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Polity and Governance

Highlights

- *Press Council of India*
- *Revisiting NGO Regulatory Framework*
- *Overseas Citizenship of India Scheme*
- *Northeast India From Frontier to Frontrunner*
- *PM E-DRIVE Scheme*
- *SC Calls For Permanent Consumer Redressal Bodies*
- *Mizoram: India's First State to Attain Full Functional Literacy*
- *Annual Review of State Laws 2024*
- *Tackling Online Abuse*
- *Presidential Reference under Article 143*
- *Compulsory Inclusion of NOTA in Elections*

Press Council of India

Why in News?

Lok Sabha Speaker has nominated **3** Members of Parliament (MP) to the Press Council of India (PCI).

What are the Key Facts Related to the Press Council of India (PCI)?

- **About: PCI** is a statutory, quasi-judicial **autonomous body**, initially established on **16th November 1966** by Parliament under the Indian Press Council Act, 1965 based on the recommendations of the **First Press Commission.**
  - It was formally established in 1966, with **Justice J.R. Mudholkar,** then a judge of the Supreme Court, as chairman.
  - It was abolished during **Emergency (1975)** and later reconstituted in **1979** under the Press Council Act, 1978.
- **Objective:** To **preserve the freedom of the press** and maintain and improve the standards of newspapers and news agencies in India.
- **Composition & Term:** It consists of **29 members** (1 Chairman + 28 Members)**. Chairman** is conventionally a **retired Supreme Court judge** nominated by a committee comprising the **Vice President (Rajya Sabha Chairman), Lok Sabha Speaker**, and a **member elected by the PCI.**
  - The **28 other members** include **13 working journalists**, **6 newspaper owners/managers**, **1 news agency representative**, **5 MPs** and **3 experts** nominated by **UGC**, Bar Council, and **Sahitya Akademi**.
  - The **term** of the **Chairman and other members** is **3 years.**
- **Funding:** Through **grants-in-aid from the Central Government** (appropriated by Parliament) and **graded fees collected from newspapers**, and other receipts.
- **Functions:** It **frames a media code of conduct**, ensures **ethical and accurate reporting**, fosters public responsibility, monitors restrictions on news flow, and oversees foreign media assistance.
  - It also studies foreign newspapers' impact, **addresses media ownership concerns**, promotes **industry cooperation**, and **advises the Central Government** to uphold press freedom and accountability.
- **Powers:** It can **censure, warn, or admonish newspapers**, agencies, editors, or journalists for **violations of journalistic ethics** after a fair inquiry.
  - It may also **require publication of inquiry details in public interest**.
  - Its **decisions are final** and **cannot be appealed before a court of law.**
  - It has **power of civil courts**, summoning witnesses, examining documents, and conducting inquiries deemed judicial proceedings.
  - However, **it cannot compel disclosure of journalistic sources.**
- **Limitations:** The **powers of the PCI are limited** as it **cannot enforce penalties for guideline violations**

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and only oversees print media such as newspapers and magazines.

- It has **no authority over electronic media,** including radio, television, and internet platforms.

Note:

- National Press Day is celebrated annually on **16th November** to commemorate the founding of the **Press Council of India (PCI).**

Revisiting NGO Regulatory Framework

Why in News?

The **Ministry of Home Affairs (MHA)** has recently announced **new amendments to the Foreign Contribution (Regulation) Rules, 2011 affecting the manner in which non-governmental organizations (NGOs)** operating in India can receive and utilize foreign funds.

What are the Key Provisions of the New FCRA Rules for NGOs?

- **Ban on Publication Activities:** NGOs **engaged in publication-related activities** must now obtain a certificate from the **Registrar of Newspapers for India** ensuring compliance with **media regulations** and declaring they are **"Not a Newspaper."**
- **Financial Disclosure:** NGOs applying for **FCRA, 2010** registration must submit **financial statements and audit reports for the past three years**, including **assets and liabilities**, **income and expenditure**, and **receipts and payments** accounts.
- **FATF Compliance:** NGOs must declare adherence to Financial Action Task Force **(FATF) Good Practice Guidelines**, aligning with India's efforts to strengthen oversight of **foreign financial flows**.
- **New Requirements for Receiving Foreign Contributions:** NGOs must submit a **commitment letter** from foreign donors matching the donation with a detailed **project report** with expense breakdown.
- **Obligations for Previously Registered NGOs:** If an NGO's FCRA registration has **expired or been cancelled**, it must submit an **affidavit** detailing the **receipt and utilisation** of previously received foreign contributions.

Foreign Contribution Regulation Act

- **About:** FCRA is a law enacted in **1976 during the Emergency** to regulate the **acceptance and use of foreign contributions** by **individuals, associations, and organizations** in India.
  - It ensures that such contributions are used only for **legitimate purposes and do not compromise national interest**.
- **Amendments:** The original **FCRA Act, 1976** was repealed and **replaced** by new legislation in **2010** to modernise the law governing foreign contributions.
  - In **2020, additional amendments** were introduced to **tighten the regulations** and **improve oversight** of foreign donations.

What are NGOs and How are they Regulated in India?

- **About:** A NGO is a **non-profit entity** that **functions independently** of the government, focusing on **humanitarian, social, or developmental objectives.**
- **Formation of NGOs in India:**
  - **Societies:** Registered under the **Societies Registration Act, 1860**.
  - **Trusts:** Private Trusts are registered under the **Indian Trusts Act, 1882** which is a central legislation.
    - Public Trusts are registered under **respective state laws**.
  - **Charitable Companies:** Registered as non-profit companies under Section 8 of the Companies Act, 2013.
- **Foreign Contribution Regulation:** NGOs that receive foreign contributions or donations must obtain **prior registration or permission** under the Foreign Contribution (Regulation) Act (FCRA), 2010, administered by the **Ministry of Home Affairs (MHA).**
  - The FCRA, 2010 governs the **receipt and utilization** of foreign funds by **individuals, associations, or companies,** including NGOs.
    - Its core objective is to **prevent** foreign contributions from **undermining India's sovereignty, integrity, security, economic or scientific interests**, public order, or leading to any offence or harm to individuals.
- **Key Amendments in the Foreign Contribution (Regulation) Amendment Act, 2020:**
  - Mandated that all foreign contributions be received only through a designated "FCRA Account" at a specified bank **(State Bank of India, Delhi).**

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- **Prohibited transfer of foreign contributions** from the recipient to any other person or entity.
- Reduced the permissible limit for **administrative expenses** from 50% to 20% of the foreign funds received.
- Empowered the Central Government to:
  - **Restrict or suspend** further receipt or utilization of foreign contributions following a **summary inquiry.**
  - **Require Aadhaar or other identification documents** for office bearers, directors, and key functionaries of NGOs.

What are the Key Roles and Responsibilities of NGOs?

- **Governance:** NGOs strengthen democracy by promoting **transparency** and **accountability**, exemplified by the Association for Democratic Reforms (ADR) whose **PILs** led to mandatory disclosure of candidates' criminal records, education, and assets.
  - They also supplement government schemes like the **Akshaya Patra Foundation**, supporting the PM POSHAN initiative against malnutrition.

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- **Social Reforms:** NGOs protect **human rights** (e.g., **Bachpan Bachao Andolan**), empower women (**SEWA**), represent marginalized groups like **PLWHA** (People living with HIV/AIDS) and **LGBTQIA+** communities (**Naz Foundation**), and alleviate poverty (**Goonj**).
- **Disaster Relief and Rehabilitation:** NGOs like **SEEDS India** play a critical role in providing **immediate aid and long-term rehabilitation** support during natural disasters and emergencies.
- **Environmental Conservation:** Many NGOs like **World Wide Fund for Nature (WWF)** work to protect **natural resources, promote sustainable development, and combat climate change** through awareness campaigns and grassroots initiatives.

What are the Key Challenges Related to NGOs in India?

- **Regulatory Restrictions: Strict FCRA regulations** have resulted in the **cancellation of NGO licenses**, restricting access to **foreign donations**, while **domestic CSR funds** are largely directed toward **corporate-linked NGOs**, leaving **smaller organizations underfunded and struggling**.
- **Trust Deficits: NGOs face accusations of "anti-national" activities**, leading to **audits, raids, and the closure** of NGOs. E.g., **Greenpeace India** was banned for allegedly **obstructing economic development** through its **campaigns against coal mining and nuclear power projects.**
- **Lack of Transparency:** Some NGOs have been criticized for **poor accountability** and **failure to comply with reporting requirements**, leading to increased **government scrutiny** and a loss of **public trust**.
  - In several instances, NGOs that did not file their **annual returns** faced **cancellation of their FCRA registration.**

Overseas Citizenship of India Scheme

Why in News?

The **Indian government** has **cancelled** the **Overseas Citizen of India (OCI)** registration of a **British academic**, citing her involvement in **anti-India activities** through her **writings**, **speeches**, and **journalistic work** at **international forums.**

What is the Overseas Citizenship of India Scheme?

About

- The **OCI scheme** was introduced through an **amendment** to the **Citizenship Act, 1955** in the year **2005,** that allows **foreign citizens of Indian origin** to **live**, **work**, and **travel freely** in India **without dual citizenship**.
  - In **2015**, the **Persons of Indian Origin (PIOs)** and **OCI categories** were merged to **streamline** documentation and benefits**.**
  - As of **31st January, 2022**, **40.68 lakh OCI cards** had been issued.

Eligibility

- **Eligibility:** Foreign nationals (except **Pakistan and Bangladesh**) who:
  - Were **citizens of India** on or after **26th January, 1950**.
  - Were **eligible to become Indian citizens** on **26th January, 1950.**
  - Belonging to a territory that became part of India after **15th August, 1947**.
  - Are **children, grandchildren, or great-grandchildren** of such persons
  - **Minor children** of such individuals or those with one Indian parent.
  - **Spousal Eligibility:** A **foreign-origin spouse** of an Indian citizen or an existing OCI cardholder is **eligible** if the **marriage** has been **registered** and has subsisted for **at least two years** preceding the application.

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- **Ineligible Categories:** Individuals who are currently **serving or retired** from **foreign military services** are **not entitled** to receive OCI status.

Benefits

- **Visa Privileges:** Entitled to a multiple-entry, multi-purpose lifelong visa for visiting India without the need for repeated applications.
- **Parity with NRIs:** Enjoys **parity with** Non-Resident Indians (NRIs) in various **financial**, **economic**, and **educational** fields, but **cannot acquire agricultural/plantation land** in India or adopt **Indian children internationally.**
- **Pathway to Citizenship:** Eligible for **Indian citizenship** under **Section 5(1)(g)** of the **Citizenship Act, 1955** after **5 years as an OCI cardholder**, with at least **1 year of residence in India** during the last 5 years.
- **Pension Scheme Access:** Eligible to join the National Pension System (NPS) on equal terms with **NRIs** for long-term retirement planning.

Limitations and Restrictions of OCI Cardholders

- **No Dual Citizenship: OCI** should **not be interpreted** as **dual citizenship**, as **India does not permit dual nationality** under its legal framework.
- **Political Rights:** OCI cardholders are **not entitled to voting rights** in Indian elections.
  - OCI holders are **barred from holding constitutional posts** such as **President (Art. 58)**, **Vice-President (Art. 66)**, **Supreme Court Judge (Art. 124)**, and **High Court Judge (Art. 217).**
- **Legislative Ineligibility:** OCIs are **not eligible** to become members of the **Lok Sabha**, **Rajya Sabha**, or **State Legislatures.**
- **Public Employment Restrictions:** Under **Article 16 (equality of opportunity in public employment)**, **OCI cardholders** cannot hold **regular government jobs**, except where **specifically permitted** by the **Central Government** via special notifications.
- **Activity-Based Restrictions: Special permission** is mandatory for **research**, **mountaineering**, **missionary/journalistic work**, and travel to **Protected or Restricted Areas**.

Cancellations

- **Cancellations are governed by Section 7D of the Citizenship Act, 1955.**
  - Grounds for **cancellation** include **fraud or misrepresentation in application**, **anti-India acts**, and **violations** of conditions under the **Citizenship Act, 1955.**

Person of Indian Origin (PIO)

- A **Person of Indian Origin (PIO)** is a **foreign citizen** (excluding nationals of **Pakistan**, **Afghanistan**, **Bangladesh**, **China**, **Iran**, **Bhutan**, **Sri Lanka**, and **Nepal**) who:
  - once held an **Indian passport**
  - has **ancestry** (parents/grandparents/great-grandparents) born and permanently residing in **India** as defined in **Government of India Act, 1935** and other territories that became part of India thereafter or,
  - is a **spouse** of an **Indian citizen** or **PIO.**

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PIO VS OCI

A PERSON OF INDIAN ORIGIN (PIO)

- Means a **foreign citizen** (except a national of Pakistan, Afghanistan Bangladesh, China, Iran, Bhutan, Sri Lanka and Nepal)
- **A foreign citizen whose one of the parents/ grandparents/ great grandparents** was **born** and a **permanent resident** of India
- Who is a **spouse** of a citizen of India or a PIO

BENEFITS

1. PIO card holders **do not require a visa to visit India** for a period of 15 years from the date of issue of the PIO card.
2. They are **exempted from registration at FRRO/ FRO** if their **stay does not exceeds 180 days**, In case if the stay exceeds 180 days, they shall have to register with FRRO/ FRO within the next 30 days
3. They **enjoy parity with NRIs in economic, financial** and **educational benefits**
4. All **future benefits** that **would be exempted to NRIs** would also be available to the **PIO card holders**

OVERSEAS CITIZEN OF INDIA (OCI)

A **foreign national**, who was **eligible** to **become citizen of India** on **26.01.1950** or was a citizen of India on or at anytime after **26.01.1950** or belonged to a territory that became part of India after **15.08.1947** is **eligible for registration as Overseas Citizen of India** (OCI). Minor children of such person are also eligible for OCI. However, if the applicant had ever been a citizen of Pakistan or Bangladesh, he/she will not be eligible for OCI.

BENEFITS

OCIs are **entitled to a multipurpose, multiple entry, lifelong visa** allowing them to visit India at any time, for any length of time and for any purpose

- **Exempted from police reporting** for any length of stay in the country
- **Have also been granted all rights in the economic, financial and education fields in parity with NRIs** except, the right to acquisition of agricultural or plantation properties

Northeast India From Frontier to Frontrunner

Why in News?

The Prime Minister at the **"Rising Northeast: The Investor Summit"** declared that the Northeast Region (NER) of India is no longer a "frontier" but a "frontrunner" in India's growth journey. Highlighting its strategic importance and economic potential, he emphasized the region's evolving role as a gateway for trade with Southeast Asia.

Note: The **Ministry of Development of North Eastern Region (DoNER)** is organizing the **Rising Northeast Summit to unlock the investment and trade potential of the NER of India.**

- The initiative aims to project NER as a dynamic economic corridor with strategic connectivity to ASEAN and BBN (Bangladesh, Bhutan, Nepal) countries.
- Rising North East Investors Summit 2025 drew an **unprecedented Rs 4.3 lakh crore in investment interest,** setting the stage for the NER to become India's next economic powerhouse.

How is the Northeast Emerging as a 'Frontrunner' for India's Growth?

- **Bio-economy and Natural Resources:** The NER, referred to as **'Ashta Lakshmis',** highlights the region's vast potential in renewable energy, agro-based industries, eco-tourism, and strategic manufacturing.
  - The region's biodiversity is being leveraged for **green growth**. Assam is a major hub for tea production, while Arunachal Pradesh leads in **bamboo-based industries**.
  - The region holds **40% of India's hydropower potential (~62,000 MW)**, yet only 6.9% is harnessed. Solar potential is estimated at **57,360 MW with only 17% installed capacity.**
- **Tourism and Human Capital Strengths:** The Northeast's natural beauty and vibrant culture make it a perfect destination for eco-friendly and sustainable tourism.

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- Key attractions include Meghalaya's living root bridges, Sikkim's eco-tourism, Kaziranga National Park, and Kamakhya Temple in Assam, and Manipur's Loktak Lake. These sites boost local livelihoods and promote eco-friendly travel.
- Additionally, high literacy rates among NER (~80%) and a high proportion of English-speaking populations contribute to the region's workforce readiness.
- States like Manipur and Mizoram are national leaders in sports like football, boxing, and weightlifting.

- **Gateway to Southeast Asia:** The Northeast is central to India's Act East Policy, serving as a bridge to ASEAN and Indo-Pacific markets.
  - Projects like the India-Myanmar-Thailand Trilateral Highway **and the Kaladan Multi-Modal Transit Transport Project** are enhancing regional connectivity.
  - Development of ports like **Sittwe in Myanmar and Chittagong in Bangladesh** will connect Northeast India to key Indian Ocean shipping routes, boosting India-ASEAN trade from **USD 125 billion to USD 200 billion over the next decade.**
- **Critical to National Security**: NER shares 5,484 km of borders with five countries **(Myanmar, Bangladesh, Nepal, Bhutan, Tibet/China)** plays a frontline role in national security.
  - The Siliguri Corridor (Chicken's Neck), is a vital **strategic and economic lifeline,** connecting Northeast India to the rest of the country and serving as a key transit hub for trade with Bhutan, Bangladesh, and Nepal.
- **Infrastructure Push:** The central government has significantly increased funding with 10% of the Ministry of Road Transport and Highways' budget allocated to the Northeast.
  - The North East Special Infrastructure Development Scheme (NESIDS), launched in 2018, has a USD 1 billion allocation for roads, water, and power.
  - Projects like the Sela Tunnel **in Arunachal Pradesh** are improving all-weather connectivity to remote areas. New initiatives like the upcoming Semiconductor **Plant in Assam** mark a shift toward high-tech industrial investment.

What are the Challenges in Making Northeast India a Frontrunner?

- **Historical Insurgency and Security Issues:** Decades of insurgent movements (Naga, Mizo, ULFA, NDFB) created instability, affecting investment and development.
  - **Cross-border infiltration from Bangladesh and Myanmar** has posed persistent security challenges.
  - The 2023 ethnic violence in Manipur between Meiteis and Kukis highlights deep-rooted tensions and fragile inter-community relations and **identity politics prevent** a unified development approach.
  - Fear of "outsiders" and demands for perpetuation of Inner Line Permits (ILP) create resistance to migration, investment, and entrepreneurship.
- **Agricultural Distress and Employment Gaps:** Although agriculture is the mainstay, the region faces serious issues like low productivity and lack of modern techniques.
  - **Middlemen dominance is prevalent in NER,** which traps farmers in debt and low income. Even cooperatives struggle to compete against these intermediaries.
  - Despite high literacy and English proficiency, a lack of industry-ready skills affects employability.
- **Low Tourist Footfall**: The region's huge tourism potential is underutilized due to limited connectivity, safety concerns, and weak marketing.
- **Dependency on Central Funds**: Many NER states heavily rely on Union government support, indicating low fiscal self-reliance.
- **Limited Industrial Base**: Industrial development is uneven, and **high logistics costs discourage** large-scale investments.
- **Geographical Constraints and Environmental Vulnerability**: Difficult terrain, frequent floods, and landslides hamper infrastructure development and connectivity.
  - The Northeast faces **frequent floods, landslides, and erratic rainfall** that harm infrastructure and livelihoods.
  - The **2022 Assam floods**, which displaced millions, highlight the region's ecological vulnerability, while climate change threatens agriculture and water security.

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- **Drug Trafficking:** Proximity to the **Golden Triangle** makes the NER vulnerable to narcotics trafficking, especially in Manipur and Mizoram.
  - Rise in drug addiction among youth, overburdening healthcare systems and worsening the social fabric.

What are Initiatives Related to Development of the Northeast Region?

- PM's Development Initiative for North East Region (PM-DevINE)
- North East Industrial Development Scheme (NEIDS)
- Mission Organic Value Chain Development for North Eastern Region (MOVCDNER)
- Uttar Poorva Transformative Industrialization Scheme (UNNATI)
- National Bamboo Mission
- Bharatmala Pariyojana

PM E-DRIVE Scheme

Why in News?

In a major step toward sustainable clean urban mobility, the **Ministry of Heavy Industries (MHI)** will deploy electric buses under the PM Electric Drive Revolution in Innovative Vehicle Enhancement (PM E-DRIVE) Scheme, with a focus on major cities like Bengaluru, Hyderabad, Delhi, and Ahmedabad.

What is the PM E-DRIVE Scheme?

- **About:** The PM E-DRIVE is a flagship scheme approved by Cabinet with Rs. 10,900 crore outlay**; effective from October 2024, to March 2026**.
  - The primary objective of this initiative is to accelerate the adoption of electric vehicles (EVs) across various categories, build robust **EV charging infrastructure**, and develop a strong domestic EV manufacturing ecosystem aligned with the vision of Aatmanirbhar Bharat.
  - PM E-DRIVE Scheme builds on earlier programs like Faster Adoption and Manufacturing of Hybrid and Electric Vehicles in India (FAME-I) (2015), FAME-II (2019) to accelerate adoption of electric two- and three-wheelers.
- **Key Components:**
  - **Target beneficiaries:** Commercial and private **electric two-wheelers and three-wheelers** with advanced batteries, **e-ambulances, e-trucks** with scrapping certificates, and **electric buses for public transport.**
  - **Demand incentives:** The PM E-DRIVE Scheme offers **demand incentives** on EVs capped at **15% of the ex-factory price** or a fixed per-vehicle limit, whichever is lower.
    - **Only EVs priced below a specified threshold are eligible.**
  - **Charging Infrastructure Development:** The scheme aims to **set up 72,300 public fast chargers in key cities** and select highways to boost EV adoption.
    - **Bharat Heavy Electricals Ltd (BHEL)**, a public sector unit under the MHI, will develop a digital **"Super App" for EV users** to book slots, make payments, and check charger availability.
  - **Testing Agencies Upgradation:** The scheme allocates Rs 780 crore to upgrade testing agencies under MHI with advanced technologies to support green mobility.
- **Eligibility:** Only EVs with advanced batteries qualify for incentives. Government-purchased EVs are excluded to prevent internal fund transfers.
  - Vehicles must be registered under Central Motor Vehicles Rules (CMVR), 1989.
  - e-2Ws and e-3Ws must be manufactured and registered within scheme validity (Oct 2024 – Mar 2026).
- **Surge in Sale of e-vehicles:** The MHI is driving electric vehicle adoption to **support India's net-zero 2070 goal.** Under schemes like Electric Mobility Promotion Scheme (EMPS) and PM E-DRIVE, e-2W sales surged to around **5.7 lakh units in 2024-25**.

SC Calls For Permanent Consumer Redressal Bodies

Why in News?

The Supreme Court (SC) of India urged the Centre to set up permanent adjudicatory bodies for consumer disputes, emphasizing that consumer rights are

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constitutionally protected and need a stable framework due to gaps in implementing the **Consumer Protection Act, (CPA) 1986.**

What is the Need for a Permanent Consumer Dispute Resolution Body?

- **Judicial Endorsement of Permanency:** The SC noted that temporary appointments in consumer forums lead to delays and inefficiency.
  - It recommended setting up **permanent bodies with full-time presiding officers and staff,** possibly headed by sitting judges. This would ensure continuity, professionalism, and better justice delivery.
- **Systemic Pendency and Delays:** As per the **National Consumer Disputes Redressal Commission (NCDRC)**, over **5.5 lakh cases** were pending across forums as of 2023.
  - Consumer Councils suffer from vacant posts, and poor digital infrastructure, resulting in delays in cases. Adequate staffing and infrastructure are essential for timely consumer redressal.
- **Rise in Digital and Cross-Border Consumer Disputes:** India's **e-commerce sector** is projected to reach USD 200 billion by 2026, and **quick commerce** is expected to grow to **USD 9.9 billion by 2029,** with a corresponding surge in complaints related to **online fraud, data privacy, service deficiencies, and cross-border consumer disputes.**
  - Existing consumer forums often lack technical expertise and jurisdictional clarity to tackle new challenges. A redressal body with judges and experts in modern and digital laws is essential for better consumer protection.

What are the Constitutional and Legal Foundations of Consumer Protection in India?

- **Consumer's Right:** It is the right to **receive accurate information about the quality, quantity, potency, purity, price, and standards of goods or services** and to be protected from unfair practices.
- **Constitutional Backing for Consumer Protection:** Consumer protection in India is rooted in the **Directive Principles of State Policy (DPSP) under Part IV of the Constitution,** which provides a moral and constitutional foundation for welfare-oriented legislation.
  - **Article 37:** It states that while DPSP are not legally enforceable, they are fundamental to governance and must guide the State in lawmaking.
    - The **Consumer Protection Act, 2019,** and earlier versions are rooted in these principles.
  - **Article 47:** The State shall endeavour to improve nutrition, living standards, and public health, and prohibit the consumption of harmful intoxicants except for medicinal purposes.
- **Legislations for Protection of Consumer Rights:**
  - **Consumer Protection Act (CPA), 1986:** It was enacted to protect consumers in India and resolve disputes through **Consumer Councils at national, state, and district levels.** It addressed issues like adulterated products, and misleading advertisements.
    - The Consumer Protection Act, 1986, grants six key rights to consumers: the **Right to Safety, Right to be Informed, Right to Choose, Right to be Heard, Right to Seek Redressal, and Right to Consumer Education.**
    - The 1986 Act had limitations, **lacking provisions for online transactions, product liability, unfair contracts, and alternative dispute resolution.**
  - **Consumer Protection Act, 2019:** It replaced the 1986 Act to address modern consumer challenges. It expanded coverage to all merchandise and enterprise transactions, added new unfair trade practices, included product liability, and regulated unfair contracts.
    - The Act introduced rules for **direct selling and e-commerce,** mandated mediation cells at all levels, and established the **Central Consumer Protection Authority (CCPA)** to enforce consumer rights.
  - **Bureau of Indian Standards (BIS) Act, 2016: Bureau of Indian Standards (BIS),** India's national standards body, ensures product safety and quality.
    - The Act mandates certification for critical products and allows product recalls and penalties for non-compliance.

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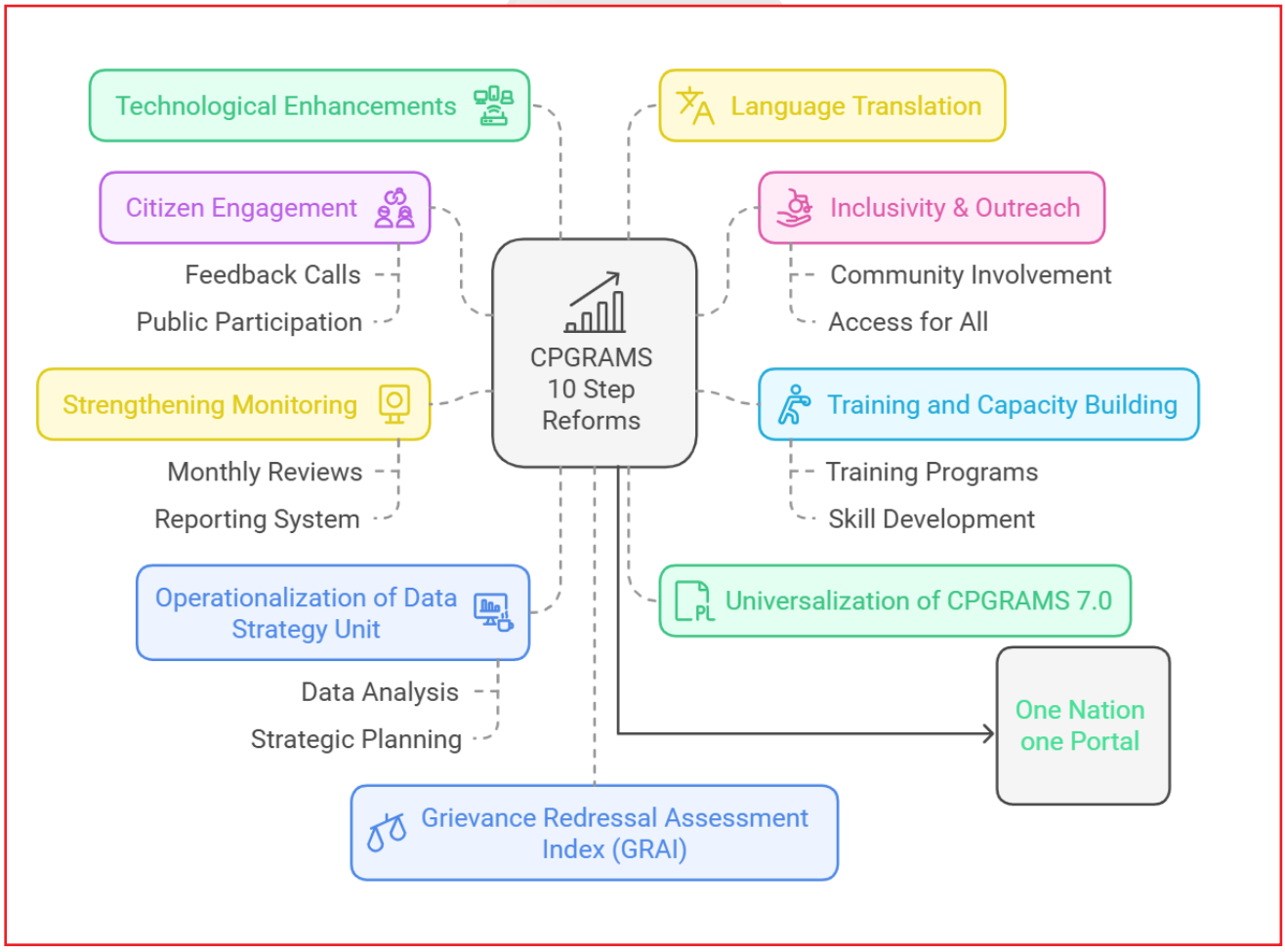
- **Legal Metrology Act, 2009:** Ensures accuracy in **weights and measurements used in commercial transactions**. It promotes fair trade practices, protects consumers, and improves market transparency.

➢ **Other Initiatives:**

- **DoCA:** The Department of Consumer Affairs (DoCA) issued **2023 Guidelines on Dark Patterns** to curb deceptive online tactics like drip pricing and false urgency.
  - DoCA runs the **"Jago Grahak Jago"** campaign nationwide and introduced the mascot **"Jagriti"** to empower consumers.
  - The **E-Jagriti portal,** launched by DoCA, is an integrated AI-powered platform streamlining consumer case filing, monitoring, and virtual hearings across all consumer commissions.
  - **E-Dakhil Portal** allows online consumer complaint filing.
- **National Consumer Helpline (NCH):** Handles consumer complaints in 17 languages via toll-free number 1915.
- **National Consumer Day**: India celebrates **National Consumer Day** on 24th December, commemorating the CPA, 1986.
- **GRAI:** The **Grievance Redressal Assessment Index (GRAI),** evaluates central ministries based on efficiency, feedback, domain, and commitment using **Centralized Public Grievance Redressal and Management System (CPGRAMS)** data for standardized grievance handling analysis.



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Consumer Rights Under CPA, 1986	
Consumer Right	**Meaning**
Right to Safety	➢ It ensures protection against hazardous goods and services.
Right to be Informed	➢ Consumers must get accurate product details to avoid unfair trade and pressure selling.
Right to Choose	➢ It ensures access to quality goods at fair prices, especially in competitive markets with diverse choices.
Right to be Heard	➢ It ensures that consumer interests are considered in appropriate forums.
Right to Seek Redressal	➢ It ensures the consumers to report issues and get help from consumer bodies.
Right to Consumer Education	➢ It is the right to lifelong consumer education, crucial to reduce exploitation, especially in rural areas.

Mizoram: India's First State to Attain Full Functional Literacy

Why in News?

Mizoram has exceeded the **95% literacy rate benchmark,** achieving **98.20% literacy** as per the **PLFS Survey 2023-24,** meeting the Ministry of Education's criteria for full functional literacy under the **ULLAS (Understanding of Lifelong Learning for All in Society) programme.**

➢ Prior to this, **Ladakh** was the **first UT to be declared fully functionally literate.**

Note: Functional literacy refers to an individual's capability to use **reading, writing, and numerical skills** in **everyday tasks** that contribute to personal growth and community participation.

What is ULLAS- Nav Bharat Saksharta Karyakram or New India Literacy Programme (NILP)?

➢ **About: ULLAS** is a **centrally sponsored scheme** being implemented from **2022 to 2027**.
  - It is designed to **empower adults aged 15 years and above** who **missed out on formal schooling**, in line with the vision of the **National Education Policy (NEP) 2020.**

➢ **Implementation Mechanism:** Encouraging **volunteerism** to foster **social responsibility and a sense of duty, or 'Kartavya Bodh'.**

➢ **Key Components:** Foundational Literacy and Numeracy, Critical Life Skills, Basic Education, Vocational Skills, and Continuing Education.

➢ **Key Features:** Provides access to educational resources via the **DIKSHA platform** and **ULLAS mobile/web portal**, supporting content in regional languages.
  - Includes the **Foundational Literacy and Numeracy Assessment Test (FLNAT)**, conducted biannually or as required at local schools for assessment and certification.

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Other Government Initiatives Related to Education

- National Programme on Technology Enhanced Learning.
- Sarva Shiksha Abhiyan
- PRAGYATA
- Mid Day Meal Scheme
- Beti Bachao Beti Padhao
- PM SHRI Schools

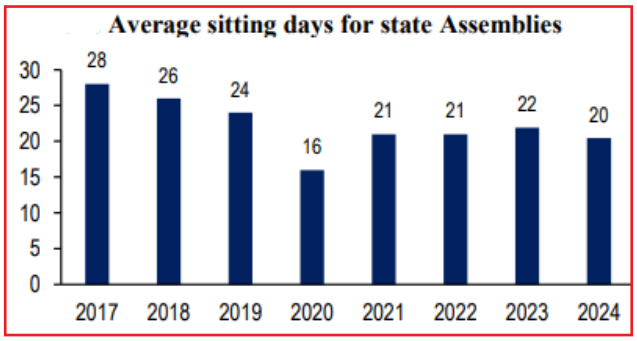
Annual Review of State Laws 2024

Why in News?

A report titled ***Annual Review of State Laws 2024*** by PRS Legislative Research, a non-partisan think tank, reveals that **India's state legislative assemblies are functioning with alarmingly low productivity.**

What is the Status of Legislative Assemblies in India?

- **Low Number of Sitting Days**: In 2024, state legislative assemblies met for an average of **only 20 days,** down from 28 days in 2017 and 16 days in 2020 (pandemic year).
  - Some states have minimum sitting day requirements under their **Rules of Procedure.** None of the states met their own targets in any year from 2017 to 2024.



- **Variation Across States:** Odisha (42 days) and Kerala (38 days) had the highest sittings in 2024. Larger states like Uttar Pradesh and Madhya Pradesh met for just 16 days.
- **Vacancy in the Deputy Speaker's Post:** Despite Article 178 of the Constitution mandating the election of a Deputy Speaker in every State Legislative Assembly, 8 state assemblies currently do not have one. Notably, Jharkhand has been without a Deputy Speaker for over 20 years.
  - The Lok Sabha also lacks a Deputy Speaker from June 2019.
- **Bills Passed Without Deliberation:** States passed an average of 17 bills in 2024.
  - Over 51% of bills were passed on the same day they were introduced, often **without debate.** The average duration of each sitting was **only 5 hours.**
  - The quality of legislative debate is deteriorating, with most bills receiving minimal discussion. This trend of **rushed law-making reflects a weakening of deliberative democracy.**
- **Focus Areas of Legislation:** About half of the laws were related to **education, finance, and local governance.**
  - Uttarakhand became the **first state to pass a** Uniform Civil Code**,** while West Bengal introduced the Aparajita Act, mandating stricter penalties for rape.
  - Madhya Pradesh brought in legislation to regulate private school fees, and
  - Maharashtra granted **10% reservation to Marathas in education and government jobs.**

What Key Facts About State Legislature in India?

- **Constitutional Provisions:** The structure, powers, and functioning of State Legislatures are governed by **Part VI of the Constitution, from Articles 168 to 212.**
  - These articles lay down the organization, composition, duration, powers, and procedures of state legislative bodies.
- **Composition:** Article 168 of the Constitution of India provides for the constitution of State Legislatures.
  - There are two types of state legislatures: **unicameral and bicameral.**
    - A unicameral legislature comprises the Governor **and the Legislative Assembly (Vidhan Sabha),** which is the more common structure in most states. In contrast, a **bicameral legislature** includes the Governor, the **Legislative Assembly, and the Legislative Council (Vidhan Parishad).**

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- **Sessions of State Legislature:**
  - **Summoning:** The Governor summons the State Legislature to meet from time to time. The maximum gap between **two sessions cannot exceed six months**. A session consists of multiple sittings.
    - **Article 174** mandates state legislatures to meet at least twice a year, with no more than six months between sessions.
  - **Adjournment:** It is the temporary suspension of House proceedings for hours, days, or weeks.
  - **Prorogation:** After the session ends, the Governor officially ends the session by issuing a notice. This is called prorogation, it can be issued even when the House is in session.
    - **Adjournment ends a meeting, but prorogation ends the session.**
  - **Dissolution:** Applies only to the Legislative Assembly, not the Legislative Council (permanent house).
    - Dissolution ends the **full term of the Assembly,** leading to fresh elections.
  - **Quorum:** It is the minimum number of members needed to start a meeting. It is either **10 members or 1/10th of total members,** whichever is greater.
    - If quorum is not met, the House is adjourned or suspended by the Presiding Officer.
  - **Voting in the House:** Decisions are by majority of members present and voting. The Presiding Officer votes only in the case of a tie (casting vote).
    - Special majority is required only in specified cases (e.g., removal of Speaker/Chairman).
  - **Language in State Legislature:** Business is conducted in the official state language, Hindi, or English. Members can speak in their mother tongue with permission.
    - States may discontinue English after 15 years (most states), 25 years (Himachal Pradesh, Manipur, Meghalaya, Tripura), and 40 years (Arunachal Pradesh, Goa, Mizoram)
  - **Rights of Ministers and Advocate General:** Ministers and the Advocate General can speak and take part in discussions in either House or its committees, even if not members. However, they cannot vote unless they are elected members.

What are the Implications of Low Productivity of State Legislative Assemblies?

- **Weakening of Democratic Deliberation:** Legislative assemblies are meant to deliberate on laws, budgets, and public issues, but low productivity undermines this role.
  - In 2021, Nearly 44% of the 583 Bills tabled in state Assemblies were passed within a day after they were introduced, leaving no scope for informed debate, resulting in laws that lack depth, foresight, and public engagement.
- **Decline in Legislative Oversight:** Assemblies often fail to hold the executive accountable through instruments like Question Hour, motions, and debates.
  - Fewer sittings mean reduced scrutiny of **public expenditure, departmental performance, and policy impact**. This undermines **accountability and transparency**, key pillars of democratic governance.
- **Poor Quality of Legislation:** In most states, bills are passed without referral to the Public **Accounts Committee (PAC)**. Ad hoc Select Committees are rare; hence, sectoral expertise and stakeholder consultations are missing.
  - Consequently, laws are often poorly drafted, hastily passed, and vulnerable to legal and implementation challenges.
- **Delayed or Arbitrary Governance:** Many Bills require the Governor's assent to become law. However delays in granting assent by Governors are frequent and often unexplained. This raises serious concerns about arbitrary governance and a lack of accountability in the legislative process.
  - Additionally, over-reliance on **ordinances** (Kerala issued 144 in 2021) circumvents legislative scrutiny.
- **Overlooking Local Aspirations:** State legislatures' inaction on key areas like education, health, land, agriculture, and policing delays essential reforms, depriving people of timely grassroots solutions.

Tackling Online Abuse

Why in News?

Following the Pahalgam terror attack, a **peace appeal** by a victim resulted in her **severe trolling**. Similarly, India's Foreign Secretary **faced abusive remarks** after announcing India-Pakistan ceasefire.

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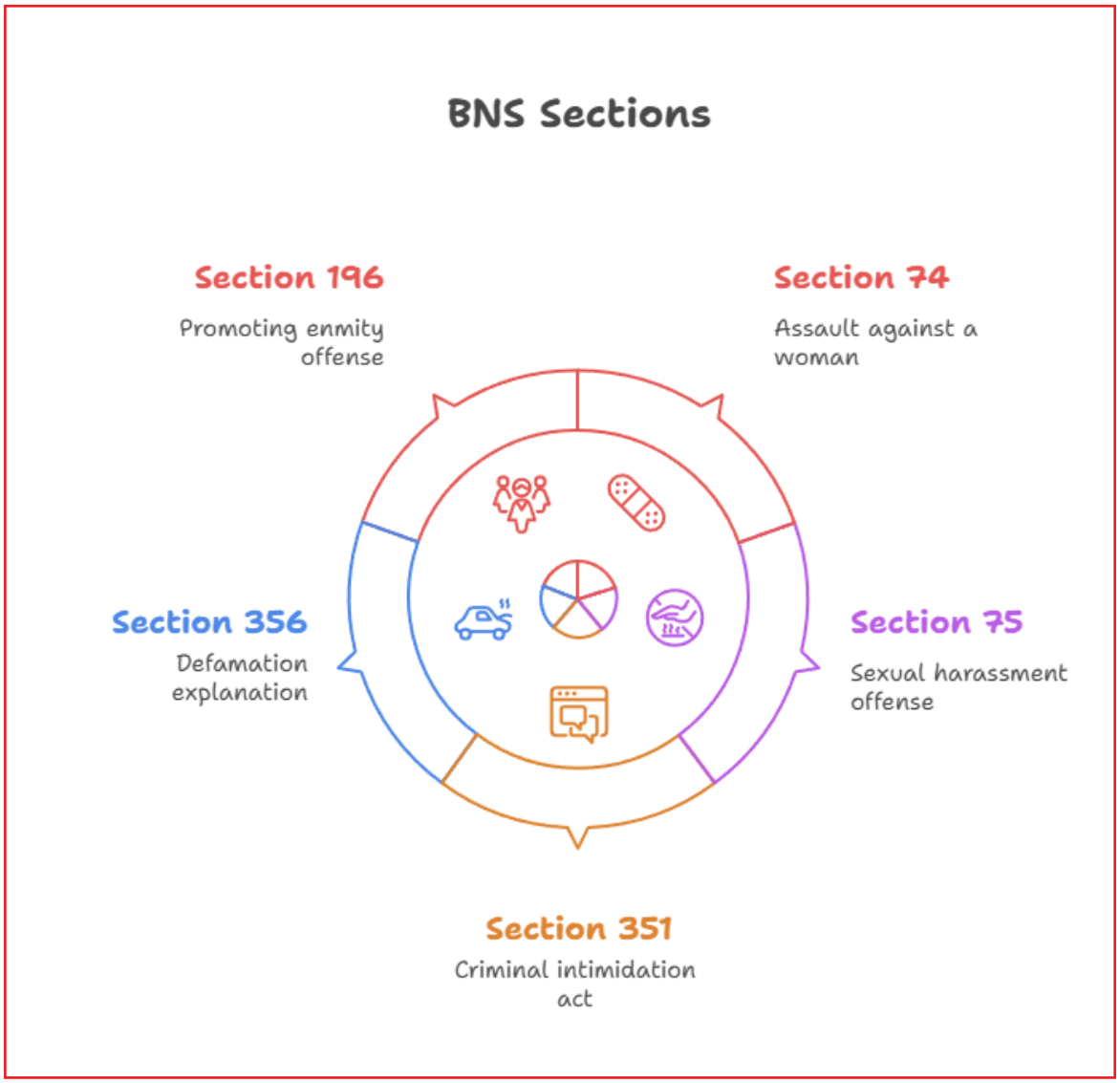
- It revealed India's growing crisis of cyber harassment **and weak regulation** highlighting the need for **legal reform, platform accountability, and victim protection**.

What is Online Abuse?

- **About: Online abuse** (cyber abuse, **digital abuse**, or **internet harassment**) refers to any form of **harmful, threatening, or demeaning behavior** that occurs through digital platforms.
  - It can be directed at **individuals, groups, or entire communities** and can take many forms, from **verbal attacks** and **harassment** to the **non-consensual sharing of private information** or images.



- **Types:**
  - **Cyberbullying:** It is the use of digital platforms to **harass, threaten, or humiliate** someone repeatedly, causing **emotional harm**.
  - **Cyberstalking:** It is **persistent, unwanted online monitoring** and harassment that causes fear, involving **repeated messages, tracking activity,** or using spyware and fake accounts.

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- **Trolling:** Trolling is deliberately posting **offensive or provocative messages** online to upset people or disrupt conversations.
- **Doxxing:** Doxxing, short for **"dropping dox" (documents),** is the **unauthorized** online sharing of **private information**, like addresses or phone numbers, often to harass or threaten victims.
- **Revenge Porn:** It is sharing or threatening to **share intimate images without consent,** violating privacy and often used for blackmail or humiliation.
- **Catfishing:** It is creating a **fake online identity** to deceive others, often for emotional, financial, or **malicious purposes.**

➢ **Status of Cyberbullying in India:** India has the **highest** cyberbullying **rate globally,** with over **85%** of children reported it.
- About **46%** reported **bullying strangers** (vs. 17% globally) and **48% bullied someone they know** (vs. 21%).
- Top forms include spreading **false rumours (39%), exclusion from chats/groups (35%),** and **name-calling (34%).**

➢ **Legal Provisions to Tackle Online Abuse:**
- **Bharatiya Nyaya Sanhita (BNS), 2023:**
- **Information Technology (IT) Act, 2000:**
  - **Section 66C:** Identity theft
  - **Section 66D:** Impersonation fraud
  - **Section 67:** Publishing or transmitting obscene material electronically.
- **Digital Personal Data Protection Act (DPDP), 2023:** DPDP provides for penalties for failing to **prevent data breaches** leading to harassment
- **IT (Intermediary Guidelines & Digital Media Ethics Code) Rules, 2021:** Social media platforms must disclose the **first originator** of content for investigations into offences like **rape, death threats, sexually explicit material**, and content threatening **state harmony** or **international relations.**

➢ **Judicial Stand:**
- ***Shaviya Sharma vs Squint Neon & Ors Case, 2024*:** The **Delhi** High Court ordered **removal of tweets** exposing a woman's **personal details**, recognizing **doxxing's serious privacy and safety risks** despite lacking specific legal status.
- ***Shreya Singhal v. Union of India Case, 2015*:** The Supreme Court **struck down** Section 66A of the IT Act**,** which **criminalized "offensive" online speech**, as unconstitutional—protecting free speech while emphasizing that **reasonable restrictions** must be narrowly defined.
- ***KS Puttaswamy v. Union of India Case, 2017*:** The Supreme Court declared **privacy a fundamental right (article 21)**, laying the foundation to **protect personal data** and prevent **unauthorized online disclosure or doxxing**.

What are the Challenges in Tackling Online Abuse in India?

➢ **No Dedicated Law**: India currently **lacks a specific law** that directly addresses **online hate speech and trolling** comprehensively.
- Existing laws don't cover ongoing online abuse unless it's **obscene, threatening, or fraudulent**.
- Stalking laws are **gender-specific (limited to men targeting women)** and target individual intent, **overlooking mass online harassment**.

➢ **Content Moderation Challenges:** Social media companies are taking significantly fewer **content screening** and **proactive measures** to address **hate speech** in **India** compared to the **US** and **EU.**
- Platforms like **Telegram** are facing legal action for **permitting criminal activity,** while **profit motives** have weakened moderation, allowing **hate speech to spread.**

➢ **Ambiguity over "Publicly Available Data"**: The **Digital Personal Data Protection (DPDP) Act, 2023** exempts **"publicly available"** personal data but **lacks a clear definition**, creating ambiguity.
- This gap may enable cybercrimes like **doxxing,** as **fragmented data** from various platforms can be **easily combined for harassment or intimidation**.

➢ **Enforcement Gaps**: There is **lax implementation** of the **IT Rules** in **India**, leading to weak enforcement of **digital safety** and **accountability standards.**
- Victims, especially of **gendered abuse**, face disbelief and **victim-blaming,** discouraging legal recourse.

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Presidential Reference under Article 143

Why in News?

The President has invoked **Article 143** of the Indian Constitution to refer a set of **14 constitutional questions** to the **Supreme Court** (SC) for its advisory opinion.

- This move comes after a recent **SC judgement** which invoked **Article 142** in the ***State of Tamil Nadu v The Governor of Tamil Nadu Case, 2023*** **imposing timelines on Governors** and the **President** to act on Bills passed by state legislatures.

President's 14 Questions to Supreme Court

• What are the constitutional options before a Governor when a Bill is presented to him under Article 200? • Is the Governor bound by the aid & advice of the Council of Ministers while exercising the options available with him when a Bill is presented before him? • Is the Governor's constitutional discretion under Article 200 justiciable? • Is Article 361 an absolute bar to the judicial review in relation to the actions of a Governor under Article 200? • In the absence of a constitutionally prescribed time limit, and the manner of exercise of powers by the Governor, can timelines be imposed and the manner of exercise be prescribed through judicial orders? • Is the exercise of constitutional discretion by the President under Article 201 justiciable? • In the absence of a constitutionally	• Are the decisions of the Governor and the President under Article 200 and Article 201, respectively, justiciable at a stage anterior into the law coming into force? Is it permissible for the Courts to undertake judicial adjudication over the contents of a Bill, in any manner, before it becomes law? • Can the exercise of constitutional powers and the orders of/by the President /Governor be substituted in any manner under Article 142? • Is a law made by the State legislature a law in force without the assent of the Governor granted under Article 200? • In view of the provision to Article 145(3), is it not mandatory for any bench of the Supreme Court to first decide whether the question before it involves substantial questions of law as to the interpretation of the Constitution and to refer it to a bench of minimum five Judges?
prescribed timeline and the manner of exercise of powers by the President, can timelines be imposed and the manner of exercise be prescribed through judicial orders? • Is the President required to seek advice of the Supreme Court by way of a reference under Article 143 and take the opinion of the Supreme Court when the Governor reserves a Bill for the President's assent or otherwise?	• Are the powers of the Supreme Court under Article 142 limited to matters of procedural law or Article 142 extends to issuing directions which are contrary to or inconsistent with existing substantive or procedural provisions of the Constitution or law in force? • Does the Constitution bar any other jurisdiction of the Supreme Court to resolve disputes between the Union Government and the State Governments except by way of a suit under Article 131 of the Constitution of India?

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- The reference raises **14 key questions**, primarily concerning Articles 200 and 201, and the **justiciability of executive actions** before a Bill becomes law.

What is Article 143 of the Indian Constitution?

- **About: Article 143 (Advisory jurisdiction)** empowers the **President of India** to seek the **SC's advisory opinion** on any **question of law or fact** that is of **public importance** and is likely to arise or has already arisen.
  - This provision establishes the **SC's advisory jurisdiction**, which is **exclusive to the President.**
- **Types of Questions Referred:**
  - **Article 143 (1):** The President may refer any question of **law or fact of public importance** which has **arisen or which is likely to arise.** Here, the Supreme Court **may tender or may refuse to tender** its opinion to the president.
    - E.g., the Supreme court has **declined to provide** its opinion in **1993** with respect to the Ram Janmabhoomi case.
  - **Article 143(2):** It allows the President to refer **disputes** arising from out of any **pre-constitution treaty, agreement, covenant, sanad** or other similar instruments. The SC **must tender its opinion** to the President.
- **Nature of the Advise:** In both the cases, the opinion expressed by the **SC** is **only advisory and not a judicial pronouncement.**
  - Hence, it is **not binding** on the president; she **may follow or may not follow** the opinion.
  - However, it facilitates the government to have an **authoritative legal opinion** on a matter to be decided by it.

What are the Key Facts Regarding the Presidential Reference?

- **About:** Article 143 gives the President **the power to refer any question of law or fact of public importance** to the SC for its opinion, based on the Union Council of Ministers' **advice.**
  - Article 145 (3) requires such references to be heard by a **bench of at least five judges**.
- **Historical Context:** Advisory jurisdiction under Article 143 is derived from the **Government of India Act, 1935**, which allowed the **Governor-General** to refer legal questions to the **federal court.**
  - The Canadian Constitution allows its **SC** to provide legal opinions, while the **US SC** refrains from giving advisory opinions to uphold a strict **separation of powers.**
- **Past Instances of Such References:** There have been about **15 Presidential references** to the Supreme Court under Article 143. Some landmark cases include:
  - **Delhi Laws Act case (1951):** Defined the scope of **delegated legislation**.
  - **Kerala Education Bill (1958):** Harmonized Fundamental Rights with Directive Principles.
  - **Berubari case (1960):** Held that **territorial cession** requires a constitutional amendment.
  - **Keshav Singh case (1965):** Explained **legislative privileges**.
  - **Presidential poll case (1974):** Allowed elections **despite vacancies** in State Assemblies.
  - **Third Judges case (1998):** Established the Collegium system for judicial appointments.
- **Key Issues in Current Reference:** It raises issues about whether **courts can impose timelines** on President and Governors **not explicitly stated** in the Constitution (especially under **Articles 200 and 201**).
  - It also questions the **extent of the SC's power under Article 142** (complete justice provision).
- **Overturning Power through Advisory Reference:** According to the **1991 Cauvery Water Disputes Tribunal opinion**, Article 143 cannot be used to **review or reverse settled judicial decisions.**
  - However, the government may still seek **review or curative petitions** to challenge the ***State of Tamil Nadu v The Governor of Tamil Nadu Case, 2023*** verdict.

What is the Significance of the Presidential Reference System?

- **Constitutional Interpretation of Roles:** It can clarify the **constitutional roles of the President and Governors**, and whether **non-time-bound executive actions** can be subject to **judicial oversight.**

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- **Reaffirmation of Democratic Structure:** It offers a chance to **redefine the balance of power** among the **legislature, executive, and judiciary**, ensuring **constitutional order** by preventing overreach.
- **Procedural Certainty:** It **resolves procedural uncertainties** in intergovernmental matters and may help establish **guidelines for resolving institutional friction** in future.
- **Smooth Federal Functioning:** In a **federal structure**, this reference helps **define jurisdictional boundaries** between the Centre and States, promoting **cooperative federalism** through a clear **legal framework for dispute resolution.**

What are Challenges in the Presidential Reference System?

- **Non-Binding Nature:** The Supreme Court's Article 143 advice is **not legally binding** on the President, limiting its practical impact and raising doubts about its effectiveness.
- **Potential Politicization:** The **reference** risks **political misuse**, especially when the ruling government seeks to **validate controversial decisions** or **question adverse rulings**, potentially compromising **judicial neutrality** and involving the **judiciary** in **political disputes.**
- **Unclear Threshold for Referral:** The **Constitution** lacks a clear **standard** for what constitutes a "**question of law or fact of public importance**," granting the **executive** broad **discretion** that may result in **references** lacking true **constitutional significance.**
- **Institutional Tensions**: **Referrals** often arise from **judiciary-executive disputes**, potentially heightening **tensions** and undermining **judicial independence**, especially when revisiting **settled judgments.**
- **No Timeline for Response:** The **Constitution** sets no **time limit** for the **Supreme Court** to respond to a **reference**, risking delays in urgent matters that hinder **governance** and **policy clarity.**

Compulsory Inclusion of NOTA in Elections

Why in News?

A Public Interest Litigation (PIL) has been filed in the **Supreme Court (SC)** by **Vidhi Centre for Legal Policy,** seeking to make the NOTA (None of the Above) option **compulsory in all elections,** including those with a single candidate.

What is NOTA in Indian Elections?

- **About:** The **"None of the Above" (NOTA)** option on Electronic Voting Machines (EVMs) allows voters to **reject all candidates** while **maintaining the secrecy of their choice.**
- **Significance:** Technically, **it does not affect the outcome of the election**, i.e., the candidate with the highest votes still wins, even if NOTA gets more votes than any candidate, but it **empowers citizens to express dissatisfaction** with contesting candidates **without abstaining from the electoral process.**
- **Background:** In its **170th Report in 1999,** the Law Commission explored the concept of **negative voting** alongside a **50%+1 voting system,** but practical challenges led to **no final recommendations** on the matter.
  - In **2004,** the **People's Union for Civil Liberties (PUCL)** petitioned the Supreme Court, citing that the Conduct of Elections Rules, 1961 violated **voter secrecy** by **recording identities of non-voters.**
    - In September 2013, the Supreme Court directed the Election Commission of India (ECI) to introduce the **NOTA option** following its directive given in the ***PUCL vs Union of India Case Case, 2013***, as a measure to **safeguard the secrecy of voters' choices.**
- **Usage of NOTA:** NOTA is available in **Lok Sabha**, **State Assembly**, and **Panchayat elections**, though **not uniformly** across all local bodies.
  - It was **first used** in the **2013 Assembly elections in Chhattisgarh, Mizoram, Rajasthan, Delhi,** and Madhya Pradesh.
  - In Lok Sabha elections, **NOTA vote share has remained low** but consistent, **1.1% in 2014, 1.04% in 2019,** and similar in **2024.**
    - In State elections, **Bihar** recorded the highest at **2.48% (2015)**, followed by **Gujarat at 1.8% (2017)**.

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Rule 49-O vs. NOTA

- **Rule 49-O of the Conduct of Elections Rules, 1961,** allowed **voters to formally abstain from voting** by **informing the presiding officer** at the polling booth.
  - This was **recorded as a "None of the Above"** type option but was **not anonymous,** as the **voter's choice to reject all candidates was noted publicly**, violating the secrecy of the ballot.
- **NOTA option** (since 2013) allows voters to **reject all candidates anonymously** by **pressing a designated button on** Electronic Voting Machines **(EVMs)** which preserves the secrecy of the ballot, empowering voters to **express dissent without fear or exposure.**

What are the Judicial Pronouncements Related to NOTA?

- In ***Lily Thomas v. Speaker, Lok Sabha, 1993*,** the **Supreme Court (SC)** held that the **right to vote includes the right to express one's will either in support or in opposition.**
  - This also implies a **voter's right to remain neutral in an election.**
- In ***People's Union for Civil Liberties v. Union of India, 2013*,** SC directed the **Election Commission** to **include a NOTA button in EVMs.**
  - The Court emphasized that **voter secrecy must be maintained** whether the person **votes for a candidate or opts for NOTA,** thus empowering voters and deepening democratic participation.
- In ***Shailesh Manubhai Parmar v. Election Commission of India, 2018,*** SC ruled that the **NOTA option was unsuitable for Rajya Sabha (Upper House) elections,** as it could distort the electoral process, **promote corruption, and encourage political defections.**
  - Consequently, the Court **removed NOTA from indirect elections**.

International Practices Similar to NOTA

- Several European nations like **Finland, Spain, Sweden, France, Belgium, and Greece** permit voters to cast a vote equivalent to NOTA.
- In the **US**, though there's **no formal NOTA button,** some states allow **write-in votes**, enabling voters to write "None of the Above" or any name to express dissatisfaction.
- Countries such as **Colombia, Ukraine, Brazil, and Bangladesh** also provide a NOTA-like voting option to their citizens.

What are the Arguments Related to Compulsory Inclusion of NOTA in All Elections?

Arguments in Favour of Compulsory NOTA Option

- **Expands Voter Choice:** NOTA empowers **voters to reject all contesting candidates,** allowing them to **express disapproval without abstaining from voting,** enhancing voter autonomy.
- **Upholds Voter Choice in Uncontested Polls:** NOTA ensures voters can express dissent even in **single-candidate elections, preserving democratic choice.**
- **Promotes Political Accountability:** The presence of NOTA encourages political parties to **nominate better, more competent,** and ethical candidates to avoid losing votes.
- **Signals Voter Dissatisfaction:** NOTA vote counts serve as an **important indicator for the EC and parties** about **public discontent,** prompting corrective measures.
  - It can pave the way for **future reforms**, like **mandatory re-election** if NOTA crosses a threshold and **minimum winning thresholds** based on voter turnout and votes polled.

Arguments Against Compulsory Inclusion of NOTA

- **Rare Use, No Electoral Impact:** NOTA has **no effect on election outcomes,** as the candidate with the **highest votes wins regardless of NOTA count**.
  - **Since 1952**, only **9 Lok Sabha candidates have been elected unopposed**, just **6 since 1971**, making rules for such rare scenarios **largely redundant.**
- **Caste-Based Bias:** In reserved constituencies, high NOTA votes sometimes reflect **caste prejudice against certain candidates**, which can distort its intended purpose.
- **Promotes Voter Apathy & Disillusionment:** Mandatory NOTA may lead to **casual rejection of all candidates** without meaningful evaluation, **reducing critical voter engagement.**
  - Additionally, if NOTA secures significant votes but has no electoral consequence, it can **erode public trust in the democratic process** and **legitimacy of the elected government.**
- **Weakens Representative Democracy:** Since NOTA does not affect the mandate, it **may undermine the principle of representative democracy** by not ensuring clear voter endorsement.

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ELECTORAL REFORMS IN INDIA

ELECTORAL REFORMS ARE CHANGES MADE TO IMPROVE THE ELECTION PROCESS AND ENSURE FAIRNESS.

Electoral Reforms Before 1996

- **Model Code of Conduct (1969):** Guidelines to regulate political parties and candidates prior to elections
- **61st Constitutional Amendment Act (1988):** Lowering of the voting age from 21 to 18 years
- **Electronic Voting Machines (EVMs) (1989):** Switched from individual colored ballot boxes to ballot papers, and later to EVMs
- **Booth Capturing (1989):** Provision for adjournment of poll or countermanding of elections in such cases
- **Elector's Photo Identity card (EPIC) (1993):** Electoral roll is the basis to issue EPIC to registered electors
- **ECI- A Multi-member Body (1993):** Election commissioners were appointed in addition to CEC

Electoral Reforms of 1996

- **Time-limit for By-elections:** Elections must occur within 6 months of any vacancy in a legislative house
- **Listing of Names of Candidates:** Contesting candidates categorized into 3 groups for listing
  - Recognised & registered-unrecognised political parties
  - Other (independent)
- **Disqualification for Insulting the National Honour Act, 1971:** Leads to election disqualification for 6 years upon:
  - Insulting the National Flag, Constitution of India or preventing the singing of National Anthem

Electoral Reforms After 1996

- **Vote Through Proxy (2003):** Service voters in Armed Forces & forces under Army Act can vote by proxy
- **Allocation of Time on Electronic Media (2003):** Equitable sharing of time on electronic media during elections to address the public
- **Introduction of Braille Signage Features in EVMs (2004):** To facilitate the visually impaired voters to cast their votes without an attendant

Electoral Reforms Since 2010

- **Voting Rights to Indian Citizens Living Abroad (2010)**
- **Online Enrollment in Electoral Roll (2013)**
- **Introduction of NOTA option (2014)**
- **VVPAT Voter Verified Paper Audit Trail (2013):** Introduction of VVPAT with EVMs to conduct free and fair elections
- **Photos of Candidates on EVMs and Ballot Papers (2015):** To prevent confusion in constituencies with namesake candidates
- **Introduction of Electoral bonds (2017 Budget):** An alternative to cash donations for political parties
  - Declared as unconstitutional by SC (2024)
- **Launch of Electronic EPIC (2021)**
- **Home Voting for People with Disabilities & Those Above 85 years of Age (2024)**

IMPORTANT COMMITTEES/ COMMISSION

Committees/ Commission	Year	Purpose
Tarkunde Committee	1974	By Jaya Prakash Narayan (JP) during the "Total Revolution" movement.
Dinesh Goswami Committee	1990	Electoral Reforms
Vohra Committee	1993	On the Nexus between Crime and Politics
Indrajit Gupta Committee	1998	State Funding of Elections
Second Administrative Reforms Commission of India	2007	Report on Ethics in Governance (Headed by Veerappa Moily)
Tankha Committee (Core Committee)	2010	To look into the whole gamut of the election laws & electoral reforms.

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Economic Scenario

Highlights

- *Strengthening Medium Enterprises as a Catalyst for MSME Growth*
- *Scheme for Special Assistance to States for Capital Investment (SASCI)*
- *Economic Capital Framework and RBI's Dividend Transfer*
- *GeM's 8th Incorporation Day*
- *Gig Economy*

Strengthening Medium Enterprises as a Catalyst for MSME Growth

Why in News?

NITI Aayog has released a report titled '**Designing a Policy for Medium Enterprises**', proposing a dedicated concessional credit scheme and reforms to **boost India's medium-sized enterprises** (that includes enterprises with investment in plant and machinery up to ₹**125 crore** and an annual turnover up to ₹**500 crore**).

- The report can also serve as a **potential blueprint for addressing the challenges faced by small and micro enterprises,** paving the way for a more inclusive and scalable MSME ecosystem.

What are the Key Policy Recommendations of NITI Aayog for Medium Enterprises?

- **Facilitating Financial Access:** Introduce a **dedicated working capital scheme** offering **concessional loans** up to **Rs 25 crore** and a **Medium Enterprise Credit Card** with **pre-approved limits up to Rs 5 crore** for emergency funds.
  - Extend the Non-Performing Asset (NPA) classification period from **90 to 180 days** to **ease liquidity pressures.**
- **Technology Integration & Industry 4.0:** Upgrade existing Technology Centres into **India SME Industry 4.0 Competence Centres** providing **AI, IoT, and automation** support through a **hub-and-spoke model (links a central unit to multiple branches)** to ensure **wider outreach and phased implementation** for smooth adoption.
- **Strengthening R&D & Innovation:** Allocate **25–30% of Government funding** from the **Self-Reliant India Fund** specifically for **medium enterprises' R&D.**
  - Establish a **three-tier governance system** and promote **competition-based funding** aligned with national priorities.
- **Cluster-Based Testing & Quality Certification:** Expand the **MSE-Cluster Development Programme** to medium enterprises by setting up **sector-specific testing facilities** within industrial clusters, **reducing costs and improving export quality** compliance through **public-private partnerships** and digital tools.
- **Customized Skill Development:** Enhance **real-time skill gap mapping** via the **MSME Sampark Portal** and expand the **Entrepreneurship and Skill Development Programme** to include **cluster-specific, technology-linked, and export-oriented training**.
- **Centralized Digital Portal:** Create a **dedicated sub-portal** on the **Udyam** platform **consolidating information on schemes**, compliance, finance, and market access, integrated with AI tools for **eligibility assistance, compliance tracking, and real-time regulatory** and **market updates.**

Note: While **medium enterprises act as catalysts** through higher innovation, investment, and export capacity, it is crucial to strengthen the **entire MSME ecosystem**, including micro and small enterprises—which are vital to inclusive economic growth and rural employment. A **synergistic approach** can amplify sectoral development and resilience.

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What are Micro, Small and Medium Enterprises (MSMEs)?

- **About:** MSMEs are businesses that produce**, process, and preserve goods and commodities.**
- **Classification:** These are **broadly classified into micro, small and medium enterprises based on their investment in plant and machinery** for manufacturing or equipment for service enterprises, as well as their **annual turnover.**

Table 1.1. Classification of the MSME Units

Enterprise	Earlier classification (July 2020)		Revised Classification (April 2025)	
	Investment in plant and machinery	Turnover	Investment in plant and machinery	Turnover
Micro	Not exceeding Rs. 1 crore.	Not exceeding Rs. 5 crores.	Not exceeding Rs. 2.5 crore.	Not exceeding Rs. 10 crore.
Small	Not exceeding Rs. 10 crores.	Not exceeding Rs. 50 crores.	Not exceeding Rs. 25 crores.	Not exceeding Rs. 100 crores.
Medium	Not exceeding Rs 50 crores.	Not exceeding Rs. 250 crores.	Not exceeding Rs 125 crores.	Not exceeding Rs 500 crores.

- **MSME Scenario:** As per Udyam Portal (Feb 2025), India has **5.93 crore MSMEs**, with **micro enterprises forming over 98%**, while **medium enterprises account for just 0.3% (69,300 units)**.
  - Out of 2.95 crore registered MSMEs (as per MSME Annual Report 2023-24), **72% are engaged in the service sector** and remaining **28% in the manufacturing sector.**
- **Significance:**
  - **Contribution to GDP & Employment:** MSMEs currently contribute approximately **29%** to India's GDP, producing **6,000+ diverse products** and **employ over 60%** of India's workforce.
    - MSMEs create **27 crore jobs,** with women comprising **26% of the workforce.**
    - While **micro enterprises generate 89% of MSME jobs**, **medium enterprises contribute 3%**, but with a high **per unit employment of ~89 persons**.
  - **Contribution to Exports:** MSMEs account for **40% of India's exports** despite only **1.36% of registered MSMEs** are **exporters.**
    - Of these, **64% have an export turnover of less than Rs 1 crore.**
  - **Green & Sustainable Growth:** MSMEs lead India's **green industrial push** by adopting **clean energy and circular economy** practices. Schemes like RAMP (with World Bank support) and **Telangana MSME Policy** (Rs 4,000 crore) focus on **sustainable growth and entrepreneurship**.
  - **Leading Digital & Technological Transformation:** MSMEs are rapidly adopting **digital payments, automation, and AI**. Programs like ONDC and the Rs 1 lakh crore interest-free innovation fund support this shift.
    - **72% of MSME transactions are now digital.**

Click Here to Read More: Role of MSMEs in India's Economic Growth

What are the Key Issues Associated with MSMEs in India?

- **Access to Finance:** Despite schemes like **Mudra Yojana** and **PM Vishwakarma**, MSMEs face credit hurdles due to **lack of collateral**, **high interest rates**, and **complex loan procedures**. Many fail to meet formal lender criteria, pushing them toward **unreliable informal credit** sources.
  - **As per SIDBI Report 2025, 17% of surveyed MSMEs did not avail any credit**, while **8% relied on informal sources**, **micro enterprises** being most impacted (12%).

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- **Regulatory and Compliance Burden:** MSMEs struggle with **complex tax structures**, **frequent policy changes**, and **onerous compliance**, lacking manpower and expertise. While **GST** has eased some processes, the regulatory load remains heavy, leading to **penalties and financial stress**.
  - Multiple **overlapping laws across labor, taxation, and environmental regulations** create **bureaucratic roadblocks.**
- **Infrastructure and Logistics Gaps:** Poor **transport**, **warehousing**, and **supply chains** increase costs and delays, especially in **rural areas**, limiting market expansion and customer satisfaction.
  - The **Economic Survey 2022-23** pointed out that **logistics costs in India were in the range of 14-18% of GDP** against the **global benchmark of 8%.**
- **Technology Adoption Lag:** Most MSMEs lack access to **AI, IoT, automation** due to **financial and technical constraints**, reducing **competitiveness and innovation**. **Digital payment integration** is weak, and **cybersecurity** remains inadequate, increasing operational risks.
  - Of 64 million MSMEs, just **7.7 million have achieved digital maturity**.
  - According to a survey by the Ministry of MSMEs, only **45% of MSMEs have adopted some form of AI** in their operations
- **Skilled Workforce Shortage:** MSMEs rely heavily on **semi/unskilled labor**, affecting efficiency. **Lack of targeted training** and skilled manpower in technical/managerial roles constrains growth and productivity.
  - About **47% of MSMEs** report **difficulty in finding employees with the right skills,** especially in manufacturing and IT-enabled services, where specialised talent is crucial for sustained growth.
- **Market Access and Competition:** MSMEs face **low brand visibility**, **restricted marketing budgets**, and **limited market intelligence**.
  - Only **1.36% of registered MSMEs are currently exporting**. And even in them, **Medium enterprises**, though just **9% of exporting units contribute 40%** of MSME exports.
- **High Informality:** Despite recent improvements, still a major portion of MSMEs operate **unregistered**, lacking access to **formal credit**, **govt. schemes**, and **IPR/ legal protection**. Weak documentation undermines **credibility and scalability**.

Click Here to Read More: Challenges Related to MSME Sector

Scheme for Special Assistance to States for Capital Investment (SASCI)

Why in News?

The Centre's 50-year interest-free capex loans under the Scheme for Special Assistance to States for Capital Investment (SASCI) are driving major land reforms across India by pushing states to modernise property systems, boosting efficiency, and industrial growth.

What is SASCI?

- **About:** The **'Scheme for Special Assistance to States for Capital Expenditure'** was launched in 2020–21 in response to the Covid-19 pandemic.
  - Later renamed as **SASCI**, it aims to stimulate economic recovery by providing interest-free assistance to states specifically for capital investment.
- **Key Features:**
  - **Capital Investment Focus:** Provides **long term interest free loans for a period of 50 years** to states exclusively for capital expenditure projects.
    - Capital expenditure boosts productive capacity, creates jobs, and drives sustainable growth. It has a **high multiplier effect for every Rs 1 spent it is estimated to generate Rs 3 in** Gross Domestic Product (GDP).
  - **Structure:** Divided into multiple parts targeting different sectors, such as **urban reforms, vehicle scrapping incentives, police housing,** Make in India **initiatives,** digital infrastructure**, Optical Fibre Cable, and tourism development.**
- **Progress:**
  - **Massive Scale-Up:** The scheme grew from Rs 12,000 crore in 2020-21 to Rs 1,50,000 crore in 2024-25, reflecting increased focus on capital investment.
  - **Widespread Industrial Reforms:** Under SASCI 22 states updated **building bylaws for industrial and commercial plots.**
    - Additionally, 18 states reduced **land wastage** by optimizing setbacks and parking norms, making more efficient use of available space.
    - To support **vertical industrial growth,** 12 states have doubled the permissible built-up area for flatted factories.

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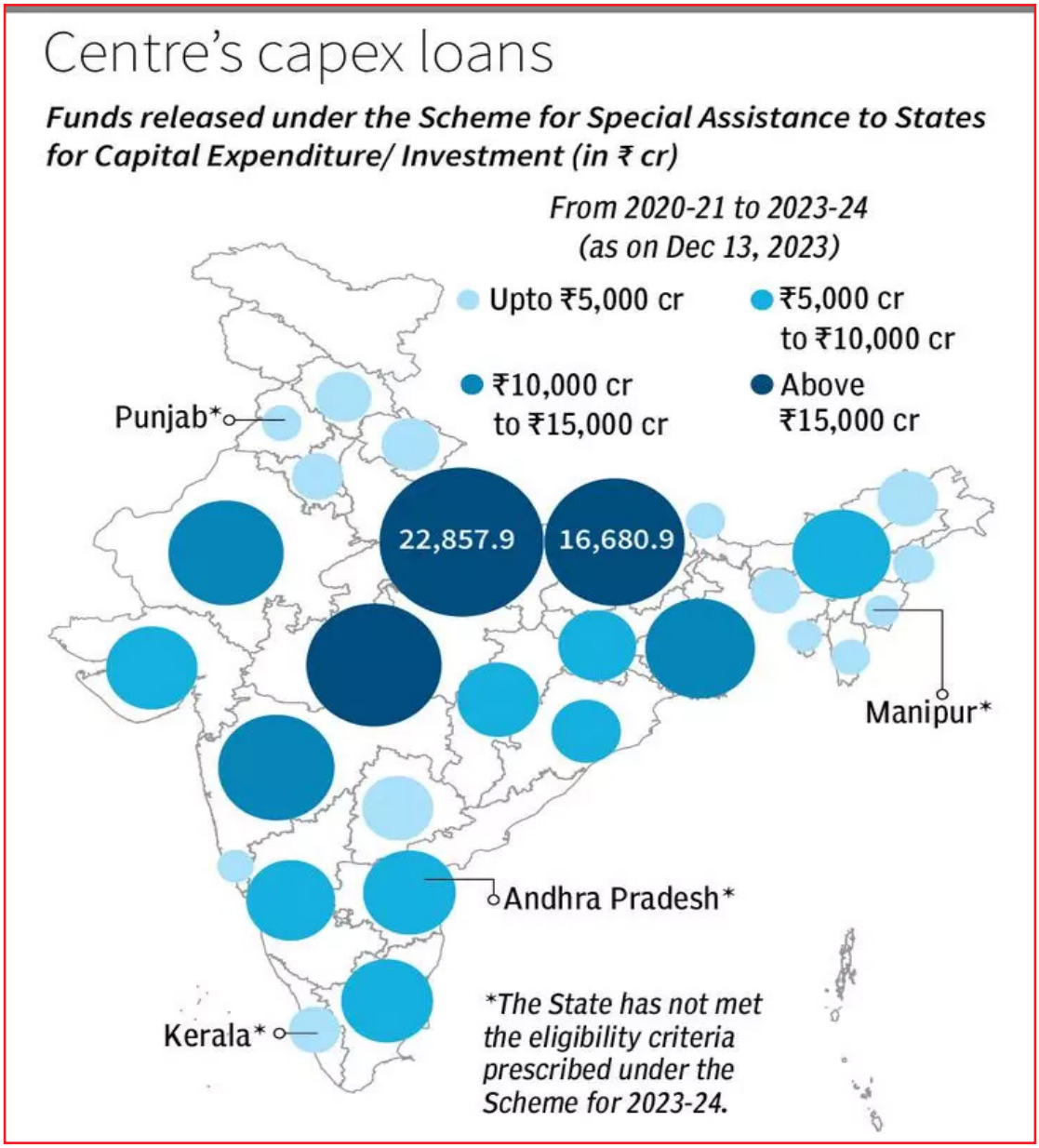
- Furthermore, 8 states have raised the **Floor Area Ratio (FAR)** in commercial zones, thereby unlocking higher density development and boosting overall **urban productivity.**

❍ **Rural Land Digitisation:** Under SASCI **90% of cadastral maps** (land ownership map) geo-referenced nationwide, and 30% of land parcels are assigned **Unique Land Parcel Identification Numbers (ULPIN) (Bhu-Aadhar).**

- Additionally, 91% of **Records of Rights** (legal documents containing all necessary information about a land parcel) digitised, enabling transparency and reducing disputes.
- Improved land administration and industrial reforms are expected to increase **manufacturing capacity, streamline credit access, and enhance overall economic growth.**

❍ **Tourism:** For the first time under SASCI, funds have been earmarked for **tourism,** with Rs 3,295 crore sanctioned for 40 projects across 23 states to develop **iconic tourist centres at a global scale.**



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Capital Expenditure

- **Capital Expenditure (Capex)** refers to funds spent by the government or businesses on acquiring, upgrading, or maintaining physical assets such as infrastructure, machinery, or technology.
  - Unlike **Operating Expenses (Opex)**, which cover day-to-day operational costs, Capex involves substantial **long-term investments** recorded as assets and depreciated over time.
- The Indian government allocates Capex through its annual Union Budget, with Rs **11.21 lakh crore (3.1% of GDP) earmarked for FY 2025–26.**
- Capex as a **countercyclical fiscal tool,** it stabilizes the economy during downturns and supports future revenue through asset creation.
- **Capex** also aids in **reducing public liabilities via loan repayments and encourages private sector investment,** making it essential for India's sustained development and infrastructure expansion.

Economic Capital Framework and RBI's Dividend Transfer

Why in News?

The Central Board of Directors of the Reserve Bank of India (RBI) assessed the Economic Capital Framework (ECF) for determining **risk provisioning** and the **distribution of dividend (surplus)** from the central bank to the government.

- It has **approved the highest-ever transfer of Rs 2,68,590.07 crore** as surplus to the Government of India for **FY 2024–25,** under the **revised ECF,** with the **Contingent Risk Buffer (CRB)** raised to **7.5%** of the RBI's balance sheet.

What is Economic Capital Framework (ECF)?

- **About:** The ECF is a **structured mechanism** adopted by the RBI to **determine the appropriate level of risk provisions** and the **surplus (profit)** that can be **transferred to the Government of India** under **Section 47 of the RBI Act, 1934.**
  - The framework was recommended by the **former RBI Governor, Bimal Jalan Committee (2018)** and **formally adopted in 2019.**
- **Objective:** It aims to strike a balance between maintaining **adequate financial buffers for monetary and financial stability** and ensuring **prudent surplus distribution**.
  - It enables the RBI to maintain a Contingency Risk Buffer (CRB) as a **financial safeguard against unforeseen shocks** like currency volatility and economic crises.
    - **CRB** is a financial safety net of **5.5% to 6.5% of RBI's balance sheet,** ensuring its stability and capacity to act as **Lender of Last Resort** during crises.
- **Revised ECF (Bimal Jalan Committee Recommendations, 2019):**
  - **Realized Equity (Contingency Fund-CF):** The CF acts as a **buffer against unforeseen losses** and is to be maintained between **5.5% and 6.5%** of the **RBI's balance sheet**.
    - Any excess above this range is transferred to the government. The RBI's Central Board has fixed the target at the **lower bound of 5.5%.**
  - **Economic Capital (Capital and General Risk Account- CGRA):** The CGRA includes the **RBI's capital, reserves, risk provisions,** and **revaluation balances** arising from **fluctuations in exchange rates, gold prices, and interest rates**.
  - It is to be maintained between **20.8% and 25.4%** of the **balance sheet size**, and any excess may be transferred to the Centre.
- **Review Mechanism:** As per the committee's recommendations, ECF is **reviewed every 5 years** to adjust for evolving economic conditions and risks, with the latest review done in August 2024.
- **Trends in Dividend Transfer:** RBI's **dividend transfers to the government** have increased from **Rs 30,307 crore in FY22** to an **estimated Rs 2.5-3 lakh crore in FY25**.
  - This sharp rise is attributed to **strong earnings from dollar sales, rising gold prices,** and **appreciation in government securities.**

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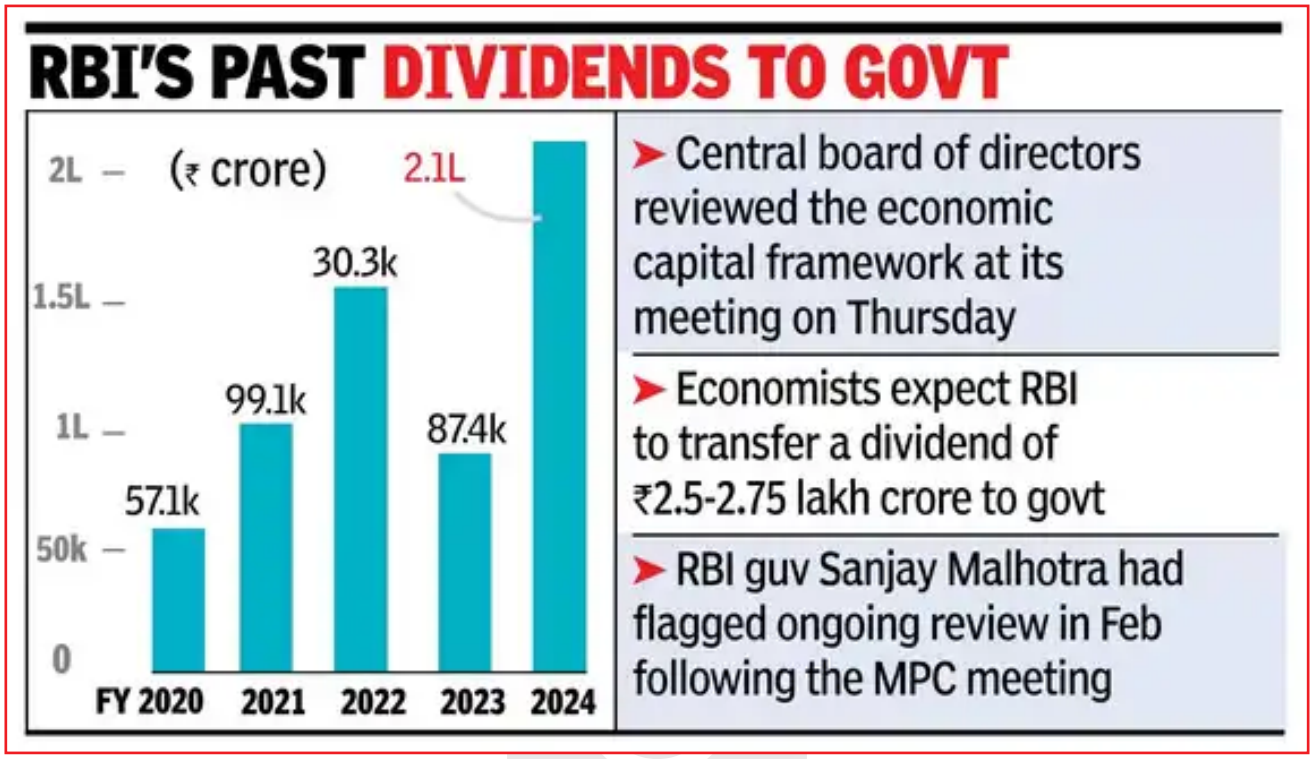
- This higher dividend will help **manage the fiscal deficit** and **boost banking liquidity** and potentially **easing short-term interest rates.**



What are the Provisions Governing RBI's Surplus Transfer?

- **RBI Act, 1934: Section 47 of the RBI Act** mandates that the **net profits of the RBI**, after making provisions for the **Contingency Fund (CF)** and **Asset Development Fund (ADF)**, must be **transferred to the Central Government.**
  - **Section 48** exempts the RBI from paying **income tax or super tax on its income,** thereby enabling a **more direct transfer of surplus to the exchequer.**
- **Committee Recommendations:** Historically, the RBI **retained a considerable portion of its profits** to strengthen its internal reserves.
  - Over the years, several **expert committees** have examined the **adequacy of RBI's capital buffers** and the **quantum of surplus to be transferred:**
    - **V. Subrahmanyam Committee (1997)**
    - **Usha Thorat Committee (2004)**
    - **YH Malegam Committee (2013)** recommended **higher transfer**s to the government while maintaining prudent reserves.
    - **Bimal Jalan Committee (2018)** introduced the revised **Economic Capital Framework (ECF),** balancing risk provisioning with fiscal needs.
  - Following these recommendations, particularly the **Malegam** and **Jalan Committees**, the RBI has progressively **increased its surplus transfers** to the government, ensuring both **macroeconomic stability** and **fiscal space** for public spending.

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What are the Major Income & Expenditure Heads of RBI?	
Source of Income	➢ **Interest on Rupee Securities**: Income earned from **holding rupee-denominated** Government Securities, adjusted for profit or loss on their sale or redemption, along with depreciation and amortization expenses. ➢ **Interest from Liquidity Adjustment Facility (LAF) and Marginal Standing Facility (MSF):** Net interest earned through operations under LAF and MSF mechanisms. ➢ **Interest on Loans and Advances**: Interest income from loans extended to the Central and State Governments, banks, financial institutions, and RBI employees. ➢ **Interest from Foreign Currency Assets**: Earnings from interest on foreign currency-denominated assets held by the RBI. ➢ Open Market Operations (OMOs)
Expenditure	➢ **Risk Provisions: The RBI maintains 2 principal risk funds:** ❍ **Contingency Fund (CF):** Set aside to **cover unforeseen contingencies** such as depreciation in the value of securities and risks arising from monetary policy changes. ❍ **Asset Development Fund (ADF):** Allocated for **investments** in subsidiaries and associated institutions, as well as for internal capital expenditures. ➢ **Currency Printing Costs:** Expenses related to the printing of banknotes. ➢ **Agency Charges:** Commissions paid to **banks, primary dealers, and other agents** involved in currency distribution and government securities operations. ➢ **Operating Expenses**: Salaries, benefits, and other related costs incurred for RBI staff. ➢ **Interest Paid on Deposits and Borrowings:** Expenditure incurred by a bank in the form of **interest payments on funds deposited by customers**, **inter-bank borrowings, central bank facilities,** or debt instruments such as bonds.
Surplus	➢ **Net income derived** from the total income (sources of income) minus total expenditure (expenses). ➢ **Reserve funds** and **contingency provisions** for financial stability and emergencies.

What is the Significance of RBI's Surplus Transfer to Government?

- **Reduces Fiscal Deficit:** Assists the government in meeting its fiscal deficit target of **5.1% in FY 2024–25** by augmenting **non-tax revenue.**
- **Enhances Revenue Generation:** Acts as a major non-tax revenue source, enabling higher public expenditure and supporting economic growth.
- **Lowers Government Borrowing:** May **reduce gross borrowings** by up to **Rs 1 trillion**, freeing fiscal space for capital expenditure.
- **Reduces Borrowing Costs:** Lower borrowing needs can soften G-Sec **yields**, reducing the government's debt servicing burden.
- **Keeps Interest Rates in Check:** Falling sovereign yields influence broader market rates, making **borrowing cheaper** for businesses and households.

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GeM's 8th Incorporation Day

Why in News?

On its **8th Incorporation Day**, Government e Marketplace (GeM) reaffirmed its **transformative role** in driving **inclusive economic growth** and digital governance in India.

- **GeM was incorporated on 17th May 2017 under the Companies Act, 2013.**

What is Government e Marketplace (GeM)?

- **About:** GeM is an **online platform** to facilitate **procurement of goods and services** by various **government departments** and **public sector units.**
  - It was launched on **9th August 2016** by the **Ministry of Commerce and Industry**.
- **Objective:** It ensures **transparency, efficiency, and fairness** in government procurement, streamlining processes and **reducing corruption**.
  - Independent reviews, including the **World Bank**, report nearly **10% cost savings** in government procurement, with nearly **97% of transactions fee-free** and **reductions of 33%-96%** (capped at Rs 3 lakh) for large orders.
- **User base:** It serves as the **Public Procurement Portal** for purchasing goods and services across all **Central and State Government Ministries, Departments, Public Sector Units (PSUs),** and their **affiliates**.
- **Product Range:** It offers a wide range of products and **services, e-bidding, reverse e-auction, and demand aggregation**.
  - The **Ministry of Finance** has authorized and made purchases through GeM **mandatory** for government users under the **General Financial Rules, 2017**.
- **Ownership:** It is managed by **GeM SPV (Special Purpose Vehicle)**, a **completely government-owned (100%),** not-for-profit entity established under the **Ministry of Commerce and Industry.**
- **Inclusivity:** It empowers diverse Indian entrepreneurs, including **MSEs, startups, women-led enterprises, artisans, and weavers.**
  - Over **10 lakh MSEs**, **1.3 lakh artisans and weavers**, **1.84 lakh women entrepreneurs**, and **31,000 startups** are now part of the GeM ecosystem.
- **Progress:** GeM's user base has **tripled**, now including over **1.64 lakh buyers** and **4.2 lakh active sellers**, offering **10,000+ product categories** and **330+ services**.
- **Pan-India Adoption:** GeM is now adopted in all 36 States and UTs, with **Uttar Pradesh** leading and **eight states**, including **Maharashtra**, **Gujarat**, and **Assam**, mandating its use.
- **Technological Advancement:** It has launched **GeMAI**, India's first generative **AI-powered chatbot** in the public sector, supporting **voice and text** in **10 Indian languages**, to improve user support and inclusive service delivery.

Gig Economy

Why in News?

The **gig workers**' meeting on **"Current Developments, Challenges, and the Way Forward,"** organized by the **Gig Workers Association**, highlighted critical issues within **India's gig economy** and recommended the establishment of **minimum wages**, **social security**, and legal protections for gig and platform workers.

- It also called for the establishment of **tripartite welfare boards** at both state and national levels, including representatives of **workers, employers, and the government**.

What is the Gig Economy?

- **About:** The new **Labour Codes of 2019** defines a gig worker as "A person who performs work or participates in a work arrangement and earns from such activities **outside of traditional employer-employee relationship**".
  - It is a labor market of **short-term, flexible jobs** often enabled by **digital platforms.**
  - Workers, as **freelancers or independent contractors**, are paid per task rather than through full-time contracts. Common activities include **freelance services, food delivery,** and **digital work**.
- **Status of India's Gig Economy:** A **NITI Aayog** report estimates **7.7 million gig workers** in India in **2020–21**, projected to reach **23.5 million by 2029–30**, mostly in medium-skilled jobs.

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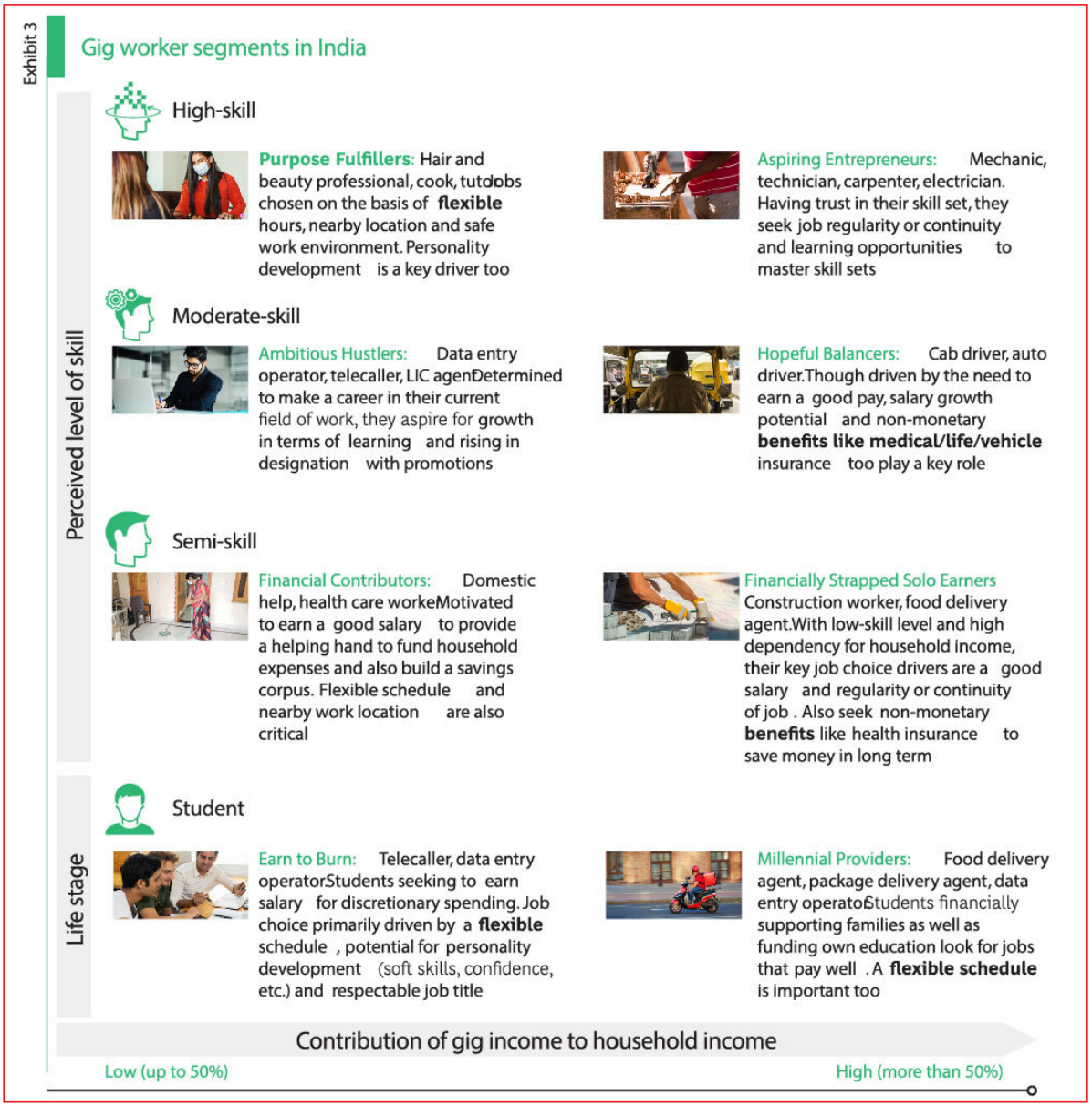
- **Key Factors of Growth:**
  - **Growing Digital Access:** India has over **936 million internet users**, with rapid growth in **rural areas**. Around **650 million smartphone users**, supported by **falling prices**, are expanding access, strengthening the **gig economy.**
  - **E-Commerce Boom:** The growth of **startups** and **e-commerce** is driving demand for **flexible gig workers** in **content creation, marketing, logistics**, and **delivery.**
  - **Rising Demand for Convenience:** Urban consumers' demand for **quick services** like **food delivery** and **e-commerce** boosts **gig opportunities** in **delivery** and **customer support.**
  - **Low-Cost Labor:** A surplus of semi-skilled labor, high unemployment, and weak social security drive many into low-paid gig work as a **survival strategy.**
  - **Shift in Work Preferences: Younger generations** favor **flexibility** and **work-life balance**, finding **gig work** attractive for its **project-based, remote**, and **flexible** options.
- **Segment:**



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What is the Significance of the Gig Economy?

- **Opportunities for Gig Workers:** The gig economy provides **flexible work** that helps **balance personal and professional life**, especially benefiting women, while enhancing **skills and earning potential**.
- **Business Friendly:** Businesses gain **cost-effective, scalable labor** and can **hire skilled workers for short-term projects**, boosting productivity without long-term commitments.
- **Economic Growth and Job Creation:** By 2030, India's gig economy could support **90 million jobs, handle USD 250 billion in work volume, contribute 1.25% to GDP**, and make up **4.1%** of the **workforce**.
- **Inclusive Growth:** Initially dominated by high-income professionals, the **gig economy** now offers **alternative income** and **flexible jobs** to **entry-level workers** and **freshers**, especially in growing **Tier-II** and **Tier-III cities.**
- **Future Potential with Technology Integration:** The gig economy is set to drive economic growth and job creation, boosted by **Artificial Intelligence (AI), predictive analytics, and digital innovation** enhancing gig work's efficiency and reach.
- **Supporting the Informal Economy:** Many gig workers in India, including drivers and delivery staff from informal sectors like **agriculture**, find additional work opportunities through platforms like **Zomato** and **Swiggy**.

What are the Major Issues Affecting the Gig Economy in India?

- **Lack of Legal Protections:** Gig workers, classified as independent contractors, **lack essential rights** like **minimum wage, paid leave,** and **health benefits**, making them vulnerable to exploitation.
  - Laws like the **Contract Labour Act, 1970,** and **Employment Compensation Act, 1923**, are **inadequate** for gig workers due to the **flexible and decentralized nature** of platform work.
- **Employment Instability:** Gig workers face **job insecurity** as **opaque algorithms** and **customer ratings control their work, pay, and employment,** leading to unpredictable income.
  - A 2024 **NITI Aayog report** found **90%** of gig workers **lack savings** and face high vulnerability, while a **2023 Fair Work India study** reported average monthly earnings of **Rs 15,000–Rs 20,000 only**.
- **Inadequate Government Response:** The **Code on Social Security, 2020**, mandates a **National Social Security Board** for gig workers' welfare, but **slow implementation** and **weak enforcement** leave most workers without benefits or protection.
  - The **"Prisoners on Wheels" report** found that **83% cab drivers work over 10 hours a day.**
- **Gender Disparities:** Women gig workers face **more harassment, lack grievance support**, and often experience **underpayment, limited opportunities, and unsafe conditions**, worsening **gender inequality**.
- **Timely Payments:** Over **25%** of gig workers face **job dissatisfaction** due to delayed payments, stressing the need for **timely, transparent, and shorter payment cycles** to avoid financial strain.
- **Algorithmic Control:** The lack of transparency and accountability in algorithmic management creates a **severe power imbalance**, with workers facing **arbitrary decisions** like **unexplained account deactivations** and **no clear recourse**, exposing platform exploitation.

India's Initiatives Related to Gig Workers

- Code on Social Security, 2020
- e-Shram Portal
- Pradhan Mantri Shram Yogi Maandhan Yojana
- Rajasthan's Platform-Based Gig Workers (Registration and Welfare) Act, 2023

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International Relations

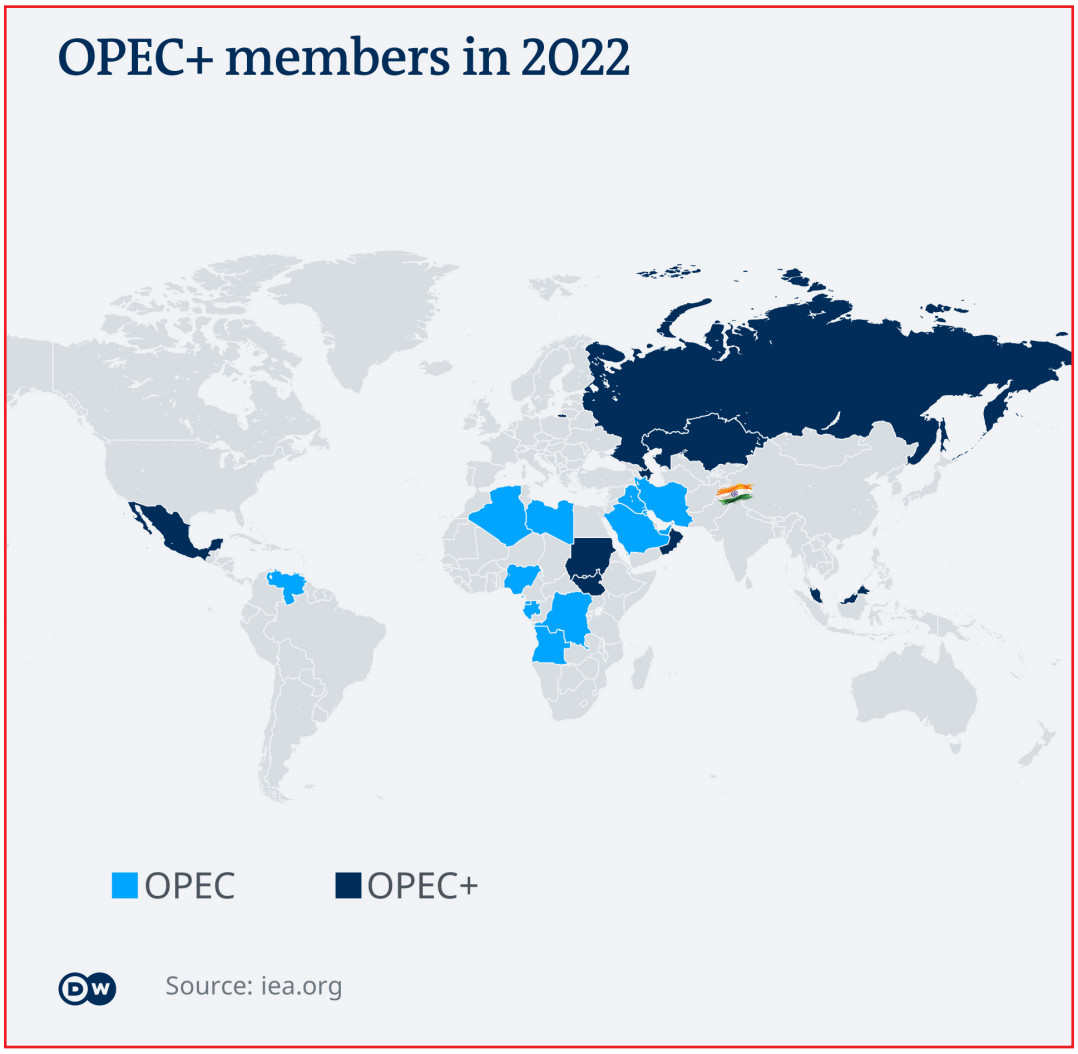
Highlights

- *Shift in OPEC+ Production Strategy*
- *WHO Endorses Global Pandemic Agreement*

Shift in OPEC+ Production Strategy

Why in News?

The **Organization of the Petroleum Exporting Countries (OPEC)+** group led by Saudi Arabia decided to increase oil production by 411,000 barrels per day (bpd). This marks the third consecutive month of production hikes, gradually reversing the **voluntary output cuts initiated in 2023.**



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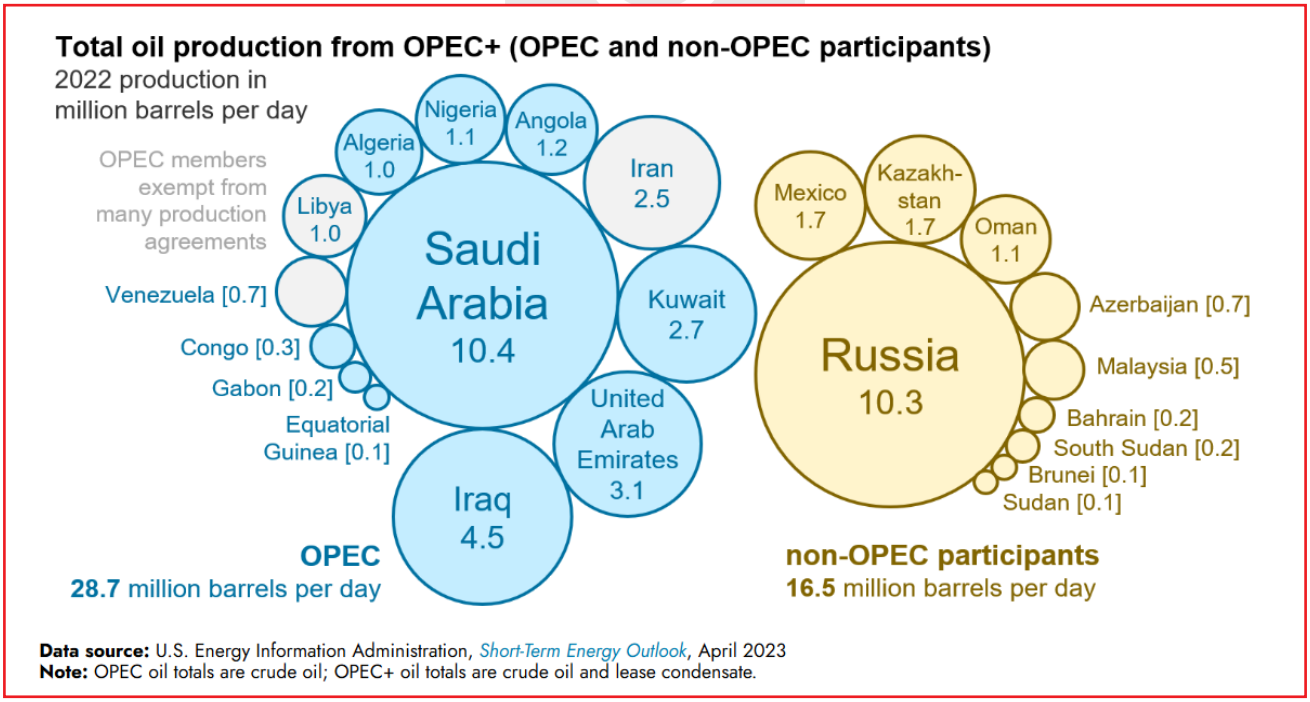
Organization of the Petroleum Exporting Countries

- The OPEC is a permanent intergovernmental organization founded at the **Baghdad Conference**, in 1960 by **Iran, Iraq, Kuwait, Saudi Arabia, and Venezuela,** headquartered in Vienna, Austria.
  - OPEC currently has 12 members, including Algeria, Iran, Iraq, Kuwait, Libya, Nigeria, Saudi Arabia, UAE, and Venezuela.
  - OPEC works to coordinate oil policies among member countries to ensure stable prices, steady supply to consumers, and fair returns for investors.
  - OPEC nations produce about **30% of the world's crude oil, hold 80% of proven reserves**, and account for nearly half of global exports, with **Saudi Arabia as the largest producer among the OPEC.**
- OPEC+ was formed in **2016** as an alliance between **OPEC and 10 other oil producers** to address declining oil prices due to **US shale oil growth.**
  - **OPEC+** includes the **OPEC** members plus **Azerbaijan, Bahrain, Brunei, Kazakhstan, Malaysia, Mexico, Oman, Russia, South Sudan, and Sudan.**
  - The OPEC and OPEC+ countries combined produce **about 60% of global oil production.**

What Factors Influenced the Rise in Oil Production by OPEC+?

- **Weak Impact of Output Cuts:** In 2023, eight OPEC+ members voluntarily cut oil production by **2.2 million barrels per day (bpd)** to support falling prices.
  - Despite these reductions, **global oil prices continued to decline**, indicating weak market response.
- **Rise of Overproduction Within OPEC+:** Countries like **Kazakhstan, Iraq, UAE, and Nigeria** produced more oil than their agreed limits. This concerned Saudi Arabia, which made the largest cuts of around **3 million bpd.**



Data source: U.S. Energy Information Administration, *Short-Term Energy Outlook*, April 2023
Note: OPEC oil totals are crude oil; OPEC+ oil totals are crude oil and lease condensate.

- **Post-COVID Market Weakness:** Post-pandemic recovery has been K-shaped, leading to **weak and uneven oil demand**. The oil market now has many freelance producers outside **OPEC+,** making it more complex.

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- High investments have gone into **expensive offshore and difficult fields** that need to keep producing, **even if profits are low,** due to political and economic reasons.
- Big oil exporters like **Russia, Iran, and Venezuela are limited by US sanctions**.
- Non-OPEC+ producers like **Brazil and Guyana** are also ramping up production, adding to **global oversupply**.
- **Shale producers** in the US have returned stronger, making the market more competitive and **less responsive to OPEC+ controls**.

➢ **Shift from Price Support to Market Share:** With price stabilization efforts failing, Saudi Arabia revived its old strategy of chasing market share over price.
- Saudi Arabia is known as the **"swing producer"** due to its large spare oil production capacity and preference for stable, moderately high prices to maintain steady revenues.
- However, when other producers exceed their quotas, **Saudi Arabia floods the market** (as seen in 1985–86, 1998, 2014–16, and 2020) to pressure high-cost producers and reassert its leadership.

How is Global Oil Demand Evolving?

➢ **Weakening Global Oil Demand:** The International Energy Agency (IEA) expects global oil demand to grow only **0.73% in 2025**.
- The **"peak demand" theory** (the idea that global oil demand will reach its highest point and then permanently decline) is gaining credibility, with indicators like a **global economic slowdown**, rising EV adoption, and stronger climate action.
  - These trends, compounded by disruptions such as the US tariff war, have led to reduced **global GDP** (S&P Global forecasts global GDP growth of just 2.2% in 2025 and 2.4% in 2026 weakest since the 2008 crisis) **and trade forecasts.**
- As a result, oil demand **may plateau, and prices may not rebound even if supply constraints ease.**

➢ **Trade Risks:** World Trade Organisation (WTO) predicts a 0.2% annual decline in global trade in 2025. This may cause oil prices to remain subdued despite supply cuts, challenging traditional supply-demand price mechanisms.

➢ **Sanctions and Supply-Side Constraints:** Key oil producers like **Russia, Iran, and Venezuela are under US sanctions,** reducing their export capacity (a situation that may change if sanctions are lifted).

What are the Implications of Global Oil Price Volatility for India's Economy?

➢ **India's Growing Oil Demand:** India is the world's **3rd-largest crude importer (after China and the US)** with demand growth (~3.2% in 2024-25) nearly four times the global rate.
- India is expected to contribute nearly **25% of global crude demand growth** in 2025 and become the primary demand driver until 2040.

➢ **Short-Term Benefits:** Lower crude prices can reduce India's import bill, with every USD 1 drop in oil prices saving roughly **USD 1.5 billion annually.**

➢ **Long-Term Risks:** Lower oil revenues can weaken the economies of key **Gulf trading partners, reducing bilateral trade, investments, and tourism.**
- It could lead to possible job losses for over **nine million Indian expatriates** in the Gulf, threatening remittance inflows **(approx USD 50 billion),** which support India's balance of payments.
- Tax revenues linked to oil and gas sectors also reduce, impacting government finances.

➢ **Need for Diversification:** India faces the strategic imperative to **reduce hydrocarbon dependence and develop new growth drivers** to mitigate risks from volatile oil markets.

WHO Endorses Global Pandemic Agreement

Why in News?

The World Health Organization (WHO), at its **78th World Health Assembly** has adopted the **world's first global Pandemic agreement** under **Article 19 of the WHO Constitution**, aiming to **strengthen health security** and **ensure equitable pandemic responses**.

➢ It is the **second legal instrument** after the 2003 Framework Convention on Tobacco Control.

What is the WHO's Global Pandemic Agreement?

➢ **About:** It was adopted on **20th May 2025**, which lays down principles for international cooperation **to strengthen global health architecture** and **ensure timely and equitable access to diagnostics, vaccines,** and therapeutics **during pandemics.**
- The treaty is open for **signature and ratification** and will become binding once ratified by **60 countries**.

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- **Background:** Negotiations for the pandemic treaty began in **December 2021** during the **Omicron variant** of **Covid-19**, exposing **vaccine hoarding by rich countries** that denied access to poorer nations.
  - Studies showed **equitable vaccine distribution could have saved over a million lives**. To **address poor coordination and inequality**, WHO member states collaborated to create this treaty.
- **Key Provisions:**
  - **Pathogen Access & Equitable Sharing: Pharma companies** gain access to pathogen samples and data in return for **sharing 10% of their pandemic-related vaccines,** therapeutics, and diagnostics **with WHO,** and **another 10% supplied at affordable prices.**
  - **Technology & Knowledge Transfer:** Member states must **promote and incentivize the sharing of technology and expertise** to enable **local production of vaccines and drugs** in developing countries.
  - **Coordinating Financial Mechanism & GSCL:** Member States mandated the initiation of a **Coordinating Financial Mechanism** for pandemic prevention, preparedness and response.
    - The **Global Supply Chain and Logistics Network (GSCL)** was launched to remove barriers and ensure **equitable, timely, safe, and affordable access** to **pandemic-related health products** during **public health emergencies** of international concern.
  - **Research Funding & Access Rights:** Countries must ensure **publicly funded research** includes conditions for timely and fair access to resulting **medical products**.
    - **Governments** should intervene if **life-saving medicines** developed with public funds are **unaffordable or unavailable.**
  - **Sovereignty Preserved: WHO is barred from overriding national laws or imposing mandates** such as travel bans, vaccination requirements, or lockdowns, ensuring **countries retain full authority over their pandemic responses.**

What are the Key Concerns Associated with WHO's Global Pandemic Agreement?

- **Limited WHO Authority:** The treaty explicitly **denies WHO powers to direct national laws or impose measures** like travel bans, vaccine mandates, or lockdowns, **limiting enforcement and compliance during crises.**
- **Intellectual Property & Innovation:** Pharmaceutical companies seek **strong Intellectual Property (IP) protection** and **legal certainty** to **support high-risk research and innovation,** highlighting the **challenge of balancing these with equitable access** during pandemics.
- **Unclear Benefit-Sharing Mechanism:** The **Pathogen Access and Benefit-Sharing System (PABS)** aims to govern the **sharing of biological materials (pathogens) and genome sequences** to ensure fair benefit-sharing, including equitable access to vaccines and diagnostics.
  - However, **its implementation lacks clarity, and the mechanism is still under negotiation**, with finalization expected at the 2026 World Health Assembly.
- **US Exit from WHO:** The **withdrawal of the US**, a key player in global pharmaceutical manufacturing, from the WHO, **weakens the treaty's impact,** as its pharma **companies are not obligated to share data or comply with treaty provisions**, creating major gaps in global coordination.

India's Contributions in WHO Pandemic Agreement

- **Advocacy for Equity & Global Solidarity:** India advocates **fair access to vaccines, diagnostics, and therapeutics**, especially for **Lower-middle-income economies (LMICs)** and has pushed for **strong equity clauses to counter vaccine nationalism** and ensure timely global support.
- **Support for Technology Transfer and IPR Flexibility:** India, in partnership with South Africa, led the global call at the WTO for **waivers on intellectual property rights (IPR) for Covid-19 vaccines** and therapeutics.
  - It continues to **push for balanced IPR provisions** in the treaty to **facilitate technology transfer and enhance manufacturing capabilities** in developing countries.
- **Emphasis on Health System Resilience:** India advocates for **increased global investment in public health infrastructure, workforce capacity building,** and training to **strengthen resilient health systems**, particularly in low-resource settings.

What are the Key Global Health Challenges?
Click Here to Read: Global Health Challenges
What is the Role of India in Shaping and Advancing Global Health Governance?
Click Here to Read: Role of India in Global Health Governance

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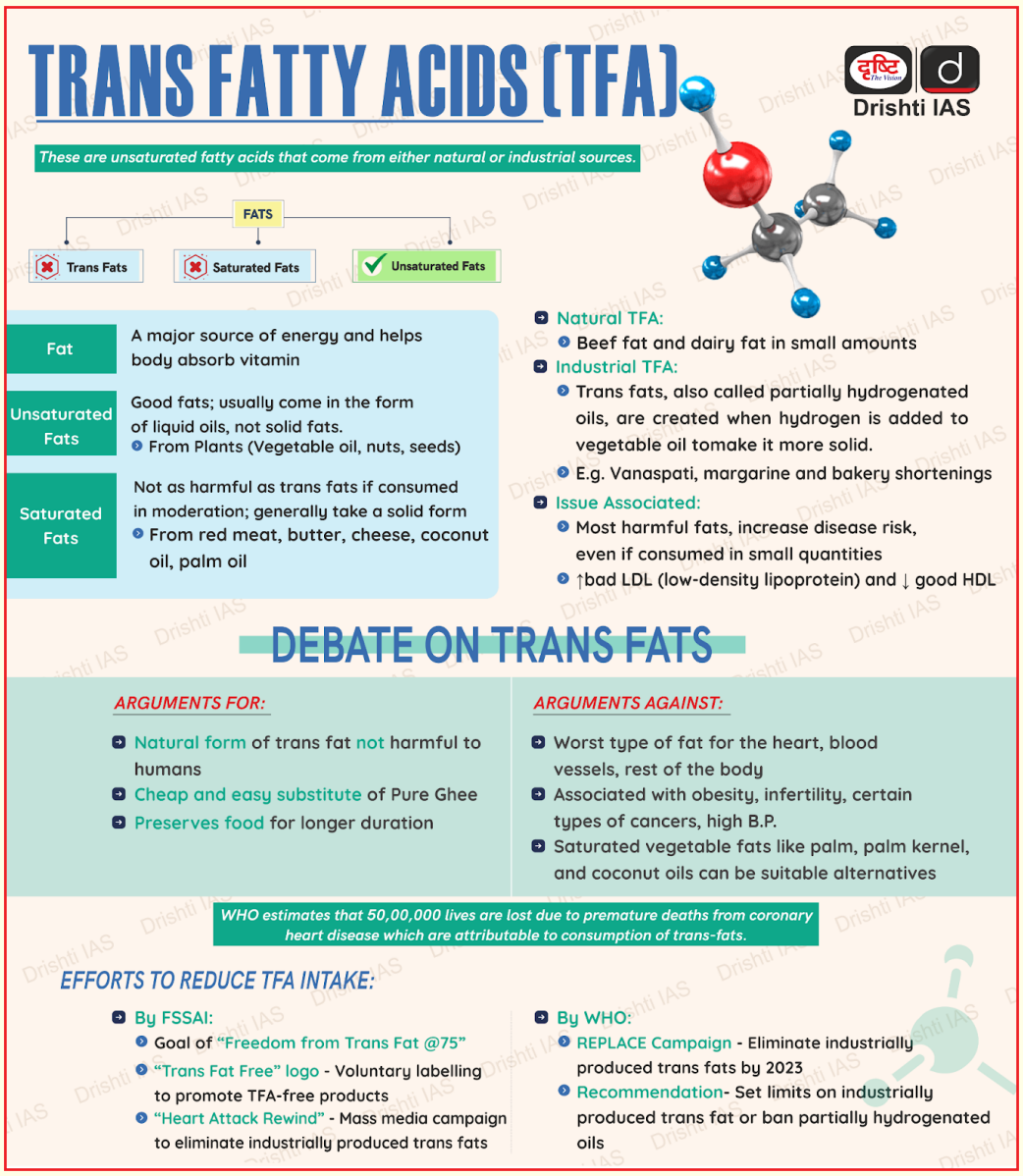
Note:

- The **78th World Health Assembly** also honoured **Austria, Norway, Oman, and Singapore** for eliminating **industrially produced Trans Fatty Acids (TFAs)** from their food supplies.



- **Efforts Against Trans Fats:**
  - **WHO limits trans fats to 2g/100g** of **total fat** or **ban partially hydrogenated oils (PHOs).**
  - **REPLACE Action Framework (2018) of WHO** for **global elimination of industrially produced trans fats** by **2025.**
    - It had set the target of **trans-fat elimination policies in countries** that account for **at-least 90% of the global trans fat burden** and at least 70% within each region by the end of 2025.
    - However, as of **May 2025**, **60 countries** (**46% of the global population**) have adopted best-practice policies.
  - **India's Role:**
    - India enforced a **2% limit on trans fats in oils and fats** in 2022 under the **Food Safety and Standards (Prohibition and Restrictions on Sales) Regulations, 2021.**

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Social Issues

Highlights

- *Global Report on Food Crises 2025* 43
- *Hooch Tragedies in India* 45
- *Accessibility and Empowerment of PwDs* 47
- *Child Wellbeing in an Unpredictable World* 49
- *Gendered Malnutrition in India* 51
- *India's Battle Against Tuberculosis* 53
- *Enrolment Drop in Government Schools and PM-POSHAN* 57

Global Report on Food Crises 2025

Why in News?

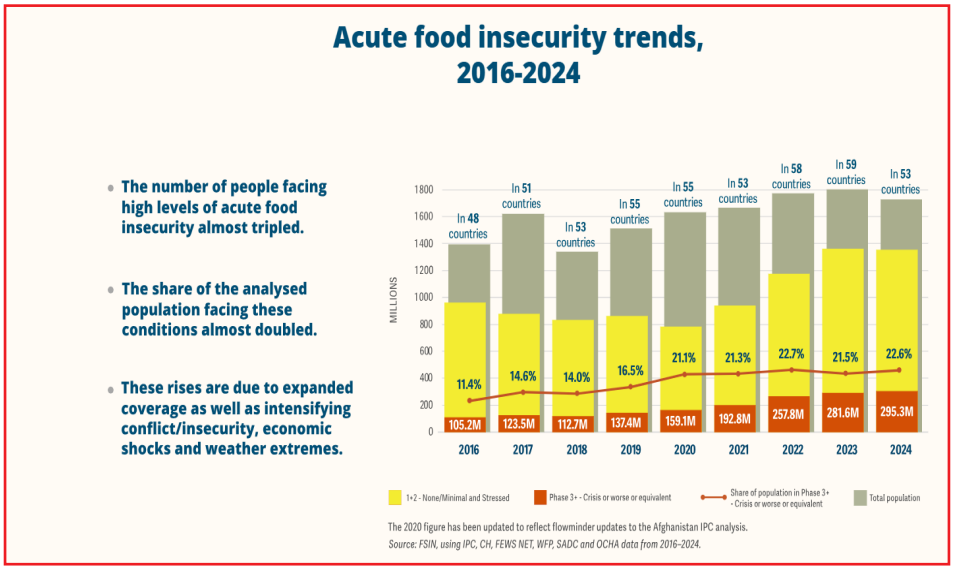
The Global Report on Food Crises (GRFC) **2025** has revealed that more than **295 million** people across **53 countries** experienced acute hunger, an **increase of 13.7 million** compared to **2023**.

- The report highlights a **deepening global food insecurity crisis** fueled by ongoing **conflicts,** severe **climate events**, **economic disruptions**, and **forced displacement**.

Global Report on Food Crises (GRFC)

- The Global Report on Food Crises (GRFC), **2025** has been published by the Global Network Against Food Crises (GNAFC) in collaboration with the Food Security Information Network (FSIN) .
- The GRFC is an annual publication that provides a comprehensive analysis of acute food insecurity and nutrition crisis (malnutrition) worldwide.
  - **Acute food insecurity** occurs when disruptions in **food availability, access, utilization,** or **stability** threaten **lives** or **livelihoods**.
  - A **nutrition crisis** arises when factors like **food scarcity, disease, conflict,** and **poor healthcare** lead to high **acute malnutrition** in children aged **6–59 months.**

What are the Key Drivers of Food Insecurity as per GRFC 2025 Report?



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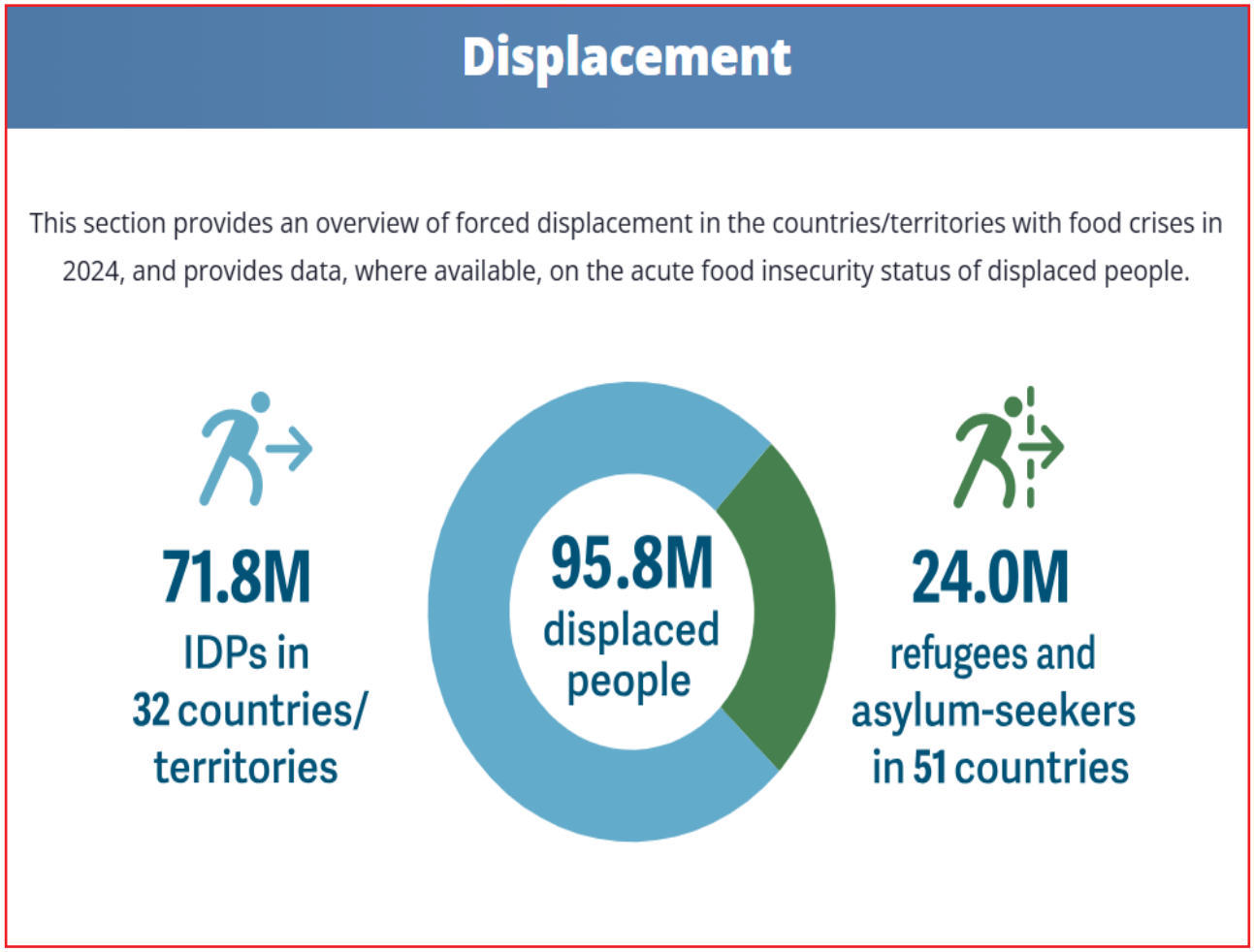
- **Conflict & Displacement:** Conflict drives food insecurity in 20 countries, affecting 139.8 million people and causing most Catastrophe **(Integrated Food Security Phase Classification (IPC)- 5 i.e., starvation, death, or severe malnutrition)** cases, especially in Nigeria, Sudan, and Myanmar.
  - Additionally, global acute malnutrition cases in the **top 10 affected countries** rose from 26.9 million in 2023 to **30.4 million in 2024**, with the worst crises in **Sudan,** and **Gaza.**
- **Extreme Weather Event & Displacement: Rising temperatures, floods,** and El Nino caused **crop failures**, damaging food supply and increasing malnutrition risks.
  - It has fueled **food insecurity** in **18 countries**, affecting **96.1 million people**, while in **2024**, **95.8 million displaced individuals—75% internally displaced**—resided in the **53 food-crisis countries.**



- **Economic Shocks:** It drives food insecurity in **15 countries (e.g., South Sudan), affecting 59.4 million people** by disrupting **incomes, jobs**, and **food supply chains**, leading to **higher food prices**, **lower purchasing power**, and reduced access to **nutritious food**.
- **Funding Cuts:** The abrupt end of United States Agency for International Development (USAID) funding in 2025 has hit humanitarian efforts risking severe malnutrition and death for **14 million children** in Afghanistan, DRC, Ethiopia, Haiti etc.
- **Weak Governance:** Food insecurity drivers worsen existing vulnerabilities like **weak health systems, fragile economies**, and **political instability,** while poor data limits effective response and monitoring.

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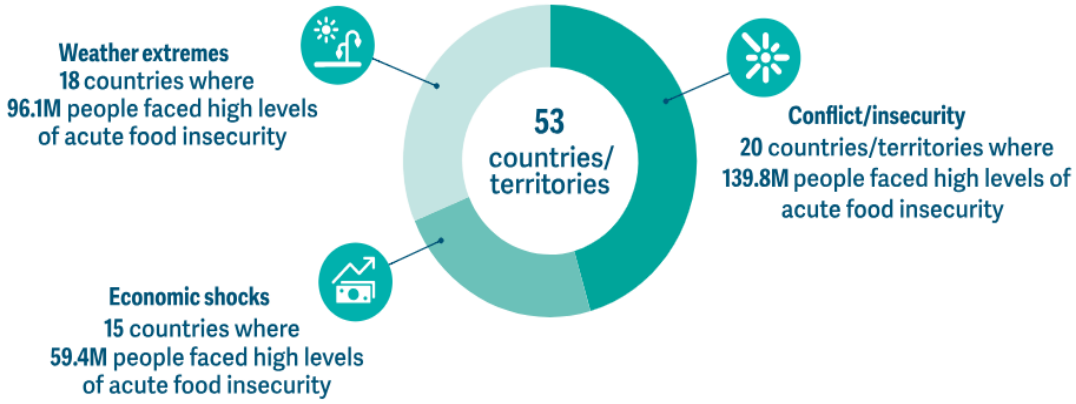
Drivers of acute food insecurity

Acute food insecurity is rarely driven by a single shock or hazard, but rather by the interaction between shocks and underlying poverty, structural weaknesses and other vulnerability factors. Still, it is possible to identify a primary driver for each country/territory.



What are the Socio-Economic Implications of Food Crises on Global Development?

- **Poverty Intensification:** Food crises **disrupt local agro-economies**, especially where agriculture dominates, and **rising food prices fuel inflation, reducing low-income purchasing power**.
- **Human Capital Loss:** Food crises **severely impact nutritional outcomes**, especially among children and pregnant women, with over **735 million** people **chronically undernourished** globally as per Global Hunger Index 2023.
  - Nutrition-related factors contribute to about **45% of deaths in children under 5 years of age.**
- **Social Instability:** Food shortages often trigger **civil unrest** and contribute to **forced migration**. The United Nations High Commissioner for Refugees (UNHCR) reports **23.5 million climate-displaced individuals**, many of whom flee due to crop failure and food insecurity.
- **Gender Inequality:** Food crises **disproportionately affect women**, who are often responsible for household nutrition but have **less access to land, credit, and aid.**
  - As per **UN Women**, it is estimated that **60% of chronically hungry people** are **women** and **girls**.
- **Impairment of Educational Systems:** Children affected by food crises often experience **higher dropout rates** due to hunger or the need to **support household incomes**.
  - While the global number of out-of-school children **fell by 9 million** from **2015-2021**, it has **increased by 6 million** since then, due to **stagnation worldwide** in food supply.

Hooch Tragedies in India

Why in News?

A major hooch tragedy in Punjab's Amritsar district has claimed 21 lives and left several hospitalised after the consumption of spurious liquor suspected to **contain methanol, a highly toxic chemical.**

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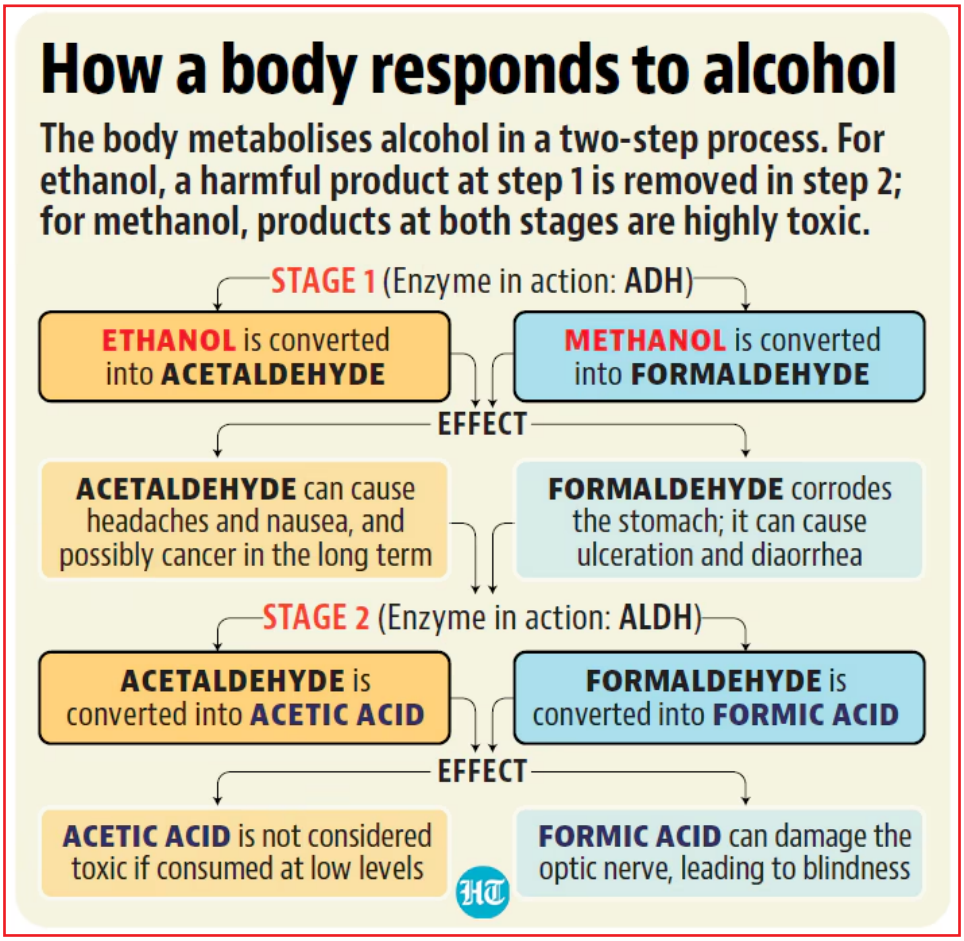
Note: Hooch refers to poor-quality, often **illicitly produced alcohol,** a term derived from the **Hoochinoo tribe of Alaska** known for brewing strong liquor.

- It is typically made in **unregulated and unhygienic conditions**. Sometimes, hooch contains a high quantity of **methanol** (an industrial alcohol along with **ethanol**), which is **highly toxic and can be fatal** when consumed.

What is Methanol?

- **About:** Methanol, also known as **methyl alcohol, wood alcohol, or wood spirit,** is the simplest alcohol, with the **chemical formula CH_3OH**.
  - Methanol is a **colorless, volatile liquid with a faintly sweet** pungent odor and is completely miscible with water.
- **Applications:** It serves as a solvent in paints, varnishes, and plastics. It is a key raw material in the production of **formaldehyde, acetic acid, and various aromatic hydrocarbons.**
  - Methanol also functions as an **antifreeze agent and fuel additive,** helping **remove water from automotive and aviation fuels.**
  - Additionally, it is gaining prominence as a **biodegradable energy resource** in sustainable energy applications.



- **Impact on Human Body:** Methanol is highly toxic to humans, especially if ingested. It breaks down into formic acid in the liver, causing **metabolic acidosis and lowering blood pH.**
  - This disrupts oxygen use in cells, leading to **organ damage**. Methanol can also harm the **optic nerve, causing blindness,** and may result in brain swelling or bleeding, which can lead to coma or death.

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- **Regulatory Framework:** The **Food Safety and Standards (Alcoholic Beverages) Regulations 2018** set maximum methanol limits in liquors to ensure safety and quality.
  - Methanol is listed under **Schedule I of the Manufacture, Storage and Import of Hazardous Chemicals Rules, 1989.**
  - The **Indian Standard IS 517** provides specifications for determining methanol quality.

What are the Causes of Hooch Tragedies in India?

- **Economic Vulnerability and Poverty:** People from economically weaker sections often **resort to cheap, locally brewed alcohol (hooch)** as they cannot afford licensed, quality liquor.
  - The cost of hooch is significantly lower than legal alcohol due to evasion of excise duty and taxes.
- **Widespread Misuse of Methanol:** Methanol, an inexpensive industrial chemical, is often stolen and **illegally added to illicit liquor to increase potency**, despite its extreme toxicity. Bootleggers frequently use methanol to produce deadly hooch, as seen in several mass poisoning cases.
- **Lack of Regulation and Enforcement:** Despite the Excise Act, 1944 and local regulations, enforcement is often weak, allowing illegal brewing and distribution to flourish.
  - In states with alcohol prohibition (e.g., Bihar, Gujarat), hooch networks expand underground, exploiting weak enforcement.
  - Methyl alcohol is not categorised as a "**poison" under the definition provided in the Poison Act, 1919,** thereby limiting the scope of legal culpability.
    - This legal gap complicates the prosecution of such cases and highlights the need for legislative reform.
- **Political and Bureaucratic Nexus:** There are frequent allegations of political protection and bureaucratic involvement in illegal liquor trade.
  - Political connections sometimes provide **immunity to hooch manufacturers,** preventing law enforcement action. **Bribery and corruption** further allow bootleggers to operate without fear of police intervention.
- **Lack of Awareness and Social Stigma:** In rural and semi-urban areas, there is a lack of awareness about the dangers of consuming unregulated alcohol.
  - **Social stigma** around alcoholism also prevents people from seeking medical help when symptoms of poisoning appear.
- **Absence of Community Reporting Mechanisms:** Fear of local liquor mafias prevents communities from reporting illegal hooch production.
  - There is often no structured system to anonymously report bootlegging activities to authorities.
- **Flaws in Supply Chain Monitoring:** Lack of digital tracking and surveillance of raw materials like methanol allows for unchecked distribution.
  - Absence of real-time tracking mechanisms makes it difficult to identify illegal distilleries.
- **Case Studies of Major Hooch Tragedies in India:**
  - **Mumbai (2015):** A hooch tragedy killed around 100 people in Malwani due to methanol poisoning.
  - **Punjab (2020):** More than 100 people died after consuming adulterated liquor in multiple districts.
  - **Bihar (2022):** Despite prohibition, 40 people lost their lives in Saran due to spurious liquor consumption.
  - **Tamil Nadu (2024):** A severe illicit liquor tragedy in Kallakurichi, Tamil Nadu, caused over 50 deaths.

Legal Measures to Prevent Hooch

- **Excise Act, 1944** regulates the production and distribution of alcohol, including penalties for illegal manufacturing.
- States like **Bihar, and Gujarat** have complete prohibition, yet hooch incidents still occur.
- Bharatiya Nyaya Sanhita (BNS), 2023 includes specific sections like 103 (murder) and 105 (culpable homicide not amounting to murder) for hooch-related deaths.
- **Alcohol regulation** is under the **Seventh Schedule of the Constitution of India, specifically the State List,** granting states exclusive power to legislate on its production, sale, and distribution. Therefore, alcohol laws vary across states.

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Accessibility and Empowerment of PwDs

Why in News?

The **Department of Empowerment of Persons with Disabilities (DEPwD)** under the Union Ministry of Social Justice and Empowerment organized the **Inclusive India Summit**, to mark **Global Accessibility Awareness Day (GAAD).**

- The summit resulted in the **signing of three Memorandums of Understanding to enhance disability inclusion.** Key initiatives include an **'Accessibility Index' to audit public buildings,** promotion of inclusive infrastructure, and awareness through hackathons and national competitions.

Note: GAAD, founded in 2012 by Jennison Asuncion (accessibility professional) and Joe Devon (web developer), is observed annually on the **3rd Thursday of May** to encourage developers, designers, and digital creators to build accessible websites and digital content for **persons with disabilities (PwDs).**

Why is Accessibility Crucial for an Inclusive Society?

- **Ensures Equal Rights and Participation:** Accessibility enables PwDs to exercise their fundamental human rights, such as **freedom of expression, access to education, employment, healthcare, and social participation,** on an equal footing with others.
- **Removes Barriers for Full Inclusion:** PwDs often face physical, informational, and attitudinal barriers.
  - Accessibility focuses on removing these obstacles by providing reasonable accommodations tailored to diverse needs, ensuring they can engage fully in social, economic, and political life.
- **International Normative Frameworks:** Key UN documents like the **UN Convention on the Rights of Persons with Disabilities (UNCRPD)**, the **World Programme of Action concerning Disabled Persons,** and the **Standard Rules on the Equalization of Opportunities** emphasize accessibility as both a **right and a means to empower PwDs.**
  - These frameworks call for accessible physical environments, information, communication, transportation, education, and healthcare.
- **Fosters Social and Economic Growth:** Inclusive societies that prioritize accessibility unlock the potential of all citizens, contributing to poverty reduction, equitable economic opportunities, and overall sustainable development.

What is the Current Status of PwDs in India?

- **PwDs in India:** As per Census 2011, the number of PwDs in the country is 2.68 crore (2.21% of the total population).
  - The prevalence of disability was higher among males than **females, with a rate of 2.4% in males and 1.9% in females**. It was also higher in rural areas than in urban areas.
  - As per the **Rights of Persons with Disabilities (RPwD) Act, 2016**, there are **21 types of Disabilities** which includes Locomotor Disability, Visual Impairment, Hearing Impairment, Speech & Language Disability, Intellectual Disability, Multiple Disabilities, Cerebral Palsy, Dwarfism etc.
- **Constitutional Provisions:**
  - **Preamble of the Constitution:** Secures to **all citizens Justice** (social, economic, political), **Liberty** (of thought, expression, belief, faith, worship), and **Equality** (of status and opportunity).
  - **Fundamental Rights (Part III):** The Constitution guarantees six **Fundamental Rights** (Equality, Freedom, Protection against Exploitation, Freedom of Religion, Cultural and Educational Rights, and Constitutional Remedies) which apply to all citizens, **including persons with disabilities,** even if not explicitly mentioned.
  - **Directive Principles of State Policy (Part IV):** **Article 41** calls for **public assistance in cases of** unemployment, old age, **sickness, and disablement.**
    - It mandates the State to make effective provisions, within its economic capacity, for securing the right to work, education, and public assistance for those in need.
  - **Panchayati Raj and Urban Local Bodies:**
    - **Twelfth Schedule (Entry 9 of Article 243-W):** "**Safeguarding the interests of weaker sections of society,** including the **handicapped** and mentally retarded."
    - **Eleventh Schedule (Entry 26 of Article 243-G):** "Social welfare, including welfare of the handicapped and mentally retarded."

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- **Policy Frameworks:** The **National Policy for Persons with Disabilities, 2006** aims to ensure equal opportunities, rights protection, and full participation of PwDs in society.
  - India ratified the **UNCRPD in 2008**. To fulfill its obligations under the Convention, Parliament enacted the **RPwD Act 2016 (**to ensure dignity, non-discrimination, and equal opportunities for PwDs).
  - The **National Trust Act, 1999,** established a national body to support the welfare of persons with **Autism, Cerebral Palsy, Mental Retardation, and Multiple Disabilities.**
  - The **Rehabilitation Council of India Act, 1992,** made RCI a statutory body to regulate and **monitor disability services, standardize training,** and maintain a register of qualified rehabilitation professionals.
  - The **Scheme for Implementation of the Rights of Persons with Disabilities Act (SIPDA)**, launched in 2015, focuses on skill training for PwDs aged 15-59 under the **National Action Plan for Skill Development.**
- **Judicial Pronouncements:**
  - In ***Rajive Raturi v. Union of India (2024),*** the Supreme Court reaffirmed that **accessibility for PwDs is a constitutional imperative under Article 21**, linking it to the right to life, dignity, and freedom of movement.
    - It stressed that digital inclusion is vital for ensuring substantive equality and preventing their marginalisation.
  - In ***Reserve Bank of India vs. A. K. Nair & Others (2023),*** the Supreme Court held that the **RPwD Act 2016,** expressly provides for **reservation in promotions for persons with disabilities,** in accordance with the instructions issued by the Government from time to time.

What are the Challenges Faced by PwDs in India?

- **Inaccessible Physical Infrastructure:** Most public buildings, transportation systems, and urban infrastructure **remain non-compliant with universal design norms.** According to a 2018 government report, **only 3% of buildings were fully accessible.**
  - The **absence** of basic accessibility features like **ramps, elevators, or tactile paths** effectively segregates PwDs, restricting their mobility and independence.
- **Educational Exclusion**: According to the **76th National Sample Survey (NSS), only 52.2% of persons with disabilities aged 7 and above are literate,** much lower than the **national average of 80%,** due to poor access to inclusive education and lack of accessible school facilities.
- **Employment Barriers and Economic Marginalization:** Societal biases and employer reluctance to provide reasonable accommodations prevent PwDs from securing meaningful employment.
  - Out of **1.3 crore employable PwDs in India, only 34 lakh are employed,** reflecting significant underutilization of talent.
  - Additionally, the lack of accessible infrastructure and assistive devices at workplaces continues to limit their participation.
- **Healthcare Inaccessibility:** During Covid-19, PwDs faced heightened risks and reduced access to essential services due to inadequate preparedness and outreach.
- **Expanding Digital Divide:** Around **98% of websites** are not compliant with accessibility standards, excluding PwDs from digital services like education, banking, and governance.
  - Despite programs like **Pradhan Mantri Gramin Digital Saksharta Abhiyan (PMGDISHA)**, **PwDs are significantly underrepresented** in digital skill development initiatives.
  - Many assistive technologies (e.g., for facial recognition, voice commands) are either unavailable or unaffordable, particularly affecting acid attack survivors and visually impaired individuals.
- **Weak Implementation of Legal and Policy Frameworks: Harmonized accessibility guidelines** (2016 and 2021) have **not been integrated into building by-laws**, due to poor awareness and accountability within public works departments.
- **Flexibility to Meet Diverse Needs:** Accessibility is not one-size-fits-all; it means designing environments, services, and technologies that are flexible and usable by people with **varying disabilities, whether physical, sensory, cognitive**, or otherwise.

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Child Wellbeing in an Unpredictable World

Why in News?

A United Nations International Children's Emergency Fund (UNICEF) report titled ***"Child Wellbeing in an Unpredictable World"*** reveals that children in the world's wealthiest nations have experienced a steep decline in academic performance, mental health, and physical wellbeing since the onset of the Covid-19 pandemic.

What is the Impact of Covid-19 on Global Children's Well-being?

- **Academic Setbacks:** School closures ranging from 3 to 12 months during the pandemic severely disrupted learning.
  - Approximately 8 million 15-year-olds (~50% of the age group) were not functionally literate and numerate in 2022, a 4% rise since 2018.
  - Countries like **Bulgaria, Colombia, Costa Rica, Cyprus, and Mexico** reported over two-thirds of 15-year-olds lacking basic skills.
- **Mental Wellbeing Decline:** Life satisfaction of children dropped significantly in 14 out of 32 countries with available data. Japan was the only country reporting an improvement in children's life satisfaction.
- **Physical Health Concerns:** Overweight and obesity rates increased substantially in 14 out of 43 countries, continuing a worrying long-term trend.
- **Best in Child Well Being:** The **Netherlands and Denmark** are the top two countries for child wellbeing, measured across mental wellbeing, physical health, and skills followed by France.

Measuring child well-being

Dimension	Components	Indicators
Mental well-being	Life satisfaction	% of children with high life satisfaction at age 15
	Adolescent suicide	Suicide rate, age 15 to 19 years
Physical health	Child mortality	Child mortality rate, age 5 to 14 years
	Overweight	% overweight, age 5 to 19 years
Skills	Academic proficiency	% proficient in reading and mathematics at age 15
	Social skills	% who make friends easily at school at age 15

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What is the Status of Child Wellbeing in India?

- **Mental Well-being:** In India, most children with mental health issues remain **undiagnosed and untreated.**
  - Even before Covid-19, 50 million children were affected, with **80–90% not seeking help.**
  - A **2021 UNICEF-Gallup survey** found that only **41% of Indian youth supported seeking mental health help**, highlighting widespread stigma and reluctance to seek support.
  - It has been observed that suicide is the **4th leading cause of death among the late adolescent age groups (15–19 years) in India.**
- **Physical Health:**
  - **Nutrition:** According to **UNICEF's World Obesity Atlas 2022,** India may have **over 27 million obese children by 2030** (1 in 10 globally), with associated economic costs projected to surge from USD 23 billion in 2019 to USD 479 billion by 2060.
  - **Child mortality:** Infant Mortality Rate (IMR) reduced from 39 per 1000 live births (2014) to 27 per 1000 live births (2021).
    - Under-Five Mortality Rate (U5MR) dropped from 45 per 1000 live births (2014) to 31 per 1000 live births (2021).
- **Skills:**
  - **Academic Proficiency:** India has one of the largest school systems with over 240 million students and 9 million teachers, but learning outcomes, especially in literacy and numeracy, remain a major challenge.
    - The Economic Survey 2024-25 notes that National Education Policy (NEP), 2020 aims for 100% Gross Enrolment Ratio (GER) by 2030.
    - Currently, GER is nearly universal at the primary level (93%) but lower at the secondary level (77.4%).
    - Despite progressive enrollment, learning outcomes remain poor, particularly in foundational literacy and numeracy.
    - According to the World Bank's Learning Poverty Index (percentage of 10-year-olds unable to read a basic text), India's learning poverty rate increased to **70% post Covid-19, from 55% in 2019.**
  - **Social Skills:** A survey by Smile Foundation reveals that **58% of teachers in India believe children missed out on social skills** during Covid-19 and get distracted easily.

What are the Causes of Declining Child Wellbeing ?

- **Economic Inequality:** Economic disparities deprive millions of children of basic needs such as **nutritious food, shelter, healthcare, and education.**
  - Children in poor households are more likely to experience child labour, and school dropouts.
  - Chronic undernutrition (stunting, wasting) continues to affect children, especially in low-income and marginalized communities.
    - Inadequate access to quality healthcare, especially in rural and tribal areas, impacts child survival and long-term development.
- **Social Cause:** Discriminatory practices (e.g., preference for sons, caste-based exclusion) coupled with Harmful traditional practices like **child marriage,** female genital mutilation, **etc.**, impact the rights and wellbeing of many children.
  - Children in conflict zones or refugee camps face trauma, hunger, violence, and lack of access to basic services.
    - **Migrant children are often excluded from national education and health systems,** increasing their vulnerability.
  - Rising academic **pressure from a very early age,** coupled with family stress and digital overexposure, has led to increasing cases of depression, anxiety, and even suicide among children and teenagers.
  - Rising instances of trafficking, sexual exploitation, and domestic violence exacerbate the crisis of child wellbeing.

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- **Digital Inequality:** The rise of digital education has **excluded children without access to devices, electricity, or internet**, especially in rural and tribal regions.
  - **Poor digital literacy among parents and children** (only 38% of households in India are digitally literate) also contributes to the learning gap.
  - Additionally, Unregulated use of social media platforms exposes **children to cyberbullying, online harassment, addiction, misinformation, and harmful content.**
    - According to the National Crime Records Bureau (NCRB), there were a total of around 1800 cases of cybercrimes against children in 2022.
    - Social media can negatively impact **self-esteem and mental health,** especially among adolescents due to unrealistic comparisons and online peer pressure.
- **Climate Change and Environmental Stress: Extreme weather events**, rising temperatures, air pollution, and water scarcity negatively impact children's health and living conditions.
  - Climate change increases **food insecurity** and displacement, which disrupts children's education and emotional stability.

Gendered Malnutrition in India

Why in News?

India's free foodgrain programme currently covers approximately 800 million people, yet challenges related to hunger and malnutrition persist, particularly among women and girls.

- Despite economic growth and the implementation of POSHAN Abhiyaan (Prime Minister's Overarching Scheme for Holistic Nourishment), **gender-based nutritional disparities remain stark.**

What are the Factors Behind Gendered Malnutrition in India?

- **Higher Rates of Anaemia and Underweight:** According to National Family Health Survey (NFHS)-5, **57% of women** aged 15–49 are anaemic, compared to just **26% of men**. **Nearly 1 in 5 women** are underweight.
  - Women have **higher nutritional needs during menstruation, pregnancy, and lactation**. These physiological demands, if unmet, **exacerbate deficiencies such as anaemia and underweight status,** impacting both maternal and child health.
- **Limited Education:** As per Census 2011, the overall literacy rate in India is 72.98%, with a significant gender gap 80.9% for males and only 64.63% for females.
  - This disparity in education affects **women's awareness about nutrition, health practices,** and access to healthcare services, contributing to **gendered malnutrition.**
- **Entrenched Social Norms:** In many economically disadvantaged Indian households, food distribution is unequal where **women and girls often eat last and receive the least.**
  - Malnutrition in such cases reflects not only **food scarcity but also deep-rooted social injustice and gender-based discrimination.**
  - Cultural biases that prioritize the nutritional needs of men further worsen health outcomes for women.
- **Economic Dependency:** Around **49% of women lack decision-making power** over their earnings, which translates to compromised nutrition. Economic vulnerability restricts women's access to nutritious food, perpetuating malnutrition.
- **Policy Gaps:** Despite large investments (Rs 24,000 crore for 2022-23), POSHAN Abhiyaan had utilized only **69% of its funds by December 2022.**
  - The scheme has created awareness about nutrition, but failed to improve key outcomes, like reducing anaemia or undernutrition **among women.**
  - POSHAN 2.0 remains isolated **from schemes aimed at women's economic empowerment.** Nutritional interventions alone are insufficient if women lack the financial means and agency to access nutritious food.

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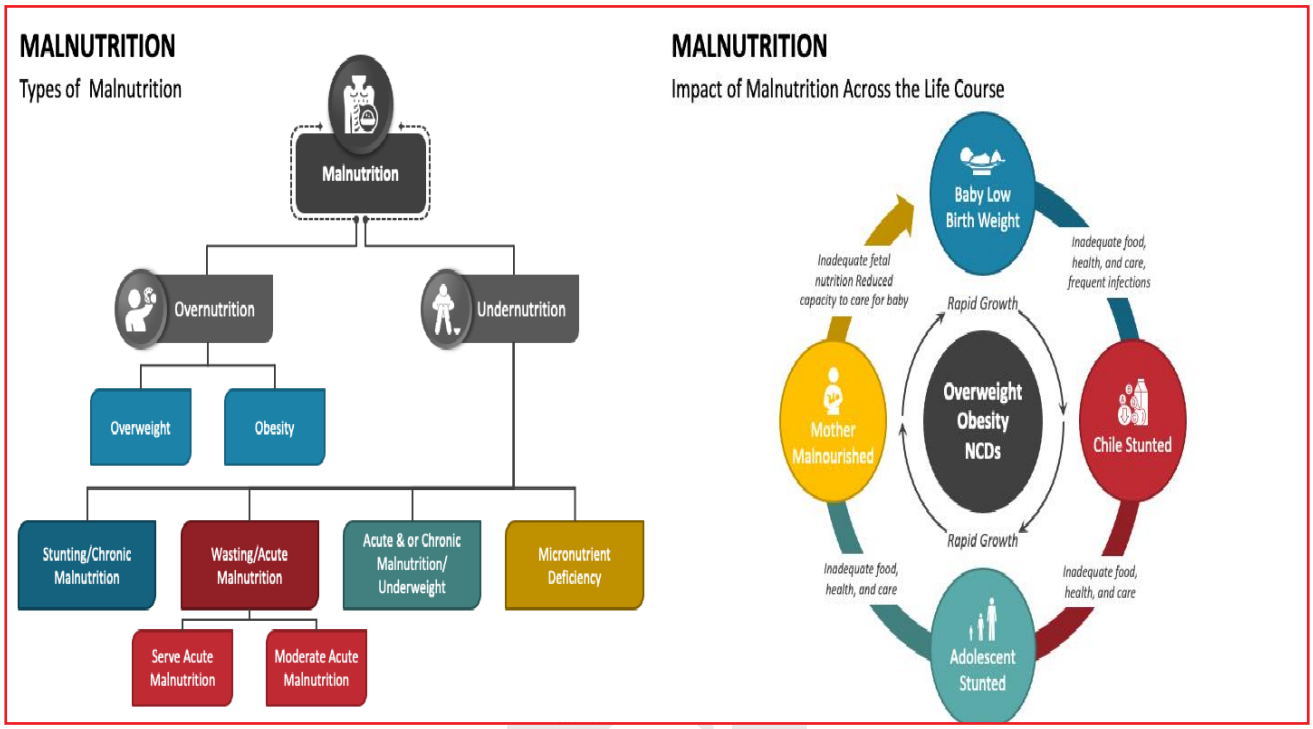

What is the POSHAN Abhiyaan?

- **About: POSHAN Abhiyaan** (formerly known as the National Nutrition Mission), is the flagship nutrition mission of the Government of India launched in 2018.
  - Its primary aim is to improve the **nutritional outcomes for children (0–6 years), adolescent girls, pregnant women, and lactating mothers** in a time-bound manner**.**
  - It targets to **reduce stunting, under-nutrition, anaemia (among young children, women and adolescent girls)** and reduce low birth weight by **2%, 2%, 3% and 2%** per annum respectively.
  - It promotes behavioural change through **Jan Andolan (People's Movement)** and the development of **Poshan Vatikas (Nutri-Gardens)** to ensure local and diverse access to nutritious food.
- **Pillars of Poshan Abhiyaan:**
  - **Access to Quality Services:** Providing essential health services through schemes like **Integrated Child Development Scheme (ICDS)** , **National Health Mission (NHM)**, and **Pradhan Mantri Matru Vandana Yojana (PMMVY)**, especially during the first 1,000 days of a child's life.
  - **Cross-Sectoral Convergence:** Coordinating efforts across multiple ministries, including water and sanitation under the **Swachh Bharat Mission and drinking water access through the National Drinking Water Mission.**
  - **Leveraging Technology:** Tools like the **Poshan Tracker application** enable real-time data collection and intervention.
  - **Jan Andolan:** Community engagement is key to driving mass awareness and encouraging behavioral change around nutrition.
- **POSHAN 2.0:** Initially launched as a three-year programme, POSHAN Abhiyaan was expanded in 2021 into **Mission POSHAN 2.0,** which integrated multiple nutrition-related schemes under a single umbrella.

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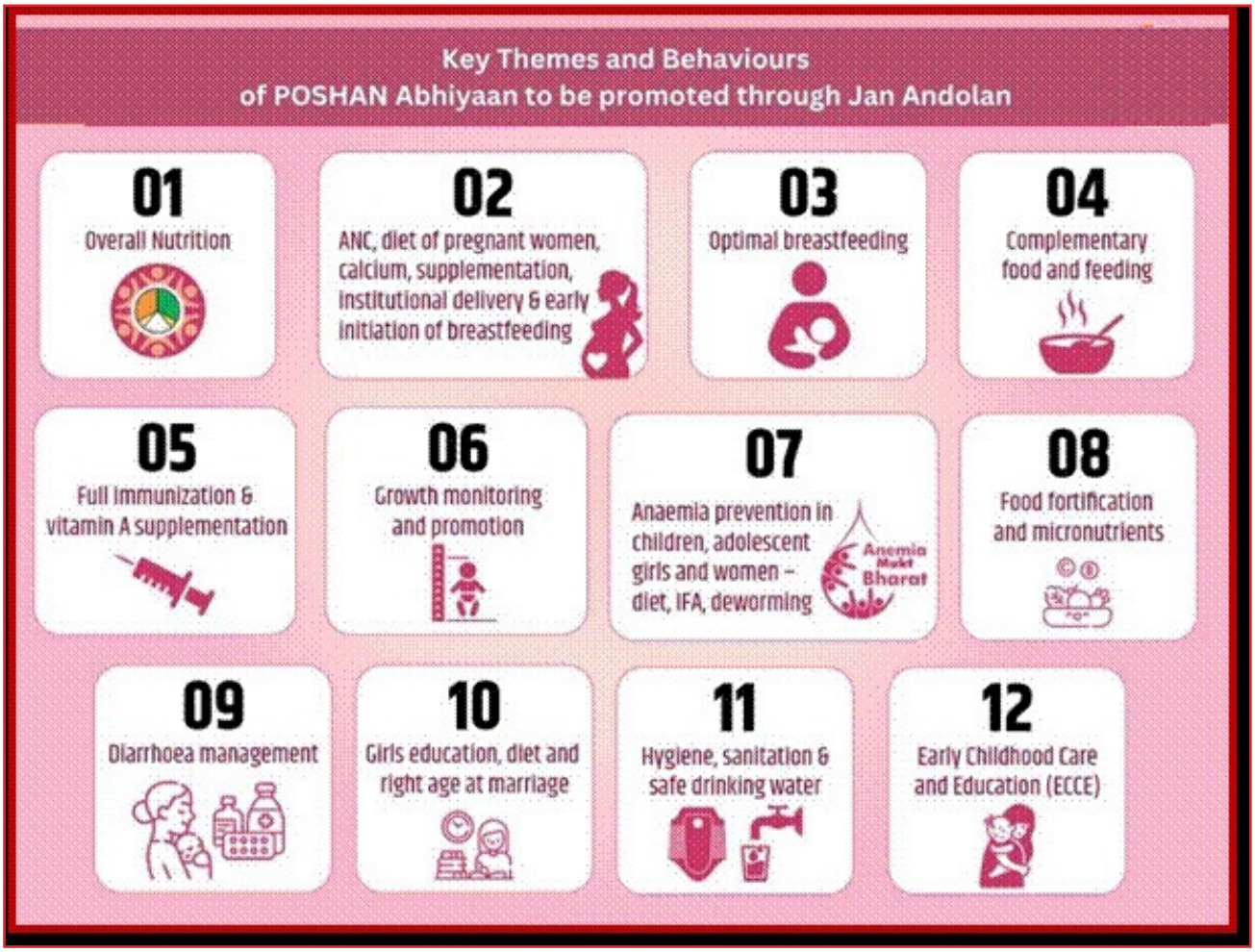
- These include the ICDS – Anganwadi Services, Supplementary Nutrition Programme, POSHAN Abhiyaan, Scheme for Adolescent Girls, and the National Crèche Scheme.
- This integrated initiative is now implemented as Mission Saksham Anganwadi and POSHAN 2.0, commonly referred to as **POSHAN 2.0.**

- **Implementation and Funding:** Poshan 2.0 is a **Centrally-sponsored program,** with a cost-sharing ratio of **60:40 between the Central and State Governments.**
- **Progress:** Mission Poshan 2.0 covers an impressive 8.9 crore children (0-6 years). Poshan Abhiyan benefits **69.42 lakh Pregnant Women (PW) and 42.54 lakh Lactating Mothers (LM).**



India's Battle Against Tuberculosis

Why in News?

The Prime Minister chaired a high-level review meeting on the National Tuberculosis Elimination Programme (NTEP) and emphasized the need for **targeted, data-driven interventions** and the use of technology to accelerate India's mission to eliminate tuberculosis (TB) by 2025.

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National TB Elimination Programme (NTEP)

- **NTEP:** In 2020, the **Revised National Tuberculosis Control Program (RNTCP)** was renamed the NTEP with the goal to eliminate TB in India by 2025, five years ahead of the **global target of 2030.**
  - The **Sustainable Development Goal targets** for TB include **80% reduction in incidence, 90% reduction in mortality, and zero TB patients facing catastrophic costs.**
  - The program is guided by the **National Strategic Plan (2017-2025)** under the strategic pillars: **Detect – Treat – Prevent – Build (DTPB).**
  - The NTEP focuses on early diagnosis, quality-assured treatment, engaging private providers, contact tracing in high-risk areas, and addressing social determinants through a multi-sectoral approach.
  - The programme recorded its **highest-ever case notifications, reporting 25.5 lakh TB cases in 2023 and 26.07 lakh cases in 2024.**
  - Under NTEP, India introduced **improved drug-resistant TB treatments, including a safer,** shorter all-oral Bedaquiline regimen, increasing success rates from 68% in 2020 to 75% in 2022.
    - The mBPaL regimen (Bedaquiline, Pretomanid, Linezolid) offers 80% success for MDR-TB, reducing treatment duration to six months.
- **Pradhan Mantri TB Mukt Bharat Abhiyaan (PMTBMBA):** Launched in 2022 as part of NTEP, it focuses on providing nutritional, diagnostic, and vocational support to improve treatment outcomes and accelerate India's TB elimination goal. P
  - PMTBMBA is the world's largest crowd-sourcing initiative for TB patient nutrition.
  - The **Ni-Kshay Mitra initiative,** part of the PMTBMBA, encourages individuals, NGOs, and corporations to support TB patients with nutritional, social, or economic aid for six months.
  - The **Ni-Kshay Portal** helps health workers manage TB cases, track treatment, and report real-time data for India's TB surveillance.

What Progress has India made under the National TB Elimination Programme?

- **Reduction in TB Incidence and Mortality:** The **World Health Organization (WHO) Global TB Report 2024** highlighted that TB incidence in India declined by **18% (from 237/lakh in 2015 to 195/lakh in 2023),** over double the **global decline of 8%.**
  - TB mortality reduced by **21%, from 28 to 22 deaths per lakh population.**
  - In 2023, India alone accounted for over 26% of global TB cases and deaths.
- **Increased Treatment Coverage:** TB treatment coverage has risen to **85%**, reflecting the success of NTEP strategies and decentralized care through **1.7 lakh Ayushman Arogya Mandirs.**
- **100-Day TB Mukt Bharat Abhiyaan:** During **100-Day TB Mukt Bharat Abhiyaan** campaign, 12.97 crore individuals were screened in high-focus districts, leading to the **detection of 7.19 lakh TB cases, including 2.85 lakh asymptomatic cases.**
- **Nikshay Mitra Initiative:** 2.55 lakh **Nikshay Mitras (volunteers)** have supported TB patients, distributing **29.4 lakh nutrition baskets to patients,** demonstrating the role of community participation in the elimination efforts.
- **Ni-kshay Poshan Yojana:** The **Ni-kshay Poshan Yojana** has facilitated **Direct Benefit Transfer (DBT)** payments to **1.28 crore TB patients since 2018.**
  - The incentive amount for nutritional support has been enhanced to Rs 1,000 in 2024, promoting better health outcomes for patients undergoing TB treatment.
- **Expansion of Diagnostic Infrastructure:** India has significantly expanded its TB diagnostic network with **NAAT (Nucleic Acid Amplification Testing) labs (helps in the detection of TB)** and drug susceptibility labs, and deployed **AI-enabled X-ray units** enhancing accessibility and early detection.
  - Screening has expanded to high-risk settings like **mines, construction sites, tea gardens, and urban slums** to identify cases in vulnerable populations.

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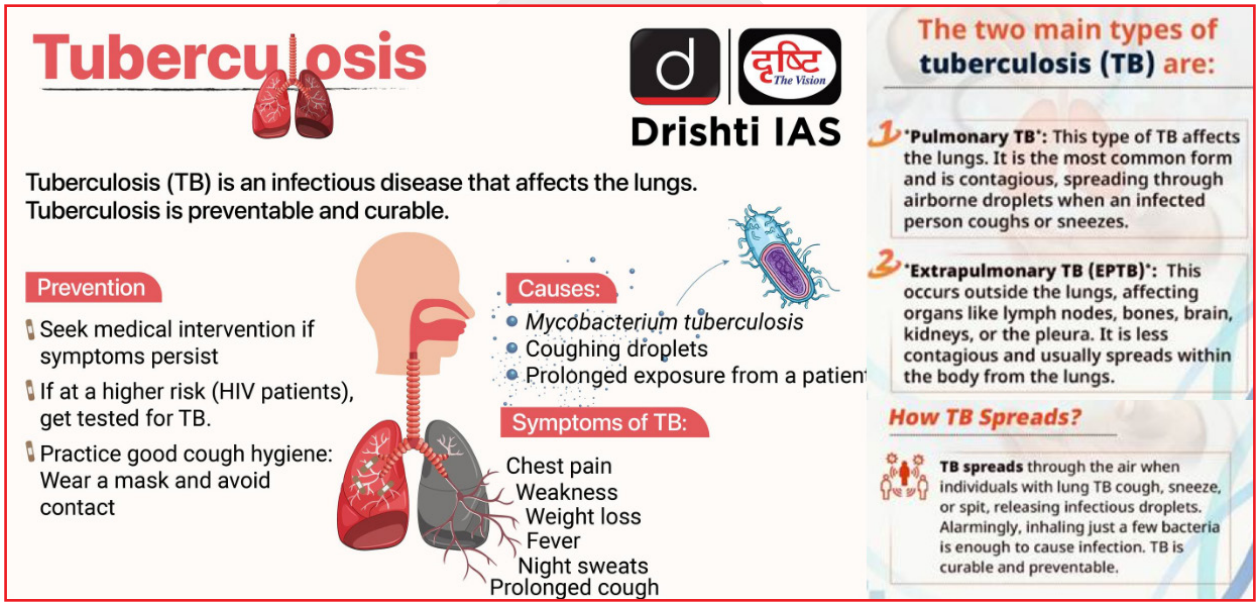
What are the Key Facts About Tuberculosis?

- **About:** TB is a bacterial infection ***(Mycobacterium tuberculosis)*** affecting the lungs, spreading through the air. It is preventable and curable with antibiotics.
  - About 25% of the global population is infected, but only 5–10% develop symptoms.
- **Risk Factors:** Weak immune system, diabetes, malnutrition, tobacco, and alcohol use.
- **Diagnosis:** WHO recommends rapid molecular diagnostic tests as initial tests for people showing signs and symptoms of TB. Other diagnostic tools can include sputum smear microscopy and chest X-rays.
- **Prevention:** The Bacille Calmette-Guérin (BCG) vaccine is given to infants to prevent TB.
- **Transmission:** TB spreads through the air when an **infected person coughs, sneezes, or spits, releasing germs that others can inhale.**
- **Treatment:** Standard TB treatment lasts 4-6 months. Incomplete treatment leads to drug-resistant TB.
- **Multidrug-resistant TB (MDR-TB):** It is resistant to isoniazid and rifampicin (medicines used to treat TB), treatable with costlier alternatives.
- **Extensively Drug-Resistant TB:** It is more severe, with limited treatment options.
- **TB and Human Immunodeficiency Virus (HIV):** HIV patients are 16 times more vulnerable to TB, a leading cause of their deaths.



What Challenges do Vulnerable Groups face While Battling TB?

- **Inadequate Nutrition:** Undernutrition is a critical risk factor that both increases **susceptibility to TB infection and worsens treatment outcomes.**
  - Vulnerable groups often lack sufficient nutritional support, which leads to higher **mortality rates, increased drug toxicity, and relapse.**
  - Although government schemes exist (such as the **Nikshay Poshan Yojana and Ni-kshay Mitras),** the reach and effectiveness of nutritional aid remain limited.
- **Delayed and Missed Diagnosis:** Symptoms of TB are often mistaken for common ailments among the poor, leading to delayed diagnosis.

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- Women, particularly homeless women, face longer delays than men in reaching diagnosis due to stigma, lack of awareness, and difficulty accessing health facilities.
- Diagnostic procedures like **sputum collection** are uncomfortable or inaccessible, especially for women who face cultural barriers.

- **Social Stigma and Isolation:** TB carries significant stigma, which discourages patients, especially women, from seeking timely treatment.
  - The **NTEP does not specifically recognize homelessness** as a vulnerability category, resulting in gaps in data collection and tailored interventions.
  - Homeless individuals **face marginalization and social exclusion** and often lack official documents like Aadhar cards and bank accounts, which are essential for accessing government schemes and financial support, further worsening their health and diminishing their **motivation or ability to seek care.**
- **Childhood TB:** It is difficult to diagnose due to low bacterial load, inability of young children to produce sputum, reliance on less sensitive tests like smear microscopy and chest X-rays, and limited drug resistance screening.
  - Only 12% of molecular tests in children confirmed TB bacteriologically in 2022.
- **Mental Health and Psychosocial Support Deficits:** Mental health challenges related to TB diagnosis and treatment are often neglected, leaving patients without adequate psychological support, which can affect treatment success.

Enrolment Drop in Government Schools and PM-POSHAN

Why in News?

The **Ministry of Education (MoE)** convened a discussion with **States and UTs** to review the **performance, planning, and budget** of the Pradhan Mantri Poshan Shakti Nirman (PM-POSHAN) scheme, revealing a **decline in government school enrolment in 23 States**.

What are the Trends in Declining Government School Enrolment?

- **Decline in School Enrolment:** The Ministry of Education revealed a significant enrolment drop in 23 States and UTs for 2024–25, with some seeing declines of **over 1 lakh students**.
  - It is led by **Uttar Pradesh (21.83 lakh), Bihar (6.14 lakh), Rajasthan (5.63 lakh)** and West Bengal (4.01 lakh).

ENROLMENT DIP: TOP 5 STATES

STATE	ENROLMENT		DROP
	2023-24	2024-25	
UP	1.74 crore	1.52 crore	21.83 lakh
Bihar	1.79 crore	1.73 crore	6.14 lakh
Rajasthan	62.65 lakh	57.02 lakh	5.63 lakh
West Bengal	1.17 crore	1.13 crore	4.01 lakh
Karnataka	43.49 lakh	41.33 lakh	2.15 lakh

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- **Factors Behind Enrolment Decline:**
  - **Change in Data Collection Methodology:** The transition from **school-wise** (total numbers) to **student-wise reporting** (name, address, parents' names and Aadhaar details) likely **eliminated** outdated records and false entries, such as **"ghost" students** not actually attending school.
  - **Shift to Private School:** Several States suggest that **post-Covid years** have seen a shift in enrolment from **government to private schools**, reversing trends observed during the pandemic.

What is the PM-POSHAN Scheme?

- **About:** PM-POSHAN is a centrally sponsored scheme for providing **one hot cooked meal** to students up to **Class 8 Government** and **Government-aided schools**.
  - Launched for an initial **five-year period (2021–22 to 2025–26)**, it replaced the earlier midday meal scheme (MDM).
    - Launched in **1995**, the MDM Scheme is the **world's largest school meal programme**, aimed at universalizing primary education.
- **Cost Sharing:** Its cost is shared by the **Centre and States on a 60:40 basis**, with the Centre supplying foodgrains.
- **Entitlements: Primary (class 1-5)** and **upper primary (class 6-8)** students receive **100g and 150g of food grains daily**, ensuring **700 calories.**
  - It also provides **extra nutrition (e.g, milk or eggs)** for children in aspirational districts and areas with **high anemia rates.**
- **Key Provisions:**
  - **Nutritional Gardens:** It promotes school nutritional gardens to provide students with additional micro-nutrients.
  - **Tithi Bhojan:** The Tithi Bhojan program, where **communities** provide **special food** to children on **special occasions like festivals,** is being widely promoted.
  - **Nutrition Expert:** Each school will appoint a **nutrition expert** to monitor Body Mass Index (BMI), **weight,** and **haemoglobin levels.**
  - **Social Audit:** Social audits are now **mandatory** in all schools to assess scheme implementation, with college students enlisted for **local monitoring**.
  - **Vocal for Atmanirbhar Bharat:** It encourages involvement of Farmers Producer Organizations (FPOs) and **Women** Self Help Groups (SHGs), and promotes locally grown **traditional foods** to boost local economies

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Science & Technology

Highlights

- *TR1 Cells Lead the Fight Against Malaria*
- *AI-Powered Autonomous Satellites*
- *India's AMR Crisis*
- *First Successful Use of Customised Base Editing*
- *ICMR Launches First Stigma Scale for Sickle Cell Disease*
- *Dr. M. R. Srinivasan and India's Nuclear Power Programme*
- *Quasi-steady State Cosmology Theory*
- *A-to-I mRNA Editing*
- *PSLV-C61/EOS-09 Mission*
- *Bharat 6G Vision*

T_R1 Cells Lead the Fight Against Malaria

Why in News?

A new study has revealed that **T_R1 (Type-1 Regulatory T-cells)**, rather than **T_H1 cells**, are the main drivers of the immune response to malaria, challenging earlier assumptions.

What are T_R1 Cells?

- **About: T_R1 cells**, or **Type-1 Regulatory T-cells**, are a **specialized group** of **CD4+ helper T-cells** that play a key role in **regulating the immune system**.
  - Unlike **other T-cells** that mainly **attack pathogens**, **T_R1 cells** help **control and balance immune responses** by reducing inflammation and preventing excessive immune reactions.
  - **CD4+ cells (helper T cells)** are a type of **white blood cell (lymphocyte)** that play a central role in **adaptive immunity**. They express the **CD4 protein** on their surface and help **coordinate the immune response.**
- **Role Against Malaria:** When infected by **Plasmodium falciparum**, the body must balance **fighting the parasite** and avoiding **excessive immune damage**.
  - **T_R1 cells** promote **immune tolerance** by controlling **inflammation**, allowing coexistence with the parasite and helping develop **clinical immunity** that prevents severe illness.
  - Essentially, T_R1 cells act as **peacekeepers**, **moderating the immune response** to protect the body.

What are the Key Components of the Human Immune System?

- **Physical Barriers:** These include the **skin and mucous membranes** that act as the **first line of defense** by preventing pathogens from entering the body.
- **Innate Immunity:** This is the **immediate, non-specific defense mechanism** that includes physical barriers, **white blood cells like neutrophils, macrophages, and natural killer cells,** as well as the **inflammatory response (such as swelling and fever)**.
  - It provides **rapid protection** against any invading pathogens.
- **Adaptive Immunity:** A **slower but highly specific defense system** that targets **particular pathogens** and **creates memory for long-term protection**. It involves specialized cells called **lymphocytes, mainly B-cells and T-cells**.
  - **B-cells:** B-cells produce **antibodies,** which are **proteins** that **bind** specifically to **antigens (foreign molecules on pathogens)** to neutralize or mark them for destruction.
  - **T-cells:** T-cells develop in the **thymus** and include:
    - **Helper T cells: Activate B-cells** to **produce antibodies**, assist macrophages in killing microbes, and **stimulate killer T cells**.
    - **Killer T cells: Destroy virus-infected cells**, cancer cells, and damaged cells.
    - **Regulatory T cells:** Help **control and balance** the immune response.

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- **Lymphatic System:** Organs like **lymph nodes, spleen, thymus, and bone marrow produce and house immune cells**, filtering out pathogens and coordinating immune responses.
- **Chemical Messengers:** Molecules like **cytokines** help immune cells **communicate and regulate** the body's defense mechanisms.

What is Malaria?

- **About:** Malaria is a life-threatening **vector-borne disease** caused by the **Plasmodium parasites**, transmitted through the bites of infected **female Anopheles mosquitoes**.
  - There are **5 Plasmodium parasite species** that cause malaria in humans and 2 of these species – **P. falciparum and P. vivax – pose the greatest threat.**
- **Transmission:** The **mosquito** becomes infected after biting an infected person. The malaria parasites then enter the **bloodstream** of the next person the mosquito bites.
  - The parasites travel to the **liver, mature, and then infect red blood cells**.
- **Treatment:**
  - **Artemisinin-based Combination Therapies (ACTs):** It is the **most effective** treatment for **Plasmodium falciparum malaria**, combining artemisinin with another antimalarial drug.
  - **Chloroquine:** It is used primarily for **Plasmodium vivax** and other **non-falciparum malaria** where **resistance is not present**.
  - **Primaquine:** It is used to **eliminate dormant liver forms (hypnozoites) of P. vivax and P. ovale** to prevent relapse.
  - **Other Drugs:** Such as **quinine, mefloquine, and doxycycline,** used in specific cases or **drug-resistant infections**.
- **Vaccine:** The **RTS,S/AS01** malaria vaccine, known as **Mosquirix**, became the **first malaria vaccine** to receive a **World Health Organization (WHO) recommendation**.
  - The **Serum Institute of India (SII)**, in collaboration with the University of Oxford, has developed a **malaria vaccine** called **R21/Matrix-M**, which has been recommended by **WHO** for use in **malaria-endemic regions**.
- **India's Efforts to Contain Malaria:** National Framework for Malaria Elimination 2016-2030, National Vector-Borne Disease Control Programme, National Malaria Control Programme (NMCP), Malaria Elimination Research Alliance-India (MERA-India).

AI-Powered Autonomous Satellites

Why in News?

The rise of Artificial Intelligence (AI)-powered **autonomous satellites** has exposed significant gaps in global space governance**.** As satellites gain the **ability to think and act independently,** questions around legal liability, ethical governance, and geopolitical risks have taken centre stage.

What is an AI-Autonomous Satellite?

- **About:** AI-autonomous satellites refer to spacecraft that leverage AI to operate **with minimal or no human intervention.**
  - These satellites use advanced algorithms, often based on machine learning **and** deep learning techniques to analyze data, make decisions, and execute tasks independently in real time.
- **Key Features:**
  - **Data Processing Onboard:** AI enables satellites to analyze data in space, filter out irrelevant details, and send only key insights to Earth, saving bandwidth and reducing delays.
    - Space-based data centers could **harness solar power** and release heat directly into space, reducing energy consumption. This approach could dramatically **cut carbon emissions compared to terrestrial data centers.**
  - **Swarm Intelligence:** In constellations or clusters, satellites can share data and learn collectively (also called **"hive learning"**). This allows for collaborative behavior and improved performance across the network.
  - **Automated operations:** They continuously monitor their own condition, identify faults, and perform repairs independently.

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- **Strategic Defence**: The next-gen AI satellite fleet will create a multi-layered surveillance system across GEO (Geostationary Equatorial Orbit), and LEO (Low Earth Orbit).
  - e.g., a GEO satellite detecting something can task a LEO satellite for closer inspection, enabling real-time monitoring and coordinated responses vital for science and defense.
- **Self-diagnosis:** Detect internal malfunctions and **attempt in-orbit fixes.**
- **Collision Avoidance:** With increasing space traffic and debris, autonomous satellites can use AI to predict potential collisions and perform evasive maneuvers without awaiting instructions from ground control.
- **Combat Support:** Satellites provide real-time threat detection with autonomous target tracking and engagement. They can adapt operations based on situational needs, such as retargeting sensors after disasters or adjusting orbit due to environmental conditions.

➢ **Advancements of AI in Space Exploration:** India will launch **50 AI-powered satellites over the next five years.** These satellites will boost space exploration and national security, marking a major step in integrating AI into space technology.

- Indian Space Research Organisation (ISRO) landmark use of AI was seen in Chandrayaan-3, the Pragyaan Rover, without an orbiter, used AI to communicate with the **Vikram Lander,** aiding in safe landing, navigation, and resource detection.
- China launched **12 satellites** as part of building its **Three-Body Computing Constellation**, which aims to create the **world's first space-based supercomputer.** Equipped with AI, these satellites process data in orbit and test advanced technologies.

Note: TakeMe2Space, a Hyderabad-based space technology firm, will launch **My Orbital Infrastructure - Technology Demonstrator (MOI-TD), India's first AI lab in space**. The mission will demonstrate real-time data processing in orbit, making space research more affordable and accessible.

What are the Emerging Risks of AI-Autonomous Satellites?

➢ **Fault Attribution and Legal Ambiguity:** If an autonomous satellite miscalculates and causes a near-collision or actual damage, it's unclear who is legally liable the **AI developer**, **launching state**, **operating entity**, or **owner nation**.
- This creates **multi-jurisdictional entanglements** where no single entity is clearly accountable for AI decisions.

➢ **AI Hallucinations and Misjudgments:** AI systems can misclassify threats, such as mistaking a commercial satellite for a **hostile object or identifying a harmless item as a collision hazard,** which could lead to unintended confrontations in space.
- This can lead to **unintended manoeuvres** or **defensive actions** that escalate into **diplomatic or military conflicts**.

➢ **Dual-Use and Weaponisation Risks**: AI technologies carry dual-use risks, as autonomous satellites designed for civilian purposes could be repurposed for **real-time surveillance, targeting, or even offensive operations in space**, aiding military operations and potentially escalating an arms race in orbit.

➢ **Collision Risk and Orbital Debris** Thousands of autonomous satellites are expected in LEO by 2030. Without coordinated **collision-avoidance protocols**, **autonomous decisions** by multiple satellites could lead to **space traffic congestion**, accidents, or a **cascade of debris** (Kessler Syndrome).

➢ **Lack of Human Oversight:** Current treaties demand "**authorization and continuing supervision**" of space activities by states.
- True autonomy, however, limits the scope for **meaningful human control**, raising concerns about **automated decision-making without accountability**.

➢ **Gaps in Certification and Standards:** Unlike aviation or maritime sectors, space lacks **global certification frameworks** for testing and verifying the safety and reliability of AI in satellites.
- There are no current **international standards for AI performance in hostile or anomalous space conditions**.

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- **Ethical Dilemmas:** AI satellites could support lethal autonomous weapons systems (LAWS). This raises ethical concerns over the **delegation of life-and-death decisions to machines**, especially if deployed in or from space, which remains legally and morally contentious.
  - Autonomous AI warfare systems lack a **moral compass and make decisions without considering long-term diplomatic consequences.** When violations of international laws or human rights occur, assigning responsibility becomes complex.
- **Legal Gaps:** Current space laws such as the Outer Space Treaty (1967) and the **Liability Convention (1972)** assume **human control and state responsibility** but lack **clear provisions for AI-driven autonomous satellites.**
  - **Article VI of the OST** holds states responsible for national space activities but **does not clearly address responsibility for autonomous actions.**

Outer Space Treaty and Liability Convention

- **Outer Space Treaty (1967)**: It is based on the **1963 UN Declaration,** and is the foundation of space law. It bans **nuclear and weapons of mass destruction in space** and ensures space is used for peaceful purposes by all nations. **India has ratified the Outer Space Treaty.**
- **Liability Convention (1972):** Building on Article 7 of the OST, Liability Convention makes **launching states absolutely liable for damage their space objects** cause on Earth and liable for fault-based damage in space. **India has ratified the Liability Convention.**

India's AMR Crisis

Why in News?

The launch of Nafithromycin **(Miqnaf)**—India's first **indigenously developed antibiotic in over 30 years**, marks a key step in combating Antimicrobial Resistance (AMR), but the scale and urgency of the AMR crisis demand **far broader and sustained efforts.**

What is Antimicrobial Resistance (AMR)?

- **About: AMR** occurs when **microorganisms** (bacteria, viruses, fungi, parasites) **adapt and resist drugs** like antibiotics and antivirals, making infections **harder to treat** and easier to spread.
  - Often called **"superbugs,"** these drug-resistant microbes are a **major global threat** and are listed by **WHO among the top 10 health risks.**
- **Threat:** A 2019 report by the **Institute of Health Metrics and Evaluation (IHME)** revealed that **AMR caused 2,97,000 deaths in India** and **1.27 million globally**.
  - If unchecked, **The Lancet** projects **1.91 million direct AMR deaths and 8.22 million associated deaths by 2050.**

What are the Key Issues Leading to Rise of AMR in India?

- **Overuse of Antibiotics:** Improper prescriptions and overuse of **antibiotics**—even for **viral infections** like influenza—drives **resistance**.
  - Although only **30% of antibiotics** are used in **humans**, in **2022**, **59%** of **India's antibiotic consumption** came from the **"Watch" group**.
    - The **"Watch" group** is a category of **antibiotics** classified by the **World Health Organization (WHO)**, intended for use only in treating **severe infections.**
- **Inadequate Healthcare Infrastructure:** Lack of **diagnostic tools** leads doctors to prescribe **broad-spectrum antibiotics empirically**. **Overcrowded**, **unhygienic hospitals** and **poor infection control** promote **resistant bacteria** and **hospital-acquired infections**.
  - Frequent **AMR outbreaks** in **Indian tertiary care centers** highlight systemic deficiencies fueling **antimicrobial resistance (AMR) .**
- **Lack of New Antibiotics:** No new antibiotics emerged for **30 years** until **Nafithromycin (2024)**, as **pharma companies** prioritize more profitable **chronic disease drugs** over **antibiotic R&D**.

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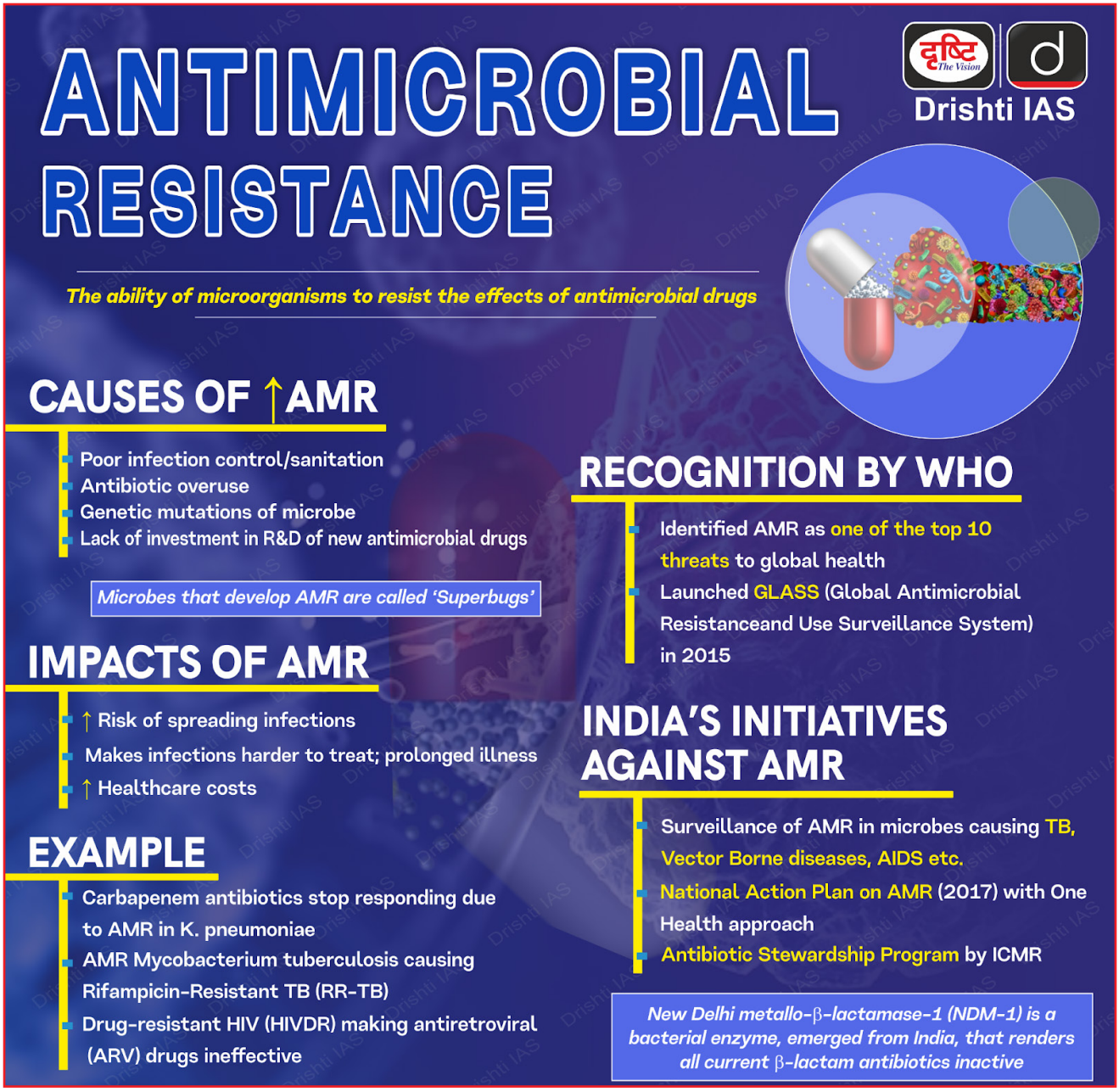
- **Unregulated Use in Agriculture and Animal Husbandry: India** is among the top **antibiotic consumers in livestock**, where **70%** are used for **growth promotion** in **livestock, agriculture, and aquaculture**.
  - These antibiotics enter the **food chain** and **environment**, spreading **resistance**. **Indiscriminate antibiotic use in aquaculture** further worsens the problem.
- **Environmental Factors: Pharmaceutical factories** discharge **antibiotic residues** into water bodies without proper treatment, contaminating **rivers** and **soil**, and creating **resistance hotspots**.
  - **Inadequate sewage** and **waste management** in India further allow **resistant microbes** to spread unchecked in the **environment.**



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What are the Consequences of Rising Antimicrobial Resistance?

- **Health Catastrophe:** AMR makes infections **harder to treat, raising mortality and morbidity**. Common illnesses like **tuberculosis, pneumonia, and urinary tract infections** can become life-threatening.
  - E.g., In 2017, **multidrug-resistant or rifampicin-resistant TB** caused **230,000 deaths**, mostly in **India and China**.
  - **Surgeries**, **chemotherapy**, and **transplants** depend on **effective antibiotics**; without them, **routine procedures** become **high-risk.**
- **Economic Cost:** The World Bank estimates AMR could add **USD 1 trillion** in healthcare costs by 2050 and cause **USD 1–3.4 trillion** in annual **GDP** losses by 2030.
  - **Longer illnesses** and **deaths** lower **workforce efficiency**, while **livestock losses** disrupt **food chains**.
- **Food Security Crisis:** With **70% of antibiotics** used in **farming**, the **AMR** accelerates threatening **food availability**, **quality**, and **safety**, and posing a risk to **national food security**.
  - E.g., **Resistant E. coli** in poultry can infect humans, and antifungal-resistant blights harm crops like **wheat, rice, and bananas.**
- **Environmental Spread: Drug waste**, hospital sewage, and **farm runoff** spread **resistance genes**, while **migratory birds** and marine life carry resistant bacteria worldwide.
  - E.g., **the River Ganga carries superbug bacterial genes**, exposing users to antibiotic-resistant infections.
- **Social Implications: Poorer communities** and countries with limited healthcare face higher **AMR deaths** due to scarce diagnostics and drugs, risking declining public confidence in treatments.

What Measures are Underway to Tackle Antimicrobial Resistance in India?

- **National Action Plan on AMR (2017):** NAP on AMR aligns with global efforts, focusing on **surveillance**, **rational antibiotic use**, and **public awareness**.
  - Coordinated by the National Centre for Disease Control (NCDC), it covers **50 medical colleges/ labs** across **27 states** and **6 UTs** as of March 2024.
- **AMR Surveillance Networks:** Through the **National Antimicrobial Surveillance Network (NARS-Net)**, India monitors **nine priority bacterial pathogens**, including **Escherichia coli.**
- **Antibiotic Regulation:** In August 2024, the government banned 156 fixed-dose combination (FDC) drugs, including popular medicines such as **Cheston Cold and Foracet.**
  - Hospital Antimicrobial Stewardship Programs (AMSP) optimize patient care and help **combat antimicrobial resistance**.
  - Schedule H1 drugs (last-resort antibiotics e.g., **carbapenems**) require chemists to retain **prescription copies** before sale.
  - In January 2024, **Kerala** became the first state in India to ban the **over-the-counter sale** of **antibiotics without a prescription**, setting an example that other states can follow to reduce **antibiotic misuse.**
- **Research & Innovation: Centre for Cellular and Molecular Platforms (C-CAMP) India AMR Challenge** identifies and supports **startups, companies, and innovators** developing technologies to tackle AMR.
  - Companies like **Wockhardt**, **Orchid Pharma**, and **Bugworks** are among the few in India focusing on **antibiotic development**.
- **Public Awareness:** Red Line Campaign warns against using **medicines marked with a vertical red line**, including antibiotics, without a prescription.
- **Global Collaboration:** India participates in **WHO's** GLASS (Global Antimicrobial Resistance Surveillance System) to standardize and strengthen the **collection, analysis,** and **sharing** of data on AMR across countries.

First Successful Use of Customised Base Editing

Why in News?

Scientists in the US have, for the first time, successfully employed a successful **CRISPR-based** gene-editing therapy to treat a baby diagnosed with a rare genetic disorder known as **CPS1 deficiency.**

- **CPS1** deficiency is a **rare metabolic disorder** in which the **liver** is unable to effectively process byproducts of **protein metabolism**, resulting in the accumulation of **toxic levels of ammonia** in the body.

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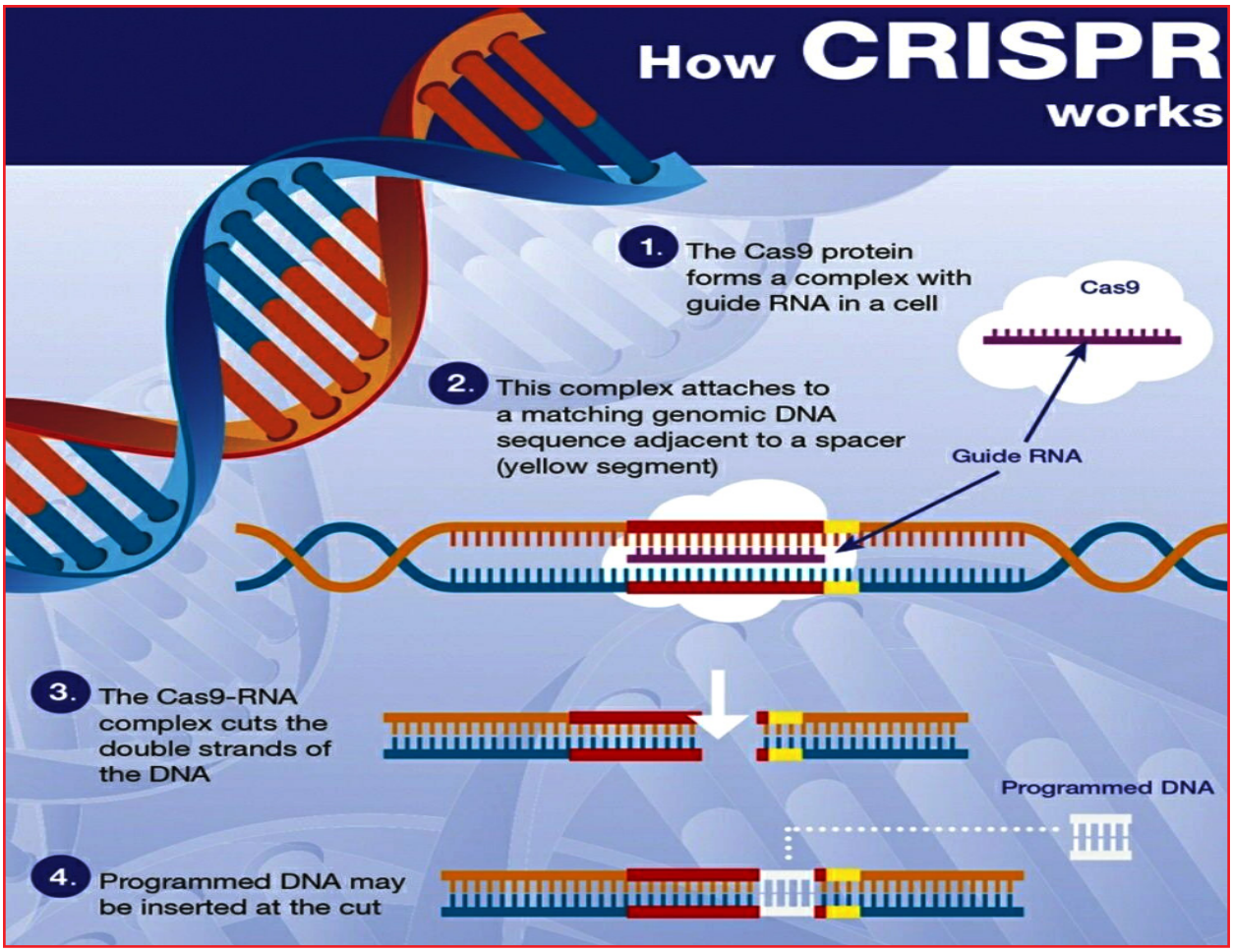
What is Gene Editing Therapy?

- **About: Gene Editing Therapy** is a medical approach that involves precisely **modifying** DNA to correct **genetic defects, treat diseases, or enhance biological functions**.
  - The most widely used tool is **CRISPR-Cas9**, which acts like **molecular scissors** to **cut and edit specific genes**.
- **Applications:** Treating Genetic Disorders e.g., Sickle Cell Anemia, Cancer Immunotherapy e.g., CAR-T Cell Therapy and Agricultural Uses e.g., Drought-resistant crops**.**
- **Tools Used for Gene Editing:** CRISPR-Cas9 technology is a **powerful and precise tool** for **editing genes** that allows scientists to **cut** and **modify DNA** at **specific locations** inside living organisms.
  - **It** uses **guide RNA** to locate and **cut faulty DNA**, enabling scientists to replace it with the **correct sequence** for **cellular repair.**
  - **TALENs and ZFNs: Transcription Activator-Like Effector Nucleases (TALENs)** and **Zinc Finger Nucleases (ZFNs)** are older technologies that also allow targeted DNA modifications.



How does Base Editing Differ from Traditional Gene Editing?

- **Base Editing: Unlike CRISPR-Cas9**, which creates **double-strand breaks** in DNA, Base editing allows **direct, precise conversion** of one DNA base into another without cutting both DNA strands.
  - This reduces risks of **unintended mutations and improves accuracy.**

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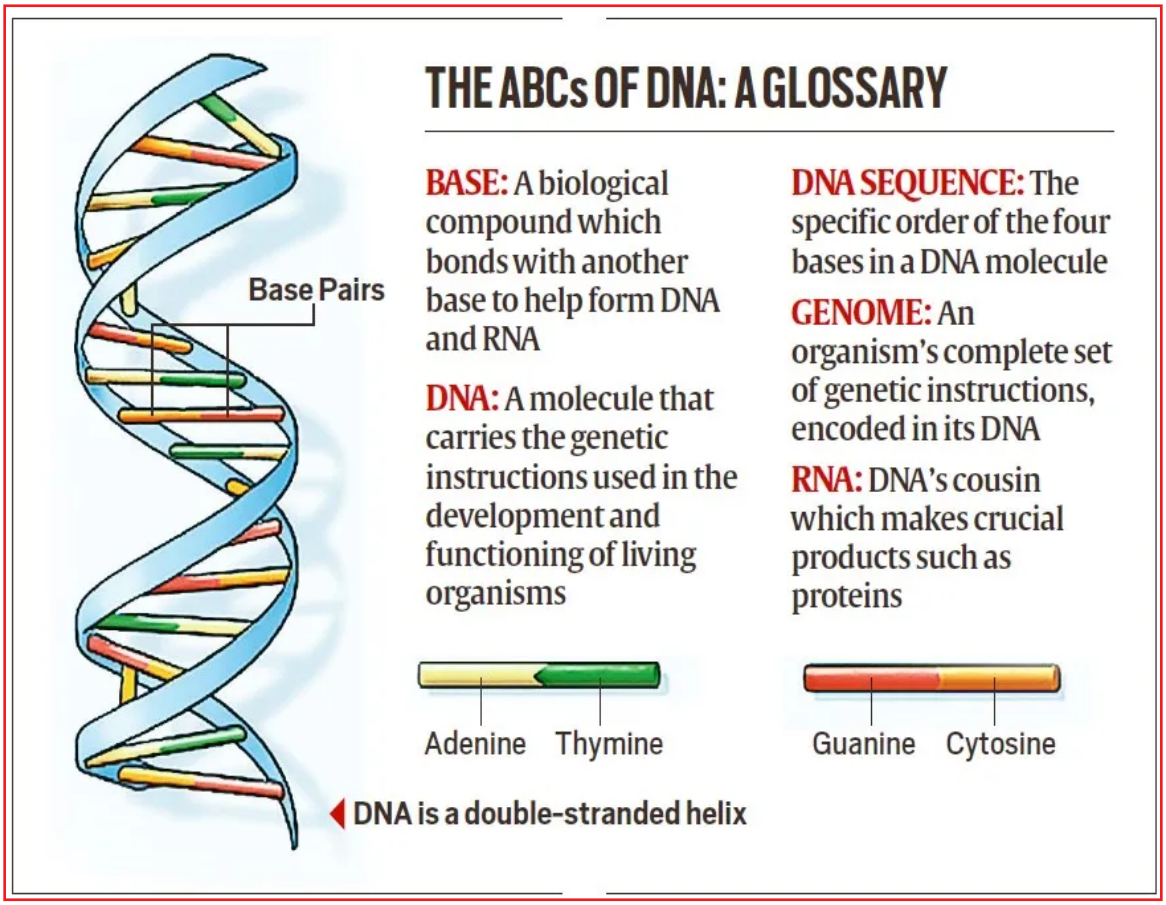
- **Mechanism:** The base editing tool uses a **fusion of Cas9** with a **base-modifying enzyme** to convert specific bases (for example, changing a faulty cytosine to thymine) that cause genetic diseases.
- **Precision:** Base editing can be likened to **using a pencil eraser to fix a typo** instead of scissors and glue, allowing safer and more targeted genetic correction.
  - Scientists identified the exact **mispaired base** causing **CPS1 deficiency** and used a **base editor** to precisely **locate and correct** it in his DNA.
    - This **personalized treatment** eliminated **toxic ammonia buildup**, marking the **first known successful human case** of **base editing.**



ICMR Launches First Stigma Scale for Sickle Cell Disease

Why in News?

The Indian Council of Medical Research (ICMR) has developed the ICMR-SCD Stigma Scale for India (ISSSI), the country's first tool to measure and address stigma faced by sickle cell disease (SCD) patients and their caregivers. The scale includes two components: ISSSI-Pt for patients and ISSSI-Cg for caregivers.

What are the Key Features of ICMR-SCD Stigma Scale for India?

- **Multi-Dimensional Tool:** Assesses stigma in **5 areas- familial/reproductive stigma, disclosure issues, illness burden, discrimination,** and **healthcare stigma.**

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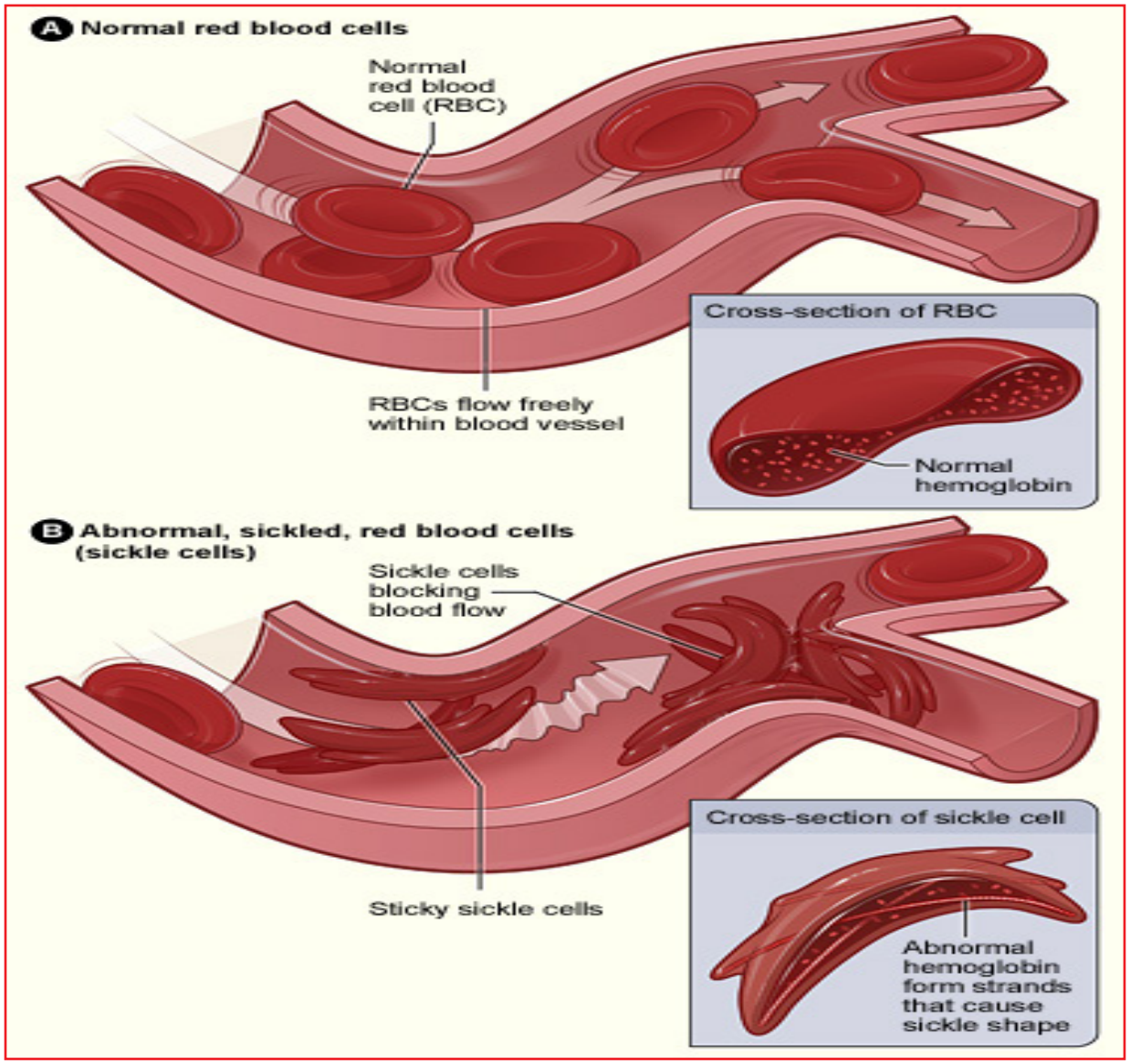
- **Culturally Grounded:** Developed in **6 SCD-endemic districts** to reflect India's tribal, regional, and linguistic diversity.
  - Existing 3 **SCD stigma scales** from **Africa and America** were **unsuitable for India** due to **phenotypic, socio-cultural, and contextual differences,** necessitating a locally relevant tool.
- **Validated & Reliable:** Psychometrically **robust, suitable for clinical use, research, and policy evaluation.**

What is Sickle Cell Disease?

- **About:**
  - Sickle Cell Disease (SCD) is a **hereditary blood disorder** caused by a **genetic mutation** in the **haemoglobin gene**, leading to **abnormal, crescent- or sickle-shaped red blood cells (RBC)** instead of the usual round shape.
    - These **sickle-shaped RBC**s are **less flexible and do not move easily** through **small blood vessels**, potentially **leading to blockages.**
    - This **impairs blood circulation** and leads to anaemia**, organ damage, severe pain,** and **reduced lifespan**.



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- **Causes :**
  - Sickle cell disease is a **genetic disorder** caused by **inheriting two mutated β-globin genes**, one from each parent, resulting in the production of abnormal sickle haemoglobin.
- **Treatment:**
  - **Gene Therapy:** SCD can be treated by **bone marrow** or **stem cell** transplantation by methods like **CRISPR.**
  - **Blood Transfusions:** These can help **relieve anemia and reduce the risk of pain crises.**
  - Medications for SCD include **Voxelotor** (prevents sickling and anemia), **Crizanlizumab** (reduces vessel blockage and pain crises), **Hydroxyurea** (lowers complications), and **L-glutamine** (reduces pain episodes), along with **nonsteroidal anti-inflammatory drugs (NSAIDs)** and **opiates** for pain relief.
- **Prevalence:**
  - SCD is a **major public health concern** in India, with the **world's second-largest SCD burden**, with **over 1 million affected individuals,** and **ranks 3rd globally in SCD births** after **Nigeria** and the **Democratic Republic of the Congo.**
  - Carrier rates among **tribal groups range from 1% to 40%**, with most patients concentrated in the tribal belt across **Odisha, Jharkhand, Chhattisgarh, Madhya Pradesh, and Maharashtra.**
- **Government Initiatives:**
  - **National Sickle Cell Anaemia Elimination Mission**: Under this, **CSIR** is developing **gene-editing therapies for SCD.**
  - **National Health Mission (NHM) 2013:** Special focus on **SCD.**
  - **The National Guidelines for Stem Cell Research 2017:** It **restricts the commercialisation of stem cell therapies** to clinical trials, except for **Bone marrow transplantation (BMT)** for SCD.
  - **Rights of Persons with Disabilities (RPwDs) Act, 2016:** SCD is included in the 21 disabilities that provide for **benefits of reservation.**

Dr. M. R. Srinivasan and India's Nuclear Power Programme

Why in News?

Dr. Malur Ramasamy Srinivasan, former Chairman of the **Atomic Energy Commission (AEC)** and a pioneer of **India's nuclear programme**, passed away, marking the end of a remarkable era in Indian atomic energy.

Who was Dr. Malur Ramasamy Srinivasan?

- **Contributions:** Srinivasan joined the Department of Atomic Energy (DAE) in 1955 and worked under **Dr. Homi Jehangir Bhabha**, contributing to India's first nuclear reactor, Apsara.
  - He served as the **Principal Project Engineer for India's first atomic power station at Tarapur** and later as the Chief Project Engineer for the Madras Atomic Power Station.
  - He became the Founder-Chairman of the **Nuclear Power Corporation of India Limited (NPCIL),** under his leadership, **18 nuclear power units were developed.**
- **Global and National Influence:** Dr. Srinivasan served as Senior Advisor to the **International Atomic Energy Agency, Vienna** (1990–92)**,** Member of the **Planning Commission (1996–98),** and **National Security Advisory Board** (2002–04, 2006–08). He also chaired the Karnataka Task Force on Higher Education (2002–04).
- **Honours and Awards:** Dr. Srinivasan received **Padma Shri (1984), Padma Bhushan (1990), and Padma Vibhushan (2015).**

What is India's Nuclear Power Programme?

- **About:** India's Nuclear Power Programme was primarily **formulated by Dr. Homi J. Bhabha,** a prominent Indian physicist often called the **"father of the Indian nuclear program."**
  - It is a **strategic, three-stage plan** aimed at harnessing **atomic energy primarily for peaceful purposes,** such as electricity generation, while ensuring self-reliance in energy resources.
  - It is designed to make **optimal use of India's limited uranium reserves and abundant thorium resources.**

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- India's programme is based on a **closed fuel cycle; each stage generates the fuel for the next,** enhancing resource utilisation and reducing waste.

➢ **Three-Stage Nuclear Power Programme:**

- **Stage 1:** Using **Pressurized Heavy Water Reactors (PHWRs)** fueled by **natural uranium** to **generate power and produce plutonium** and depleted uranium as by-products.
  - In Stage 1, it is estimated that about 420 gigawatt-years (GWe-yrs) of electricity can be produced.
- **Stage 2:** Deploying **Fast Breeder Reactors (FBRs)** that use **plutonium from PHWRs** to breed more fuel while generating electricity (additional 54,000 GWe-yrs). FBRs **also produce uranium-233 from thorium.**
- **Stage 3:** It involves utilizing **thorium-based reactors** to convert thorium into **fissile uranium-233,** ensuring a **sustainable and long-term nuclear fuel supply**.
  - It aims at large-scale power generation using India's abundant thorium reserves. This stage is **projected to yield about 358,000 GWe-yrs of electricity,** helping secure energy needs beyond the depletion of coal.
  - The **world's first thorium-based nuclear plant, "Bhavni,"** using Uranium-233, is being **set up at Kalpakkam in Tamil Nadu.**

➢ **Current Status:** Stage 1 is commercially mature. The second stage with FBRs began with a **500 MWe reactor at Kalpakkam, Tamil Nadu.**

- **Stage 3 thorium-based systems have been developed at the pilot scale**; however, commercial deployment is yet to begin.

➢ **Additionalities to the Three-Stage Program:** To accelerate nuclear power capacity, India is **complementing its three-stage program with imported reactors.**

- **Kudankulam Nuclear Power Project (KKNPP),** built with Russian collaboration, currently operates two 1,000 MWe **VVER (water-water energy)** reactors since 2013 and 2016, with four more under construction.
  - VVER reactors, known for safety and reliability, are used globally and have clocked over 2,000 reactor-years of operation.
- **Nuclear energy is the 5th-largest source of electricity for India** which contributes around **3% of the total electricity generation in the country.**

➢ **Future Plans and Projections:** The study by the **Department of Atomic Energy (DAE),** estimates the nuclear share to be about **8.6% by the year 2032 and 16.6% by the year 2052.**

Quasi-steady State Cosmology Theory

Why in News?

Renowned astrophysicist and one of India's most influential scientists, **Professor Jayant Vishnu Narlikar**, passed away in Pune. He was best known globally for his pioneering work on the **quasi-steady state cosmology** theory of the universe.

What is the Quasi-steady State Cosmology Theory of the Universe?

➢ **About:** The Quasi-Steady State Cosmology (QSSC) is a refined version of the **Steady-State Theory of the universe.** It was developed in the early 1990s **by Fred Hoyle, Jayant Narlikar, and Geoffrey Burbidge** as a response to the increasing dominance of the **Big Bang theory**, while addressing some of its limitations.

➢ **Key Features of QSSC:**

- **Combines Steady-state and Cyclic Concepts:** QSSC proposes that the universe follows a cyclical pattern of periodic expansion and contraction over vast timescales, while still maintaining an **overall steady-state appearance**.
- **No Singular Origin:** While the **Big Bang theory posits a singular origin of the universe**, QSSC **rejects the idea of a singular explosive beginning**.
  - Instead, it suggests that the **universe has existed eternally and** undergoes periodic **episodes of matter creation and expansion.**
  - **Matter is continuously created** in localized, non-singular events called **'mini-bangs'** or **creation events**, which occur intermittently in the universe, **avoiding a single origin point.**
- **Modified General Relativity:** The theory introduces modifications to **Einstein's equations of general relativity** to account for continuous matter creation, a key contribution by **Jayant Narlikar**.
- **Scientific Acceptance: QSSC considered a minority alternative to the Big Bang,** with some mathematical innovations, but not widely accepted in mainstream cosmology.

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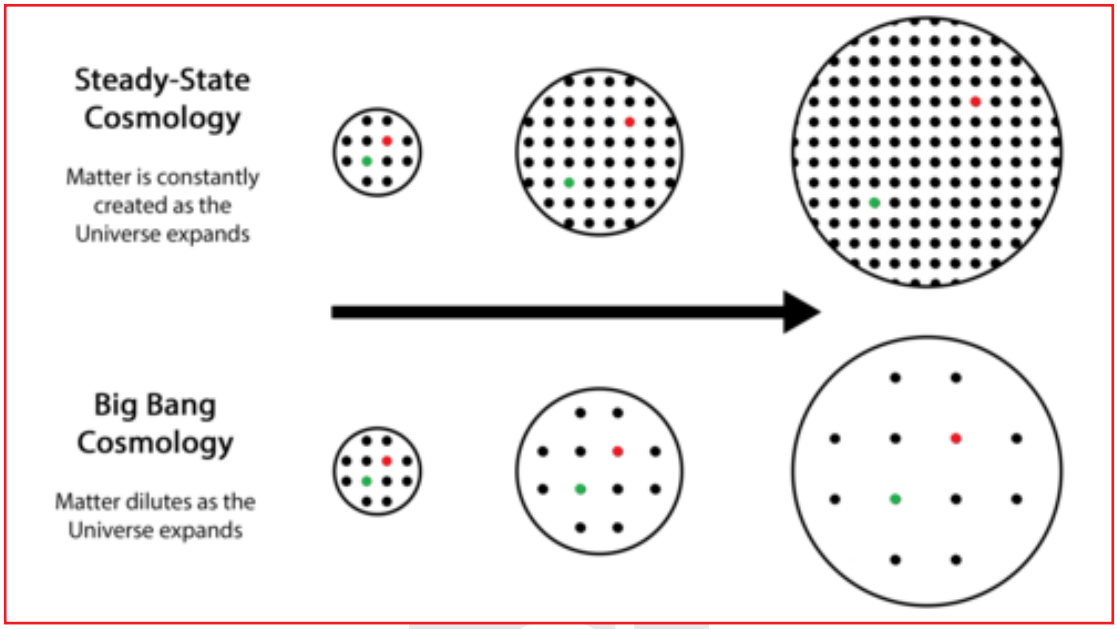
Note: The steady-state theory, proposed in 1948 by **Hermann Bondi, Thomas Gold, and Fred Hoyle**, posits that the universe is eternally expanding while maintaining a constant average density.



What is Big Bang Theory?

- **About:** The Big Bang Theory, proposed in **1927 by Belgian cosmologist Georges Lemaître,** explains the **origin and evolution of the universe**, proposing that it began around **13.7 billion years ago from an extremely hot, dense point known as a singularity**.
  - The evolution of the universe started with a **phase of cosmic inflation** (an incredibly **rapid expansion** that occurred within a fraction of a second after the Big Bang).
  - As the **universe expanded and cooled**, energy converted into fundamental particles, forming matter and radiation. This **led to the creation of atoms, stars, galaxies, and planets**, along with the emergence of the four fundamental forces: **gravity, electromagnetism, strong nuclear, and weak nuclear forces.**
- **Planck Epoch:** The Planck Epoch is the **first 10^{-43} seconds after the Big Bang**, when the universe was **extremely hot and dense.** Current physics (General Relativity and Quantum Mechanics) cannot describe this period, and a **theory of quantum gravity** is needed to understand it.
- **Evidence Supporting Big Bang:**
  - **Edwin Hubble's observations,** famously known as **Hubble's Law,** showed that **galaxies are moving away from each other,** with farther galaxies receding faster, indicating the **universe is expanding**.
  - The **Cosmic Microwave Background (CMB)** radiation, discovered by Penzias and Wilson, is the **cooled leftover radiation from the first light** that traveled freely through the Universe shortly after the Big Bang.
    - It is considered a **fossil or echo of the Big Bang,** this ancient light has since cooled and weakened and is now detected as **microwaves**.
    - **The European Space Agency's Planck mission** observed this oldest detectable radiation, providing valuable insights into the Universe's origin and evolution.

Who was Dr. Jayant Vishnu Narlikar?

- **Early Life:** Born on 19th July 1938 in Kolhapur, Maharashtra, Dr. Jayant Vishnu Narlikar pursued higher studies at Cambridge University.

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- **Institutional Building:** In 1988, he was invited by the University Grants Commission (UGC) to establish the Inter-University Centre for Astronomy and Astrophysics (IUCAA) in Pune as its Founder Director. His leadership made IUCAA a global science hub.
- **Bibliography:** Dr. Narlikar was also a noted science communicator and author of popular science fiction works, including ***An Introduction to Cosmology.***
  - His autobiography, ***A Tale of Four Cities (Char Nagaratale Majhe Vishva),*** was awarded the Sahitya Akademi Award **in 2014** for its literary merit in Marathi.
- **Awards:** Received Padma Bhushan **(1965)** and **Padma Vibhushan (2004).** In 1996, Narlikar received the UNESCO Kalinga Prize for his exceptional work in popularizing science.
  - Additionally, in 2011, he was conferred the **Maharashtra Bhushan,** the highest civilian honor awarded by the Government of Maharashtra.

Read more: Challenging Big Bang Theory

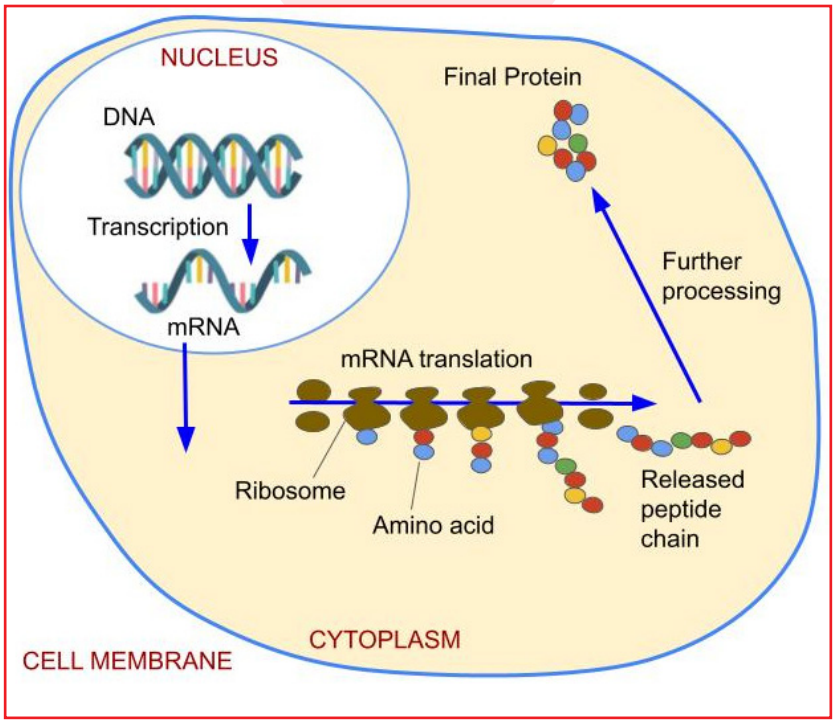
A-to-I mRNA Editing

Why in News?

Researchers from China highlighted the process of **A-to-I mRNA editing,** especially in the wheat pathogen ***Fusarium graminearum,*** revealing its complex role in biology.

What is A-to-I mRNA Editing?

- **DNA:** DNA (Deoxyribonucleic acid) is the genetic material of organisms and has a **double helix structure.** It is composed of four nucleotides: **adenine (A), thymine (T), cytosine (C), and guanine (G), which pair specifically (A with T, and C with G).**
  - The sequence of these bases carries the instructions for making proteins and Ribonucleic acid (RNA).



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- **Messenger RNA (mRNA):** It is a type of **single-stranded RNA** that plays a key role in protein synthesis. It is created from **DNA during the process of transcription**.
  - mRNA acts as a messenger by carrying genetic instructions from the DNA in the cell's nucleus to the **cytoplasm,** where proteins are made.
  - In the cytoplasm, the cell's protein-making machinery (mainly ribosomes) reads the mRNA sequence.
    - Each set of three bases (called a codon) corresponds to a specific amino acid. These amino acids are then linked together to form proteins, which perform essential functions in the body.
- **A-to-I mRNA Editing:** It is a biological process where the **nucleotide adenosine (A)** in messenger RNA (mRNA) is enzymatically converted to **inosine (I).**
  - The editing is performed by enzymes called **ADARs (Adenosine Deaminases Acting on RNA).**
- **Impact on Protein Synthesis:** Inosine as result of A-to-I mRNA Editing is read as **guanine (G) by ribosomes** during translation, potentially altering the amino acid sequence of proteins.

Note: Transcription is the process of making an RNA copy of a gene's DNA sequence. **Translation,** in genomics, is the process by which the information encoded in messenger RNA (mRNA) directs the addition of amino acids during protein synthesis.

How Does RNA Editing Compare to DNA Editing?

- **RNA Editing:** It is the process of **correcting mistakes in messenger RNA (mRNA)** after it has been synthesized from DNA but before it directs protein production.
  - This process allows cells to produce normal, functional proteins despite errors in the mRNA sequence.
- **RNA Editing Vs. DNA Editing:** RNA editing causes **temporary changes** to the RNA, unlike DNA editing which permanently alters the genome.
  - This temporary nature allows doctors to halt therapy if adverse effects arise, reducing long-term risks.
  - RNA editing relies on **ADAR enzymes naturally found in the human body,** lowering the chance of immune reactions compared to DNA editing tools that use bacterial proteins.
  - **RNA editing is therefore potentially safer for repeated treatments** and for patients with immune sensitivities.

PSLV-C61/EOS-09 Mission

ISRO's Polar Satellite Launch Vehicle **(PSLV-C61)** mission failed to place the Earth Observation Satellite**-09 (EOS-09)** into its intended sun-synchronous polar orbit due to a **glitch in the rocket's third stage**.

- This was ISRO's **101st mission** and the **63rd** using the **PSLV**. The EOS-09 satellite carried a **Synthetic Aperture Radar (SAR) payload** designed to capture **all-weather Earth images.**

Note:

- A **sun-synchronous polar orbit (SSO)** is a polar orbit where a satellite passes over the **same Earth location at the same local solar time** each day, maintaining a **consistent position relative to the Sun.**

What is PSLV?

- **About:** The Polar Satellite Launch Vehicle (PSLV) is a highly reliable and cost-effective **launch vehicle** developed by ISRO.
  - It is used to transport satellites into various orbits, including **sun-synchronous**, **geostationary**, and **navigation** orbits.
- **Function**: It carries satellites (payloads) into space, overcoming Earth's gravity through powerful propulsion systems. Once the desired orbit is reached, satellites are deployed from the vehicle.
- **Structure: PSLV has 4 stages:**
  - **PS1**: Solid rocket motor with 6 strap-on boosters.
  - **PS2**: Liquid engine (Vikas engine).
  - **PS3**: Solid rocket motor for high thrust post-atmospheric phase.
  - **PS4**: Two liquid-fuel engines for final orbital insertion.
- **Variants**: **PSLV-XL (with extended strap-ons),** PSLV-DL, PSLV-QL, etc., are selected based on payload weight and target orbit.

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- **Significance**: Known as ISRO's **"workhorse"** due to its versatility and high success rate.
  - Used in major missions like Chandrayaan-1 (2008) and Mars Orbiter Mission (2013).
  - Achieved global recognition by launching **104 satellites in a single mission (PSLV-C37, 2017)**.
- **Earlier Failure:** The PSLV has **failed twice in its history.** The first failure was in **1993** (PSLV-D1) due to **software issues**, causing the IRS-1E satellite to crash into the ocean.
  - The second was in **2017** (PSLV-C39), when a **heat shield separation failure** trapped the IRNSS-1H satellite, preventing its deployment into orbit.

What is Earth Observation Satellite-09 (EOS-09)?

- **About: EOS-09**, also called RISAT-1B, is an advanced Indian **remote sensing satellite** equipped with a C-band Synthetic Aperture Radar (SAR) for all-**weather, day-and-night Earth imaging**.
  - It is designed for diverse applications including **land-use mapping, hydrology, disaster management, agriculture, forestry**, and **coastal security.**

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- **Key Features:**
  - **All-weather capability:** SAR penetrates clouds, rain, fog, and darkness, ensuring continuous surveillance.
  - **High resolution:** Offers up to 1-meter resolution and wide swath coverage (10 to 225 km).
  - **Multiple Imaging modes:** Supports five modes like High-Resolution Spotlight and Medium Resolution ScanSAR for varied uses.
  - **Dual-use:** Supports both civilian applications and defence surveillance, including monitoring military activity and maritime security.
  - **Orbit:** Intended for a sun-synchronous polar orbit for consistent daily coverage.

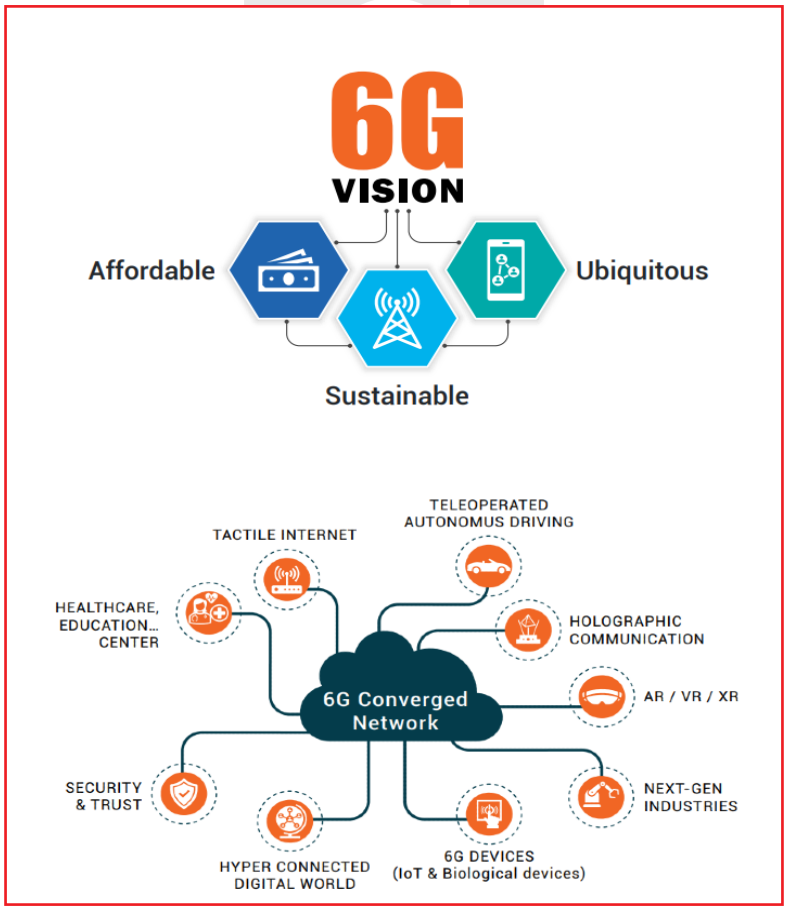
Bharat 6G Vision

Why in News?

India reaffirmed its commitment to lead the global race in 6G technology during the **'Bharat 6G 2025' International Conference,** highlighting 6G as a civilisation-scale opportunity with transformative potential, aligning with **Bharat 6G Vision.**

What is Bharat 6G Vision?

- **About:** Launched in 2023, the Bharat 6G Vision is based on the principles of affordability, sustainability, and ubiquity. It aims to position India as a global leader in **sixth-generation (6G) telecommunications technology by 2030.**



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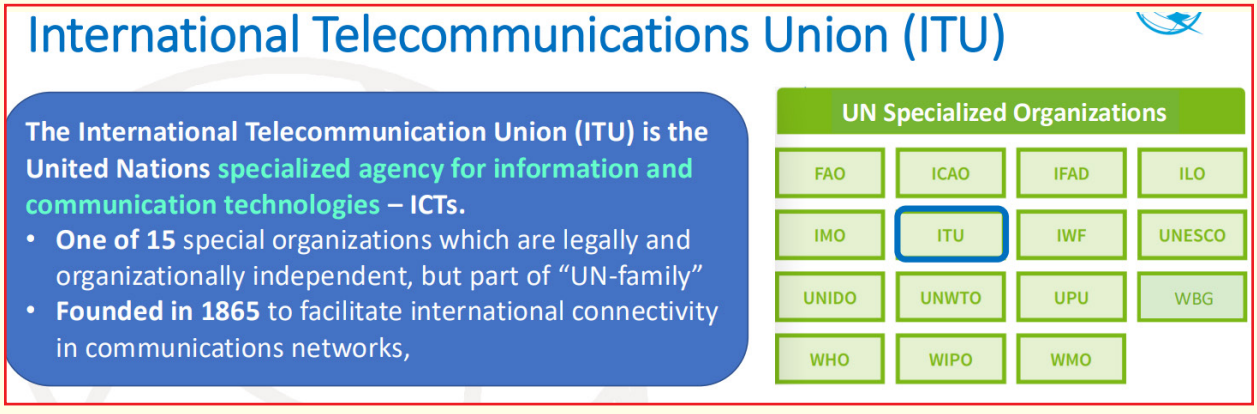
- **Significance:** It builds upon India's strong 5G foundation with over **4.35 lakh 5G base stations deployed by 2024.**
  - It aims to transform not just communication, but the entire digital ecosystem with future-proof, secure, and green networks (energy-efficient networking technologies).
- **Features of the Vision:**
  - **Timeline:** It is a 9-year phased mission from 2022 to 2031, targeting major milestones such as **R&D breakthroughs, field trials, and contributions to international 6G standards.**
  - **Infrastructure:** Establishment of two advanced testbeds, **the 6G Terahertz (THz) Testbed** and the **Advanced Optical Communication Testbed** to drive research and innovation domestically.
    - Sanctioned 100 5G labs at academic institutions in FY 2023-24, across India for capacity building & for building a 6G ready academic and start-up ecosystem in the country.
  - **Bharat 6G Alliance:** It is a national platform bringing together academia, startups, research institutions, industries, and policymakers to drive the development and deployment of 6G technologies.
- **ITU 2030 Alignment:** India's 6G vision is aligned with the **International Telecommunication Union's (ITU) International Mobile Technology (IMT) 2030 framework,** contributing to global capabilities like ubiquitous connectivity, interoperability, and sustainability.

What is 6G Technology?

- **About:** 6G refers to the sixth generation of **wireless communication technology**, the successor to 5G.
  - It aims to build upon 5G's advancements, offering even faster data speeds (potentially reaching 1 Terabits per second) and lower latency (down to 100 microseconds).
  - 6G is expected to enable new applications and transform how we live and work by enabling hyper-connectivity, immersive experiences, and intelligent automation.
- **IMT 2030:** The 6G Technology has been named **'IMT 2030'** by ITU, the specialised agency for **Information and Communication Technologies of the United Nations.**
  - The ITU 6G Framework has been formulated with collaborative efforts of member countries of UNs in which India has played the front-runner role from the very beginning.

Note:



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Environment and Ecology

Highlights

- *WMO Global Annual to Decadal Climate Update 2025-2029*
- *World Dugong Day*
- *Strengthening Urban Biodiversity*
- *Oil Spills*
- *Sagarmatha Sambaad and Preserving Himalayas*
- *Environmental Costs of Electric Vehicles*
- *Climate Physical Risks in India*
- *World Hydrogen Summit 2025*
- *World Turtle Day 2025*
- *Gangetic Dolphins*
- *16th Asiatic Lion Census 2025*

WMO Global Annual to Decadal Climate Update 2025-2029

Why in News?

The World Meteorological Organization (WMO) has released a report titled ***"WMO Global Annual to Decadal Climate Update (2025–2029)"***, warning that the **Earth's average temperature is likely to exceed 1.5°C above pre-industrial levels during this period.**

What are the Key Takeaways from WMO Global Annual to Decadal Climate Update?

- **Global Temperature Trends:** WMO projects that the annual global average temperature **between 2025 and 2029 will range from 1.2°C to 1.9°C above the 1850–1900 pre-industrial average.**
  - There is a 70% chance that the average temperature for this five-year period will exceed the **critical 1.5°C threshold**.
  - Additionally, there is an 86% chance that at **least one year within this timeframe will temporarily surpass the 1.5°C limit,** and an 80% chance that one of these years will be hotter than 2024, which is currently the warmest year on record.
- **Regional Climate Projections:**
  - **South Asia**: Expected to remain wetter than average.
  - **Amazon:** Likely to experience drier-than-average conditions.
  - **Arctic:** Expected to warm 2.4°C above normal, 3.5 times the global average.
- **Paris Agreement Threshold:** 2024 was the first full year to record temperatures above 1.5°C.
  - The **1.5°C threshold is a temporary breach**, but a long-term (20–30 years) exceedance would mean failure of the Paris Agreement.
- **Urgency for Policy Action:** Despite the urgency, 180 of 195 United Nations Framework Convention on Climate Change (UNFCCC) countries have not yet submitted their updated Nationally Determined Contributions (NDCs) for 2031–2035.
  - These plans are critical to staying within the 1.5°C limit set in the Paris Agreement.
  - WMO stresses the importance of continued climate monitoring to inform decision-making and boost adaptation efforts.

World Meteorological Organization

- The WMO is an intergovernmental body comprising 192 Member States and Territories, **including India.**
  - It evolved from the **International Meteorological Organization (IMO),** founded following the 1873 Vienna International Meteorological Congress.
- In 1950, the IMO formally became the World Meteorological Organization (WMO) through the ratification of the WMO Convention.
  - It serves as the **United Nations'** specialized agency for meteorology (weather and climate), operational hydrology, and related geophysical sciences.
- The Secretariat, based in **Geneva, Switzerland** and led by the **Secretary-General,** is overseen by the **World Meteorological Congress.**
- WMO publishes reports such as the **State of the Global Climate, the State of Global Water Resources, and the State of Climate Services.**

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What are Key International Conventions/Protocols Aimed at Limiting Global Warming?

Conventions/ Protocols	Objective
Kyoto Protocol (1997)	It aimed to reduce the emission of gases that contribute to global warming.
Paris Agreement (2015)	Limit global temperature rise to well below 2°C above pre-industrial levels, and pursue efforts to limit the increase to 1.5°C.
Glasgow Climate Pact (COP26) (2021)	Secure global net-zero emissions by mid-century and keep warming within 1.5°C within reach.
Sharm El-Sheikh Plan (COP27) (2022)	Focus on implementation and climate justice; established the Loss and Damage Fund, emphasized adaptation, and reinforced the 1.5°C goal.
Global Stocktake (COP28) (2023)	Reaffirmed the 1.5°C target; governments agreed to raise their 2025 climate commitments to align with this goal, covering all sectors and greenhouse gases.

Read more: State of Global Climate Report 2024

World Dugong Day

Why in News?

As the world observed World Dugong Day **on 28th May**, attention turned toward India's dwindling **dugong population**. With only around 200 individuals remaining in the wild, making their conservation a pressing national priority.

What are Dugongs?

- **About: Dugongs *(Dugong dugon)***, also called **"sea cows,"** are marine mammals that graze on seagrass beds, earning them the nickname **"farmers of the sea."** They are the **only herbivorous marine mammals found in Indian waters.**
- **Distribution:** Dugongs are distributed throughout the **Indo-Pacific region,** and along the Indian coastline, they primarily inhabit the warm waters around the **Andaman and Nicobar Islands, the Gulf of Mannar, Palk Bay, and the Gulf of Kutch.**
  - The Palk Bay is considered their last stronghold in Indian waters.
- **Behaviour:** The dugong is a **long-lived species**, capable of living up to 70 years. Typically **solitary or found in small mother-calf pairs,** large herds common in Australian waters are rare in India.
  - Dugongs reach reproductive maturity at **nine to ten years** and give birth every three to five years.
  - This **slow reproductive cycle**, combined with extended maturity and infrequent calving, limits the population's maximum **growth rate to about 5% per year.**
  - They are closely related to **manatees** but are strictly marine and shy in nature.
    - Manatees are large, herbivorous aquatic mammals of the ***Sirenia group,*** found in coastal regions of South America, West Africa, and the Caribbean.
- **Diet:** Dugongs feed on seagrass species such as ***Cymodocea, Halophila, Thalassia, and Halodule***, consuming 20-30 kg per day. Their feeding stirs up the seabed, helping maintain seagrass health and biodiversity.
- **Protection:** The Dugong is listed as Vulnerable on the I**UCN Red List of Threatened Species.**
  - **Appendix I** of Convention on International Trade in Endangered Species (CITES) bans international trade of dugongs or their parts, ensuring strict protection.

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- In India, Dugongs are protected under **Schedule 1 of the Wild Life (Protection) Act, 1972.**
- India is a signatory to the **Convention on Migratory Species (CMS)** since 1983 and to the **CMS Dugong Memorandum of Understanding since 2008.**
  - A national Task Force has been set up to **address dugong conservation and CMS implementation.**
- The **Dugong Conservation Reserve**, established in 2022 in Palk Bay, Tamil Nadu, protects about 122 sq km of seagrass along the coasts of Thanjavur and Pudukottai districts.

➢ **Threats:** Habitat loss is a major concern, as **seagrass meadows** are being destroyed by **port construction, dredging, land reclamation, and pollution** from agricultural runoff, sewage, and industrial waste.
- **Mechanised fishing** has degraded dugong habitats and increased accidental entanglement in nets, often causing fatal drownings.
- **Climate change has added another layer of vulnerability,** with rising sea temperatures, **ocean acidification,** and extreme weather events affecting both food availability and breeding grounds.
- **Illegal hunting** also persists, especially in remote regions like the Andaman and Nicobar Islands.
- Additionally, their **slow reproductive cycle (maturing at 9–10 years and reproducing only once every 3–5 years)** severely limits their ability to recover.

➢ **Dugong Conservation:** Protecting and restoring seagrass habitats is vital for dugong conservation. This involves **mapping and monitoring seagrass meadows, restricting damaging activities,** and promoting community-led stewardship, especially with local fishers.
- Regulating harmful fishing methods like **gill nets and trawling in dugong areas reduces accidental harm.**
- More research funding is needed for long-term dugong studies, supported by citizen science and traditional knowledge. Technologies like tagging and drones aid in tracking and habitat identification.

Seagrass

➢ Seagrass is an **underwater flowering plant**, not to be confused with seaweed (macroalgae). Classified as **wetland ecosystems**, seagrass meadows stabilize the seafloor, support fisheries, capture carbon, and shelter marine life.
- **Healthy seagrass is essential for dugongs and marine** life such as turtles and fish.
- A 2022 study by the National Centre for Sustainable Coastal Management documented 516.59 sq. km of seagrass habitat in India. This translates to a **carbon dioxide sequestration potential of up to 434.9 tonnes per sq. km each year.**

➢ India's most extensive seagrass meadows occur along the **Gulf of Mannar and Palk Bay, off the coast of Tamil Nadu,** and together support more than 13 species of seagrass (the highest diversity in the Indian Ocean).
- Seagrass in **Lakshadweep and Kachchh is patchy and threatened by port activities and pollution.** Andhra Pradesh and Odisha have minor, limited seagrass habitats unsuitable for dugongs.

Strengthening Urban Biodiversity

Why in News?

Urban biodiversity is vital for a **healthy planet** and **human well-being** but faces severe threats, from **habitat loss** and **climate change**. On **International Day for Biological Diversity (22nd May)**, the theme **"Harmony with nature and sustainable development"** stresses the urgent need to integrate **ecological conservation** into **urban growth.**

What is Urban Biodiversity?

➢ **About: Urban Biodiversity** refers to the **variety of living organisms** (plants, animals, fungi, and microorganisms) found within **cities and urban areas**.
- It includes all life forms in **human-dominated environments**, such as **parks, gardens, green roofs, wetlands, and built structures.**

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- **Key Components:**
  - **Green spaces**: **Parks, gardens, green belts**, lawns, roadside trees.
  - **Blue spaces**: **Lakes, rivers**, canals, ponds, **wetlands**.
  - **Built structures**: **Walls, roofs,** and abandoned buildings that provide habitats (e.g., bats in attics, birds nesting on buildings).
  - **Wildlife corridors**: Paths that allow animals to move **between green patches** (e.g., tree-lined streets)
- **Prominent Examples:**
  - **Wetlands within cities**, e.g., the Okhla Bird Sanctuary in Delhi, Varthur Lake in Bengaluru.
  - **Urban forests and biodiversity parks**, e.g., the Arignar Anna Zoological Park in Chennai.
  - **Rivers and lakes passing through cities**, supporting **aquatic biodiversity** (e.g., In **Pune**, the **Mutha** and **Mula rivers** demonstrate **high biodiversity,** with many **freshwater invertebrate species**).

What is the Significance of Urban Biodiversity Conservation for India?

- **Mitigating Climate Change & Pollution**: Urban green spaces **reduce** urban heat island effect e.g., **Frankfurt's green belts lowered temperatures by 3.5°C.**
  - Trees sequester carbon, filter air pollutants, and **reduce** noise pollution (a **10m-wide tree line cuts noise by 5 decibels**).
  - Wetlands and urban forests help in **flood control and** groundwater recharge**.**
- **Health & Well-being Benefits: Parks and green spaces** offer a vital escape from "concrete jungles," enhancing **mental health**, reducing **stress**, and providing **recreational** opportunities, while also supporting important **pollinators** like **bees** and **butterflies** that help secure **food supply**.
  - E.g., **Green walls shield Delhi from the hot desert winds** blowing in from Rajasthan to the west.
- **Economic Benefits:** Urban trees in mega cities deliver ecosystem services valued at **Rs 8 crore per sq. km annually**, including **air purification**, **temperature moderation**, **stormwater management**, and **aesthetic benefits**.
  - Proximity to parks and water bodies also raises **property values**, boosting **local economies.**
- **Global Commitments:** The Kunming-Montreal Global Biodiversity Framework (GBF) **Target 12** emphasizes **integrating green and blue spaces** into urban planning.
  - The **UN** Sustainable Development Goals (SDGs) **Goal 11** (Sustainable Cities and Communities) highlights the need to make cities **inclusive, safe, resilient, and sustainable.**

What are the Key Issues Affecting Urban Biodiversity in India?

- **Rising Urban Sprawl:** In 2025, nearly **50% of the global population** lives in **urban areas**, projected to reach **70% by 2050** pressurising **natural green spaces**.
  - The Forest Survey of India (2023) shows major cities have an average forest cover of just **10.26%**, with **Mumbai** highest at **25.43%** and **Ahmedabad** lowest at **3.27%**.
  - From 2021 to 2023, **Chennai and Hyderabad** lost **2.6** and **1.6 sq. km** of forest, reflecting urban growth at the expense of **biodiversity.**
- **Heat Island Effect:** Concrete-dominated cities like **Delhi** are **4–6°C hotter** than rural areas, stressing **urban wildlife**.
  - The **surface urban heat island effect** drives **birds** to **suburban areas**, impacting their **breeding** and **foraging.**
- **Loss of Urban Wetlands & Water Bodies:** The East Kolkata Wetlands, a Ramsar site, are under increasing threat from encroachment, endangering critical habitats for migratory birds such as the Northern Pintail.
  - Alarmingly, **just 15%** of **Chennai's wetlands survive** today—a steep drop from **80%** in earlier decades when the **city's urban footprint** was much smaller.
- **Pollution: Urban pollution—air, water, soil, and noise—harms biodiversity** by **disrupting animal health, communication**, and **ecosystems**, as seen in **Delhi's toxic air** and **Bangalore's polluted Bellandur Lake.**

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International Day for Biological Diversity

- **About:** The United Nations declared **22nd May** as the **International Day for Biological Diversity (IDB)** to raise awareness about biodiversity.
  - Originally, the day was celebrated on **29th December**, marking the entry into force of the Convention on Biological Diversity (CBD).
  - However, in **2000,** the UN moved the date to **22nd May** to honor the adoption of the **CBD's text** on that day in **1992**.
- **Biological Diversity:** Biodiversity as a concept, first **coined** by **Walter G. Rosen in 1985** and includes the wide variety of **plants**, **animals**, and **microorganisms**, as well as the **genetic differences** within species (like different **crop varieties** and **livestock breeds**) and the variety of **ecosystems** (**lakes, forests, deserts, agricultural landscapes**) where many living beings interact.
  - These resources are the **foundation** of human civilization e.g.,
    - **Fish** provide **20%** of animal protein for about **3 billion people**,
    - **Plants** make up over **80%** of the human diet, and
    - About **80%** of people in rural areas of developing countries rely on **traditional plant-based medicines** for basic healthcare.
  - The United Nations General Assembly (UNGA) designated the years **2011-2020** as the United Nations Decade on Biodiversity, aiming to advance the implementation of a **strategic plan for biodiversity.**

Oil Spills

Why in News?

A Liberian-flagged cargo vessel carrying hazardous materials, including **calcium carbide** and **diesel**, sank off the Kerala coast, raising serious concerns over **oil spills.**

- **Calcium carbide (CaC_2)** is a chemical that **reacts with seawate**r to release acetylene gas, which is **highly flammable** and hazardous.

What are Oil Spills?

- **About: Oil Spills** refer to the release of **liquid petroleum hydrocarbons** into the environment, particularly into **oceans, rivers, or coastal waters** as a result of human activities.
- **Impact: Diesel, petroleum, crude oil, and other hydrocarbons** may be released from sources such as **tankers, offshore platforms, drilling rigs, or wells** which have **harmful** effects on **marine ecosystems, coastal livelihoods**, and **human health.**
  - **Marine Ecosystem:** Oil **coats the feathers of seabirds and fur of marine mammals,** leading to **hypothermia and death**. It **clogs fish gills, impairs reproduction**, and becomes toxic when ingested by marine life..
    - Oil films **block sunlight**, affecting **phytoplankton** and reducing oxygen levels. Coral reefs, mangroves, estuaries (e.g., Sunderbans) get smothered, disrupting ecosystems.
  - **Coastal Livelihood:** Oil spills **disrupt fishing, aquaculture, and coastal industries,** causing **economic hardship** for local communities.
    - Contaminated beaches and dead marine life **reduce tourism,** affecting livelihoods and regional economies.
    - **Cleanup and restoration efforts** lead to significant **financial burdens** on governments and industries.
  - **Human Health: Health and livelihood risks for indigenous communities** due to seafood contamination and reduced fish catches.

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What are the Measures to Clean Oil Spills?

Method	Description
Bioremediation	Uses **oil-degrading bacteria** (e.g., *Cycloclasticus*, *Oleispira*) to **break down hydrocarbons**; eco-friendly and accelerates natural detoxification.
Containment Booms	**Floating barriers** that **restrict oil spread**, aiding in containment, recovery, and minimizing environmental impact.
Skimmers	**Mechanical devices** that **collect oil from the water surface** for safe disposal or recycling; effective when deployed quickly.
Sorbents	They **absorb or adsorb** oil from water and are particularly u**seful for small spills or residual oil** after primary cleanup. Natural sorbents (Straw, Volcanic ash), Synthetic (Polyester-derived plastic shavings).
Dispersing Agents	**Surfactant-based chemical**s that **break oil into droplets** for **faster biodegradation**. It is effective but may harm marine life due to its **potential toxicity.**

Mechanical Recovery 	Vessels maneuver containment boom to capture and concentrate spilled oil. Oil is then removed from the water's surface with a skimmer. Recovered oil is stored and disposed of.	+ Oil is removed from the environment. - Oil and water/debris must be stored. - Resource intensive (vessels, people, equipment).
Chemical Dispersants 	Chemicals are applied to the oil spill that break the slick into smaller droplets that mix into the water, avoiding contamination of areas like beaches or tide flats.	+ Oil removed from the surface of the water. - Oil is not actually removed from the environment. - Impact of oil spill is shifted to below the ocean surface. - Dispersants themselves may be toxic.
In-Situ Burning 	Vessels maneuver containment boom to contain and thicken the slick. Oil is then burned off the water's surface in a controlled fashion. Oil contained by ice may be able to be burned as well.	+ Oil removed from the surface of the water. - Potential for air quality impacts due to smoke. - Residue sinks if not collected and may be toxic.
Tracking & Surveillance 	Spill observation and mapping via aircraft or marine vessel, tracking buoys, or infrared technology may be used to find the spill.	+ Critical for determining the extent and trajectory of an oil slick. - Method and effectiveness can be very limited by visibility.
Shoreline Cleanup 	Spilled oil which reaches the shore can be collected through a variety of methods, including spraying down with hoses, soaking up with absorbent materials or digging (manually or with heavy equipment).	+ Oil is removed from shoreline or displaced into the water for removal. - Labor and time intensive. - Impacts may have already occurred, or could be worsened.

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What are the Legal and Institutional Frameworks on Oil Pollution Control?

- **Indian Legal Framework:**
  - **Merchant Shipping Act, 1958:** Serves as the **primary maritime legislation**. Incorporates provisions of the **International Convention for the Prevention of Pollution from Ships (MARPOL) Convention** to **regulate ship-borne pollution,** including oil discharges.
  - **National Oil Spill Disaster Contingency Plan (NOS-DCP), 1993:** Implemented by the **Indian Coast Guard,** as a key **framework for coordinated oil spill response**.
    - Though **not legally binding**, it ensures **timely and integrated action** among stakeholders.
  - **National Green Tribunal (NGT) Act, 2010:** **NGT** provides a judicial mechanism for swift adjudication of environmental disputes, including marine pollution, and awards compensation for damages.
- **International Frameworks:**
  - **Bunker Oil Convention (2001): Ratified by India in 2015** under the **IMO**, this convention **ensures prompt and adequate compensation** for **damage caused by fuel oil spills from ships' bunkers,** protecting those affected by such pollution incidents.
  - **MARPOL 73/78 (Annex I)**: India is a party to this **key international convention** aimed at **preventing marine pollution from ship**s, covering both **operational discharges and accidental oil spills**.
  - **Civil Liability Convention (CLC), 1969 & International Oil Pollution Compensation Fund (IOPC), 1992:** Establish **liability and compensation mechanisms for oil spill damage**. Facilitate **financial recovery and legal recourse for victims** and governments in the event of tanker spills.

Sagarmatha Sambaad and Preserving Himalayas

Why in News?

Union Environment Minister represented India at the inaugural **Sagarmatha Sambaad** in Nepal, reaffirming India's commitment to **climate action** and calling for **collaborative efforts** to protect the **Himalayas** and **mountain ecosystems**.

- The Himalayan ecosystem is vital to **sustaining India's environmental integrity** and driving its **economic resilience**.

What is Sagarmatha Sambaad?

- **About:** It is a **biennial global dialogue** forum initiated by the **Government of Nepal**, named after **Sagarmatha (Mount Everest),** to deliberate on **pressing global issues**, with an emphasis on **mountain ecosystems** and **climate resilience**.
  - It **coincided** with the "**International Year of Glaciers' Preservation 2025**".
- **Theme and Focus:** The **theme of first edition (2025)** was ***"Climate Change, Mountains and the Future of Humanity."***
  - The **focus areas** include the **impact of climate change** on **mountain ecosystems**, particularly **glacial melt**, **lake outbursts**, **biodiversity loss**, and **downstream effects** on **water cycles** and **natural disasters.**
- **India's Stand:** India outlined a **5-point call for global action** to address the shared ecological challenges of mountainous regions.
  - **Enhanced Scientific Cooperation**: Joint monitoring of climate and biodiversity in high-altitude ecosystems.
    - India stressed **regional cooperation** via the **International Big Cats Alliance** to conserve snow leopards, tigers, and leopards, and lauded its success with **718 snow leopards** recorded under **Project Snow Leopard** (2019–2023).
  - **Building Climate Resilience**: Develop **early warning systems** and **adaptation infrastructure** for mountain hazards like **glacial lake outburst flood (GLOF)**.
  - **Empowering Mountain Communities**: Prioritize **local welfare**, integrate **traditional knowledge**, and support **green livelihoods**.
  - **Providing Green Finance**: Urged for **adequate and predictable climate finance** aligned with the Paris Agreement.
  - **Recognizing Mountain Perspectives**: Advocate for **mountain-specific concerns** in global climate and development forums

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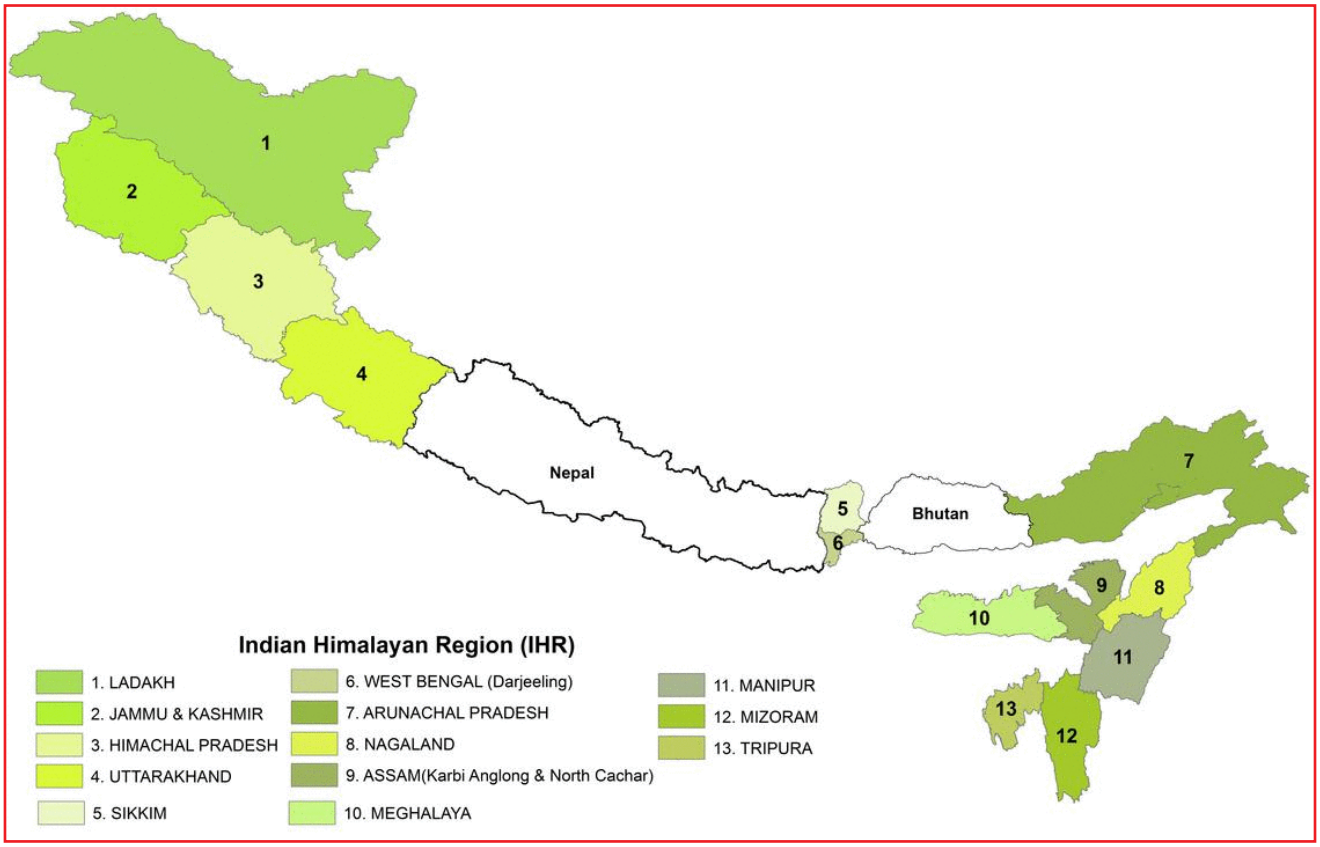
What is the Significance of Himalayan Ecosystem for India?

- **Hydrological Significance:** The **Himalayas**, known as **Asia's water towers**, is a major source of rivers like the **Ganga**, **Brahmaputra**, and **Indus**, with vast **snow and ice deposits** supplying around **1.2 trillion cubic meters** of water annually to support agriculture, drinking water, and hydropower.
- **Ecological Significance:** The **Himalayas**, a **biodiversity hotspot**, host over **10,000 vascular plants**, **979 birds**, and **300 mammals**—including the **snow leopard**, **red panda**, **Himalayan tahr**, and **Himalayan monal**—across diverse climate zones from tropical to alpine.



- **Cultural Significance:** The **Himalayas** hold spiritual significance in **Tibetan Buddhism** and **Hinduism**, featuring sacred sites like **Kailash Mansarovar**, **Kedarnath** and **Badrinath**, attracting millions of pilgrims annually.
- **Economic Significance:** The **Himalayas** support millions through **tourism**, **agriculture**, and **forestry**, with sustainable growth driven by **organic farming**, **eco-tourism**, and **renewable energy**.
  - In states like U**ttarakhand, West Bengal, Tripura, Assam,** and **Meghalaya**, the **tourism sector** has been contributing more than **10%** to the **state GDP**.
  - The **Ganges river basin** supports around **40%** of **India's population** and is vital for **agriculture** and **industry**.
- **Renewable Energy:** Himalayan rivers offer vast **hydropower potential**, vital for India's **energy security** and **green transition**.
  - The **Northeastern states**, especially Arunachal Pradesh with its 13,000 MW **Lohit Basin project (2023)**, lead in hydropower development.

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- **Climate Regulation:** Acting as a **colossal natural shield**, the Himalayas **block frigid winds from Central Asia,** thus preventing extreme cold in northern India.
  - Their towering presence also influences the **Indian monsoon** by forcing **moist oceanic air to rise**, causing heavy rainfall vital for crops.
  - Without the Himalayas, much of India could **face harsher winters and erratic monsoons**, disrupting food security.
- **Carbon Sink:** The **vast forests** and **alpine meadows** of the Himalayan region act as an important **carbon sink**, absorbing significant amounts of atmospheric carbon dioxide and helping to **mitigate climate change**.
  - These ecosystems store carbon in their **dense vegetation and soil**, reducing greenhouse gas levels and **buffering global warming impacts**.
  - **Protecting Himalayan forests** from deforestation and degradation is crucial to **maintain their carbon sequestration capacity** and preserve **regional climate stability.**

What are the Key Issues Related to India's Himalayan Ecosystem?

- **Climate-Driven Disasters:** The **Himalayas** face increasing **disasters** like **avalanches**, **landslides**, and **flash floods** due to **rising temperatures**, **glacier retreat**, and **erratic weather**, including more frequent **cloudbursts**.
  - Recent events like the **2025 Uttarakhand avalanche** and **2023 Sikkim Glacial Lake Outburst Flood** highlight rising **disaster risks.**
- **Fragile Economic Development: Slope cutting**, **deforestation**, and **blasting** weaken **mountain stability**, causing **landslides** and **subsidence**.
  - Heightened **seismic activity** in the **Indus–Tsangpo zone** combined with unsustainable projects led to crises like the 2023 **Joshimath land subsidence** linked to the **Char Dham Project**.
- **Retreating of Glacier: Himalayan glaciers**, key to India's rivers, are rapidly melting due to **global warming**, risking water scarcity, droughts, reduced hydropower, and conflicts;
  - A 2023 report warns **Hindu Kush glaciers** may lose **75% volume** by century's end if trends continue.
  - For instance, over the **last 25 years**, **Gangotri glacier** has **retreated** more than **850 meters**.
- **Biodiversity Loss: Deforestation**, **encroachment**, and **climate change** drive significant **biodiversity loss** in the Himalayas, also fueling invasive species like **crofton weed** that threaten native **pine trees.**
  - Also, it is leading to **displacement** of species, for instance, about **90%** of the endemic species in the **Sikkim Himalayas have been displaced**.
- **Unregulated Tourism:** Tourism growth, while economically beneficial, often leads to **littering, pollution, and strain** on local resources.
  - Overcrowding in **pilgrimage sites** like Kedarnath and **trekking** trails damages **fragile alpine ecosystems**.
  - The **Himalayan Clean-Up (2022) waste** audit revealed that **92.7%** of the trash was **plastic**, with **72%** consisting of **non-recyclable plastic.**

Environmental Costs of Electric Vehicles

Why in News?

A recent study reveals that while **electric vehicles (EVs)** reduce greenhouse gas emissions, their heavier weight leads to increased tyre wear, releasing more microplastic pollution—challenging the notion that EVs are fully eco-friendly.

What are the Environmental Concerns Regarding EVs?

- **Tyre Microplastic Pollution:** EVs are typically 15–20% heavier than **internal combustion engine (ICE)** vehicles due to battery packs weighing 300–900 kg, leading **to increased tyre stress and wear.**
  - Primary fragmentation, **caused by sudden braking or road impacts,** releases **micro-sized particles,** while sequential fragmentation from routine wear produces larger particles.
  - **Smaller fragments** (1–10 µm) **remain airborne,** contributing to **air pollution,** while **larger ones (>100 µm) settle on roads,** affecting **soil and water.**
    - Rapid acceleration in EVs further increases friction and heat, intensifying microplastic emissions.

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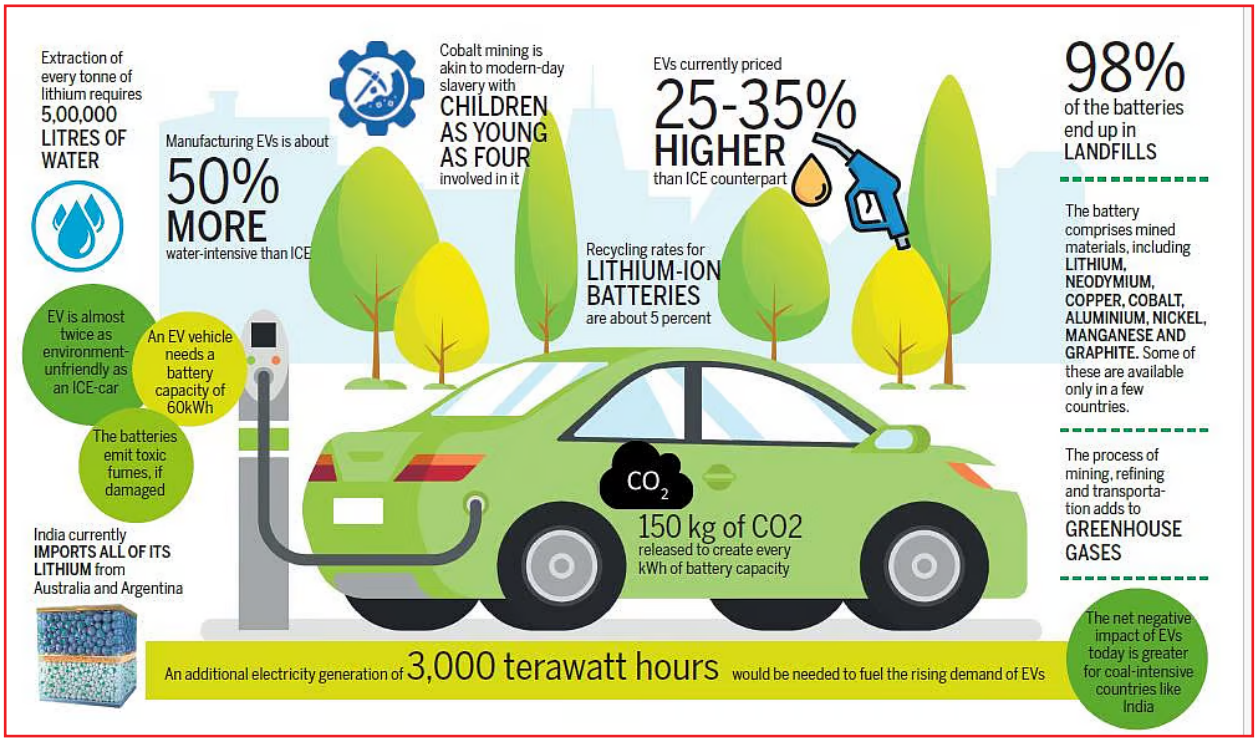
- While **EVs cut tailpipe emissions,** they increase **non-exhaust pollution, presenting a complex environmental trade-off.**

- **Lithium-Ion Battery Hazards:** Manufacturing a single EV releases **16–19 tonnes of CO_2**, almost double that of an ICE vehicle (7–10 tonnes).
  - Producing **1 tonne of lithium** requires **approximately 1.89 million liters of freshwater** affecting groundwater and ecosystems.
- **Recycling and Waste Management Deficit:** Often EV batteries end up in landfills after damage or end-of-life. Proper recycling infrastructure is inadequate.
  - **Cobalt and lithium residues** can take centuries to break down and pose lasting risks to human and environmental health.
- **Grid Dependency & Fossil Fuels:** EVs are **only as green as the grid** that powers them. India's grid is still coal-dominated. **Coal-fired power plants** emit 800–850g of CO_2/kWh, which powers most EVs in India.
  - Many public charging stations run on **diesel generators, ironically increasing emissions.**



What are the Gaps in EV Regulation in India?

- **Inconsistent and Fragmented Policy Implementation:** Existing air pollution standards focus on **particulate matter (PM) 2.5 and PM10**, but tyre particles are often smaller and unregulated. No current standards adequately address **non-exhaust emissions such as tyre and brake wear.**
  - India is currently woefully underprepared to manage the massive **volume of EV battery waste expected over the coming decade.**
  - Critically, India lacks robust legislation to prevent the **illegal dumping of spent lithium-ion batteries.** The existing legal framework including the **E-waste (Management and Handling) Rules, 2011, E-waste (Management) Rules, 2016, and the 2018 amendment** has evolved in terms of the range of materials covered. However, it fails to provide a cohesive, dedicated framework for the **safe disposal and recycling of EV batteries.**

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- This regulatory gap risks turning India into a **dumping ground for domestic and imported battery waste.**

- EV schemes like FAME-I and II have had limited impact due to inconsistent implementation. While states like **Gujarat and Delhi have strong policies, many lack even a basic EV roadmap.**
- The absence of uniform standards across states hinders nationwide scalability and integration.

- **Limited Scope of Government Incentives:** The EV efforts focus mostly on 3-wheelers and buses in select urban areas, **leaving out rural and semi-urban adoption potential**.
  - EV efforts are **mainly limited to intra-city transport**, and **long-distance inter-city electrification lacks a viable roadmap**.
- **Charging Infrastructure Gaps:** The current charging infrastructure is **insufficient and underdeveloped**, especially outside metro cities.
  - There is **no national standardisation of charging equipment** and battery technologies, resulting in **compatibility issues** across EV brands and stations.
  - **High cost (investment ranging around Rs 1 crore or more)** for setting up a charging station is a major deterrent, especially without guaranteed demand or utilization.
- **Lack of Dedicated Regulatory Authority:** There is currently **no single agency or department dedicated to EV regulation and coordination** across ministries (Transport, Power, Renewable Energy, Environment, etc.).
  - The **absence of a unified institutional mechanism** hampers efficient decision-making, monitoring, and rapid response to industry needs.
- **Inadequate Focus on Supply Chain Security:** India lacks a **secure and diversified supply of critical raw materials** like lithium (India imported 70% of its lithium-ion cells in 2023), cobalt, and rare earth elements needed for EV batteries.
  - There is **no comprehensive national strategy** to build domestic reserves, create international partnerships, or incentivize local alternatives (e.g., sodium-ion batteries).
- **Limited Consumer Awareness and Adoption Support:** Consumer adoption remains low due to **limited awareness of EV benefits, range anxiety** and battery concerns, and poor promotion of home or decentralized charging options.

What are India's Key Initiatives to Promote EV Adoption?

- PM E-DRIVE Scheme
- New Electric Vehicle Policy 2024
- Faster Adoption and Manufacturing of Electric Vehicles (FAME) Scheme II
- National Electric Mobility Mission Plan (NEMMP)
- National Mission on Transformative Mobility and Battery Storage
- Production Linked Incentive (PLI) scheme
- Go Electric campaign

Climate Physical Risks in India

Why in News?

Recent reports, including from the World Bank, confirm **India's climate crisis**, with **Climate Physical Risks (CPRs)** like **rising temperatures, erratic monsoons,** and **severe disasters** threatening over 80% of its population and economy.

What are Climate Physical Risks?

- **About: Climate Physical Risks (CPRs)** refer to the **direct and indirect impacts of climate change** on natural **ecosystems, human societies, and economic systems.**
  - These risks arise from extreme weather events and **long-term climatic shifts**, leading to financial losses, operational disruptions, and threats to lives and livelihoods.
- **Types: CPRs are categorized into two main types:**
  - **Acute Physical Risks**: They are **short-term, high-impact events** caused by **extreme weather**, such as **hurricanes**, cyclones, floods, heatwaves, droughts, and **severe storms**.
    - Impacts include **infrastructure damage**, **supply chain disruptions**, **loss of lives**, and **community displacement.**

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- **Chronic Physical Risks:** They are **long-term, gradual changes** in **climate patterns**, including **rising sea levels**, **increasing temperatures**, **changing precipitation**, and **ocean acidification**.
  - These lead to **reduced agricultural productivity**, **water scarcity**, **health risks**, and **biodiversity loss.**

What are Climate Physical Risks (CPRs) for India?

- **Rising Temperatures & Heatwaves:** India's average temperature increased by approximately **0.7˚C between 1901 and 2018**, while the **tropical Indian Ocean's sea-surface temperature** rose by about **1˚C from 1951 to 2015.**
  - The **IPCC** warns that each **0.5°C rise** will **worsen heat, rainfall, and drought extremes**. Heatwaves in India could **last 25 times longer by 2036–2065** if temperatures rise to **4°C** by 2100.
- **Erratic Monsoons:** Analysis of long-term data shows a **27% increase** in **dry spells** during **1981–2011** compared to 1951–1980, alongside **more intense wet spells in the summer monsoon**.
  - In **central India**, extreme daily rainfall (>150mm) increased by **75%** from 1950 to 2015.
- **Droughts & Water Scarcity:** According to **NITI Aayog's 2019 Composite Water Management Index,** approximately **600 million Indians** face **high to extreme water stress.**
  - **12% of India's population** faces '**Day Zero**' conditions **(water supply is nearly depleted)**. By **2030**, water demand may double supply, risking **severe scarcity** for millions and a **6% GDP loss.**
- **Rising Sea Levels:** According to the **Global Assessment Report on Disaster Risk Reduction 2022**, by **2100**, around **27 million people** in India could be impacted by **global sea-level rise** (projected to **rise a foot by 2100**).
- **Food Security Crisis:** Climate change could **reduce wheat yields by 19.3% by 2050 and 40% by 2080**, while **kharif maize** yields may **decline by 18% and 23%** in the same periods.
  - Rising CO_2 levels may lower **iron**, **zinc**, and **protein** in staple crops like **rice, wheat, maize**, and **legumes**, risking **nutritional deficiencies** for **over a billion people** globally.
- **Economic & Infrastructure Damage:** Climate-induced events like **floods** and **heatwaves** damage infrastructure. **India lost USD 3 billion** to floods in the last decade—**10% of global losses.**

What are the Challenges in Tackling CPRs for India?

- **Fossil fuel-centric Energy Model:** Despite renewable gains, **77% of India's electricity** (FY23) still comes from **coal**.
- **Lack of Climate Finance:** India needs **USD 10.1 trillion by 2070** for net-zero, but **green financing** falls short.
- **Technological Lags:** India's green tech sector—especially **battery storage and solar panels**—depends heavily on imports, with **over half (USD 3.89 billion of USD 7 billion in FY24)** coming from China.
  - Limited **domestic manufacturing** hampers the **Production Linked Initiative (PLI) Scheme** and slows green self-reliance.
- **Vulnerability to Renewable Projects:** Ironically, **climate impacts** hinder **renewable energy**.
  - **Wind power** in **Tamil Nadu** may drop **5% in 2024–25** due to erratic winds. High temperatures **reduce solar PV efficiency by 0.4–0.5 % per degree Celsius**. **Dust** can **reduce PV output by up to 60 %**, especially in desert regions.
- **Limited R&D Investment in Green Technologies:** India spends just **0.7% of GDP** on R&D, lagging behind global leaders like **Israel (4.6%), South Korea (4.5%)**.
  - This limits innovation in **green hydrogen**, **energy storage**, and **carbon capture**, where India trails despite being the **third-largest CO_2 emitter**.
- **Challenges in Electric Vehicles (EVs):** The transport sector, responsible for **14% of emissions**, struggles with EV adoption due to limited charging infrastructure (**25,000 stations in 2024**) and high costs.
- **Fragmented Data:** India's **CPR assessments** remain **fragmented**, with efforts dispersed among various **agencies** and **institutions** employing different **methodologies**, lacking a **unified system** despite resources like **IIT Gandhinagar's flood maps** and **IMD's vulnerability atlases.**
  - Reliable **CPR projections** are limited by **global climate models** that overlook India's **hyper-local climate.**

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What are Government Initiatives to Tackle CPRs?
➢ National Adaptation Plan (NAP)
➢ National Action Plan on Climate Change (NAPCC)
➢ Atal Bhujal Yojana
➢ Sovereign Green Bonds
➢ Mangrove Initiative for Shoreline Habitats & Tangible Incomes (MISHTI)
➢ Mission LiFE (Lifestyle for Environment)

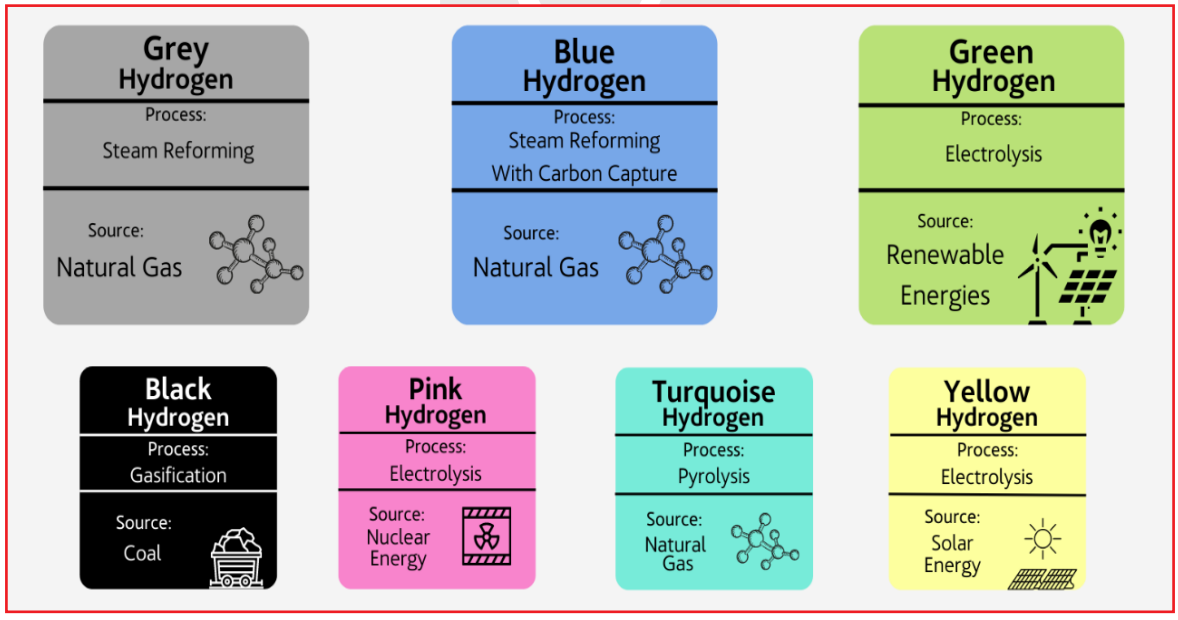
World Hydrogen Summit 2025

Why in News?

At the World Hydrogen Summit **2025** in **Rotterdam**, **Netherlands,** the Ministry of New & Renewable Energy outlined **India's initiatives** to emerge as a global hub for green hydrogen **production**.

What is Green Hydrogen (GH2)?

- **About: Green hydrogen** is produced by **splitting water** into **hydrogen (H_2) and oxygen (O_2)** through **electrolysis** powered by **renewable energy** sources like solar power, or via **biomass gasification.**
- **Applications:** Its **uses** include **fuel cell electric vehicles (FCEVs)**, **industrial uses** such as fertilizers and refineries sector, and **transportation** sectors like **road** and **rail.**
- **Other Types of Hydrogen:**



What are India's Initiatives to Promote Green Hydrogen?

- **National Green Hydrogen Mission:** National Green Hydrogen Mission is India's flagship policy to scale up **green hydrogen**, with a target of establishing **5 million tonnes of annual green hydrogen** production capacity by 2030.
  - **Phase I** of the mission spans from **2022-23 to 2025-26**, followed by **Phase II** from **2026-27 to 2029-30**.

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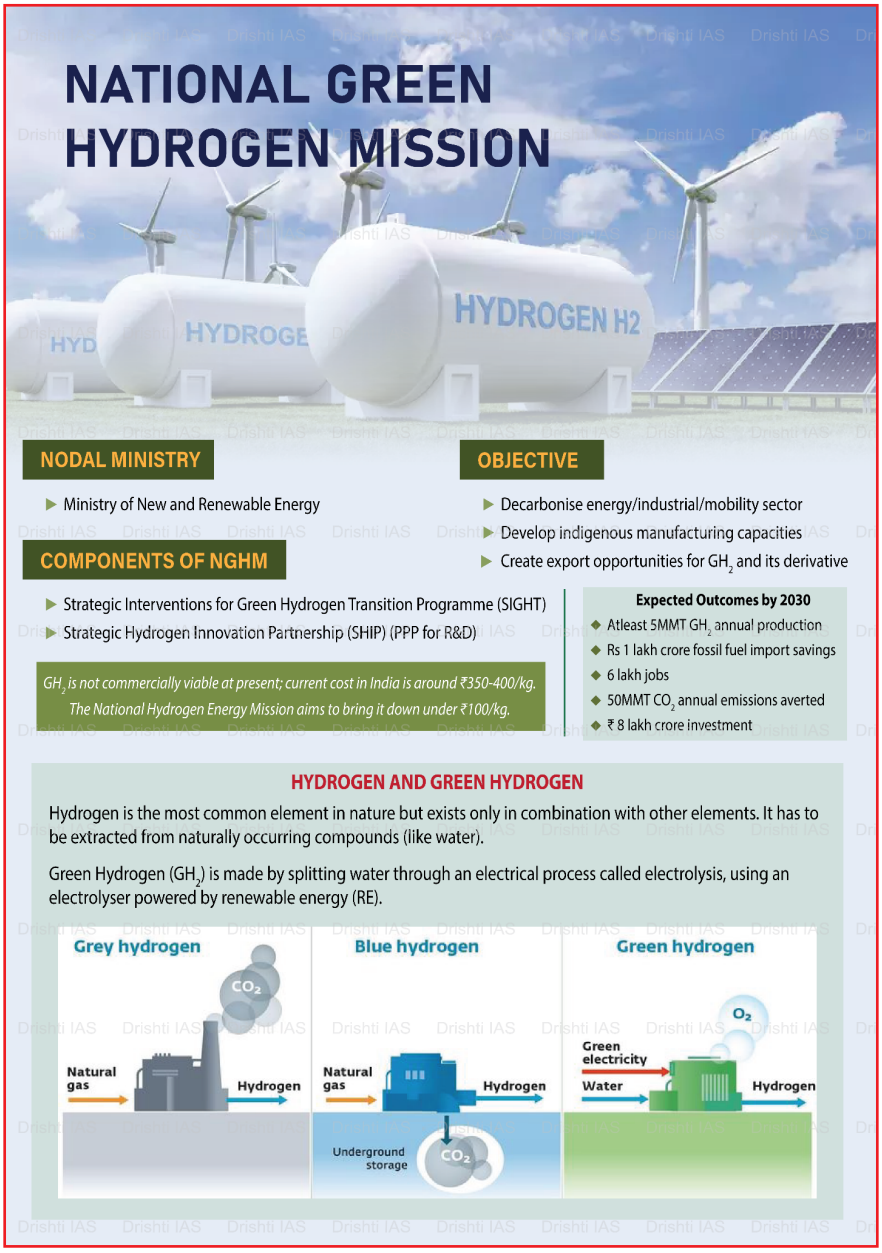
- **Green Hydrogen Certification Scheme (GHCI):** GHCI is an initiative to **certify green hydrogen production**, ensuring transparency and market credibility while promoting India's green hydrogen market.
  - It will be verified by the **Bureau of Energy Efficiency (BEE) Accredited Carbon Verification (ACV) Agency** to ensure compliance.
- **Environmental Clearance Exemptions: Green Hydrogen and Green Ammonia plants** are **exempt** from mandatory **Environmental Clearance**, reducing delays and easing project implementation.



- **Green Hydrogen Hubs:** Ministry of Ports, Shipping and Waterways (MoPSW) has identified three major ports—**Kandla, Paradip, and Tuticorin**—to be developed as Green Hydrogen hubs.
- **International Collaboration:** India has partnerships with **Japan, Australia, and the UAE** for **technology transfer and investment** for green hydrogen production.

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Hydrogen
➢ **Hydrogen** is the lightest and most abundant element in the universe. It is a **colorless, odorless, and highly flammable gas** at room temperature. ➢ **Need of Hydrogen-based Fuel:** They are crucial for **India's energy independence** (reduces reliance on **fossil fuel imports**), offering a **stable, local energy source** from **renewables**. ❍ Production from **waste biomass** also creates **additional income** for **farmers** and **local communities.**

World Turtle Day 2025

World Turtle Day is observed annually on **23rd May** to highlight the importance of conserving **turtles** and **tortoises**.

➢ The day was **established in 2000** to **raise awareness and promote conservation** of **turtles and tortoises** globally.

What are the Key Facts Related to Turtles?

➢ **About: Turtles (*Order Testudines*)** are **reptiles** distinguished by a **cartilaginous shell** developed from their ribs, forming a **protective shield**.

❍ Unlike other animals with shells, **turtles cannot shed or exit their shell**, as it is an **integral part of their skeleton.**

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- **Habitat:** Turtles can live in **both freshwater** and **marine (sea) environments**.
- **Different From Tortoise: Tortoises** differ from other turtles primarily by being **strictly terrestrial**, while **many turtle species are partially aquatic**.
  - Although **all tortoises are turtles**, not all turtles are tortoises.
  - Both are generally shy, solitary animals that lay eggs on land by burying them in nests.
- **Key Features:** Turtles are **cold-blooded (ectothermic)** species, i.e they can **regulate their body temperature by moving between warmer and cooler environments**.
  - Like other ectotherms such as **insects, fish, and amphibians,** they exhibit **slow metabolism** and can **survive extended periods without food or water.**
- **Key Species:**
  - **Sea Turtles:** Loggerhead Turtle, Green Turtle, Hawksbill Turtle, Leatherback Turtle, Olive Ridley Turtle, and Flatback Turtle.
  - **Freshwater Turtles:** Snapping Turtle, Painted Turtle, Red-eared sliderTurtle, Spiny Softshell Turtle and Musk Turtle etc.

What is the State of Turtle Species in India?

- **Species in India**: India is home to **30 species of freshwater turtles**, **26** of which are listed under **Schedule I** of the Wildlife Protection Act, 1972.
  - Assam, West Bengal & Uttar Pradesh have high **turtle diversity.**
  - India also hosts **5 sea turtle species: Olive Ridley, Green, Loggerhead, Hawksbill, and Leatherback.** All of which are protected under **Schedule I of the Wildlife Protection Act, 1972**.
- **Protection Status (as per the IUCN Red List):**
  - **Olive Ridley, Loggerhead, and Leatherback**: Vulnerable
  - **Green Turtle**: Endangered
  - **Hawksbill Turtle**: Critically Endangered
- **Threats:** Turtles face severe threats from **habitat destruction, climate change, plastic pollution,** and **illegal wildlife trade** for meat, pets, and traditional medicine, with Uttar Pradesh and West Bengal being major trafficking hotspots.
- **Conservation Efforts:** UP leads in conserving turtles by establishing **turtle conservation centres** in **Kukrail (Lucknow), Sarnath (Varanasi), Chambal (Etawah)**, and a **30 km Turtle Sanctuary in Prayagraj**.
  - The Forest Department **actively curbs illegal trade**, especially in Pilibhit, a major trafficking hotspot identified in WCCB's Operation Kurma.
  - To enhance efforts, a **Turtle Conservation and Research Centre** is being set up in Pilibhit Tiger Reserve along **River Mala,** funded by CAMPA.

Read More: Olive Ridley Turtles in India, Illicit Trade of Tortoises and Hard-Shell Turtles

Gangetic Dolphins

Why in News?

A recent study by the Wildlife Institute of India (WII) has highlighted severe **chemical pollution risks** posing threats to the endangered **Gangetic dolphins (*Platanista gangetica*)**.

What are the Key Facts Related to Gangetic Dolphins?

- **About:** The **Ganga River Dolphin**, also known as the **"Tiger of the Ganges,"** was officially **discovered in 1801**.
  - It is India's **National Aquatic Animal** (declared in 2009) and **State Aquatic Animal of Assam**.
  - It acts as a **reliable indicator of river ecosystem health**, highlighting biodiversity and water quality.
- **Habitat:** Historically found in the **Ganges-Brahmaputra-Meghna and Karnaphuli-Sangu river systems** across India, Nepal, and Bangladesh. But the species is extinct from most of its early distribution ranges.

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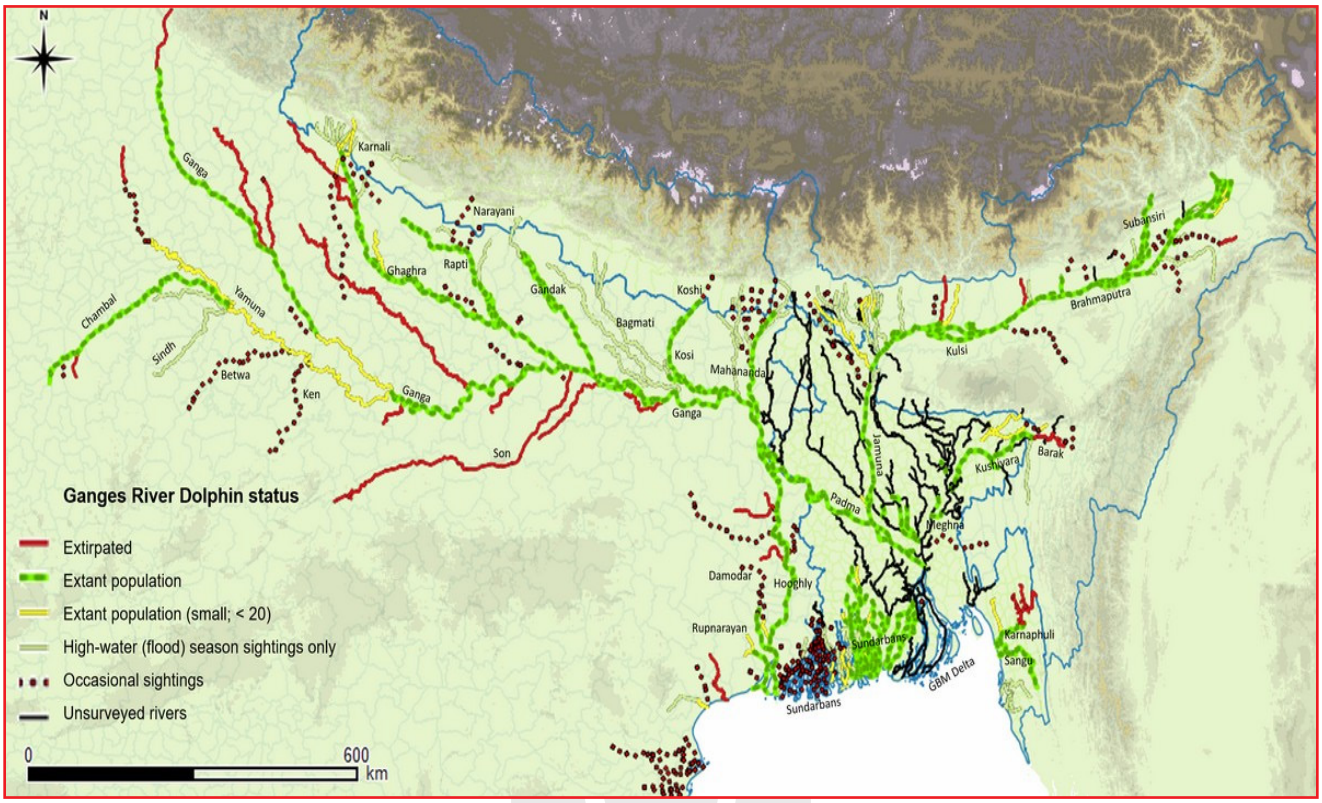

- **Features:** Exclusively a **freshwater species,** they are **functionally blind** and rely on **ultrasonic echolocation** to locate prey.
  - **Generally solitary** or in **small groups**, often seen as **mother-calf pairs**.
  - It is locally called **'Susu'** due to the sound it makes while exhaling.
- **Population:** There are **6,327 river dolphins** in India, according to the first nationwide survey under **Project Dolphin (2020).**
  - The population of **Ganges dolphins** has **declined by over 50% since 1957**, with a **25% shrinkage in range**.
- **Threat:** A **WII** study has found high levels of harmful **Endocrine-Disrupting Chemicals (EDCs)** in fish consumed by Gangetic dolphins.
  - Pollutants such as **industrial chemicals (DEHP, DnBP)**, **banned pesticides (DDT, Lindane)**, and **heavy metals (arsenic, mercury, cadmium),** mainly from agricultural runoff, untreated industrial effluents, vehicular emissions, and poor waste management, damage hormonal and reproductive systems.
  - Additional threats include **fishing gear entanglement,** poaching, habitat loss from dams and water extraction, and vessel noise.
- **Protection Status:**
  - **IUCN:** Endangered
  - **Indian Wildlife (Protection) Act 1972** : Schedule I
  - **Convention on International Trade in Endangered Species (CITES):** Appendix I
  - **Convention on Migratory Species (CMS):** Appendix 1

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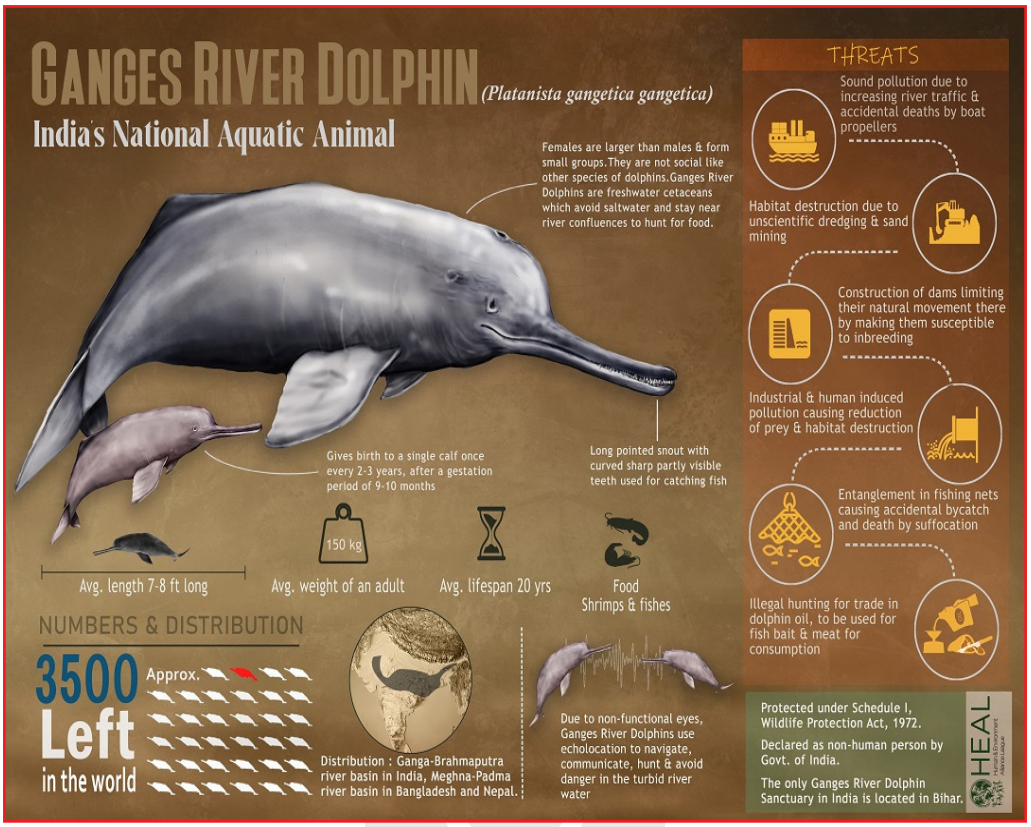

India's Initiatives for Gangetic Dolphins Protection

- **Project Dolphin:** Implements special conservation measures for Gangetic River Dolphins, recognized as umbrella species.
  - The project aims to protect both marine and riverine dolphins along with related cetaceans. Funded by the Ministry of Environment, Forests and Climate Change,
- **Vikramshila Ganges Dolphin Sanctuary** has been established in Bihar. It is India's only dedicated dolphin sanctuary.
- **National Ganga River Dolphin Day** (5th October)

16th Asiatic Lion Census 2025

Why in News?

Asiatic lion *(Panthera leo persica)* population in Gujarat goes up from 674 to 891 in 5 years, according to the 16th census 2025 released by the Gujarat Forest Department.

What are the Key Findings of 16th Asiatic Lion Census 2025?

- **Total Population:** 891 Asiatic lions recorded in Gujarat, a 32.2% increase from 674 lions in 2020 (15th census).
- **Population Distribution:** 384 lions live inside protected forest and sanctuary areas. **Lions in non-forested areas have risen from 340 in 2020 to 507 in 2025.**
  - 44.22% of the lion population now resides outside traditional protected habitats.
  - **Gir National Park** and adjoining sanctuaries **(Gir Wildlife Sanctuary, and Pania Wildlife Sanctuary)** house 394 lions, forming the core population.
    - **Amreli district has the highest count with 257 lions**, while Mityala Wildlife Sanctuary doubled its population to 32 lions.

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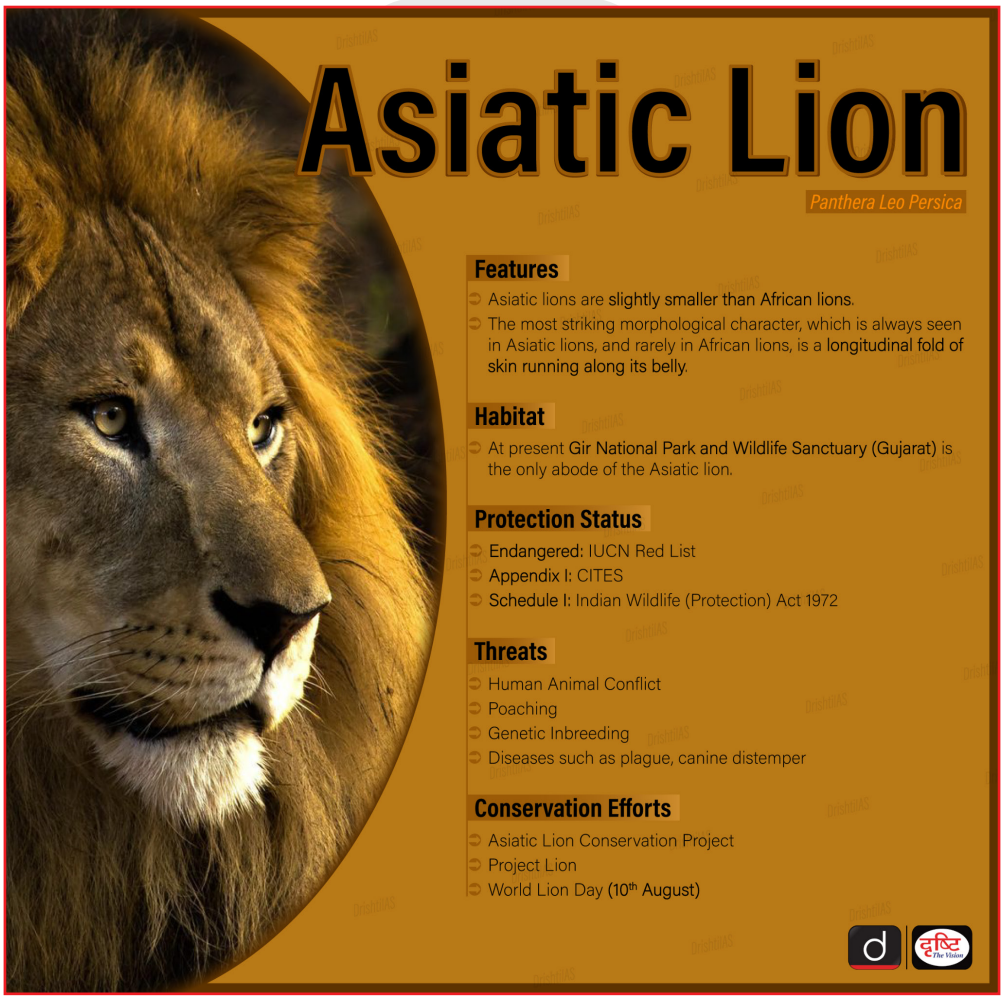
- **Barda Wildlife Sanctuary** near Porbandar has become a newly established lion population area, with 17 lions recorded, the first since 1879.
- The 2025 census also **identified new satellite populations** around Jetpur and Babra-Jasdan.

- **Adult Females: 330 adult females recorded, a 27% rise since 2020,** indicating strong potential for further growth.
- **Reasons of Population Boom:** Project Lion has helped in restoring habitats, **strengthening the prey base,** and mitigating conflicts to support Asiatic lion conservation.
- **Census methodology:** Conducted using **direct beat verification** (the area was divided into regions, zones, and sub-zones with designated officials, enumerators, supervisors, and volunteers), **a more scientific and statistically robust method** compared to **pugmark-based tiger surveys.**
  - **Completed in just three days,** unlike the tiger census which takes two years.

What is Project Lion?

- **Project Lion:** Announced in 2020, Project Lion is a long-term initiative aimed at securing the future of **Asiatic lions** by creating a sustainable environment that enhances the overall health of their ecosystems.
  - The project, being implemented in the Gir landscape in Gujarat, focuses on habitat improvement, the use of advanced technologies such as **radio-collaring and camera traps for monitoring**, and the mitigation of human-wildlife conflict.
  - The Gujarat Forest Department plays a central role in implementing these conservation measures, conducting regular lion censuses to track population trends and health.



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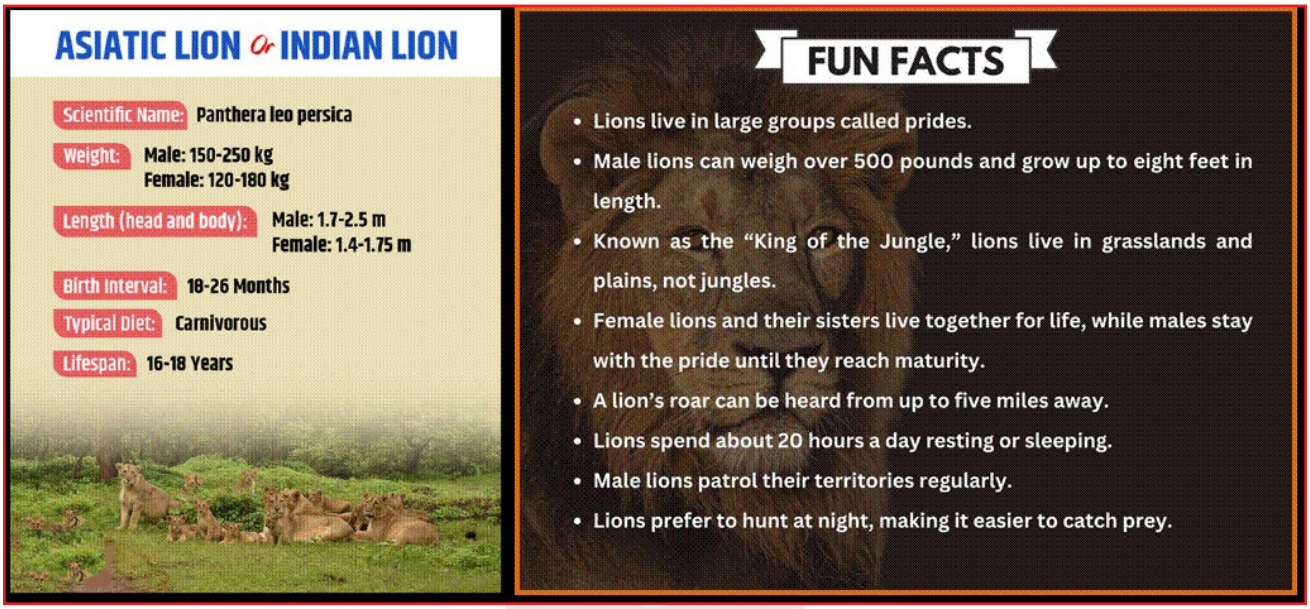
- **Technologies in Lion Conservation:** Advanced tools such as **Global Positioning System-based tracking** are used to monitor lions and vehicles, ensuring efficient surveillance.
  - An **automated sensor grid,** which includes magnetic, movement, and infrared heat sensors, helps detect and track wildlife activity.
  - Geographic Information System (GIS)-based real-time monitoring enables timely analysis, report generation, and effective management of conservation efforts.



Note: The International Union for Conservation of Nature (IUCN) released the **first Green Status Assessment for lions in 2025**, providing a global standard to measure species recovery and conservation impact.

- **IUCN Green Status of Species covers all species** except microorganisms and uses **eight categories** (Extinct in the Wild, Critically Depleted, Largely Depleted, Moderately Depleted, Slightly Depleted, Fully Recovered, Non-Depleted and Indeterminate).
- **Unlike the IUCN Red List**, which focuses on extinction risk, the **Green Status highlights recovery potential and necessary conservation actions**. Lions have been placed in the **Largely Depleted category.**

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History

Highlights

- *Veer Savarkar Jayanti*

Veer Savarkar Jayanti

Why in News?

On 28th May, the **Prime Minister** paid tribute to **Vinayak Damodar Savarkar (Veer Savarkar)** on his birth anniversary.

Who was Vinayak Damodar Savarkar and What were his Major Contributions?

- **Early Life:**
  - Born on **28th May, 1883**, in Nashik, Maharashtra, VD Savarkar (also known as **Swatantryaveer Savarkar**) was a **freedom fighter, politician, lawyer, writer,** and **social reformer.**
- **Related Organisations and Work:**
  - Founded **Mitra Mela** in 1899, later, it was renamed as the **Abhinav Bharat Society** in 1904.
  - Established **Free India Society** in London in **1906** to foster revolutionary nationalism among Indian students abroad. Played a key role in the **India House** in London (founded by **Shyamji Krishna Verma**), a hub for revolutionary activities.
  - Advocated **guerrilla warfare,** allegedly involved in making **handmade bombs**, and provided legal aid to **Madan Lal Dhingra**.
  - Authored the influential book **"Hindutva: Who is a Hindu?" (1923)** and also wrote **"The History of the First War of Indian Independence"**.
    - Savarkar sometimes wrote using the pen-name **"Mahratta"** for some of his writings.
- **Trial & Sentence:**
  - He was **arrested in 1909** on charges of **plotting armed revolt against** the **Morley-Minto reform (Indian Councils Act 1909)**, later **extradited and sentenced to life imprisonment** and deported to the **Cellular Jail** in the **Andaman and Nicobar Islands** (also known as **Kala Pani**).
    - He was later interned at **Ratnagiri** until 1937.
  - He **attempted to escape** while being transported via **Marseilles** but was **recaptured by British authorities**.
- **Political Career and Ideology:**
  - After his release, Savarkar served as **President of the Hindu Mahasabha (1937–1943)** and opposed the **Quit India Movement (1942)**, considering it impractical.
  - He engaged in discussions on the **Cripps Mission** and **Wavell Plan,** promoting national unity.
  - Influenced by **Tilak, Lajpat Rai, and Bipin Chandra Pal**, Savarkar envisioned a **unified nation with equal rights for all**, rooted in loyalty to India.
  - A **strong advocate of civil liberties and social reform**, he fought a**gainst casteism, promoted inter-caste marriages, Dalit temple entry** (e.g., **Patit-Pavan Mandir**), **sea-crossing,** and **reconversion to Hinduism.**
- **Death & Legacy:**
  - In **1964**, feeling that his mission was complete after India's independence, Savarkar began a **hunger strike on 1st February and** died on **26th February 1966**.
  - In recognition of his contributions, **Port Blair Airport** in the Andaman and Nicobar Islands was renamed **Veer Savarkar International Airport** in **2002**.

Read More: Veer Savarkar Jayanti

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Geography

Highlights

- *Early Monsoon Onset 2025*
- *Geographical and Climatic Factors Influencing Heatwaves*
- *Rising Cyclone Threats and Mangrove Vulnerability*

Early Monsoon Onset 2025

Why in News?

The India Meteorological Department (IMD) declared the southwest monsoon onset over Kerala earlier than usual. This early arrival is significant as the monsoon provides over **70% of India's annual rainfall**, crucial for agriculture and the economy. The last early onset before 2025 was in **2009.**

What are the Criteria for Declaring the Onset of the Monsoon?

- **Essential criteria:** IMD declares monsoon onset anytime after May 10 based on key criteria:
  - **Rainfall Criteria:** After 10th May, if **60% of 14 designated weather stations in Kerala and surrounding areas** (e.g., Thiruvananthapuram, Kochi, Mangalore) record ≥2.5 mm rainfall for two consecutive days, onset can be considered on the second day.
  - **Wind Field:** Westerly winds blow from West to East in the **30 to 60 degree latitudes,** both in the northern and southern hemispheres.
    - For the onset, the depth of westerly winds should be maintained at up to 600 hectoPascals or hPa, which is the unit for measuring **atmospheric pressure**, and wind speeds must range between 15-20 knots (27-37km/hr) at 925 hPa.
  - **Outgoing Longwave Radiation (OLR):** The INSAT-derived **OLR value**, which measures the energy emitted to space by the Earth's surface, oceans, and atmosphere, should be below **200 watts per square meter (W/m^2)** in the region between 5°N and 10°N latitude and 70°E and 75°E longitude, indicating sufficient atmospheric heat conducive to rainfall.
- Once these conditions are met on two consecutive days, IMD declares the monsoon onset.

What Factors Caused the Early Monsoon Onset 2025?

- **Madden-Julian Oscillation (MJO):** The MJO is a transient **eastward-moving system of winds, clouds, and pressure** disturbances that travels around the equator.
  - It was identified in 1971 by Roland Madden and Paul Julian, scientists at the National Centre for Atmospheric Research in Colorado.
  - The MJO typically travels eastward at 4–8 m/s, and completes one global cycle in 30–60 days, though sometimes it takes up to 90 days.
  - It **influences weather in tropical regions,** especially between 30°N and 30°S, which includes India.
  - MJO has two distinct phases: an **active phase,** which brings enhanced convection and increased rainfall, and a **suppressed phase,** which leads to reduced convection and drier conditions.
  - It can trigger cyclones and cause brief but intense rainfall spells, even during dry periods.
- **Mascarene High:** The IMD describes the **Mascarene High** as a high-pressure area found around the **Mascarene Islands (in the south Indian Ocean)** during the monsoon period.
  - The variation in the intensity of high pressure is responsible for heavy rains along India's west coast.

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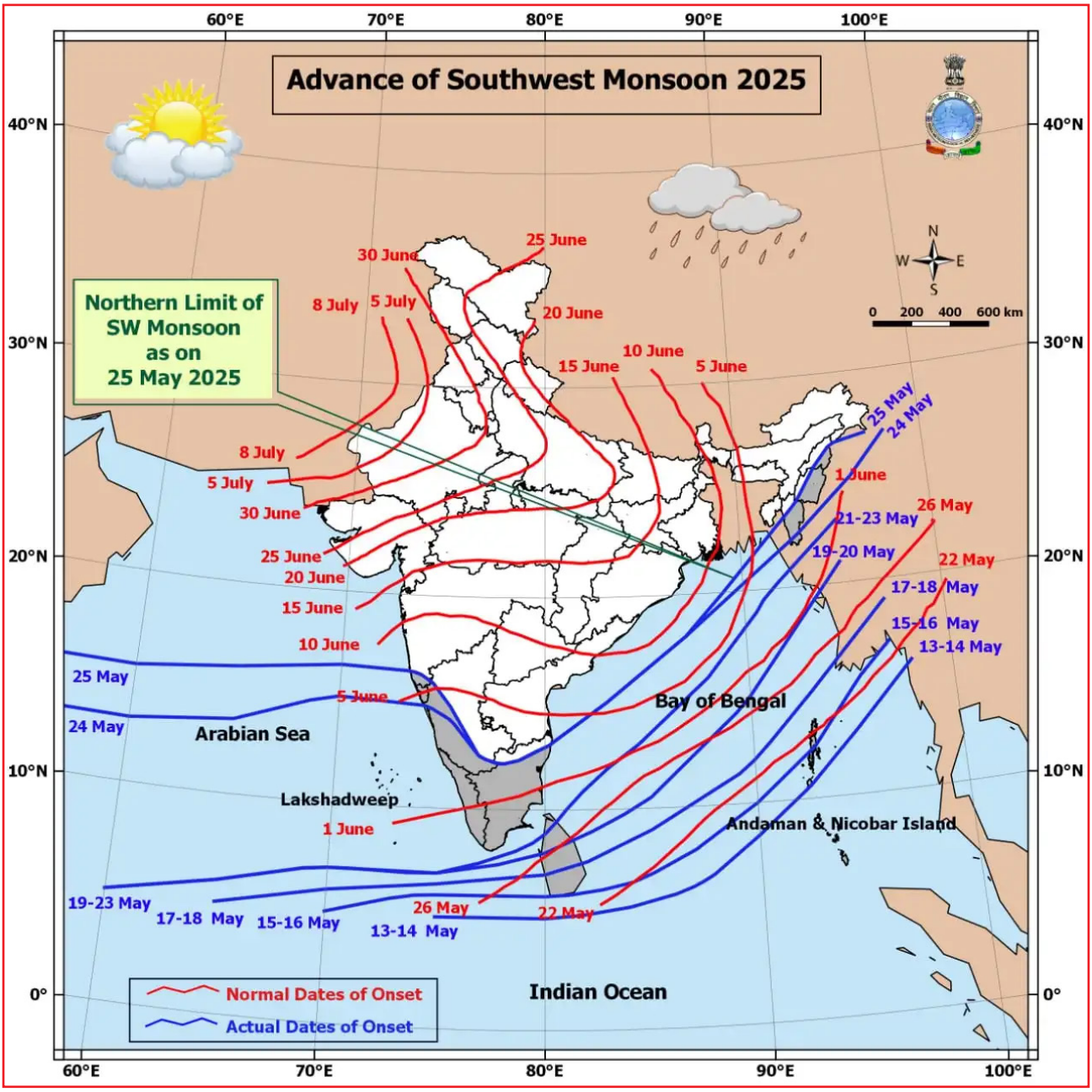
- **Convection:** An increase in the convective activity, that is, the vertical transport of heat and moisture in the atmosphere, also brings rainfall.
- **Somali Jet:** It is a low-level, inter-hemispheric cross-equatorial wind band originating **near Mauritius and north Madagascar**.
  - During May, after crossing the east coast of Africa, it reaches the Arabian Sea and the west coast of India. A strong Somali jet is associated with the strengthening of monsoon winds.
- **Heat-low:** As the Sun moves northward, a low-pressure zone forms over the Arabian Sea and Pakistan, acting like a **suction pump to draw moist air** along the monsoon trough, boosting monsoon rainfall.



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- **Monsoon Trough:** It is an **elongated low-pressure area** extending from the heat low to the north Bay of Bengal. The north-south swinging of this trough causes rainfall during the **June–September period across the core monsoon zone.**
- **Cyclonic Monsoon Vortex:** It is also known as a **Monsoon Onset Vortex (MOV)**, is a **synoptic-scale cyclonic circulation** that forms over the Arabian Sea during the Indian summer monsoon.
  - These vortices can intensify into tropical cyclones and play a crucial role in the onset and advance of the monsoon.
- **Pressure gradients:** It is the rate of change of pressure over a given distance. It also supports the strong monsoon onset.

Other Factors Influencing Monsoon

- **Monsoon low:** It is a type of **low-pressure area (LPA)** characterized by the lowest pressure at its center with winds blowing anticlockwise in the **Northern Hemisphere.**
  - It causes air to converge and rise, leading to cloud formation and rainfall. During the monsoon season, these **LPAs are known as monsoon lows and can intensify into monsoon depressions,** which are the main rain-bearing systems of the southwest monsoon over India.
- **Tibetan High:** It is a warm anticyclone **located over the Tibetan Plateau** in the middle to upper troposphere during the monsoon season.
  - It produces an outflow of easterly winds that form a jet stream near Chennai. The position of this Easterly Jetstream influences the **monsoon rainfall pattern over India**.

How are Rainfall alerts Categorised?

Alert Colour	Rainfall Category (24 hrs)	Weather Description	Advisory / Action
Green	Less than 64 mm	Light rain	**No advisory**: Weather is generally safe; no action needed.
Yellow	64.5 – 115.5 mm	Moderate rain	**Be aware**: Minor disruptions possible; stay informed and updated.
Orange	115.6 – 204.4 mm	Heavy to very heavy rain	**Be prepared**: Likely disruptions in transport, power; take necessary precautions.
Red	204.5 mm and above	Extremely heavy rain	**Take action**: High risk to life and property; follow emergency measures immediately.

What is the Impact of Early Onset of Monsoon?

- **Boost to Kharif Crop Sowing:** Early monsoon facilitates **timely sowing** of major Kharif crops like rice, maize, millets, toor, and moong, ensuring **higher productivity**.
- **Vegetable and Mushroom Cultivation:** Pre-monsoon rains benefit **vegetable farmers** (e.g., tomatoes, okra, beans) and **mushroom growers** by creating a **cool, moist environment** favorable for cultivation.
- **Water Resource Management:** Early rainfall recharges groundwater, **fills reservoirs**, and **improves irrigation**, essential for both agriculture and **hydropower generation**.
- **Increased Spoilage & Inflation Pressure: Unanticipated rains** have led to **farm-level spoilage**, pushing up **vegetable prices** in cities like Mumbai.
- **Weather Extremes and Flood Risks: Heavy downpours, lightning, and gusty winds** in parts of Kerala, Karnataka, and Maharashtra raise concerns over **localized flooding and damage to standing crops**.
- **Enhanced Export Potential:** Increased crop production could **improve farm incomes**, **boost agri-exports**, and support **India's GDP growth**.

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Why do Cyclones not occur in India during the Peak Monsoon Months?

- **Conditions Required for Cyclone Formation: Tropical cyclogenesis** (cyclone formation) requires a combination of the following environmental factors:
  - Warm ocean waters with temperatures of **at least 26.5°C**, extending to a depth of 50 meters or more.
  - High humidity in the **mid-troposphere, around 5 km altitude**, to support cloud development.
  - **Low vertical wind shear,** meaning there should be minimal difference in wind speed and direction between the surface and the upper atmosphere, allowing the system to remain vertically aligned.
  - **A pre-existing low-pressure** disturbance near the surface to initiate cyclonic rotation.

MONSOON

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Monsoons are seasonal winds that reverse their direction with the change of season.

Origin of Monsoon

- Thermal Concept
- Dynamic Concept

Thermal Concept by Halley

- **Monsoon result of:**
  - Heterogenous character of globe (Unequal distribution of land and water)
  - Differential seasonal heating and cooling of continents and oceans

South-West (Summer) Monsoon

- Sun shines over Tropic of Cancer
- Brings low-pressure centres (Near Baykal Lake and Peshawar) due to High temperature
- Low temperature in Southern hemisphere brings High pressure centre over Australia and Indian Ocean
- Winds Blow from high (ocean) to low pressure in Asia (land)
- Ferrel's law and Coriolis force turn these wind in south-westerly (SW) direction
- They bring moisture from Indian oceans to Indian subcontinent yielding heavy rainfall

North-East (Winter) Monsoon

- Sun shines over Tropic of Capricorn
- Brings High Pressure centers (near Baykal Lake and Peshawar) due to low temperatures
- High temperature in Southern hemisphere brings Low pressure centre over Australia and Indian Ocean
- Winds Blow from high (land) to low pressure (ocean) in north-easterly (NE) direction called Retreating Monsoon

Dynamic Concept by Flohn

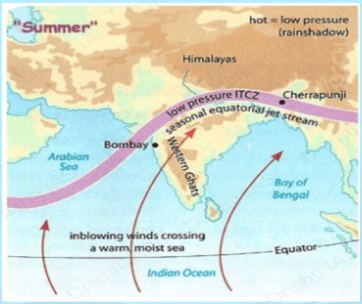
- Monsoon originated due to shifting of pressure and wind belts
- Intertropical Convergence (ITC) formed due to convergence of NE and SE trade winds near equator
- Northern and Southern branches of the ITC, known as NITC and SITC respectively, create a belt of doldrums marked by equatorial westerlies

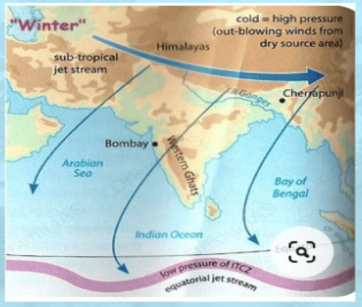
South-West (Summer) Monsoon

- Sun shines over Tropic of Cancer
- NITC extended up to 30° N latitude covering south and SE-Asia and establishes Equatorial westerlies
- It brings atmospheric depressions (cyclones) with heavy rainfall

North-East (Winter) Monsoon

- Sun shines over Tropic of Capricorn
- Due to Southward shifting of Sun, pressure and wind belts also shifts
- Western cyclonic disturbances (from Mediterranean Sea) enter India from west in winter due to Westerly Jet stream
- Northeast trade winds reestablished over south and SE Asia
- These NE trades become winter monsoons called Retreating Monsoon and rains in Andhra and Tamil Region





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- **Atmospheric Conditions During Monsoon:** Despite **warm seas and high moisture** (both crucial for cyclone formation) India rarely experiences cyclones during July and August, the peak monsoon months.
  - This is primarily due to unfavorable atmospheric conditions, especially strong **vertical wind shear that prevents cyclones** from developing and sustaining.
  - Westerly winds peak at **20–25 knots between 900 and 800 hPa,** while easterly winds reach 60–80 knots at 150–100 hPa over peninsular India.
    - This results in **high vertical wind shear**, disrupting cyclone formation and making conditions unfavorable for tropical cyclogenesis during these months.

What is the Impact of Climate Change on Indian Monsoon?

- **Increasing Extreme Rainfall Events:** Rising trend in both the frequency and magnitude of extreme rainfall events during the monsoon season, particularly over central India. This is attributed to **climate change combined with natural variability.**
  - Alongside more extreme events, there is a decreasing trend in moderate rainfall occurrences during the monsoon season over central India.
- **Overall Monsoon Rainfall Decline:** Over the last 50 years, summer monsoon precipitation (June to September) over India has declined by approximately 6%, with significant reductions noted over the Indo-Gangetic Plains and the Western Ghats.
- **Increase in Heavy Rainfall Frequency:** Central India has experienced about a 75% increase in the frequency of daily extreme precipitation events, defined as rainfall exceeding 150 mm per day.
- **Warming Atmosphere and Moisture Capacity:** The Earth's rising temperature due to anthropogenic greenhouse gas emissions increases the atmosphere's capacity to hold moisture.
  - According to the **Clausius-Clapeyron Relation principle,** the moisture-holding capacity of air increases by approximately 7% for every 1°C rise in temperature.
  - As the atmosphere holds more moisture, heavy rainfall events are expected to become more frequent and intense under changing climate conditions.

Withdrawal of Monsoon

- The withdrawal of monsoon is defined as the **gradual retreat of the southwest (SW) monsoon** from different parts of India. It marks the end of the rainy season and is characterized by:
  - Cessation of rainfall for at least **5 consecutive days.**
  - Change in wind patterns, especially a shift from **southwesterly to northeasterly directions.**
  - Reduction in **atmospheric moisture** as seen in satellite water vapour imagery and tephigrams.
  - Formation of **anticyclonic circulation** in the lower troposphere (850 hPa and below).

Geographical and Climatic Factors Influencing Heatwaves

Why in News?

Andhra Pradesh and Telangana experience intense heat waves during summer due to a combination of unique **geographical features and climatic conditions**.

How do Geographical and Climatic Factors Influence Heat Waves?

- **Geographical Factors:**
  - **Latitude and Solar Intensity:** Areas near the **Tropic of Cancer,** such as Andhra Pradesh and Telangana, receive intense solar radiation during summer when the sun is nearly overhead.

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- This vertical **solar incidence** increases ground heating and raises temperatures significantly.

❍ **Terrain and Surface Characteristics:** Rocky and barren landscapes, such as the **Deccan plateau in Telangana**, absorb more heat compared to vegetated or moist surfaces.

- **Black soils** prevalent in these regions also retain heat longer, contributing to elevated daytime temperatures.
- Conversely, regions with dense vegetation or irrigated agricultural land experience cooling due to **evapotranspiration** (sum of all processes by which water moves from the **land surface to the atmosphere** via evaporation and transpiration) .

❍ **Landlocked Regions:** Landlocked regions, such as most of Telangana, experience higher heatwave risks due to the **absence of nearby water bodies,** leading to greater temperature variations, a pattern also observed in north-central and northwest India.

- The coastal regions experience moderated temperatures due to cooling effects from large water bodies, which have higher heat capacity and promote evaporative cooling.
- **Urban Heat Islands,** characterized by **high population density, extensive concrete and asphalt surfaces, and limited vegetation**, absorb and retain more heat, creating localized zones of elevated temperatures, which lead to more intense heat waves.

➢ **Climatic Factors:**

❍ **Rainfall and Humidity:** Low **pre-monsoon rainfall** leads to dry soils and reduced moisture, limiting **evaporative cooling** (process of removing heat from a surface due to the evaporation of water).

- Minimal cloud cover increases solar radiation, raising surface temperatures leading to intense heat waves.
- High humidity worsens **heat stress** by reducing sweat evaporation, raising the heat index.

❍ **Wind and Atmospheric Conditions:** Weak winds during heat waves prevent **heat from dispersing,** causing it to build up near the ground and intensify surface temperatures.

- Stable atmospheric conditions can trap heat close to the ground (**temperature inversion**), prolonging and intensifying heatwaves.
- High atmospheric conditions, such as **anti-cyclonic flows** (high-pressure systems), promote clear skies, dry air, and sinking air masses that enhance surface heating and heatwave development.
- **El Niño effect, and phenomena like the "Loo" wind contribute** to the frequency and intensity of heat waves.
  - **El Niño** weakens the monsoon-driving trade winds. This leads to reduced **cloud cover and lower rainfall,** causing dry soils and higher surface temperatures creating ideal conditions for heatwave formation and intensification.
  - **"Loo,"** is a hot, dry, and dusty wind that blows during the summer months

What are Heat Waves?

➢ **About:** Heat waves are periods of **unusually high temperatures relative to the normal climate of a region.**

❍ The threshold for declaring a heat wave **varies by location, depending on the region's historical temperature patterns**.

❍ In India, Heat Waves occur mainly from **March to June** and in some rare cases even in July. The peak month of the heat wave over India is May.

❍ Heat Waves are **not officially classified as natural disasters under the Disaster Management (DM) Act of 2005** despite their severe impacts.

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- **India Meteorological Department (IMD) Criteria for Declaring Heat Wave:**

Region/Condition	Heat Wave
Plains	Max temperature ≥ **40°C**
Hilly Regions	Max temperature ≥ **30°C**
Coastal Stations	When the maximum temperature departure is **4.5°C or more from normal,** and provided the actual maximum temperature is **37°C or above.**
Based on Departure from Normal	**Heat Wave:** Departure from normal is **4.5°C to 6.4°C** **Severe Heat Wave**: Departure from normal is **> 6.4°C**
Based on Actual Maximum Temperature	**Heat Wave:** When actual maximum temperature ≥ **45°C** **Severe Heat Wave:** When actual maximum temperature ≥ **47°C**
Spatial & Temporal Condition	To declare as a heatwave the criteria must be met at **minimum 2 stations** in a Meteorological subdivision for at least **2 consecutive days.**

What is the Impact of the Heat Waves?

- **Impact on Human Health:** Heatwaves lead to a surge in illnesses such as heat cramps, edema (swelling), syncope (fainting), heat exhaustion, and life-threatening heat stroke.
  - The elderly, outdoor laborers, low-income groups, and people with pre-existing health conditions are especially at risk.
  - According to the "Heat Watch 2024" report, **733 heatstroke deaths** were reported across 17 Indian states between March and June.
- **Economy:** Workers in industries like construction, mining, power plants, and refineries experience prolonged heat exposure, increasing **health risks and reducing efficiency.**
  - High heat exposure results in the **loss of up to 162 working hours annually for laborers engaged** in heavy physical work, significantly impacting economic productivity.
  - Heatwaves reduce air density, requiring aircraft to use longer **take-off distances,** simulating high-altitude conditions and increasing **operational expenses and energy consumption.**
- **Environmental Damage:** Increased forest fires due to heat waves harm ecosystems and human settlements.
  - Forest Survey of India has estimated that **21.4% area under forest** is vulnerable to forest fires
  - Heatwaves accelerate evaporation, reducing **water availability** and affecting agriculture, livestock, and livelihoods.
- **Agricultural Impact:** Extreme heat stresses plants, **stunts their growth, and can cause plant mortality**, leading to lower yields and poor-quality produce, especially impacting Kharif crops like rice and threatening food security in affected states.
  - 1 % increase in heatwaves led to a **15% reduction in crop yield in 2022**, and Every 1°C rise in temperature beyond 30°C during the grain filling period reduces wheat yield by 3–4%. In 2022, a 1% increase in heatwave events led to a 15% reduction in crop yield.

What are India's Initiatives to tackle Heat Waves Issue?

- **Heat Action Plans (HAPs):** The Indian government has updated HAPS across 23 states, aiming to strategically combat and manage heatwaves.
  - HAPs typically include a region's **heat profile, past heatwave data, temperature trends, and vulnerability assessments** to identify high-risk areas.
  - They provide response plans with recommendations for mitigating heat wave impacts before, during, and after events, specifying roles for departments like disaster management, labor, and police.
- **IMD Heat Wave Warnings:** India Meteorological Department issues following colour code impact-based heat warning jointly with **National Disaster Management Authority.**

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Colour Code	Alert	Warning	Impact	Suggested Actions
Green (No action)	Normal Day	Maximum temperatures are near normal	Comfortable temperature. No cautionary action required.	Nil
Yellow Alert (Be updated)	Heat Alert	Heat wave conditions at isolated pockets persists on 2 days	Moderate temperature. Heat is tolerable for general public but moderate health concern for vulnerable people e.g. infants, elderly, people with chronic diseases	(a) Avoid heat exposure. (b) Wear lightweight, light-coloured, loose, cotton clothes. (c) Cover your head: Use a cloth, hat or umbrella
Orange Alert (Be prepared)	Severe Heat Alert for the day	(i) Severe heat wave conditions persists for 2 days (ii) Through not severe, but heat wave persists for 4 days or more	High temperature. Increased likelihood of heat illness symptoms in people who are either exposed to sun for a prolonged period or doing heavy work. High health concern for vulnerable people e.g. infants, elderly, people with chronic diseases.	(b) Avoid heat exposure– keep cool. Avoid dehydration. (b) Drink sufficient water- even if not thirsty. (c) Use ORS, homemade drinks like lassi, torani (rice water), lemon water, buttermilk, etc. to keep yourself hydrated
Red Alert (Take Action)	Extreme Heat Alert for the day	(i) Severe heat wave persists for more than 2 days. (ii) Total number of heat/severe heat wave days exceeding 6 days.	Very high likelihood of developing heat illness and heat stroke in all ages.	Extreme care needed for vulnerable people.

- **Jal Shakti Abhiyan:** Focuses on water conservation and restoring water bodies, crucial during heatwaves for hydration and urban cooling.
- **Smart Cities Mission:** Promote **green cover,** water-sensitive urban design, and climate-resilient infrastructure. Encourages creation of **urban green spaces and cool zones.**
- **Cool Roof and Urban Cooling Initiatives:** Cool Roof programs (e.g., in Hyderabad) promote the use of reflective paints or materials to reduce indoor temperatures.
  - States like Telangana, Gujarat, and Maharashtra have included cool roofs in **building codes and public housing schemes.**

Rising Cyclone Threats and Mangrove Vulnerability

Why in News?

A new study revealed that climate change is making cyclones **more intense and expanding** their reach into previously unaffected regions.

- It also revealed that half of the **world's** mangroves could face **severe risks by 2100**, threatening **coastal protection,** carbon storage**,** and biodiversity.

Note: Climate change is complex, so experts use **Shared Socioeconomic Pathways (SSPs)** to understand its effects. Each SSP shows a different future.

- **SSP3** describes a **divided world** with little focus on the environment.
- **SSP5** shows a world with **rapid fossil fuel use** and heavy **resource depletion**.
- **SSP5-8.5** is the **SSP5 pathway plus a radiative forcing**, the amount of extra energy being added to the planet's surface.

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What are Key Findings of the Study on Cyclones and Mangroves?

- **Increased Cyclone Intensity and Range:** Under the **SSP5-8.5** scenario (high emissions and fossil fuel use), **tropical cyclone** belts may shift **away from the equator**, increasing risks to **higher-latitude ecosystems**.
  - **East Asia**, **Central America**, the **Caribbean**, **Madagascar**, and **Oceania** face rising **cyclone exposure.**

CYCLONE

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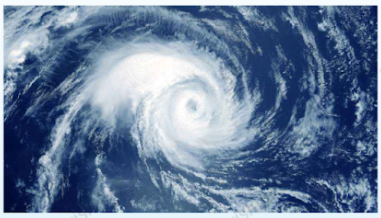
Cyclones are rapid **inward** air circulation around a **low-pressure** area.

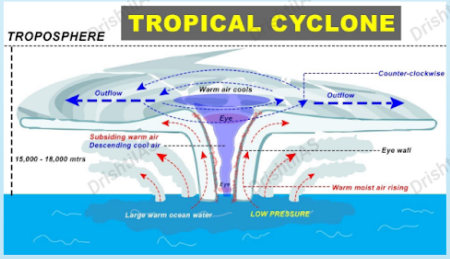


Cyclone v/s Anticyclone

Pressure System	Pressure Condition at the Center	Pattern of Wind Direction	
		Northern Hemisphere	Southern Hemisphere
Cyclone	Low	Anticlockwise	Clockwise
Anticyclone	High	Clockwise	Anticlockwise

Classification

- **Tropical Cyclones;** originate between the **Tropics of Capricorn and Cancer**
- **Extra Tropical/ Temperate Cyclones;** originate in the **Polar Regions**



Conditions for Formation

- Large sea surface with temperature >27° C.
- Presence of the **Coriolis force**
- Small **variations in the vertical wind speed**
- **A pre-existing weak low- pressure area**
- **Upper divergence** above the sea level system

Nomenclature

- Nodal Authority - **World Meteorological Organization (WMO)**
- Indian Ocean Region - **Bangladesh, India, Maldives, Myanmar, Oman, Pakistan, Sri Lanka** and **Thailand** contribute to naming cyclones that occur in this region.

Different Names for Tropical Cyclones

- **Typhoons** - Southeast Asia and China
- **Hurricanes** - North Atlantic and eastern Pacific
- **Tornados** - West Africa and southern USA
- **Willy-willies** - Northwest Australia
- **Tropical Cyclones** - Southwest Pacific and Indian Ocean

Cyclones in India

- **Bi-annual Cyclone Season** - March to May and October to December
- Recent Cyclones - **Tauktae, Vayu, Nisarga and Mekanu** (in Arabian Sea) and **Asani, Amphan, Fani, Nivar, Bulbul, Titli, Yaas and Sitrang (in Bay of Bengal)**

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- **Shorter Recovery Time for Ecosystems:** In **resilient ecoregions** (historically adapted to cyclones), the **recovery time between high-intensity storms** could drop from **19 years (1980-2017) to 12 years (2015-2050)**.
  - Some ecosystems may **shift into irreversible states** due to frequent disturbances.
- **Mangroves Under Threat:** By **2100**, up to **56%** of global **mangroves** could face **high to severe risk** under **SSP5-8.5**.
  - **Southeast Asia** is especially vulnerable with **52–78%** mangroves at risk.

Why is Cyclone Intensity and Range Increasing?

- **Warmer Ocean Temperatures:** Cyclones draw energy from **warm ocean waters** (≥26.5°C), and **climate change** raises **sea surface temperatures**, supplying more **heat** and **moisture**.
  - It leads to **higher wind speeds** (increased intensity), **more rapid intensification** (storms strengthening quickly), and **heavier rainfall** (warmer air holds more moisture).
- **Changing Wind Patterns:** As global temperatures rise, the **Hadley Cell** (atmospheric circulation near the equator) expands, pushing **storm tracks** toward higher latitudes, while changes in **wind patterns** (e.g., jet streams) shift **cyclone paths**, exposing regions like **Madagascar**, **East Asia**, and parts of the **Mediterranean** to new risks.
- **Rising Sea Levels: Higher sea levels** from **melting ice** and **warming oceans** worsen **coastal flooding** during storms, even without an increase in **cyclone frequency.**
- **Changes in Atmospheric Stability: Lower wind shear** in some regions (e.g., tropics) helps **cyclones grow stronger**, while higher shear in areas like the **Atlantic** can **weaken storms**, causing **cyclones to shift to new regions.**
  - **Wind shear** is the change in **wind speed or direction** over a short distance in the atmosphere—either **horizontally** or **vertically.**
- **Polar Warming:** Warming in the **polar regions**, which is **faster than in the tropics**, reduces the **equator-to-pole temperature gradient**, **shifting cyclone activity** away from the equator.
- **Degraded Ecosystems:** Human activity and climate stress have weakened natural buffers like **mangroves**, **coral reefs**, and **wetlands**, which protect against **storm surge**, absorb **wave energy**, and aid recovery.
  - Losing them exposes inland areas more and makes vulnerability worse over time.

Why is the Mangroves Ecosystem Under Severe Risk?

- **Climate Change:**
  - **More Powerful Cyclones:** Warmer **oceans** fuel **stronger cyclones** and **storms** that **uproot mangroves**, **erode soils**, and increase **saltwater intrusion**, harming **freshwater species.**
    - E.g., **Amphan** (1st **super cyclone** in the Bay of Bengal since 1999), damaged around **28%** of **Sundarban** **mangroves** and harmed **floral diversity** by increasing **soil salinity.**
  - **Rising Sea Levels: Mangroves face a dual threat** as they are **unable to shift inland** due to **farmlands**, **urban expansion**, and **flood-control structures**, while rising **sea levels** flood them from the coast, causing a **coastal squeeze**.
    - When **sea levels rise faster than 7 mm per year**, mangroves struggle to adapt and risk **dying from prolonged submersion.**
  - **Extreme Weather: Coral reef die-offs** (from warming) remove **natural wave barriers**, exposing mangroves to stronger waves.
- **Human Induced Destruction:**
  - **Deforestation for Aquaculture:** Since 1980, **35%** of the world's **mangroves** have vanished due to **aquaculture**, unchecked **development**, and **climate stress**.
    - In **Southeast Asia**, home to a third of global mangroves, cover declined by **3.4%** between 2000 and 2016, with **palm oil** and **rice farms** also replacing mangroves.
  - **Coastal Development: Tourism resorts**, **ports**, and **road development** lead to **habitat fragmentation**.
    - **E.g., Mumbai lost 40% of its mangroves** to **urban expansion** over the past **20 years**.
  - **Pollution & Overharvesting: Oil spills** (e.g., 2020 Mauritius) suffocate **mangrove roots**, **plastic waste** blocks **waterways**, **sewage** triggers **algal blooms**, and **illegal logging** persists in **Africa** and **Asia.**

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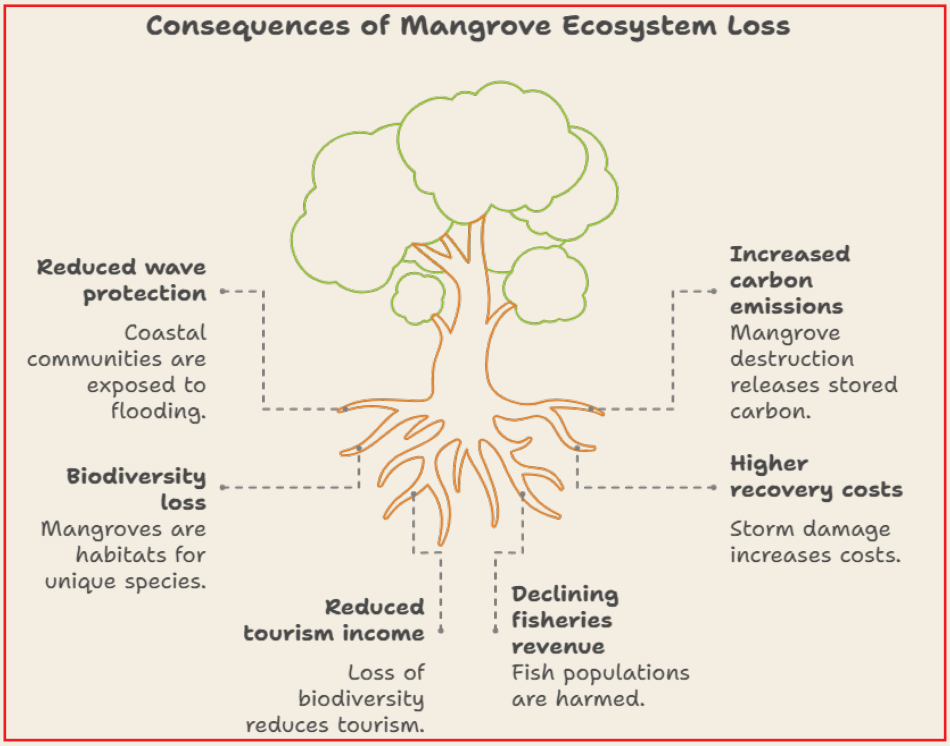
Consequences of Losing Mangroves Ecosystem



What are the Implications of Increasing Cyclone Intensity and Geographic Spread?

- **Ecological Devastation:**
  - **Stronger cyclones** uproot **mangroves** while **saltwater intrusion** kills **freshwater-dependent plants.** E.g., **62%** of mangroves in **southwest Florida** suffered **canopy damage** from **Hurricane Irma.**
  - **Coral Reef Destruction: Cyclones** damage **coral reefs** that protect shorelines, while **warmer seas** and storms trigger **mass bleaching** (e.g., Great Barrier Reef).
  - **Biodiversity Loss: Coastal ecosystems (seagrass, estuaries)** face habitat fragmentation. **Endangered species** (e.g., Bengal tigers in Sundarbans) lose refuge.
- **Human & Economic Crises:**
  - **Deadlier Storms & Flooding: Storms** with **higher wind speeds** destroy **homes** and **infrastructure**, while **heavier rainfall** causes **inland flooding**. E..g, Cyclone Idai (2019) killed over **1,300 people** in **Mozambique.**
  - **Mass Displacement & Migration: Small island nations** (e.g., **Fiji**, **Bahamas**) face **existential threats**, with a **2021 World Bank report** warning that **+200 million people** could be **displaced by 2050** due to the **climate crisis.**
  - **Economic Losses: Climate-related damage** rose from **USD 450 billion** (2000–2004) to over **USD 1 trillion** (2020–2024). E.g., **Hurricane Helene** (2024) alone caused **USD 100+ billion** in damage, making it one of the **costliest US hurricanes.**
- **Food Security Risks: Rice paddies & crops** in cyclone-prone Asia (India, Bangladesh) face **salinization**.
  - E.g., **Cyclone Amphan** washed away about **1.7 million hectares of productive cropland** and **aquaculture farms** and **killed 2.1 million animals** in India (West Bengal and Odisha).
- **New Regions at Risk: Mediterranean**, **South Atlantic**, and **higher latitudes** (e.g., **Japan**, **New Zealand**) may face first-ever **cyclones.**
  - **Mega-cities** like **Miami**, **Shanghai**, and **Lagos**, built for past climates, face **catastrophic damage.**

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Security

Highlights

- *Inter-Services Organisations Rules 2025*
- *INSV Kaundinya*
- *India's Rising Defence Innovation & Export Capability*

Inter-Services Organisations Rules 2025

Why in News?

India has notified the **Inter-services Organisations (Command, Control and Discipline) Rules, 2025** under the Inter-Services Organisations (Command, Control and Discipline) Act, 2023.

- These rules aim to strengthen the command, control, and administrative efficiency of Inter-Services Organisations (ISOs), following the coordinated tri-service response during Operation Sindoor.

What are Inter-Services Organisations?

- **About:** ISOs are units or commands composed of personnel from two or more branches of the **Armed Forces (Army, Navy, and Air Force)**. They are designed to facilitate integrated planning, operations, and logistics.
  - Examples include **tri-service commands like the** Andaman and Nicobar Command or upcoming theatre commands under India's theaterisation plan.
- **ISO Act 2023:** The act addresses challenges arising from separate service laws, the **Army Act (1950), Navy Act (1957), and Air Force Act (1950)** which often hinder coordination and discipline in joint-service settings.
  - While it does not amend these existing laws, the **Act empowers ISO Commanders-in-Chief and Officers-in-Command with administrative and disciplinary authority over all personnel under their command,** regardless of service.
  - It formally recognises joint services command organisations like the **Andaman and Nicobar Command and Defence Space Agency** and allows the creation of **new ISOs and Joint Services Commands** and placed under the command of a Commander-in-Chief.
  - The Centre retains overall control and sets eligibility for leadership roles, while **Commanding Officers manage unit-level discipline** and administration within ISOs.
- **ISO Rules 2025:** Notified under the **Section 11** of the **ISO Act, 2023**. These rules aim to ensure **efficient management of discipline and administration** across the Army, Navy, and Air Force **when operating under ISOs**, such as joint commands or theatre commands.
  - As per the 2025 rules, both the **Joint Services Command and the Inter-Services Establishment** comprise personnel from any two or all three armed forces.
    - The Joint Services Command is headed by a **Commander-in-Chief** holding the rank of Lieutenant General, Air Marshal, or Vice Admiral.
    - An Inter-Services Establishment is commanded by an **Officer-in-Command** with the rank of Major General, Air Vice Marshal, Rear Admiral, or higher.
  - Under the ISO Rules 2025, if a **Commander-in-Chief, Officer-in-Command, or Commanding Officer** is on leave or absent, a replacement will be formally designated in the Inter-services unit's orders.
    - In emergencies without prior orders, the next higher formation will appoint a temporary substitute.
  - Matters not covered by **existing rules or Acts** regarding command and control in Inter-services Organisations shall be referred to the **Central Government for a decision.**

What is the Significance of Inter-Services Organisations?

- **Enhanced Operational Synergy:** Integration under unified commands allows for joint **planning and real-time coordination among** Army, Navy, and Air Force units.

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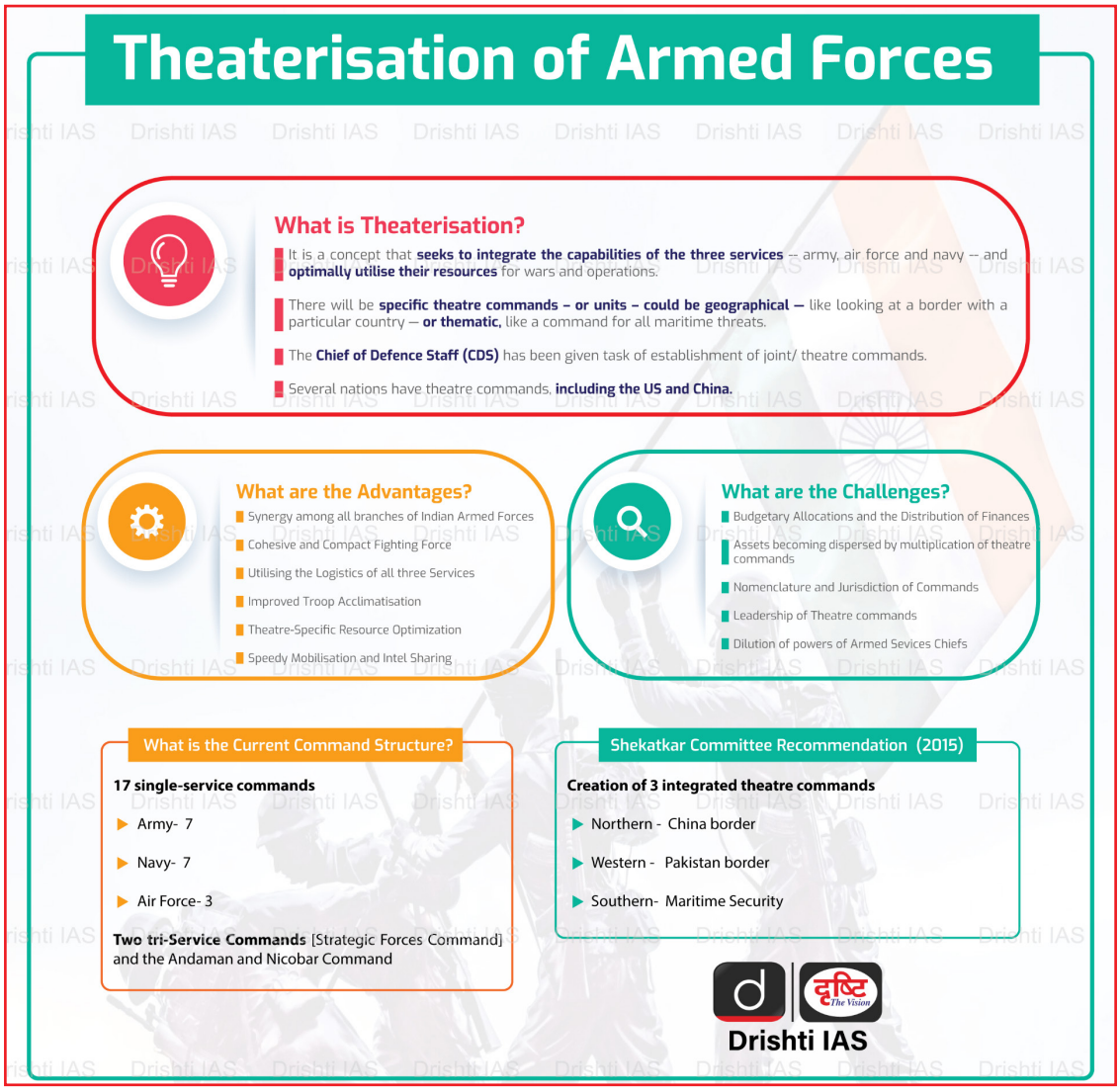
- The **Kargil Review Committee (1999)** highlighted the lack of coordination among the three armed services during the **Kargil War** and emphasized the urgent need for structural reforms. It recommended integrated commands to enhance joint operational effectiveness.
- This synergy is crucial to handle complex, multi-domain threats in the modern battlefield, particularly along the **two-front scenario involving China and Pakistan.**



- **Optimal Use of Resources:** ISOs enable **pooling of logistics, maintenance, and support functions,** preventing duplication and saving resources.
  - The establishment of the **first Tri-Service Common Defence Station in Mumbai (2024)** reflects the move toward integrated infrastructure.
- **Improved Combat Readiness:** Joint training and planning **enhance interoperability** and preparedness for **multi-domain operations** including cyber and space warfare.
- **Strategic Reform and Modernisation:** Integration reflects a shift towards modern military doctrine and international best practices (e.g., U.S. and China).
  - It aligns **India's military structure with evolving geopolitical challenges** and encourages technological integration and doctrinal evolution to prepare for future warfare.

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INSV Kaundinya

Why in News?

The Indian Navy recently inducted the **Indian Naval Sailing Vessel (INSV) Kaundinya**, the 1st **'stitched ship'** using **ancient stitched shipbuilding method (Tankai method)** to revive forgotten shipbuilding techniques.

- It is named after **Kaundinya**, a legendary **Indian mariner**, and set to embark on a historic voyage to **Oman by the end of 2025**, retracing ancient trade routes.
- It is executed through a tripartite agreement between the **Indian Navy**, **Ministry of Culture**, and a **Goa-based shipbuilding company.**

What are Key Facts About INSV Kaundinya?

- **About INSV Kaundinya:** It is a **stitched ship** modeled after a vessel depicted in the **5th-century Ajanta cave paintings.**
  - It is inspired by **Ajanta murals**, the ancient text **Yuktikalpataru** (written by **King Bhoja in 9th century CE**), and accounts of **foreign travellers** who described **stitched Indian ships.**
  - It features **symbolic motifs** like:
    - **Gandabherunda**, **two-headed eagle** of the **Kadamba dynasty** who ruled the Konkan coast
    - **Sun motifs** on sails
    - **Simha Yali (mythical lion)** on the bow
    - **Harappan-style stone anchor.**

- **About Kaundinya: Kaundinya** was a 1st-century **Indian mariner**, known for sailing to the **Mekong Delta**, where he married **warrior queen Soma** and co-founded the **Kingdom of Funan (modern-day Cambodia)**, one of the earliest **Indianised states** in Southeast Asia.
  - The **Khmer and Cham dynasties** of modern-day Cambodia and Vietnam **trace their origins** to this union.
  - His story is preserved in **Cambodian** and **Vietnamese sources**, though not in **Indian records**, and he is regarded as the **first named Indian mariner** to make **overseas voyages** with **global historical impact**.
- **Tankai Method:** It is a **2,000-year-old traditional Indian shipbuilding technique** known for its **manual craftsmanship**, **indigenous materials**, and **non-industrial techniques**. **Key Features include:**

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- **Stitched Plank Technique**: **Teak**, **sal**, or **mango wood planks** are drilled and stitched with **coir ropes**, then sealed with **cotton**, **resin**, and **fish oil** for waterproofing.
- **No Metal Fasteners**: Unlike European methods using **iron nails**, the **Tankai method** avoided metal to prevent **rust**, making ships **lighter**, more **flexible**, and **easier to repair**.
- **Unique Construction**: The **hull is** built **first**, then added ribs, allowing greater **flexibility** and **durability** in rough seas, unlike Western frame-first methods.
- **Indigenous Materials**: Uses **coir rope**, **dammar resin**, and **animal fat**, all **resistant to seawater.**

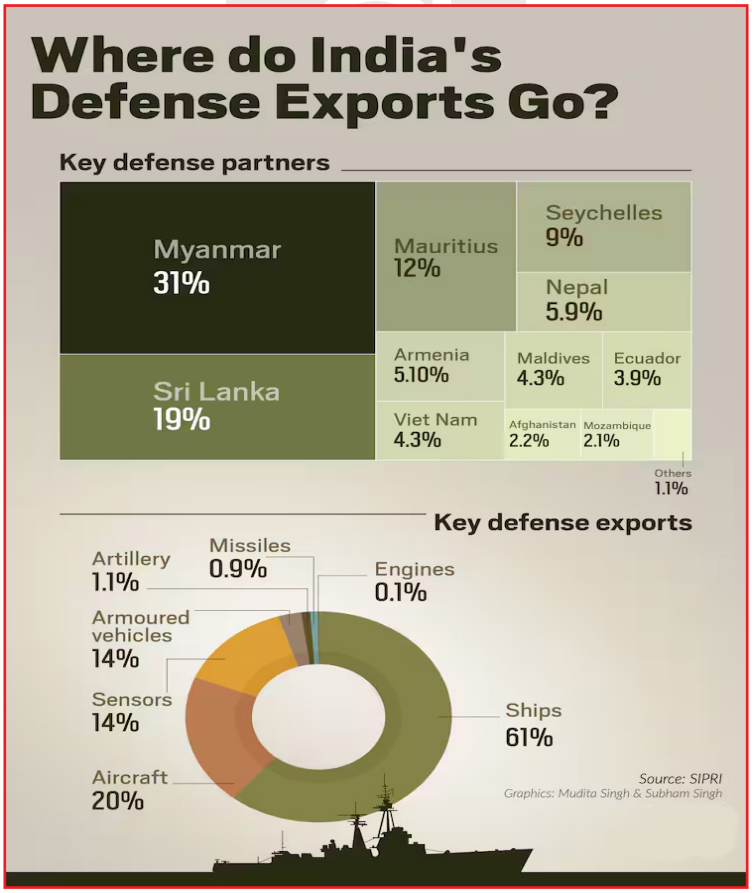
India's Rising Defence Innovation & Export Capability

Why in News?

India's **defence sector** is shifting from **import dependence to export competence**, driven by initiatives like **iDEX (Innovations for Defence Excellence)** and a **surge in domestic production and exports,** aligning with the goal of achieving **self-reliance in defence.**

What are the Key Developments in India's Defence Sector?

- **Surge in Indigenous Defence Production:** India's **domestic defence production** rose from **30–35% in 2014–15 to 65% in 2024-25,** reaching an **all-time high of Rs 1.27 lakh crore in FY 2023–24**, with a **target of Rs 3 lakh crore by 2029**.
  - The private sector plays a crucial role, contributing 21% to total defence production, fostering innovation and efficiency. In FY 2024–25, over **92% of capital procurement contracts** were **awarded to domestic firms,** witnessing strong policy support through initiatives like **Make in India**.



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- **Defence Exports Expansion:** India's defence exports grew over 34 times between FY 2013–14 and FY 2024–25, reaching Rs 23,622 crore in 2024–25, with the private sector contributing nearly **twice** as much as the **Defence Public Sector Undertakings (DPSUs).**
  - India exports **Dornier Do-228 aircraft,** Chetak helicopters, **bulletproof jackets, lightweight torpedoes,** and **interceptor boats** to **over 100 countries,** including the **US, France, and Armenia.**
  - India aims for **Rs 50,000 crore in defence exports by 2029** to strengthen global influence.
- **Technological Advancements in Defence R&D:** India's defence R&D has advanced through **iDEX** and **Technology Development Fund (TDF)**.
  - iDEX offers funding up to Rs 1.5 crore through **Support for Prototype and Research Kickstart (SPARK)**, up to Rs 10 crore through **iDEX Prime** and up to Rs 25 crore through Acing Development of Innovative Technologies with iDEX (ADITI) (2024) scheme
    - Key outcomes such as the **SkyStriker loitering munition and AI-powered surveillance robots**, deployed during **Operation Sindoor,** reflect its impact.
  - Recognised with the **Prime Minister's Award for Innovation in 2021,** iDEX has become central to India's push for defence self-reliance.
- **Defence Industrial Corridors (DICs) Development:** India has set up 2 Defence Industrial Corridors in **Uttar Pradesh** and **Tamil Nadu** to **boost indigenous defence production** and **attract investment**.
  - These corridors offer **infrastructure, incentives, and support for MSMEs**.
- **Modernisation of Armed Forces:** India is rapidly modernising its armed forces through a mix of indigenous and advanced imported systems.
  - In 2025, contracts were signed for **156** Light Combat Helicopters (LCH) Prachand, boosting aerial capabilities.
  - Precision weapons like SCALP missiles, HAMMER bombs, and loitering munitions were effectively used in Operation Sindoor.
  - Modernisation also focuses on domestically developed platforms such as **Tejas Light Combat Aircraft, Arjun Mk-1A tanks, Astra air-to-air missiles**, and **Pinaka rocket systems**.
  - DRDO is advancing in hypersonic tech, **Unmanned Aerial Vehicles (UAVs), and anti-satellite weapons, while AI, robotics, and space-based Intelligence, Surveillance, and Reconnaissance (ISR) tools** are shaping India's preparedness for future warfare.
- **Policy Reforms: India allowed** up to **74%** Foreign Direct Investment (FDI) **via automatic route** (100% via government approval), attracting Rs 5,516 crore investment since 2000.
  - The Defence Procurement Procedure (DPP) 2012, reformed procurement process to promote industry participation and streamline processes.
  - 'Make' projects and the Defence Acquisition Procedure (DAP) 2020 focused on indigenisation and promoting 'Make in India' **in defence manufacturing.**
  - Initiatives like Self-Reliant Initiatives through Joint Action (SRIJAN) linked the Armed Forces, DPSUs, private industry, to boost indigenous defence production, and accelerate the development of critical technologies.
  - Positive Indigenisation Lists (PILs) require defence items to be sourced domestically. The fifth PIL included 346 items for DPSUs, resulting in an import substitution value of Rs 1,048 crore and promoting the local industry.

What are the Key Challenges to India's Defence Sector?

- **Technological Gaps & Import Dependence:** India faces major gaps in **key defence technologies** like **fighter jet engines, Active Electronically Scanned Array (AESA) radars, semiconductors**, and **precision electronics**.

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- **Slow & Complex Procurement Process: Bureaucratic delays** hinder defence acquisitions, impacting readiness.
  - For instance, the **Tejas program took almost 20 years from approval to prototype**, and deals like **Rafale fighters** and **Scorpene submarines faced long delays**.
  - Though new **Defence Acquisition Council** guidelines seek to speed up procurement, **effective implementation remains challenging.**
  - Despite plans for 6-8 new centres under **Defence Testing Infrastructure Scheme (DTIS)**, **delays slow validation and deployment** of indigenous projects.
- **Low R&D Budget:** In 2025-26, only **Rs 1.8 lakh crore of the Rs 6.81 lakh crore defence budget** is for **modernisation,** with **DRDO receiving just 3.94%.**
  - Overall **R&D spending in India is about 0.7% of GDP,** much below global peers such as **China (2.4%), the US (3.5%),** and **Israel (5.4%).**
- **Limited Private Sector Role:** Private firms contribute just **21% to defence production,** hindered by **procurement risks, low R&D support**, and **weak collaboration with public units.**
  - Further, **uncertain global events** like **trade tensions** further **dampen investor confidence** and **hinder long-term private sector participation** in the defence ecosystem.
- **Testing and Certification Challenges:** India lacks sufficient facilities for testing advanced defence tech like UAVs, electronic warfare, and electro-optics.
- **Cybersecurity & Internal Security Challenges**: India's cybersecurity and electronic warfare capabilities **lag behind countries like China**, as seen in the **2020 Mumbai power grid cyberattack.**
  - Moreover, despite the creation of the **Chief of Defence Staff (CDS), lack of integrated planning** and **delayed implementation** of **Integrated Theatre Commands** hamper **joint operational effectiveness.**
- **Outdated Equipment:** Legacy systems like **MiG-21s** still operate **without upgrades,** reflecting deeper procurement and planning flaws.

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Disaster Management

Highlights

- *Urban Flooding in India*
- *Global Report on Internal Displacements 2025*

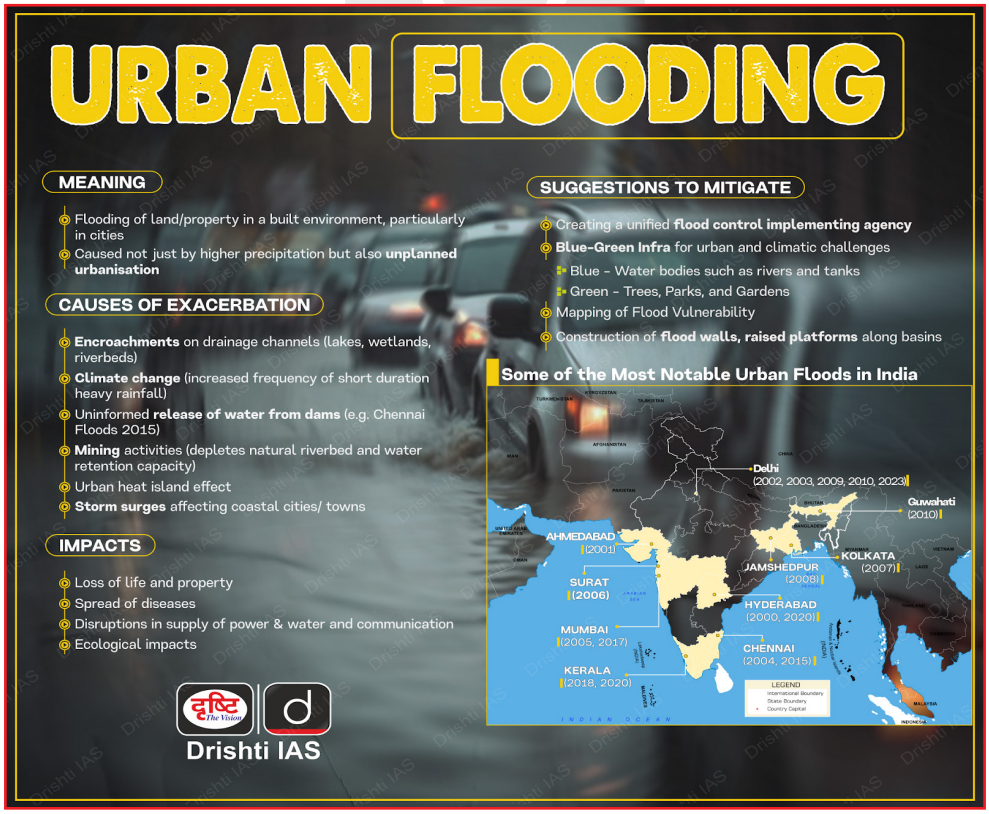
Urban Flooding in India

Why in News?

Bengaluru experienced intense **pre-monsoon rains** leading to severe **waterlogging, lake overflows**, and significant **damage to life and property.** With the **early onset of the monsoon** this year, the risk of **urban flooding** in the city is expected to escalate further.

What is Urban Flooding?

- Urban flooding refers to the **inundation of land or property in densely populated areas** due to **heavy rainfall, overflowing rivers, poor drainage systems**, or other **water-related incidents.**
  - It leads to **waterlogging, disrupting transportation, damaging infrastructure, and posing health hazards to urban populations.**
- **Examples**: **Bengaluru floods (2024), Delhi Floods (2023), Mumbai floods (2020), Chennai floods (2015)**.



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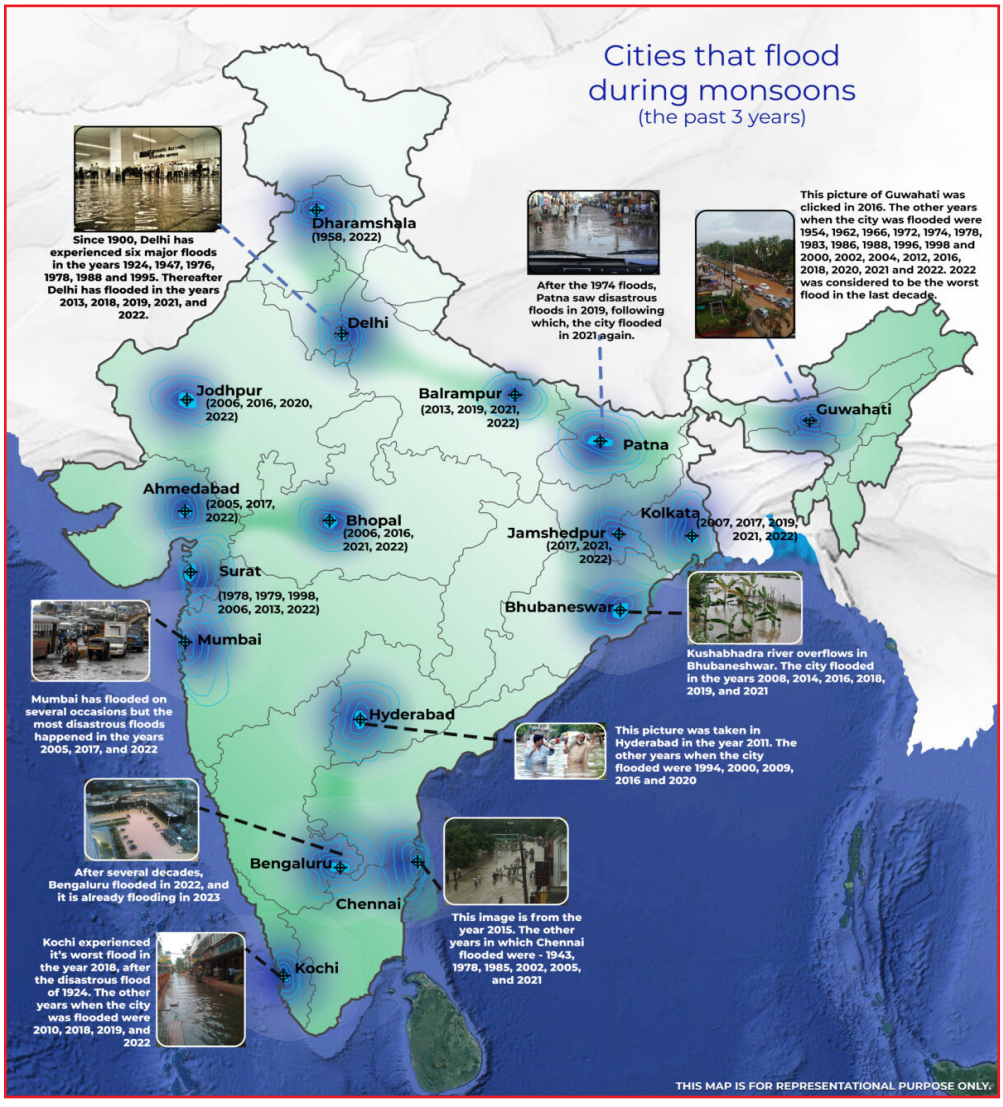
What are the Key Reasons for Urban Flooding in India?

- **Natural Causes:**
  - **Heavy Monsoon Rainfall:** The Indian subcontinent experiences **intense monsoon precipitation** from **Southwest Monsoon**, especially in the **Western Ghats** and northeastern regions. Cities like **Mumbai** often receive heavy downpours in short durations, overwhelming drainage systems.
    - Eg: The **2015 Chennai floods** were triggered by **record-breaking monsoon rains linked to cyclonic circulation** over the Bay of Bengal.
  - **Topography:** Many Indian cities are located in **floodplains or low-lying coastal zones** (e.g., Mumbai on the Konkan coast, Kolkata in the Ganga-Brahmaputra delta). These areas **naturally accumulate runoff** due to **flat terrain and slow drainage,** exacerbated by **high tidal influence in coastal cities.**
    - Also, cities like Bengaluru, at an elevation of about 900 metres, **lack major rivers** to naturally channel excess water.
  - **Climate Change & Extreme Weather Events: Climate change** has led to **more frequent and intense rainfall**, triggering **flash floods.**
    - For example, the **2023 Delhi floods** resulted from **record rainfall causing the Yamuna River to overflow** into urban areas.



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- **Anthropogenic Causes:**
  - **Rapid Urbanization & Poor Planning: Unplanned urban growth** has led to the **concretization of natural drainage channels** and encroachment on wetlands and floodplains.
    - For instance, Bengaluru once had over 1,000 lakes, but around **80% have been lost** or degraded due to encroachment and construction, **reducing natural water retention and increasing runoff.**
  - **Inadequate Drainage Infrastructure:** Many Indian cities depend on **outdated, undersized drainage systems** that **cannot manage intense rainfall.**
    - For instance, **Mumbai's British-era drainage**, designed for **25 mm/hr**, is frequently overwhelmed during heavy monsoons, as seen in the 2023 floods.
  - **Solid Waste Mismanagement: Unregulated dumping of solid waste blocks** drains, nullahs, and stormwater systems, aggravating urban flooding.
    - For instance, in **Himachal Pradesh in 2023, plastic waste clogged both natural and artificial waterways,** worsening the flood impact.
    - Also, **2015 Chennai floods** were worsened due to **silt and waste blocking estuary canals,** along with unchecked urban development that **blocked natural water flow.**
  - **Deforestation: Deforestation** and **improper land use** caused by **shifting cultivation (Jhum)** and **grazing in hill tracts** increase **surface runoff and silt buildup, l**eading to **urban flooding downstream.**
    - For example, **Assam's Guwahati faces** recurring floods due to such deforestation.

What are the Major Impacts of Urban Flooding?

- **Economic Loss and Infrastructure Damage:** Urban flooding causes severe d**amage to critical infrastructure like roads, bridges, power, and water systems**, leading to **huge repair costs and economic disruption**.
  - **Eg: 2015 Chennai floods** resulted in damages exceeding Rs 15,000 crore, severely impacting transport and power supply.
- **Public Health Crisis:** Urban flooding leads to **public health crises** by creating stagnant water that b**reeds mosquitoes**, increasing diseases like **malaria and dengue. Contaminated drinking** water also causes outbreaks of **cholera, typhoid, and hepatitis**.
  - **Eg: 2020 Kerala flood**s saw a rise in **leptospirosis** and other **waterborne diseases.**
- **Displacement and Social Vulnerability:** Urban flooding **disproportionately impacts vulnerable groups,** especially residents of **informal settlements and low-lying areas.** Thousands are **displaced, losing homes and access to basic services**, worsening poverty and inequality.
  - The **2022 Mumbai floods** led to **slum dwellers** facing severe displacement and livelihood loss.
- **Ecological Degradation and Water Pollution:** Urban floods carry **pollutants, sewage, and industrial waste** into lakes and rivers, **harming aquatic ecosystems** and **reducing biodiversity**. This contamination, seen in **Bengaluru's lakes**, disrupts **groundwater recharge** and natural flood control.
  - Also, **rapid runoff** causes **soil erosion** and **damages green spaces,** worsening **urban water scarcity.**
- **Overburdened Infrastructure:** Recurring urban floods **expose failures in drainage, waste management, and city planning**. Blocked drains, inadequate stormwater systems, and encroachment on water bodies worsen flooding.
  - **Mumbai's outdated drainage**, seen during the **2023 floods,** often collapses, causing severe waterlogging and costly emergency responses.

What Measures Can be Adopted to Enhance Resilience Against Urban Floods?

- **Integrated Watershed Management**: Comprehensive **management of entire river basins** helps control flooding at the source by considering upstream and downstream impacts.
  - For example, the **Netherlands' "Room for the River" project,** which creates **designated spaces for rivers to safely overflow,** can be adapted to Indian urban contexts to reduce flood hazards.
- **Promote Sustainable Urban Drainage Systems (SUDS):** Integrate p**ermeable pavements, rain gardens, bio-swales**, and **detention basins** to manage runoff at source and **reduce pressure on drainage.** This mimics **natural hydrological processes** and enhances infiltration.

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- **Adopt the Sponge City Concept**: The **Sponge City** approach involves **designing urban landscapes that absorb, store, and purify rainwater** through natural and engineered solutions, reducing runoff and flood peaks.
  - **Shanghai, China** has adopted **green roofs, permeable surfaces, and green spaces** under this model.
  - Similarly, **Mumbai's is also adopting this model to enhance flood resilience and groundwater recharge.**
- **Restoration of Water Bodies:** Reviving **urban lakes, wetlands, and natural water retention zones** enhances flood absorption capacity.
  - **Bengaluru's Jakkur Lake restoration** showcases effective flood mitigation through eco-restoration.
- **Community Engagement & Early Warning Systems:** Active **involvement of local communities in flood preparedness** and **response** strengthens resilience.
  - Establishing robust early warning systems, similar to **Ahmedabad's heat action plan** which includes community outreach, can be adapted to improve urban flood management.
  - **Singapore's Smart Water Assessment Network (SWAN)** uses **remote sensors** to **track water levels in real time,** issuing **alerts via SMS** to ensure **quick public response and flood preparedness. India can learn from the same.**

Global Report on Internal Displacements 2025

Why in News?

The Internal Displacement Monitoring Centre (IDMC) released the Global Report on Internal Displacements **2025** highlighting the **number of disaster-related internal displacements** and climate refugees **globally in 2024**.

Note: IDMC is the world's leading source of data and analysis on **internal displacement.** It was established in 1998 as part of the Norwegian Refugee Council (NRC).

- Internal displacement is the **forced movement** of people **within their own country** due to **conflict, disasters, or climate change**, **without crossing international borders**.

What are Key Findings of the Global Report on Internal Displacements 2025?

- **Global Displacements:** Total global internal displacements reached **45.8 million**, the highest since records began in **2008** and **more than double the annual average** over the past decade.
- **Disasters as Displacement Drivers:** Disasters drove most displacements, with **99.5% linked to climate-related extreme weather** worsened by **climate change**.
- **India Related Findings:** India saw **5.4 million displacements in 2024,** the highest in 12 years, with **floods causing two-thirds of them.**
  - Violence caused **1,700 displacements,** with Manipur accounting for **1,000,** remaining the main hotspot for such movements.
- **Conflict and Climate Relation: 20.1 million** were displaced by conflict, mostly in **climate-vulnerable countries**, with the number of nations facing both **disaster and conflict displacement tripling since 2009**.

Who are Climate Refugees?

- **About:** Climate refugees (**environmentally displaced persons** or **climate-induced migrants**) are individuals or communities who are **forced to leave their homes and regions** due to the **adverse effects of climate change** and **environmental degradation**.
  - These impacts make living conditions **unviable**, driving **internal displacement** and **cross-border movement.**
- **Causes:**
  - **Rising Sea Levels:** Low-lying coasts, **small islands, and deltas face** rising seas, forcing communities to relocate as land and homes become uninhabitable.
    - E.g., sea level rise could displace somewhere between **2–110 million people in Bangladesh.**
  - **Extreme Weather Events:** More frequent and severe disasters like **storms, floods, and** wildfires are displacing people by destroying **homes, infrastructure, and livelihoods.**
    - E.g., In 2022, disasters caused **32.6 million displacements**, 98% due to weather-related hazards.

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- **Desertification and Land Degradation:** Desertification in regions like **sub-Saharan Africa and the Middle East** force pastoralists and farmers to migrate in search of fertile land and water.
  - E.g., From **2015 to 2019**, land degradation in India **doubled from 4.42% to 9.45%,** affecting 30.51 million hectares.
- **Water Scarcity:** Climate changes reduce freshwater and agriculture, driving migration for **stability and food security.**
  - Over **1 billion migrants** exist, with water shortages driving **10% of global migration. 17 countries**, home to **25%** of the population, face **extreme water stress.**

➢ **Consequences:**

- **Humanitarian Crises:** Climate displacement can cause **food and water shortages,** health crises, and overcrowded camps.
- **Urban Strain:** Climate refugees **add pressure to already overburdened cities.**
- **Social Conflicts and Tensions:** Resource competition can lead to **unrest** between displaced persons and host communities.
- **National Security Concerns:** Unmanaged displacement poses **security risks**, particularly in fragile regions.

What are Legal and Policy Challenges for Climate Refugees?

➢ **Lack of Legal Recognition:** Under international law, including the 1951 Refugee Convention, climate refugees **aren't recognized**, as it only covers those fleeing persecution for reasons like **race, religion, or political beliefs.**

- Most countries, including the **US,** European Union**, and Australia**, don't recognize **climate displacement** as **grounds for asylum.**
  - In the US, **Temporary Protected Status (TPS)** offers **limited, discretionary relief** for disaster-hit countries.
- The **Principle of** Non-Refoulement **doesn't cover climate refugees**, allowing states to **remove individuals** despite risks of serious harm or rights violations.
- **India is not a signatory to the 1951 Refugee Convention or its 1967 Protocol** on refugee protection.

➢ **Gaps in Migration Plans:** The Global Compact on Migration (2018) mentions climate displacement but is **non-binding**.

➢ **Statelessness Risks:** Climate refugees may become stateless if they **can't gain residency or citizenship**, facing challenges like lack of **asylum rights, poor living conditions, limited access to healthcare and education**, and potential detention or deportation.

➢ **Strict Border Controls:** The **European Border and Coast Guard Agency** often blocks climate migrants, while **Australia's Pacific Solution detains asylum seekers** offshore, including those from climate-vulnerable islands.

➢ **Funding Disputes:** The Loss and Damage Fund, agreed at COP27 (2022), became **operational in 2025** amid funding disputes. The Green Climate Fund focuses on **mitigation**, not relocation or asylum.

What are Current Provisions for Protection of Climate Refugees?

➢ **Limited Applicability of 1951 Refugee Convention:** A **drought-related famine can cause conflict** and displacement, potentially **qualifying affected individuals for refugee** protection under the **1951 Convention.**

➢ **Regional Refugee Instruments:** Some regional frameworks include **more flexible refugee definitions** that could cover climate-related displacement. E..g,

- **Organization of African Unity Convention 1969:** It protects those fleeing **"events seriously disturbing public order,"** which can include climate-induced conflicts, such as **floods, droughts, or climate-related displacement,** especially when civil unrest follows such events.
- **Cartagena Declaration 1984 (Latin America):** It expands the refugee definition to include those fleeing "**massive human rights violations" or events "seriously disturbing public order,"** which could encompass climate-related events causing social and political disruption.

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Miscellaneous

Highlights

- *Gallantry Awards 2025*
- *State of the World's Animal Health Report*

Gallantry Awards 2025

Why in News?

The President of India conferred Gallantry Awards, including **6 Kirti Chakras** (4 posthumously) and **33 Shaurya Chakras** (7 posthumously), to personnel from the **Armed Forces**, **Central Armed Police Forces**, and **State/UT Police** that were **announced** on the eve of the 76th Republic day 2025.

What are the Gallantry Awards?

- **About Gallantry awards:** They are given to the personnel for displaying **raw courage, unparalleled bravery** and **total disregard to personal safety** in the line of duty.
  - These gallantry awards are announced **twice in a year**, first on the occasion of the Republic Day and then on the occasion of the Independence Day.
- **Types:**
  - Gallantry Award in the Face of Enemy:
    - **Param Vir Chakra (PVC):** It shall have embossed on the obverse **four replicas of "Indra's Vajra"** with the **State Emblem** embossed in the centre.
      - It is awarded for **most conspicuous bravery or some daring or pre-eminent act of valour or self sacrifice**, in the **presence of the enemy**.
    - **Mahavir Chakra (MVC):** It shall have embossed on the obverse a **five-pointed heraldic star** with the points of the **star just touching the rim**. The star shall have in the centre a **domed gilded State Emblem**.
      - It is awarded for **acts of gallantry** in the **presence of the enemy**.
    - **Vir Chakra:** The star will feature a **Chakra at its centre**, with a domed centerpiece inside the Chakra bearing the gilded State Emblem.
      - It is awarded for **acts of gallantry** in the **presence of the enemy on land, at sea or in the air**. The decoration may be awarded **posthumously.**
  - Gallantry Award Other than in the Face of Enemy:
    - **Medals:** It includes **Ashok Chakra**, **Kirti Chakra**, and **Shaurya Chakra**, on which the **obverse** of the medal shall be embossed a **replica of the respective chakra** in the **centre**, surrounded by a **lotus wreath**.
      - Along the **rim**, on the inner side, shall be a pattern of **lotus leaves, flowers, and buds.**
      - On its reverse shall be embossed the respective words both in Hindi and English the two versions being **separated by two lotus flowers.**

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- **Order of precedence of the Award:**
  - Param Vir Chakra
  - Ashoka Chakra
  - Mahavir Chakra
  - Kirti Chakra
  - Vir Chakra
  - Shaurya Chakra

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- **Eligibility:**
  - **Param Vir Chakra, the Maha Vir Chakra and the Vir Chakra: All ranks** of the **Naval, Military, Air, Reserve, and Territorial Forces**, including **medical and nursing staff,** and **civilians** serving under their direction.
  - **Ashoka Chakra, Kirti Chakra & Shaurya Chakra: All ranks** of the **Armed Forces, Reserve and Territorial Forces, Nursing Services, Police, Central Para-Military Forces, Railway Protection Force**, and **civilian** citizens.

Note: For **each subsequent act** of similar bravery, recipients are recognized by a **Bar to the Chakra.**
- Also, both **Chakra** and **Bar to the chakra** for additional bravery **may be** awarded **posthumously.**

State of the World's Animal Health Report

Why in News?

The World Organisation for Animal Health (WOAH) released its first-ever **State of the World's Animal Health report**, warning of the growing spread of infectious diseases like African Swine Fever, avian influenza, and Lumpy skin disease, which threaten agrifood system stability.

What are the Key Concerns Raised by the State of the World's Animal Health Report?

- **High Zoonotic Risk**: 47% of reported diseases are **zoonotic,** capable of infecting humans.
- **Antimicrobial Resistance (AMR) Threat:** Without urgent action, AMR could impact **2 billion people and cause economic losses of USD 100 trillion by 2050.**
- **Cross-Species Transmission Increasing:** The spread of infectious diseases like avian influenza is increasingly crossing species barriers, affecting a wider range of animals beyond their traditional hosts, as outbreaks in mammals doubled.
- **Drivers of Zoonotic Disease:** Climate change is altering ecosystems and enabling the spread of pathogens into new regions and species.
  - **Global trade and the increased movement of animals and animal products** have amplified the risk of disease transmission across borders.
  - Expanding human-wildlife contact increases zoonotic spillover risk, worsened by weak veterinary systems and poor vaccine access in developing nations.

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What are the Key Diseases Affecting Animals Across the Globe?		
Disease	**Cause**	**Description**
Avian Influenza	Influenza virus (Orthomyxoviridae family)	It is a highly contagious viral disease affecting domestic and wild birds, and occasionally mammals including humans. It is caused by multiple virus subtypes (e.g., H5N1, H5N3, H5N8).
African Swine Fever (ASF)	ASF virus (Asfarviridae family)	It is a highly contagious viral disease of domestic and wild pigs, whose mortality rate can reach 100%.
Foot and Mouth Disease (FMD)	Aphthovirus (Picornaviridae family)	It is a highly contagious viral disease affecting cloven-hoofed animals like cattle, sheep, goats, and pigs, causing fever and blister-like sores.
Peste des Petits Ruminants	Morbillivirus (Paramyxoviridae family)	It affects goats, sheep, and some wild relatives of domesticated small ruminants, as well as camels. It was first reported in Ivory Coast in 1942.
Lumpy Skin Disease	Lumpy skin disease virus (Poxviridae family).	It is a cattle disease causing fever, skin nodules, weight loss, and swollen lymph nodes.
Bluetongue	Bluetongue virus (Reoviridae family)	It is an infectious, non-contagious, vector-borne viral disease affecting wild and domestic ruminants like sheep, goats, cattle, buffaloes, deer, African antelope, and camels.
New World Screwworm	NWS fly larvae (Calliphoridae family)	It infests the living flesh of warm-blooded animals, most commonly **livestock and less commonly birds, pets, and humans.**
Nipah Virus	Nipah virus (Paramyxoviridae family)	It was first detected in pigs in Malaysia and Singapore. It affects animals like pigs and horses, causing respiratory and neurological symptoms, with serious potential for human transmission.
Rinderpest	Morbillivirus (Paramyxoviridae family)	It is also known as cattle plague, is a highly contagious viral disease that primarily affected cattle, buffalo, and other even-toed ungulates. **Rinderpest was the first animal disease to be globally eradicated by vaccination.**

What is the World Organization for Animal Health?

- **About:** The WOAH, originally founded as the **Office International des Epizooties (OIE)** in 1924, is an intergovernmental organization headquartered in Paris, France.
  - It was founded in response to the **global rinderpest outbreak**.
  - The **World Assembly of Delegates** is WOAH's top decision-making body, comprising representatives from all 183 member countries, including **India.**
    - It **meets annually in Paris,** with each country having one vote.
- **WOAH's Standards and Guidelines:** WOAH develops and maintains a comprehensive set of reference documents, including:
  - The **Terrestrial Animal Health Code and its Manual of Diagnostic Tests and Vaccines for Terrestrial Animals** (covering mammals, birds, reptiles, bees).
  - The **Aquatic Animal Health Code and its diagnostic manual** (covering fish, amphibians, molluscs, crustaceans).
- **WOAH's and WTO:** WOAH is formally recognized under the World Trade Organisation (WTO) Agreement on the Application of Sanitary and Phytosanitary Measures (SPS Agreement) as the international standard-setting body for animal health.
  - WTO members are encouraged to base their sanitary measures on WOAH's standards to harmonize regulations globally and facilitate trade.

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Rapid Fire Current Affairs

Highlights

- *Mount Augustus Snail*
- *Extension of Modified Interest Subvention Scheme*
- *China's Tianwen-2 Mission*
- *Mount Khangchendzonga*
- *RoDTEP Scheme*
- *Maternity Benefits for Third Child*
- *Death Anniversary of Pandit Jawaharlal Nehru*
- *Dholes*
- *Dark Patterns*
- *Cave-Dwelling Fish Discovered in Meghalaya*
- *DoP Launched New Digital Platforms*
- *INTERPOL Silver Notice*
- *India's First Gene-Edited Sheep*
- *Viksit Krishi Sankalp Abhiyan*
- *Asian Productivity Organization*
- *Sugar Boards*
- *NASA's GRAIL Mission*
- *Charaka and Sushruta Legacy*
- *Jarosite*
- *India Becomes World's 4th Largest Economy*
- *Bharat Forecast System*
- *Bird-Wing Solar Event*
- *Official Secrets Act 1923*
- *Xenon Gas*
- *Weather Balloons*
- *KVIC's Honey Mission*
- *Sagar Mein Samman Initiative*
- *Judicial Accountability and the K Veeraswami Judgment, 1991*
- *Golden Dome Missile Defence Project*
- *iGOT Karmayogi*
- *Heart Lamp wins 2025 International Booker Prize*
- *Guttala Drought Inscription*
- *Metrology and India's Initiatives*
- *Shirui Lily Festival*
- *Indian Yak Genomics*
- *e-Zero FIR*
- *Operation Olivia*
- *Suggi Migration*
- *Suez Canal*
- *Tsarap Chu Conservation Reserve*
- *Yala Glacier Declared Dead*
- *World Food Prize 2025*
- *India's Commitment to UN Peacekeeping*
- *SC Strikes Down Ex-Post Facto Environmental Clearances*
- *Kandha Tribe*
- *Dispute over Parasnath Hill*
- *Shingles Diseases*
- *58th Jnanpith Award*
- *Nicaragua Withdrawal from UNESCO*
- *Mhadei River Water Dispute*
- *Nipah Virus*
- *Algal Bloom Devastates Marine Life*
- *North-East India's First Geothermal Well in Dirang*
- *E-Passport*
- *Repairability Index*
- *Quantum Dots and 2D Metals*
- *Revamped PLFS*
- *Chandrayaan-5 (LUPEX)*
- *Illegal Killing of Migratory Birds*
- *Bhutan Launched First Crypto-Tourism Payment*
- *MSP for Jute*
- *Anamalai Tiger Reserve*
- *Parali Protection Force*

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Mount Augustus Snail

For the first time, the rare **Mount Augustus Snail (*Powelliphanta augusta* snail)** has been filmed **laying an egg from its neck,** revealing unique reproductive behavior.

- **Biology & Characteristics: Endemic to New Zealand**, it is among the **world's largest carnivorous land snails**. It is distinguished by its **vibrant, swirling shell patterns.**
  - This slow-growing species **preys on slugs and earthworms.** In captivity, it has a lifespan of **25 to 35 years.**
- **Reproduction:** It is **hermaphroditic (have both male and female organs)**, mating through **mutual sperm exchange** via a **genital pore on the neck.**
  - It reaches **sexual maturity at 8 years,** lays around **5 eggs annually**, and each egg takes **over a year to hatch.**
- **Threats & Habitat Loss:** Native only to **Mount Augustus (New Zealand)**, its habitat was destroyed by **coal mining** in the early 2000s.

Snails:

- Snails are **mollusks** belonging to the **gastropod class,** easily identifiable by their **spiral shells**, which they retract into for protection or when resting.
- They are one of the two primary species in this class, with the other being **slugs.** The key difference between snails and slugs is the **presence of an external shell in snails, while slugs lack one.**

Read More: New Species of Land Snail in Maharashtra.

Extension of Modified Interest Subvention Scheme

The **Union Cabinet** has approved the continuation of the Modified Interest Subvention Scheme (MISS) for **FY 2025–26.**

- Under this scheme, **1.5%** interest subvention will continue to be provided to banks for short-term crop loans up to **Rs 3 lakh** issued through the Kisan Credit Card (KCC) platform.

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Modified Interest Subvention Scheme (MISS)

- **About: Launched in 2006–07 as Interest Subvention Scheme.**
  - MISS is a **Central Sector Scheme** under the Ministry of Agriculture and Farmers' Welfare (MoA&FW).
  - It provides **concessional short-term credit** for **agriculture and allied activities** via **KCC.**
  - While **loans are sanctioned at 7% interest,** a **3% Prompt Repayment Incentive (PRI)**, given for **prompt and timely repayment of loans** reduces the **effective rate to 4%,** making credit more affordable.
- **Implementation:** Jointly implemented and monitored by RBI and NABARD with **Public Sector Banks,** RRBs, Cooperative Banks and Private Sector Banks.
- **Key Features:**
  - **Revolving credit** facility under KCC for up to **5 years** with flexible withdrawals.
  - **Collateral-free loans** up to **Rs 2 lakh**.
  - **Interest relief** up to **1 year** during natural calamities, extendable to **5 years** for severe disasters.
  - Targets **small and marginal farmers**, who account for **76%** of agri-credit accounts.
  - The government launched the **Kisan Rin Portal (KRP)** to digitally track interest subvention claims.

Kisan Rin Portal (KRP)

- Launched in **2023** collaboratively by **MoA&FW, Ministry of Finance, RBI, and NABARD.**
- **KRP** aims to **track interest subvention claims digitally**, ensuring f**aster disbursement, greater transparency, and accountability,** benefiting both **farmers** and **banks.**

Read More: Agriculture Development in India, Agricultural Initiatives and their Implementation

China's Tianwen-2 Mission

China is set to launch the **Tianwen-2 mission**, aiming to survey and sample the near-Earth asteroid **469219 Kamo'oalewa**.

- **Tianwen-1:** Tianwen-1 (2020) was a Chinese mission to **Mars** that included an **orbiter, a lander, and a rover** to explore the **Martian surface.**
- **About Tianwen-2 Mission:** It is a **near-Earth asteroid (NEAs) sample return** and main asteroid belt comet **orbiter mission** that aims to demonstrate China's capabilities in complex **deep space operations.**
  - NEAs are asteroids with **orbits** that bring them **close to Earth**. Those whose paths **cross Earth's orbit** are called **Earth-crossers.**
- **Significance:** It will make China one of the few nations after the **US (**OSIRIS-Rex) and **Japan (**Hayabusa 2**)** to **retrieve asteroid samples** and return them to Earth.
- **Objectives:** It aims to investigate Kamo'oalewa's **unusual orbit** and **potential lunar origin**, testing the hypothesis that it may be a **lunar fragment** from an **ancient Earth-Moon collision.**
  - Discovered in **2016**, **Kamo'oalewa** is one of only seven known **quasi-satellites of Earth**.
  - Quasi satellites **orbit the Sun** but because of their close distance to the planet, they are **gravitationally influenced by the planet**.
  - Quasi-satellites like Kamo'oalewa are known to **shift their orbits in 100-300 years.**
- **Sampling Techniques:** It will use a **"touch-and-go" technique** (robotic arm propels fragments into chamber) to collect asteroid samples, with an optional **"anchor and attach" method** for drilling if needed.
- **Future Plans:** After Kamo'oalewa, Tianwen-2 will **orbit and analyze** a **comet** in the **asteroid belt (between Mars and Jupiter)**.
  - **Tianwen-3 (2028)** aims to **return samples** from **Mars** for the first time.

Read More: NASA's OSIRIS-REx Mission, Dust Samples from Hayabusa 2

Mount Khangchendzonga

Sikkim has urged the Union Government to consider **restricting mountaineering** activities on Mt. Khangchendzonga, acknowledging its profound **religious significance** to the **indigenous communities** of the state.

- **About Mt. Khangchendzonga:** It is **India's highest peak (8,568 meters)** and the **world's third-highest**, located on the **Sikkim-Nepal border.**
  - It is **sacred** to **Sikkim's indigenous people**, revered as the abode of the guardian deity **Dzoe-Nga (Pho-lha).**

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- **Dzoe-Nga** is recognized as **guardians of the land** by **Ugyen Guru Rinpoche** (**Guru Padmasambhava**), Sikkim's **Patron Saint.**
  - The **indigenous Lepcha community** traditionally followed the **Mun faith**, led by priests called **Bongthings**, and have a rich **oral tradition** of **poetry**, **songs**, and **myths.**
- Climbing is **prohibited** on the **Sikkim side** but **permitted** from the **Nepal side**. The mountain was first successfully climbed in **1955** by **Charles Band and Joe Brown.**

➢ **About Khangchendzonga National Park:** It **is a UNESCO World Heritage Site (2016)** and a part of the **UNESCO World Network of Biosphere Reserves (2018).**

- It is **India's first Mixed World Heritage Site**, renowned for its **diverse ecosystem** comprising **plains**, **valleys**, **mountains**, **glaciers**, **lakes**, and **forests.**
- It is part of the **Eastern Himalayan biodiversity hotspot** and the **Dzongu Valley** in **North Sikkim** is especially rich in **medicinal plants.**
- **Fauna:** Blood Pheasant (State Bird of Sikkim), **Red Panda, Snow Leopard**, **Musk Deer** etc.

Read More: Khangchendzonga To Be Included In The World Network of Biosphere Reserves

RoDTEP Scheme

India has reinstated the **Remission of Duties and Taxes on Exported Products (RoDTEP) scheme** benefits for exports by **Advance Authorization (AA)** holders, **Export-Oriented Units (EOUs)**, and **Special Economic Zone (SEZ)** units.

➢ RoDTEP benefits for these categories, halted in February 2025, have now been reinstated to ensure a level playing field for all exporters.

➢ The restoration, effective from June 2025, aims to boost export competitiveness and enhance global market access.

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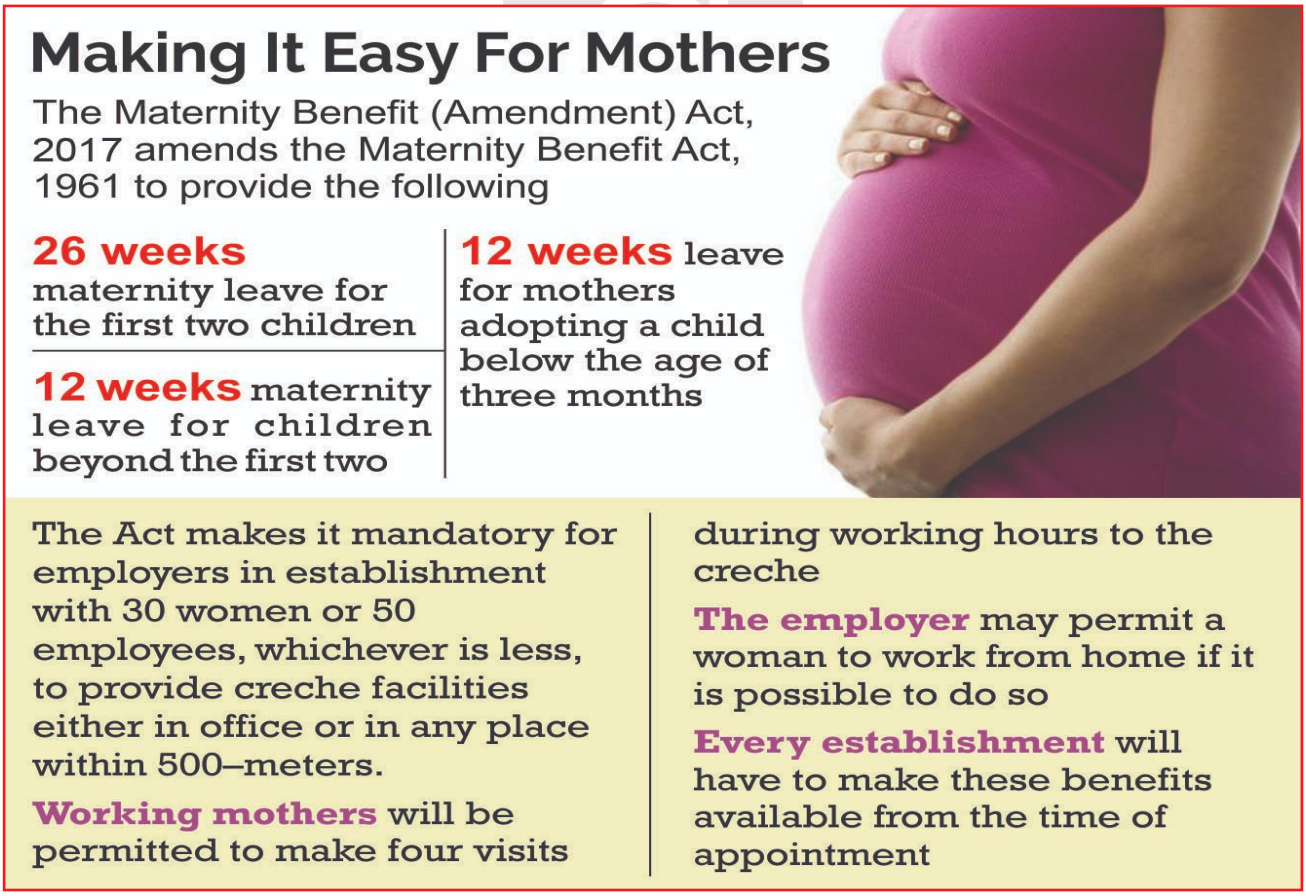
- **RoDTEP Scheme:** Launched in 2021 by the **Ministry of Commerce and Industry**, the RoDTEP scheme is designed to **reimburse exporters for embedded duties, taxes, and levies** that are not otherwise refunded under any other existing scheme.
  - The RoDTEP scheme, which replaced the **Merchandise Export from India Scheme (MEIS)**, is fully aligned with **World Trade Organization norms.**
  - Rebates under RoDTEP Scheme will be issued as transferable duty credits or electronic scrips (e-scrips), maintained in an electronic ledger by the **Central Board of Indirect Taxes and Customs (CBIC).**
  - As of March 2025, total disbursements under the RoDTEP scheme exceeded Rs 57,976 crore, highlighting its critical support for India's exports.

Read more: RoDTEP Scheme

Maternity Benefits for Third Child

In the ***K. Umadevi v. Government of Tamil Nadu Case, 2022***, the **Supreme Court (SC) granted maternity benefits to a woman for her third child**, under the **Maternity Benefit (Amendment) Act, 2017** calling it a **constitutional right.**

- The **SC affirmed that the right to health, dignity, privacy, and non-discrimination** are integral to the **Right to Life under Article 21** of the Constitution.
  - It emphasized that **reproductive rights** form part of **international human rights law**, including rights to **health, equality, and dignity.**



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- **Right to reproductive choices** is protected under **Article 21 (Right to Life and Personal Liberty)**, as reaffirmed in the ***Suchita Srivastava v. Chandigarh Administration Case, 2009***.
- **Maternity Benefit (Amendment) Act, 2017:** The **Maternity Benefit Act, 1961**, as **amended in 2017**, provides **paid maternity leave** and related **benefits** to **women employees** both **before and after childbirth.**
  - **Applicability**: The Act applies to **factories, mines, plantations, government establishments, shops,** and other **workplaces** with **10 or more employees.**
    - Women covered under the **Employees' State Insurance Act, 1948** are also entitled to **maternity benefits.**
  - **Maternity Leave:** Women are entitled to **26 weeks of paid maternity leave** for **up to two children**, and **12 weeks** for with **more than two** i.e., the Act does **not prohibit maternity leave** for women with **more than two children**; it only **limits the duration** based on the **number of children.**

Read More: The Maternity Benefit (Amendment) Act 2017

Death Anniversary of Pandit Jawaharlal Nehru

On **27th May 2025**, the Prime Minister paid **homage to India's first Prime Minister, Pandit Jawaharlal Nehru**—who **died on 27th May 1964** and is remembered as **the Architect of Modern India**.

- **About JL Nehru:**
  - **Early Life:** Born on **14th November 1889**, in **Prayagraj**, he attended his **first Congress session in 1912** at **Bankipore (Patna)** as a delegate and joined **Annie Besant's Home Rule League** in **1916**, becoming its **Allahabad Secretary** in **1919.**

  - **Contribution in Freedom Struggle:** He was elected **Congress President** at the **1929 Lahore session**, passing the historic **Purna Swaraj resolution** for complete independence, and later presided over the **1936 Lucknow** and **1937 Faizpur** sessions, promoting **socialism.**
    - He drafted **Fundamental Rights** and **Economic Policy (1929-31)**, adopted at the **1931 Karachi Session** under **Sardar Patel**, and advocated legal defence for **Indian National Army (INA) soldiers**.
    - He led the **Interim Government** in 1946.
  - **Post-Independence:** In **1953**, he formed the **States Reorganisation Commission**, promoted **industrialisation** through **Five-Year Plans,** and led the **Non-Alignment Movement**.
  - **Awards:** He was awarded the **Bharat Ratna (1955)** and **World Peace Council Prize (posthumously, 1970)**.
  - **Literary Contributions:** The **Discovery of India**, **An Autobiography**, **Glimpses of World History** and **Letters from a Father to His Daughter**.

Read More: Jawaharlal Nehru

Dholes

28th May is celebrated as **World Dhole Day** to promote the **conservation of dholes—endangered Asian wild dogs**—who play a **crucial role as apex predators** in maintaining **forest ecosystem balance.**

- **About Dholes: Dholes** (*Cuon alpinus*) are **wild dogs native to southern and eastern Asia**, including India's Western Ghats (e.g., **Valparai plateau**).
- **Characteristics:** Dholes have **auburn fur**, **black tails**, **amber eyes**, and **upright rounded ears**, living socially in **packs of 2 to 25**.

- **Habitat:** Adaptable to **forests, shrublands, and high mountain steppes.**
  - In India, dholes are found in three main areas i.e., the **Western and Eastern Ghats**, the **central Indian landscape**, and **Northeast India.**

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- **Diet and Hunting: Dholes** are **carnivores** that **hunt cooperatively** in groups of **3-5**, and communicate with **yaps**, **growls**, and distinctive **whistles**, earning them the nickname "**whistling dogs**."
  - Dholes **do not** have the **jaw strength** to deliver a **fatal bite** to their prey, so the **pack eats the prey alive.**
- **Reproduction:** A pack usually has one **dominant monogamous breeding pair**, while the non-breeding members support by **bringing food** and **caring for the pups.**
- **Conservation Status:**
  - **IUCN: Endangered**.
  - **CITES: Appendix II**.
  - **Wildlife (Protection) Act, 1972: Schedule II**.

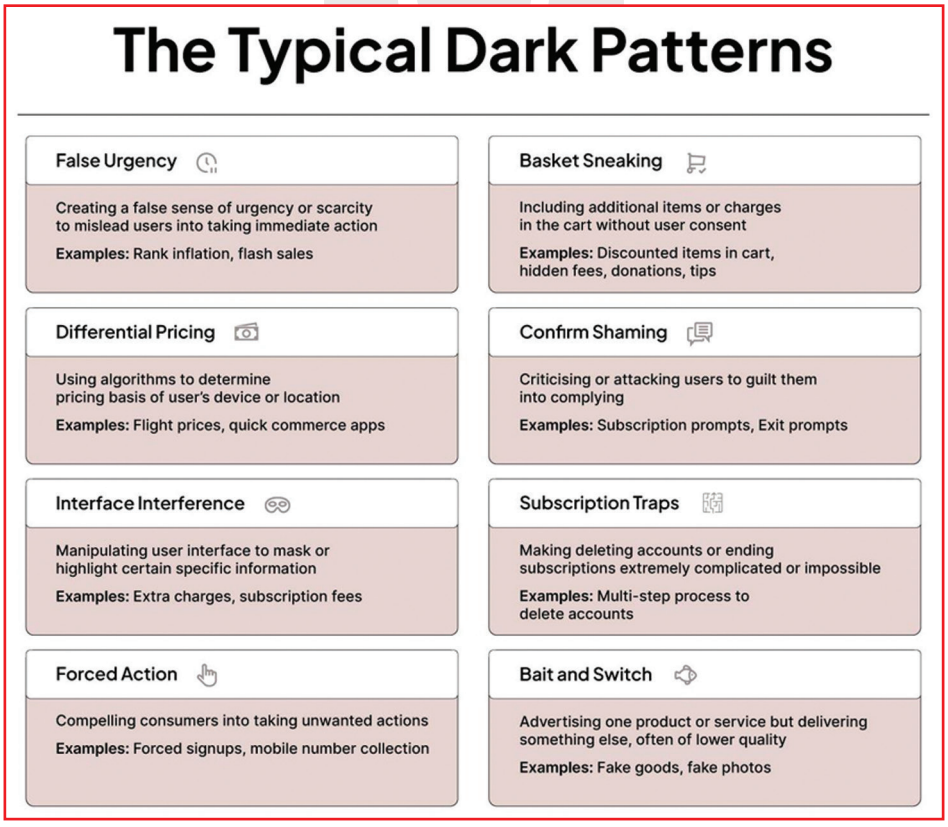
Read More: Dholes

Dark Patterns

The **Department of Consumer Affairs** has issued notices to various **e-commerce platforms** for using deceptive "**dark patterns**" to **manipulate consumer behavior unfairly,** terming it as **unfair trade practices.**

Dark Patterns

- **About: Dark Patterns** are **manipulative design techniques** used in **user interfaces (UI) and user experiences (UX)** on websites, apps, or digital platforms, which are deliberately crafted to deceive, mislead, or pressure consumers into actions they may not have intended to take.
  - The term **"dark patterns"** was introduced in **2010** by user experience expert **Harry Brignull.**
  - It **exploits user behavior to serve business interests**, undermining consumer autonomy, transparency and fair trade principles.



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- **Related Government Measures:** The **Central Consumer Protection Authority (CCPA),** under the **Consumer Protection Act, 2019,** issued **guidelines in 2023** to **curb dark patterns**.
  - Apps like **Jago Grahak Jago** and the **Jagriti Dashboard** were launched to **enable the CCPA to take suo motu action** against such unfair trade practices.

Read More: Dark Patterns, Consumer Protection Act, 2019,

Cave-Dwelling Fish Discovered in Meghalaya

A **new species** of **cave-adapted fish**, *Schistura densiclava*, has been discovered in **Krem Mawjymbuin cave** in **Meghalaya (East Khasi Hills).**

- **About:** *Schistura densiclava* is a **troglophile species**, meaning it can live in both **underground** (subterranean) and **aboveground** (epigean) habitats.

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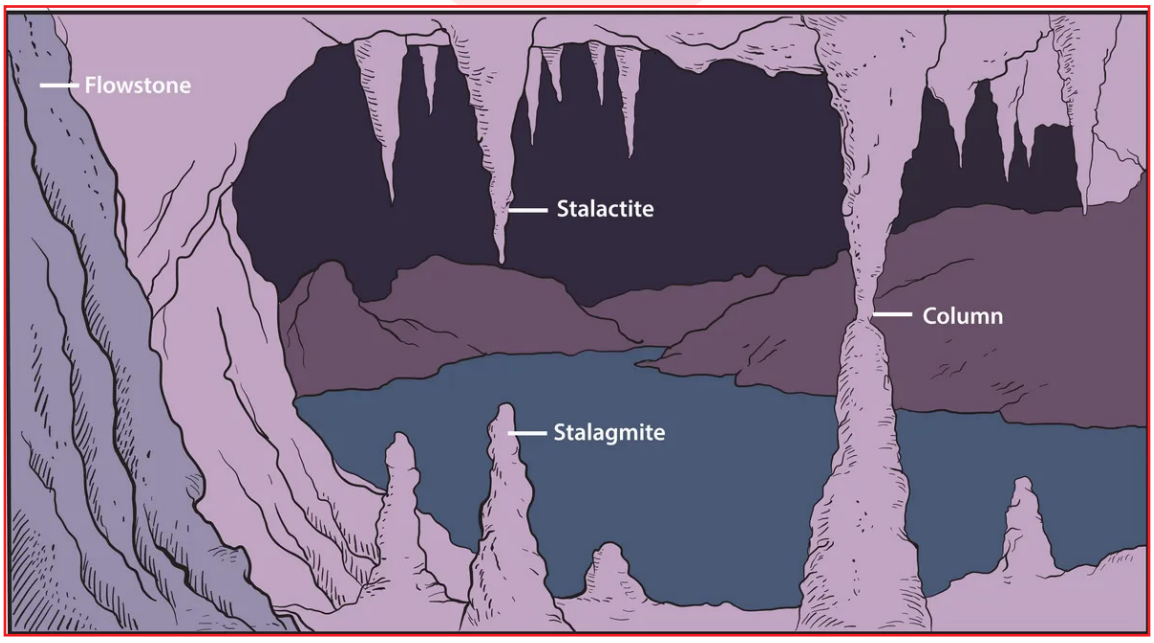
- It belongs to the **Nemacheilidae family**, and is the **6th cave fish species** recorded from Meghalaya.

- **Habitat:** It is found **60 meters** inside **Krem Mawjymbuin cave**, in a **cool, fast-flowing stream** (18°C, low oxygen).
  - The species' presence is restricted to the cave, indicating it is **endemic** to this **cave system**.
- **Adaptation**: Unlike fully blind cavefish, it retains **pigmentation and eyesight.**
- **Morphology:** It has a **pale yellow-green body** with 14–20 grey-black bars, a thick dorsal stripe (*densiclava*), and shows sexual dimorphism with **slimmer males and sturdier females.**
- **Krem Mawjymbuin (limestone cave)** is carved out of **calcareous sandstone** and adorned with elegant **stalactites** and **stalagmites** formed by mineral-rich **calcium carbonate.**
  - Inside the cave lies **Symper Rock**, a striking **dome-shaped structure** characterized by its **unusually flat summit**.



Read More: Meghalayan Age

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DoP Launched New Digital Platforms

The **Department of Posts (DoP)** launched two digital platforms-**'Know Your DIGIPIN'** and **'Know Your PIN Code',** marking a significant stride in India's efforts **to modernise its address system and geospatial governance** under the framework of the National Geospatial Policy 2022.

- **Know Your DIGIPIN:**
  - **DIGIPIN (Digital Postal Index Number)** is an **open-source, geo-coded, grid-based digital addressing system** developed to enable **precise location identification** using **latitude and longitude coordinates.**
  - DIGIPIN **links addresses to exact latitude-longitude coordinates**, enabling **high-resolution geospatial identification.**
  - It facilitates **Address-as-a-Service (AaaS) by** providing secure, standardised digital address solutions.
  - Incorporates Geographic Information System (GIS) tools to **enhance logistics, emergency response, and digital governance.**
  - It enables digital **address access in remote and underserved regions.**
- **Know Your PIN Code:**
  - **Digitally defines boundaries** of over 1.5 lakh PIN Codes by **geo-fencing of PIN zones** to improve location accuracy.
  - Enables users to find the correct PIN Code using real-time GNSS (Global Navigation Satellite System) location data.
  - Includes a **public feedback system** for continuous improvement of the PIN Code database.
  - **Enhances delivery networks**, emergency services, and postal logistics, especially for e-commerce and rural areas.

Read More: National Geospatial Policy 2022, Digital Public Infrastructure.

INTERPOL Silver Notice

India has successfully leveraged **INTERPOL's newly introduced Silver Notice system** to trace assets and seek international cooperation in tracking down economic fugitives.

- **INTERPOL Silver Notice:** Launched in 2025, it helps **trace and recover criminal assets, combat transnational organized crime,** and enhance international police cooperation.
  - It is currently in a pilot phase involving 51 countries, which will run until November 2025. During this period, **each country can request up to nine Silver Notices.**
  - In India, the Central Bureau of Investigation (CBI) acts as India's nodal agency for Interpol-related matters. It coordinates requests from all Indian law enforcement agencies seeking Interpol's international assistance.
    - **BHARATPOL,** developed by the CBI, gives both central and state agencies real-time access to INTERPOL data. It streamlines cooperation against transnational crimes like cybercrime and trafficking, and simplifies Red Notice processing.
- **Interpol's Colour-coded Notices System:** INTERPOL notices are requests for cooperation or alerts shared among police in **196 member countries.**
  - Interpol issues nine colour-coded notices for various purposes; it is issued by INTERPOL's General Secretariat on request from a country's **National Central Bureau (NCB).**
  - It can also be issued at the request of **International Criminal Tribunals and the International Criminal Court** to seek persons wanted for committing crimes within their jurisdiction, notably genocide, war crimes, and crimes against humanity.
  - They may also be issued on behalf of the **UN Security Council** to enforce its sanctions.

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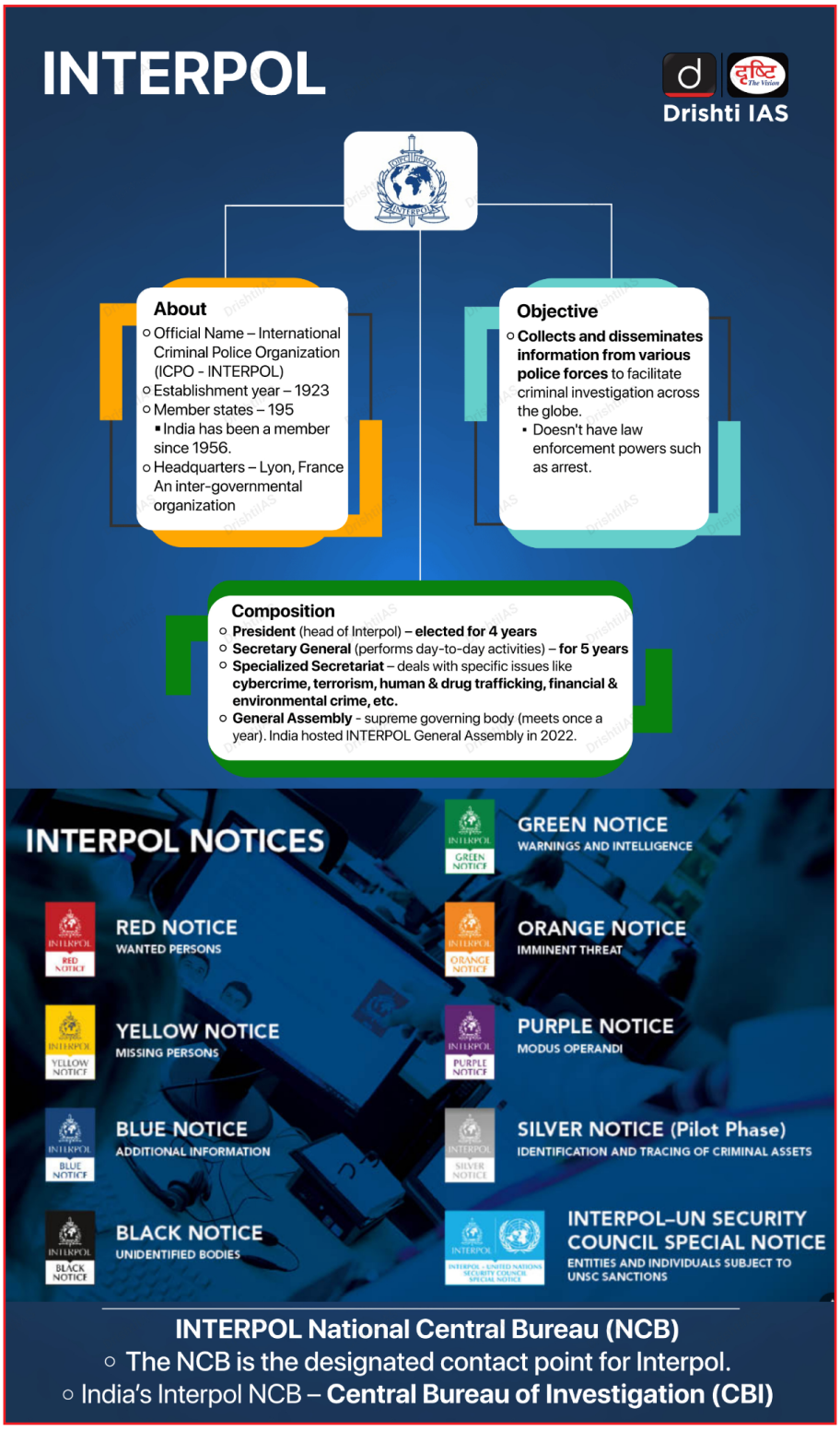

Read more: [Notices of Interpol]

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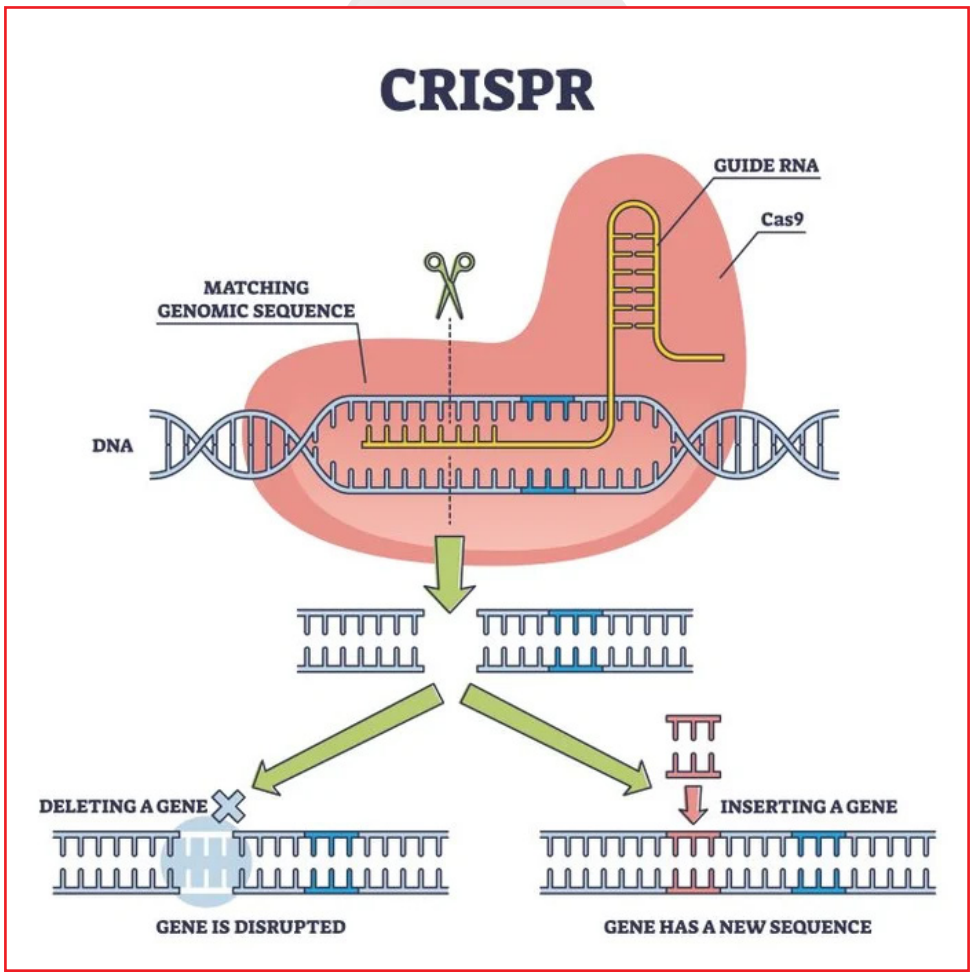
India's First Gene-Edited Sheep

Researchers from **Kashmir** have successfully developed **India's first gene-edited sheep** using **CRISPR-Cas9 technology**, under a project funded by the **ICAR.**

- They **edited the myostatin gene** in a local **Merino lamb**, **increasing muscle mass by 30%**, similar to European **Texel sheep.** It contains no foreign DNA, making it **non-transgenic.**

Gene Editing

- **About: Gene Editing** (or **Genome Editing**) is a biotechnology that enables the **precise modification** of an **organism's genetic material (DNA** or **RNA).**
  - It allows scientists to **add, delete, or alter** specific **gene sequences within the genome** using **specialised tools.**
- **Key Gene Editing Methods:**
  - **CRISPR-Cas9: CRISPR-Cas9 (Clustered Regularly Interspaced Short Palindromic Repeats)** is a **widely used** gene-editing tool that uses a **guide RNA (gRNA)** to direct the **Cas9 enzyme** to a specific DNA sequence, where it makes a **double-strand cut**; the cell then repairs the DNA, enabling gene disruption or insertion.
    - The **Nobel Prize in Chemistry 2020** was awarded jointly to Emmanuelle Charpentier and Jennifer A. Doudna for the development of a method for **genome editing.**



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- **Zinc Finger Nucleases (ZFNs):** ZFNs are **artificial gene-editing tools** composed of a **DNA-binding domain (zinc finger proteins)** and a **DNA-cleaving domain (FokI endonuclease)**.
  - The **zinc finger proteins** are engineered to recognize and bind specific DNA sequences, while the **FokI enzyme** cuts the DNA at the target site.

- **Gene Knockout** is a genetic technique where a **specific gene is deliberately disabled or deleted** to stop its protein expression. It **helps study gene function** by comparing traits in organisms with and without the gene.

Read More: Genome Sequencing

Viksit Krishi Sankalp Abhiyan

The **Viksit Krishi Sankalp Abhiyan** is a nationwide campaign launched to modernize Indian agriculture through scientific outreach, sustainable practices, and farmer empowerment.

- **About:** Viksit Krishi Sankalp Abhiyan is conducted **biannually** before the Kharif and Rabi sowing seasons to provide timely field-level guidance on improving crop production, soil health, and resource management.
  - It aims to cover over **65,000 villages** across 723 districts and is expected to directly engage more than **1.3 crore farmers,** fostering the adoption of scientific farming practices and promoting sustainable agricultural growth.
  - It aligns with the vision of making India the **"Food Basket of the World"** through science-backed, climate-resilient, and farmer-centric agriculture.
- **Organizers:** The campaign is organized by the Ministry of Agriculture & Farmers Welfare, Indian Council of Agricultural Research (ICAR), State Agriculture Departments, Krishi Vigyan Kendras (KVKs), and Farmer Producer Organizations (FPOs).
- India promotes tech-driven farming through the Digital Agriculture Mission, AgriStack (Farmer IDs), and Namo Drone Didi.
  - Apps like **Kisan Suvidha** and AI-based irrigation under **"Per Drop More Crop"** enhance farm advice and water efficiency.

Read more: Advancing Indian Farms with Digital Solutions

Asian Productivity Organization

India has officially assumed the **Chairmanship** of the **Asian Productivity Organization (APO)** for the **2025–26** term during the **67th Governing Body Meeting (GBM)**.

Asian Productivity Organization (APO)

- **About:** The APO, is an **intergovernmental body established in 1961 with headquarters at Tokyo**.
  - It aims to **improve productivity** through **regional cooperation and capacity building** across the **Asia-Pacific region.**
  - It contributes to the **sustainable socioeconomic development** of the region through policy advisory services, and undertaking smart initiatives in the **industry, agriculture, service, and public sectors.**
- **Members & Organisation Structure:** APO membership is open to Asia-Pacific **countries** that are also members of the United Nations Economic and Social Commission for Asia and the Pacific (UN ESCAP).
  - UNESCAP is the **regional development arm of the UN** for the **Asia-Pacific region.**
  - It currently has **21 member economies**, including **India (a founding member)**.
  - Member countries **collaborate** through their respective **National Productivity Organizations (NPOs)**.
    - National Productivity Council (NPC), an autonomous body under the **Ministry of Commerce and Industry**, is the **designated NPO for India.**

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- APO includes the **Governing Body**, which is the **highest decision-making authority** and **meets annually to set strategic direction,** and review performance.

Read More: National Productivity Council, Significance of Indo-Pacific

Sugar Boards

To combat the rising health risks associated with excessive sugar consumption among school children, the Central Board of Secondary Education (CBSE) has mandated the establishment of **'sugar boards'** in over 24,000 affiliated schools across India.

- 'Sugar boards' visually display the **sugar content in common beverages and snacks, educating children about the health risks** of high sugar intake using simple, relatable comparisons like teaspoons of sugar.
- The National Commission for Protection of Child Rights (NCPCR) has urged all schools, including state boards, to implement sugar boards, highlighting a significant increase in Type-2 diabetes.
- Studies show Indian children consume sugar amounts **(13-15% of daily calories)** far exceeding the **recommended 5% limit,** increasing their risk of lifestyle diseases.
- The Food Standards and Safety Authority of India (FSSAI) is yet to finalize **High Fat, Salt, and Sugar (HFSS) standards** for school meals and front-of-pack labelling.
- India follows World Health Organization (WHO) guidelines recommending adults and children limit **free sugar intake** to under **10% of daily energy.**
  - Experts urge stricter limits due to higher local heart disease risk. A nationwide study is needed to set suitable standards.

Read more: Curbing Intake of Processed Foods

NASA's GRAIL Mission

NASA's **Gravity Recovery and Interior Laboratory (GRAIL) mission** has revealed **notable contrasts** between the **Moon's near side** and far side due to **temperature variations, crust thickness**, and **ancient volcanic activity**.

- **GRAIL** used twin spacecraft, **Ebb and Flow**, to study the Moon's **internal structure** in detail and to produce the **highest-resolution gravity map of the moon** by mapping lunar gravitational variations.
- **Key Findings of GRAIL Mission:**
  - **Tidal Locking**: The **Moon's rotation** period **equals its orbit period**, so **one side** always faces **Earth** and the other **permanently hidden.**
  - **Temperature Difference:** The Moon's **near side** (facing Earth) is **warmer**, **softer**, and was once **partly molten**, while the **far side** (hidden from Earth) is **colder** with a **thicker crust** that blocks **magma eruptions**.
  - **Volcanic History:** The Moon's **near side** features **dark lava plains (maria)**, while the **far side** has a **thicker crust** with **fewer lava flows.**
  - **Thermal Asymmetry:** It estimated a **temperature difference** of **100–200°C** between hemispheres. It found that the Moon's **crust** is more **porous** and **thinner** than previously believed.
- The phenomenon helps explain the Moon's **Janus-faced appearance** i.e., **one side bright and heavily cratered,** the **other dark and smooth**.

Read More: NASA's Artemis Program

Charaka and Sushruta Legacy

The Vice-President commissioned the statues of Charaka and Sushruta at Raj Bhavan, Goa and recalled their contributions.

- **Charaka:** Charaka (around 2nd century BCE and the 2nd century CE), known as the **father of medicine**, served as the **royal physician of Kanishka (Kushan Kingdom)**.
  - He authored the Charaka Samhita, a foundational text of Ayurveda.
  - The **Agnivesha Samhita**, written by **Agnivesa** in the 7th century BCE under the guidance of **Atreya**, was **revised** and **renamed** the **Charaka Samhita** by **Charaka**, and divided it into **eight sections** known as **Ashtanga Sthanas.**
    - **Dhabala** (scholar of Ayurveda) later **added 17 chapters** to the Charaka Samhita.

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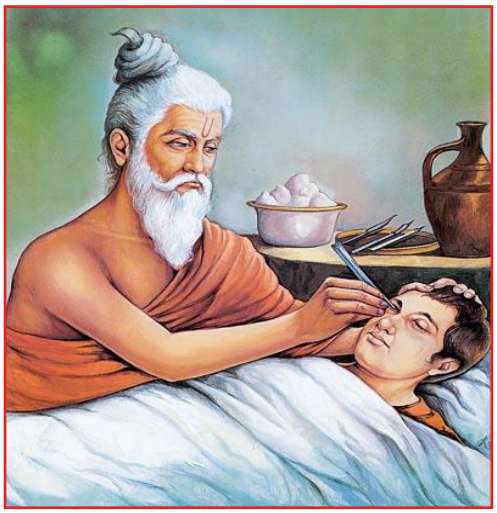
- **Sushruta: Sushruta** (7th–6th century BCE), an ancient Indian physician, is called the **"Father of Surgery"** and **"Father of Plastic Surgery."**
  - Sushruta was a **disciple of Dhanvantari**, one of the **Navratnas** of **King Vikramaditya (Chandragupta II).**
  - He authored the **Sushruta Samhita**, one of the earliest texts on plastic surgery.
    - The **Sushruta Samhita** is a part of Ayurveda's **Great Trilogy** alongside **Charaka Samhita** and **Astanga Hridaya**.
  - He performed and documented over **300 surgical procedures**, including **plastic surgery (e.g., rhinoplasty i.e., rebuilding of the nose)**, gutter removal, fracture management, and even caesarean delivery.
    - He treated numerous cases of **Oshtha Sandhan (lobuloplasty)** and **Karna Sandhan (otoplasty)** as well.



Read More: Surgery and Ayurveda

Jarosite

A new study highlights **jarosite** as a **natural luminescent mineral** capable of recording the **timing of ancient Martian** events such as **dust storms, flooding, and volcanic activity**. The mineral, also present in **Gujarat's Kutch region**, offers crucial insights due to its presence **both on Earth and Mars.**

- It is a **yellow-brown mineral** rich in **potassium, iron, and sulphate**, found in **arid, salty environments** like those on **Mars.**
  - It exhibits **radiation-induced luminescence**, serving as a **geological clock** that can record events up to **25,000 years** ago.
- **Occurrence:**
  - **Earth**: It is found in **acid mine drainage**, **sulfur-rich volcanic zones**, and **arid, sulfate-rich sedimentary rocks**.
  - **Mars**: It was detected by **NASA's Opportunity and Curiosity rovers** in **Meridiani Planum** and **Gale Crater.**
- It has been successfully used to **date weathering processes**, particularly with the **Potassium-Argon (K-Ar) dating method**.
  - **Potassium-Argon (K-Ar) dating method** is a **radiometric technique** used to determine the **age of rocks and minerals** based on the **decay** of **radioactive potassium-40** into **argon-40**.

Read More: NASA's Mars Sample Return Program

India Becomes World's 4th Largest Economy

At the **10th NITI Aayog (National Institution for Transforming India) Governing Council Meeting,** NITI Aayog CEO announced that **India has overtaken Japan to become the world's 4th largest economy,** with its GDP crossing **USD 4 trillion.**

- India remains the **world's fastest-growing major economy** and is the only country projected to grow **over 6% annually for the next two years**.
  - This sustained growth is expected to raise India's Gross Domestic Product (GDP) to USD 5.58 trillion by 2028, enabling it to surpass **Germany and become the third-largest economy globally.**

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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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- Earlier, the International Monetary Fund (IMF) in its 2025 World Economic Outlook Report projected that India would become the fourth-largest economy **in 2025** with a nominal GDP of USD 4.187 trillion, overtaking Japan's USD 4.186 trillion.
- **NITI Aayog:** NITI Aayog was established on **1st January 2015** as the successor to the Planning Commission of India.
  - It was created to serve as the **premier policy think tank of the Government of India,** focusing on inclusive and sustainable development through cooperative federalism and a bottom-up approach.

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- The **Prime Minister of India** serves as the Chairperson, while the **Vice-Chairperson** is appointed by the Prime Minister.
- The **Governing Council** comprises the Chief Ministers of all States and the Lieutenant Governors of Union Territories, ensuring representation from across the country.

Read more: 2025 World Economic Outlook Report

Bharat Forecast System

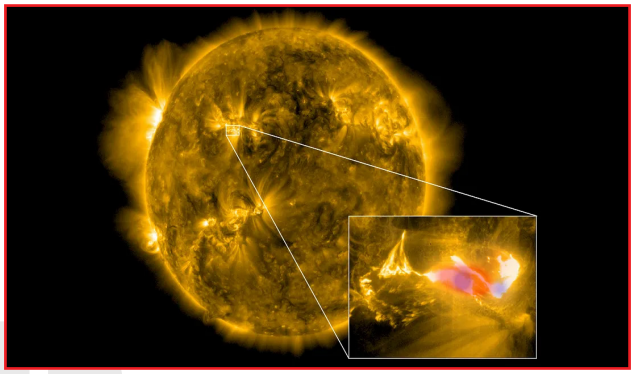
The India Meteorological Department (IMD) is set to adopt the indigenously developed **Bharat Forecast System (BFS)**, India's first high-resolution weather model capable of forecasting at a 6 km x 6 km spatial resolution.

- **Bharat Forecast System (BFS)** has been developed by the **Indian Institute of Tropical Meteorology (IITM), Pune**, and will be **operationalised by IMD**.
- BFS significantly **improves upon IMD's existing resolution of 12 km x 12 km**, allowing for **more accurate detection of localised extreme weather events**, such as cloudbursts **and** flash floods.
  - The **current limitation of a 144 sq km unit of analysis** will be reduced to 36 sq km, enabling better micro-level weather predictions.
- The BFS model is expected to enhance **forecasting precision** for **cyclones, heavy rainfall, and monsoon variability**, especially at the district and sub-district levels.
- The BFS has been **tested in experimental mode since 2022** and is now being scaled for nationwide operational use with **high-performance computing support**.
- Currently, IMD uses the **Coupled Forecasting System (CFS),** developed under the Monsoon Mission and adapted from a US-based model for Indian monsoon forecasting.
  - It also operates the **Global Forecasting System (GFS),** a coupled ocean-atmosphere model, for forecasts ranging from hours to seasonal scales.

Read more: India Developing Early Warning Systems in Partner Nations

Bird-Wing Solar Event

NASA has observed a **massive solar eruption,** named as the **"Bird-Wing" event** due to its **bird wing-like plasma structure**. Though it raised concerns of a severe **geomagnetic storm**, Earth **escaped a direct hit,** experiencing **only minimal impact.**



Bird-Wing Solar Event

- **Origin:** The eruption originated from the **Sun's northern hemisphere**, with its **plasma (**eruption**) structure extending** over **one million kilometres**, i.e. more than twice the Earth-Moon distance.
- **Components Involved:**
  - The event involved **both a Solar Flare and a Coronal Mass Ejection (CME)**.
    - **Solar Flares** are **sudden, intense bursts** of **electromagnetic radiation** from the **Sun's surface** caused by the **snapping and realignment of magnetic field lines.**
      - They are **classified from A to X** based on **X-ray brightness.**
      - They often occur alongside **CMEs** and **travel at the speed of light** and can **reach Earth in about 8 minutes.**
    - **Coronal Mass Ejection (CME)** is an **explosive ejection of charged solar plasma** into space, travelling at speeds of **250 to 3000 km/s** (**slower than solar flares)** and taking **1–3 days to reach Earth.**

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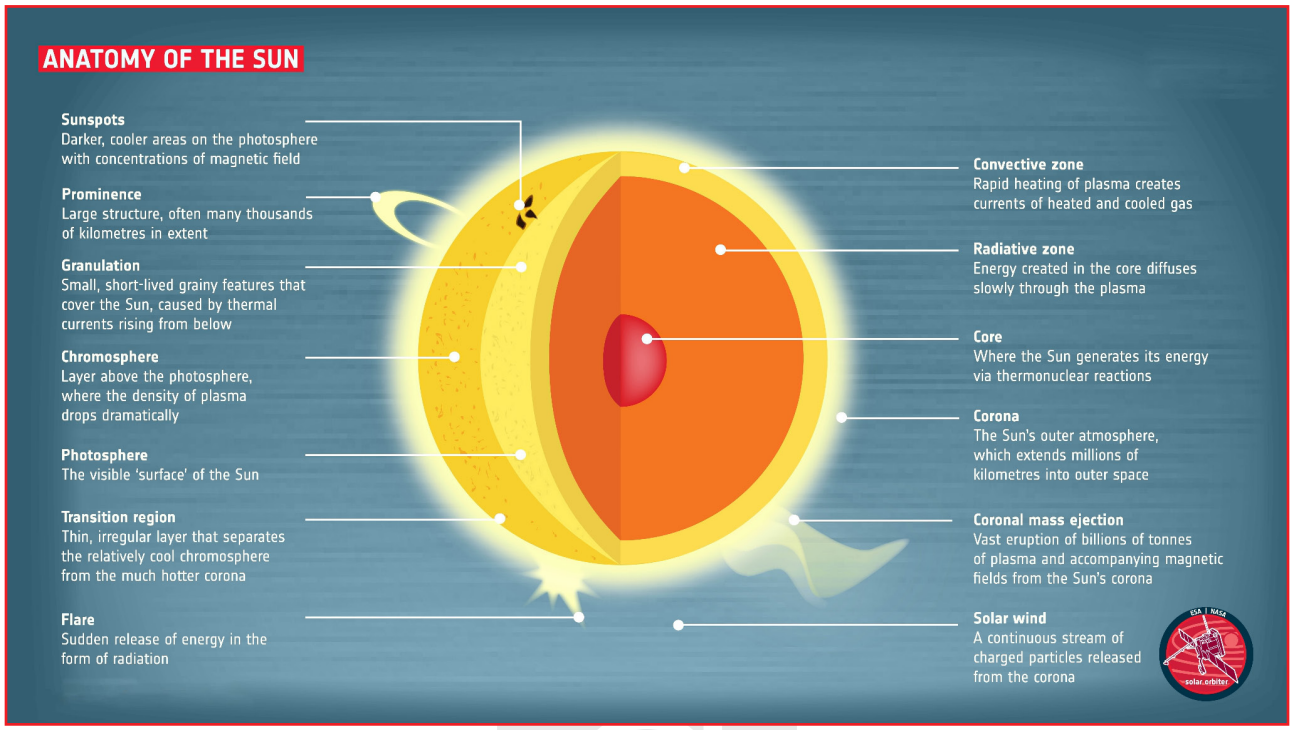

- **Impact on Earth:**
  - **Solar flares** can cause geomagnetic storms that **disrupt Earth's magnetic field,** leading to **radio blackouts, power grid failures,** and **visible auroras at lower latitudes.**
  - High-energy particles may **damage satellites, GPS, and communication systems.**

Read More: Coronal Mass Ejections, Solar Flare

Official Secrets Act 1923

A travel blogger from Haryana was arrested for alleged espionage and promoting pro-Pakistan content under **Sections 3 and 5 of the** Official Secrets Act, 1923 & **Section 152 of the** Bharatiya Nyaya Sanhita (BNS).

Official Secrets Act (OSA), 1923

- **About:** It originated during the colonial-era **Indian Official Secrets Act, 1889**, aimed at **suppressing press dissent** and made more stringent in **1904** under **Lord Curzon** and finally revised in **1923**.
- **Purpose:** To prevent **espionage** and **unauthorized disclosure** of classified sensitive information, protecting India's **sovereignty**, **integrity**, and **strategic interests**, especially from foreign threats.
- **Applicability**: Applicable to **all Indian citizens**, including government officials, **both in India and abroad**, and to **non-citizens** if they are involved in acts of espionage.
- **Sections of OSA, 1923:**
  - **Section 3 of the Act** criminalises espionage and **acts against national security, including the possession of sensitive documents** or the sharing of secret codes, with a punishment of imprisonment for up to 14 years.
  - **Section 5** penalises **unauthorised disclosure, possession, retention, or failure to return official documents**, including those who knowingly receive such information.
  - **Section 10 deals with** penalty for **harboring spies**

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Section 152 of the BNS

- Section 152 of BNS (deals with sedition) **criminalizes intentional acts**—by words, signs, electronic means, or finance—**that incite secession, rebellion, or threaten India's sovereignty and integrity,** while **exempting legitimate and lawful criticism of the government.**

Read More: Arrest Under Official Secrets Act, Sedition Charges.

Xenon Gas

Four **British climbers** are the first to reach Mount Everest**'s summit** using **Xenon gas** by speeding up their **acclimatisation.**

- **About Xenon Gas: Xenon (stranger gas)** is a **rare, colourless, odourless, chemically stable, and non-reactive gas** found in **trace amounts** in Earth's atmosphere. It is available in **solid, liquid, and gaseous** states.
  - Commercially, xenon is obtained as a **by-product** of the **air separation process**, where air is **fractionally distilled** into **oxygen and nitrogen**.
  - Xenon is a **noble gas (inert gas)** and therefore they **do not react** with any other elements. However, xenon can **form compounds** with **fluorine and oxygen.**
- **Applications of Xenon:**
  - **Mountaineering:** It has **neuroprotective properties** that enhances **oxygen delivery**, supports **acclimatisation**, and guards against altitude sickness and hypoxia**-related damage.**
  - **Medical**: It acts as a **natural anesthetic** and, when inhaled with oxygen, stimulates **hormone production** that increases **red blood cell count**. It is also used to **measure blood flow** and **image the brain, heart, and lungs.**
  - **Lighting**: Used in **high-intensity lighting** such as **flash lamps**, **strobe lights**, and **car headlights** because it emits **bright white light**.
  - **Industry: Xenon** is used in **nuclear energy plants**, as **filling gas in tubes for televisions and radios**, and for **etching silicon microprocessors** using **xenon difluoride.**
  - **Space Exploration**: Used as **fuel** for **ion propulsion systems** in **satellites** and **deep-space missions.**
- **Toxicity:** Xenon compounds are **strong oxidizing agents** that are **highly toxic** and **explosive**.

Read More: 150 years of the Periodic Table

Weather Balloons

The US has reduced its **weather balloon** launches following budget cuts by the administration, causing concerns globally among **meteorologists** about the i**mpact on weather forecasting accuracy.**

Weather Balloons:

- **About**: **Léon Teisserenc de Bort,** a French meteorologist, pioneered **weather balloon** use in **1896** and discovered the tropopause and **stratosphere.**
  - Weather balloons are **large latex balloons** filled with **helium or hydrogen**, used by meteorologists to study the **upper atmosphere (above 5,000 feet)**.
  - Modern weather balloons can rise up to **1,15,000 feet (35 km)** in about 2 hours.
- **Key Components:** They carry a **radiosonde**, a small **battery-powered radio-transmitter** suspended about **66 feet below**, which **collects and transmits real-time data** on **temperature, pressure, humidity, and wind** to ground stations via radio signals.
  - **High-tech radiosondes** are **lighter, more energy-efficient,** and use Global Positioning System (GPS) for **accurate tracking** and **wind measurement**, though they are **still launched using weather balloons.**
- **Significance**: Helps **fill the gap** between **surface observations** and **satellite data,** offering **detailed vertical profiles of the atmosphere** essential for accurate weather prediction.
- **India's Scenario:** The **National Balloon Facility (NBF)**, Hyderabad, was established in the 1960s as a collaborative initiative between the Tata Institute of Fundamental Research (TIFR) and the ISRO to enable **high-altitude scientific balloon launches** for atmospheric and space research.
  - The India Meteorological Department (IMD) and over **900 global weather stations** launch balloons **twice daily** to maintain forecasting accuracy.

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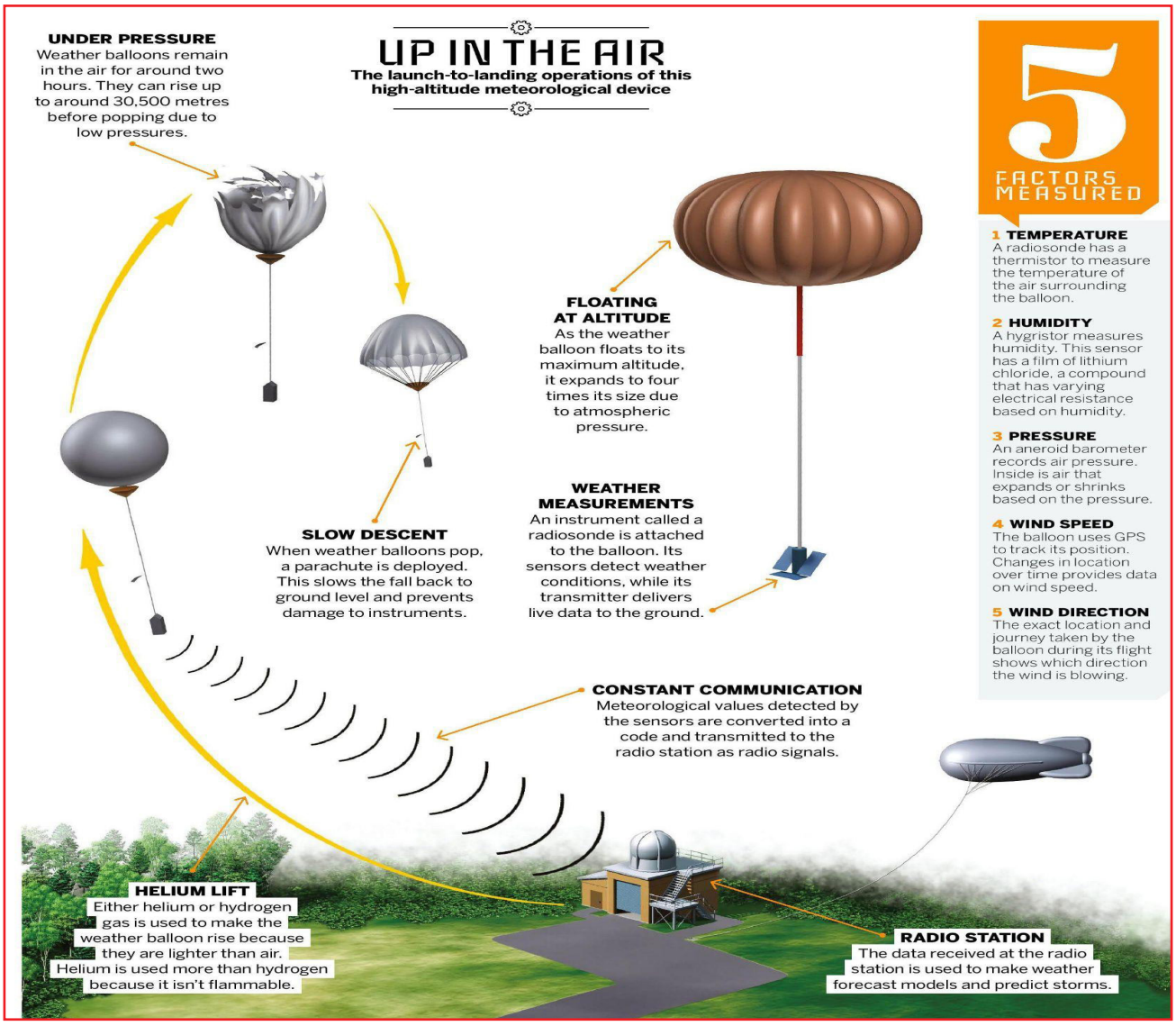

Read More: Weather Monitoring by IMD, Surveillance Balloon

KVIC's Honey Mission

The Khadi and Village Industries Commission (KVIC) celebrated **World Bee Day 2025** with the theme ***"Bee inspired by nature to nourish us all,"*** highlighting the transformative impact of the Honey Mission.

- **World Bee Day:** Observed on **20th May**, World Bee Day was established by the UN in 2018, to raise awareness of the critical **role of bees and pollinators** in maintaining ecosystem and human health.
- **Honey Mission:** The Honey Mission, launched by **KVIC in 2017-18** under the Ministry of Micro,Small & Medium Enterprises, promotes beekeeping to generate self-employment in rural and remote areas.
  - Beneficiaries receive bee boxes, colonies, toolkits, and training. As of 2025 **KVIC has distributed over 2.29 lakh bee boxes**, leading to the production of 20,000 metric tonnes of honey and generating Rs 325 crore income for beekeepers. In **FY 2024-25, honey exports under KVIC touched Rs 25 crore.**

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- **Other Initiatives to Boost Beekeeping:** The Scheme of Fund for Regeneration of Traditional Industries (SFURTI) and the National Beekeeping & Honey Mission (NBHM) support traditional beekeepers by forming clusters and providing training and modern machinery for sustainable employment.
  - NBHM aims to achieve the goal of **'Sweet Revolution'** as part of Atmanirbhar Bharat Abhiyaan.

BEE FACTS

- The honey bee is the only insect that produces food for humans.
- A honey bee can fly up to 15 miles per hour and visits 50-100 flowers in one trip.
- A pound of honey is made by 2 million flower visits. The bees fly 55,000 miles back and forth to bring that honey.
- A honey bee worker only makes an average of 1/12 of a teaspoon in her lifetime
- One ounce of honey would fuel a bees flight around the world.
- Honey bees beat their wings 11,400 times per minute. This beating of wings makes the buzzing noise.
- An average hive has 50,000 to 60,000 worker bees.

Read more: KVIC's Honey Mission

Sagar Mein Samman Initiative

The Government of India launched the **Sagar Mein Samman (SMS)** initiative during the **International Day for Women in Maritime,** to train more women as **seafarers**, and to power India's goal of a Global Maritime Powerhouse.

- The **International Day for Women in Maritime**, observed annually on **18th May by the** International Maritime Organisation's (IMO), promotes **gender balance and inclusive growth** in the maritime sector.
- Theme 2025: **"An Ocean of Opportunities for Women."**

Sagar Mein Samman:

- **About:** It aims to build a **gender-equitable maritime workforce** by **promoting women's inclusion, safety, skill development, leadership**, and equal opportunities across maritime operations.
  - It is aligned with the IMO mission for **gender inclusion** and broader vision of the **UN SDG-5 (gender equality).**
  - It is also aligned with India's Diversity, Equity, and Inclusion (DEI) agenda and Maritime India Vision 2030., it covers **planning, training, research, governance, and outreach**.

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- **Impact & Targets:** India witnessed a **649% rise in women seafarers**, from **341 in 2014 to 2,557 in 2024**, and **nearly 3,000 women received financial assistance**.
  - The initiative sets a target of **12% female representation in technical maritime roles by 2030**.

India's Key Initiatives in India's Maritime Sector:

- Security and Growth for All in the Region (SAGAR)
- Maritime AmritKaal Vision 2047

Read More: Developments in India's Maritime Sector

Judicial Accountability and the K Veeraswami Judgment, 1991

The Vice President challenged the **constitutional basis** of in-house inquiries and called for a review of the K Veeraswami judgment, 1991 following the seizure of cash at Justice Varma's residence, as the SC rejected FIR petitions against Justice Varma and allowed the in-house inquiry to continue.

- **In-House Inquiry:** An **in-house inquiry** is conducted by a **panel of judges** appointed by the Chief Justice of India (CJI) to determine if there is a **prima facie case** against a judge.
  - The CJI's powers over errant judges are **limited** to **transferring** or **withdrawing work** assigned to them and **recommend impeachment** for the concerned judge.
  - Under the **Constitution, impeachment under** Article 124 is the only constitutional removal process but has **never succeeded in 75 years**.
  - In **2019**, then **CJI Ranjan Gogoi** permitted the CBI to register an **FIR** against **Justice S N Shukla** while **CJI Dipak Misra** had recommended impeachment, which the **government ignored**.
- **K Veeraswami Judgment, 1991:** It classified judges as **public servants** under the **Prevention of Corruption Act** but requires **CJI approval** for prosecution (registering FIR), **protecting the judiciary from executive interference** with **built-in immunity**.
- **Immunity Under the Constitution:** Unlike the **President** and Governors (Article 361), there is **no immunity for judges** under the Constitution.
  - The **Vice President** argues that **sanction for prosecution** must come from the authority that appoints the public servant i.e., the **President of India**, vested with **executive power** under **Article 53.**

Read More: Judicial Transfers and In-House Inquiry

Golden Dome Missile Defence Project

The US President announced the creation of a **'Golden Dome'** missile defence programme to counter advanced **aerial threats,** including missiles launched from space.

- **About:** It is a **missile defense project** with **space-based sensors** and **interceptors**, designed to create a **multilayered shield**, neutralize **hypersonic**, **ballistic**, **cruise missiles**, and **drones** from anywhere in the world—including **space.**
  - **Thousands of satellites** will orbit Earth to **intercept missiles** shortly after launch—a concept first explored by Nazi Germany during World War II, and by the **Soviet Union** and the **US** during the Cold War.
  - It draws inspiration from **Israel's** Iron Dome and **Ronald Reagan's** Strategic Defense Initiative (Star Wars project), aiming to deploy a **multi-layered missile shield**.
- **Comparison with Iron Dome:** The **Golden Dome** is an **ambitious next-generation defense system** covering **land, sea, and space**, while the **Iron Dome** is a **short-range, ground-based system** that relies only on **radar**, not **satellites.**
- **Similar Initiatives:** Few countries like the **US, China**, France, Japan, Russia, the United Kingdom have a Space Force (military branch responsible for conducting operations in **outer space**).

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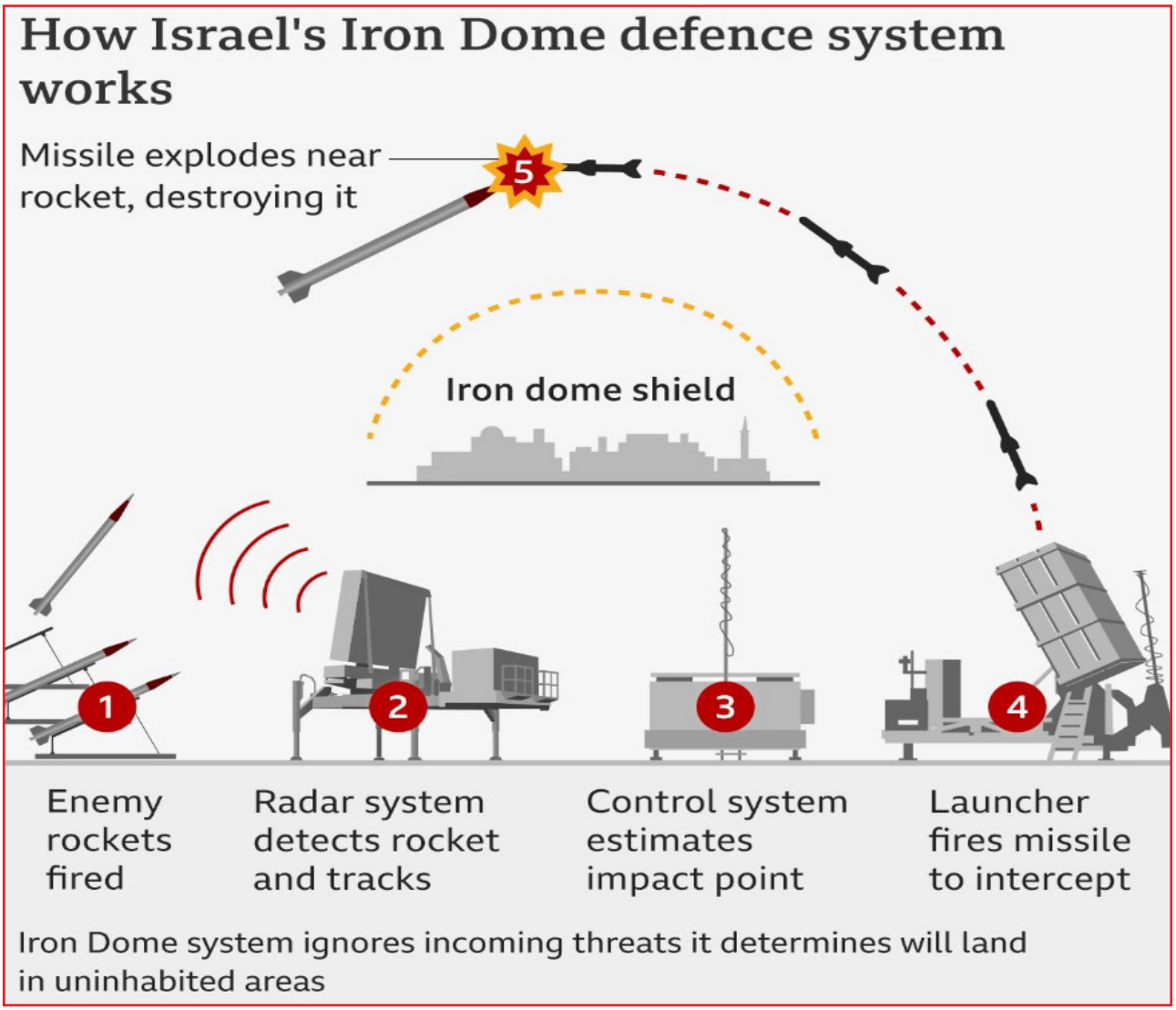

Read More: Strategic Defence Technologies in India

iGOT Karmayogi

The **iGOT Karmayogi digital learning platform**, central to India's National Programme for Civil Services Capacity Building (Mission Karmayogi), has achieved a landmark milestone with **over 1 crore civil servants registered,** reflecting rapid digital adoption and a transformative shift in public administration.

- Top 5 states by registration are **Bihar, Andhra Pradesh, Madhya Pradesh, Rajasthan, Uttar Pradesh.** iGOT Karmayogi issued over **3.1 crore learning certificates**, totaling 3.8 crore learning hours completed.
- **iGOT Karmayogi:** Managed by **Karmayogi Bharathas, iGOT Karmayogi** offers over 2,400 courses in 16 languages, all courses align with the indigenous **Karmayogi Competency Model** based on Indic wisdom and **Mission Karmayogi principles.**

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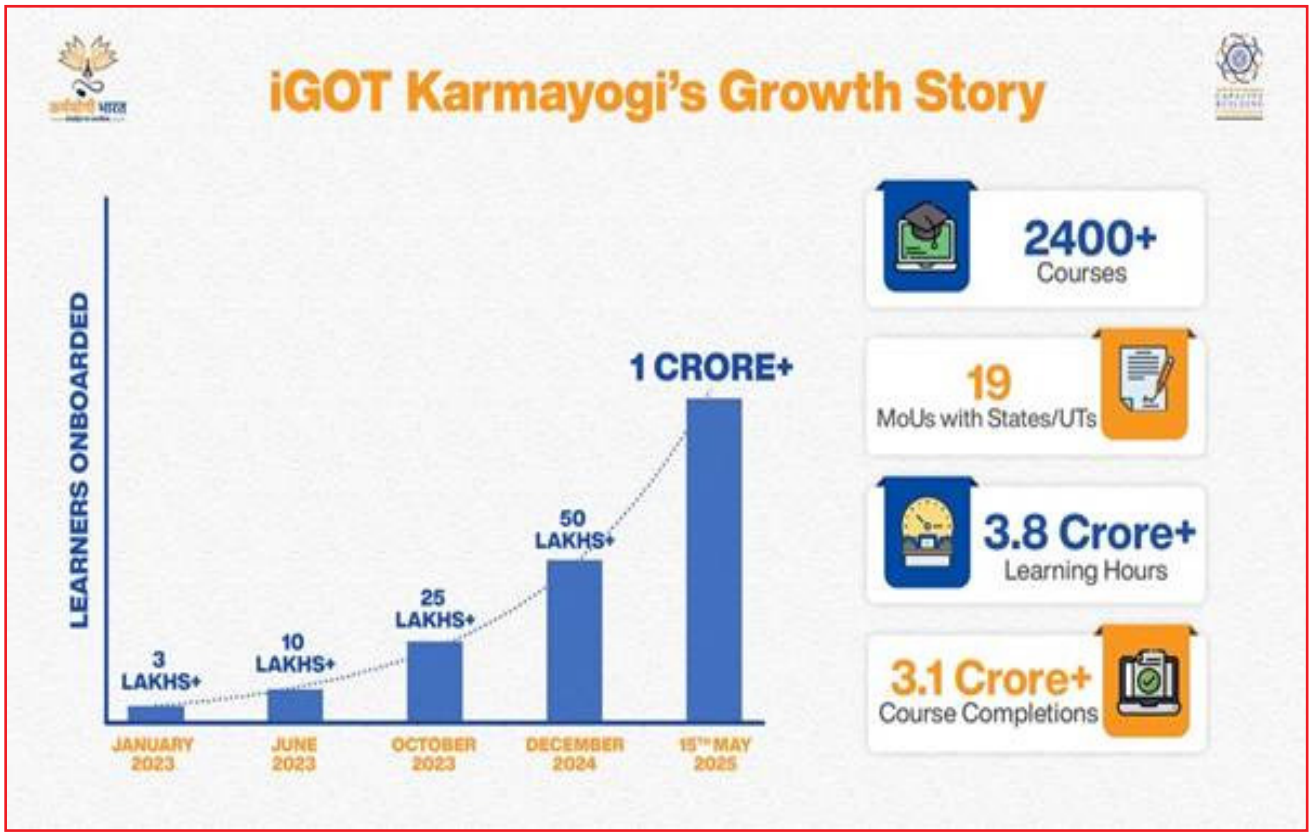
- Karmayogi Bharat, a **100% government-owned not-for-profit Special Purpose Vehicle**, incorporated under the **Companies Act, 2013.**

➢ **Mission Karmayogi:** It is aimed at creating a professional, well-trained, and future-ready civil service aligned with India's developmental priorities and national programs.

- The mission promotes a shift from **rule-based to role-based training**, and embraces a competency-driven approach that focuses on the right blend of **Attitude, Skills, and Knowledge (ASK).**
- It follows the **70-20-10 model (70% learning through experience, 20% via peers, and 10% from formal training).** It also links learning with career goals and ensures objective performance evaluation.



Read more: National Learning Week Under Karmayogi Mission

Heart Lamp wins 2025 International Booker Prize

"Heart Lamp," a short story collection by **Banu Mushtaq,** translated into English by **Deepa Bhasthi,** became the first Kannada work to win the **2025** International Booker Prize, marking a historic moment for Indian regional literature.

➢ Heart Lamp features **stories portraying women's struggles under patriarchy**, echoing the **Bandaya Sahitya movement** and highlighting universal themes of gender discrimination.

- The **1970s Bandaya movement** ignited literary and social activism around **women's rights, and Dalit issues,** influencing politics and literature across Karnataka and India.

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- **International Booker Prize:** Formerly known as the **Man Booker International Prize,** it is a prestigious annual award for translated fiction, honoring the best long-form works or short story collections published in the UK or Ireland. It is awarded by the **Booker Prize Foundation, UK.**
  - The prize awards Great Britain Pound (GBP) 50,000, equally shared between the author and the translator. Additionally, each shortlisted author and translator receives GBP 2,500.
- **Indian International Booker Prize Laureates:**

Year	Author	Work
1971	V.S. Naipaul	In a Free State
1981	Salman Rushdie	Midnight's Children
1997	Arundhati Roy	The God of Small Things
2006	Kiran Desai	The Inheritance of Loss
2008	Aravind Adiga	The White Tiger
2022	Geetanjali Shree	Tomb of Sand

Read more: International Booker Prize 2024

Guttala Drought Inscription

A **rare Kannada** inscription discovered in **Haveri, Karnataka**, marks the **first known historical record** in India to document a **mass humanitarian disaster (6,307 deaths) due to bara"** (drought), dating back to **18th August 1539 CE.**

- The bodies were buried after paying respects to **God Basaveshwara**. It is **India's earliest** known **inscription explicitly recording the human toll** of a natural disaster.
  - **Inscriptions** are texts carved on durable materials like **stone or metal,** serving as **historical records** to commemorate events, royal decrees, donations, or victories.
- **Notable Inscriptions in Karnataka:**
  - **Maski Rock Edict (3rd Century BCE):** One of **Ashoka's minor edicts**, it first uses the title **"Devanampriya"** (Beloved of the Gods) for Ashoka.
  - **Aihole Inscription (634 CE):** Composed by **Ravikirti** in **Sanskrit**, it records **Pulakeshin II victories**, including over **Harshavardhana.**
  - **Halmidi Inscription (450 CE):** It is the oldest known **Kannada inscription**, and written in **early Kannada script** and **poetic form**.
    - It mentions **Kadamba king Kakusthavarma** and has **16 lines carved on a sandstone slab.**

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INSCRIPTIONS AND ROCK EDICTS

Sohgaura Copper Plate

- Location - Sohgaura, Gorakhpur (UP)
- Mentions - Famine relief efforts
- Language - Prakrit*
- Features - **Mauryan dynasty**
  - Earliest-known copper plate
  - (Rare) **Pre-Ashokan Brahmi inscription**

Ashokan Edicts

- Location - Eastern India
- Mentions - Ashoka's view of Dharma (Buddhist philosophy)
- Language - Magadhi Prakrit*
- Features - 33 inscriptions (pillar edicts, Major rock edicts, Minor rock inscriptions)
  - **1st tangible evidence of Buddhism**
  - Ashoka as **Devanampiyadasi** "Beloved servant of the God"

Rummindei Pillar Edicts

- Location - Lumbini, Nepal
- Mentions - Ashoka's visit to Lumbini and tax exemptions he made there
- Script - Brahmi
- Features - Minor pillar inscriptions

Prayag-Prashasti (Allahabad Pillar)

- Location - Allahabad Fort (earlier Kaushambi)
- Mentions - Ashoka Stambh but with 4 different inscriptions
- Script - Brahmi
- 4 Inscriptions include -
  - Usual Ashokan Inscriptions
  - Queen's Kaurwaki edict
  - Samudragupta's conquests by Harisena
  - Jahangir's inscriptions in Persian

Mehrauli Inscription (Mehrauli Iron Pillar)

- Location - Qutub Minar complex, Delhi
- Mentions - Credits **Chandragupta II** for the conquest of Vakatakas and Vanga countries
- Script - Brahmi
- Features - **Gupta dynasty**
  - Pillar estd by Chandragupta II as **Vishnupada** (in honor of Lord Vishnu)
  - Notable for rust-resistant metal composition

Kalsi Inscription

- Location - Kalsi town (Uttarakhand)
- Mentions - Ashoka's humane approach in administration, non-violence, spirituality
- Language - Prakrit*
- Features - Only place in north India to have 14 Ashokan rock edicts

Maski Inscription

- Location - Maski (an archaeological site in Karnataka)
- Mentions - Dharma shasana (promotes Buddhist tenets)
- Language - Prakrit*
- Features - 1st edict to contain Ashoka's name instead of Piyadasi.

Kalinga Edicts

- Location - Kalinga, Odisha
- Mentions - Kalinga war turning point for Ashoka
- Language - Magadhi Prakita, Script - Brahmi
- Features - Set of 11 out of 14 rock edicts
  - 2 special rock edicts signifying pacification
  - Ashoka gave up **Digvijaya**, adopted non-violence & Buddhism

Aihole Inscription

- Location - Meguti temple, Karnataka
- Mentions - **Pulakeshin II** defeated Harshavardhana
- Language - Sanskrit; Script - Kannada
- Features - Chalukya victory→Pallavas
  - Capital: **Aihole→Badami**
  - Written by Ravikirti (Pulakeshin II's court poet)
  - Samudragupta's conquests by Harisena

AIHOLE WAS THE FIRST CAPITAL OF CHALUKYAS

Hathigumpha Inscription (Elephant Cave Inscription)

- Location - Udaygiri-Khandgiri Caves, Odisha
- Mentions - History of King Kharvela - a champion of Jainism
- Language - Prakrit*
- Features - **Mahameghavahana dynasty**

*NOTE: *implies that wherever language is Prakrit, the script is Brahmi*

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Read More: 900-Year-Old Chalukyan Inscription

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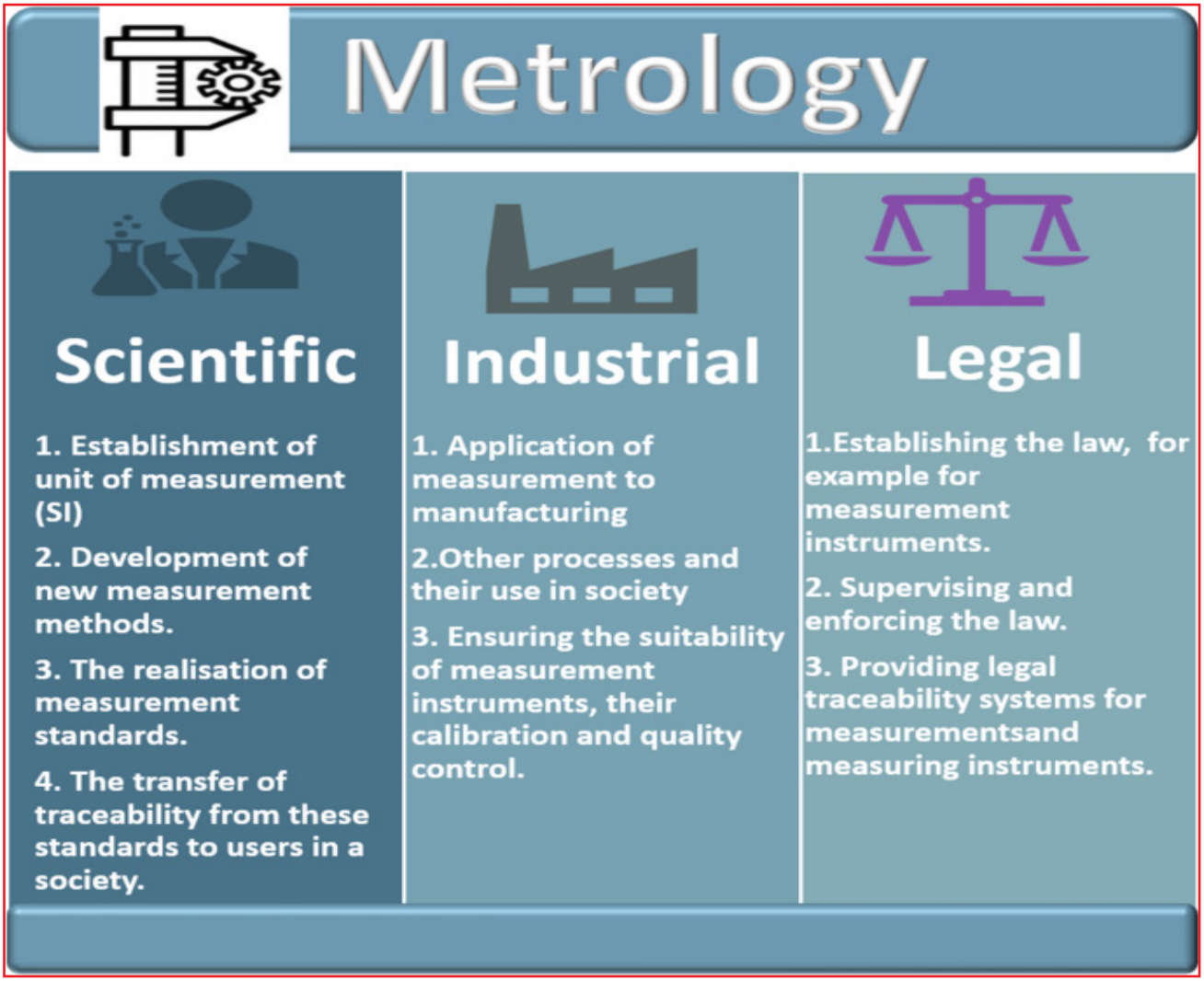
Metrology and India's Initiatives

The Department of Consumer Affairs, Government of India, celebrated **World Metrology Day 2025**.

- **World Metrology Day 2025:** The day commemorates the 150th anniversary of the **Metre Convention** signed in Paris on **20th May 1875,** which established the **metric system to standardize units globally.**
  - The celebration was first initiated in 1999 by the **International Committee for Weights and Measures (CIPM).**
  - The theme for 2025 is **"Measurements for all times, for all people,"** highlighting measurement's continuous impact across history, present, and future.



- **Metrology:** It is the scientific **study of measurement,** establishes common standards for **units and instruments.** It plays a vital role in various fields such as navigation, construction, product development, environmental monitoring, medicine, and food processing.
  - Metrology aligns with **UNESCO's vision of advancing science for a better world.**
- **India's Initiatives in Metrology:** India joined the **Metre Convention in 1957** following the enactment of the **Standards of Weights and Measures Act, 1956.**

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- India became the 13th country globally to issue **OIML (International Organization of Legal Metrology) certificates,** boosting global trust in its measurement systems.
- The **eMaap portal,** digitizes legal metrology processes across 18 states for easier licensing, registration, and enforcement.
- The launch of the **"One Nation, One Time"** initiative under **Draft IST Rules 2025** aims to **provide millisecond-accurate Indian Standard Time** through Regional Reference Standard Laboratories, benefiting critical sectors like telecom and banking.

Read more: India Authorised to Issue OIML Certificates

Shirui Lily Festival

After a two-year hiatus due to ethnic conflict, **Manipur's Shirui Lily Festival returns in 2025,** symbolizing both a cultural revival and a cautious attempt at restoring inter-community movement and peace in the state.

- **Shirui Lily:** The Shirui Lily ***(Lilium mackliniae)***, **Manipur's State Flower**, is a rare pinkish-white bloom found only in the **Shirui Hills of Ukhrul district**.
  - It was discovered in 1946 by Dr. Frank Kingdon Ward, and was named after his wife, **Jean Macklin**. The flower received the Royal Horticultural Society's merit award in 1948.
  - It blooms from **April to June,** grows about a foot tall, and has a bell-shaped flower.
  - The Shirui Lily is endangered, with climate change, habitat loss, and invasive species like wild dwarf bamboo contributing to its decline.
- **Shirui Lily Festival:** First held in 2017, the festival is one of Manipur's two major tourism events (the other being the **Sangai Festival).**
  - The Shirui Lily Festival celebrates **ecotourism, Tangkhul Naga culture, and conservation.** It features music concerts, cultural performances, and other community events.

Read more: Violence in Manipur

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Indian Yak Genomics

For the first time, **Indian scientists** have successfully assembled a **chromosome-level genome** of the **Indian yak (Bos grunniens)**, an essential high-altitude bovine species.

- **Indian Yak Genomics:** The project used **long-read sequencing technology** and advanced **bioinformatics**, enabling precise mapping of **genes to specific chromosomes.**
  - Long-read sequencing is a **DNA sequencing** method that reads **long stretches of DNA, thousands to millions of base pairs**, unlike **short-read sequencing**, which reads shorter fragments (typically **100–300 base pairs**).
  - **Bioinformatics** combines **biology, computer science, and math** to analyze and interpret large biological datasets, such as **DNA, RNA,** and **protein sequences**.
  - Moreover, this genomics study will help in **allele mining,** enhancing scientific research and **local livestock management.**
    - Allele mining **identifies genetic variations** linked to desirable traits like **disease resistance, drought tolerance, or high yield** within or across species.
- **Indian Yak:** In India, yaks are found **above 7,000 feet** in **Ladakh, Sikkim, Arunachal Pradesh, and Himachal Pradesh.**
- **Food Animal:** In **2022**, **Food Safety and Standard Authority of India (FSSAI)** approved the Himalayan Yak as a **'food animal'**, allowing its use in **food production or consumption** to help arrest its declining population.

Read More: Himalayan Yak

e-Zero FIR

The Union Home Minister has launched the **e-Zero FIR initiative as a pilot project** in Delhi under the **Indian Cyber Crime Coordination Centre (I4C)** to improve the efficiency of **investigating cyber financial frauds**, supporting the vision of a **Cyber Secure Bharat.**

- **Zero FIR:** An **Zero FIR** can be **filed at any police station,** regardless of the **jurisdiction**, **for a cognisable offence** and is **transferred to the proper jurisdiction** for investigation.
  - **e-Zero FIR is the electronic version of Zero FIR and is enabled under Section 173(1) and 1(ii) of the BNSS.**
- **Key Features of e-Zero FIR:**
  - **Automatic FIR Registration:** Cyber financial fraud complaints above **Rs 10 lakh**, filed via **National Cybercrime Reporting Portal (NCRP)** or **Helpline 1930**, will be **automatically converted into Zero FIRs**.
    - Complainants must **visit the concerned police station within 3 days** to get the Zero FIR **converted into a regular FIR**.
  - **Systems Integration:** Combines **I4C's NCRP system**, **Delhi Police's e-FIR system**, and **NCRB's Crime and Criminal Tracking Network & Systems (CCTNS)** into a unified cybercrime reporting and investigation framework.
- **FIR (First Information Report):** An **FIR** is the **first formal report** of a **cognizable offence** (police can arrest without a warrant and begin investigation without magistrate approval) **filed by an individual and recorded by the police.**
  - It **initiates the criminal justice process**.
  - They are regulated under **Section 173** of the **BNSS, 2023**.

Read More: FIR and General Diary, Cyber Commandos

Operation Olivia

Indian Coast Guard (ICG)'s annual operation, 'Operation Olivia' has achieved major **success by protecting over 6.98 lakh Olive Ridley turtles** nesting at the **Rushikulya river** mouth in Odisha.

Operation Olivia:

- It was launched in the early **1980s** to protect **Olive Ridley turtles** during their **breeding and nesting season** along the **Odisha coast.**
- It aims to ensure **safe nesting grounds** for these turtles, by **preventing unlawful trawling,** particularly at **Gahirmatha Beach** and nearby coastal area of Odisha.

Olive Ridley Turtles (Lepidochelys olivacea):

- **About:** It is the **smallest sea turtle species** in the family ***Cheloniidae***, identified by its **olive** or **grayish-green color** and **heart-shaped carapace**.

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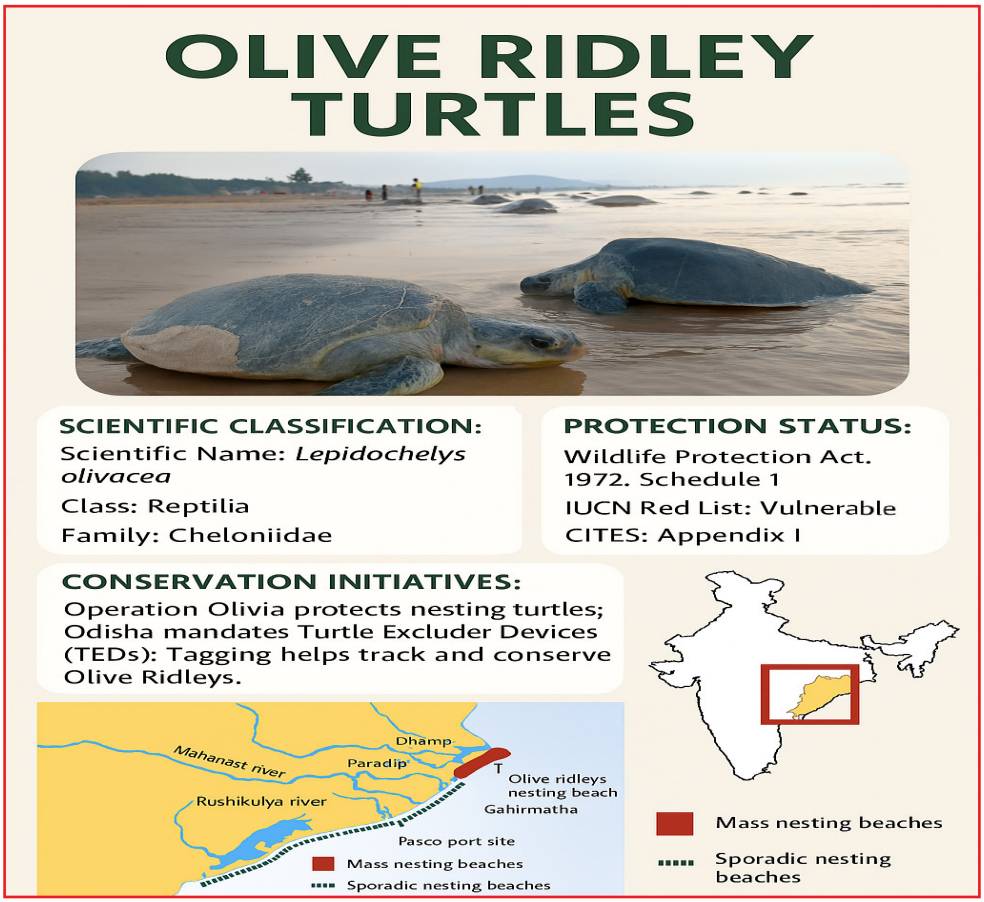
- **Nesting:**They are **omnivorous** and known for the **mass nesting** event called **arribada,** where thousands of females nest together, migrating up to 9,000 km over **Pacific, Indian,** and **Atlantic Oceans.**
  - Major nesting sites include **Gahirmatha, Rushikulya** and **Devi River mouth** in **Odisha** and the **Andaman Islands.**
- **Threats**: It includes **bycatch, poaching, habitat loss, plastic pollution**, and **climate change** effects.
- **Protection Status:** Protected under the **Wildlife Protection Act, 1972** (Schedule 1), **IUCN Red List** (Vulnerable), and **CITES** (Appendix I).



Read More: **Mass Nesting of Olive Ridley Turtles**

Suggi Migration

Every summer, thousands of families from **Rayalaseema, Andhra Pradesh** undertake seasonal migration, locally known as **Suggi**.

- **Causes for Suggi Migration: Agriculture** in Rayalaseema is **entirely dependent on monsoon rains** (June–September). **No secondary crop season** due to lack of water.
  - **Tanks and ponds dry up during summer**, leaving entire villages without drinking or irrigation water. **Failed borewells and lack of irrigation projects** worsen the crisis.
  - Lack of non-farm jobs compels rural workers to migrate. While **Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA)** offers Rs 307/day in Kurnool, delayed payments make it unreliable.

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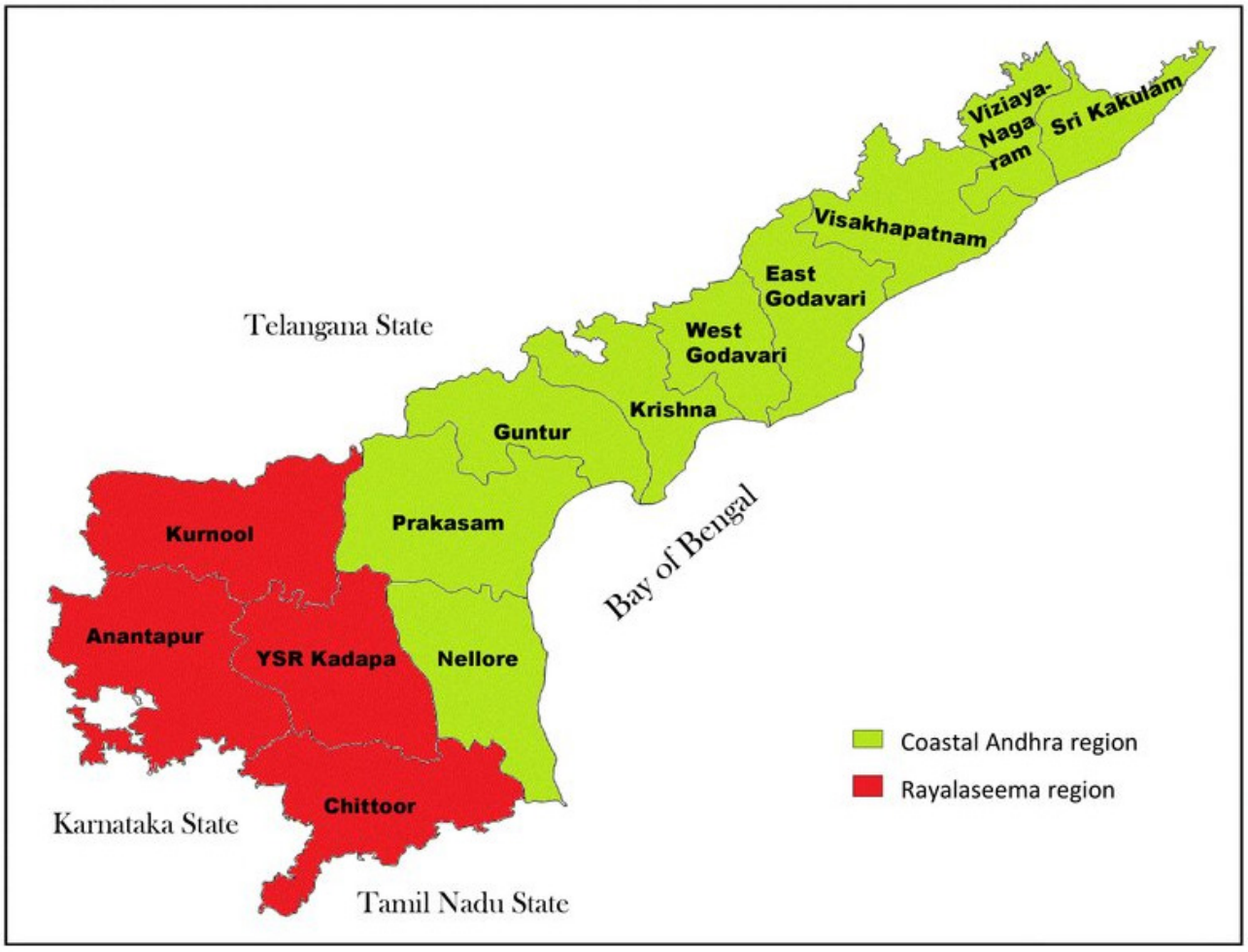
- In contrast, migrant work like chilli harvesting pays around Rs 1,000/day, making it a more attractive option.

❍ ***Suggi* reflects a rural economy** trapped in **cycles of drought, underdevelopment, and migration.**

➢ **Solutions:** Irrigation infrastructure is seen as the key to breaking this cycle of seasonal distress. Experts suggest building a weir (low-head dam) to divert 50 thousand million cubic feet of **Krishna water to Rayalaseema**

➢ **Rayalaseema**: It is a **semi-arid zone** in southern Andhra Pradesh comprising Anantapur, Chittoor, Kadapa, and Kurnool districts. Rivers like **Penna and its tributary, the Papagni** flow through the region.

Rayalaseema and Coastal Andhra regions of the Andhra Pradesh State



Read more: Migration: Trends, Challenges, and Solutions

Suez Canal

The Red Sea security crisis, triggered by Houthi attacks on commercial vessels, drastically disrupted shipping traffic through the Suez Canal, leading Egypt's Suez Canal Authority to offer a discount on transit fees to incentivize the return of cargo ships amid lingering regional risks.

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- **Suez Canal:** The Suez Canal is an artificial sea-level waterway running north–south across Egypt's Isthmus of Suez. It is a vital international shipping route, connecting the Mediterranean Sea to the **Indian Ocean via the city of Suez on the Red Sea.**
  - Geographically, the canal lies in **northeastern Egypt,** spanning the **Isthmus of Suez.**
  - It stretches from **Port Said in the north to Gulf of Suez in the south,** effectively separating the **African continent from the Sinai Peninsula,** and forms the shortest **maritime route between Europe and the Indian and Pacific Oceans.**
- **Significance:** The canal accounts for approximately 12-15% of global trade and nearly 30% of global container traffic before the crisis. It serves as a key passage for 8-9% of global energy flows.
- **India and Suez Canal:** India relies heavily on the Red Sea route, with nearly 80% of export volumes to Europe transiting the canal.

Read more: Escalating Threat in Red Sea

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Tsarap Chu Conservation Reserve

Himachal Pradesh (HP) has notified the **Tsarap Chu Conservation Reserve** under **section 36A(1)** of **Wildlife (Protection) Act, 1972,** to protect **high-altitude biodiversity** and strengthen snow leopard habitats.

Tsarap Chu Conservation Reserve:

- **About:** It is **India's largest conservation reserve (1585 sq km area)**, located in **Spiti Valley,** and the **state's fifth,** joining **Darlaghat, Naina Devi, Potter Hill, and Shilli reserves.**
  - It is bounded by the **UT of Ladakh (north)**, **Kibber Wildlife Sanctuary** and **Malang Nala (east)**, **Kabjima Nala (south)**, and **Chandratal Wildlife Sanctuary (west)**.
- **Significance:**The area is ecologically significant as it lies in the catchment of the **Charap Nala** and serves as a vital **wildlife corridor** between **Kibber Wildlife Sanctuary** & **Chandratal Wildlife Sanctuary (Himachal Pradesh).**
- **Flora & Fauna:**
  - It hosts a high density of **Snow Leopard** ("Ghost of the Mountains"), and other key fauna include **Tibetan wolf, bharal (blue sheep), Himalayan ibex, kiang (wild ass)** and **Tibetan argali.**
    - Rare birds like **Rose Finch, Tibetan Raven**, and **Yellow-billed Chough are also found.**

Conservation Reserve:

- Conservation Reserves are **Protected Areas (PAs)** established on government land that function as **corridors or buffer zones** connecting national parks, wildlife sanctuaries, or other protected regions.
- Notified under **Section 36A** of the **Wildlife (Protection) Act, 1972,** these reserves are **managed collaboratively** with **local communities, Panchayats,** and **conservation partners.**

Categories of Protected Areas in India

National Parks	Wildlife Sanctuaries	Conservation Reserves	Community Reserves
A National Park is a form of protected area which is strictly reserved for the betterment of the wildlife and biodiversity, with much higher levels of restriction in terms of human entry and no human activity, such as foraging, grazing, cultivating and collection of firewood from fringe areas is allowed within National Parks. **Kanha National Park, Kaziranga National Park, Gir National Park, Ranthambore National Park**	A Wildlife Sanctuary is a naturally occurring geographic territory that safeguards wildlife and provides the species protection from poaching, hunting, predation etc. Some human activities are allowed inside wildlife sanctuaries such as grazing and collecting forest produce. Technically, a wildlife sanctuary may be a separately existing entity or it can stand within a national park. There have been instances where a wildlife sanctuary have been upgraded into a national park. **Periyar Wildlife Sanctuary, Bhagwan Mahavir Wildlife Sanctuary, Indian Wild Ass Sanctuary, Kaimur Wildlife Sanctuary**	Conservation Reserves are a form of protected areas, which act as buffer zones or migration corridors between established national parks, wildlife sanctuaries and reserved and protected forests of India. **Jayamangali Blackbuck Conservation Reserve, Sundha Mata Conservation Reserve, Chari-Dhand Wetland Conservation Reserve, Naina Devi Himalayan Bird Conservation Reserve**	Community Reserves are declared by the State Government in any private or community land. The land for the Community Reserve should not fall within a National Park, Sanctuary or a Conservation Reserve. It is essentially an area where an individual or a community has volunteered to conserve wildlife and its habitat. **Abubshehar Community Reserve, Dambuk Attong Community Reserve, Lalwan Community Reserve**

Read More: Conserving Protected Areas in India

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Yala Glacier Declared Dead

The International Centre for Integrated Mountain Development (ICIMOD) held a ceremony to commemorate the **rapid retreat** of Nepal's **Yala Glacier** in **Langtang Valley**, which is threatened to **vanish by 2040** due to climate change.

- This tribute is part of Nepal's role in the UN International Year for Glaciers Preservation 2025 and part of the inaugural **Sagarmatha Sambad (mountain dialogue) summit 2025 by Nepal.**
- **Yala Glacier**: Yala Glacier, situated in **Langtang Valley, Nepal**, within the Hindu Kush Himalayan (HKH) region, is the first glacier in Nepal to be declared **"dead"** as it has shrunk by **66% since the 1970s.**
  - **Glaciers are declared "dead" when they no longer show movement or flow under their own weight.**
  - It is the **first glacier in Asia to bear a climate memorial plaque**, with messages in English, Nepali, and Tibetan languages.

- **Glaciers:** A glacier is a **large, long-lasting mass of ice and debris** that forms on land and **slowly moves downhill due to gravity.**
  - **Glaciers** are distributed mainly in **Antarctica (91%) and Greenland (8%)**, with **less than 1%** in North America, Asia, Europe, Africa, New Zealand, and Indonesia; **Australia has none**.
  - Between **2000 and 2023,** glaciers lost **6,542 billion tons of ice**, causing an **18 mm rise in global sea levels**, exposing an additional **2–3 lakh people** to flooding per millimeter rise.
  - **Glacier melt** is the **second-largest contributor** to sea-level rise after ocean warming.

Read More: 2025 as International Year of Glaciers' Preservation

World Food Prize 2025

Brazilian microbiologist **Mariangela Hungria** has been awarded the **World Food Prize 2025** for her pioneering work in Biological Nitrogen Fixation (BNF) and development of **microbial technologies** that reduce chemical fertiliser use.

- **Mariangela** pioneered rhizobia-based nitrogen fixation in legumes, this innovation reduced chemical fertilizer use, saving **Brazilian farmers USD 40 billion annually,** and boosted soybean production **from 15 million tonnes in 1979 to an estimated 173 million** tonnes by 2025.

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- Her work drove **Brazil's "Micro Green Revolution"** through **sustainable, low-cost microbial technologies.**

Biological Nitrogen Fixation (BNF):

- Biological nitrogen fixation is a natural process where certain **microorganisms convert atmospheric nitrogen (N_2) into ammonia (NH_3),** a form usable by plants.
  - This improves soil fertility and lessens the need for chemical fertilizers.
  - Key nitrogen-fixing bacteria include ***Rhizobium*, *Anabaena*, *Nostoc*, *Azotobacter*,** and ***Clostridium pasteurianum*.**

World Food Prize:

- It was founded in **1986** by **Nobel Laureate** Norman Borlaug, is a top global award recognizing contributions in **improving food quantity, quality** and **accessibility** and **agriculture**.
- It awards **USD 500,000 annually** to innovators in **agriculture, nutrition, food technology, and hunger alleviation.**
- The first recipient was **India's** M.S. Swaminathan **(1987),** father of **Indian green revolution.**

Read More: World Food Day 2024

India's Commitment to UN Peacekeeping

At the **United Nations Peacekeeping (UNPK)** Ministerial 2025 meeting in **Berlin**, 74 member states pledged to enhance the **effectiveness** and **adaptability** of peace operations amid evolving global challenges.

- **India** pledged a **Quick Reaction Force (QRF)**, **One male armed police (Central Reserve Police Force (CRPF) or mixed armed police (CRPF)**, **Women-led Police Unit**, among others.
- As per **UNPK data**, **India** is currently the **4th largest** troop-contributing nation with **5,375 personnel** after **Nepal, Rwanda** and **Bangladesh.**
  - Nearly **180 Indian peacekeepers** have died in action—the **highest of any troop contributor**. India deployed the **first all-female unit to Liberia** in **2007.**
- **About UNPK:** The **first UNPK mission**, **United Nations Truce Supervision Organization (UNTSO)**, was established in **May 1948** to **monitor the Armistice Agreement** between **Israel and its Arab neighbors** with a small team of **military observers.**
  - They are deployed by the **UN Security Council** to support **ceasefires and peace agreements** and are called **Blue Helmets** due to the light blue color symbolizing **peace on the UN flag.**
  - Currently, over **61,000 military and police peacekeepers** from **119 countries** and more than **7,000 civilian personnel** serve in **11 UN Peacekeeping Missions.**

Read More: India's Commitment to UN Peacekeeping

SC Strikes Down Ex-Post Facto Environmental Clearances

The Supreme Court (SC) of India has declared **ex-post facto environmental clearances (ECs)** (granted after a project has already commenced) as illegal, and has invalidated the 2017 Environment Ministry notification and the 2021 Office Memorandum (OM) that permitted retrospective clearances for projects**.**

- SC noted that the concept of post-clearance approval is in derogation of Article 21 (Right to life in a pollution-free environment) and Article 14 (right to equality before law), **as the OM** applied to all project **proponents who "were fully aware" of the consequences of violations.**
  - However, the judgment allowed ECs already granted under the 2017 and 2021 regime to remain valid, avoiding retroactive disruption.
- The SC criticized the post-facto clearance regime, citing past judgments (***Common Cause v. Union of India (2017) and Alembic Pharmaceuticals v. Rohit Prajapati (2020)***) to reaffirm that ex-post facto approvals **violate environmental law.**
  - It held that the 2021 OM effectively legalized starting projects without prior clearance, defying earlier rulings and fundamental principles of environmental jurisprudence.
  - The SC noted that prior clearance is mandatory under the Environment Impact Assessment Notification, 2006, to scrutinize a project's impact on the environment, natural resources, human health, and social infrastructure.
- The Court emphasized that **development cannot come at the cost of environmental degradation** and reaffirmed the constitutional duty under Article 51A(g) to protect nature.

Read more: Post-Facto Environmental Clearances

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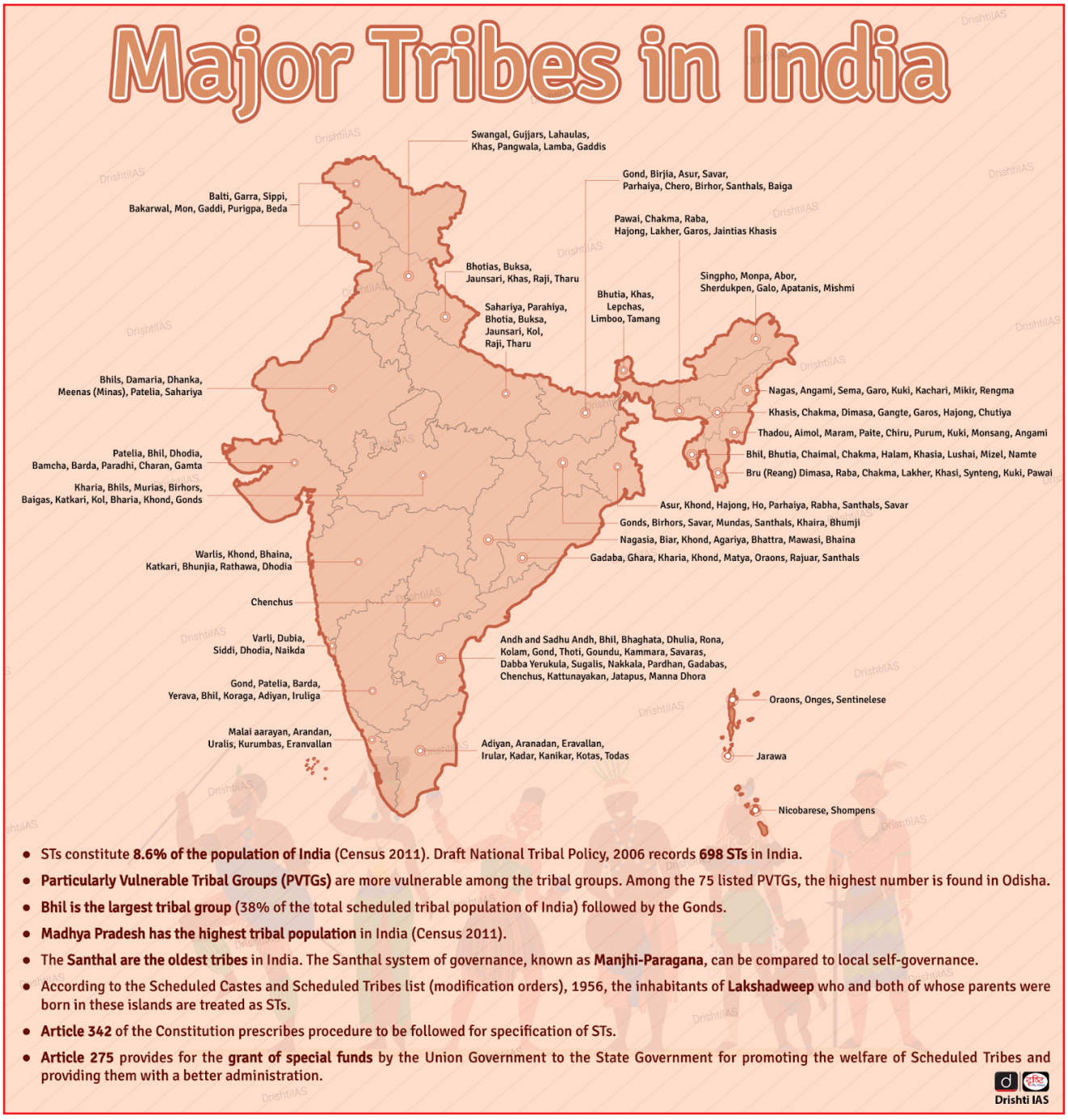
Kandha Tribe

Facial tattooing among Kandha **tribal women** in Odisha's Kandhamal district is a **fading tradition**, reflecting both **past trauma** and **present-day empowerment.**

- Facial tattoos among Kandha women, applied from **age 10** in **geometric patterns,** served as a **form of protection against sexual exploitation (not decorative)** by landlords, royals, and British colonizers.



- STs constitute **8.6% of the population of India** (Census 2011). Draft National Tribal Policy, 2006 records **698 STs** in India.
- **Particularly Vulnerable Tribal Groups (PVTGs)** are more vulnerable among the tribal groups. Among the 75 listed PVTGs, the highest number is found in Odisha.
- **Bhil is the largest tribal group** (38% of the total scheduled tribal population of India) followed by the Gonds.
- **Madhya Pradesh has the highest tribal population** in India (Census 2011).
- The **Santhal are the oldest tribes** in India. The Santhal system of governance, known as **Manjhi-Paragana**, can be compared to local self-governance.
- According to the Scheduled Castes and Scheduled Tribes list (modification orders), 1956, the inhabitants of **Lakshadweep** who and both of whose parents were born in these islands are treated as STs.
- **Article 342** of the Constitution prescribes procedure to be followed for specification of STs.
- **Article 275** provides for the **grant of special funds** by the Union Government to the State Government for promoting the welfare of Scheduled Tribes and providing them with a better administration.

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- **About Kandha Tribe:** It is **numerically highest** among all the **62 tribes** of Odisha, making up **17.13%** of the state's tribal population according to the **2001 Census**.
  - They speak **Kui or Kuvi (Dravidian languages)** and call themselves '**Kui loku', 'Kui enju', or 'Kuinga'** from the Dravidian Kui and Kuvi languages.
  - **Nuclear families** are **common** and **joint families** are **rarely found**.
  - Their population is concentrated mainly in **south and central Odisha**, especially in **Kandhamal, Rayagada, Koraput, and Kalahandi districts.**
  - Among Kandha communities, **Kutia Kandha** and **Dongria Kandha** are recognized as **Particularly Vulnerable Tribal Groups (PVTGs)**.
    - **PVTG** is a **more vulnerable** sub-group of Scheduled Tribes. India has **75 PVTGs**, with **Odisha** having the **most (13)**, followed by **Andhra Pradesh (12).**
  - **Dongria Kandha** are recognized for **opposing mining in the Niyamgiri hills**, while **Kutia Kandha** reside in **distinct homes** with floors situated about **2 ft below the village road level**.

Read More: Dongria Kondh Tribe

Dispute over Parasnath Hill

The Jharkhand High Court directed the state government to enforce a pre-existing ban on the sale and consumption of meat, alcohol, and intoxicants on **Parasnath Hill,** a site sacred to both Jains and the Santal Adivasi community.

- **Significance of Parasnath Hill:** It is known as Parasnath to Jains and Marang Buru (literally "the Great Mountain") to Santals.
  - **For Jains:** It is the site **where 20 of 24 tirthankaras,** including Parshvanatha, **attained nirvana,** many Jain temples and dhams are situated on the hill.
  - **For Santals: Marang Buru is the supreme animist deity** and seat of justice. The Jug Jaher Than (sacred grove) on the hill is the most sacred dhorom garh (religious site) of the Santals.
    - **Lo Bir Baisi,** the traditional Santal tribal council, convenes at the base of the hill to resolve inter-village disputes.
    - The **Santal Hul of 1855,** led by **Sidhu and Kanhu Murmu,** was a major tribal uprising launched from Marang Buru.
- **Parasnath Hill Dispute:** A major flashpoint is the **Sendra festival, a traditional ritual hunt held by the Santals on the hill.**
  - This practice, **a rite of passage for Santal men,** starkly contrasts with Jain values of non-violence and vegetarianism, leading to a legal battle between the Santals and the Jains.
- **Santals:** The Santal tribe, one of India's largest indigenous communities, primarily resides in Jharkhand, West Bengal, Bihar, Odisha, and Assam.
  - They speak **Santali**, a constitutionally recognized language (**Eighth Schedule**) with its own script **Olchiki, created by Pandit Raghunath Murmu.**
  - **Dance (enej) and music (sereng)** remain core to their cultural expression during festivals and social gatherings.

Read more:Santhal Hul of 1855

Shingles Diseases

Recent studies show the **shingles vaccine**, primarily designed to **prevent viral reactivation**, may reduce risks of **cardiovascular diseases by 23%** and **lower dementia** risk.

- **About Shingles Diseases:** It is caused by the **varicella-zoster virus,** which also causes **chickenpox.**
  - After childhood chickenpox, the virus **stays dormant in nerve cells** and can **reactivate** as shingles when **immunity weakens**.
- **Symptoms:** Shingles causes **painful rashes and blisters**, usually on one side of the **torso**. If close to the **eye,** it can cause **vision loss, facial paralysis,** or **brain inflammation**.
- **Transmission:** People without prior chickenpox can contract the virus by **touching fluid from shingles blisters** or **inhaling airborne virus particles**.
- **Vaccine:** It is recommended for individuals **aged 50 years and above**, and for adults with **weakened immune systems** (e.g., **HIV** patients).

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- There are treatments for shingles symptoms, but **there is no cure**.

➢ **Dementia:** It is a condition that slowly **worsens thinking abilities beyond normal aging**. It affects **memory, thinking, understanding, learning, language, and judgment**, but does not affect consciousness.

Read More: Dementia

58th Jnanpith Award

The President conferred the 58th Jnanpith Award for the year 2023 upon **Sanskrit scholar Jagadguru Rambhadracharya** and renowned poet-lyricist **Gulzar.**

➢ **Jagadguru Rambhadracharya:** He is a revered Sanskrit scholar and Hindu spiritual leader, has held the title of Jagadguru Ramanandacharya since 1982. He is the founder and head of **Tulsi Peeth** in Chitrakoot (MP), a prominent religious and literary institution.

- A prolific author of over 240 works, he has **penned four Sanskrit epics** (Bhargava Raghavam, Sri Ramayaṇam, Dasavatara Tīrtham, and Ramanandacharya Tīrtham). He was honoured with the Padma Vibhushan in 2015.

➢ **Gulzar:** Sampooran Singh Kalra (**Gulzar)** is a celebrated Urdu poet, lyricist, author, and filmmaker.

- He pioneered the **Triveni poetic form** and made lasting contributions to Hindi cinema with films like **Maachis, Aandhi, and Koshish.**
- He is recipient of the **Padma Bhushan (2004), Sahitya Akademi Award (2002), Dadasaheb Phalke Award (2013), an Oscar (2009), a Grammy (2010),** and **five National Film Awards**.

➢ **Jnanpith Award:** The Jnanpith Award, established in **1961 and first presented in 1965,** is **India's oldest and highest literary honour.**

- Conferred annually by **Bharatiya Jnanpith**, the award recognises outstanding **contributions to Indian literature across both English** and various Indian languages, exclusively to Indian citizens and not posthumously.
- Recipients of the Jnanpith Award receive a cash prize of Rs 11 lakh, a statue of Vagdevi/Saraswati, and a citation, celebrating their literary excellence.

Note: Vinod Kumar Shukla has been named the recipient of the **59th Jnanpith Award (2024),** becoming the first writer from Chhattisgarh to receive the honor.

Read More: Jnanpith Award

Nicaragua Withdrawal from UNESCO

Nicaragua has announced its withdrawal from the UNESCO in protest over the awarding of the **UNESCO/ Guillermo Cano World Press Freedom Prize to Nicaraguan newspaper La Prensa** despite its opposition from the Nicaraguan government.

➢ **UNESCO/Guillermo Cano World Press Freedom Prize:** It was **established in 1997** and is the **UN's only journalism award**, presented every year **on 3rd May,** World Press Freedom Day.

- Named after **Colombian journalist Guillermo Cano**, it **honors individuals or organizations** for their **contributions to press freedom.**
- Past recipients include Myanmar journalists **Kyaw Soe Oo and Wa Lone (2019**) and **Belarus' top independent journalists' group (2022).**

➢ **UNESCO:** UNESCO is a United Nations (UN) **agency,** founded in **1945** and **headquartered in Paris.**

- It aims to foster **peace and equality** by promoting **education, science, culture, and communication** through **global cooperation and standard-setting.**

➢ **Nicaragua:**

- **Location: Largest country in Central America**, bordered by **Honduras (north), Costa Rica (south), Pacific Ocean (west), Caribbean Sea (east).**
- **History:** Colonized by both **Spain and Britain**, gained independence in **1821**, became **fully independent in 1838** after briefly joining the **Central American Federation.**
- **Population:** Predominantly **mestizo ethnic group** (mixed Indigenous and European ancestry).

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Read More: UNESCO's List of Intangible Cultural Heritage (ICH), Hurricane Eta

Mhadei River Water Dispute

A recent study recommending the diversion of water from Mhadei's tributaries to the **Malaprabha River** in Karnataka, without major impacts on Goa has sparked protests in Goa, reigniting the decades-long inter-state water dispute with Karnataka over water sharing.

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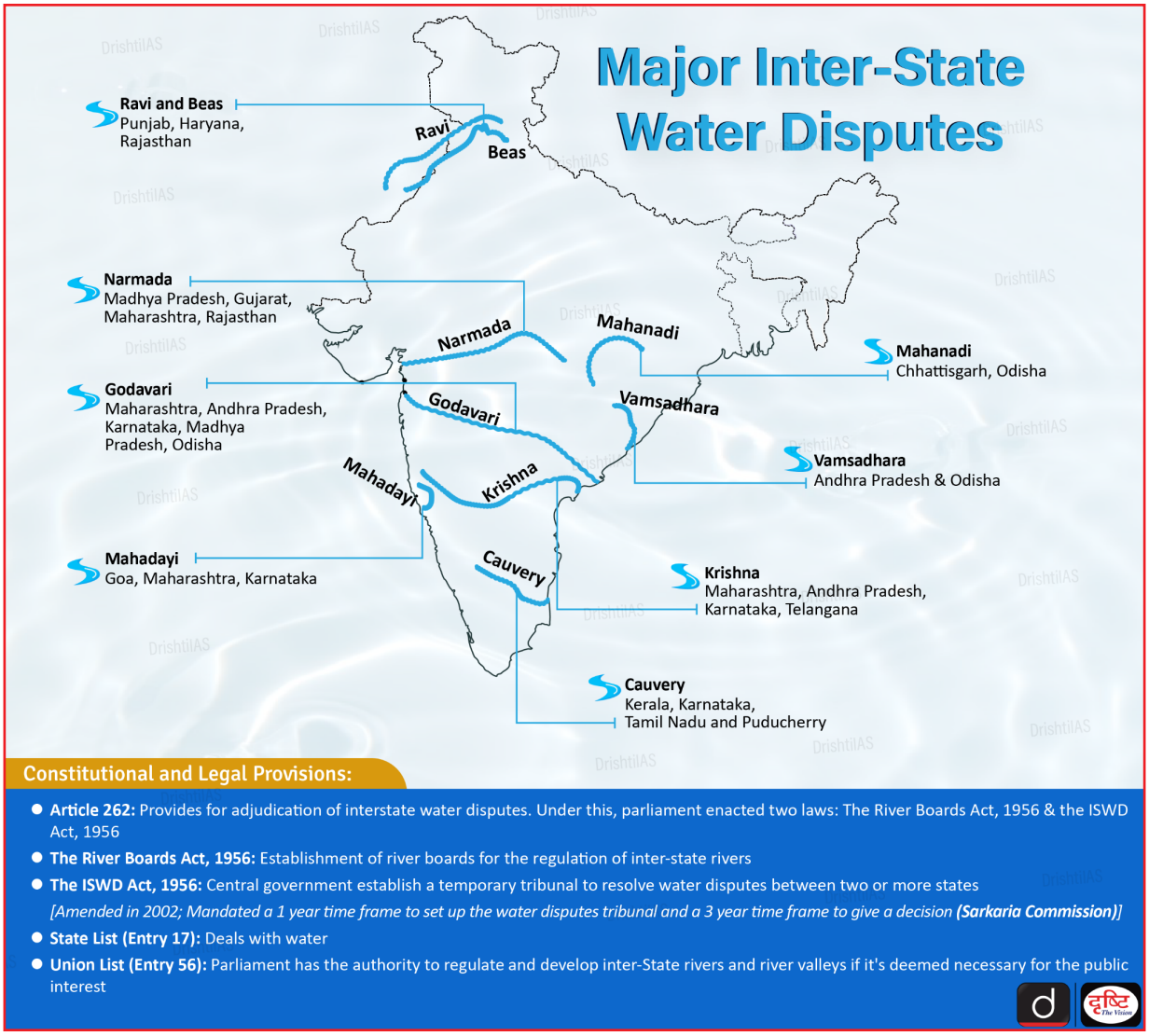
- The Mahadayi Water Disputes Tribunal's (MWDT) allotted Karnataka **13.42 thousand million cubic feet (tmcft)** to **Karnataka**.
- **About Mhadei River:** It originates in the Western Ghats (Bhimgad Wildlife Sanctuary, Karnataka), flows through **Goa (basin cover 78%)**, **Karnataka (18%)**, and **Maharashtra (4%)** emptying into the **Arabian Sea.**
  - **Tributaries: Kalasa, Banduri,** Mapusa, **Ragada**, Nanuz, Valvoti, Nerul, St. Inez Creek, Dudhsagar, Kotrachi Nadi, and Rio de Ourém.
    - It is connected to the **Zuari River** through the **Cumbarjua Canal**.
  - **Features:** It is known for Dudhsagar Falls (Mollem National Park and Bhagwan Mahaveer Sanctuary) and **Salim Ali Bird Sanctuary** on Chorao Island.
- **About Malaprabha River:** It is a **tributary** of the Krishna River and originates in **Kanakumbi village** in **Western Ghats** in **Belgaum**, **Karnataka**.
  - Aihole, Pattadakal, and Badami, all UNESCO **sites,** are located along its banks.



Read More: Mhadei River

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Nipah Virus

Health experts and physicians have raised concerns about the **deadly Nipah virus' transmission** from animals to humans in Kerala.

- **About Nipah Virus:** The Nipah virus (NiV) is a **zoonotic virus** that can spread from **animals to humans**, as well as through **contaminated food** or **direct human-to-human** transmission.
- **Causative Agent: Nipah virus encephalitis** is caused by an **RNA (ribonucleic acid)** virus belonging to the family ***Paramyxoviridae***, genus ***Henipavirus***, and is closely related to the **Hendra virus.**
- **Host:** NiV was first identified in domestic animals such as **pigs, dogs, cats, goats, horses, and sheep**.
  - The virus is transmitted by **fruit bats** of the genus ***Pteropus*** and is present in their **urine, feces, saliva, and birthing fluids**.
- **Symptoms:** NiV causes **encephalitic syndrome** in humans, with symptoms like **fever, headache, drowsiness, confusion,** and **coma**, often leading to **death**. The fatality rate is **40% to 75%.**
- **Diagnosis:** Diagnosis is done via **real time polymerase chain reaction (RT-PCR)** from body fluids. **No vaccines** exist for humans or animals.
- **WHO's Stand: The World Health Organization (WHO)** has designated Nipah as a **priority disease**.

Read More: Nipah Virus

Algal Bloom Devastates Marine Life

A **massive toxic algal bloom**, caused by algae *Karenia mikimotoi* (bloom-forming dinoflagellate), has severely impacted **South Australia's coastline**, leading to the **death of over 200 marine species.**

- **Causes of Marine Death:** The algal bloom has **spread over 150 km** of **coastline**, affecting **biodiversity hotspots** like **Kangaroo Island, Yorke Peninsula, and Fleurieu Peninsula.**
  - ***Karenia mikimotoi*** produces toxins that **suffocate marine life** by **damaging gills, attacking red blood cells,** and **disrupting the nervous system**, leading to abnormal behavior and mass mortality.
  - Additionally, **marine heatwaves** raised sea temperatures by **2.5°C** and **depleted oxygen**, triggering **algae blooms** whose **thick spread reduces oxygen levels**, **suffocating** marine life.
    - MHWs are **extreme ocean events** with sea temperatures rising **3-4°C above** average for **at least five days,** often lasting weeks.
- **Algal Bloom:** An algal bloom is a **rapid increase** in **algae population** in **freshwater, marine, or brackish waters**, often visible as **green, blue-green, red, or brown patches**.
  - While **most are harmless** and **support marine life**, harmful blooms called **Harmful Algal Blooms (HABs)**—threaten human health and ecosystems.
  - It is caused due to the introduction of a **nutrient** (such as **nitrogen** or **phosphorus**) into an **aquatic ecosystem**.
  - A red tide occurs when certain **algae grow excessively**, turning the water **red, as well as brown**.

Read More: Red Tide

North-East India's First Geothermal Well in Dirang

Northeast India's first geothermal production well has been drilled in **Dirang, Arunachal Pradesh,** marking a significant advancement in harnessing **renewable energy** in the **Himalayan region.**

Dirang Geothermal Project:

- **About**: It is **Northeast India's first geothermal energy project**, aiming to make **Dirang t**he first fully geothermal-powered town**.**
  - The site, located between **quartzite and schist** near a **major fault zone** like those in the **Himalayas**, has a **reservoir temperature of around 115°C**, making it suitable for **direct-use geothermal technologies.**
  - It aims to **reduce dependence on diesel and firewood, improve agricultural productivity** and **living standards** in high-altitude areas,
    - It has potential to contribute to India's **10,600 MW geothermal potential** by offering stable, base-load renewable energy.
- **Technology Used:** It uses a **closed-loop binary organic Rankine cycle (ORC) system** which uses **geothermal heat to vaporize an organic fluid** in a secondary loop, which **drives a turbine to generate electricity**.

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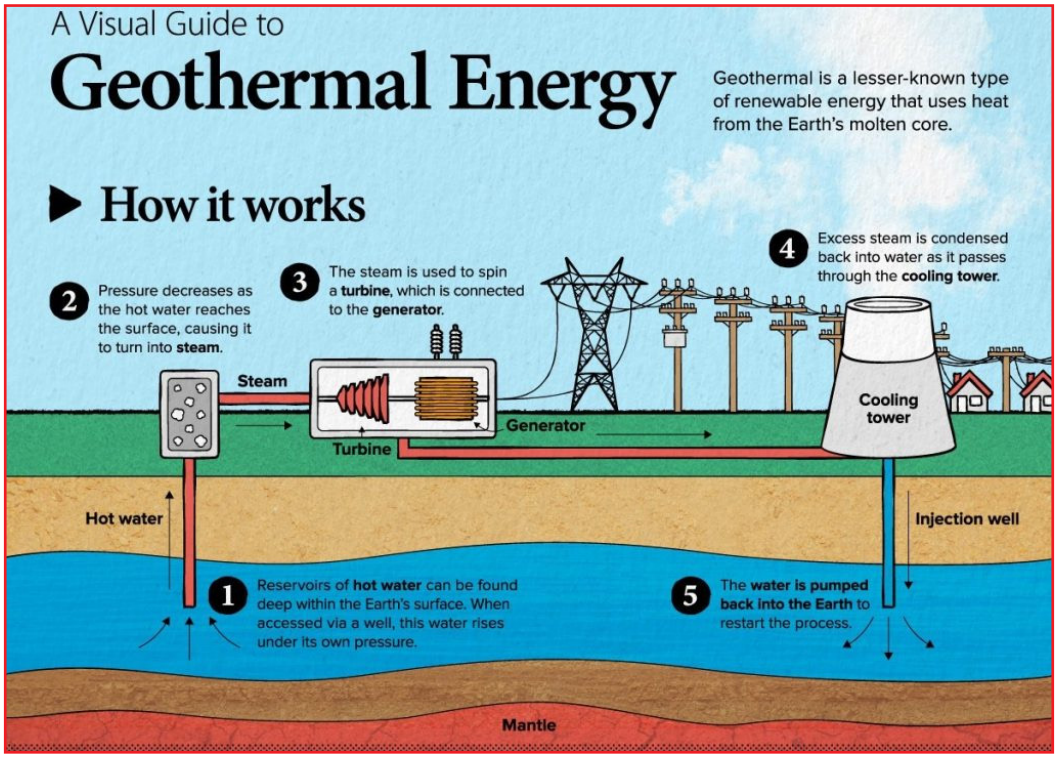
Geothermal Energy:

- Geothermal energy is **heat from the Earth's interior,** generated by **radioactive decay.** It is **renewable,** provides **baseload power**, available 24/7 as the Earth continuously produces heat.
- India has **381 thermally anomalous sites** identified by the **Geological Survey of India (GSI)** with a potential to generate **10,600 MW**, enough to power **10 million households**.
  - Key projects include a **20 kW pilot plant** in **Manuguru**, Telangana and **ONGC's 1 MW project** in **Puga Valley**, Ladakh.
- India has established agreements with countries like **Iceland** (2007), **Saudi Arabia** (2019), and the **Renewable Energy Technology Action Platform (RETAP) with the US (2023)** for geothermal energy collaboration.



Read More: Tapping Renewable Energy Potential in India

E-Passport

The Ministry of External Affairs has begun issuing **e-passports** in several cities under the **Passport Seva Programme (PSP) 2.0**, aimed at **modernizing and securing travel documentation.**

- Traditional passports remain valid, and **conversion to e-passports is optional and gradual.**

E-Passport:

- **About**: An ePassport is a **combined paper and electronic passport** with a **Radio Frequency Identification (RFID) chip** and an antenna embedded as an inlay of passport that contains the **personal particulars and biometric information** of the passport holder.
  - The ePassport will be visually identifiable as a **small additional gold colour symbol printed** below the front cover of the passport.

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- **Advantages:**
  - **Faster identity verification** with **secure storage of biometric and personal data.**
  - The secure digital signature safeguards the passport against forgery and fraudulent activities such as fake passports.
  - **Public Key Infrastructure (PKI) in epassport** forms the **security foundation** by protecting sensitive information and ensuring the authenticity and integrity of personal and biometric data on the chip.
    - PKI helps verify the **origin of the data** and prevents unauthorized tampering or copying.

Passport Seva Programme (PSP) 2.0:

- PSP 2.0, operational from 2024, is an **expansion** and improvement of the **PSP** which was launched in 2010.
- **PSP 2.0** is a **tech-driven digital transformation** ensuring **transparent, reliable, and integrated passport services.**
- By March 2025, e-passports were issued in cities like Chennai, Delhi, Hyderabad, and others, with Chennai issued over 20,700.

Read More: India's e-passports: Passport Seva Programme (PSP)

Repairability Index

The **Department of Consumer Affairs (DoCA)** has submitted a report on the **Framework on Repairability Index (RI) for consumer electronics and appliances**, aiming to **assign scores** to products based on their **ease of repair,** aligning with the **right to repair movement.**

- Consumer electronics will be **scored** based on their **repairability**, considering factors like **availability of spare parts, cost of repair, software updates, and repair information**.
- This is due to **planned obsolescence** and **cost-cutting** on materials and quality **(leaner engineering choices)** amid rising metal prices and market competition**.**
  - **Planned obsolescence** focuses on creating **short-term product life cycles** to drive **repeat sales**, whereas **leaner engineering** uses **minimal materials** to **improve efficiency, reduce waste, and deliver high-quality products** at lower cost.
- The **right to repair** empowers consumers and businesses to **fix their own devices without manufacturer restrictions**, ensuring access to **necessary tools, parts, and documentation.**
- DoCA has formed a committee chaired by **Nidhi Khare** that led to the creation of **Right to Repair Portal India,** offering consumers **easy access to product repair and maintenance information.**

Read More: Repairability Index for Mobile and Electronic Sectors

Quantum Dots and 2D Metals

Quantum dots and **2D metals** have revolutionized **nanomaterials**, driving advances in **electronics, diagnostics,** and **sustainable technologies**.

- **Quantum dots** are **semiconductors** just a few **nanometres wide**, displaying unique properties due to **quantum confinement**, where **electrons are restricted in all dimensions.**
  - **Quantum confinement** leads to **altered electron energy states**, crucial for the behavior of **zero-dimensional materials** like **quantum dots.**
  - **Applications of quantum dots** include **LEDs, medical diagnostics, solar panels, and semiconductor fabrication**, earning the **2023 Nobel Prize in Chemistry.**
- Efforts to create **2D metals** faced challenges as metals naturally prefer **3D bonding**, making **atomically thin, stable 2D metal sheets elusive.**
  - 2D metals are just **1 or 2 atoms thin sheets** of metals where electrons move **only in two dimensions (length & width)**, unlike **bulk metals** where electrons move freely in **3 dimensions (length, width, height)**.
  - **Applications** of 2D metals include **super-sensitive sensors** with applications ranging from **medicine to the military.**
  - **2D bismuth** and **tin** are expected to be **topological insulators**, conducting **electricity** only along their **edges**, with edge magnetization offering potential for **faster future computers**.
- **2D materials**, like **graphene**, allow electrons to move in **two dimensions**, showing **massless behavior** and **exotic properties.**

Read More: Nobel Prize in Chemistry 2023

Revamped PLFS

The **Ministry of Statistics & Programme Implementation (MoSPI)** has **revamped the Periodic Labour Force Survey (PLFS)** by extending it to **rural areas**.

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- **Revamped PLFS** will provide **monthly** estimates of Labour Force Participation Rate, Worker Population Ratio, and Unemployment Rate for **both rural and urban areas at the all-India level**, using the Current Weekly Status (CWS) framework.
  - These indicators, for **urban areas alone**, have been released quarterly.
  - **Quarterly estimates** will cover **rural areas** and **major states** for better **detail and timely insights**. **Annual** estimates using **Usual Status (ps+ss)** and **CWS** will ensure comprehensive coverage.
  - **Usual Status (ps+ss)** and **CWS** are frameworks that determine a person's activity status based on a **one-year and a seven-day** reference period, respectively.

What is the Periodic Labour Force Survey (PLFS)?

ABOUT

The PLFS was launched by the National Statistics Office (NSO) in 2017 with the aim of generating labour force statistics at more frequent intervals.

OBJECTIVES OF PLFS

- To estimate key employment and unemployment indicators such as **Worker Population Ratio (WPR), Labour Force Participation Rate (LFPR), and Unemployment Rate (UR)** at three-month intervals for urban areas using the Current Weekly Status(CWS) approach.
- To estimate the same indicators annually for both rural and urban areas, using both **Usual Status (Principal activity status (ps) + Subsidiary economic activity status (ss)) and CWS** approaches.

INDICATORS

LFPR: The percentage of persons in the labour force (employed or seeking employment) in the total population.
- LFPR = (Number of Employed + Number of Unemployed) / Total Population × 100.

WPR: The percentage of employed persons in the total population.
- WPR = (Number of Employed Persons) / Total Population × 100.

UR: The percentage of unemployed persons among the total labour force.
- UR = (Number of Unemployed Persons) / (Number of Employed + Number of Unemployed) × 100.

ACTIVITY STATUS

- **Usual Status (ps+ss):** This is based on the activity status over the last 365 days prior to the survey date. It considers: **ps** (the activity in which a person spent the majority of their time) and **ss** (any secondary economic activity performed for at least 30 days in the past year).
- **CWS:** This approach captures the activity status over the 7 days preceding the survey date.

- **PLFS (2017)** is conducted by the National Statistical Office (NSO) under **MoSPI** to measure the **employment** and **unemployment** situation in India.

Read More: Periodic Labour Force Survey 2024

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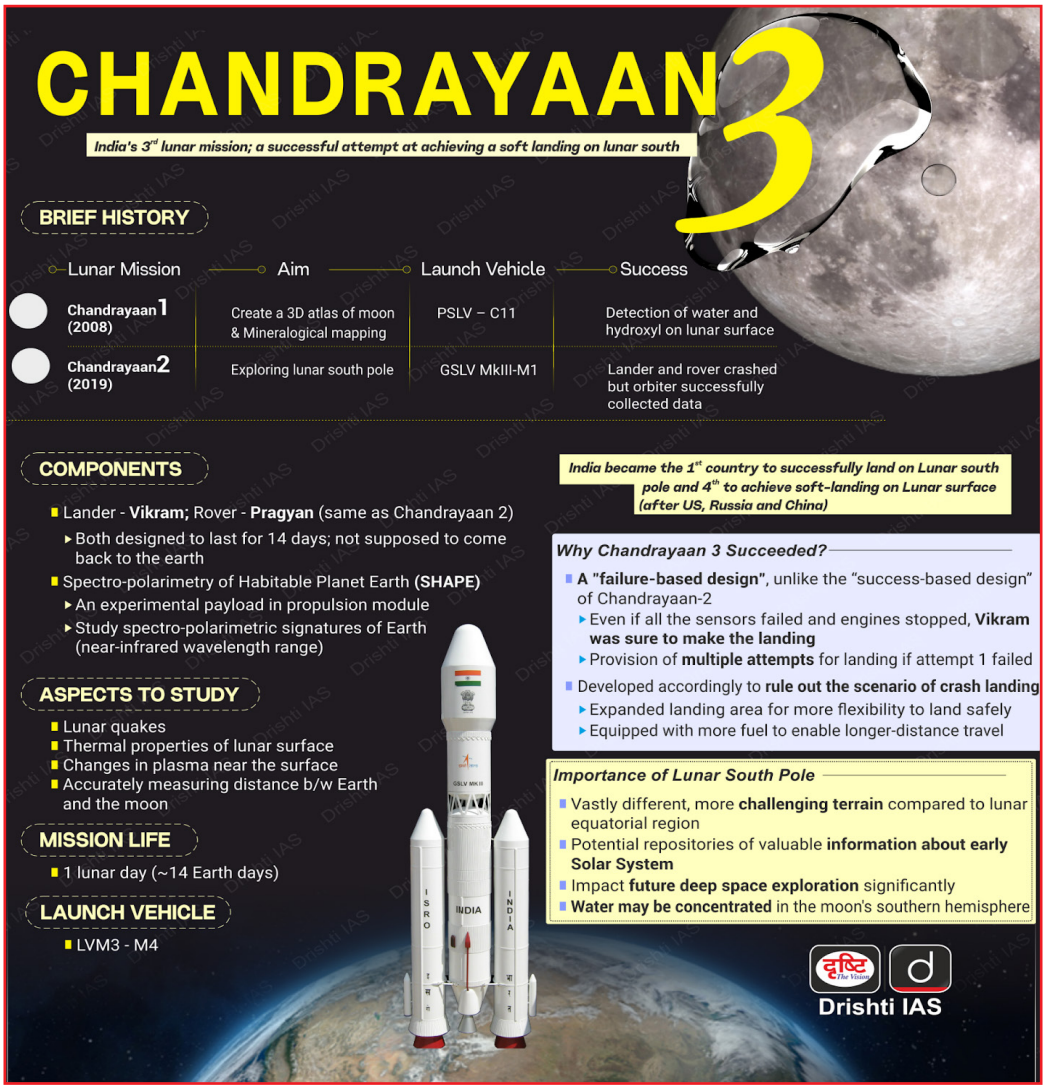
Chandrayaan-5 (LUPEX)

Following the **successful** soft landing of **Chandrayaan-3** and the **proposed** lunar sample return by ISRO's **Chandrayaan-4 mission**, India and Japan have **jointly planned** the upcoming **Chandrayaan-5 (LUPEX) mission** to study the **Moon's surface and the subsurface** for locating **lunar water and ice deposits**.

- **Chandrayaan-5** also known as **LUPEX (Lunar Polar Exploration)** is a joint lunar mission by **ISRO (India) and JAXA (Japan's space agency)**, scheduled for **2027-28** launch on **Japan's H3 rocket**.
  - **Rover** will be developed by **JAXA** and **lander** by **ISRO.**
  - It will carry **7 scientific instruments**, including a **mass spectrometer** by **ESA** and **neutron spectrometers** by **NASA**.



- **Mission Objectives:**
  - Mapping **lunar water presence.**
  - Drilling **lunar regolith** to analyze **water content, quality, and composition**.
  - Performing **in-situ scientific observations** using spectrometers and sensors.

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- It is a proposed **100 days (3.5 months)** with possible **extension to a year** and an attempt to explore the **Moon's far side.**
- **Chandrayaan-4 will be a lunar return sample mission**, scheduled before **Chandrayaan-5.**
- **Chandrayaan-3** made India the **first country** to **soft-land** on the **Moon's south pole** in 2023.

Read More: Evolution of India's Space Program

Illegal Killing of Migratory Birds

A study highlights that millions of birds across the **Mediterranean littoral** spanning **Europe, North Africa, and West Asia** continue to be illegally killed despite commitments to halve such activities by 2030.

- **Key Species at Risk: European Turtle Dove** (Streptopelia turtur), **Egyptian Vulture** (Neophron percnopterus), and **European Goldfinch** (Carduelis carduelis).
- **Widespread Non-Compliance:** 38 out of 46 countries assessed are not on track to meet the **Convention on Migratory Species (CMS) Rome Strategic Plan.**
- **CMS Rome Strategic Plan:** It aims to eradicate **illegal killing, trapping, and trade of birds (IKB)** in Europe and the Mediterranean.
  - It targets a **50% reduction in illegal activities by 2030** compared to 2020 levels. The Plan builds on the previous **Bern Convention.**
- **Bern Convention (1979):** It is the **first international treaty to protect both species and habitats**, promoting coordinated conservation across **Europe and parts of Africa.**

India and Bird Conservation

- The **National Action Plan for the Conservation of Migratory Birds (2018–2023)** focuses on protecting migratory species **along the Central Asian Flyway** (areas between the Arctic and Indian Oceans).

Details of bird species reported from India which are listed as Critically Endangered in IUCN Red List version 2010.1

S. No.	Common Name	Scientific Name	Family	Status
1	White-rumped Vulture	*Gyps bengalensis*	Accipitridae	CR
2	Indian Vulture	*Gyps indicus*	Accipitridae	CR
3	Slender-billed Vulture	*Gyps tenuirostris*	Accipitridae	CR
4	Red-headed Vulture	*Sarcogyps calvus*	Accipitridae	CR
5	Pink-headed Duck	*Rhodonessa caryophyllacea*	Anatidae	CR
6	White-bellied Heron	*Ardea insignis*	Ardeidae	CR
7	Sociable Lapwing	*Vanellus gregarius*	Charadriidae	CR
8	Christmas Frigatebird	*Fregata andrewsi*	Fregatidae	CR
9	Jerdon's Courser	*Rhinoptilus bitorquatus*	Glareolidae	CR
10	Siberian Crane	*Grus leucogeranus*	Gruidae	CR
11	Bengal Florican	*Houbaropsis bengalensis*	Otididae	CR
12	Himalayan Quail	*Ophrysia superciliosa*	Phasianidae	CR
13	Spoon-billed Sandpiper	*Eurynorhynchus pygmeus*	Scolopacidae	CR
14	Forest Owlet	*Heteroglaux blewitti*	Strigidae	CR

CR: Critically Endangered.

- Under the **Wildlife Protection Act, 1972,** rare and endangered birds are included in **Schedule-I** for the highest protection.
- India has **also signed non legally binding MOU with CMS** on the conservation and management of **Siberian Cranes (1998), Marine Turtles (2007), Dugongs (2008) and Raptors (2016).**

Read more: Convention on Migratory Species

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Bhutan Launched First Crypto-Tourism Payment

Bhutan has become the **first country** to launch a **national** cryptocurrency **tourism payment system** in partnership with **Binance Pay and DK Bank,** enabling **fully cashless travel using cryptocurrencies**.

- The system supports over **300 cryptocurrencies** like **Binance Coin (BNB), Bitcoin (BTC), and USD Coin (USDC),** facilitating seamless QR code-based real-time payments.
- This initiative seeks to **lower transaction costs, boost tourism, and improve financial inclusion** in Bhutan.

Cryptocurrency:

- **Cryptocurrency** is a **decentralized digital or virtual currency** secured by cryptography. Transactions are recorded on a **public ledger** using blockchain technology and maintained by a global network of computers.
  - Eg: **Bitcoin, Ethereum**, and **Litecoin.**
- In **India,** cryptocurrency is **not a legal tender**, but **not banned either.**

Bhutan:

- **Bhutan** (capital **Thimphu**), also called **"Land of the Thunder Dragon"** is a l**andlocked Himalayan country** between India and China.

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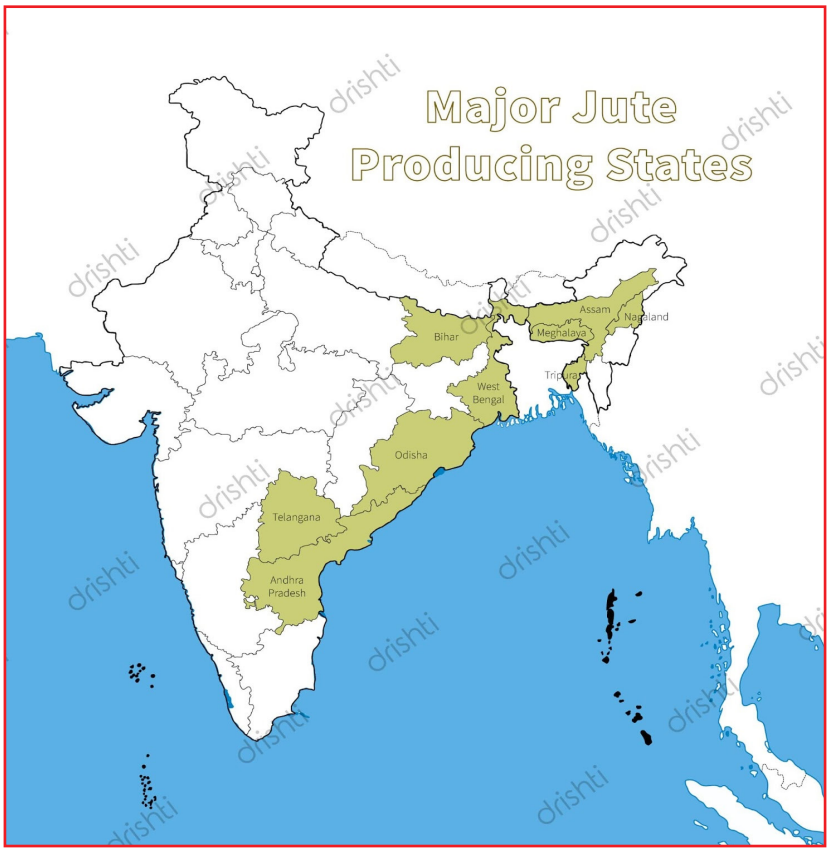
- The **Manas River**, over 376 km long, is **Bhutan's longest river** and a **transboundary river shared with India.**
- Bhutan is the **world's first carbon-neutral country** and prioritizes **Gross National Happiness (GNH)** over **GDP.**

Read More: India-Bhutan Ties and Subnational Diplomacy, Need for Balanced Cryptocurrency Regulation

MSP for Jute

The Jute Corporation of India (JCI) has increased the minimum selling price (MSP) of jute for crop year 2025-26 to **discourage** distress sales (forced sales at low prices) by farmers.

- **About Jute:** Jute (**golden fibre**) is the **2nd most important cash crop in India after** cotton in terms of cultivation and usage.
  - India is the **largest producer of jute in the world**, with **West Bengal, Assam, and Bihar** being the major jute-growing states.
  - **Ideal conditions** for jute cultivation include a **temperature range of 17°C to 41°C**, **relative humidity between 40% and 90%**, and **well-distributed rainfall of over 120 cm.**



- **About JCI:** JCI is a **price support agency** under the **Ministry of Textiles** that **procure raw jute** from farmers at MSP **without any quantity limit**.
- **About MSP:** MSP is the **minimum price** set by the Government of India at which it promises to **purchase crops from farmers**, regardless of the market price.
  - It was announced by the Cabinet Committee on Economic Affairs (CCEA) based on recommendations of the **Commission for Agricultural Costs and Prices (CACP).**

Read More: Need for Reforms in the Jute Industry

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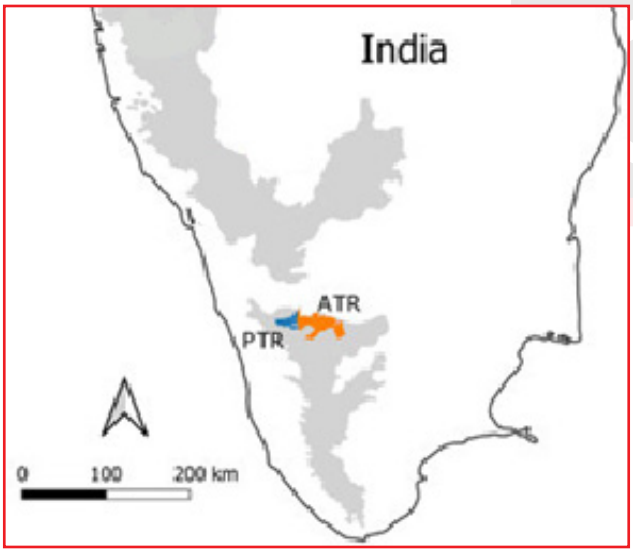
Anamalai Tiger Reserve

The pre-monsoon (summer) estimation of tigers, **co-predators, prey,** and their **habitats** has begun in the Anamalai Tiger Reserve (ATR), Tamil Nadu.

- **About ATR:** It was declared as a **Tiger reserve** in the year **2007** and is located in the **Anamalai Hills** of the Western Ghats in **Tamil Nadu**.
  - It is also known as the **Indira Gandhi Wildlife Sanctuary and National Park**, named to honour the former Prime Minister of India **Indira Gandhi**.
- **Geographical Surroundings:** It is surrounded by Parambikulum Tiger Reserve(PTR) on the East, Chinnar Wildlife Sanctuary and Eravikulum National Park on the South Western side.
  - The reserve is also surrounded by **Nenmara, Vazhachal, Malayattur and Marayur** reserved forests of Kerala.



- **UNESCO World Heritage Site:** The **Kariyan shola, Grass hills and Manjampatti** of Anamalai Tiger Reserve has been identified as a world heritage site **by** UNESCO.
- **Indigenous Communities:** It is home to several indigenous tribal communities such as the **Kadars, Muduvars, Malasars, Malai malasars, Eravalars and Pulayars**.
- **Vegetation:** The reserve includes **evergreen, deciduous**, and **shola forests**, along with **Montane Grasslands, Savannahs**, and **Marshy Grasslands.**
- **Fauna:** It is home to key wildlife such as the **Tiger, Asiatic elephant, Sambar, Spotted deer, Barking deer, Jackal, Leopard**, and **Jungle cat**, among others.

Read More: Pulayar Community and Anamalai Tiger Reserve

Parali Protection Force

The Commission for Air Quality Management (CAQM) has directed **Punjab, Haryana, and Uttar Pradesh** to establish a **Parali Protection Force** to curb stubble burning, a major cause of air pollution in **Delhi-NCR**.

- **Key Directives by CAQM:**
  - **Formation of Parali Protection Force**: A dedicated force at **district/block levels** consisting of **police, agriculture officers, and officials** for 24/7 to **monitor and prevent** stubble burning.
  - **Penalties for Burning**: Farmers face environmental compensation fines and **"Red Entries"** in farm records for stubble burning.
  - **Support for Farmers**: Assign a **nodal officer** for every 50 farmers for monitoring and assistance, provide **rent-free Crop Residue Management (CRM) machines** via Custom Hiring Centres (CHCs), and replace outdated machines by **August 2025**.
  - **Storage and Utilization**: Use **Govt/Panchayat land** for storing **paddy straw bales** and establish a **district-level supply chain** for **residue collection**, storage, and **bioenergy use**.
  - **Digital Monitoring**: Setup **real-time online platform** to track paddy residue generation and use.
- **CAQM** is a **statutory body** formed under the **Commission for Air Quality Management in National Capital Region and Adjoining Areas, Act 2021** to formulate air pollution control strategies for **Delhi-NCR and the adjoining areas**.

Read More: Addressing India's Stubble Burning Issue

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