initiatives

- Protection and conservation of Greater Adjutant in Gangetic riverine tract
- Dolphin Conservation in Non-Protected Area Segment of Ganga River
- Conservation Breeding Centre for Wild water buffalo (2020)
- Recovery programme for Snow leopard (2009)
- Recovery programme for Vultures (2006)
- Project Elephant (1992)
- Project Tiger/National Tiger Conservation Authority (NTCA) (1973)

India's Collaboration with Global Wildlife Conservation Efforts

- Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)
- Convention on the Conservation of Migratory Species of Wild Animals (CMS)
- Convention on Biological Diversity (CBD)
- World Heritage Convention
- Ramsar Convention
- The Wildlife Trade Monitoring Network (TRAFFIC)
- United Nations Forum on Forests (UNFF)
- International Whaling Commission (IWC)
- International Union for Conservation of Nature (IUCN)
- Global Tiger Forum (GTF)

Drishti IAS

World Environment Day 2025

Why in News?

World Environment Day (WED) 2025 is being celebrated on 5th June 2025, with South Korea (Republic of Korea) serving as the global host.

- Additionally, the Prime Minister will plant a **Banyan sapling** under the Ek Ped Maa Ke Naam initiative as part of the 'Aravalli Green Wall project'.

What is World Environment Day 2025?

- **About: WED** was established by the United Nations General Assembly **in 1972**, coinciding with the **opening day of the** Stockholm Conference on the Human Environment—the first major global summit focused on environmental issues.
  - The event has been **led by the** United Nations Environment Programme (UNEP), since its inception in 1973.
  - This landmark conference marked a **turning point in the global environmental movement.**
- **Theme:** The **theme "Beat Plastic Pollution,"** aims to raise awareness about the **production, use, and disposal of plastics**, and promote solutions like **refusing, reducing, reusing, and recycling** plastic use.
- **Significance: Plastic pollution** worsens pollution, biodiversity loss, and climate change. Annually, **11 million tonnes** of plastic enter water bodies, while microplastics **from landfills and sewage** pollute soil.
  - The global cost of plastic pollution is estimated at **USD 300–600 billion per year**. India produces approximately **9.3 million tonnes** of plastic waste each year, accounting for nearly **20% of the global total.**
  - **Burning** over **5.8 million tonnes yearly** releases **toxic pollutants.**

'Ek Ped Maa Ke Naam' Campaign

- **About:** It aims to **honor mothers by encouraging tree planting in their names**, combining **environmental conservation** with a **tribute to motherhood**, symbolizing how **mothers, like trees, nurture and sustain life.**
  - It was launched by the **Prime Minister** on **World Environment Day**, **5th June, 2024**.
- **Objective**: To promote **environmental preservation**, **increase forest cover**, and support **sustainable development** while **honoring mothers.**
- **World Record Achievement:** On **22nd September 2024**, **128 Infantry Battalion & Ecological Task Force** of the **Territorial Army** planted **over 5 lakh saplings in one hour** in **Jaisalmer.**

Aravali Green Wall Project

- **About:** It aims to establish a **1,400 km long and 5 km wide green belt buffer** around the Aravalli Mountain range, spanning the states of **Haryana, Rajasthan, Gujarat, and Delhi**.
  - It is inspired by Africa's **'Great Green Wall' project**, which stretches from **Senegal in the west to Djibouti in the east** and was launched in 2007.
- **Objectives:** It aims to **combat land degradation** and the **eastward spread of the Thar desert** by creating a **green belt from Porbandar to Panipat** along the **Aravalli range**.
  - This **afforestation effort** will **restore degraded land**, **block desert dust** from western India and Pakistan, enhance biodiversity, and improve **ecosystem services** like **carbon sequestration**, **wildlife habitat**, and **water quality**.
- **Need:** According to the Desertification and Land Degradation Atlas **by ISRO**, **97.85 million hectares (29.7%)** of India's **total geographical area (328.72 mha)** experienced land degradation in 2018-19.
  - The **Aravali** is a key degraded zone targeted for greening under India's goal to restore **26 million hectares** of land.

What are the Main Causes of High Plastic Pollution in India?

- **High Plastic Consumption:** India generates about **3.5 million tonnes of plastic waste annually**, with a **per capita plastic consumption of around 11 kg per year**, driven by rising industrialization and consumerism.
  - Consequently, India ranks among the **top 10 plastic-polluting countries globally.**
- **Poor Waste Management:** Only **15-20% of plastic waste is recycled** in India, while the remaining waste ends up in **landfills, water bodies, or is burned**.

- Most recycling is informal, with **90% carried out by waste pickers working in unsafe conditions.**

- **Domination of Single-Use Plastics:** In 2023, nearly **43% of India's total plastic waste**—about **4.07 million tonnes**—was **single-use plastic**. Despite bans in some states, **enforcement remains weak**, and alternatives are often **expensive or unavailable.**
- **Plastic Waste in Rivers & Oceans:** Three of the world's top ten rivers carrying **90% of plastic waste**—the **Ganga, Indus, and Brahmaputra**—are in India. The country contributes **0.6 million tonnes of plastic waste to the oceans annually**.
- **Rapid Urbanization:** Waste from **Tier 1 cities** accounts for **72.5% of India's daily waste**. In cities like **Bengaluru and Mumbai**, where daily waste exceeds **9,000 tonnes**, plastic pollution reflects a **structural failure in planning, design, and governance**.
  - Many consumers and small businesses lack awareness of **sustainable alternatives and proper disposal methods.**

What are the Issues Associated With Mismanaged Plastic Waste in India?

- **Environmental Degradation:** Plastic waste in landfills releases **toxic chemicals** like **phthalates and** Bisphenol A (BPA) into soil, affecting **agriculture**.
  - Burning plastic emits **dioxins and heavy metals**, contaminating **farmland.**
  - **Microplastics** in **rivers** harm **aquatic species**, while **stray animals,** and **marine species** ingest plastic, leading to **intestinal blockages and death.**
- **Public Health Risks:** Each year, **5.8 million tonnes of plastic waste** are openly burned across India, mainly in **rural areas and urban slums**, releasing carcinogens like **dioxins and furans**.
  - **Microplastics** have been found in **Indian table salt, seafood, and drinking water**.
  - Additionally, **clogged drains from plastic waste** create stagnant water, worsening **malaria and dengue outbreaks.**
- **Economic Costs:** A **FICCI report** estimates India could lose over **USD 133 billion** in material value from plastic packaging by 2030, with **USD 68 billion** lost due to uncollected plastic waste.
  - Plastic-littered beaches **deter tourists,** harming coastal economies. Municipal corporations spend **Rs 1,500–2,000 crore annually** on drain cleaning.

What are the Regulations Related to Plastic Waste Management in India?

- Plastic Waste Management Rules, 2016
- Plastic Waste Management (Amendment) Rules, 2022
- Plastic Waste Management (Amendment) Rules, 2024
- Swachh Bharat Mission
- India Plastics Pact

Primates in Peril

Why in News?

A recent report titled Primates in Peril highlights the increasing risks faced by **25** primate species from across the globe.

- Out of 25 primates, **6 species belong to Africa**, **4 species from Madagascar**, **9 species from Asia**, and **6 species from South America (Neotropics)**

What are the Key Primate Species Identified in the Report?

- **Most Endangered Primates:** The **Cross River Gorilla** and **Tapanuli** Orangutan are highlighted as **critically endangered** in the report.
  - **Cross River gorillas** are scattered in at least **11 groups** in Cameroon and Nigeria, while the **Tapanuli orangutan**, the most endangered great ape, has fewer than **800 individuals**.
  - Both are listed as **Critically Endangered** by the International Union for Conservation of Nature (IUCN).
- **Primate Species from India: Phayre's** Langur and the Western Hoolock Gibbon, found in **Northeast India and Bangladesh**, were **evaluated** based on **risks** faced by them, but ultimately **excluded from the final list.**
  - **Phayre's Langur:** This primate, known for its distinct **'spectacled' appearance**, is primarily found in **eastern Bangladesh** and **northeastern India**, including **Assam, Mizoram, and Tripura**.
    - **Behaviour:** They are **arboreal (primarily live in trees)**, **diurnal**, and **folivorous** (primarily leaf-eating), with a preference for **young leaves.**

- **Conservation Status:** It is listed under **Schedule I** of the Wildlife (Protection) Act, 1972 and is listed as **Endangered** in **IUCN Red list.**

➢ It is found in three **Protected Areas** i.e., Sipahijala, Trishna, and Gumti Wildlife Sanctuaries in **Tripura**.

- **Habitat:** It prefers **evergreen or semi-evergreen forests**, **mixed moist deciduous forests**, as well as **bamboo-rich areas**, **light woodlands**, and regions near **tea plantations.**

❍ **Western Hoolock Gibbon** (Hoolock hoolock): It is a **tailless ape** found in the **tropical forests** of **India, Bangladesh, and Myanmar**, with **black males** having a **white stripe** above their eyes while **females are light colored (beige, brown, grey).**

- They are known for their **loud, melodic duet calls**, sung by male-female pairs to **mark territory**. Their vocal patterns are **similar in both sexes**.

❍ **Behaviour:** Gibbons are **arboreal** and navigate the canopy by **leaping and swinging**, with an **omnivorous diet** of plants, invertebrates, and bird eggs.

- They live in **monogamous family groups**, giving birth to a **single offspring** that stays with the mother for about two years.

❍ **Habitat:** They thrive in **moist deciduous, evergreen, subtropical, and lowland forests**, with a range spanning **Northeast India**, **Bangladesh**, and **western/northern Myanmar**.

❍ **Conservation Status:** It is listed under **Schedule I** of the **Wildlife (Protection) Act, 1972** and is listed as **Endangered** in **IUCN Red list.**

- The **Western Hoolock Gibbon**, India's **only ape species**, is found in the Hoollongapar Gibbon Sanctuary located in **Assam's Jorhat district**.

What are the Other Key Primate Species Found in India?

➢ **Lorises:**

❍ **Grey Slender Loris (**Loris lydekkerianus**):** Slim, nocturnal primate with a subtle spinal stripe.

- **Two subspecies:** Mysore (larger, grey) and Malabar (reddish-brown, round eye patches).
- Found in **Western and Eastern Ghats**.

❍ **Bengal Slow Loris (**Nycticebus bengalensis**): Tail-less** with prominent large eyes.

- Fur varies from **ash-gray to buff-yellow.**
- Inhabits **northeastern India**, especially south of the **Brahmaputra River**.

➢ **Langurs:**

❍ **Gee's Golden Langur (**Trachypithecus geei**):** Seasonal fur color changes from **cream/off-white to golden-orange**.

- **Black face**, palms, and soles with golden whiskers.
- Found in Assam between **Manas and Sankosh rivers**.

❍ **Nilgiri Langur (**Semnopithecus johnii**): Shiny black coat** with yellowish fur patches.

- Lives in Western Ghats from Kodagu to Kanyakumari Hills.

- **Capped Langur (**Trachypithecus pileatus**):** Distinctive **colored "cap"** on the head and long tail.
  - Found across **Assam, Meghalaya, Nagaland, Arunachal Pradesh, and Tripura.**

➢ **Macaques:**

- **Lion-tailed Macaque (**Macaca silenus**): Dark, glossy coat** with a long gray facial mane and tufted tail.
  - Native to **Western Ghats** forests of Karnataka, Kerala, and Tamil Nadu.
- **Bonnet Macaque (**Macaca radiata**):** Recognizable **swirl or "cap" of hair** on the head.
  - **Long tail, longer than body,** common in southern India.
- **Stump-tailed Macaque (**Macaca arctoides**): Largest Indian macaque**, short tail, reddish-pink face with beard-like ruff.

History

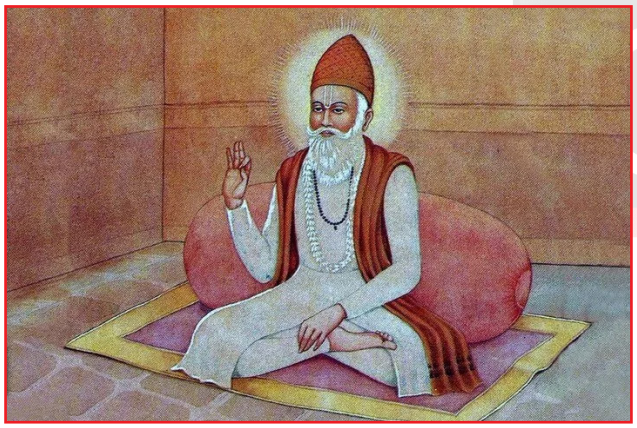
Highlights

- *648th Birth Anniversary of Sant Kabir Das*
- *Birsa Munda Martyr's Day*
- *50th Anniversary of Sikkim's Integration with India*

648th Birth Anniversary of Sant Kabir Das

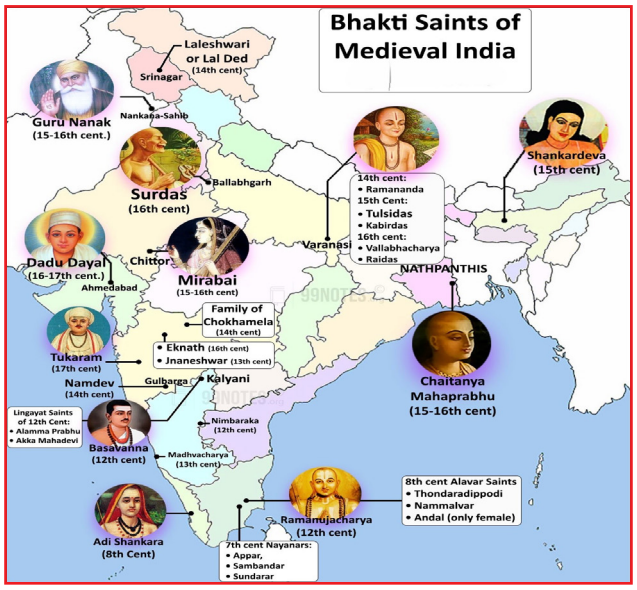
Why in News?

On **11th June 2025,** the Prime Minister paid tribute to Sant Kabir Das on the occasion of his **648th birth anniversary,** observed as **Kabirdas Jayanti (Kabir Prakat Divas).**



Who was Sant Kabirdas and What were his Contributions?

- **About: Sant Kabir Das (1440–1518)** was a revered **mystic poet, saint, and social reformer**, born in **Varanasi, Uttar Pradesh**.
  - Kabir often referred to himself as a **"julaha" (weaver)** and **"kori" (lower-caste identity)**, reflecting **his humility** and solidarity with the marginalized.
- **Teachings & Philosophy: Sant Kabir Das** is a prominent proponent of the **Nirguna Bhakti** tradition, which emphasizes devotion to a **formless, attribute-less God (Nirguna Brahman)**.
  - He received spiritual guidance from **Ramananda**, a Bhakti saint, and **Sheikh Taqi**, a Sufi teacher.
  - Along with Ramananda, he **popularized devotional worship** in **vernacular languages**, bringing **spirituality closer to the masses.**
  - His teachings **challenged religious orthodoxy, blind rituals, and social divisions**, advocating a **universal, inclusive path to God**.
  - He emphasized **truth, compassion, equality**, and **direct spiritual experience** over formal religion.
- **Role in Bhakti Movement:** Kabir was a key figure in the Bhakti movement (7th-15th century), promoting **devotion, inner purity, and social equality**, while rejecting **rituals and casteism**.
- **Literature:** Kabir composed **dohas' (couplets)** and **bhajans (devotional songs)** in **Brajbhasha, Awadhi**, and **Sant Bhasha**, playing a pivotal role in the evolution of **Hindi literature**.
  - His works are marked by **simplicity, depth, and universal appeal**, often featuring **"ulatbansi"**, paradoxical verses with reversed meanings to provoke reflection.
  - His major compilations include **Kabir Bijak** (preserved by Kabirpanth in Varanasi and eastern UP), **Kabir Parachai, Sakhi Granth, Anurag Sagar** and **Kabir Granthawali** (associated with the Dadupanth sect in Rajasthan)
  - Many of his verses are included in the Guru Granth Sahib, compiled by **Guru Arjan Dev (5th Sikh Guru)**, reflecting his **influence on Sikhism**.
- **Legacy & Following:** Kabir is **revered by Hindus, Muslims & Sikhs alike**, and his teachings laid the foundation for the **Kabir Panth**, a spiritual sect whose followers are known as **Kabir Panthis**.
  - His legacy represents **communal harmony, moral integrity**, and **inner spiritual awakening**.



Read More: Sant Kabir Das

Birsa Munda Martyr's Day

Why in News?

Prime Minister (PM) paid tribute to Bhagwan Birsa Munda on 9th June 2025 on the occasion of his **Martyr's Day.**

Who was Birsa Munda?

- **About:** Birsa Munda was a **tribal leader, religious reformer,** and **freedom fighter** who led a **strong resistance against British colonial policies** in the Chotanagpur region.
  - Also known as **Dharti Abba (Father of the Earth),** he is remembered for **mobilising Adivasi communities** around **land rights, social reform, and spiritual unity.**
- **Early Life:** Born on **15th November 1875** in **Ulihatu (Khunti district, Jharkhand)** to a poor **Munda tribal** sharecropper family, Birsa was initially named **Daud Munda** due to his father's **temporary conversion to Christianity.**
- **Education:** Educated at the **German Mission School**, Birsa was initially influenced by **Christian teachings** but **rejected them due to cultural alienation**.
  - He was inspired by **Vaishnavism,** he founded the **Birsait religion** and was revered as **Bhagwan** by his followers.
- **Beliefs and Teachings:** He preached **monotheism** through the worship of **Singhbonga (sun god), denounced alcoholism, black magic, superstitions**, and **forced labour (**beth begari), and promoted **hygiene, spiritual unity, pride in tribal identity,** and **community land ownership.**
- **Resistance Against British Rule:** British land revenue policies dismantled the traditional Khunt Katti land system **(collective land ownership within a clan),** empowering zamindars and **thikadars** who exploited tribal peasants.
  - Birsa **mobilised tribal masses** against these injustices and campaigned to **reclaim their rights.**
- **The Ulgulan Movement (1895–1900):** In **1895,** Birsa Munda was **arrested for rioting and jailed for 2 years**; after his release in 1897, he **resumed mobilising support** across villages for a **tribal-led self-rule movement.**
  - In **1899,** he launched the Ulgulan (The Great Tumult) movement, which included **guerrilla warfare tactics** to **resist British authority and promote** the establishment of a **self-governed tribal state known as "Birsa Raj"**
- **Aftermath and Legacy:** He was captured in **February 1900** and died in **British custody on 9th June 1900** at the young age of **25**, under mysterious circumstances, officially attributed to **cholera.**
  - His movement led to the **Chotanagpur Tenancy Act (1908)**, which recognised **tribal land rights (Khuntkatti)**, **banned land transfer to non-tribals,** and **abolished beth begari (forced labour).**
  - Since **2021**, **15th November** is observed as Janjatiya Gaurav Divas (Tribal Pride Day).

Key Initiatives Related to Tribal Communities

- Dharti Aaba Janjatiya Gram Utkarsh Abhiyan is an **umbrella** initiative that targets integrated development across **63,000 Scheduled Tribe-majority villages**.
- PM-JANMAN was initiated in 2023 to support Particularly Vulnerable Tribal Groups (PVTGs) with targeted schemes, including healthcare, financial inclusion, and community support.
- **Pradhan Mantri Adi Adarsh Gram Yojana (PMAAGY**) aims to **provide basic infrastructure in villages with a significant tribal population.**

MAJOR TRIBAL REVOLTS IN INDIA

TRIBE (REVOLT)	REGION	YEAR	LEADER/S
Pahariya	Rajmahal Hills	1778	Raja Jagannath
Chuar (Jungle Mahal Rebellion)	Jungle Mahal (b/w Chota Nagpur & Bengal plains)	1798	Durjan/Durjol Singh, Madhab Singh, Raja Mohan Singh, Lachman Singh
Oraon and Munda (Tamar Revolt)	Tamar (Chhotanagpur)	1798; 1914-15	Bholanath Sahay/Singh (1798) Jatra Bhagat, Balram Bhagat (1914-15)
Ho and Munda	Singhbhum and Ranchi (Chhotanagpur region)	1820-37; 1890s	Raja of Parahat (Ho) Birsa Munda (1890s)
Ahom	Assam	1828-30	Gomdhar Konwar
Khasi	Hilly region b/w Jaintia and Garo hills	1830s	Nunklow ruler – Tirath Singh
Kol	Chhotanagpur (Ranchi, Singhbhum, Hazaribagh, Palamau)	1831	Buddho Bhagat
Santhals	Rajmahal Hills	1833; 1855-56	Sidhu Murmu and Kanhu Murmu
Khond	Orissa, Andhra Pradesh	1837-56	Chakra Bisnoi
Koya	Eastern Godavari track (Andhra) Rampa (Andhra)	1879-80; 1886 1916; 22-24	Tomma Sora, Raja Anantayyar Alluri Sitarama Raju (Rampa revolt)
Bhil	Western Ghats, Khandesh (MH), south Rajasthan	1817-19; 25; 31; 46 & 1913	Govind Guru (1913 Mangarh Massacre)
Gond	Adilabad (Telangana)	1940	Komrum Bheem

Drishti IAS

50th Anniversary of Sikkim's Integration with India

Why in News?

The **Prime Minister** congratulated Sikkim on the **50th anniversary** of its **integration into the Indian Union**, marking its official recognition as the **22nd state of India** on **16th May 1975**.

What are the Key Facts About Sikkim's Integration with India?

- **Monarchical Background:** Sikkim was a **hereditary monarchy** ruled by the **Chogyal dynasty** from **1642 to 1975**.
- **Sikkim's Autonomy:** It maintained its **autonomy** during British colonial rule and post Indian independence through:
  - **Treaty of Tumlong (1861):** Sikkim became a **protectorate state** of British India.

- **Treaty of Titaliya (1817):** It gave the British authorities several **commercial and political advantages** in Sikkim.
- **Calcutta Convention (1890):** It demarcated the **Sikkim-Tibet border**, signed by **Viceroy Lord Lansdowne** and **Qing China's Imperial Associate Resident** in **Tibet**.
  - **The Convention** was affirmed by the **Lhasa Convention (1904).**
- **Indo-Sikkim Treaty (1950)**: It made **Sikkim** an **Indian protectorate**, with India controlling **defence**, **external affairs**, and **communication**, while Sikkim retained **internal autonomy**.

➢ **Merger with India:** In **1975**, a **referendum** saw participation from **two-thirds** of eligible voters, with **97%** voting to **abolish the monarchy** and **join India.**
- **35th Amendment Act, 1974:** The status of Sikkim as a **protectorate state** was **terminated** and Sikkim was given the status of **'Associate State'** of India.
- **36th Amendment Act, 1975:** It made Sikkim a **full-fledged state** in India.

What are Key Facts About Sikkim?

➢ **About: Sikkim** is the smallest state after Goa and is situated in the **northeastern** part of India in the **eastern** Himalayas.
- It shares borders with the **Tibet Autonomous Region of China** to the north and northeast, **Bhutan** to the southeast, the Indian state of **West Bengal** to the south, and **Nepal** to the west.

➢ **New Developments: Soreng district** in **Sikkim** will be developed as **India's first organic fishery cluster**. To boost **tourism**, the **Pelling Ropeway** was inaugurated as part of efforts to make Sikkim a **global tourism hub**.
- Notably, Sikkim became the **world's first fully organic state** in **2016.**

➢ **Geography:**
- **Mountains:** Mount Kanchenjunga, India's highest peak and the world's third highest mountain lies in Sikkim.
- **Rivers:** Sikkim is drained by the Teesta river and its tributaries such as the **Rangit, Lhonak, Talung and Lachung**. Teesta river is a tributary of Brahmaputra river.
  - Teesta river water conflict is one of the most contentious issues between **India and Bangladesh**.
- **Glaciers:** Zemu glacier, Lhonak glacier, Changsang glacier, **Boktok glacier** etc.
- **Lakes: Tsomgo Lake (Changu Lake)**, Menmecho lake, Bidang Cho lake, Gurudongmar lake etc.
- **Passes: Nathu La, Jelep La**, Dongkha La, Chiwabhanjang Pass.

➢ **Biodiversity:** Sikkim covering just **0.2 %** of the geographical area of the country has tremendous biodiversity and has been identified as **one of the Hotspot in the Eastern Himalayas.**
- **Flora:** Oaks, Chestnuts, **Rhododendrons, Magnolias**, Japanese Cedar, Toona, Castanopsis etc.
- **Fauna: Himalayan squirrel**, **Large palm civet**, **Yellow-throated martens**, **Flying squirrels,** Bar-headed geese, **Indian tortoiseshell**, **Golden sapphire**, Red panda, Blue Sheep, Gorals, Tibetan antelope.
- **Protected Areas:** Kanchenjunga National Park (World Heritage Site (2016), Biosphere Reserve (2018)), **Fambong Lho Sanctuary**, Varsey Rhododendron Sanctuary, Maenam Sanctuary, **Pangolakha Wildlife Sanctuary** etc.

Geography

Highlights

- *China's Dams and Their Effect on Brahmaputra in India*

China's Dams and Their Effect on Brahmaputra in India

Why in News?

The Brahmaputra River has garnered attention due to concerns over China's hydroelectric projects **on the river.** With the potential impact of Chinese dams on the river's flow in India, this issue has raised questions about India's water security.

How could Chinese Dams Affect the Flow of the Brahmaputra in India?

- **Alteration of Water Flow**: China has been constructing major hydroelectric projects like the Medog Hydro Project **in Medog County (Tibet),** near the 'Great Bend' where the river makes a U-turn and plunges into a canyon before entering Arunachal Pradesh, potentially affecting Brahmaputra flow and course.
  - This intervention could **alter water flow into India and Bangladesh**, exacerbating potential water scarcity.
- **Ecological Disruptions:** China's hydroelectric projects in the region have **minimal water storage capacity,** any major changes in water retention could lead to reduced flow downstream, affecting flood cycles and water availability for irrigation and domestic use.
  - Changes in the water flow could also affect the river's ecosystems in India, including **vital wildlife habitats.**
  - The Brahmaputra supports rich biodiversity, including protected areas like Kaziranga National Park, home to the one-horned rhinoceros. Altered water flow might disrupt fish migration patterns and the natural habitat of other species.

Note: The planned Medog project is expected to have a generation capacity three times that of the **Three Gorges Dam on the Yangtze,** currently the world's largest hydropower station.

What are the Key Facts About the Brahmaputra River System?

- **Origin and Course:** The Brahmaputra River originates from the **Chemayungdung Glacier in the Kailash range near Mansarovar Lake,** where it is known as the **Yarlung Tsangpo** in Tibet. Upon entering India through **Arunachal Pradesh,** it is called the **Siang or Dihang**.
- **Drainage**: The Brahmaputra basin spans **Tibet (China), Bhutan, India, and Bangladesh**.
  - It enters India west of Sadiya town in Arunachal Pradesh, with its catchment area across **Arunachal Pradesh, Assam, West Bengal, Meghalaya, Nagaland, and Sikkim.**
  - In India Brahmaputra is bounded by the **Himalayas (north and west), Patkari hills (east), and Assam hills (south).**

- Brahmaputra River is known as the **Jamuna River** after it is joined by the **Teesta River.** From there, it flows south and eventually joins the **Ganges** (which is known as the Padma in Bangladesh) near **Goalundo Ghat (Bangladesh**), creating a combined stream called the **Padma.**
  - The Padma eventually joins the **Meghna River,** and flows into the Bay of Bengal.
  - The Sunderbans Delta is primarily formed by the combined sediment deposition of the **Ganges and Brahmaputra** rivers, along with contributions from the Meghna River
- The **Brahmaputra is 2,900 km long, with only 916 km flowing through India**. (The Ganges is the longest river entirely within India).

➢ **Tributaries:**

- **Right Bank Tributaries:** Lohit, Dibang, Subansiri, Jiabharali, Dhansiri,Manas, Torsa, Sankosh and the Teesta.
- **Left Bank Tributaries**: Burhidihing, Desang, Dikhow, Dhansiri and the Kopili.

➢ **Geographical and Ecological Significance:** Brahmaputra holds over 30% of India's total water resource potential and it contributes 41% of India's hydropower potential.

- Brahmaputra river valleys are home to important wildlife sanctuaries and national parks **(e.g., Kaziranga, Manas).**
- The Brahmaputra valley and nearby low hills mostly have **deciduous forests.**

➢ **Unique Features: Majuli,** the world's largest river island, is located in the Brahmaputra in Assam.

- **Umananda**, the smallest river island in the world, is also in the Brahmaputra in Assam.

➢ **India's Monitoring Efforts Along Brahmaputra**: India covers about **34% of the Brahmaputra basin but contributes over 80% of its water due to heavy rainfall (2,371 mm) and snowmelt,** unlike the dry Tibetan Plateau (low rainfall ~300 mm annually).

- Tributaries within India further boost the river's flow. **The basin holds 30% of India's water resources and 41% of its hydropower potential,** with Arunachal Pradesh leading development despite challenges.
- The proposed river-linking projects **Manas-Sankosh-Teesta-Ganga Link,** joining the Manas, a tributary of the Brahmaputra, to the Ganga via the **Sankosh and Teesta**; and the **Jogighopa-Teesta-Farakka Link,** joining the Brahmaputra at the planned Jogighopa Barrage to the Ganga at the Farakka Barrage aim to transfer surplus water to dry areas and are unlikely to be affected by Chinese upstream activities.

➢ **Hydro Electric Projects in Brahmaputra Basin (India):**

Name	State	River
Chuzachen Hydroelectric Project	Sikkim	Rangpo & Rongli
Doyang Hydroelectric Project	Nagaland	Doyang
Karbi Langpi Hydroelectric Project	Assam	Borpani
Kopili Hydroelectric Project	Assam	Kopili
Myntdu Leshka Stage-I	Meghalaya	Myntdu
Pagladia (Kamrup)	Assam	Pagladia
Ranganadi Hydroelectric Project	Arunachal Pradesh	Ranganadi
Rangit - III Hydroelectric Project	Sikkim	Greater Rangit
Subansiri Lower Hydroelectric Project	Assam	Subansiri
Teesta - V Hydroelectric Project	Sikkim	Teesta
Teesta Low Dam III Hydroelectric Project	West Bengal	Teesta
Teesta Low Dam IV Hydroelectric Project	West Bengal	Teesta
Umiam Hydroelectric Project	Meghalaya	Umiam
Umiam-Umtru Hydroelectric Project	Meghalaya	Umtru
Umtru Hydroelectric Project	Meghalaya	Umtru

Security

Highlights

- *Women in Indian Armed Forces*

Women in Indian Armed Forces

Why in News?

For the first time in Indian military history, 17 women cadets graduated from the **National Defence Academy (NDA)**, marking a historic step toward gender-inclusive military leadership and opening the path for future women service chiefs.

How did the Entry of Women in the Indian Armed Forces Begin?

- **Early Military Roles for Women:** Women first joined military service through the Military Nursing Service established in **1888**, and later through the Indian Army Medical Corps in **1958**, where women doctors received regular commissions.
- **Non-Medical Entry:** Non-medical roles for women began only in **1992** with the introduction of the Women Special Entry Scheme (WSES), which inducted women as **Short Service Commission** officers in select non-combat branches such as the **Army Education Corps, Corps of Signals, Intelligence Corps, and Corps of Engineers.**
- **Legal Framework:** Entry of women into the Indian Army was initially governed by **Section 12 of the Army Act, 1950,** which allowed women to serve only in specific corps or branches as notified by the government.
  - The government issued notifications allowing women officers in branches like the **Army Postal Service, Judge Advocate General's (JAG) department, Army Education Corps (AEC), Ordnance Corps, and Service Corps,** initially for five years, and later extended to more branches, including the **Corps of Engineers and the Regiment of Artillery.**
- **Transition from WSES to SSC:** Initially, women joined under the WSES as Short Service Commission officers.
  - In 2005, the **Short Service Commission (SSC) system** was introduced, offering a 14-year tenure to women officers and marking a more formalized career structure.
- **Permanent Commission (PC) and Judicial Intervention:** Women were first granted Permanent Commission in **2008** in limited branches like JAG and AEC.
  - In Babita Puniya v. Union of India **(2020)**, the Supreme Court mandated PC for women in **all arms where SSC is permitted**, allowing them to hold command positions.
    - The Court held that denying PC to women violated Article 14 and struck down sex-based discrimination as unconstitutional.
  - In 2015, the Indian Air Force began the experimental induction of women in combat roles, which was institutionalized as a permanent scheme in 2022.
  - Women cadets were also inducted into the NDA from 2022, marking a legally backed and progressive inclusion of women in core military roles.
- **Women Agniveers:** The Agnipath scheme (launched in 2022) includes women recruits in all three Services (Army, Navy, and Air Force), signaling a paradigm shift in recruitment norms.

WOMEN IN COMMANDING AND COMBAT POSITIONS

Indian Defence Forces have taken remarkable steps to become a true gender-neutral and inclusive force. It has commenced the induction of **women into all branches.**

Highlights

- **Captain Shiva Chauhan** became the **first woman officer** to get operationally deployed in Kumar Post, Siachen Glacier in January 2024.
- In December 2023, Captain **Geetika Koul** became the **first woman medical officer** to be deployed at Siachen after completing the training at Siachen Battle School.
- Captain **Fatima Wasim** became the **first woman medical officer** to be deployed on an operational post on the Siachen Glacier in 2023.
- **Lt Cdr Prerna Deosthalee** was named as the **first woman officer** to command an Indian Naval Warship.
- **Gp Capt Shaliza Dhami,** a helicopter pilot became the **first woman** from a flying branch to command a combat unit in the IAF in 2023.

Breaking barriers

- In 2019, 24-year-old Sub-Lieutenant Shivangi became the first woman pilot in the Indian Navy to steer a fixed-wing Dornier maritime reconnaissance aircraft in 2019.
- In 2017, six women officers from the Navy made history by circumnavigating the globe in INSV Tarini.
- Flight Lieutenant Parul Bharadwaj, Flying Officer Aman Nidhi and Flight Lieutenant Hina Jaiswal became the first all-women crew to embark on a battle Inoculation Training Mission.
- Flight Lieutenant Avani Chaturvedi along with fighter pilots Bhawana Kanth and Mohana Singh – first women combat pilots – are inducted into IAF's fighter squadron.

- **Current status of Women in Armed Forces:** In India's over one million-strong Army, **women comprise only about 4%** of the force, compared to 16% in the US.
  - Women have been inducted at the soldier level in the Corps of Military Police, and around 1,700 women officers currently serve across various arms and services.
  - The Indian Air Force began inducting women as fighter pilots in 2016 and now allows women in all combat roles.
  - Since 2022, the **Navy has opened all branches,** including submarines and aviation, to women officers, with several already serving onboard ships and in combat aviation roles.
  - Women officers, including **Col. Sofiya Qureshi and Wg Cdr. Vyomika Singh** played a key role in Operation Sindoor, highlighting their leadership in military strategy.
  - Lt. Cdrs. Dilna K and Roopa A completed **Navika Sagar Parikrama II**, a 25,600-nautical-mile expedition, proving women's endurance in maritime defense.

Note: The Indian Armed Forces offers two main pathways for officers. The SSC provides a limited service tenure, typically **10 years with an option for a 4-year extension**, while PC grants a career-long commitment until retirement. The Supreme Court has directed that women officers, regardless of their years of service, should be eligible for PC.

What are the Challenges Faced by Women in the Armed Forces?

- **Physical Demands and Training Standards:** Combat roles often require high **physical endurance and strength,** which can be challenging given biological differences and current training regimes.
  - Sometimes training standards differ for men and women, raising debates about equality versus operational effectiveness.
- **Cultural and Societal Bias:** A significant portion of armed forces personnel hail from **conservative, rural backgrounds** where traditional gender roles are deeply ingrained.
  - Such mindsets can **lead to prejudice and resistance** against women officers, especially in leadership roles, with stereotypes undermining their authority, morale, and career growth, ultimately affecting unit cohesion and discipline.
- **Limited Combat Role Opportunities:** Despite the 2020 Supreme Court ruling granting PC to women, they are still barred from certain frontline combat arms such as **infantry, armored corps, and special forces in the Army.**
  - This exclusion limits access to **key combat experience,** which is a major criterion for higher command and strategic leadership roles.
  - As a result, the glass ceiling limits women's career progression, reducing their representation in top ranks and decision-making positions.
- **Work-Life Balance and Family Constraints:** Issues related to **marriage, pregnancy, and childcare** can affect women's career continuity and deployment options.
  - Lack of adequate policies for **maternity leave, childcare facilities, and spousal support remains a concern.**
  - Women **make up less than 2% of India's central paramilitary forces but account for over 40% of suicides**. Despite not being deployed in combat roles, **women face extreme stress, often linked to marital discord** and balancing family with duty.
- **Psychological and Emotional Pressures:** Operating in predominantly male environments can create feelings of **isolation and additional stress**. Women may face scrutiny for their decisions and behavior, leading to emotional burnout.
- **Infrastructure and Facilities:** Limited access to **gender-sensitive health care** and counseling, coupled with **inadequate separate accommodation**, sanitation, and hygiene facilities in some units, especially in field or remote postings.

Disaster Management

Highlights

- *National Florence Nightingale Awards 2025*
- *Padma Awards*

National Florence Nightingale Awards 2025

The **President of India** presented the **National Florence Nightingale Awards 2025** to 15 nursing professionals, recognizing their exemplary contributions to healthcare and public service.

National Florence Nightingale Awards

- **About:** It was instituted in **1973** by the **Ministry of Health and Family Welfare** to honour outstanding **nursing personnel** serving in **Central and State Governments, Union Territories**, and **Voluntary Organizations**.
  - These awards recognize meritorious contributions in **clinical care, public health, education**, and **nursing administration.**
- **Categories**: It is presented across 3 categories: **Registered Nurses and Midwives (RN & RM)**, **Registered Auxiliary Nurses and Midwives (RANM)**, and **Registered Lady Visitors**.
- **Eligibility:** Eligible nominees include nurses working in **hospitals, community settings, educational institutions, or administrative roles**.
- **Award:** Each award comprises a **Certificate of Merit**, a **cash prize of Rs. 1,00,000**, and a **medal**.

Florence Nightingale

- **Florence Nightingale** (1820–1910) was an **English social reformer, statistician,** and **founder of modern nursing**.
- She rose to prominence during the **Crimean War** (fought between **Russia and the Ottoman Empire**) for **organizing care for wounded soldiers** and significantly **reducing mortality through improved hygiene**.
- She founded the **Nightingale School of Nursing** at St. Thomas' Hospital, London, laying the foundation for **modern nursing education.**

Read More: State of the World's Nursing 2025 Report

Padma Awards

Why in News?

The President **of India** presented Padma Vibhushan, Padma Bhushan and Padma Shri Awards for the year **2025** to **139 distinguished persons** whose names were announced on the eve of the 76th Republic day 2025.

What are Padma Awards?

- **About:** Instituted in **1954**, the **Padma Awards** are among **India's highest civilian honours**, announced annually on **Republic Day (26th January)**.
  - Their objective is to **honour excellence** in various fields involving **public service.**
- **Categories:** The Awards are given in **3 categories**:
  - **Padma Vibhushan:** For exceptional and distinguished service
  - **Padma Bhushan:** For distinguished service of high order
  - **Padma Shri:** For distinguished service.
  - The **Padma Vibhushan** is the **highest** among the **Padma Awards**, followed by the **Padma Bhushan** and then the **Padma Shri**.
- **Presentation and Recognition: Padma Awards** are **conferred by the President of India** in **March/April**, with recipients receiving a **Sanad**, **medallion**, and a **replica** for ceremonial use.

- **Disciplines:** The awards are presented across diverse fields such as **art**, **social work**, **public affairs**, **science and engineering**, **trade and industry**, **medicine**, **literature and education**, **sports**, **civil service**, and more.
- **Eligibility:** All persons **without** distinction of **race, occupation, position or sex** are eligible for these Awards.
    - Since **2014**, the government has been recognizing **"unsung heroes"** with the **Padma Awards**, transforming them into the **"People's Padma"**. This year, **30 such individuals** were honoured.
- **Jury Composition:** All **Padma Award nominations** are reviewed by the **Padma Awards Committee**,

appointed annually by the Prime Minister and chaired by the Cabinet Secretary.
- The committee includes the **Home Secretary**, **Secretary to the President**, and **four to six eminent persons** as members.
- Its **recommendations** are submitted to the **Prime Minister** and **President** for final approval.

➢ **Limitations: Padma Awards** are generally **not given posthumously**, and a **higher category award** is only granted after **five years** unless the **Awards Committee** makes an **exception**.
- The award is **not a title** and cannot be used as a **prefix or suffix** to the recipient's name.
- It is limited to a maximum of **120 awards** per year (excluding **posthumous**, Non-Resident Indians (NRIs), **foreigner**, and Overseas Citizenship of India (OCI) recipients).

Note: Padma awards were **not conferred** during the years **1978** and **1979** and **1993 to 1997**.

➢ **Article 18(1)** of the Indian Constitution **abolishes and prohibits** the state from conferring **titles** on individuals, except for **military** and **academic distinctions**.
- Awards like **Bharat Ratna**, **Padma Vibhushan**, and **Padma Shri** are exempt as they **recognize exceptional work**.
- In Balaji Raghavan v. Union of India (1996), the court ruled that national awards are **not titles** under **Article 18(1)**.

Rapid Fire Current Affairs

Highlights

IREDA Bags 'Excellent' Ratings

The **Indian Renewable Energy Development Agency Ltd. (IREDA)** was awarded an **'Excellent' rating** for its exceptional performance in the **Power and NBFC sectors** by the **Department of Public Enterprises (DPE).**

- IREDA received the 'Excellent' rating for the **fourth consecutive year**, based on its annual performance for FY 2023-24.
- This recognition highlights **IREDA's leadership in green financing** and reaffirms its dedication to nation-building through promoting **sustainable energy solutions.**

IREDA:

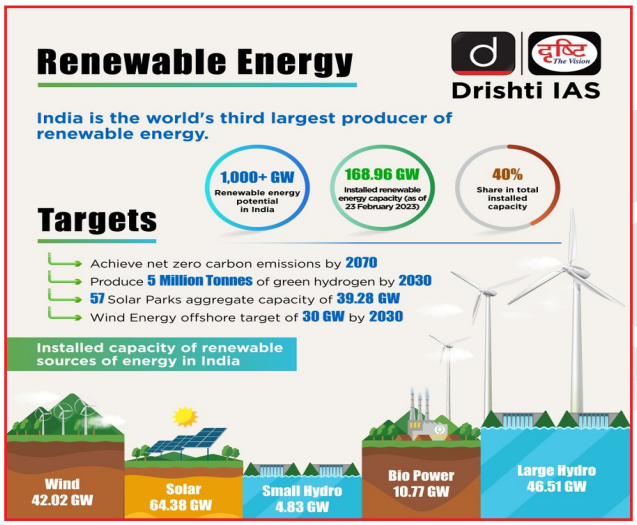
- **IREDA** is a **Navratna public sector company** under MNRE, established in **1987** as a **Non-Banking Financial Institution**.
- It is the **largest green financing NBFC** in India, dedicated to **promoting, developing, and financing renewable energy** and energy efficiency projects, while supporting the sector by encouraging lending from banks and financial institutions.

DPE Ratings:

- The DPE, under the **Ministry of Finance,** formulates policies on CPSEs' performance, autonomy, and finance, and publishes the Public Enterprises Survey for monitoring.
- DPE Ratings **annually assess CPSEs** on MoU targets like **profitability and efficiency,** grading them from **Poor to Excellent** to ensure accountability and transparency.

India's Renewable Energy Initiatives:

- PM-KUSUM scheme
- PLI scheme for Solar PV manufacturing
- International Solar Alliance



Read More: Tapping Renewable Energy Potential in India

Deep Seafloor Exploration

A study has revealed that about **99.999%** of the Earth's **deep seafloor,** which covers **two-thirds of the Earth** area below 200 meters depth, remains **visually unexplored.**

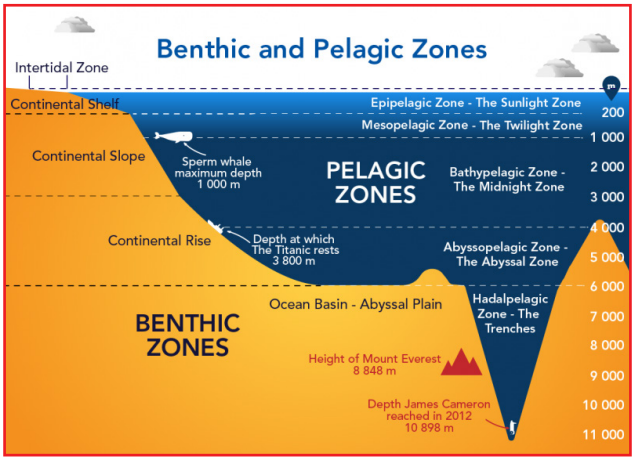
- More than **97%** of dives were conducted **by just 5 countries (**US, Japan, New Zealand, France, and Germany).
- Exploration has been biased toward **geomorphological features like ridges and canyons**, while vast **abyssal plains,** which cover the majority of the **seafloor remain under-studied.**

Deep Ocean:

- The deep ocean refers to the part of the ocean at **depths greater than 200 meters,** where **sunlight no longer penetrates .**
- The **deep ocean is cold**, with an **average temperature of just 4°C**, and is subjected to **extreme pressures** ranging from **40 to over 110 times** that of Earth's atmosphere.
- The deep ocean region **lacks photosynthesis** due to **absence of light** and is **nutrient-poor,** yet life thrives in its harsh conditions.
- The **mesopelagic zone (200–1,000 m),** hosts about **90% of global fish biomass**. It includes species like **fish, squid and krill**.
- India launched the Deep Ocean Mission (DOM) in **2021** to explore and sustainably harness **deep-sea resources.**
- **Significance of Exploration:** Exploration of the deep ocean **offers potential sources of energy** (such as oil, gas, methane hydrate, and ocean currents), a **promising reservoir for new antibiotics,** the discovery of **polymetallic nodules**, and critical insights into **understanding, predicting, and mitigating climate change.**

Marine Snow

It is a **steady fall of organic matter**, like dead plankton, fecal pellets, and mucus **from the ocean surface to the deep sea.** It s**ustains deep-sea life** in the a**bsence of sunlight** and plays a crucial role in the **carbon cycle** by transporting carbon to ocean depths, aiding **long-term sequestration and climate regulation.**



Read More: Deep Ocean Mission

Snail Infestation in Cardamom

The cardamom-growing regions of Idukki, Kerala, are facing threat from **small snail infestations** following heavy summer rains. Snails feed on **new panicles, flowers, and young capsules**, causing **crop damage, reduced yield, and quality loss**.

- Farmers are using chemical sprays like **metaldehyde** (as a last resort) to **control snail infestations.**

Cardamom (Elettaria cardamomum)

- **About:** Known as the **"Queen of Spices,"** it is a **highly aromatic spic**e from the **Zingiberaceae (ginger) family.**
  - It is native to the **evergreen rainforests** of the **Western Ghats.**
- **Climatic Conditions:** Requires rainfall of **1500-4000 mm**, temperatures between **10°C to 35°C**, and at **altitudes of 600–1500 meters**. It requires **acidic, loamy, humus-rich soils** with a **pH of 5.0–6.5**.
- **Production Hotspots: Kerala** contributes **58%** of India's cardamom output, with **Idukki** as the leading district.
  - **Karnataka** grows it in districts like **Kodagu and Chikmagalur**.
  - **Tamil Nadu** cultivates it in the **Nilgiri hills**.
- Recently identified cardamom species include Elettaria facifera (Periyar Tiger Reserve, Idukki) and Elettaria tulipifera (Agasthyamalai hills, Thiruvananthapuram and Munnar, Idukki).

Spices Market in India: India produced **11.14 million tonnes** of spices in **2022–23,** cultivating **75 of the 109 ISO-listed spices**.

- **Chilli, cumin, turmeric, ginger,** and **coriander** accounted for **76%** of total production.
- **Major producing states** include **Madhya Pradesh, Rajasthan, Gujarat**, and **Andhra Pradesh**.
- In 2023–24, India **exported** around **14 lakh tonnes of spices**, with **chilli being the top export (31%)** to key markets such as China, Bangladesh, West Asia, and the US.

Read More: Strengthening India's Spice Industry

Stingless Bees

Researchers in Nagaland found native **stingless bees *Tetragonula iridipennis* and *Lepidotrigona arcifera*** to be safe, effective pollinators that boost crop yields and produce medicinal honey, ideal for **Northeast India** and safer than traditional honeybees.

- **Stingless Bee:** They are **small, eusocial insects** belonging to the **tribe Meliponini** within the **family Apidae**, commonly found in **tropical and subtropical regions.**
- **Key Characteristics:**
- **Identification Features:** Stingless bees are **small, black or dark-bodied** with yellow markings.
  - They have **2 pairs of wings, short antennae, large oval eyes,** and an o**val face with a pointed chin.**
- **Habitat and Nesting:** They **nest in tree trunks, termite mounds, wall cavities,** or wooden boxes.
  - Nests are made of **resin, mud, and wax,** containing honey pots and brood cells arranged spirally or randomly.

- **Diet:** Their diet includes **nectar and pollen.** Pollen is used to make protein balls for larval growth. Some species also feed on rotting fruits or carrion.

- **Reproduction and Lifecycle:** The **queen mates once**. Fertilized eggs develop into **workers or queens (depending on nutrition),** while **unfertilized eggs become drones.** Larvae pupate in sealed wax cells.
- **Defense Mechanism:** They **lack functional stingers** but bite with mandibles. Some, like Trigona, inject venom through bites.
- **Pollination Role:** Stingless bees are **buzz pollinators, vital for pollinating tropical plants and crops,** contributing significantly to ecosystem health and agriculture.

Read More: Threats to Wild Bees, KVIC's Honey Mission

Passage Exercise (PASSEX) 2025

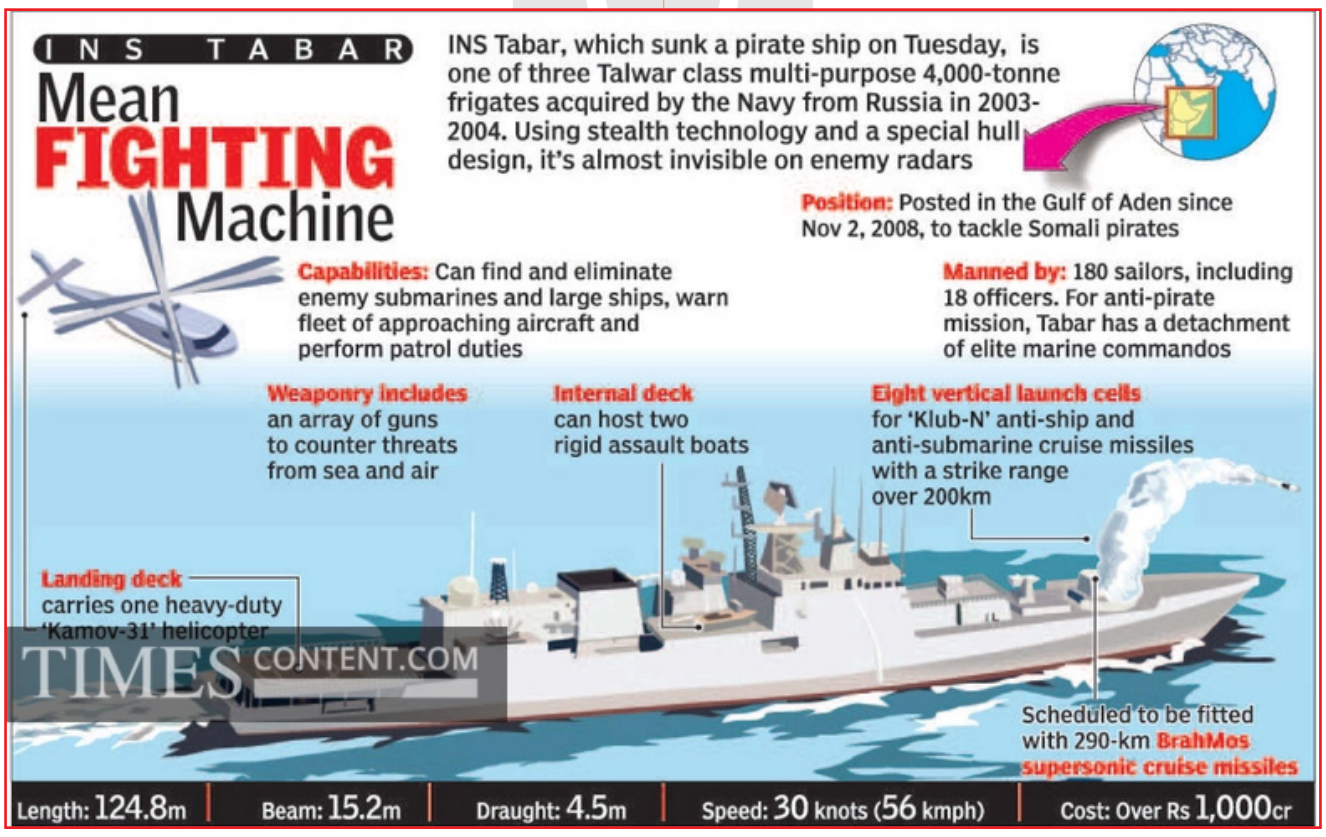
The **Indian Navy** and the UK Royal Navy conducted a **Passage Exercise (PASSEX)** in the **North Arabian Sea.**

Passage Exercise (PASSEX)

- **About:** PASSEX refers to **joint naval exercises carried out between allied navies** when their deployments intersect. It strengthens **interoperability, communication, and strategic collaboration at sea.**
  - It also aims to enhance **tactical manoeuvres, maritime domain awareness,** and reaffirming commitment to **Indo-Pacific maritime security.**
- **Key features: Helicopter control drills, fleet manoeuvres, joint ASW operations, officer exchanges, real-time data sharing, and communication protocol testing** for seamless coordination.
  - India's fleet includes the stealth **frigate INS Tabar,** a conventional submarine, and the **P-8I long-range maritime aircraft.**
- **Broader Vision:** It aligns with the **India–UK Comprehensive Strategic Partnership** and the **India–UK 2030 Roadmap,** while also supporting India's **SAGAR vision (Security and Growth for All in the Region)** and strategic presence in the Indo-Pacific.

INS Tabar

- It is the third Talwar-class stealth frigate **commissioned in April 2004** in Russia, and the **first to carry BrahMos missiles.**



- Serving with the Western Fleet in Mumbai, it is **equipped for air, surface, and sub-surface missions,** and **operates independently or within a naval task force,** featuring advanced weapons like Barak-1 and modern sensors.

P-8I

- The **P-8I** is a **long-range maritime patrol** and **anti-submarine aircraft,** developed by US Boeing for India.
- With a range of over **1,200 nautical miles** and a speed of **907 kmph**, it **detects and neutralizes threats** far from Indian shores, **enhancing maritime security.**

Read More: Major Military Exercises of India

Exercise KHAAN QUEST

An Indian Army contingent (Kumaon Regiment) reached **Ulaanbaatar, Mongolia,** to participate in the **Multinational Military Exercise KHAAN QUEST**.

Exercise KHAAN QUEST

- **Origin**: Initiated in **2003** as a bilateral exercise between the **USA and Mongolia**, became a **multinational peacekeeping exercise** from **2006 onwards.**
  - The 2025 edition is the 22nd iteration.
- **Hosted by:** Mongolian Armed Forces.
- **Objective**: Enhance **peacekeeping capabilities, interoperability, and military readiness** under **Chapter VII** of the **UN Charter.**
  - **Chapter VII** empowers the UN Security Council to act on **threats to international peace**, **breaches of peace**, and **acts of aggression**. It authorizes both **non-military** (e.g., sanctions) and **military measures** to maintain or restore global peace and security.
- **Focus Areas:** Exercise includes **joint planning, tactical drills, physical fitness, and coordination,** with drills like **checkpoints, cordon and search, civilian evacuation, counter-Improvised Explosive Device (IED)** and **casualty management.**
- **Significance:** Promotes exchange of **Tactics, Techniques, and Procedures (TTPs)** and strengthens military cooperation and camaraderie among participating nations.

Joint Military Exercises of India with Other Countries	
Name of Exercise	**Country**
Garuda Shakti	Indonesia
Ekuverin	Maldives
Hand-in-Hand	China
Bold Kurukshetra	Singapore
Mitra Shakti	Sri Lanka
Nomadic Elephant	Mongolia
Shakti	France
Surya Kiran	Nepal
Yudh Abhyas	USA

Read More: Major Military Exercises of India

Lesser Flamingos

A large number of **lesser flamingos** have recently arrived at **Chhaya pond** in Porbandar, Gujarat, from where they will migrate to the Great Rann of Kutch**,** along the **India-Pakistan border**, for **breeding.**

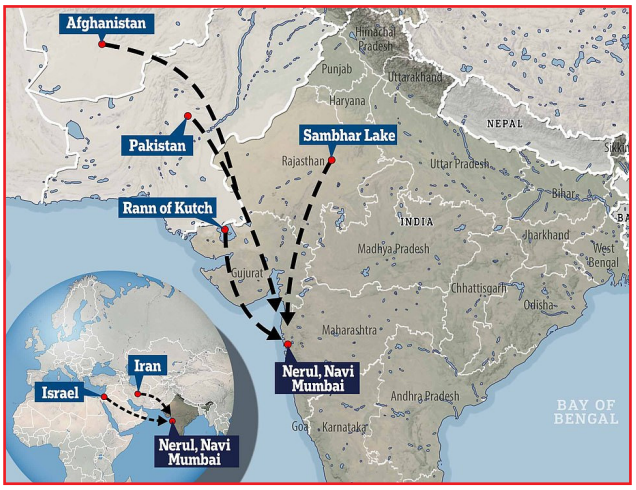
Lesser Flamingo (Phoeniconaias minor):

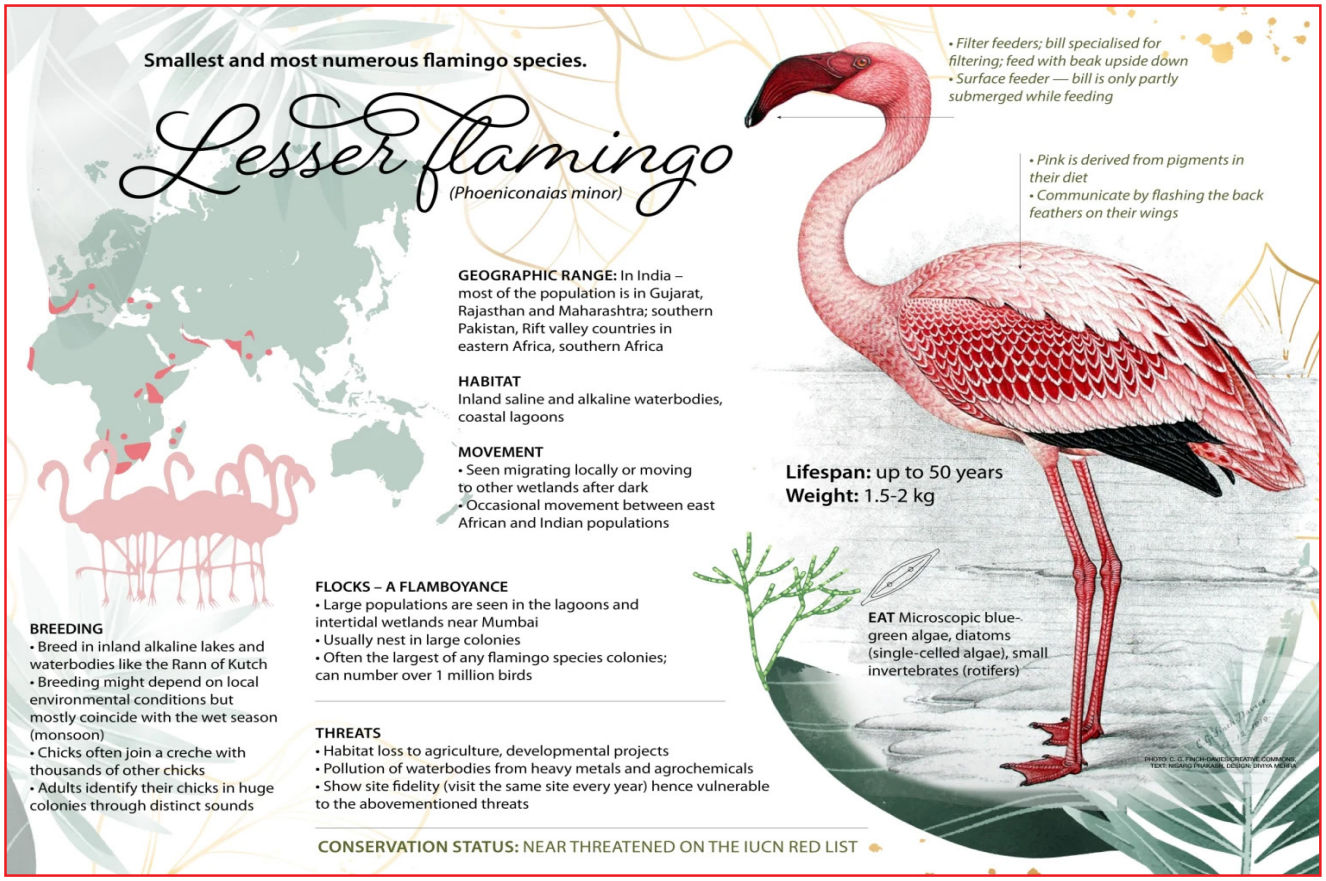
- It is the **smallest flamingo** species, found across **sub-Saharan Africa,** and in parts of **India, Pakistan, and the Arabian Gulf.**
- In India, it primarily inhabits **brackish and coastal water bodies.**
- It is classified as **Near Threatened by the IUCN**, listed under **CITES Appendix II** and under **Schedule IV** of WPA, 1972**.**

Flamingos:

- **About:** Flamingos are **tall water birds** known for their **long, S-shaped necks and stick-like legs.**
  - They are **highly social** and often **seen in large flocks** inhabiting **shallow, eutrophic water bodies** such as **saline lagoons, saltpans,** and **alkaline lakes.**
- **Species:** There are 6 species of flamingos found globally in **tropical and subtropical regions**, with **only 2 found in India (Greater & Lesser Flamingo).**

- Other Species:
  - **Chilean Flamingo** (Phoenicopterus chilensis)
  - **American/Caribbean Flamingo** (Phoenicopterus ruber)
  - **Andean Flamingo** (Phoenicoparrus andinus)
  - **James's or Puna Flamingo** (Phoenicoparrus jamesi)
- **Diet & Colouration:** Flamingos feed on **algae, molluscs, and crustaceans.** Their **plumage colour**, ranging from **white to pink** to orange, is determined by **carotenoid pigments** in their diet.
- **Common Migratory Route:**





Read More: Flamingos, Himalayan Ibex and Blue Sheep

Heat-Tolerant Pigeonpea

Scientists have developed a **heat-tolerant** pigeonpea (tur dal) **variety** named **ICPV 25444** using **speed breeding technique**, with the potential to transform fallow lands and reduce reliance on imports.

- **Key Features:** It can **withstand temperatures up to 45°C**, making it ideal for **India's hot, semi-arid regions**, and can **utilize 12 million hectares of rice fallows** left uncultivated post-kharif due to **water scarcity and heat**.
  - It enables **4 crop generations/year**, cutting development time from **15 to 5 years**, **doubling yields** from **1.1–1.2 to 2 tonnes/ha**, and **reducing harvest time** to **4 months** from the usual **6–7**, improving rotation and profitability.
  - It could drastically **reduce India's pigeonpea imports**, which cost **USD 800 million annually**, by bridging the **1.5 million tonne shortfall** in domestic production.
- **About Pulses:** India is the **world's largest producer, consumer, and importer of pulses** and aims to **eliminate imports by 2028**.
  - The **top 3** pulses-producing states are **Madhya Pradesh, Maharashtra, and Rajasthan**.
  - **Tur dal (Pigeon Pea)** is a **key protein-rich legume** in India, thriving in **tropical and semi-arid regions**.
  - Under the **Price Support Scheme (PSS)**, the government ensures **procurement of notified pulses, oilseeds, and copra** from farmers **at Minimum Support Price (MSP)** when **market prices fall below MSP**.
- The **Union Budget 2025–26** announced a **6-year Mission for Self-Reliance in Pulses**, aiming to achieve **self-sufficiency** in crops like **Tur, Urad, and Masur**

Speed breeding accelerates plant growth by controlling light, temperature, and humidity, enabling **multiple crop cycles per year.**

Read More: India to Import Tur Dal from Mozambique

Green Nickel

A new **hydrogen plasma**-based method for **nickel extraction** promises a breakthrough in **green metallurgy** by cutting **CO_2 emissions by 84%** and improving **energy efficiency by 18%**.

- This breakthrough is vital as **nickel,** essential for **clean tech like EV batteries (demand >6 million tonnes/ year by 2040), currently emits >20 tonnes of CO_2 per tonne**, offsetting EVs' environmental benefits.
- **About Nickel:** Nickel is a **silvery-white metallic element**, the **5th-most common on Earth**, found widely in the **crust (80 ppm)** and forming a major part of the **Earth's core as a nickel-iron alloy**. It also occurs in **meteorites, soil, and water**, and is an **essential nutrient for plants.**
  - **Features: Corrosion resistance**, High-temperature stability, Strength, Ductility, Toughness, **Recyclability**, and Catalytic and **electromagnetic properties**.
  - **Reserves: Australia, United States, Brazil, Canada**, and China have the largest global nickel reserves.
    - In India, **nickel occurs in lateritic deposits** of **Sukinda Valley, Odisha**, but is **not produced from primary sources**.
- Nickel is also found in **sulphide form** alongside **copper mineralization** in the **East Singhbhum** district of Jharkhand.
  - The entire demand is met through **imports**, with limited recovery as **nickel sulphate by-product** at **HCL's Ghatsila copper smelter** in Jharkhand.
  - **Ores: Ores of Nickel** is grouped into their two major categories i.e., **sulphide ores** and **laterite ores.**
    - **Sulphide Ores: Pentlandite**, Millerite and Gersdorffite.
    - **Laterite Ores:** Garnierite, **Nickeliferous limonite** and Saprolite.
  - **Applications: Stainless steel production**, **Rechargeable batteries** (e.g., **lithium-ion batteries** for **EVs), Alloys** (e.g., **aerospace**), **Electroplating**, **coinage**, and **catalysts** in chemical industries.
- Nickel is listed among **India's 30 critical minerals**, alongside others like **Bismuth, Cobalt, Copper, Gallium, Germanium, and Graphite.**

Read More: National Critical Mineral Mission

NeVA Digital Platform Launched in Puducherry

Union Minister of State for Information & Broadcasting & Parliamentary Affairs inaugurated the **National e-Vidhan Application (NeVA) platform** for the **Puducherry Legislative Assembly**.

NeVA Platform

- **About:** NeVA is a **workflow-based digital platform** launched under the **"One Nation, One Application"** initiative to digitise legislative functioning in a **paperless, efficient, and transparent** manner.
  - It is funded through **100% central assistance** by the **Ministry of Parliamentary Affairs**, hosted on **NIC Cloud – MeghRaj**.
  - **Nagaland** was the first state to implement NeVA in 2022.
- **Key Features:**
  - **Device-neutral, member-centric** platform accessible via tablets and handheld devices.
  - Provides real-time access to **rules, notices, business lists, bills, bulletins, questions, reports**, etc.
  - **Secure portal** for legislators to submit questions and notices.
  - **Live-streaming support** to enhance transparency and citizen access.
  - **Unified digital repository** of legislative data across all States/UTs, eliminating redundant platforms.
  - **mNeVA mobile app** (Android/iOS) provides **24x7 access to legislative data**.

- **Significance:** The move would **save 3–5 tonnes of paper annually** supporting **Digital India, Go Green, and Good Governance**, and aligns with the **UN Sustainable Development Goals (SDGs)**.

Read More: Nine Years of Digital India Initiative

Etalin Hydropower Project

The Forest Advisory Committee (FAC) under the **Ministry of Environment, Forest and Climate Change (MoEFCC)** has granted **in-principle forest clearance** for the **3,097 MW Etalin** run-of-the-river hydropower project.

- **Location:** Etalin Hydropower Project is located in the **Dibang Valley**, Arunachal Pradesh, which is part of the **Eastern Himalaya Global** Biodiversity Hotspot, one of 36 such hotspots worldwide.
- **Rivers:** The project involves two gravity dams, one on the **Dri River** and another on the **Talo (Tangon) River**, both **tributaries of the** Dibang River (tributary of **Brahmaputra**).
- **Environmental Impact:**
  - **Deforestation:** The project will require the felling of **270,000 trees** and the **diversion of over 1,100 hectares** of unclassified forest land.
    - It has faced persistent **opposition** from the **indigenous Idu Mishmi community.**
  - **Biodiversity:** The region is home to **6 globally threatened mammal species**, **3** of which are **endangered**, and **3** are **vulnerable**. It also harbors about **56% of India's bird species**, including **3 rare, restricted-range endemic bird species**.
    - The area hosts species like **tigers, leopards, snow leopards, black bears, musk deer, and Mishmi takin**.

Run-of-the-River (ROR) Hydropower Project: It is a type of **hydroelectric power generation project** that utilizes the **natural flow and elevation drop** of a river to produce electricity, **without the need for a large dam or major water storage reservoir.**

FAC:

- **FAC** is a **statutory body** under MoEFCC, constituted under the Forest (Conservation) Act, 1980.
  - It examines proposals for **diversion of forest land for non-forest uses** like mining, industrial projects, and townships, and **advises the government** on granting **forest clearances**. Its role is **advisory** in nature.

Read More: Etalin Hydroelectric Project

Indian Grey Wolf

Indian grey wolf (*Canis lupus pallipes*) was sighted near the Yamuna floodplains in Delhi, marking the rare & first sighting in Delhi since the 1940s.

Indian Grey Wolf:

- **About**: The **Indian Grey Wolf** is a **subspecies** of the **Grey Wolf** native to the **Indian subcontinent** and **Southwest Asia.**
  - It is **nocturnal** and **apex predator** that hunts **in small packs** and is **less vocal** compared to other wolf subspecies.
- **Appearance:** A **carnivore** of the **Canidae family**, the Indian Grey Wolf is **intermediate in size** between the **Tibetan** and **Arabian wolve**s and **lacks a thick winter coat,** adapting to warmer climates.
- **Habitat & Distribution: From Israel in the west to the Indian subcontinent in the east**, inhabiting **scrublands, grasslands, pastoral agro-ecosystems** and **semi-arid agro-ecosystems** in warmer regions.
- **Protection Status:**
  - **Wildlife Protection Act, 1972: Schedule I.**
- **Threats:** The species faces several threats, including the **loss of grasslands due to agricultural and industrial expansion, habitat modification, depletion of natural prey,** and the **spread of diseases from feral dogs.**

Read More: Indian Grey Wolf

800-Year-Old Shiva Temple Discovered in Tamil Nadu

An **800-year-old Shiva temple** from the **later Pandya period (1216–1345)** has been **discovered in Tamil Nadu**, offering **significant insights into the region's historical and socio-economic dynamics**.

- **Inscriptions** and Shilpa Sastram confirm the temple, named **Thennavanisvaram**, was dedicated to **Lord Shiva**.
  - Dated to **1217–1218 CE** during **Maravarman Sundara Pandya's reign**, it is located in the village formerly called **Attur** (now **Udampatti**).
  - **Thennavan** is a **title** used by the **Pandyas**, showing the temple had **royal support.**
- The inscriptions record the **sale of a waterbody named Nagankudi** for **64 kasu (coins)**.
  - The **land tax** was to be paid to the **God of Thennavaniswaram** ensuring **financial independence** of the temple.
- **About Later Pandyas:** The early **Pandyas (4th to 3rd centuries BC)** lost power to the **Kalabhras**, regained it in the **6th century**, were overshadowed by the **Cholas** in the **9th century**, and ruled again in the **12th century** as **Later Pandyas**.
  - They had ties with the **Roman Empire, Greeks, Chinese, and Egyptians**, and were praised by travelers like **Marco Polo** (**Italian traveller** of the 13th century).
  - Their kingdom ended in the **14th century** after the **Delhi Sultanate invasion**, leading to their incorporation in the **Vijayanagar Empire**.

Temples patronized by Pandyas: Meenakshi Temple (Madurai), Aranganathar Temple (Srirangam), Vijayanarayana temple (Nanguneri), Lakshmi Narayana temple (Athur).

Read More: Sangam Age

Major Breakthrough in Indigenous Heeng Cultivation

After about **5 years of continuous effort**, the **first flowering and seed setting** of **heeng (asafoetida)** at **IHBT Palampur** were successfully reported. This achievement is a **landmark milestone** in heeng cultivation, demonstrating that the plant can be **acclimatized to Indian conditions.**

- In 2020, the **CSIR-Institute of Himalayan Bioresource Technology (IHBT), Palampur** launched a **national mission to introduce heeng cultivation** with plantation in **Kwaring village, Lahaul Valley (HP)**, using seeds sourced from **Iran and Afghanistan.**

Heeng

- **About:** This plant is a **perennial herb** belonging to the **Umbelliferae (Apiaceae) family.**
  - The **oleo-gum resin**, extracted from the **plant's thick root** after **5 years of maturity**, forms the edible **asafoetida** used in **culinary and medicinal applications.**
- **Ideal Environmental Conditions:** Heeng thrives in **cold, arid climates** such as those found in **Iran, Afghanistan, and Central Asia**.
  - The plant prefers **sandy, well-drained soils** with minimal moisture. It requires temperatures between **10-20°C** but can tolerate extremes of **40°C in the heat and -4°C in the cold**.
  - It also needs **very little rainfall (under 300 mm annually)** for optimal growth.
  - In India, regions such as **Lahaul-Spiti and Uttarkashi** are well-suited for cultivating heeng due to their **semi-arid, high-altitude** conditions.
- **Significance:** This ancient **Ayurvedic herb,** mentioned in the Mahabharata**, Charaka Samhita, and Panini's texts,** is prized for its **digestive benefits**, relieving abdominal pain, enhancing taste, and aiding digestion.
  - Despite being the **world's largest consumer**, **India relied entirely on imports** from **Afghanistan, Iran, and Uzbekistan** until early last decade.

Read More: Heeng Cultivation Project in India

KATRIN Experiment

The **Karlsruhe Tritium Neutrino (KATRIN) Experiment** closely analyzed the decay of molecular **tritium** to estimate the mass of the **neutrino**.

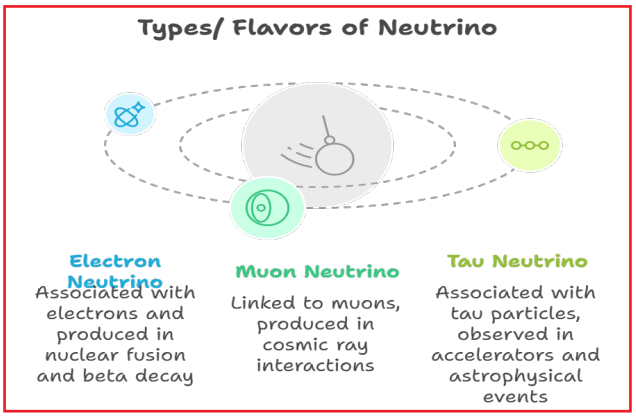
- Situated in **Germany,** the KATRIN Experiment is designed to measure the **absolute mass of neutrinos**, some of the most elusive particles in the universe.

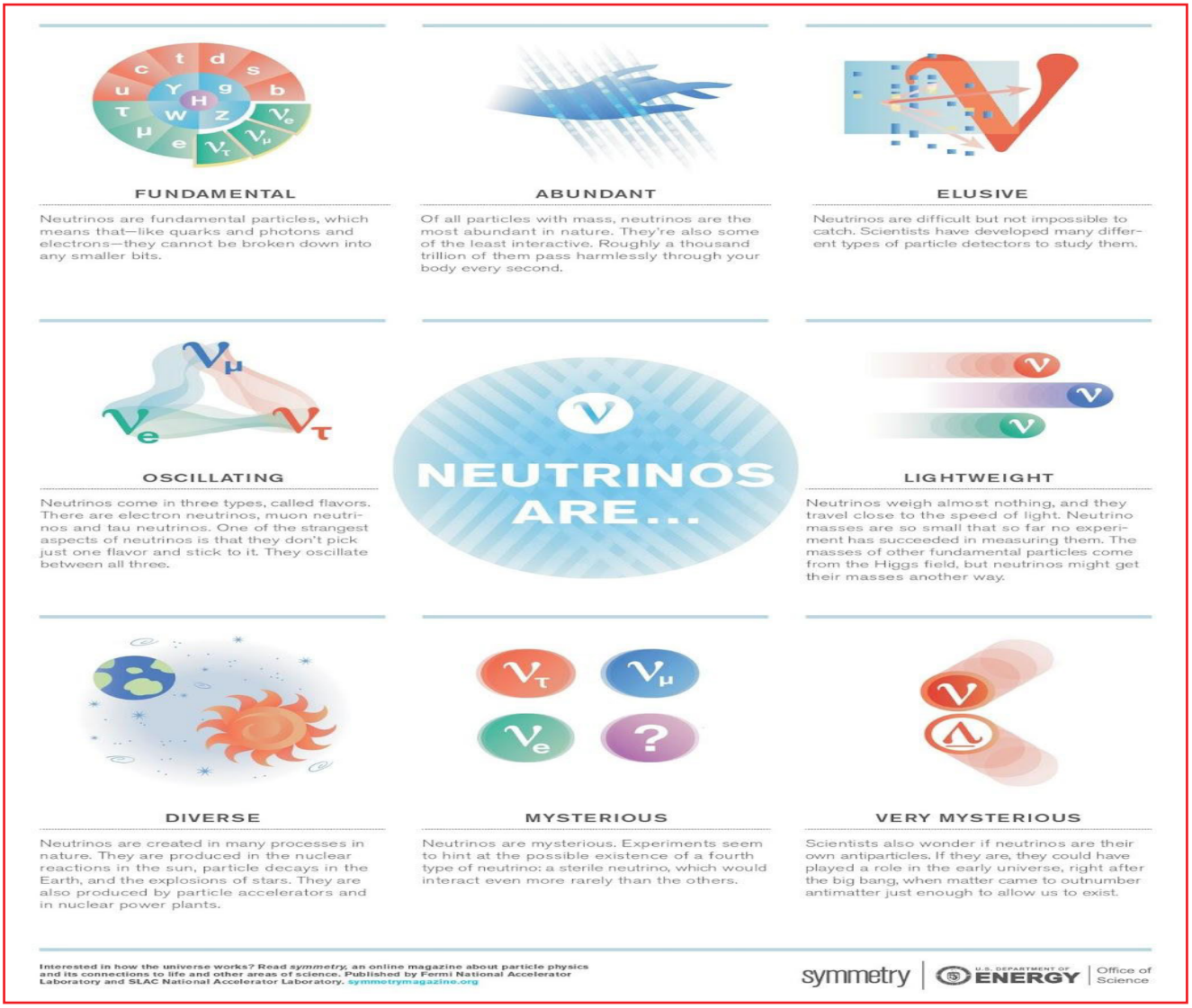
Neutrinos:

- **About:** They are subatomic particles often called **"ghost particles"**, with **no electric charge, no size,**

extremely small mass, and **minimal interaction with matter.**

- **Key Features:** They are the **second most abundant particles** in the universe after **photons** and the **most abundant among all matter particles.**
  - They are **extremely hard to detect**, as they interact only via the **weak nuclear force.**
  - They are **unaffected by even the strongest magnetic fields** and **travel in straight lines from their source.**
- **Types:**

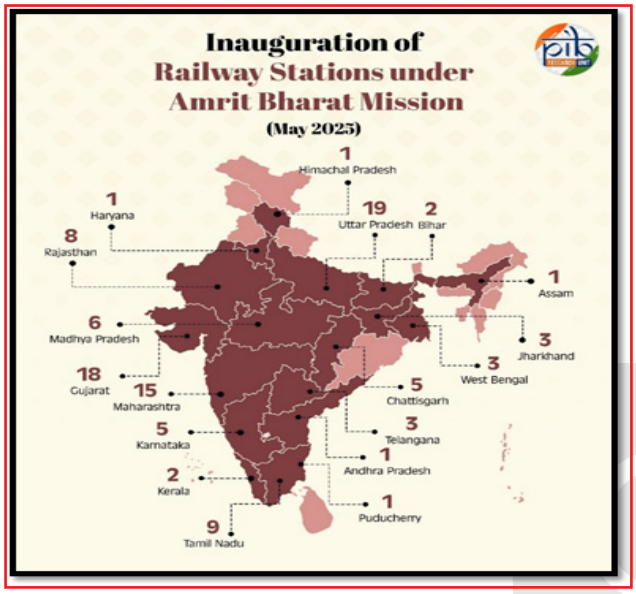




Read More: Detection of Most Energetic Neutrino

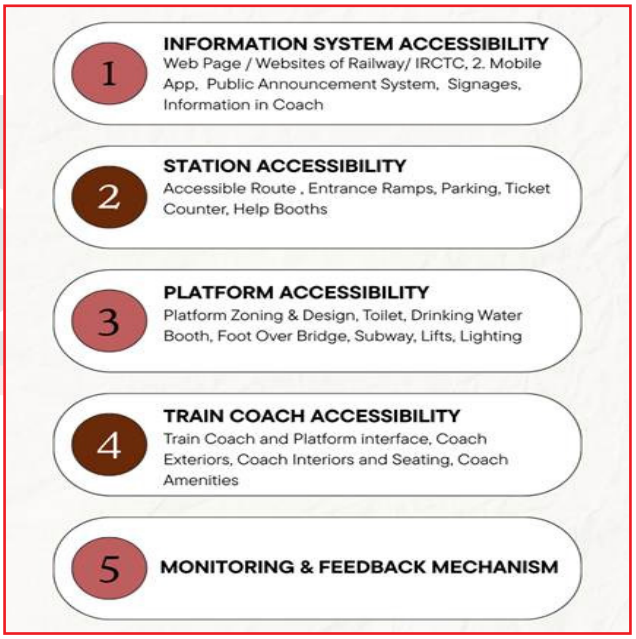
Amrit Bharat Station Scheme

The **Prime Minister** inaugurated 103 redeveloped **railway stations** across 86 districts in 18 States/UTs under the **Amrit Bharat Station Scheme (ABSS)**.



Amrit Bharat Station Scheme (ABSS)

- **About:** ABSS, introduced by the **Ministry of Railways in December 2022**, aims to **redevelop 1,309 railway stations into modern integrated transport hubs** across India.
  - It is also aimed at integrating **regional architecture**, enhancing **passenger amenities**, promoting **inclusivity**, and supporting **urban development**.
- **Key Features:**
  - **Customised & Culturally Integrated Redevelopment:** Stations are redeveloped in phases with **location-specific plans**, **combining modern amenities with regional architectural themes.**
    - **Eg**: Dwarka (Dwarkadheesh Temple), Ahmedabad (Modhera Sun Temple), Kumbakonam (Chola style) and Gurugram (modern urban design).
  - **Passenger Amenities:** Stations include **modern waiting halls**, **clean toilets**, **roofed platforms**, **streamlined access points**, along with **Wi-Fi**, **escalators**, **lifts**, **executive lounges**, **business areas**, and **improved signage** for a seamless travel experience.
  - **Inclusive & Accessible Design:** Aligned with the Accessible India Campaign (Sugamya Bharat Abhiyan), features include **ramps, lifts, Braille signage, tactile paths, accessible toilets**, and **lift-equipped subways/FOBs** etc.
  - **Urban Development Focus:** Stations are developed as **multimodal city centres**, integrating with **bus and metro systems**, connecting both sides of cities, and incorporating **eco-friendly, noise-reducing infrastructure** to support urban mobility.



Read More: Amrit Bharat Stations Scheme

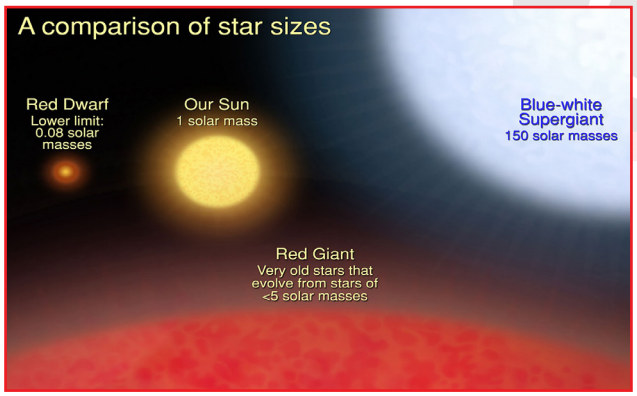
Giant Planet Orbiting Red Dwarf Star

Astronomers have discovered a **Saturn-sized gaseous planet** orbiting the red dwarf star **TOI-6894** beyond our solar system.

- The planet was studied primarily using data from **NASA's** Transiting Exoplanet Survey Satellite (TESS) and the **Very Large Telescope (VLT)** operated by the **European Southern Observatory in Chile.**

- Planets beyond our solar system are called exoplanets.

- It is the **smallest-known star** to host such a massive planet **challenging conventional theories** of **planetary formation.**
- It is located in the **Leo constellation**, is just **21% of our Sun's mass**, yet hosts a **Saturn-sized gas giant**—defying current models that suggest **small stars** typically form only **rocky planets** like Earth or Mars.
- **Red Dwarf: Red dwarfs** are the **smallest stars**, with masses between **7.5% and 50% of the Sun**.
  - They have **very low luminosity**, emitting just **0.01% to 10%** of the Sun's brightness, and **low surface temperatures** give them a **red or orange glow**.
  - Their **slow hydrogen burning** allows them to shine for **trillions of years**, far longer than the Sun's **10-billion-year lifespan**.
  - They are the most **common type of star** in the Milky Way galaxy. The **closest star to the Sun**, **Proxima Centauri**, is a red dwarf.



Read More: Binary Brown Dwarfs

World Accreditation Day 2025

The Quality Council of India (QCI) celebrated **World Accreditation Day (WAD) 2025** on **9th June** to **highlight the role of accreditation in trade and economy,** with the theme **"Accreditation: Empowering Small and Medium Enterprises (SMEs)".**

- QCI also launched the **revamped** NABL **Portal and** Gunvatta Samarpan Initiative to **enhance digital accreditation access for MSMEs** and promote **public commitment to quality standards**

Accreditation

- Accreditation is a **formal verification** that an **institution meets quality standards in testing, inspection, or certification**. It **enhances quality** in sectors like **health, education, and food, promotes standardization,** and **boosts global competitiveness.**

Certification vs Accreditation

Comparison Table

Characteristics	Certification	Accreditation
Definition	Refers to a written assurance by a third party on the conformity of a service, product or process, based on certain specified requirements provided by some form of education, audit, assessment or external review	Refers to formal recognition on the competency towards specified standards by an authoritative body.
Base activities	Relates to all company activities in a given industry	Is based on specific activities, and is not based on all activities in an organization
Endorsements	Involves the endorsement of a product, service or proccess by a third party	Involves the endorsement of a product, service or process by an independent third party.

Quality Council of India (QCI)

- **Established: 1997** as an **autonomous body** under the Department for Promotion of Industry and Internal Trade (DPIIT), Ministry of Commerce and Industry.
- **Chairperson:** Appointed by the **Prime Minister** based on industry recommendations.
- **Mandate:** To **develop and manage the** National Accreditation Structure (NAS) for **conformity assessment bodies** in sectors like health, education, and quality promotion.

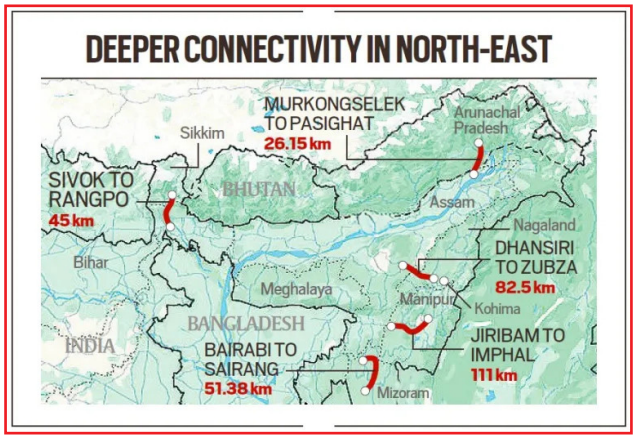
- **Key Bodies:** National Accreditation Board for Certification Bodies (NABCB) and National Accreditation Board for Testing and Calibration Laboratories (NABL) are the 2 accreditation boards of the QCI.
  - These work closely to **support the Government and regulators** to ensure that the **data provided by accredited conformity** assessment bodies is **robust, reliable, trustworthy** in terms of decision making, compliance testing and standards setting.
- **Industry Representation:** Includes **ASSOCHAM, CII, and FICCI,** reflecting strong industry-government collaboration.

Read More: Quality Council of India (QCI)

Rail Connectivity in Aizawl

Mizoram's capital **Aizawl** has been successfully connected to the **national railway network** via the **Bairabi–Sairang rail line**, becoming the **4th Northeastern capital with rail access** after **Assam (Dispur), Tripura (Agartala),** and **Arunachal Pradesh (Itanagar).**

- **Earlier,** railway connectivity **in Shillong (Meghalaya) faced** opposition from Khasi pressure groups, who fear that it may lead to a significant influx of outsiders into the state.



About Indian Railways

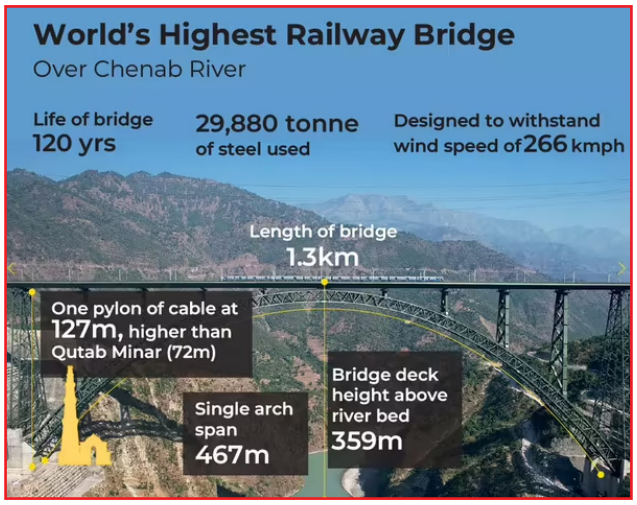
- Established in **1853**, the country's **first train journey** covered 21 miles between **Bombay and Thane.**
- India has the **4th largest railway network in the world**, following the **US, China** and **Russia.**
- In **2022–23**, Indian Railways generated **69% of its internal revenue from freight** operations and **24% from passenger services**, while the remaining **7% came from other sources** such as parcel services, coaching receipts, and platform ticket sales.
- It contributed approximately **1.5% to the GDP in FY24.**
- By **2050,** India is expected to contribute around **40% of global rail activity**.
- The National Rail Plan (NRP) for India 2030 has been formulated to modernize the sector and build a future-ready railway system.

Read More: Rerouting Indian Railways' Future

Chenab Rail Bridge and Anji Khad Bridge

The **Prime Minister** inaugurated the **Chenab rail bridge** over the **Chenab River** and **Anji Khad bridge** over the **Anji River (a Chenab tributary)** in **Jammu and Kashmir.**

- **About Chenab Rail Bridge:** Located in **Reasi district,** it is the **world's highest railway arch bridge**, standing **359 metres tall—35 metres higher** than the **Eiffel Tower.**
  - **Construction and Design:** It was constructed by **Konkan Railway Corporation**, with the **foundation designed by IISc Bengaluru**. **IIT Delhi** and **IIT Roorkee** conducted **seismic analysis**, while **DRDO** ensured the bridge is **blast-proof**.
  - **Durability and Safety:** It is designed to withstand **magnitude 8 earthquakes**, **explosions up to 40 tonnes of TNT**, temperatures as low as **-20°C**, and **wind speeds reaching 266 km/h.**
  - **Uniqueness:** A key feature is its ability to **remain stable and operational** even if **one of its eight piers fails**, allowing trains to continue at a **reduced speed.**
- **About Anji Khad Bridge:** It is **India's 1st cable-stayed rail bridge** and the **2nd-highest railway bridge** in the country, after the **Chenab rail bridge.**
- **Significance:** Both bridges are part of the **Udhampur-Srinagar-Baramulla Rail Link (USBRL)** project, providing **all-weather rail connectivity** between **Kashmir** and the rest of **India**.



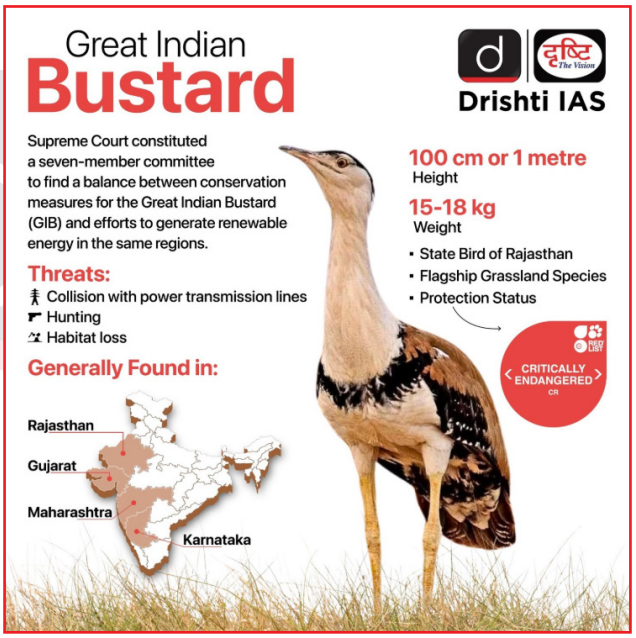
- **About Chenab River:** Chenab (or **Chandrabhaga river**) is the **largest tributary of the Indus River**, formed by the confluence of the **Chandra** and **Bhaga** rivers at **Tandi**, **in Himachal Pradesh.**

Read More: Anji Khad Bridge

Great Indian Bustard

The Rajasthan Forest Department named newly hatched Great Indian Bustard (GIB) (Ardeotis nigriceps) chicks **Sindoor, Vyom, Mishri, and Sophia** to honour Operation Sindoor and military personnel involved.

- **GIB, Rajasthan's state bird,** is India's most **critically endangered** bird. It is one of the **heaviest flying birds in the world,** and mainly found in **Rajasthan's Thar Desert,** with small populations in **Gujarat, Maharashtra, Karnataka, and Andhra Pradesh.**
  - GIB is one among four bustard species found in India, alongside the **Lesser Florican, Bengal Florican, and Macqueen's Bustard.**
  - GIB is **omnivorous** and vulnerable to power line collisions due to **lack of frontal vision.**
- **Ecological Importance:** GIB **acts as an indicator species**, it reflects the health of grassland ecosystems. Their decline signals degradation of native grasslands.
- **Protection Status:** IUCN Red List (Critically Endangered), CITES (Appendix 1), Convention on Migratory Species (CMS) (Appendix I), and Wildlife (Protection) Act, 1972 (Schedule I).
- **Threats:** Habitat loss from **agriculture, mining, and infrastructure,** along with **collisions with power lines** (the leading cause of adult mortality) threaten the GIB.
  - Poaching has declined but human disturbance and unsustainable land use continue to impact the species.
- **Conservation Efforts:** Project GIB (launched in 2018) a joint initiative of the Ministry of Environment, Wildlife Institute of India, and Rajasthan Forest Department
  - Captive breeding centres in Sudasari and Sam, Jaisalmer, use AI-enabled monitoring, incubators, and sensor-based systems to improve chick survival.



Read more: Great Indian Bustards

Nanozyme to Combat Abnormal Blood Clotting

Researchers have developed a **metal-based nanozyme** that effectively **prevents abnormal blood clotting**, offering promising treatment for conditions like **pulmonary thromboembolism (PTE, blood clots block arteries in the lungs)** and thrombosis **(blood clotting in veins or arteries).**

- **Normal blood clotting (haemostasis)** involves platelets clustering at injury sites, triggered by signals from **physiological agonists** like **collagen and thrombin.**
- In disorders like **PTE** or Covid-19, **oxidative stress** and **toxic Reactive Oxygen Species (ROS)** increase, causing **excessive platelet activation** and **dangerous clot formation** (thrombosis).
- **Redox-active nanomaterials (nanozymes)** mimic **natural antioxidant enzymes**, helping **scavenge reactive oxygen species (ROS)** and prevent **platelet over-activation**.
  - Among them, **spherical-shaped vanadium pentoxide (V_2O_5) nanozymes** were most effective, mimicking **glutathione peroxidase**, a key **natural antioxidant enzyme.**
- It could help **prevent ischemic stroke** caused by **blood vessel blockages** and may also aid in managing **Covid-19**-related clotting complications.
- A **nanozyme** is a **nanomaterial (1–100 nm)** that mimics the activity of **natural enzymes**, catalyzing **biochemical reactions** like biological enzymes.
  - Nanozymes can be **made from** various materials, such as **metals, metal oxides, carbon-based substances**, and **metal-organic frameworks (MOFs)**.

Read More: Nanotechnology

National Cadet Corps (NCC)

Raksha Rajya Mantri has announced the **expansion of the NCC by 3 lakh cadets** across the country**.**

National Cadet Corps

- **About:** The **NCC** is a **voluntary Tri-Services organisation** (Army, Navy, and Air Force) under the **Ministry of Defence** headquartered in **New Delhi**, established by the **NCC Act, 1948.**
  - It is the largest uniformed youth organisation globally, with over **15 lakh cadets across the country.**
- **Historical Background:** The concept of cadet training began in **Germany in 1666**. In India, it originated with the **University Corps**, established under the **Indian Defence Act, 1917** during **World War I**.
  - After the **Indian Territorial Act of 1920, the University Corps** was reorganized as the **University Training Corps (UTC),** and later renamed the **University Officers Training Corps (UOTC) in 1942**.
  - Its **limited impact during World War II led the HN Kunzru Committee Report (1946)** to recommend a unified youth body, resulting **in the NCC Act, 1948.** The **Girls Division was added in 1949** to promote gender inclusion.
- **Objective:** It aims to groom the youth into **disciplined, patriotic, and responsible citizens**.
- **Role in Wars & Reforms:** During the **1965 and 1971 Indo-Pak wars**, **NCC cadets supported defence efforts** by guarding vital areas, aiding in logistics, and assisting in rescue and traffic control.
  - **Post-1971, NCC reoriented towards leadership,** social service, and nation-building, reducing its focus on combat training.
- **Structure & Training:** Headed by a **Director General (rank of Lieutenant General)**.
  - Enrolment from high schools, colleges, and universities across India.
  - Cadets receive **basic military training**, and **certificates (A, B, C)** enhancing eligibility for military recruitment.

Read More: National Cadet Corps

Unnat Bharat Abhiyan

The **Ministry of Education's** **Unnat Bharat Abhiyan (UBA)** completes a decade, redefining the role of higher education in rural development.

- **About UBA: UBA (2014)** aims at bringing **transformational change in rural India** by leveraging the resources of **higher educational institutions (HEIs)** to solve **local development challenges** through **sustainable and inclusive practices.**
- **Need: UBA** is crucial because **70%** of India's **population** lives in **rural areas**, and while **54-55% of the workforce** is engaged in **agriculture and allied sectors**, they contribute only **15-18%** to the **national GDP**, highlighting the urgent need for **comprehensive rural development.**
- **Implementation & Reach:** IIT Delhi is the **National Coordinating Institute** that oversees UBA, with

4,000+ institutions working with 19,000+ villages across 35 states and union territories.

- **Key Focus Areas:** Organic agriculture, Water and energy systems, Healthcare and sanitation, Rural crafts and housing, E-governance and basic amenities.
  - **Village Adhyayan (Participatory Learning)** is central to UBA, promoting **bottom-up planning** rather than top-down imposition of solutions.
- **Notable success stories:**
  - **IIT Delhi's lemongrass cultivation** and **oil extraction unit** boosted farmer income **by Rs 8,000–10,000 per month** during harvest.
  - **NIT Manipur's water purifier** provides clean water to **2,000+ villagers**.
- **UBA 2.0 (2018)** follows a **Challenge Mode**, requiring all HEIs to **voluntarily** adopt **at least 5 villages**, unlike **UBA 1.0** (Invitation Mode), where institutions were **invited** to participate.

Read More: Unnat Bharat Abhiyan Scheme

India Elected to IIAS Presidency

India has been elected **President** of the **International Institute of Administrative Sciences (IIAS)** for the term **2025–2028**.

- It marked the **first time** in the organization's **history** that elections were held through a **ballot**, with **India securing the top position** by winning **61.7% votes.**
- **About IIAS: IIAS**, established in **1930** and headquartered in **Brussels**, is an **international non-profit organization** with **scientific objectives**.
  - IIAS is a **global federation** of **31 Member Countries, 20 National Sections, and 15 Academic Research Centres**, collaboratively developing **public governance solutions** to contemporary **policy challenges**.
  - **Notable member countries** are **India, Japan, China,** Germany, Italy, Korea, Saudi Arabia, South Africa, Switzerland, Mexico, etc.
  - **IIAS works closely** with the United Nations, contributing to the UN Committee of Experts on Public Administration (UN CEPA) and the UN Public Administration Network (UNPAN), though **not formally affiliated to the UN**.
- **India** has been a **Member State of IIAS since 1998**, represented by the **Department of Administrative Reforms and Public Grievances (DARPG).**

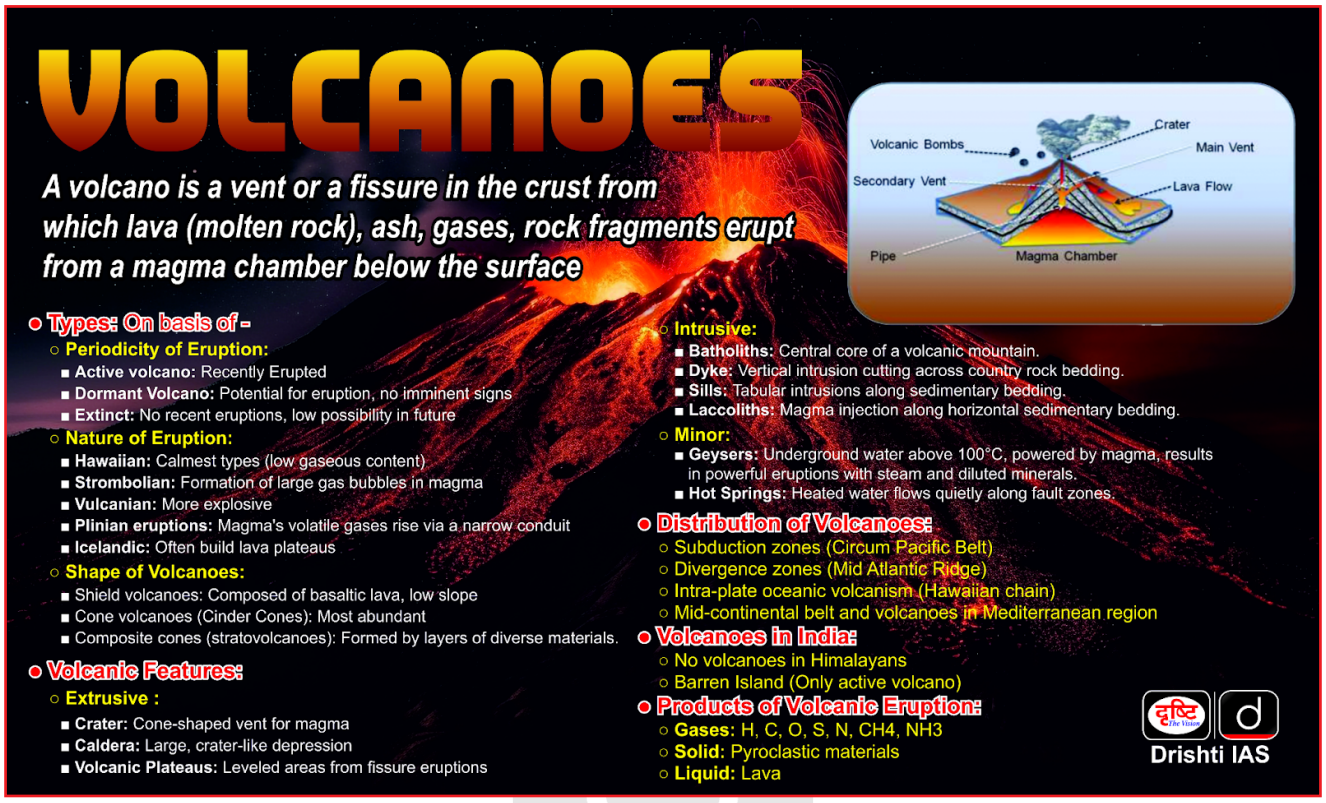
Read More: Major Administrative Reforms

Mount Etna

Mount Etna**, Europe's largest and one of the world's most active volcanoes**, has begun erupting.

Mount Etna

- It is located on **Sicily's east coast** in the Mediterranean Sea, it is part of **Italy**.
- It is **a continuously active stratovolcano with five summit craters,** known for explosive, effusive, and mixed eruptions.
  - Etna has been a UNESCO World Heritage Site since 2013.
- Mount Etna's eruption was initially classified as a **Strombolian eruption**, involving **moderate gas-driven explosions** due to **bursting gas bubbles.**
  - However, due to its **high ash plume reaching several kilometres,** some experts suggest it may have been a more **explosive Plinian eruption**.



Read More: Volcanic Vortex Rings

Neolithic Site Daojali Hading in Assam

Recent archaeological findings at **Daojali Hading, Dima Hasao district in Assam,** have reaffirmed its status as a **Neolithic habitation site over 2,700 years old**, revealing both **domestic artefacts and early metallurgical activity.**

- **Daojali Hading**, located in the **Langting-Mupa Reserve Forest**, was first uncovered in the 1960s, by **T.C. Sharma and M.C. Goswami** (1962–64).
- **Artefacts recovered include:**
  - **Polished double-shouldered celts** (a chiselled stone tool), **cord-marked pottery**, **mortars**, **pestles**
  - **Grinding stones, low-fired potsherds, charcoal samples**
  - The presence of **jadeite stones**, also found in **China** and **unique to Daojali Hading**, suggests **ancient trade links with East and Southeast Asia.**
- **About Neolithic Age:** The **Neolithic Age**, or **New Stone Age**, was the final stage of the **Stone Age**, beginning around **9000 BCE** (varying by region) and lasting until the advent of **metal tools** around **3000 BCE**. Its **key features** are:
  - **Agriculture** (wheat, barley, rice, millet) & **domestication** (cattle, sheep, goats)
  - **Permanent settlements** (mud-brick or stone houses e.g., Mehrgarh in Baluchistan)
  - **Polished stone tools** (e.g., axes, sickles, grinding stones)
  - **Potter's wheel** became known after **4500 BC**.
  - Complex **social structures** emerged, evidenced by **burials**, **rituals**, and early **religious symbols.**
- **Prominent Neolithic Sites:**
  - **Northwest India: Mehrgarh** (now in Pakistan), **Burzahom** & **Gufkral** (Kashmir).
  - **Northern & Central India: Senuwar (Bihar), Koldihwa & Mahagara (Uttar Pradesh), Bagor (Rajasthan), Adamgarh (Madhya Pradesh)**.
  - **Northeastern India:** Daojali Hading & Sarutaru (Assam), **Napachik and Laimanai (Manipur).**
  - **Southern India:** Brahmagiri & Maski (Karnataka), **Paiyampalli** (Tamil Nadu).

Read More: Wooden Artifacts of Stone Age

Scheme to Promote Manufacturing of Electric Passenger Cars in India

The **Center** has issued detailed guidelines for the **Scheme to Promote Manufacturing of Electric Passenger Cars in India (SPMEPCI)** to boost domestic electric vehicle (EV) **production** and establish India as a **global EV manufacturing hub**.

SPMEPCI

- **About:** It is an initiative launched by the **Ministry of Heavy Industries (MHI)** with the objective to **boost domestic manufacturing of electric passenger cars (e-4W)**.
  - The scheme aligns with India's broader goals of **achieving net-zero emissions by 2070** and fostering sustainable mobility.
- **Eligibility Criteria:** It is limited to companies/groups with minimum automotive revenue of **Rs 10,000 crore** from automotive manufacturing, and with a minimum investment of **Rs 3,000 crore in fixed assets**.
- **Key Features of SPMEPCI:**
  - **Customs Duty Concession:** Approved applicants can import **Completely Built-in Units (CBUs)** of electric passenger cars with a **minimum cost of USD 35,000** at a reduced **customs duty of 15%**.
    - This benefit will be available for **five years** from the approval date, with a cap on imports **set at 8,000 units per year.**
  - **Investment Commitment:** Applicants must invest a minimum of **Rs 4,150 crore within 3 years**, establish manufacturing units, and commence production in that timeframe.
  - **Domestic Value Addition (DVA):** Applicants must achieve at least **25% DVA within 3 years and 50% within 5 years,** aligned with the **Production Linked Incentive (PLI) Scheme for Automobile and Auto Components**.

India's Automotive Sector

- India is the **3rd largest automobile market in the world**, with a current market size of **Rs 12.5 lakh crore**.
  - India aims to become the **world's largest automobile market by 2030**, with a focus on **electric and alternative fuel vehicles.**
  - This market is expected to grow to **Rs 24.9 lakh crore by 2030**, reflecting a **50% growth**.
- The automobile sector contributes **7.1% to India's GDP**.
- **Growth Drivers of India's Auto Sector:** **PLI Scheme for Automobile and Auto Components (PLI-Auto)**, **PLI Scheme for Advanced Chemistry Cells (PLI-ACC)**, **PM E-DRIVE Scheme**.

Read More: **PM E-DRIVE Scheme**

Thermophilic Bacteria for AMR Treatment

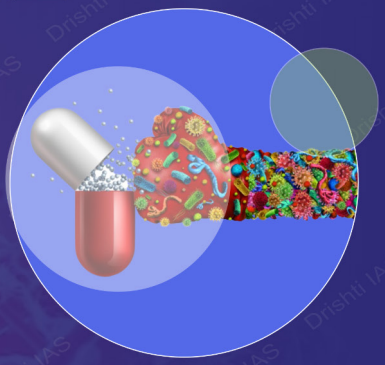
Thermophilic bacteria thriving in extreme heat environments like **hot springs** in Rajgir (Bihar) hold great promise as sources of **potent antibiotics** against **resistant bacteria** and have significant **industrial and agricultural applications.**

- **About the Study:** In Rajgir, **Actinobacteria,** known producers of **antimicrobials** like **streptomycin and tetracycline,** comprised **40-43%** of the bacterial population.
  - A compound, **diethyl phthalate**, extracted from Actinomycetales **bacterium**, showed inhibition against Listeria monocytogenes, a dangerous **foodborne pathogen.**
  - **Rajgir hot springs** were studied using **16S rRNA metagenomics** to identify **microbial diversity**, especially focusing on **antibiotic producers.**
    - Metagenomics is the study of **genetic material (DNA/RNA)** recovered directly from **environmental samples** (like **air, soil, water**, gut microbiomes) without the need for **culturing individual organisms** in a lab.
- **Significance of the Study:** The **extraction of potent antibacterial compounds** is vital to combat **antimicrobial resistance (AMR)**—a **silent epidemic** fueled by **antibiotic overuse**.
  - AMR has **increased healthcare costs**, often requiring multiple antibiotics per infection, with the **WHO projecting global healthcare costs to reach USD 1 trillion by 2050.**
- **About Thermophilic Bacteria:** Thermophilic bacteria (heat lovers) inhabit **hot springs, deep-sea vents, and compost piles**, exploiting mineral-rich, low-competition niches.
  - Thermophiles from Saudi Arabia **produce antibiotics effective against gram-positive pathogenic bacteria.**
  - **Application: PCR test enzyme** (used for Covid-19) **and a bacterial** combination from a Leh hot spring **promote plant growth.**

ANTIMICROBIAL RESISTANCE

Drishti IAS

The ability of microorganisms to resist the effects of antimicrobial drugs



CAUSES OF ↑AMR

- Poor infection control/sanitation
- Antibiotic overuse
- Genetic mutations of microbe
- Lack of investment in R&D of new antimicrobial drugs

Microbes that develop AMR are called 'Superbugs'

IMPACTS OF AMR

- ↑ Risk of spreading infections
- Makes infections harder to treat; prolonged illness
- ↑ Healthcare costs

EXAMPLE

- Carbapenem antibiotics stop responding due to AMR in K. pneumoniae
- AMR Mycobacterium tuberculosis causing Rifampicin-Resistant TB (RR-TB)
- Drug-resistant HIV (HIVDR) making antiretroviral (ARV) drugs ineffective

RECOGNITION BY WHO

- Identified AMR as one of the top 10 threats to global health
- Launched GLASS (Global Antimicrobial Resistanceand Use Surveillance System) in 2015

INDIA'S INITIATIVES AGAINST AMR

- Surveillance of AMR in microbes causing TB, Vector Borne diseases, AIDS etc.
- National Action Plan on AMR (2017) with One Health approach
- Antibiotic Stewardship Program by ICMR

New Delhi metallo-β-lactamase-1 (NDM-1) is a bacterial enzyme, emerged from India, that renders all current β-lactam antibiotics inactive

Read More: Metagenomics

India as a Global Biotechnology Hub

India showcased its **rising prominence** in the **global** biotechnology sector at the International Centre for Genetic Engineering and Biotechnology (ICGEB) **meeting** in New Delhi.

- India inaugurated first of its kind **public-funded DST-ICGEB Bio-foundry**, a platform for scaling up **bio-based innovations, supporting startups**, and researchers.

- **ICGEB**, established in **1983**, is a premier intergovernmental organization with **69 member countries**, with centres in **New Delhi, Trieste, and Cape Town.**
  - Under the **BioE3 Policy (Biotechnology for Economy, Environment & Employment)**, India aims to build a **resilient bio-manufacturing ecosystem.**
  - **India's bioeconomy grew from USD 10 billion (2014) to USD 165.7 billion (2024)**, targeting **USD 300 billion by 2030**.
- India ranks **12th globally, 3rd in Asia-Pacific** in biotechnology, and is the **largest global vaccine producer**, with **over 10,000 biotech startups** in 2024 (up from 50 in 2014).
- **Notable Achievements Include:**
  - **ZyCoV-D- World's first DNA-based Covid vaccine** developed under **Mission Covid Suraksha**.
  - **Nafithromycin,** country's first indigenous Macrolide antibiotic.
  - **Quadrivalent Human Papilloma Virus (qHPV) vaccine**, **CERVAVAC**, has been developed to help **prevent cervical cancer.**
  - **Pneumococcal Conjugate Vaccine (PCV)**, **Pneumosil,** has been developed to protect against **pneumococcal diseases**, such as **pneumonia, meningitis, and sepsis**, especially in **children.**

Read More: BioE3 Policy and Biotechnology in India

Khichan and Menar as New Ramsar Sites

The **Khichan (Phalodi) and Menar (Udaipur) wetlands in Rajasthan** have been declared **Ramsar Sites, bringing India's total to 91, the highest in Asia.**

- **Khichan** is famous for hosting thousands of **migratory Demoiselle cranes**, while **Menar (Bird Village)**, is recognized for its **community-led bird conservation efforts.**
- Rajasthan now has **4 Ramsar Sites**, including **Sambhar Lake** (Nagaur & Jaipur) and **Keoladeo Ghana National Park** (Bharatpur).
- **About Wetlands:** They are areas of **marsh, fen, peatland, or water (natural or artificial)** with **water that is static or flowing**, including **marine areas with a depth not exceeding six meters**.
  - Wetlands are **ecotone**, having land transitional between **terrestrial and aquatic ecosystems.**
- **About Ramsar Convention:** It was adopted in **1971** in **Ramsar, Iran**, and provides a global framework for **wetland conservation and wise use**. **India joined it in 1982**.
  - The **Montreux Record** (threatened list) lists wetlands with **deteriorating ecological character** due to human activity or pollution. India has **two wetlands** in the Montreux Record:
    - **Keoladeo National Park**, **Rajasthan (1990)**: A **UNESCO World Heritage Site.**
    - **Loktak Lake**, **Manipur (1993)**: The **largest freshwater lake in Northeast India**, known for its **Phumdis** (floating masses of **vegetation, soil, and organic matter**).
  - **Chilika Lake** was included in the Montreux Record in **1993** but was removed in **2002 (first site from Asia).**

Read More: Strengthening Wetland Protection

BharatGen: India's First AI Multimodal LLM

The **Union Minister of State (IC) for Science & Technology** launched **"BharatGen LLM"** at the **BharatGen Summit 2025**.

BharatGen

- **About:** It is **India's first indigenously developed, government-funded Multimodal Large Language Model (LLM)** in **22 Indian languages.**
  - **Multimodal LLMs** are **large language models** trained on **diverse data types (text, images, audio, and video),** enabling them to **understand and interpret complex human language and multimedia**.
    - They **overcome limitations of unimodal models** (such as earlier versions of ChatGPT)

by **providing cohesive responses across multiple data forms.**

- **Developed Under:** National Mission on Interdisciplinary Cyber-Physical Systems (NM-ICPS), implemented by the **TIH Foundation for IoT and IoE at IIT Bombay**.
  - NM-ICPS was launched in **2018** by the **Ministry of Science and Technology** to promote **innovation and R&D in Cyber-Physical Systems (CPS)** and **new-age technologies.**
- **Objectives: Promote ethical, inclusive, multilingual AI rooted in Indian values,** provide **region-specific solutions in healthcare, agriculture, education, and governance,** and **boost rural telemedicine** with AI doctors speaking native languages.

Feature / Aspect	Large Language Models (LLMs)	Generative Adversarial Networks (GANs)	Autoregressive Models (ARMs)
Definition	AI models trained on large text data to generate human-like language	AI models with two networks (Generator & Discriminator) that generate realistic content	Models that predict next value/token based on past sequence
Key Purpose	Text generation, translation, summarization	Image generation, deepfakes, data enhancement	Sequence modeling (text, speech, time-series)
Content Type	Primarily **text**	Primarily **images**, videos, or audio	Any sequential data (text, numbers, audio)
Relation to Generative AI	A **subset** of generative AI for text	A **type** of generative AI for media content	A **technique** used in both LLMs and time-series models
Examples	GPT-4, PaLM2, LLaMA	StyleGAN, CycleGAN	GPT, WaveNet, PixelRNN

Read More: Large Language Models, National Mission on Interdisciplinary Cyber-Physical Systems

Industrial Iron Pollution Disrupts Ocean Nutrient Cycles

A study finds that **industrial iron pollution depletes ocean nutrients** and disrupts marine ecosystems, posing major ecological risks.

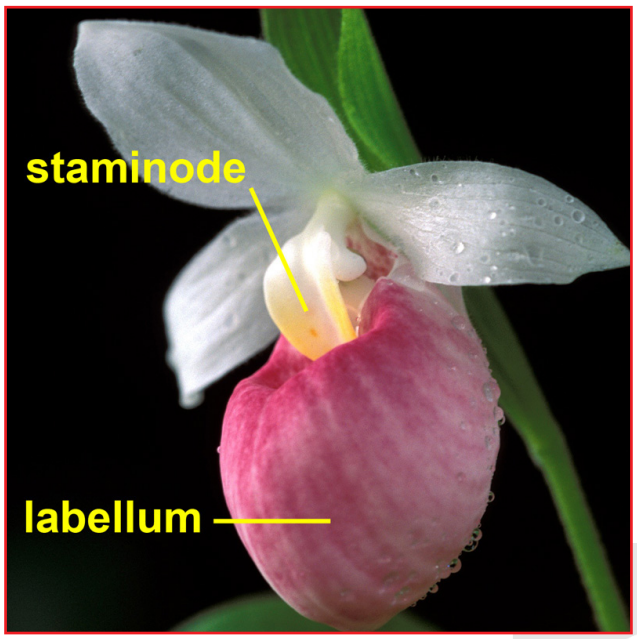
- **Human-released iron** boosts **spring phytoplankton blooms** and accelerates nutrient loss, worsening ocean nutrient depletion amid climate change.
  - These threaten the entire marine food chain, from zooplankton to whales, especially affecting species unable to migrate or adapt.
  - **Phytoplankton are microscopic algae with chlorophyll** that need sunlight to grow and form the base of the marine food chain, but **excess nutrients can trigger toxic harmful algal blooms (HABs)** affecting marine life and humans.
- **India's Iron and Steel Sector Emissions:** India's iron and steel industry contributes **5% to national GHG emissions**.
  - The iron and steel industry causes significant pollution due to the use of coal and iron ore. Furnace operations release **sulphur oxides (SOx), nitrogen oxides (NOx), carbon dioxide (CO_2), carbon monoxide (CO), particulate matter (PM2.5 and PM10),** and polycyclic aromatic hydrocarbons (PAHs).
  - Additionally, it generates wastewater, hazardous waste, and solid waste, leading to air, water, and soil pollution.

Read more: India's Steel Sector

Lady's-Slipper Orchid

The **Lady's Slipper orchid,** once **believed to be extinct in the UK** for nearly a century due to over-collection, was rediscovered in 1930 when a single plant

was found. It has **now been spotted growing naturally in the wild again in England.**



Lady's Slipper Orchid

- **Taxonomy:** It belongs to the subfamily Cypripedioideae (Orchidaceae) and known for their distinctive **slipper-shaped labellum** that aids **pollination** by **trapping insects.**
- **Species & Distribution:**
  - Of the 5 global genera (Cypripedium, Mexipedium, Paphiopedilum, Phragmipedium, Selenipedium), **Cypripedium** and **Paphiopedilum** occur in **India**, primarily in the **Himalayan states** (J&K, Uttarakhand, Sikkim, Arunachal Pradesh) and the **Northeast hills**.
  - Its species are found in **boreal, temperate, and tropical regions** of **Europe, Asia, and North America.**
- **Habitat & Ecology:** Grow in **moist, shady, boreal, cool temperate forests** and **alpine zones** of **Europe, Asia, and North America.** It requires **humus-rich, well-drained soils**.
  - Some species like C. guttatum and C. passerinum in Alaska **sprout under snow.**
- **Threats & Conservation:** Declined due to **overcollection, medicinal use, habitat loss,** and **failed transplantation.** They are difficult to cultivate due to **specific soil and fungal needs.**
  - Conservation in India is led by the **Botanical Survey of India (BSI)** and other institutions through **in-situ and ex-situ conservation, tissue culture propagation**, and **habitat restoration**.
- **Conservation Status**
  - **CITES: Appendix I & II**
  - **IUCN Red List: Critically endangered/ Endangered**
  - **Wildlife Protection Act, 1972: Schedule III**

Read More: Rare Orchids in India

Mysterious Star Emitting Both Radio Waves and X-Rays

Astronomers have discovered a **unique celestial object** that emits **simultaneous radio waves and X-rays** every 44 minutes, marking it as a **rare member** of a newly identified class known as **long-period radio transients**.

- It is located in the **Milky Way galaxy** about 15,000 light-years from Earth in the direction of the **constellation Scutum.**
- **Long-period radio transients** emit **bright radio bursts** every few minutes to hours—much longer than typical **pulsars**, which blink **on and off** in **milliseconds to seconds** due to their **rapid rotation**.
  - **Pulsars** are rapidly rotating **neutron stars**, formed from the **collapsed core of a massive star** after it dies.
- **Nature of the object is still unknown**, with possible identities including:
  - A **magnetar** (a spinning neutron star with an **extreme magnetic field**)
  - A **white dwarf** in a **binary system** with a companion star.
    - **Stars** up to **eight times the mass of our Sun** end as **white dwarfs**. After using up their **hydrogen fuel**, they expand into **red giants**, **shed outer layers**, and collapse into a **dense, Earth-sized core** called a **white dwarf.**
- Researchers used data from **NASA's Chandra X-ray Observatory**, and **other telescopes** for their study.

- Radio waves have **long wavelengths and low frequencies,** primarily used for **communication** such as **radio and television**. **X-rays** possess **short wavelengths and high frequencies,** allowing them to penetrate materials and are widely used in **medical imaging**.

Read More: Magnetars and Related AstroSat's Discovery

Miniratna Status to 3 DPSUs

The Ministry of Defence has approved the conferment of **"Miniratna (Category-I)"** status to three key **Defence Public Sector Undertakings (DPSUs):** Munitions India Limited (MIL), Armoured Vehicles Nigam Limited (AVNL), and India Optel Limited (IOL).

- **Transformation of DPSUs:** MIL, AVNL, and IOL are three of the seven PSUs carved out of the erstwhile **Ordnance Factory Board (OFB)** in 2021 as part of the Government of India's defence sector reforms**.**
  - MIL products include ammunition (small to high calibre), mortars, rockets, grenades, and in-house explosives.
  - AVNL products include **MBT Arjun**, **T-90 tanks**, **BMP-II Sarath** (amphibious Infantry Combat Vehicle), and Defence mobility solutions (Stallion, LPTA etc.)
  - IOL specializes in Opto-electronic systems and vision equipment for tanks, artillery and naval weapons.
- **Miniratna Category-I Status:** The CPSEs which have **made profit in the last three years continuously, pre-tax profit is Rs.30 crores or more** in at least one of the three years and have a **positive net worth** are eligible to be considered for grant of Miniratna-I status.
  - Miniratna companies get **more autonomy to invest, raise capital, and make quick decisions.** This boosts efficiency, competitiveness, and global reach.

Classification of CPSESs

Category	Launch	Criteria	Examples
Maharatna	**Maharatna Scheme** was introduced for CPSEs in May, 2010, in order to **empower mega CPSEs to expand their operations and emerge as global giants.**	➢ Having **Navratna status.** ➢ Listed on Indian stock exchange with minimum prescribed public shareholding under **Securities and Exchange Board of India (SEBI)** regulations. ➢ An **average annual turnover of more than Rs. 25,000 crore** during the last 3 years. ➢ An average annual **net worth of more than Rs. 15,000 crore** during the last 3 years. ➢ An average **annual net profit after tax of more than Rs. 5,000 crore** during the last 3 years. ➢ Should have **significant global presence/ international operations.**	Bharat Heavy Electricals Limited, Bharat Petroleum Corporation Limited, Coal India Limited, GAIL (India) Limited, etc.
Navratna	**Navratna Scheme** was introduced in 1997 in order to identify CPSEs that enjoy comparative advantages in their respective sectors and **to support them in their drive to become global players.**	➢ The **Miniratna Category - I and Schedule 'A' CPSES, which have obtained 'excellent' or 'very good' rating** under the Memorandum of Understanding system in three of the last five years, and have composite score of 60 or above in the **six selected performance parameters,** namely,	Bharat Electronics Limited, Hindustan Aeronautics Limited, etc.

		❍ Net profit to net worth. ❍ Manpower cost to total cost of production/ services. ❍ Profit before depreciation, interest and taxes to capital employed. Profit before interest and taxes to turnover. ❍ Earning per share. ❍ Inter-sectoral performance.	
Miniratna	**Miniratna scheme** was introduced in 1997 in pursuance of the policy objective **to make the public sector more efficient and competitive** and to grant enhanced autonomy and delegation of powers to the profit-making public sector enterprises.	➢ **Miniratna Category-I:** The CPSEs which have **made profit in the last three years continuously,** pre-tax profit is Rs.30 crores or more in at least one of the three years and have a positive net worth are eligible to be considered for grant of Miniratna-I status. ➢ **Miniratna Category-II:** The CPSEs which have **made profit for the last three years continuously and have a positive net worth** are eligible to be considered for grant of Miniratna-II status. ➢ Miniratna CPSEs **should have not defaulted in the repayment of loans/interest payment on any loans** due to the Government. ➢ Miniratna CPSEs **shall not depend upon budgetary support or Government guarantees.**	➢ **Category-I:** Airports Authority of India, Antrix Corporation Limited, etc. ➢ **Category-II:** Artificial Limbs Manufacturing Corporation of India, Bharat Pumps & Compressors Limited, etc.

Read more: Seven New Defence Public Sector Units (DPSUs)

India's First Indigenous Polar Research Vessel

Garden Reach Shipbuilders and Engineers Limited (GRSE), a Government of India undertaking, has signed an MoU with Norway's Kongsberg firm to develop India's **first indigenously built Polar Research Vessel (PRV).**

- A PRV is a ship that supports research in the polar regions (around the North and South Poles) and ocean areas, tailored to the needs of the National Centre for Polar and Ocean Research.
- PRV will support India's **polar and ocean research missions**, strengthening its existing three research stations: **Bharati** and **Maitri** in **Antarctica**, and **Himadri** in the **Arctic**.
  - The vessel will be equipped with **advanced scientific instruments** to explore marine ecosystems and **deep-sea biodiversity** in polar and southern ocean realms.
- The project will reinforce India's commitment to MAHASAGAR (Mutual and Holistic Advancement for Security Across the Regions).
  - Under Sagarmala 2.0, India aims to become a **global maritime leader** by bridging infrastructure gaps and **enhancing shipbuilding, repair, and recycling.**
- The collaboration with Norway also aligns with India's 'Make in India' and Atmanirbhar Bharat goals by boosting **indigenous shipbuilding capability**.

Read more: India's Maiden Winter Arctic Research

New Caledonia

France's recent effort to establish a new political agreement for New Caledonia has been **unsuccessful,** increasing uncertainty about the **territory's future**. This follows years of unrest and three **referendums** held between 2018 and 2021, in which **independence was rejected.**

New Caledonia

- **Geography:** It is a **French overseas territory** in the **southwestern Pacific Ocean,** about **1,500 km east of Australia.**
  - It includes **Grande Terre** (with capital **Nouméa**), the **Loyalty Islands** (Ouvéa, Lifou, Tiga, Maré), **Belep archipelago, Isle of Pines**, and **remote islands**.

- **Historical Background:** Inhabited **originally by Kanaks (**indigenous Melanesian inhabitants of New Caledonia**)**, it was **seized by France in 1853.** Kanaks gained **French citizenship** post-**World War II**, but 1960s migration reduced their majority, sparking independence movements.
  - The **Matignon Agreements (1988)** and **Nouméa Accord (1998)** promised 3 independence referendums. All votes **favoured France**, though the 2021 referendum was boycotted by pro-independence groups.
- **Rivers & Climate:** The longest river is the **Diahot (100 km)**. It has a **subtropical climate,** the east coast receives significantly more rainfall than the west coast.
- **Biodiversity:** Home to Amborella trichopoda, a **rare plant species** and **endemic birds** like the **kagu**.
  - Its **lagoons** have been a **UNESCO World Heritage site** since 2008.

Overseas Territory:

- It refers to a **region or land** that is **geographically separated from a country's mainland** but **remains under its sovereignty and administration.**

Read More: Referendum in New Caledonia

Trojan Horse Styled Drone Attack

Ukraine launched a covert **Trojan Horse-** styled **drone strike targeting Russia air bases** using **FPV (First Person View) drones** hidden in **mobile wooden cabins** transported by trucks.

- FPV drones are **remotely operated unmanned aerial vehicles (UAVs)** equipped with a front-facing camera that transmits **live video feed** to the operator, giving a "pilot's-eye view."

FPV DRONES

Ukraine Defence Ministry

- FPV drones are equipped with cameras which allow the operator, sitting in a control room far away, to see what is in front of the drones.
- These drones are inexpensive, with the total cost of one drone (including its payload) as little as $500, according to a *Reuters* report.
- Because they are so small, they are also hard to detect, and take down using conventional air defence systems.
- This makes them potent weapons, capable of inflicting significant damage, especially when deployed in numbers, at a relatively low cost.

Trojan Horse

- The term **Trojan Horse** has significance both in **mythology (Greek) and cybersecurity.**
  - In mythology, **it represents deception— a concealed threat presented as a gift.**
  - In **cybersecurity**, a **Trojan Horse (or Trojan)** is a type of **malware** that **appears legitimate but secretly provides unauthorized access** to systems once installed.
    - It often uses **social engineering** to trick users into downloading or opening it, mirroring the ancient tale's deceptive tactic.
- In **military and geopolitics**, a **Trojan Horse** refers to **covert tactics,** where **weapons, agents, or technology are concealed** within harmless-looking objects to **infiltrate or harm an enemy.**

Cyberattack

- **About:** A **cyberattack** is a **malicious and deliberate attempt** by an individual or organization to **breach the information system** of another individual or organization.
- **Types:**

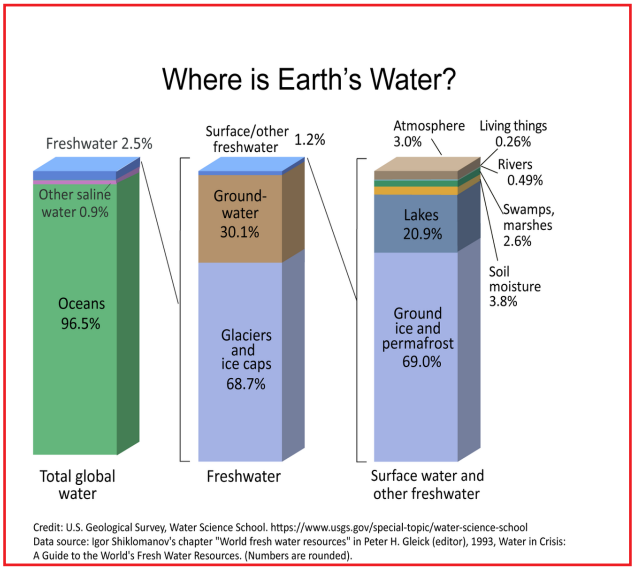
Read More: Cyber Fraud, UAVs in Modern Warfare

International Conference on Glacier's Preservation

Tajikistan hosted the 1st **UN International Conference on Glaciers' Preservation** in **Dushanbe (Tajikistan)** in collaboration with **UNESCO** and **World Meteorological Organisation (WMO)**, leading to the adoption of the **Dushanbe Glaciers Declaration**.

- **About Glaciers: Glaciers** are **slow-moving ice masses** formed from **compacted snow** over centuries.
  - They mainly exist in **polar regions** (Greenland, Canadian Arctic, Antarctica) due to **low solar insolation**, while **tropical glaciers** occur at **high altitudes** near the **Equator**, like in the **Andes**.

- **Importance of Glaciers:**
  - **Freshwater:** Only **3%** of Earth's water is **freshwater,** and glaciers hold about **70%** of the world's freshwater supply.
  - **River Systems: The** Hindu Kush Himalayas (HKH) are referred as **"Water Tower of Asia"** and contribute approximately 40% of the **Indus River system's water flow.**
  - **Climate Archives:** Glaciers **preserve climate records** dating back up to **800,000 years**, which help scientists study historical warming and cooling patterns.
  - **Monsoon Influence:** The **temperature difference** between the **Himalayan glaciers and the Indian Ocean** plays a key role in driving the South West monsoon **winds.**
- **Glacier Retreat:** Nepal lost Langtang's Yala Glacier, while **Venezuela** became the 2nd country after **Slovenia** to lose **all its glaciers.**
- **Initiatives Taken:**
  - **India:** National Mission for Sustaining the Himalayan Ecosystem (NMSHE), **Centre for Cryosphere and Climate Change Studies,** Glacial Lake Outburst Flood (GLOF) risk mapping.
  - **Global:** International Year of Glaciers Preservation (2025), Decade of Action for Cryospheric Sciences (2025–2034), International Centre for Integrated Mountain Development (ICIMOD).



Read More: 2025 as International Year of Glaciers' Preservation

India to Study Life Sustainability in Space under BioE3 Mission

The **Union Minister of State for Science & Technology** announced that **India will conduct its first biological experiments** aboard the International Space Station (ISS) to explore the **sustainability of human life in space.**

- Led by ISRO in partnership with the **Department of Biotechnology (DBT)**, these experiments will be **part of the upcoming ISS mission, AXIOM-4** under the BioE3 (Biotechnology for Economy, Environment & Employment) policy.
- Axiom Mission 4 is a private spaceflight to the ISS, operated by the US-based company **Axiom Space**.
  - Scheduled for launch in **June 2025**, the mission will also carry **2 Indian astronauts** from ISRO to the ISS.

Experiments Proposed in Space under BioE3 Mission:

- **Edible Microalgae in Space:** This experiment will check **how microgravity affects the growth of edible microalgae,** which are rich in **proteins, fats**, and useful compounds.
  - These algae can be used as **food in space** and also help **clean the air** by taking in CO_2 and giving out O_2.
- **Spirulina and Cyanobacteria:** This study will test how cyanobacteria like Spirulina **grow in space using two types of nutrients**- **urea** and **nitrate**.
  - It will help scientists understand **how to recycle waste (like carbon and nitrogen) from humans** to support life in space.
  - **Spirulina,** which is a **protein-rich, antioxidant-packed blue-green algae,** is also being tested as a **"superfood"**.

BioE3 Policy (2024)

- BioE3 Policy promotes **high-performance biomanufacturing** to support a circular bioeconomy and India's Net Zero goals.

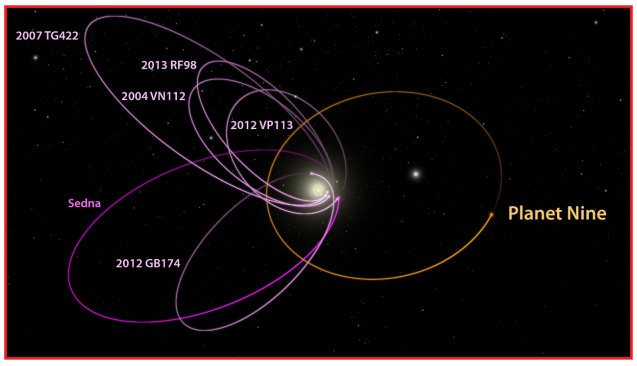
- It focuses on **innovation, Bio-AI hubs, skilled workforce development**, and **sustainable biotech solutions.**

Read More: BioE3 Policy and Biotechnology in India

New Dwarf Planet and Planet Nine

During the ongoing search for the **hypothetical Planet Nine** at the **outer edge of the** solar system, astronomers have discovered a new **distant** dwarf planet named **2017 OF201**, shedding light on the **unexplored regions beyond Neptune**.

- **About 2017 OF201: 2017 OF201** is a **700 km-wide dwarf planet** with a **25,000-year orbit** that extends **1,600 times the Earth-Sun distance**, reaching far into the Oort cloud (outermost boundary of the Sun's gravitational influence)**.**
  - Its orbit **differs from the clustered patterns** of other **trans-Neptunian objects (TNOs)**, leading some scientists to propose the **gravitational influence of Planet Nine** or consider **alternative explanations** for these orbital behaviors.
- **Significance:** This discovery suggests the existence of **hundreds of similar icy bodies** in the Kuiper Belt beyond Neptune.
  - The Kuiper Belt is a **vast, doughnut-shaped** region of **icy bodies and dwarf planets** orbiting the Sun beyond Neptune. It is often called the **"outer solar system's asteroid belt".**



- **About Planet Nine:** The **Planet Nine hypothesis** suggests a **large, undiscovered planet** beyond Neptune causing unusual **gravitational effects** on distant **TNOs**.
  - This theory is based on the **clustered orbits** of extreme TNOs like **Sedna** and **2012 VP113**, indicating an **unseen gravitational influence**.
- **About Dwarf Planet:** A **dwarf planet** is a **celestial body** that **orbits the Sun**, is **nearly round** due to its own gravity, has **not cleared its orbital path**, and is **not a satellite (i.e., not a moon).**
  - Unlike planets, **dwarf planets** do **not clear their orbits** and often share them with **asteroids** or **Kuiper Belt objects.**

Read More: Dwarf Planet Ceres

2025 Osaka World Expo

India has made a cultural statement at the **2025 Osaka World Expo,** embracing its **civilisational ethos and soft power** by blending ancient wisdom with modern innovation under the theme of **compassion and inclusivity.**

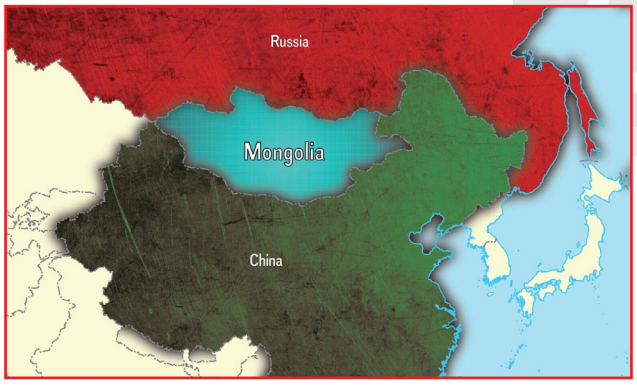
- **Osaka World Expo 2025:** Held in Japan under the theme "Designing Future Society for Our Lives", the Osaka Expo serves as a "Living Lab" to co-create innovative solutions for global challenges using shared knowledge and cutting-edge technologies, aligned with the Sustainable Development Goals (SDGs).
- **India's Pavilion:** It was curated by the Indira Gandhi National Centre for the Arts (IGNCA) under the Ministry of Culture, positioning itself as a modern **"sutradhar" (narrator) of India's civilisational story.**
- **Key Elements of the Pavilion:** The pavilion's central motif is the 'Bodhisattva Padmapani' from Ajanta Caves, symbolizing compassion and knowledge in Mahayana Buddhism.
  - The Lotus Courtyard showcases **Bodhisattva forms** and frescoes from the 2,000-year-old UNESCO-listed Ajanta Caves.
  - The **'Oneness Lounge'** features a reimagined Bodhi Tree, representing spiritual unity. The **'Wall of Life'** promotes internal wellness through Yoga and Ayurveda.
  - The pavilion reflects India's use of soft power in foreign policy, combining spiritual, cultural, and scientific achievements to foster global partnerships.

Read more: Delivering Soft Power

17th Nomadic Elephant Exercise

The **17th edition** of the **India-Mongolia** Joint Military **Exercise Nomadic Elephant** is scheduled to be held in **Ulaanbaatar, Mongolia**.

- It is a **bilateral annual military exercise** held alternately in India and Mongolia since **2006.** The last edition was held in **Umroi, Meghalaya (July 2024)**.
- Its aim is to enhance **interoperability** for **semi-conventional operations** in **semi-urban/ mountainous terrain**, under the **United Nations Mandate – Chapter VII.**
  - **UN Chapter VII** authorizes **military/non-military actions** (sanctions, blockades, troop deployment) for **international peace enforcement**.
- India also actively takes part in Exercise **Khaan Quest**, a **multinational peacekeeping exercise** organized by Mongolia.



Read More: Multilateral Exercise Khaan Quest 2024

Birch Glacier

A **catastrophic collapse** of Switzerland's **Birch Glacier** triggered a **massive landslide**, burying an **Alpine village** under **ice, rock, and mud.**

- The glacier's instability was due to a **cascading disaster** i.e., combining heavy debris load, **permafrost thawing**, and **rising temperatures.**
  - The collapse impacted the **River Lonza**, raising risks of flooding due to debris.
- **About Birch Glacier:** The **Birch Glacier** is situated in the **Swiss Alps** in the **Lotschental Valley**.
  - It lies near the **Bietschhorn mountain**, a prominent peak in the region.
  - **Swiss glaciers have already lost nearly 40% of their volume since 2000**; record temperatures in 2022–2023 caused a 10% loss alone.
- **About Swiss Alps: Swiss Alps** lie to the south of the **Swiss Plateau**. It has historically served as a **natural barrier** between **northern and southern Europe**, with **mountain passes** providing vital **trade routes**, especially linking **Italy** to the north.
- **About Alps:** The **Alps** are Europe's highest and most extensive **mountain range (fold mountain)**, spanning **eight countries** i.e., **France**, **Switzerland**, **Italy**, **Liechtenstein**, **Austria**, **Germany**, **Slovenia**, and **Monaco**. The **highest peak** is **Mont Blanc**, on the **France-Italy border.**

Read More: Changing Landscape of Alps: Europe

Liberalised Remittance Scheme

India's outward remittances under the **Liberalised Remittance Scheme (LRS)** fell to **USD 29.56 billion in FY2025 (USD 31.74 billion in FY2024)**, indicating **reduced overseas spending** by resident Indians due to **global uncertainties, sluggish domestic income growth**, and **high base effect** from the previous year.

- **The primary cause** is the **16% drop in student remittances**, falling from **USD 3.48 billion to USD 2.92 billion**, due to **stricter student visa regulations** in countries like the **US, UK, and Canada.**

Liberalised Remittance Scheme (LRS):

- **About:** The LRS, introduced by the **Reserve Bank of India (RBI)** in **2004** with an initial limit of **USD 25,000 per financial year**, now permits resident individuals to remit up to **USD 250,000** annually for approved **current or capital account transactions.**
- **Eligibility:** Only **resident individuals** are eligible. The scheme **excludes corporates, Hindu Undivided Family (HUFs), partnership firms, and trusts.**

- **Prohibited Transactions:** Purchase of **lottery tickets, banned magazines,** transactions with **FATF non-compliant countries,** gifting in foreign currency to another Indian resident's foreign account etc.
- **No foreign currency accounts in India**: Residents **cannot** open **foreign currency** accounts **within India** under LRS.

Read More: Liberalised Remittance Scheme

Mosura Fentoni

Mosura fentoni, a Cambrian-era (541 million to 485.4 million years ago) sea creature from **Canada's Burgess Shale, challenges** existing views on **arthropod evolution** with its advanced **swimming** and **respiratory adaptations**, hinting at the rise of modern **insects** and **crustaceans.**

- **About:** Mosura fentoni is a **small** but **highly specialized radiodont**, a primitive relative of **modern arthropods (insects, crabs, spiders)**.
- **Anatomy:** It had a **segmented body** with a **short neck**, **six paddle-shaped flaps** for swimming, and a **posterotrunk** featuring **gills** for respiration.
  - The **posterotrunk functioned as a specialized respiratory tagma**, resembling the **oxygen-collecting tails of horseshoe crabs.**
  - It shows early **segment specialization**, crucial for **arthropod diversity.**

- **Radiodonts:** Radiodonts were **ancient marine predators** from the **Cambrian period** and are **early relatives** of **arthropods** like **insects and crabs,** though **not their direct ancestors.**
- **Burgess Shale** is a renowned **fossil site** in Canada dating to the Cambrian period.

Read More: Pliosaur Skull