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# Current Affairs (Consolidation)

## OCTOBER 2024 (Part – II)

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# Polity and Governance

## Highlights


- *Limiting Expenditure on Elections*
- *Allocation of Satellite Spectrum*
- *Freebies Culture in India*
- *SC Allows States to Regulate Industrial Alcohol*
- *India's Semiconductor Ambitions*
- *Socialist and Secular as Integral Part of Constitution*
- *Ensuring Railway Safety*
- *SC Upholds Section 6A of Citizenship Act*
- *Challenges in Madarsa Education*


## Limiting Expenditure on Elections

### *Why in News?*

According to the **Centre for Media Studies (CMS)**, the total expenditure by various political parties for the general election to Lok Sabha 2024 was around **Rs 1,00,000 crores**.

- CMS is a **not-for-profit organisation** that works towards **responsive governance and equitable development.**

### *What is the Status of Election Expenditure in India?*

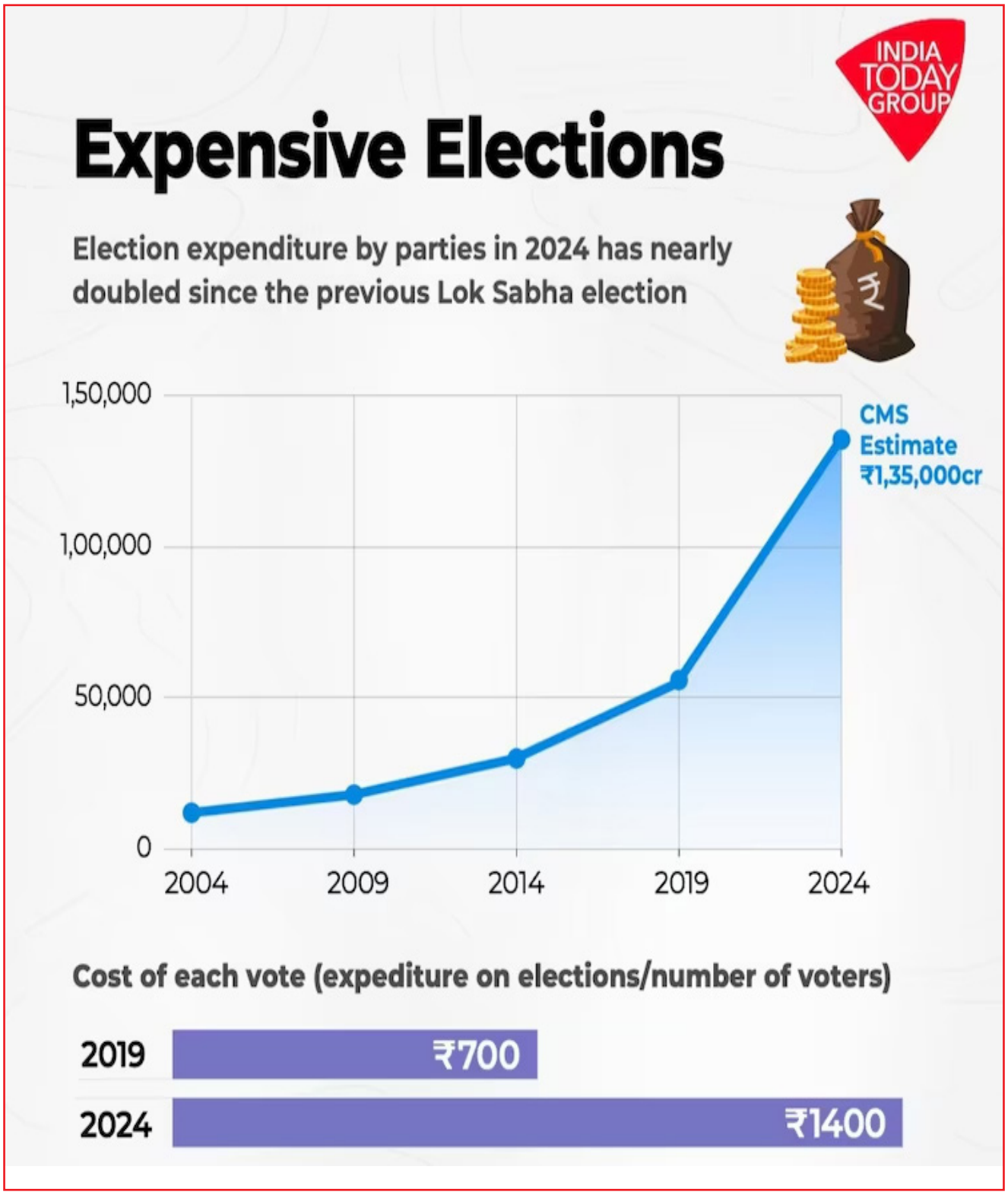
- **Expenditure Limit on Candidates:** The election expenditure limit for **candidates** is set at **Rs 95 lakh for Lok Sabha seats** and **Rs 40 lakh for Assembly seats** in larger states, and **Rs 75 lakh and Rs 28 lakh** respectively in **smaller states.**
- **Political Party Spending:** Currently, there are **no expenditure limits** imposed on **political parties** during elections, allowing them unrestricted spending.
  - In the **2024 Lok Sabha Election**, the cost of a **single vote** in India has amounted to around **Rs 1,400** and **total expenditures** reached approximately **Rs 1 lakh crores**.
- **Promoting Schemes:** Government advertisements, especially before elections, often serve as **campaigns for the ruling party**.
  - The Central government spent **Rs 3,020 crore** on advertisements between **2018-19 and 2022-23**, with higher spending in **election years—Rs 1,179 crore in 2018-19** versus **Rs 408 crore in 2022-23**.
- **Comparison with Previous Elections:** Candidates initially spent **only Rs 25,000** during the first **general elections** in **1951-52** which now skyrocketed to **Rs 75-95 lakh (300-fold increase).**
  - Additionally, overall election expenditure has **risen sixfold from Rs 9,000 crore** in 1998 to approximately **Rs 1,00,000 crores** in 2024.
- **Transparency Measures:** Political parties are required to submit **annual contribution reports** to the **Election Commission of India (ECI)** for donations **exceeding Rs 20,000**.
  - They must also provide **Annual Audited Accounts (AAA)** and election expenditure reports within **75 days post-election**.
- **Funding Sources:** The vast majority of political funding comes from **corporate entities** and businesses, creating a strong **nexus between donors and politicians.**

**Status of Election Expenditure in Other Democracies**

- **United States:** In the US, election financing is predominantly derived from limited contributions made by **individuals, corporations, and Political Action Committees (PACs)**.
  - US Supreme Court rulings have facilitated the emergence of **Super PACs**, which can spend **unlimited amounts on political campaigning.**
- **United Kingdom:** Political parties face **specific expenditure limits** when contesting elections.
  - **Each party** is permitted to spend **£54,010 for each constituency** they contest, leading to an **overall cap of £35 million for parties** contesting all constituencies.

Note:

- During the **long campaign phase** (five months before the House of Commons term ends), candidates can spend **£46,000 to £49,000 per constituency**. In the **short campaign** period (after election announcement), spending is limited to **£17,000 to £20,000 per constituency.**




Note:

### *How is Election Expenditure Govern in India?*

- **Representation of the People Act (RPA), 1951:**
  - **Section 77** of the RPA requires candidates to keep a **detailed and accurate account** of all expenses related to their campaign from the day they **file their nomination until the election day.**
  - **Section 78** mandates that every candidate **submit their election expense account** to the **District Election Officer** within 30 days of the result declaration.
- **Companies Act, 2013:** A **non-government company** with **at least three years** in operation may contribute up to **7.5% of its average net profits from the last three years** to political parties registered under the RPA.
- **Foreign Contribution (Regulation) Act (FCRA), 2010:** Political parties, candidates, and election-related entities in India are **prohibited from receiving foreign contributions.**
  - This includes **funds, gifts, donations, and any financial support** from foreign sources.

### *What are Challenges Associated with Election Expenditure in India?*

- **Absence of Regulation:** Unlike 65 countries, including the **US, UK, Canada, and Brazil**, India has **no limits on political party expenditures** during elections.
  - It leads to an **uneven playing field**, favouring well-funded **national parties** over regional and independent candidates.
- **Media Advertising:** National and **state-level parties** allocate a substantial portion of their budgets to **media advertisements,** surpassing expenditures for **grassroots activities** like rallies.
  - It can **marginalise candidates** without access to significant financial resources.
- **Disproportionate Digital Advertising:** The growing influence of digital platforms like **Google and Meta (facebook)** has widened the **spending gap**, with national parties investing significantly more in digital advertising than state parties.
  - This trend exacerbates existing **inequalities** and **reduces the visibility** of smaller parties and candidates.
- **Risk of Unaccounted Money:** The absence of regulation for **third-party campaigners** raises concerns about **unaccounted money** flooding the electoral process.
  - There is a heightened risk of **quid pro quo arrangements** where financial contributions influence political decisions without proper accountability.

### *What Reforms are Needed in Election Expenditure?*

- **Expenditure Ceilings:** As per the **ECI's 'Proposed Electoral Reforms' report** in 2016, **expenditure ceilings for political parties** should be introduced in India.
  - It will ensure a **more equitable playing field** to encourage parties to compete based on ideas rather than financial clout.
- **Regulation of Third-Party Campaigners:** India should implement **formal registration and disclosure** requirements for third-party campaigners like **Australia**.
- **State Funding of Elections:** The **Indrajit Gupta Committee (1998)** and the **Law Commission report (1999)** have recommended **state funding for elections**, whereby the government would **partially finance** the election expenditures of candidates nominated by recognised political parties.
- **Ban on Government Advertisements:** A **ban** on government advertisements during the **six months leading up to elections** should be enforced to reduce the advantage held by the ruling party and promote fair competition among candidates.
- **Party Financial Assistance:** The law must be amended to explicitly provide that **'financial assistance'** by a political party to its candidate should also be within the candidate's prescribed **election expenditure limits**.
  - It would **close loopholes** that allow parties to circumvent spending regulations.
- **Comprehensive Electoral Oversight:** Establishing an **independent electoral oversight** body could enhance accountability in campaign financing.

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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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Note:

# Allocation of Satellite Spectrum

### *Why in News?*

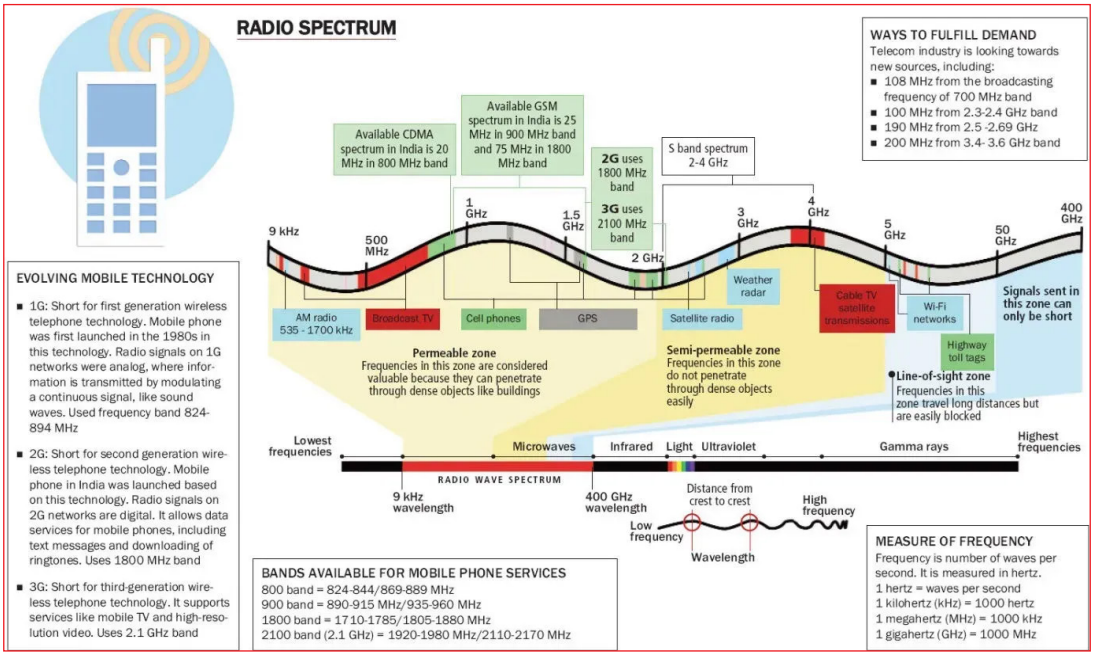
Recently, India opted for an **administrative allocation of satellite spectrum**, diverging from the **auction method**, amid reactions from industry giants and renewed debates over spectrum management.

### *What is Satellite Spectrum?*

- **Definition:**
  - Satellite spectrum refers to the specific **frequency bands** used for **communication via satellites**.
    - These radio frequencies are essential for transmitting signals from ground stations to satellites in orbit and vice versa, facilitating services such as **television broadcasting, internet access, and mobile communication.**
- **Regulatory Oversight:**
  - Satellite spectrum differs from terrestrial spectrum used for mobile communication, as it operates without national boundaries.
    - This international nature requires coordination and management by the **International Telecommunication Union (ITU)**, a **UN** agency.
- **Importance in Communication:**
  - With the increasing demand for satellite services especially in areas like broadband and emergency communications, spectrum allocation becomes crucial.
    - Efficient management of satellite spectrum ensures reliable connectivity, especially in remote or underserved regions.
- **Satellite Frequency Bands:**
  - **L-band (1-2 GHz):** Utilised for **GPS** and **mobile satellite services.**
  - **S-band (2-4 GHz):** Used for weather **radar**, air traffic control, and mobile satellite applications.
  - **C-band (4-8 GHz):** Commonly employed for satellite TV broadcasting and data communication.
  - **X-band (8-12 GHz):** Primarily utilised by military applications for radar and communication.
  - **Ku-band (12-18 GHz) and Ka-band (26-40 GHz):** Used for satellite television, internet services, and high-throughput data transmission.

**International Telecommunication Union (ITU)**

- It is the **UN specialised** agency for Information and Communication Technologies (ICTs).
- Established in 1865 to **enable international connectivity in communication networks**, it is headquartered in Geneva, Switzerland.
- It allocates global radio spectrum and satellite orbits, develops the technical standards that ensure networks and technologies seamlessly interconnect, and strives to improve access to ICTs to underserved communities worldwide.




Note:

**Status of the Satellite Communication (SatCom) Sector in India**

- **Market Size:**
  - India is ranked **fourth globally** in terms of investments in the Satcom sector.
  - The Indian Satcom sector is valued at approximately **USD 2.3 billion** annually which is expected to grow to **USD 20 billion** by 2028.
  - Around **290.4 million households** in India remain untapped for broadband services, presenting a significant opportunity for satellite operators.
    - India's focus on development and adoption of cutting-edge technologies across **5G/6G** services and **Satellite Communication (Satcom)** has further accelerated the sector's progress.
- **Applications:**
  - Satcom services support vital sectors, including telecommunications, broadcasting, rail, and maritime communications.
  - Satcom services support 5 billion ATM transactions annually, through 125,000 **Very Small Aperture Terminal (VSAT**)-enabled ATMs.

### *What are the Methods of Spectrum Allocation In India?*

- **Auction Method:** Competitive bidding process where the government sells spectrum licenses to the highest bidder.
  - Governed by the **Telecommunications Act, 2023**, which mandates auctions for most spectrum allocations.
  - **Benefits**:
    - Promotes efficient resource allocation, ensures transparency, and generates significant revenue for the government.
    - Primarily used for terrestrial mobile services where multiple entities compete for access.
- **Administrative Allocation:** The government directly assigns spectrum licenses without a bidding process.
  - Certain entries in the **First Schedule of the Telecommunications Act, 2023** allow for administrative allocation, particularly for satellite spectrum.
  - **Benefits:**
    - Provides flexibility, suitable for sectors with low competition, and ensures easier access for government-related services.
    - Often used for emerging industries, public services, and **national security**.
- **Differences Between Auction and Administrative Allocation:**

| Auction Method | Administrative Allocation |
|---|---|
| Mandated by the Telecommunications Act, 2023. | Governed by provisions in the Telecommunications Act, 2023 for specific sectors. |
| Competitive bidding; licences sold to highest bidder. | Direct assignment by the government without bidding. |
| High transparency; reduces chances of favouritism | Lower transparency; potential for less oversight. |
| Generates significant revenue for the government. | Typically involves nominal fees covering administrative costs. |
| Allocates spectrum to those who value it most; efficient in competitive markets. | More flexible but less efficient in resource allocation. |
| Commonly used for commercial telecommunications. | Suitable for national security, public services, and specialised sectors. |

**Spectrum Allocation Controversies in India**

- **Shift to Administrative Assignments:** India's spectrum allocation has faced scrutiny, particularly with the transition to administrative methods.
- **2G Spectrum Scam:** This major scandal involved the first-come, first-served allocation of 2G licenses, resulting in:
  - **Financial Losses:** Alleged loss to the exchequer of Rs. 30,984 crore.
  - **Presumptive Loss:** Estimated loss of Rs. 1.76 trillion from 122 2G licenses.
    - **Supreme Court** Ruling (2012) mandated auctions as the preferred allocation method due to the 2G scandal's fallout.

Note:

### *Why did India Choose for Administrative Allocation?*

- **Non-Exclusive Use:** Unlike **terrestrial spectrum**, satellite spectrum can be shared among multiple operators, making administrative allocation practical for diverse users.
- **Accessibility to Remote Areas:** Administrative allocation aims to enhance connectivity in remote and underserved regions, facilitating access to satellite services.
- **Flexibility:** This method allows the government to quickly assign spectrum to companies without the lengthy auction process, promoting faster deployment of services.
  - The US and Brazil moved back to **administrative allocations** after finding auctions impractical.
- **Encouraging Emerging Industries:** It supports the growth of new technologies and services, such as **satellite communications,** which may not be adequately addressed by auctions.
- **Regulatory Alignment:** As a signatory to the **ITU**, India chose to adopt the global standard of administratively allocating satellite spectrum.
  - The **Telecommunications Act, 2023**, had also added spectrum for satellite communication in the list of administrative allocation.

**Salient Features of the Telecommunications Act, 2023**

- **Definitions:** The Act clearly defines its scope, thereby reducing uncertainties.
  - Messages sent through internet-based messaging service providers such as WhatsApp, Signal, and Telegram, as well as those that are encrypted (except Over-the-Top (OTT) services), are within the Act's ambit.
- **Right of Way (RoW) Framework:** The Act provides an effective RoW framework, both on public and private property.
  - The definition of public entities has been broadened to include government agencies, local bodies, and **Public Private Partnerships (PPP)** projects like airports, seaports, and highways.
  - Public entities shall be obligated to provide right of way except in special circumstances.
- **Common Ducts:** In line with **PM Gati Shakti's vision**, the law provides for the Central Government to establish common ducts and cable corridors.
- **National Security Measures:** Section 20 (2) of the Act allows the government to stop the transmission of any message in the interest of public safety and during a public emergency.
  - This majorly expands the number of government entities that may be able to intercept messages.
- **Digital Bharat Nidhi:** With the new Act, the **Universal Service Obligation Fund (USOF)** will become Digital Bharat Nidhi, which can be used to fund research and development and pilot projects instead of just supporting the establishment of telecom services in rural areas.
  - The Act also provides a legal framework for **Regulatory Sandbox** to facilitate innovation and deployment of new technology.
- **Protection of Users:** Commercial messages sent without the user's consent may lead to the relevant operator facing a fine and being banned from providing services.

## Freebies Culture in India

### *Why in News?*

**Freebies** in electoral campaigns continue to be a divisive issue in Indian politics. A recent survey conducted across multiple cities in India reveals mixed attitudes among urban Indians toward freebies, especially in the context of rising debates on fiscal responsibility.

- Prime Minister's criticism of "revdi culture" in 2022 intensified discussions on the sustainability and ethical implications of election-driven freebies.
- Freebies are short-term handouts aimed at voter appeal, often lacking sustainable impact unlike welfare policies that promote lasting economic and social well-being.

Note:

**Note:**

- In the survey, Over half (56%) of respondents viewed freebies as unnecessary, with 78% labelling them as vote-seeking tactics and 61% expressing concern about their impact on national finances.
- Wealthier respondents (84%) largely see freebies as economically harmful, while only 46% of lower-income respondents share this view. Lower-income groups see subsidies on essentials, particularly healthcare, as justified, contrasting with wealthier respondents' views.

### *What is the Difference between Freebies and Welfare Policies?*

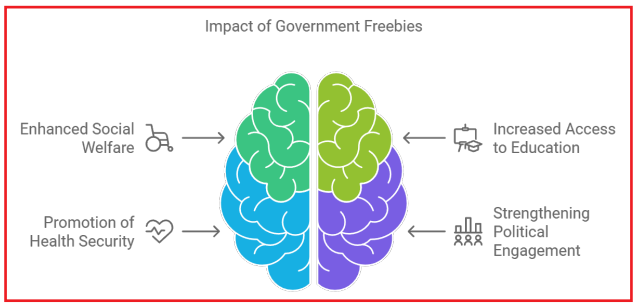
| Freebies | Welfare Policies |
|---|---|
| ➢ RBI in its 2022 report, defined **"freebies"** as **"public welfare measures provided free of charge."**<br>➢ Freebies often focus on short-term relief.<br>➢ Typically include items such as free laptops, TVs, bicycles, electricity, and water, often used as electoral incentives.<br>➢ Frequently criticised for potentially encouraging dependency rather than promoting sustainable development. | ➢ Welfare schemes are comprehensive initiatives aimed at uplifting target populations by enhancing their living standards and resource access.<br>➢ Rooted in the DPSPs, aligned with the goals of social justice and equity and aim for positive societal impact and **long-term human development.**<br>➢ Examples: Public Distribution System (PDS), MGNREGA, and Mid-Day Meal (MDM) programs. |

### *What are the Positive Aspects Related to Freebies?*

- **Uplifting the Lower Class:** In states with relatively lower levels of development and higher poverty rates, such freebies become particularly valuable in supporting and uplifting the lower strata of society.
- **Foundation for Welfare Schemes**: Freebies not only include pre-election promises but also a number of services that the government provides to meet its constitutional obligations (Directive Principles of State Policy) towards citizens.
  - The Mid-Day Meal Scheme was first introduced in 1956 by Tamil Nadu's Chief Minister K. Kamaraj and was later adopted nationally a decade after.
  - **NT Rama Rao's Rs. 2/kg rice scheme** in Andhra Pradesh laid the foundation for today's National Food Security Program.
  - Telangana's **Rythu Bandhu** and Odisha's **KALIA** schemes served as precursors to the Pradhan Mantri Kisan Samman Nidhi (PM-KISAN) for farmer support.
- **Boost Industries:** States like Tamil Nadu and Bihar provide women with sewing machines, saris, and cycles, boosting the sales of these industries, which can be considered a **productive investment** rather than a wasteful expenditure due to the corresponding production.
- **Enhanced Social Welfare:** Freebies support vulnerable and low-income populations by providing essential services and goods such as food, healthcare, and education.
  - Freebies like **bus passes for women** can encourage women to join the workforce, which can lead to economically stable families and Women empowerment.
- **Increased Access to Education and Skill Development**: By distributing items like bicycles and laptops, governments **improve educational accessibility, especially in rural areas**.
  - For example, freebies like **distributing laptops among students** (as done by the Uttar Pradesh government) can increase their productivity, knowledge, and skills.
  - A report by the NITI Aayog stated that the distribution of bicycles to schoolgirls in Bihar and West Bengal has significantly reduced dropout rates, enhanced attendance, and improved learning outcomes.
- **Strengthening Political Engagement and Public Trust:** Freebies can foster political awareness and public trust by demonstrating government accountability and responsiveness to citizens' needs.
  - According to a study by the Centre for Policy Research, in states like Uttar Pradesh and Tamil

Note:

Nadu, freebies improved public satisfaction with governance, raised political engagement, and enhanced voter turnout.




### *What are the Negative Aspects Related to Freebies?*

- **Burden on Public Finances:** Freebie distribution significantly strains public finances, with costs ranging from 0.1% to 2.7% of **gross state domestic product (GSDP)** across various states. Some states, like Andhra Pradesh and Punjab, allocate over 10% of their revenue to subsidies.
- **Against Free and Fair Election:** The promise of irrational freebies from public funds before elections unduly influences the voters, disturbs the level playing field and vitiates the purity of the poll process.
  - It amounts to an unethical practice that is similar to giving bribes to the electorate.
- **Distortion in Resource Allocation:** Freebies can misallocate resources by diverting funds from productive sectors, hindering economic growth and essential infrastructure development. **NITI Aayog** criticised subsidies like laptops in Uttar Pradesh for overshadowing urgent needs in education.
- **Dependency Culture**: Freebies may foster a culture of dependency, discouraging self-reliance and entrepreneurship, which are vital for sustainable economic growth.
- **Reduced Accountability:** They can diminish accountability in governance, as political parties may use freebies to distract from systemic issues and failures in public service delivery.
- **Environmental Impact:** Freebies can lead to the overuse of natural resources, such as water and electricity, reducing incentives for conservation and increasing pollution. For example, free electricity for farmers in Punjab has resulted in resource overuse and decreased service quality from the power utility.

### *What is the Ethical Perspective on Freebies?*

- **Government:**
  - **Moral Responsibility:** The government has an **ethical obligation to uplift marginalised** sections of society. Providing welfare measures can be seen as **fulfilling this duty,** especially in addressing **poverty** and **inequality.**
    - However, there is a fine line between genuine welfare and populism aimed at garnering votes.
  - **Accountability and Transparency:** The Governments must ensure that such schemes are **transparent, targeted, and sustainable, avoiding misuse** of public funds for political gain.
  - **Distortion of Incentives:** Freebies may **distort market dynamics**, creating **disincentives for work and productivity.**
    - Ethical governance should promote **self-sufficiency** rather than dependency, encouraging citizens to engage in productive economic activities.
- **Citizens Perspective:**
  - **Responsibility of Citizens:** While citizens may benefit from freebies, there is an expectation for them to **engage in responsible behaviour,** such as managing finances wisely and seeking productive means to improve their circumstances.
    - Dependency on government aid can hinder personal and communal growth.
  - **Equity and Justice:** The allocation of **freebies** should be analysed from the **perspective of equity**.
    - Ethical considerations include evaluating whether these measures favour specific groups over others and whether they effectively tackle the underlying causes of poverty.
  - **Public Perception and Social Values:** The culture of freebies can **influence societal values**, potentially fostering a **mindset of entitlement** rather than responsibility.
    - This raises **concerns about the long-term implications** for civic engagement and community welfare.

Note:

# SC Allows States to Regulate Industrial Alcohol

## *Why in News?*

Recently, the **Supreme Court's** nine-judge **Constitution bench** held in a 8:1 ruling that states have the authority to regulate **industrial alcohol**, reversing a 1990 decision (***Synthetics & Chemicals Ltd v. State of Uttar Pradesh Case, 1989***) that favored central government control.

## *What is the Constitutional Bench of the Supreme Court?*

- **About:**
  - A **Constitution Bench** consists of five or more judges in the Supreme Court, convened only for specific legal matters. These benches are not a routine phenomenon.
- **Circumstances for Formation:**
  - **Article 145(3):** The minimum number of judges required for deciding cases involving substantial constitutional questions or references under **Article 143** is five.
  - **Conflicting Judgments:** When conflicting decisions arise from different three-judge benches, a larger bench (Constitution Bench) is formed to resolve the issue.

### Industrial Alcohol

- **About:** Industrial alcohol is essentially impure alcohol that is used as an industrial solvent.
  - Mixing chemicals such as benzene, pyridine, gasoline, etc. in ethanol **(a process called denaturation)** turns it into industrial alcohol, significantly lowering its prices and making it unfit for human consumption.
- **Applications:** Used in pharmaceuticals, perfumes, cosmetics, and cleaning liquids.
  - Sometimes it is also used to make illicit liquor, cheap and dangerous intoxicants whose consumption poses severe risks, including blindness and death.

## *What has the SC Bench Ruled on Industrial Alcohol?*

- **Expanding the Definition:** The majority Bench has overturned the 1990 ruling in ***Synthetics & Chemicals vs State of Uttar Pradesh***, which limited the definition of "intoxicating liquor" to potable alcohol and barred states from taxing industrial alcohol.
- **Majority Opinion:** The Bench clarified that **"intoxicating liquor"** includes more than just alcoholic beverages or potable alcohol. All types of alcohol that can negatively impact public health are covered by this definition.
  - The court emphasised that substances like **alcohol, opium, and drugs can be misused and ruled that Parliament cannot override state powers over intoxicating liquors**, stating that "intoxicating" can also mean "poisonous," allowing for broader classification.
- Dissenting Opinion: Justice B.V. Nagarathna expressed disagreement with the majority ruling regarding the regulation of industrial alcohol arguing that merely because there can be a potential misuse of "industrial alcohol", **Entry 8 – List II** cannot be stretched to include such "industrial alcohol".
  - Permitting states to regulate industrial alcohol could result in misinterpretations of the legislative intent behind alcohol regulation.

### Centre vs States' Arguments on Industrial Alcohol Regulation

- **Central Government's Argument**:
  - Classifies industrial alcohol as an "industry" under **Entry 52** of the Union List, allowing the Centre to regulate industries deemed in public interest.
  - Asserts that trade, commerce, supply, and distribution of industrial alcohol fall under **Entry 33(a)** of the Concurrent List, permitting central oversight.
  - The Centre contends that **industrial alcohol** falls under the jurisdiction of the Industries (Development and Regulation) Act, 1961, asserting it "occupied the field" for regulation. Thus, states cannot impose their regulations on this subject.
- **States' Argument**:
  - Argue for regulation under **Entry 8** of the State List, asserting the right to tax intoxicating liquors, which includes industrial alcohol.
  - States emphasize the necessity of maintaining authority to combat illegal consumption and generate crucial revenue, especially after the implementation of GST.

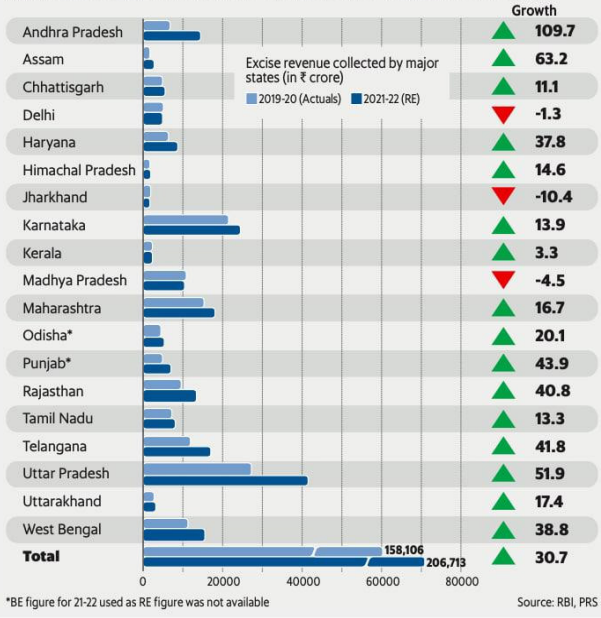
Note:

### Importance of Taxing Alcohol for States

- **Revenue Generation**: Taxing alcohol is a vital source of revenue for states. For example, in 2023, Karnataka raised the Additional Excise Duty (AED) on Indian Made Liquor (IML) by 20%.
- **Financial Dependency**: States like Maharashtra and Kerala derive a significant portion of their revenue from alcohol taxes, contributing around 30-40% of their total excise revenue.
- **Public Services Funding**: Alcohol taxes are used to fund essential public services, including healthcare and education.

### THE GOLDEN GOOSE

Major states collected more than ₹2 trillion under state excise in 2021-22.




*BE figure for 21-22 used as RE figure was not available

Source: RBI, PRS

### Industries (Development and Regulation) Act, 1951

- **The Industries (Development and Regulation) Act, 1951** provides the legal and conceptual framework for industrial development and regulation in India.
- **The act's main goals are to:**
  - Control and direct the growth of the nation's industries,
  - Promote fair resource distribution,
  - Avoid economic power concentration,
  - Guarantee balanced and controlled industrial expansion.
- **The act gives the central government the power to:**
  - Regulate the production, supply, and distribution of certain industries
  - Impose restrictions on the establishment of new industries
  - Grant licences to the industries to operate
  - Create and run industries when it thinks it's in the best interests of the general public
  - Take measures to stop the concentration of economic power in a small number of hands

## *What are the Other Similar Cases?*

- **Ch Tika Ramji v State of UP Case, 1956:**
  - The SC upheld Uttar Pradesh's legislation regulating the sugarcane industry against a challenge claiming exclusive central jurisdiction under Section 18-G of the Industries (Development and Regulation) Act, 1951 (IDRA).
    - The ruling affirmed states' authority to legislate in industries even in the presence of central laws, setting a crucial precedent for federal governance.
- **Synthetics & Chemicals Ltd v. State of Uttar Pradesh Case, 1989:**
  - A 7-judge Constitution Bench held that states' powers, as per Entry 8 of the State List, were limited to regulating "intoxicating liquors" which are different from industrial alcohol.
    - Essentially, the SC said that only the Centre can impose levies or taxes on industrial alcohol, which is not meant for human consumption.
  - The SC failed to consider its own prior Constitution Bench decision in Ch Tika Ramji v State of UP Case, 1956.

## *What will be the Impact of this Ruling?*

- **Pending Litigations:** The ruling will significantly influence ongoing litigations concerning protective taxes or special fees imposed by state governments, as prior judgments had stayed such levies.
- **State Regulatory Power:** States now possess authority over the regulation and taxation of industrial alcohol, which is expected to lead to varied tax regimes across states.

Note:

- **Revenue Generation:** States can leverage this ruling to enhance revenue streams, especially crucial post-GST, as they were previously restricted from taxing industrial alcohol.
- **Industry Perspective**: Industry bodies view the ruling positively, suggesting it clarifies regulatory controls and taxation for the Indian Made Foreign Liquor (IMFL) sector, reducing ambiguity for manufacturers.
- **Operational Costs**: Potentially, states may increase taxes on industrial alcohol, impacting operational costs for industries reliant on it, which could lead to pricing disparities.

# India's Semiconductor Ambitions

### *Why in News?*

Recently, India's semiconductor ambitions advanced with the Union Cabinet approving an $11 billion chip fabrication plant in Gujarat, led by Tata Group and Taiwan's Powerchip, boosting India's goal to become a key global semiconductor player.

### *What is the Current Status and What are the Opportunities in India's Semiconductor Industry?*

- **Current Status:**
  - According to a recent report published in the Economic Times, India's semiconductor market was valued at $45 billion in 2023 and is projected to rapidly grow at a CAGR of 13 per cent to surpass $100 billion by 2030.
- **Opportunities:**
  - **Large Domestic Market:** As the largest populous economy in the world, India possesses a vast domestic consumption market for semiconductors.
    - India has emerged as the second-largest market for 5G smartphones after China in the first half of 2024, which is expected to grow further in future.
  - **Government Support and Incentives:** Government has approved the **Semicon India programme** for the development of semiconductor and display manufacturing ecosystem in the country.
  - **Infrastructure Development:** The establishment of semiconductor manufacturing units and assembly, testing, marking, and packaging facilities is creating a strong foundation for the industry.
  - **Strategic Partnerships:** Collaborations with global semiconductor leaders and technology partnerships with countries like the US and Japan are enhancing India's capabilities and fostering technology transfers.

### *What are Some of the Initiatives taken by the Government to promote Semiconductor Industry?*

- **India Semiconductor Mission (ISM)**
  - **About:**
    - The ISM was launched in 2021 with a total financial outlay of Rs76,000 crore under the aegis of the Ministry of Electronics and IT (MeitY).
    - It is part of the comprehensive program for the development of sustainable semiconductor and display ecosystems in the country.
    - The programme aims to provide financial support to companies investing in semiconductors, display manufacturing and design ecosystem.
    - Envisioned to be led by global experts in the Semiconductor and Display industry, ISM will serve as the nodal agency for efficient, coherent and smooth implementation of the schemes.
  - Four schemes have been introduced under the India Semiconductor Mission:
    - **'Modified Scheme for setting up of Semiconductor Fabs in India':**
      - It offers 50% fiscal support for Silicon CMOS-based semiconductor fabs, aiming to attract large investments and strengthen the country's electronics manufacturing ecosystem and value chain.
    - **'Modified Scheme for setting up of Display Fabs in India':**
      - It offers 50% fiscal support to attract investments for manufacturing TFT LCD and AMOLED display panels, strengthening the country's electronics manufacturing ecosystem.

Note:

- **'Modified Scheme for setting up Compound Semiconductor and ATMP facilities in India':**
  - The 'Modified Scheme for setting up Compound Semiconductor and ATMP facilities in India' provides 50% fiscal support for capital expenditure on establishing Compound Semiconductor, Silicon Photonics, Sensors, and Discrete Semiconductor fabs.
- **'Semicon India Future Design: Design Linked Incentive Scheme':**
  - **The 'Semicon India Future Design:** Design Linked Incentive Scheme' offers financial support for semiconductor design, providing up to 50% incentives on expenses (₹15 crore limit) and 6%-4% on net sales turnover over five years (₹30 crore limit).

➢ **Scheme for Promotion of Manufacturing of Electronic Components and Semiconductors (SPECS):** This scheme aims to enhance India's manufacturing ecosystem for electronic components and semiconductors. With a growing market that reached $20.8 billion in 2018-19 and is expected to hit $200 billion by 2025, India is well-positioned to become a global hub, supported by skilled labor, improved infrastructure, and government initiatives. The scheme will boost domestic demand, increase value addition, and create jobs in the sector.

➢ **Production Linked Incentive Scheme (PLI) for Large Scale Electronics Manufacturing:** The PLI for Large Scale Electronics Manufacturing proposes a financial incentive to boost domestic manufacturing and attract large investments in the electronics value chain including mobile phones, electronic components and ATMP units.

Note:

- **Production Linked Incentive Scheme (PLI) for IT Hardware:** The Production Linked Incentive Scheme for IT Hardware proposes a financial incentive to boost domestic manufacturing and attract large investments in the value chain. The scheme seeks to incentivise companies to utilise the existing installed capacity to fulfill the increasing domestic demand.

- **Modified Electronics Manufacturing Clusters (EMC 2.0) Scheme:** EMC 2.0 Scheme aims to enhance infrastructure for India's electronics industry, promoting supply chain efficiency and reducing logistics costs. It offers financial incentives for building quality infrastructure and common facilities for manufacturers.

### *What is the Strategic Importance of Semiconductor Fabrication?*

- **Economic Growth:** Building a **semiconductor industry** can attract substantial investments, create high-value jobs, and drive economic growth, particularly in the electronics manufacturing sector.
  - With the global semiconductor market projected to reach USD 1 trillion by 2030, **India aims to achieve a 10% share in the global semiconductor market** by 2030.
  - Moreover, domestic semiconductor production is essential for a wide array of downstream industries, supporting economic resilience and strategic interests.

Note:

- **Technological Sovereignty and Self-Reliance:** Developing domestic semiconductor fabrication capabilities will reduce India's reliance on foreign suppliers, ensuring greater control over critical technologies and enhancing national security.
  - This aligns with India's strategic goals to achieve technological self-reliance and supports initiatives like **"Make in India"** and **"Aatma Nirbhar Bharat Abhiyan."**
  - Moreover, India imports about 65-70% of its electronic components, mainly from China. Establishing local manufacturing can mitigate this dependency.
- **Elevating India's Status Globally:** As semiconductors are considered the **"new oil"** of the economy, India's emergence as a key player in this industry can elevate its global status and establish it as a hub for technology and electronics manufacturing.
- **Fostering Technological Advancements**: Investing in semiconductor fabrication encourages research and development, leading to technological advancements and fostering a culture of innovation within the country. This is essential for sustaining long-term growth and competitiveness.
- **Embracing the Fourth Industrial Revolution:** India is embracing the **Fourth Industrial Revolution**, also known as Industry 4.0, which heavily depends on semiconductors. The country has the potential to be a leader in emerging technologies such as artificial intelligence (AI), drones, and quantum computing.
  - A strong semiconductor ecosystem will be crucial for facilitating advancements in these areas, driving innovation, and enhancing productivity across various sectors.

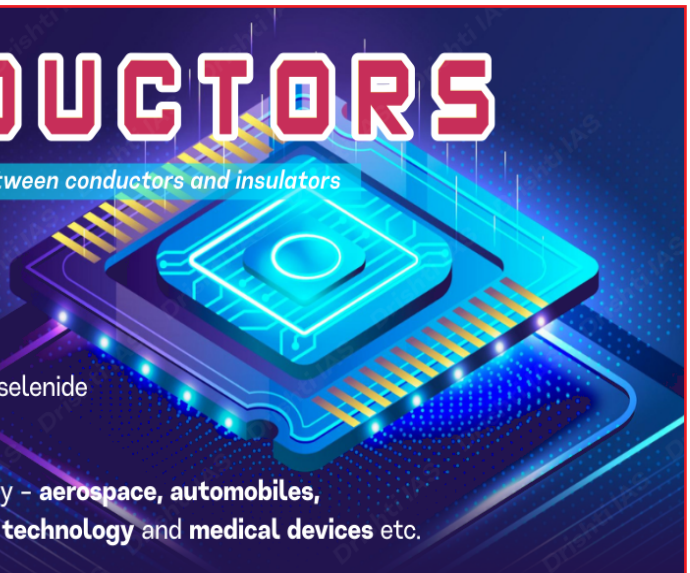
### *What are the Challenges faced by the Semiconductor Industry in India?*

- **Supply Chain and Infrastructural Bottlenecks**: Semiconductor manufacturing faces challenges in establishing reliable supply chains for raw materials and building the necessary infrastructure, such as cleanrooms and fabs.
  - Semiconductor fabrication is a highly intricate process, often involving between 500 and 1,500 steps, taking place in cleanrooms to avoid contamination. Developing this ecosystem requires significant investment and technological expertise.
- **Capital-Intensive**: Setting up **semiconductor manufacturing** plants requires substantial capital investment, alongside sustained R&D expenditure. The financial burden of these projects is often daunting for many companies.
  - Beyond infrastructure, companies need to invest in advanced technology, talent, and equipment, further increasing the capital requirements for semiconductor production.
- **Talent Gap:** India faces a critical shortage of skilled professionals in chip design, fabrication, testing, and packaging, hindering its ability to scale semiconductor production.
  - According to a report by TeamLease Degree Apprenticeship, the semiconductor industry in India is projected to encounter a shortage of 250,000-300,000 professionals by 2027.
- **Global Competition and Market Dominance:** The global semiconductor market is largely controlled by a few countries, with **Taiwan** and **South Korea** accounting for 80% of the global chip foundry base. India faces stiff competition from these established players, along with **China** and other semiconductor hubs.
  - **Nvidia's Dominance in AI Chips**: In the chip design market, companies like **Nvidia** dominate, especially in high-end graphics and AI chips, creating barriers for India to penetrate this segment. Similarly, **ARM** holds significant market share in designing architectures for processors.
  - **EUV Technology Monopoly**: Advanced semiconductor manufacturing is heavily dependent on **Extreme Ultraviolet Lithography (EUV)** technology, produced solely by the Netherlands-based company **ASML**.
    - The monopoly of this technology challenges India by restricting access to advanced chip-making equipment.
- **Environmental Concerns:** The semiconductor industry uses large quantities of hazardous chemicals, such as hydrochloric acid, toxic metals, and volatile solvents, which pose significant environmental risks.
  - Managing these environmental concerns adds complexity and cost to semiconductor production.

Note:

# SEMICONDUCTORS

*Semiconductors are materials having conductivity between conductors and insulators*



## EXAMPLES

- **Pure Elements:** Silicon and Germanium
- **Compounds:** Gallium Arsenide and Cadmium selenide

## SIGNIFICANCE

- Essential to almost all sectors of the economy - **aerospace, automobiles, communications, clean energy, information technology** and **medical devices** etc.

## SEMICONDUCTORS AND INDIA

- **India Imports from: China, Taiwan, USA** and **Japan**
- **Indian Semiconductor Market:** Expected to reach **USD 55 bn** by **2026**

| SCHEMES | OBJECTIVES |
|---|---|
| **Production-Linked Incentive (PLI) scheme** | Encourage semiconductor and display manufacturing in the country. |
| **Design Linked Incentive (DLI) Scheme** | Nurture >20 domestic companies in semiconductor design Achieve a turnover of > Rs.1500 crore in next 5 years |
| Scheme for Promotion of Manufacturing of Electronic Components and Semi-conductors (SPECS) | Manufacture electronics components and semiconductors |

## INDIA'S SEMICONDUCTOR MISSION (ISM)

### VISION

- Build a **vibrant semiconductor** and **display design** and **innovation ecosystem**

### LAUNCHED

- 2021

### NODAL MINISTRY

- Ministry of Electronics and Information Technology (MeitY)

### TOTAL FINANCIAL OUTLAY

- Rs 76,000 crore

### COMPONENTS

- Scheme for setting up of Semiconductor Fabs
- Scheme for setting up of Display Fabs
- Scheme for setting up of Compound Semiconductors/Silicon Photonics/ Sensors (including MEMS) Fabs/ Discrete Semiconductors Fab and Semiconductor ATMP/OSAT
- DLI Scheme

Drishti IAS

Note:

drishti

# Socialist and Secular as Integral Part of Constitution

### *Why in News?*

Recently, the **Supreme Court** affirmed that **"socialist" and "secular"** are integral to the Constitution's **Basic Structure**, rejecting a petition to remove these terms from the Preamble.

- The Supreme Court upheld the **42nd Amendment, 1976** which introduced the terms **socialist and secular** saying that these terms hold **specific significance** in the Indian context, distinct from their **Western interpretations**.

### *What Arguments were Presented for Removal of Terms Socialist and Secular?*

- **Rejection by Constituent Assembly:** On **15th November 1948**, **Professor KT Shah** proposed including **secular and socialist** in the **Preamble**, but the assembly **rejected** the proposal.
  - Further attempts to insert the term "**secular**" into **Article 18** of the Constitution were similarly **dismissed** by the **Constituent Assembly.**
- **Preamble's Amendment Date**: A petitioner claimed the inclusion of socialist and secular terms in the **42nd Constitutional Amendment Act, 1976** was unconstitutional because of the fixed adoption date of **26th November, 1949** and amendments were made in **1976** with **retrospective effect**.
  - However, the Court recognised the Constitution as a **living document** that **evolves with societal needs,** noting that the inclusion of socialist and secular reflects this evolution.
- **1989 Amendment to the Representation of People Act:** The petitioners challenged the **1989 amendment** to the **Representation of People Act (RPA), 1951** arguing that requiring political parties to pledge allegiance to **socialism and secularism** for registration infringes on their **freedom of speech** under **Article 19(1)(a)**.

### *How Western Concept of Secularism Different from Indian Concept?*

| Aspect | Western Concept of Secularism | Indian Concept of Secularism |
|---|---|---|
| **Definition** | Primarily refers to the **strict separation of religion from state affairs.** | **No strict separation** between state and religion. Emphasises **equal respect** for all religions and the **state's positive role** in promoting religious harmony. E.g., Temple entry and Criminalising **triple talaq** |
| **Role of Religion** | Religion is often seen as a **private matter**, and the state remains neutral. | The state **recognises and accommodates** multiple religions, promoting their coexistence. |
| **Government's Obligation** | The government has **no obligation** to endorse or support any religion. | The government is expected to **treat all religions equally** and ensure their fair respect in society. |
| **Individualism Vs Collectivism** | Focus on **individual rights** to practise religion freely without state interference. | Focus on **collective rights** of religious communities and ensuring their **cultural and religious practices** are protected. |
| **Cultural Context** | Often developed in societies with a history of **religious conflict**, emphasising neutrality. | Developed in a **pluralistic society** with a long history of coexistence among various religions. |
| **Educational Institutions** | Public schools are typically secular, **prohibiting religious instruction.** | Schools may **incorporate religious education**, reflecting the cultural diversity of the community. |
| **Main Focus** | Advocates for **collective or government ownership** of the means of production to achieve economic equality. | Emphasises on **democratic socialism** though **equitable distribution of resources** while allowing for a **mixed economy** with both public and private sectors. |
| **Economic Structure** | It involves an imperative **planning** model where the state controls key industries, especially in **Marxist or Leninist contexts.** | It involves an **indicative planning model** where the **state** indicates areas of cooperation and the private **sector also plays a significant role** in achieving the targets**.** |

Note:

| | | |
|---|---|---|
| **Class Struggle** | Focuses on the **conflict between classes** (proletariat vs. bourgeoisie) as a driver for social change and revolution. **Capitalists and socialists** consider **each other as their enemy**. | Emphasises **social justice and upliftment of marginalised communities** without necessarily advocating for class struggle. |
| **Role of the State** | The state often plays a central role in **economic planning and resource allocation**, especially in more radical forms of socialism. | The state has a **regulatory role** and implements **welfare schemes,** while encouraging private enterprise and **liberalisation.** |
| **Cultural Context** | Developed in response to **industrial capitalism** and **urbanisation** in the West, often rooted in **Marxist theory.** | Evolved from the context of **colonialism, independence**, and the need to address deep social inequalities and diverse cultural identities. |
| **Globalization and Trade** | May be **critical of globalisation**, viewing it as a form of **capitalist exploitation.** | Generally **supportive of globalisation**, recognizing the need for India to engage with global markets while ensuring social welfare. |

# DIRECTIVE PRINCIPLES OF STATE POLICY

*DPSP in Part IV Article (36-51) of the Indian Constitution, draws inspiration from the Irish Constitution.*

**Article 37** *DPSP are not justiciable, yet fundamental to governance.*

### Socialist Principles

- **Article 38:** Promote social order and minimise inequalities in income, status and opportunities (44th CA*)
- **Article 39:**
  - Right to adequate means of livelihood
  - Equitable distribution of resources
  - Prevention of concentration of wealth
  - Equal pay for equal work
  - Protection of the strength and health of the workers
  - Opportunities for development of children
  - Article 39A: Free legal aid to the poor (42nd CA)
- **Article 41:** Right to work, education and public assistance
- **Article 42:** Just and humane conditions of work and maternity relief
- **Article 43:** Wage and a decent standard of life to all workers
  - **Article 43A:** Participation of workers in the industries (42nd CA)
- **Article 47:** Raise the level of nutrition and improve public health

### Gandhian Principles

- **Article 40:** Organise village panchayats
- **Article 43:** Promote cottage industries in rural areas
  - **Article 43B:** Cooperative societies (97th CA)
- **Article 46:** Educational & economic interests of SCs, STs and other weaker sections
- **Article 47:** Prohibit consumption of intoxicating drinks/drugs
- **Article 48:** Prohibit slaughter of cows, calves and cattle

### Liberal-Intellectual Principles

- **Article 44:** Uniform Civil Code
- **Article 45:** Early childhood care & education for children (0-6 yrs) (86th CA)
- **Article 48:** Agriculture and animal husbandry
  - **Article 48A:** Protection of environment, forests and wildlife (42nd CA)
- **Article 49:** Protect every monument or place of historic interest
- **Article 50:** Separation of judiciary from executive
- **Article 51:** Establish international peace & security via honourable relations, laws & treaties and dispute settlement

*CA = Constitutional Amendment

Drishti IAS

Note:

### *What is the Role of Indian Judiciary in Shaping Secularism?*

- ***Sardar Taheruddin Syedna Sahib Case 1962*:** The Supreme Court asserted that **Articles 25 and 26 (freedom of religion)** of the Constitution highlight the **secular nature** of Indian democracy.
- ***Kesavananda Bharati Case 1973*:** The Supreme Court held that **secularism** was a part of the **basic structure** of the Constitution.
  - The basic structure doctrine posits that certain **core elements** of the Indian Constitution have **intrinsic value** and cannot be altered or removed.
- ***SR Bommai Case, 1994*:** The Court stated that secularism signifies **equal treatment of all religions** and noted that the term secular, added to the **Preamble** by the 42nd Amendment Act, 1976 emphasises the fundamental rights protected under **Articles 25-28.**
- ***Ismail Faruqi Case, 1994*:** The Court held that any **property belonging to a religious community** could be **acquired** by the State if deemed necessary after paying **fair compensation** of the property.
- ***Aruna Roy Case, 2002*:** The Supreme Court of India held that the essence of secularism is **non-discrimination of people by the State** on the basis of religious differences.
  - The Court made a distinction between **religious instruction and religious education** or study of religion and said the **latter was permissible**, and indeed desirable, while the **former was banned.**
- ***Abhiram Singh Case, 2017*:** The Court held that secularism does not require the State to be **aloof from religion**; rather, it mandates **equal treatment for all religions.**
  - It acknowledged that religion and caste are **integral to society** and cannot be entirely separated from politics.
  - A **political candidate or their agent** cannot appeal to **religion**, race, caste, community, or language during elections, as it is considered a **corrupt practice (Section 123(3) of RPA)**.

### *What is the Role of Indian Judiciary in Shaping Socialism?*

- ***Kesavananda Bharati Case, 1973*:** The Supreme Court ruled that **socialism** is a fundamental aspect of the Constitution's **basic structure**, reinforcing its role in promoting social justice and equality.
- ***State of Karnataka vs Sri Ranganatha Reddy Case, 1977*:** The Court emphasised that socialism must focus on **social good**, arguing that **nationalisation or acquisition** should aim for the **common good and equitable wealth distribution**.
- ***Maneka Gandhi Case, 1978*:** The judgement emphasised that the **right to life** includes the **right to live with dignity**, which is essential to the **socialist principle** of ensuring a **fair quality of life for all citizens.**
- ***Minerva Mills Case, 1980*:** The Supreme Court emphasised the need to harmonise **Fundamental Rights** with the **Directive Principles of State Policy (DPSP)**, stating that the DPSP should guide state policies **to secure social and economic justice** in line **with socialist principles.**
- ***Sanjeev Coke Manufacturing Company vs Bharat Coking Coal Ltd Case 1982*:** The judgement framed **nationalisation** as a necessary step for reorganising the coal industry and **safeguarding resources vital for public welfare**.
  - It noted that even if there was a violation of **Article 14**, **Article 31C** would protect **legislation**.
  - **Article 31C** protects laws enacted to ensure the **"material resources of the community"** are distributed to serve the common good **(Article 39(b))** and that wealth and the means of production are **not "concentrated" to the "common detriment" (Article 39(c)).**

## Ensuring Railway Safety

### *Why in News?*

Recently, there has been a **spate of accidents** across railway zones after which the government has called for **urgent steps** to prevent them.

### *What is the Status of Railway Accidents?*

- **Decrease Over the Decades:** In the **1960s,** the number of railway accidents was significantly higher, with an **annual average of 1,390.**
  - Over the last decade, this number dropped to **around 80 accidents per year,** indicating a notable improvement in safety measures and operational efficiency.

Note:

- **Recent Trends in Consequential Accidents:** Despite the reduction in **overall accidents**, there were still **34 consequential accidents in 2021-2022, 48 in 2022-2023, and 40 in 2023-2024.**
  - A **consequential accident** injures and/or **kills people, damages railway infrastructure, and disrupts rail traffic.**
- **Primary Causes of Accidents:** According to public records, **55.8%** of all accidents involving trains have been due to the failure of **Railway staff** and another **28.4%** due to failures on the part of **non-staff people**. **Equipment failure** accounted for **6.2%.**
- **Signalling Failures in Major Accidents:** Both the **Balasore** (2023) and **Kavaraipettai** (2024) railway accidents were attributed to **signalling system errors.**

### *What are the Causes of Railway Accidents?*

- **Inadequate Safety Technologies:** **Kavach has the potential to prevent collisions by automating** braking and issuing alerts, its limited deployment makes it ineffective on a larger scale.
  - By February 2024, the Railways had installed **'Kavach' on 1,465 route km, or 2% of its total route length.**
- **Signalling System Failures:** Faulty signalling systems have directly caused some major accidents, including the **Balasore and Kavaraipettai incidents.**
  - **Since 1990-1991**, the Railways has classified nearly 70% of all major accidents as derailments due to **signalling errors.**
- **Network Congestion:** High levels of congestion on the railway network are highlighted as a significant safety issue.
  - According to the **draft National Rail Plan**, nearly **30%** of the railway network is utilised to **more than 100% capacity** exacerbating the safety risks.
- **Insufficient Track Maintenance:** The Railways needs to keep up existing equipment, including **replacing tracks and wagons** and maintaining trackside infrastructure.
  - But in the **2023-2024 budget**, **capital outlay** for track renewal dropped to **7.2%**.
  - Appropriations to the **Depreciation Reserve Fund** also fell **96%** between 2014-19.
- **High Operating Ratio:** The **operating ratio (OR)** in 2024-2025 is estimated to be **Rs 98.2**, a small improvement from **2023-2024 (Rs 98.7)** but a decline from **Rs 97.8 in 2016.**
  - A higher OR leaves **less for capex** and makes the Railways more dependent on **budgetary support** and **Extra-Budgetary Resources (EBRs).**
  - This financial tension results in underfunding for **critical safety upgrades** and infrastructure improvements.
  - OR is the amount the Railways spends to earn Rs 100.
- **Slow Infrastructure Development:** Of the **Dedicated Freight Corridors (DFCs)** the government mooted in 2005, only the **eastern DFC is fully operational.**
  - The **western DFC is partly ready**; the east coast, **east-west sub-corridor**, and **north-south sub-corridor DFCs**, amounting to 3,958 km, are still in **planning.**
  - Such a demand and supply gap of infrastructure compounds the safety problem.
- **Off-Setting of Loss:** As per **NITI Aayog**, freight rates increased **more than thrice** as fast as passenger rates in 2009-2019 but Railways' freight profit is **offset significantly by passenger losses.**
  - In **2019-2020**, the revenue from passenger services was a little over **Rs 50,000 crore and losses were Rs 63,364 crore.**
- **Prolonged Working Hours:** One key cause of railway accidents, especially **Signal Passed at Danger (SPAD)** cases, is loco pilots' extended working hours.
  - Manpower shortages force them to **exceed the 12-hour duty limit**, causing fatigue and increasing the risk of human error.

### *What are the Various Committees' Recommendations for Railway Safety?*

- **Rakesh Mohan Committee (2010):**
  - Revamp the accounting system to **align with Indian GAAP (Generally Accepted Accounting Principles)**
  - Focus on **long-distance and inter-city transport**, speed upgrades, and **High-Speed Rail corridors** for passenger services
  - Develop **logistics parks** at key network hubs
- **Kakodkar Committee (2012):**
  - Establishing a statutory **Railway Safety Authority**

Note:

- Forming a non-lapsable **Rashtriya Rail Sanraksha Kosh (RRSK)** of Rs. 1 lakh crores over **5 years** for safety projects.
- Adopting advanced technologies for **track maintenance and inspection.**

- **Bibek Debroy Committee (2014):**
  - Establishing a **Railway Infrastructure Authority of India.**
  - **Outsourcing** non-core activities.
- **Vinod Rai Committee (2015):**
  - Setting up an **independent Railway Safety Authority** with statutory powers
  - Forming a **Railway Accident Investigation Board** for impartial inquiries
  - Establishing a separate **Railway Infrastructure Company** for owning and maintaining railway assets

**What are the Steps taken for Railway Safety?**

- **Kavach System**
- **Rashtriya Rail Sanraksha Kosh (RRSK)**
- **Eliminated Unmanned level crossing**
- **GPS-based Fog Safety Devices**

### *What can be Done to Prevent Railway Accidents?*

- **Addressing Loco Pilot Vacancies:** Indian Railways faces about **18,799 loco pilot vacancies**. Immediate action is needed to **fill these positions** to prevent overworking pilots and **reduce errors from stress and exhaustion**.
- **Implement 'Kavach' Anti-Collision System:** The **Railways must expedite the installation of Kavach** on more routes, especially **high-traffic and high-risk section**s, to prevent future collisions.
- **Address Network Congestion:** Prioritising **Dedicated Freight Corridors (DFCs)** and completing pending projects can help **distribute traffic more evenly** and reduce congestion.
- **Independent Railway Safety Authority:** Creating an independent **Railway Safety Authority** as recommended by the **Kakodkar Committee** would ensure a more **specialised and independent** approach to railway safety oversight.
- **Work Hour Regulations:** Stricter **enforcement of work hour limits** and ensuring that crew members have **adequate rest** are essential to reduce human errors.
- **Improve Signal Infrastructure:** Investments in advanced **signal and communication technologies** can drastically reduce the chances of accidents caused by **signal failures.**
- **Installation of Fencing Along Tracks:** Installing **fences along railway tracks** in high-risk areas could prevent **cattle runovers** that have been a cause of derailments.
- **Increasing Passenger Revenue:** Increasing **passenger fares** judiciously or **improving the efficiency of passenger services** could help mitigate losses.

## SC Upholds Section 6A of Citizenship Act

### *Why in News?*

Recently, **the Supreme Court** upheld the constitutionality of **Section 6A of the Citizenship Act 1955**, which permits **immigrants from Bangladesh residing in Assam to secure Indian citizenship**, as a valid piece of legislation aligned to the Preambular value of fraternity.

- According to the court, the **principle of fraternity cannot be selectively applied to one section** living in Assam while another lot are labelled "illegal immigrants".
- The petitioning **NGO** argued to court that **Section 6A threatened Assamese people's right** to preserve their political, linguistic, and cultural identity by bringing illegal immigrants and altering its demography.

### *What is the Supreme Court's Ruling?*

- **Majority Opinion:**
  - **Reaffirming Constitutional Validity:** The court ruled that **Section 6A does not violate Articles 6 and 7 of the Constitution**, which set 26th January 1950, as the cut-off for granting citizenship to migrants from East and West Pakistan.
    - Section 6A applies from a much later date, so it operates separately from the earlier constitutional provisions.
    - The **cutoff date of 25th March 1971 is justified**, as the Pakistani Army initiated **Operation Searchlight** to suppress the Bangladeshi nationalist movement in East Pakistan on 26th March 1971.

Note:

- The Court stated that **the petitioners failed to prove that the Assamese people's ability to safeguard their culture** was compromised by Section 6A.
  - The Court emphasised that constitutional and statutory provisions already protect Assam's cultural and linguistic interests.
- **Power of Union:** Parliament enacted Section 6A under its powers from **Article 246** and **Entry 17 of the Union List,** which addresses citizenship, naturalization, and aliens.
  - Assam's special citizenship law does not violate **Article 14 (Equality)**, as the state's migrant situation was distinct from the rest of India.
- **Acknowledging the Issue:** The court affirmed that the **ongoing migration from Bangladesh** has placed a significant **burden on Assam.**
  - It was emphasized that **a nation can simultaneously accommodate immigrants and refugees while focusing on sustainable development** and ensuring an equitable distribution of resources.
- **Clarifying Responsibility:** It was emphasised that Section 6A should not be solely blamed for this situation.
  - The **government's failure to detect and deport post-1971 immigrants** from Bangladesh in a timely manner was a major contributing factor.
- **Criticizing the System:** The court found that the **current mechanisms and Tribunals responsible for identifying illegal immigrants in Assam are inadequate.**
  - These systems are not sufficient for the timely enforcement of Section 6A and related laws, such as **the Immigrants (Expulsion from Assam) Act, 1950, and the Foreigners Act, 1946.**
- **Need for Oversight:** The enforcement of immigration and citizenship laws requires judicial supervision and cannot be left to the discretion of authorities.
  - The Court asked the **CJI** to **constitute a Bench for monitoring the implementation** of these laws in Assam.

➢ **Dissenting Opinion:**

- **Dissenting view**: The **dissent declared Section 6A unconstitutional with prospective effect**, rejecting concerns that different ethnic groups would infringe on the cultural and linguistic rights of others.
- **Balancing Development and Immigration**: The dissent asserted that sustainable development and population growth can coexist without conflict.
  - Accepting the petitioners' argument, which claimed that immigration impacts local rights to sustainable development, could lead to restrictions on domestic inter-State movement.

## *What is Section 6A of the Citizenship Act 1955?*

➢ **About Section 6A:**

- It was enacted as part of the **Citizenship (Amendment) Act, 1985**, following the **Assam Accord of 1985**.format
- It grants Indian citizenship to immigrants who entered Assam from Bangladesh before 1st January 1966.
  - Those who **entered between 1st January 1966 and 25th March 1971,** can be **conferred citizenship** after fulfilling certain prescribed procedures and conditions.
  - The section, however, **denies citizenship to immigrants** who **arrived in Assam after 25th March 1971.**

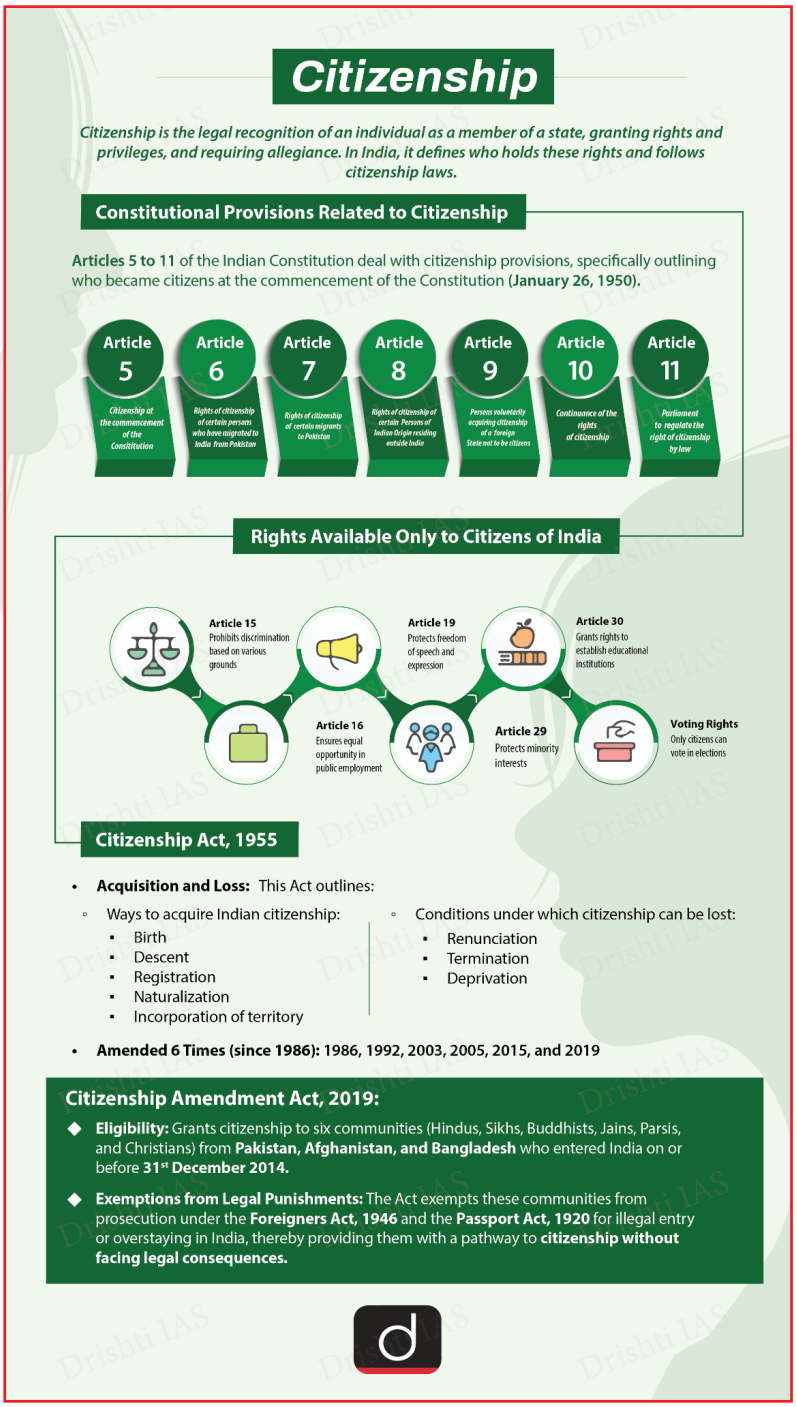
➢ **The Assam Accord:**

- The **Assam Accord was a tripartite agreement** between the Central Government, the State Government of Assam, and the leaders of the Assam Movement. It sought **to end the influx of illegal migrants from Bangladesh.**
- It introduced Section 6A into the Citizenship Act, of 1955, exclusively for Assam.
  - This provision addresses the issue of large-scale migration preceding the **1971 Bangladesh Liberation War**.
  - It mandates the **detection and deportation of foreigners** who entered Assam after 25th March 1971, marking the creation of Bangladesh.
  - The introduction of Section 6A reflects the specific historical and demographic challenges faced by Assam during this critical period.

Note:

### *What can be the Implications of this Judgement?*

- **Immigrant Recognition:** By upholding Section 6A, the **judgment grants continued legal protection** and citizenship rights **to immigrants from Bangladesh** (entered Assam before 25th March 1971).
  - This **reinforces India's commitment** to protecting those displaced by the **Bangladesh Liberation War**.
- **Assamese Identity Preservation:** The majority opinion **dismisses the notion that the presence of immigrants** automatically **infringes** upon the **cultural and linguistic rights of the Assamese people.**
  - This means that **despite demographic changes, the Assamese community's rights are protected** through existing constitutional safeguards (**Article 29(1)**), allowing them to preserve their identity.
- **Tensions on Demographic Shift:** Critics argue that **continued immigration strains Assam' s demographic balance**, threatening its cultural identity and economic resources.
  - This **could fuel local demands for stricter immigration controls** or even political mobilisation around cultural preservation.
- **Resource Allocation:** Immigrants continue to be eligible for citizenship and the resources and rights that come with it, potentially **increasing strain on Assam's already limited economic resources**.
  - This may necessitate more robust policies to ensure equitable resource distribution and prevent further economic disparities.
- **Pressure on Immigration Laws:** The judgment stresses **the need for more effective implementation of immigration laws,** particularly the detection and deportation of illegal immigrants who entered after the 1971 cut-off date.
- **Bangladesh Relations:** By not recognizing post-1971 immigrants as Indian citizens, the judgement **could lead to tensions with Bangladesh**, as it may be seen as India pushing responsibility for these immigrants onto its neighbour, potentially straining diplomatic ties.
  - The decision could impact regional cooperation on border management, migration control, and security, complicating India-Bangladesh relations.




Note:

# Challenges in Madarsa Education

## *Why in News?*

Recently, the **National Commission for Protection of Child Rights (NCPCR)** has submitted before **the Supreme Court** that the curriculum imparted in madrasas lacks comprehensiveness and thus contravenes the mandates of the **Right to Education.**

- The Commission contends that the textbooks utilised in these institutions promulgate teachings centred on the **doctrinal primacy of Islam**.
- Madrasa, derived from **Arabic**, refers to an **educational institution** primarily associated **with Islamic teachings**.

## *What are the Recent Developments Related to Madrasas?*

- **Supreme Court (SC) Interim Verdict:**
  - **SC** states that **Section 1(5) of the RTE (Right to Education) Act** says that "Nothing contained in this Act shall apply to **Madrasas, Vedic Pathshalas and educational institutions** primarily imparting religious instruction."
  - A **law per se regulating an institution** belonging to a particular community does not ***ipso facto*** [by the fact itself] **offend the principle of secularism**.
- **Uttar Pradesh:**
  - The **Allahabad High Court judgement dated March 2024**, declared **Uttar Pradesh Board of Madarsa Education Act, 2004,** as "unconstitutional."
  - The Court's ruling was based on the premise that the Act contravened **"the principle of secularism"** enshrined in the **Constitution** and violates **fundamental rights** guaranteed under **Article 14 (right to equality before the law)**.
  - The NCPCR made its **submission to the Supreme Court in response to** a set of appeals challenging a **verdict by the Allahabad High Court.**
    - NCPCR has recommended that **all Muslim and non-Muslim children be removed from Madrasas and enrolled in schools** to receive fundamental education **as per the RTE Act, 2009.**
- **Assam:**
  - In 2023, the **Assam government reclassified 1,281 madrasas as "Middle English" (ME) schools**, following their transformation into general schools under the State Directorate of Elementary Education.
    - This initiative **aims to foster uniformity and inclusion within the state's education system.**

**Uttar Pradesh Board of Madarsa Education Act, 2004**

- The Act aimed to regulate and govern the functioning of **madrasas (Islamic educational institutions)** in the state of Uttar Pradesh.
- It provided a framework for the establishment, recognition, curriculum, and administration of madrasas across Uttar Pradesh.
- Under this Act, the **Uttar Pradesh Board of Madarsa Education** was established to oversee and supervise the activities of madrasas in the state.

## *What is the State of Madrasas in India?*

- **Number of Madrasas in India:**
  - As of 2018-19, India had a total of 24,010 madrasas, of which 19,132 were recognised, while **4,878 remained unrecognized**.
    - Recognised **madrasas are affiliated with state madrasa education boards**, while **unrecognized madrasas follow** curricula set by prominent seminaries such as **Darul Uloom Nadwatul Ulama** (Lucknow) and **Darul Uloom Deoband.**
  - **Uttar Pradesh has the largest share of madrasas in the country**, with 11,621 recognised and 2,907 unrecognized institutions, representing 60% of India's total madrasas.
    - **Rajasthan had the second highest number of madrasas**, with 2,464 recognised and 29 unrecognized.
    - Certain states and Union Territories, including Delhi, Assam, Punjab, Tamil Nadu, and Telangana, reported **having no recognised madrasas.**
- **Education and Curriculum:**
  - **Curriculum:** Education in madrasas **mirrors the structure of mainstream school and higher education**, with students progressing through various levels like **Maulvi** (equivalent to **Class 10**), **Alim** (equivalent to **Class 12**), **Kamil** (equivalent to a **Bachelor's degree**), and **Fazil** (equivalent to a **Master's degree**).
  - **Medium of Instruction:** The medium of instruction in charitable **Madrasa Darse Nizami includes Arabic,**

Note:

**Urdu, and Persian,** while **Madrasa Darse Aliya uses** textbooks either published by **state textbook corporations or** prescribed by the **National Council of Educational Research and Training (NCERT)**.

- A significant number of madrasa boards across India have adopted the NCERT curriculum, with **compulsory subjects such as Mathematics**, Science, Hindi, English, and Sociology.

- In addition to the core subjects, students can choose an **optional paper,** selecting **either Sanskrit or Deeniyat** (religious studies, including the Quran and other Islamic teachings). The Sanskrit paper includes Hindu religious scriptures and teachings.

- **Funding:**
  - The primary source of funding for madrasas comes from the respective state governments, with supplementary support from the central government under the **Scheme for Providing Education to Madrasas/Minorities (SPEMM)**.
    - **SPEMM** offers financial assistance to madrasas and minority institutions across the country, facilitating their educational development and support.
    - **It has two sub-schemes:**
      - **Scheme for Providing Quality Education in Madrasas (SPQEM):** It focuses on improving educational standards.
      - **Infrastructure Development of Minority Institutes (IDMI):** It addresses infrastructure enhancement.
    - In April 2021, SPEMM was transferred from the Ministry of Minority Affairs to the **Ministry of Education** for more streamlined administration.

**What are the Initiatives Related to Education?**

- **Sarva Shiksha Abhiyan (SSA)**
- **Rashtriya Madhyamik Shiksha Abhiyan.**
- **Rashtriya Uchhattar Shiksha Abhiyan (RUSA)**
- **National Programme on Technology Enhanced Learning.**
- **PRAGYATA**
- **Mid-Day Meal Scheme**
- **Beti Bachao Beti Padhao**
- **PM SHRI Schools**

## *What is the Role of Madrasas in the Indian Education System?*

- **Cultural Preservation:** Historically, Madrasas have served to **preserve and transmit Islamic culture, beliefs, and values among Muslim communities in India,** fostering a sense of identity and community.
- **Education and Literacy:** They **provide an educational platform** for many Muslim children, particularly in areas where access to formal schooling is limited.
  - However, **concerns exist regarding the quality of education** and the comparatively lower literacy rates among Muslim communities, with many **students unable to progress beyond secondary education.**
- **Influence on Ideology:** While Madrasas **can promote positive values**, some have been **criticized for fostering extremist ideologies and anti-national sentiments**, potentially contributing to social divisions and communal tensions within the country.
- **Legal and Funding Issues:** The existence of Madrasas **raises questions about secularism and equality in education funding**.
  - Critics argue that public funds should not be used to support religious education without equally funding other religions to ensure uniformity and adherence to secular principles.
- **Challenges to Integration:** Many graduates of Madrasas face difficulties in integrating into the broader workforce due to a **lack of vocational skills and modern education**. The **educational approach often leads to isolation from mainstream society**, hindering opportunities for upward mobility and social cohesion.

## *What are the Issues related to the Madrasa's Education?*

- **Quality of Education:** Many madrasas offer a **curriculum that primarily focuses on religious education**, often lacking in subjects like mathematics, science, and languages.
  - This can **lead to gaps in students' overall academic development** and limit their opportunities for further education and employment.
- **Regulatory Challenges:** A significant number of madrasas **operate without proper government**

Note:

**oversight or regulation**. This lack of regulation can result in varying quality of education, and in some cases, inadequate facilities.

- **Socioeconomic Factors:** Madarsa education is **often associated with marginalized communities**, where families may opt for these institutions due to economic constraints. This can **perpetuate cycles of poverty and limit socioeconomic mobility.**
- **Extremism and Radicalisation:** Some madrasas have been **criticised for promoting extremist ideologies or fostering radicalization.**
- **Limited Vocational Training:** Most madrasas **do not provide vocational training or skills development programs.** This limits students' practical skills and employability, further hindering their integration into the broader workforce.
- **Gender Disparities:** Many madarsas have **historically been male-dominated, with fewer opportunities for female students.** This can exacerbate gender disparities in education and limit women's participation in society .
- **Inadequate Infrastructure:** Many madarsas suffer from **poor infrastructure, including inadequate classrooms, lack of libraries, and insufficient educational materials.** This can significantly affect the learning environment .
- **Resistance to Modernization:** There can be **resistance within some madarsas to adopting modern educational practices for integrating technology,** which can hinder the overall development of students.

### *Citizen Charter*

■■■

Note:

# Economic Scenario

## Highlights


- *Threat to Indian Online Gaming Sector*
- *Mormugao Port on Environmental Ship Index*
- *Microfinance Institutions*
- *World Economic Outlook Report*
- *World Energy Outlook 2024*
- *Shift of Tech Giants Towards Nuclear Energy*
- *New Airports Under RCS-UDAN*
- *MSP and its Legalization*
- *Haber-Bosch Process and Production of Fertilizers*
- *Looking Beyond Yield in Agriculture*
- *3 Years of PM GatiShakti National Master Plan*


## Threat to Indian Online Gaming Sector

### *Why in News?*

According to a report by **the Digital India Foundation (DIF)**, **Money laundering** is a major **threat to the Indian online gaming sector's** integrity and long-term success.

**Note: Digital India Foundation (DIF)** is a **not-for-profit think-tank** aiming to **foster digital inclusion and adoption,** and the use of the Internet and related technologies for the developmental process.

### *What are the Key Points of the Report?*

- **International Online Betting Threats:** The report titled **"Combating Money Laundering in Online Gaming Ecosystem"** highlights the rising trend of **using international online betting sites for money laundering** and **terror financing in cybercrime.**
- **Sectoral Growth:** India's online gaming industry is rapidly growing with a **Compound Annual Growth Rate (CAGR) of 28%** from FY20 to FY23.
  - The sector's revenue is expected to reach **USD 7.5 billion in five years.**
- **Employment Generation:** India has **568 million gamers,** creating significant employment opportunities across various sectors such as fintech, cybersecurity, and cloud services.
  - The sector has the potential to create 250,000 jobs by 2025, with over 400 start-ups and 100 million daily online gamers.
- **Vulnerabilities and Risks:**
  - The report identifies various **mechanisms used for money laundering** within the online gaming sector:
    - **Illegal operators:** Many platforms bypass restrictions through mirror sites and **Virtual Private Network (VPNs).**
    - **In-game currencies and assets:** Often used for illicit activities.
    - **Cryptocurrencies:** Provide anonymity and facilitate cross-border money laundering.
    - **Mule accounts:** Accounts used to facilitate transactions, obscuring the source of illegal funds.
    - **Smurfing and money dumping:** Techniques where small transactions are used to avoid detection.

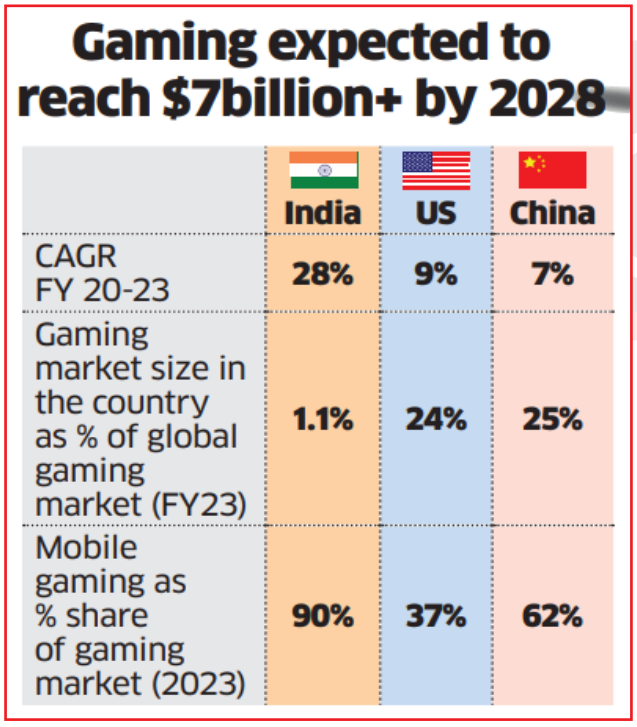
### *What is Online Gaming?*

- **About:**
  - Online gaming involves **playing video games with others over the internet.** Players can **connect via computer, gaming console, or smartphone.**
  - It **enables real-time interaction and competition among players**, regardless of location.
- **Classification:**
  - **Skill-Based Games**: These games are **legal in India** as long as they emphasize skill rather than chance. E.g **Game 24X7, Dream11, Mobile Premier League (MPL).**
  - **Games of Chance:** These games are considered **illegal** if the outcome is primarily determined by chance rather than skill. E.g., Roulette where

Note:

players are drawn in primarily due to the potential for monetary rewards.

- **Current Scenario:**
  - **Youth Demographics:** Over 600 million people in India are **under 35, comprising 45% of the population, driving the gaming industry's growth.**
  - **Smartphone Penetration:** Smartphone **usage has reached 75%, enhancing access to gaming** and contributing to rising engagement.
    - Mobile gaming accounts for **90% of total gaming revenue,** primarily through free-to-play games and in-app purchases.
  - **E-sports Growth**: E-sports viewership in India has surged to over 80 million, with government backing and an increasing number of professional gamers.




## What is the Legality of Online Gaming and Gambling in India?

- **Legal Jurisdiction**: The state legislators are, vide **Entry No. 34 of List II (State List)** of the Seventh Schedule of the Constitution of India, given exclusive power to make laws relating to Gaming, Betting and Gambling.
  - Most Indian states regulate gaming on the basis of a distinction in law between 'games of skill' and 'games of chance'.
- **Public Gambling Act, 1867**: At present, India has just one central law that governs gambling in all its forms. It's called the Public Gambling Act, 1867, which is an old law, ill-equipped to handle the challenges of digital casinos, online gambling and gaming.
- Recently, the Finance Ministry of India announced a **28%** Goods and Services Tax (GST) on online money gaming, casinos, and horse racing.
- **The Lotteries Regulation Act, 1998:** The lottery is considered legal in India. The lottery should be organised by the state government and the place of Draw should be in that particular state.

## Money Laundering

- **About:**
  - It is an **intricate method employed by individuals and organizations to hide the origins of illegally acquired money**, transforming illicit funds into seemingly legitimate ones through multiple transactions.
- **Methods of Money Laundering:**
  - **Structuring (Smurfing):** Dividing large sums of cash into smaller, less noticeable amounts for bank deposits.
  - **Trade-Based Laundering:** Utilizing trade transactions to transfer value internationally while masking the origins of illegal funds.
  - **Shell Companies:** Establishing businesses with no real activity to route illicit funds through seemingly legitimate transactions.
  - **Real Estate:** Acquiring property with illegal funds and selling it to transform the value into legitimate assets.
- **Steps to Prevent Money Laundering in India:**
  - Enforcement of the Prevention of Money Laundering Act (PMLA)
  - Formation of the **Financial Intelligence Unit (FIU)**
  - **Mandatory Reporting** by banks and financial institutions for cash transactions above a certain threshold and suspicious activity
  - Strict KYC guidelines to verify customer identities
  - Coordination with international organisations like the Financial Action Task Force (FATF)
  - Information Technology Rules, 2021 (oversight in online gaming industry)

Note:

### *What are the Challenges to the Gaming Sector?*

- **Financial Integrity Issues**: India's **illegal betting market attracts over USD 100 billion in deposits annually,** raising **concerns about financial integrity** due to easy asset transfers and conversions, which **fuel money laundering and fraud.**
- **Cybersecurity Threats**: Cyber Attack risks threaten user safety and data protection in gaming, while users bypass restrictions using **VPNs and** geo-blockers to access illegal gambling sites.
- **Misuse of In-Game Assets**: There are **risks associated with the potential misuse of in-game assets and cryptocurrencies**, which can complicate regulation.
- **Operation of Illegal Offshore Platforms**: The prevalence of **illegal offshore online betting sites** poses a challenge to regulatory efforts.
- **Circumvention of Regulations**: Many platforms circumvent existing regulations using **mirror sites, illegal branding, and misleading promises**, indicating a need for stronger oversight and enforcement.

### *What can be the Risk-mitigation steps?*

- **Establishment of Taskforce**: Form a **dedicated taskforce of experts to recommend policy measures** for better regulation of the gaming sector.
- **Mandatory Registration**: Require all online and offshore Real Money Gaming (RMG) operators **to** register under **the** Central Goods and Services Tax Act, 2017**,** within 30 days of becoming liable.
- **Creation of a Whitelist**: Publish and regularly update a **whitelist of legal online RMG operators** to **ensure that payment gateways, hosting providers, and ISPs serve only these operators.**
- **Advertising Advisory**: The Information and Broadcasting Ministry should issue **advisories allowing only whitelisted online gaming applications** to advertise.
- **Collaboration with Financial Institutions**: Collaborate with banks and payment service providers to **establish protocols for blocking transactions to known illegal gambling operators.**
- **Cross-Border Cooperation**: Lead efforts to develop **multilateral agreements with international organizations and other countries** to enhance cooperation in combating illegal online gambling.

## Mormugao Port on Environmental Ship Index

### *Why in News?*

Recently, Mormugao Port Authority (MPA), Goa became the **first Indian port** to be listed on the Environmental Ship Index (ESI) portal for **MPA's Harit Shrey programme**.

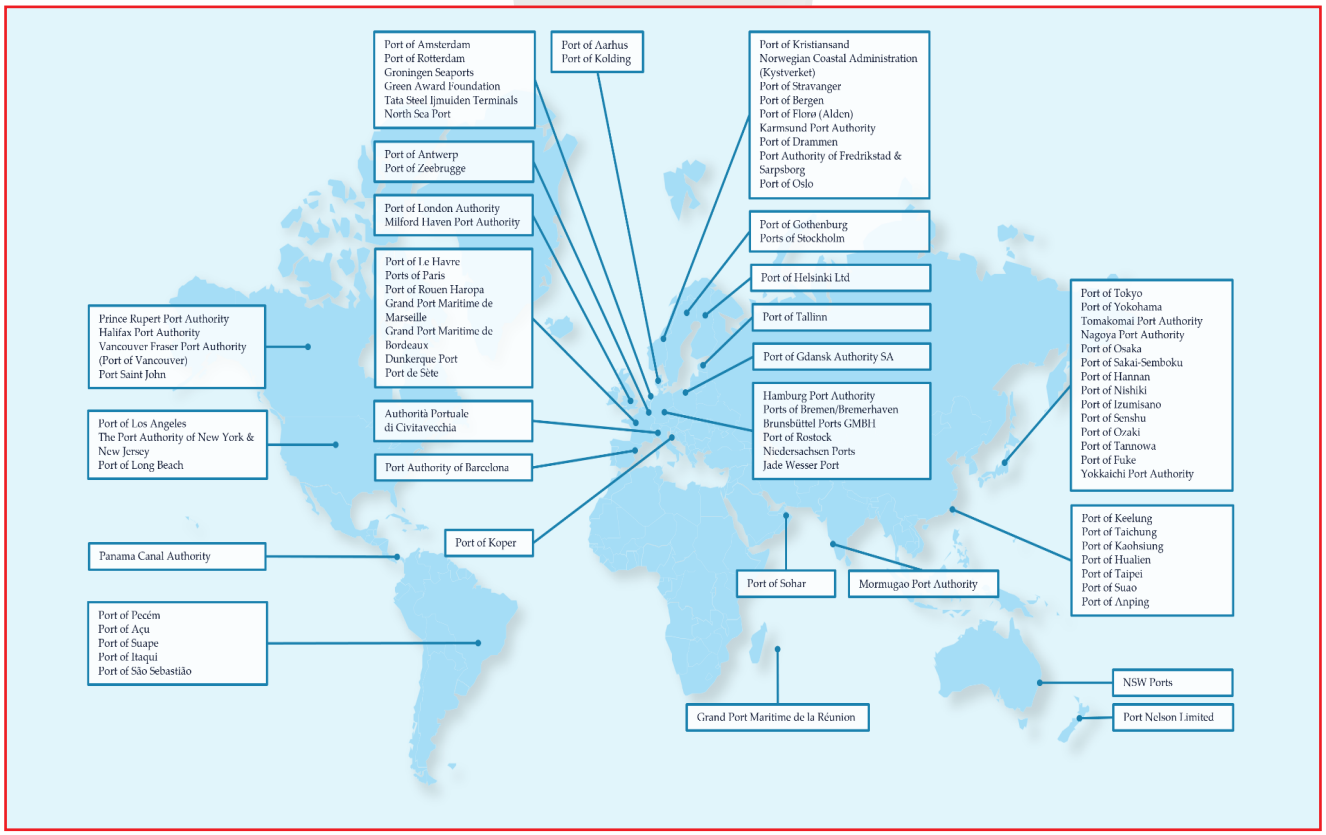
- It was acknowledged by the **International Association of Ports and Harbours (IAPH).**

Note:

- In another development, the government plans to **limit the development of inland waterway terminals (IWTs)** near major ports to safeguard their economic interests.

### *What is the Environmental Ship Index (ESI)?*

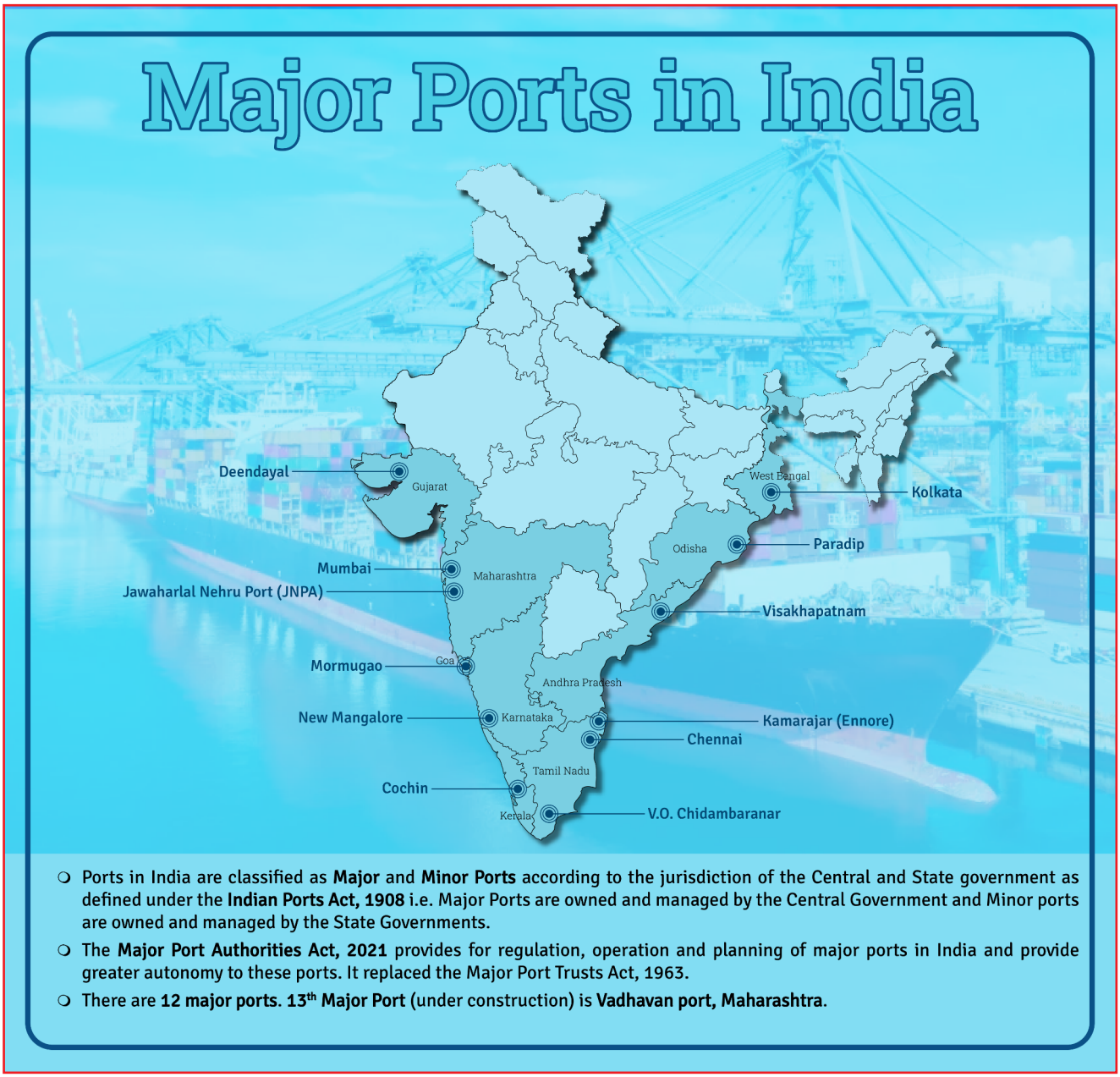
- **About:** It is a system designed to **evaluate and reward ships** for their environmental performance.
  - ESI identifies seagoing ships that perform better in **reducing air emissions** than the current **International Maritime Organization (IMO)** emission standards.
    - The **2023 IMO greenhouse gas(GHG) Strategy** envisages a **reduction in the carbon intensity** of international shipping by **at least 40% by 2030.**
- **Origin of ESI:** The ESI Initiative commenced on **1st January 2011** and from then onwards, its database under the administration of **International Association of Ports and Harbours (IAPH).**
- **Evaluation Criteria**: It assesses the emissions of **nitrogen oxides (NOx) and sulphur oxides (SOx)** released by ships.
  - The index includes a reporting scheme for **greenhouse gas emissions** from vessels.
- **Main Characteristics of ESI:**
  - **Port-Centric System**: Designed specifically as a system from **ports to ports.**
  - **Voluntary Participation**: Allows shipowners to demonstrate the environmental performance of their vessels on a **voluntary basis**.
  - **Applicability**: Can be applied to **all types of seagoing ships**, regardless of size or function.
  - **Automated Calculation**: It is automatically calculated and maintained.
- **Incentives**: Ports and authorities may offer incentives, such as **reduced port fees or priority berthing,** to ships with higher ESI scores.




Note:

## Mormugao Port Authority (MPA)

- **Historical Background**: Mormugao Port was commissioned in **1888.**
  - With the rise of **mining** as a key industry in Goa, Mormugao Port was developed as an **iron ore terminal.**
- **Major Port Designation**: Mormugao Port was declared a **Major Port in 1964**.
  - Iron ore traffic growth, especially due to **Japanese** demand during their **industrial reconstruction**, helped in the dramatic growth of Mormugao port.
- **Strategic Development Plans**: In 1965, a **Perspective Plan** was established to develop Mormugao Port for **deep-water** access and high-capacity loading to compete with **Brazil and Australia** in the iron ore market.
- **Green Transition:** Harit Shrey program was launched in **October 2023** that offers **discounts on port charges** to vessels that use **green fuel** and **emit no nitrogen oxides and sulphur oxides.**




- Ports in India are classified as **Major** and **Minor Ports** according to the jurisdiction of the Central and State government as defined under the **Indian Ports Act, 1908** i.e. Major Ports are owned and managed by the Central Government and Minor ports are owned and managed by the State Governments.
- The **Major Port Authorities Act, 2021** provides for regulation, operation and planning of major ports in India and provide greater autonomy to these ports. It replaced the Major Port Trusts Act, 1963.
- There are **12 major ports. 13th Major Port** (under construction) is **Vadhavan port, Maharashtra**.

Note:

**Developments on Inland Waterways**

- **National Waterways(NW) Expansion**: India is developing **111** national waterways (NWs) that span over **20,000 kilometres**.
- **Current Status of IWTs**: There are approximately **50 IWTs** currently operational.
- **Cargo Traffic Growth**: Since **2013-14**, cargo transported through inland waterways rose from **29.16 million tonnes** in FY15 to **133.03 million tonnes** in FY24.
- **Future Targets**: Under the Maritime India Vision 2030 and Maritime Amrit Kaal Vision 2047, the government aims to increase cargo traffic through inland waterways to **200 million tonnes** by 2030 and **500 million tonnes** by 2047.

# Microfinance Institutions

## *Why in News?*

Recently, the **Financial Services Secretary,** while highlighting the crucial role of microfinance institutions (MFIs) in fostering financial inclusion, emphasised that they must avoid reckless lending despite their role in promoting financial inclusion.

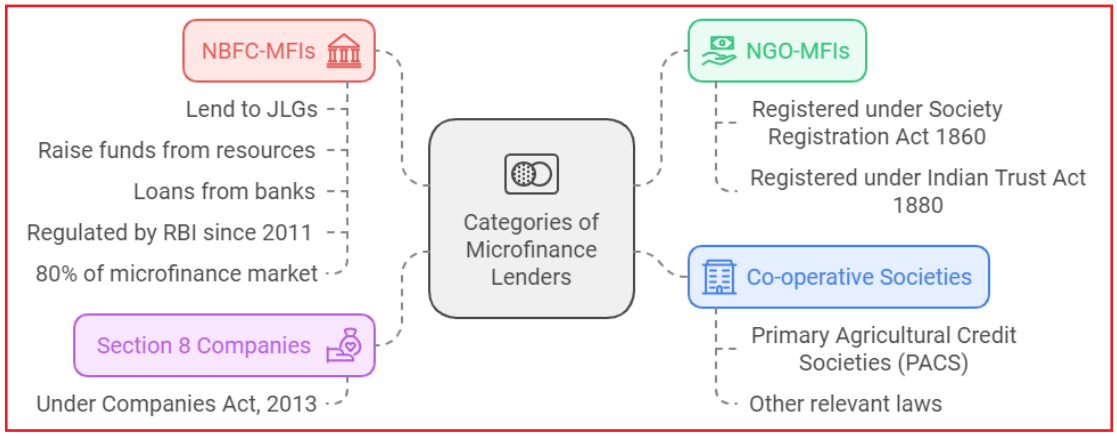
**Note:**

- Many MFIs are under scrutiny for **excessive interest rates (averaging around 24% per annum)** and high processing fees, with findings of **non-compliance** in assessing borrowers' income and repayment capacities. A report by **Sa-Dhan indicates** minor interest rate reductions won't significantly impact repayment amounts for **low-income households.**

## *What are Microfinance Institutions?*

- **About:** MFIs are financial companies that provide **small loans and other financial services to people** who don't have access to banking facilities.
  - The goal of microfinance is to help **low-income and unemployed people** become self-sufficient.
  - It serves as a powerful tool for **financial inclusion**, helping marginalised and **low-income groups**, especially women, to achieve social equity and empowerment.
- **Regulatory Framework:**
  - The **RBI** regulates MFIs under the **NBFC-MFI framework (2014),** which covers client protection, borrower safeguards, privacy, and credit pricing.
- **Status of MFIs:**
  - In India, the microfinance sector has grown significantly, with 168 **Microfinance Institutions (MFIs)** operating across **29 States, 4 Union Territories, and 563 districts.**
  - These institutions serve over **3 crore clients.**
- **Business Models Under Microfinance:**
  - **Self-Help Groups (SHGs):** SHGs are informal groups of 10-20 members specially women who save collectively to access bank loans through the **SHG-Bank Linkage Programme**.
  - **MFIs:** MFIs provide microcredit and other financial services like **savings, insurance, and remittances**.
    - Loans are typically offered through **Joint Lending Groups (JLGs)**, informal groups of 4-10 individuals involved in similar activities who jointly repay the loans.

- **Categories of Microfinance Lenders:**




Note:

# Microfinance Institutions (MFIs)

## About MFIs

- Provides financial services & small-value loans
- Targets – Low-income households, small businesses, & entrepreneurs in rural & urban areas
- Maximum annual income criteria – Rs 3 lakh (for collateral-free microloans)

## Evolution of Microfinance Sector

- **Initial Period (1974–1984):**
  - Shri Mahila Sewa Sahakari Bank established for women
  - NABARD promoted SHG linkage
- **Change Period (2002–2006):**
  - Unsecured lending norms for SHGs were aligned with secured loans
  - RBI included microfinance in the priority sector
- **Growth and Crisis (2007–2010):**
  - Private equity investments→ Rapid MFI growth
  - Microfinance Institutions Network (MFIN) formed
- **Consolidation and Maturity (2012–2015):**
  - Malegam Committee (2012) recommended regulatory changes
  - New Category of NBFCs – Non Banking Financial Company-Micro Finance Institutions (NBFC-MFIs)
  - Universal banking license to Bandhan Bank (largest microlender) by RBI (2014)
  - MUDRA Bank launched (2015)

*MFIs in India are regulated by the RBI through the NBFC-MFIs framework 2014.*

## Business Models

- **Self Help Groups (SHGs):**
  - Informal groups (10-20 members) saving together & accessing credit
  - Linked to banks through the SHG-Bank Linkage Programme
- **Microfinance Institutions (MFIs):**
  - Offer micro-credit & financial services
  - Loans through Joint Lending Groups (JLGs) of 4-10 members

## Types of MFIs

- NGO-MFIs (under Society Registration Act 1860 or Indian Trust Act 1880)
- Co-operative Societies
- Section 8 Companies (under Companies Act, 2013)
- NBFC-MFIs (accounts for 80% of microfinance market)

## Benefits

- Digitization and financial inclusion
- Self-sufficiency (entrepreneurship and improved livelihoods)
- Steady income (assets building)
- Women entrepreneurship

| Challenges of MFIs | Way Forward |
|---|---|
| High Interest Rates | Improve regulatory oversight and encourage interest rate caps |
| Over-Indebtedness of Borrowers | Strengthen credit risk assessment and promote financial literacy |
| Dependency on External Funding | Diversify funding sources through partnerships and capital markets |
| Low Financial Literacy Among Borrowers | Promoting financial education programs/campaigns |

Note:

### *What are Challenges for Microfinance Institutions (MFIs)?*

- **Regulatory Action**: The RBI has banned certain **Microfinance Institutions (MFIs)** from issuing loans due to **exorbitant interest rates**, affecting their operations and growth potential.
  - The RBI has directed MFIs to reevaluate lending practices and emphasize **affordability** in credit offerings.
- **Low Financial Literacy:** Many borrowers lack the necessary financial literacy to understand loan terms, increasing the risk of defaults and perpetuating poverty cycles.
- **Over-Indebtedness of Borrowers**: Borrowers often take loans from multiple MFIs, leading to unsustainable debt.
  - The RBI noted over **12%** of microfinance clients had four or more active loans as of March 2024, reaching **18%** in some states, risking defaults and damaging MFIs' reputations.
- **Dependency on External Funding**: MFIs frequently rely on **external funding** from banks and investors, creating vulnerabilities during economic downturns.

**RBI Guidelines Related to Microfinance Lending (2022)**

- Microfinance loans are **collateral-free for households** with incomes up to Rs 3 lakh.
- Entities must have policies for flexible repayment and household income assessment.
- The cap on lenders per borrower is removed; repayments cannot exceed 50% of monthly income.
- 75% of NBFC-MFI loans must qualify as microfinance (down from 85%).
- Entities must report income discrepancies and household income.
- No pre-payment penalties on microfinance loans; late fees apply only to overdue amounts.

**What are the Government Schemes Related to Microfinance?**

- Pradhan Mantri Mudra Yojana (PMMY)
- Self-Help Group (SHG) - Bank Linkage Program
- National Rural Livelihoods Mission (NRLM)
- Deen Dayal Upadhyaya Antyodaya Yojana
- Credit Guarantee Fund for Micro and Small Enterprises (CGTMSE)

# World Economic Outlook Report

### *Why in News?*

Recently, the International Monetary Fund (IMF) released its World Economic Outlook (WEO) report for October 2024.

- In this, the IMF reaffirmed India's growth projections at **7%** for FY2024 and **6.5%** for FY2025.

**World Economic Outlook**

- **Aboot: WEO is** a key report produced by the **International Monetary Fund** and published **biannually,** in April and October.
  - **Focus**: Provides analysis and projections for the **global economy** and **individual countries**.
  - **Purpose**: Aims to assess **economic developments**, identify **trends**, and offer **policy recommendations**.
- **Components**:
  - **Economic Growth Projections**: Forecasts for **global** and **regional** economic performance.
  - **Inflation Trends**: Insights into inflation rates and their implications.
  - **Financial Stability Assessment**: Evaluates risks to **financial systems** and **markets**.
- **Importance**:
  - Serves as a critical tool for **policymakers**, **researchers**, and **investors** to understand and navigate the **economic landscape**.

### *What are the Key Highlights of the WEO Report?*

- **India Specific Findings:**
  - **Growth Projections**: It projected India's **7%** growth for current fiscal year, highlighting slowdown from 8.2% in FY 2023-24.
    - The decline is attributed to the exhaustion of pent-up demand **(rapid increase in demand)** post-pandemic as the economy reconnects with its potential growth trajectory.
  - **Inflation**: Headline inflation (the total inflation rate in an economy, including all categories of goods and services) in India is expected to ease, projected at **4.4% for FY 2024-25** and **4.1% for FY 2025-26**.

Note:

- This aligns with global trends of decreasing inflation after peaking during the pandemic.

- **Domestic Demand**: Despite the global slowdown, **India's consumption and investment momentum remain strong**, supported by domestic policies and a favorable investment climate.
  - Recently, the Reserve Bank of India (RBI) maintained its growth projection for the current financial year at 7.2% due to strong domestic demand.
  - These factors could affect **India's growth trajectory** indirectly through external shocks.

- **Global Growth Projections:**
  - **Global growth** is forecasted to remain steady at **3.2%** in **2024 and 2025.**
    - The IMF projects the U.S. economy to grow by 2.8% in 2024 and 2.2% in 2025, while China's economy is expected to expand by 4.8% in 2024 and 4.5% in 2025.
  - **Sectoral Shifts:** Goods prices remain higher than services due to the pandemic, with a shift toward services consumption expected globally.
    - The global automotive industry is transforming as it shifts to electric vehicles (EVs), which will reduce emissions but may cause job losses in capital-intensive manufacturing sectors.

**What is the International Monetary Fund?**

- **About:**
  - **International Organization**: Promotes **global economic growth** and **financial stability**.
  - **Encourages**: **International trade** and **reduces poverty**.
  - **Established**: In **1944** following the **Bretton Woods conference**.
- **Primary Goal**:
  - Initially aimed to foster **international economic coordination** to prevent countries from **competing currency devaluation** to boost exports.
- **Expansion**:
  - Became a **lender of last resort** for governments facing **severe currency crises**.
- **Reports by the IMF**:
  - Global Financial Stability Report
  - World Economic Outlook

### *What are Challenges Highlighted by the WEO Report?*

- **Global Economic Slowdown**: Medium-term global growth projections remain weak due to **aging populations, weak investments**, and **slow productivity growth**.
  - Geoeconomic fragmentation and trade tensions pose significant risks to global supply chains and market efficiency.
- **Social Resistance to Reforms**: **Structural reforms**, while necessary, often encounter significant public resistance, which typically arises from distrust, misinformation, and behavioral factors rather than economic concerns.
- **Fiscal Constraints and Debt**: Elevated debt levels, especially in low-income and emerging market countries, require careful debt management to avoid fiscal distress.
- **Climate and Energy Transition**: The transition to clean energy, while essential, needs substantial investment and support, which is challenging for many economies under fiscal strain.

### *What are the Key Recommendations Suggested by the WEO Report?*

- **Structural Reforms**: Policymakers should prioritize reforms in **health, education, labor markets, and digitalization** to address productivity bottlenecks and enhance long-term growth.
- **Social Acceptability Framework**: Effective reform design should incorporate **public consultations, build trust, and ensure clear communication** to foster social acceptance.
- **Fiscal Policy Adjustments**: Countries need gradual and credible fiscal adjustments to ensure debt sustainability while avoiding sharp cuts that could harm growth.
  - **Public investments**, particularly in digital and infrastructure sectors, should continue for growth support.
- **Climate Resilience and Green Investments**: Expanding climate financing, particularly for vulnerable countries, and implementing carbon pricing policies with **WTO-compliant green subsidies** are crucial steps to advancing the green transition.

Note:

# World Energy Outlook 2024

### *Why in News?*

The **World Energy Outlook 2024** released by the **International Energy Agency (IEA)** presents a detailed analysis of **global energy trends**, focusing on clean energy transitions, rising energy demand, and the impacts of geopolitical conflicts.

- India's **growing energy demand**, reliance on coal, and its efforts toward achieving **net zero emissions** by 2070 are key aspects highlighted in the report.

**What is the International Energy Agency (IEA)?**

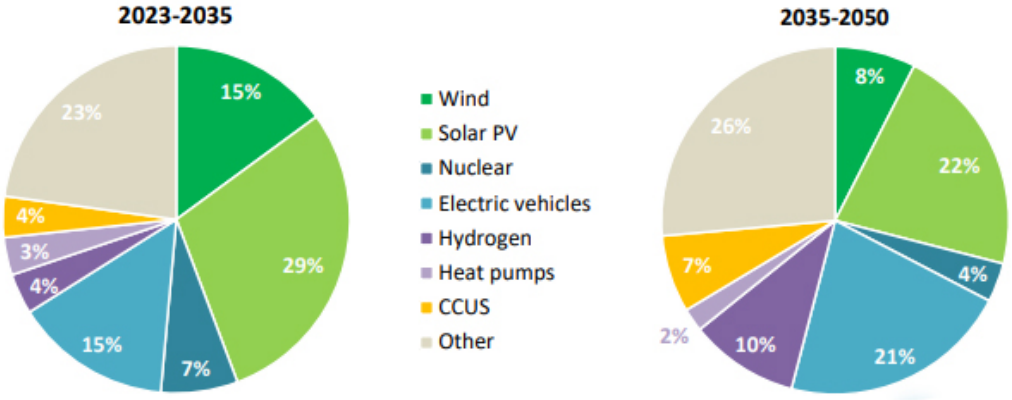
- **About:**
  - The IEA was created in 1974 by member countries of the **Organisation for Economic Co-operation and Development (OECD)** to help industrialised countries respond to the major 1973-1974 oil crisis.
    - Since then, its work has expanded to cover energy security, economic development, and clean energy.
  - The IEA is an **autonomous forum** that provides **analysis, data, and policy** recommendations to help countries provide secure and sustainable energy.
  - The IEA has **four main areas of focus:** energy security, economic development, environmental awareness, and engagement worldwide.
  - **Headquartered** in Paris, France.
- **Members:**
  - The IEA family is made up of 31 member countries, 13 association countries including **India**, and 4 accession countries.
    - A candidate country to the IEA must be a member country of the OECD.
- **Major Publications:**
  - **World Energy Outlook reports.**
  - **India Energy Outlook Report.**
  - **World Energy Investment Report.**
  - **The IEA Technology Roadmap and Policy Pathway series.**
  - The Annual Energy Efficiency Market Report.
  - The Energy Technology Perspectives.

### *What are the Major Highlights of the World Energy Outlook 2024 Report?*

- **Geopolitical Tensions and Energy Security:** Ongoing conflicts, such as the **Russia-Ukraine war** and tensions in the **Middle East**, continue to threaten global energy security.
- **Clean Energy Transitions Accelerating:** Clean energy investments have reached record highs, particularly in **solar** and **wind power.**
  - In 2023 alone, over 560 gigawatts (GW) of renewable capacity was added globally, marking a significant leap towards reducing reliance on fossil fuels.

Note:

**Figure 3.42 ▷ Clean energy technology contribution to energy combustion $CO_2$ emissions reduction in the APS, 2023-2050**

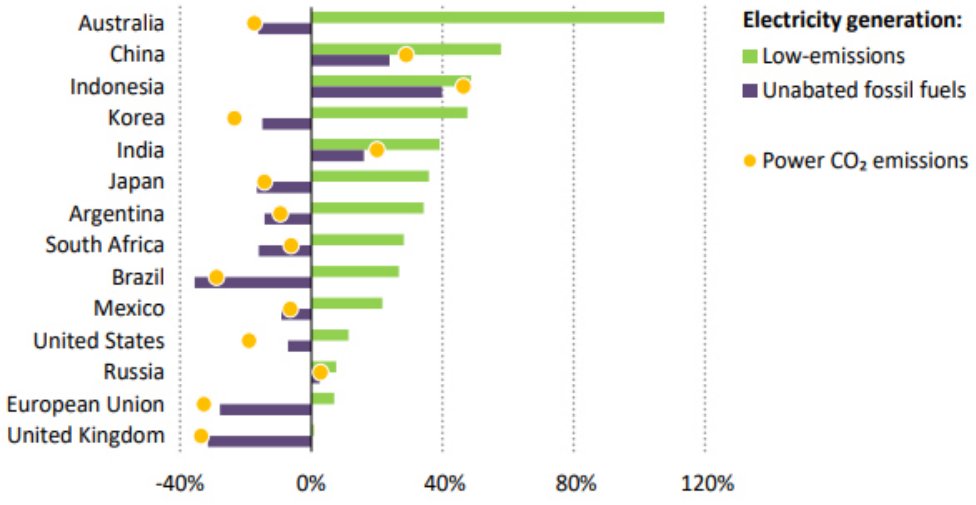



*Deployment of seven key clean energy technologies accounts for about three-quarters of $CO_2$ emissions reductions from today through to 2050*

Note: Other includes energy efficiency improvements, other fuel switching such as electrification or switching to biomass, and behaviour changes.

- **Global Power Mix Transformation:** By 2030, **renewable energy** is expected to become the **dominant source of electricity**, surpassing coal, oil, and gas.
  - **Solar photovoltaic (PV)** and wind energy are driving this shift, and low-emission energy sources, including **nuclear power**, are projected to generate over 50% of the world's electricity by the end of the decade.

**Figure 1.15 ▷ Change in electricity generation by source and power sector $CO_2$ emissions in selected regions, 2018-2023**




*Over the past five years, low-emissions sources outpaced any electricity demand growth in many regions, driving down unabated fossil fuels and cutting power sector emissions*

Note:

- **Oil and Gas Markets Facing a Surplus:** The second half of the 2020s is expected to see a surplus in oil and liquefied natural gas (LNG) supply, leading to downward pressure on prices.
- **Rising Electric Mobility and Oil Demand Shift:** The **global** electric vehicle (EV) market is rapidly expanding, with EVs expected to account for 50% of new car sales by 2030.
- **Clean Energy Technology Competition:** The report highlights **intense competition** among suppliers of clean energy technologies, such as solar PV and battery storage.
- **Impact of Climate Change on Energy Systems:** The increasingly visible effects of climate change, such as extreme weather events, are adding new challenges to global energy systems.
- **Role of Energy Efficiency:** Improving energy efficiency is key to cutting emissions, but the report shows that the **global target** of doubling efficiency by 2030 is **unlikely to be met** with current policies.

### *What are the Key Highlights Related to India?*

- **India's Economic and Population Surge:** India was the **fastest-growing major economy in 2023**, with a 7.8% growth rate. It's set to become the world's **third-largest economy by 2028.**
  - In 2023, India also surpassed China as the most populous country, despite having a fertility rate below the replacement level.
- **Surging Energy Demand:** India is set to experience the highest increase in energy demand globally over the next decade, driven by rapid economic growth and urbanisation.
  - By 2035, total energy demand is expected to **rise by nearly 35%,** with sectors such as transportation, construction, and manufacturing contributing significantly.
- **Strong Coal Dependency:** Despite its ambitious renewable energy targets, coal remains a critical part of India's energy mix.
  - By 2030, the country is projected to add nearly **60 GW of coal-fired capacity,** with coal continuing to generate more than 30% of India's electricity, even as solar PV installations expand rapidly.
- **Industrial Expansion:** India's industrial sector is poised for major growth by 2035.
  - Iron and steel production is expected to rise by 70%, while cement production is projected to increase by 55%.
- **Electricity Demand for Cooling:** The stock of air conditioners in India is projected to grow more than 4.5 times by 2035, causing electricity demand from cooling to surge.
  - The energy required for air conditioning alone in 2035 will **exceed Mexico's total projected electricity** consumption for that year.
- **Renewable Energy Growth and Storage Capacity:** India is making significant progress in expanding its renewable energy portfolio.
  - The country is on track to nearly triple its electricity generation capacity to 1,400 GW by 2035.
  - Additionally, by 2030, India is set to have the world's third-largest installed battery storage capacity, crucial for integrating variable renewables like solar and wind.
- **Net Zero Emissions Target:** India's goal of achieving net zero emissions by 2070 is a key component of its energy strategy.
  - The clean power generation in this trajectory is expected to be **20% higher than current policy** projections by 2035.
  - **Electric mobility and** hydrogen usage in industries are set to play a pivotal role in reducing coal and oil consumption, with India's $CO_2$ emissions projected to be 25% lower by 2035 compared to the Stated Policies Scenario (STEPS).
- **Electric Mobility and Oil Demand Peak:** The rapid adoption of electric vehicles (EVs) in India will contribute to a peak in oil demand by the 2030s.
  - As more EVs hit the roads, oil demand for transport will decline, even though oil use in other areas, such as petrochemicals, will continue to rise.
- **Government Policy Support:** India's clean energy ambitions are supported by strong government initiatives like the PM-KUSUM scheme for solar energy in agriculture, the National Solar Mission, and the Production Linked Incentive (PLI) Scheme for manufacturing solar PV modules.

Note:

### *What are the Challenges Highlighted in the Report?*

- **Geopolitical Risks:** Conflicts, like the war in Ukraine, threaten energy security and disrupt global energy supplies.
- **Supply Chain Issues:** Most clean energy technologies, like solar panels and batteries, are made in a few countries. This **concentration creates risks** if supplies are disrupted.
- **High Financing Costs:** It's becoming **more expensive to fund renewable energy** projects, especially in developing countries.
- **Grid Infrastructure Delays:** Many countries **lack the grid capacity** to handle the fast-growing renewable energy supply, leading to the underuse of solar and wind power.
- **Slow Progress on Energy Efficiency:** Efforts to improve energy efficiency are **not moving fast enough** to meet global targets.
- **Continued Reliance on Fossil Fuels:** Despite the growth in renewables, **coal, oil, and gas still dominate** energy use, slowing the shift to clean energy.
- **Challenges for Developing Countries:** Many poorer countries struggle to get the investments needed for clean energy, widening the gap in energy access.
- **Impact of Climate Change:** Extreme weather events, like **heat waves** and **floods**, are putting extra pressure on energy systems, increasing the need for resilience.

## Shift of Tech Giants Towards Nuclear Energy

### *Why in News?*

Recently, some **big tech companies** including **Google** signed agreements to **purchase nuclear energy** to meet rising electricity demands for **Artificial Intelligence** **data centres**.

### *Which Big Tech Companies Are Investing in Nuclear Energy?*

- **Google**: Google has entered into a corporate agreement to purchase nuclear energy from multiple **Small Modular Reactors (SMRs)** being developed by **Kairos Power**.
  - It will provide **500 MW** of carbon-free power for development of **AI technologies**.
- **Microsoft**: Microsoft signed a 20-year power purchase agreement with **Constellation Energy** to restart the **Three Mile Island nuclear power plant** **in the US.**
  - It will provide approximately **835 MW of carbon-free energy**, supporting Microsoft's goal of becoming carbon negative.
- **Amazon**: Amazon has formed **three agreements** to support nuclear energy. It includes, partnership with **Energy Northwest** for **SMRs in Washington**, investing in **SMR** development with **X-energy**, and collaborating with **Dominion Energy in Virginia.**
- **OpenAI**: OpenAI CEO **Sam Altman** has backed the nuclear **startup Oklo**, aiming for operational status by 2027.
  - Altman also invested in **Helion,** a **nuclear fusion company**, in 2021.

### *Why are Big Tech Companies Shifting to Nuclear Energy?*

- **Increasing Energy Demands from AI**: The **Electric Power Research Institute (EPRI)**, a non-profit organisation, highlighted that **data centres' electricity consumption could more than double by 2030.**
  - Data centres, which are critical for AI operations, are projected to **consume up to 9% of the United States' electricity by 2030**, more than double their current usage.
- **Limitations of Renewable Energy**: Nuclear energy provides **continuous and carbon-free power** around the clock as AI companies scale their operations.
  - Renewable energy sources such as **wind** **and** **solar** **are intermittent** in nature.
- **Sustainability**: Major tech companies are increasingly focused on reducing their **carbon footprints** and achieving **sustainability goals.**
  - E.g., Google reported a **13% rise in global greenhouse gas emissions** **in 2023**, highlighting the challenges of balancing growth with sustainability.

Note:

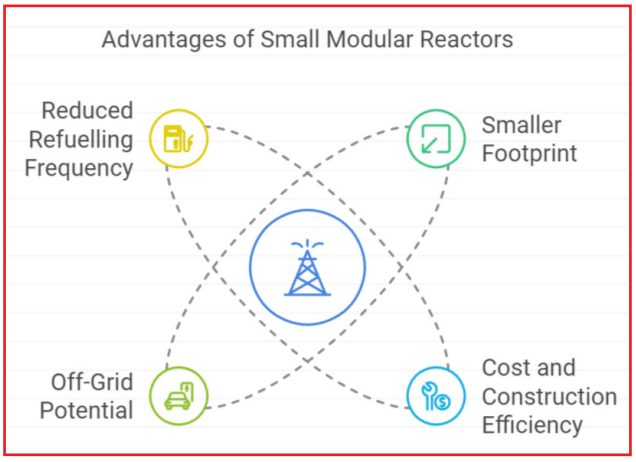
- **Strategic Partnerships and Investments:** Tech giants are forging strategic partnerships with energy companies to invest in nuclear power projects.
  - E.g., Microsoft partnered with **Constellation Energy** to revitalise the Three Mile Island nuclear plant in the US for securing long-term carbon-free energy.
- **Potential for Economic Advantage**: Investing in nuclear power now enables tech firms to secure a **reliable energy source**, which will be increasingly **valuable** as energy **competition intensifies**.
- **Climate Change Concern**: Concerns about climate change and energy reliability make nuclear power **more appealing**, prompting tech companies to justify their investments in this sector.

**What is the Nuclear Energy Scenario in India?**

- India aims to **triple its nuclear power capacity to 22,480 MW by 2032**, with a goal of deriving **25%** of its electricity from **nuclear sources by 2050.**
- REC (Rural Electrification Corporation) plans to allocate **Rs 6 trillion** to renewable and nuclear projects by **2030**.
- NTPC is partnering with NPCIL (Nuclear Power Corporation of India) to form **Anushakti Vidhyut Nigam**, focusing on building and operating **nuclear power plants**.
- India plans to establish **10 new reactors** and collaborate with private players to explore SMRs and innovate in nuclear technologies.

### *What are Key Points about Small Modular Reactors (SMRs)?*

- **About**: SMRs are advanced nuclear reactors that are about **one-third the size** of traditional nuclear reactors.
  - **Small Size (S)**: Power capacity of up to **300 MW(e).**
  - **Modular (M)**: Components are **prefabricated and transported** to the installation site.
  - **Nuclear Reactors (R)**: Use nuclear fission to generate low-carbon electricity.
- **Advantages**:
  - **Smaller Footprint**: SMRs can be installed in locations **unsuitable for larger reactors.**
  - **Cost and Construction Efficiency**: Prefabrication and modular design **reduce construction time and costs.**
  - **Off-Grid Potential**: SMRs, especially **microreactors (up to 10 MW),** can provide power in remote areas.
  - **Reduced Refuelling Frequency**: SMRs may only need refuelling every **3 to 7 years,** with some designs lasting up to **30 years** without refuelling.
- **Global Adoption:** Russia's floating SMR power plant, the **Akademik Lomonosov**, began commercial operation in **2020**.
  - India aims to deploy 40-50 SMRs named Bharat Small Modular Reactor to replace captive thermal power plants
  - Other countries like **Argentina, Canada, China, South Korea, and the U.S.** are also advancing SMR projects.
  - More than **80 commercial SMR** designs are being developed globally for various applications, including **electricity generation, heating, water desalination, and industrial steam.**
- **Challenges**: Although SMRs have a lower upfront capital cost per unit, their economic competitiveness **still needs to be proven in real-world deployments**.

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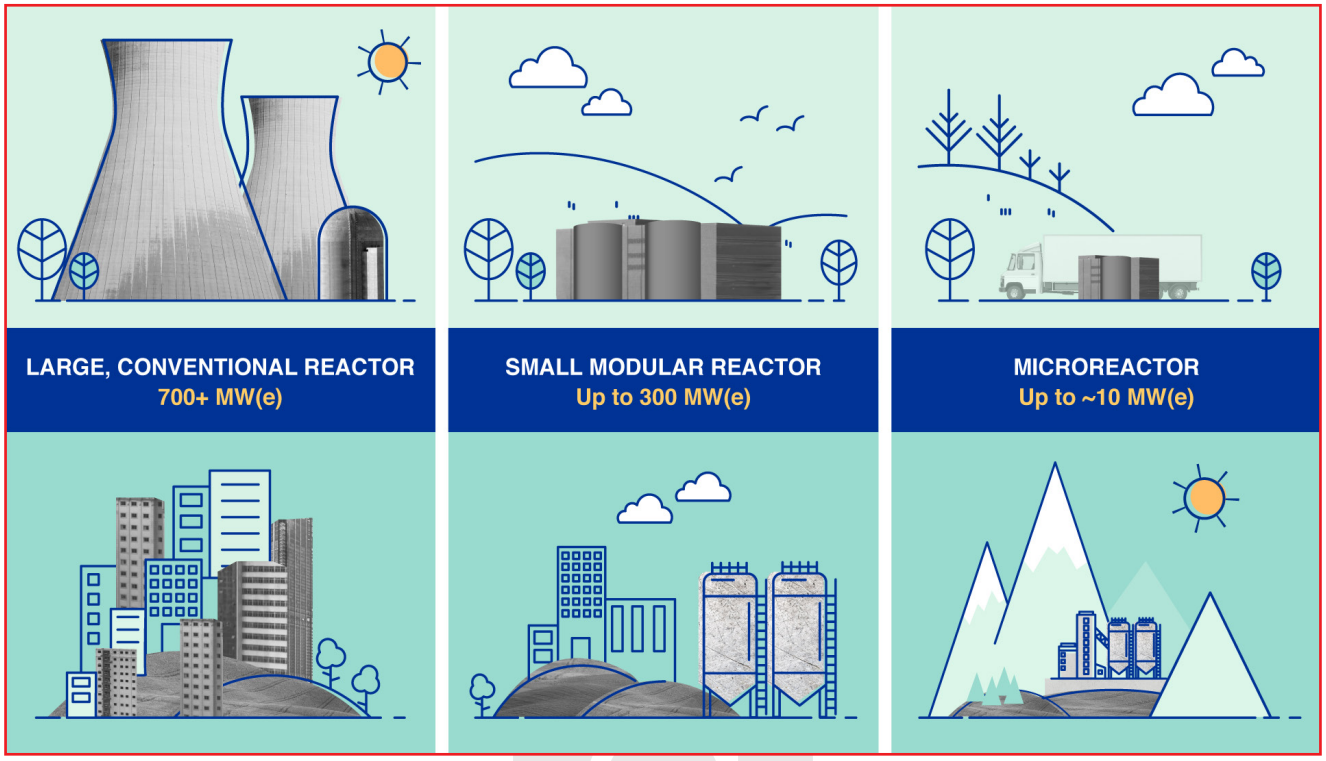



### *What are Advantages of Nuclear Energy?*

- **Low-Carbon Solution**: Nuclear energy is a **reliable and consistent source** of power that is not affected by weather conditions, making it suitable for meeting energy demands continuously.
- **Small Land Footprint**: Nuclear facilities occupy **significantly less land** compared to other renewable energy sources.
  - A typical **1,000 MW nuclear plant requires only about one square mile**, whereas wind farms and solar plants need **360 and 75 times more land**, respectively.
- **High Power Output:** Nuclear power plants have a **high capacity factor**, producing maximum output approximately **93%** of the time.
- **Minimal Waste Production**: Nuclear energy produces **relatively small amounts of waste** compared to other energy sources.
  - Advanced reactor designs are being developed that can utilise used fuel, potentially reducing waste even further.

### *What Concerns are Associated with Nuclear Energy?*

- **Carbon Dioxide Emissions:** Nuclear power reactors themselves do not produce direct carbon dioxide emissions during operation but the processes of **mining and refining** **uranium ore**, as well as constructing nuclear power plants, require significant energy sourced from fossil fuels.
- **Reputation Issues**: Nuclear energy is often linked to **nuclear weapons**, which contributes to public fears about **proliferation and security risks**.
- **Safety Concerns:** High-profile accidents, such as **Three Mile Island Incident (1979)**, **Chernobyl Disaster (1986)** **and** **Fukushima Accident (2011)** have instilled fear about the safety of nuclear power plants, leading to widespread scepticism about their safety.
  - Environmental groups, such as **'Friends of the Earth,'** have criticised nuclear energy highlighting issues like **accidents,** **radioactive leaks,** and the challenges of **nuclear waste management.**
- **Cost and Financial Viability**: Nuclear power is often associated with **high initial construction and operational costs**, making it less appealing compared to alternative energy sources.

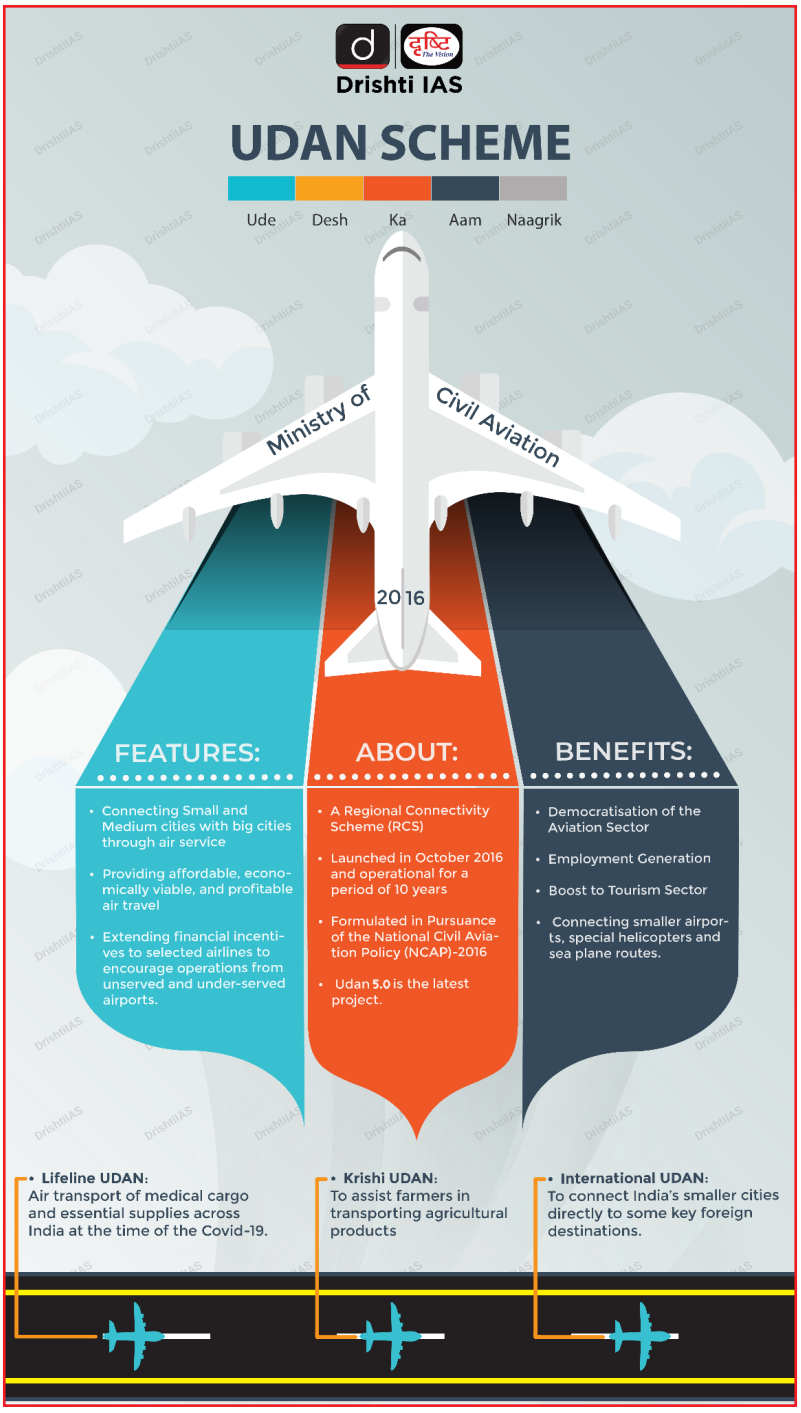
Note:

# New Airports Under RCS-UDAN

### *Why in News?*

Recently, the Prime Minister inaugurated three airports under the **Regional Connectivity Scheme (RCS-UDAN)** in **Rewa (Madhya Pradesh), Ambikapur (Chhattisgarh), and Saharanpur (Uttar Pradesh)**.

- These airports aim to enhance air travel accessibility and will soon commence flights, furthering the mission of improving infrastructure in underserved regions.




Note:

### *What is the Regional Connectivity Scheme (RCS-UDAN)?*

- **About:** Ude Desh Ka Aam Naagrik (UDAN) was launched as a **Regional Connectivity Scheme (RCS)** under the Ministry of Civil Aviation in 2016.
  - The scheme connects remote areas, promoting tourism and economic growth, and has facilitated over 144 lakh passenger travels in its seven years.
    - **It supports last-mile connectivity** and addresses unserved air routes.
  - The **first RCS-UDAN flight** was inaugurated by the Prime Minister in 2017, **connecting Shimla to Delhi.**
- **Versions of UDAN:**
  - **UDAN 1.0:** Awarded 128 flight routes to connect 70 airports (36 newly operational).
  - **UDAN 2.0:** Inclusion of **helipads for the first time.**
  - **UDAN 3.0:** Introduce seaplanes for water aerodromes, enhancing connectivity in the North-East Region.
  - **UDAN 4.0:** Focused on North-Eastern regions, hilly states, and islands, facilitating operations for helicopters and seaplanes.
  - **UDAN 5.0:** Prioritises Category-2 and Category-3 aircraft.
    - **UDAN 5.1:** Boosts **helicopter routes by increasing funding**, lowering airfare caps, and requiring one destination to be a priority area.
    - **UDAN 5.2:** Enhances last-mile connectivity with small aircraft, boosting tourism in remote areas.
    - **UDAN 5.3 and 5.4:** To operationalize previously discontinued routes, further enhancing point-to-point air connectivity.

**Other Major Initiatives for Aviation Sector**

- **National Civil Aviation Policy (NCAP):** The NCAP seeks to make flying affordable and accessible, foster civil aviation growth, promote tourism and employment, enhance regional connectivity through fiscal support and infrastructure, and improve business ease via deregulation and e-governance.
- **Open Sky Agreement:** The bilateral agreements between **two countries negotiating to provide rights for airlines** to offer international passenger and cargo services.
- **Digi Yatra for Seamless Travel:** This digital platform facilitates a contactless experience for air travellers, with features like facial recognition and paperless check-in.

## MSP and its Legalization

### *Why in News?*

Recently, the Cabinet Committee on Economic Affairs (CCEA) increased the **Minimum Support Price** for six rabi crops **(wheat, barley, gram, lentil, rapeseed, mustard, and safflowerfor).**

- The **increase of MSP ignited debate** around the farmers' demand **for the legalisation of MSP** and its effect on the agricultural ecosystem.

Better support

PTI

The Cabinet increased the minimum support prices for rabi crops

| Crop | MSP for rabi 2025-26* | MSP for rabi 2024-25* | Increase in MSP |
|---|---|---|---|
| Wheat | ₹2,425 | ₹2,275 | ₹150 |
| Barley | ₹1,980 | ₹1,850 | ₹130 |
| Gram | ₹5,650 | ₹5,440 | ₹210 |
| Lentil (masoor) | ₹6,700 | ₹6,425 | ₹275 |
| Rapeseed & mustard | ₹5,950 | ₹5,650 | ₹300 |
| Safflower | ₹5,940 | ₹5,800 | ₹140 |

(*per quintal)

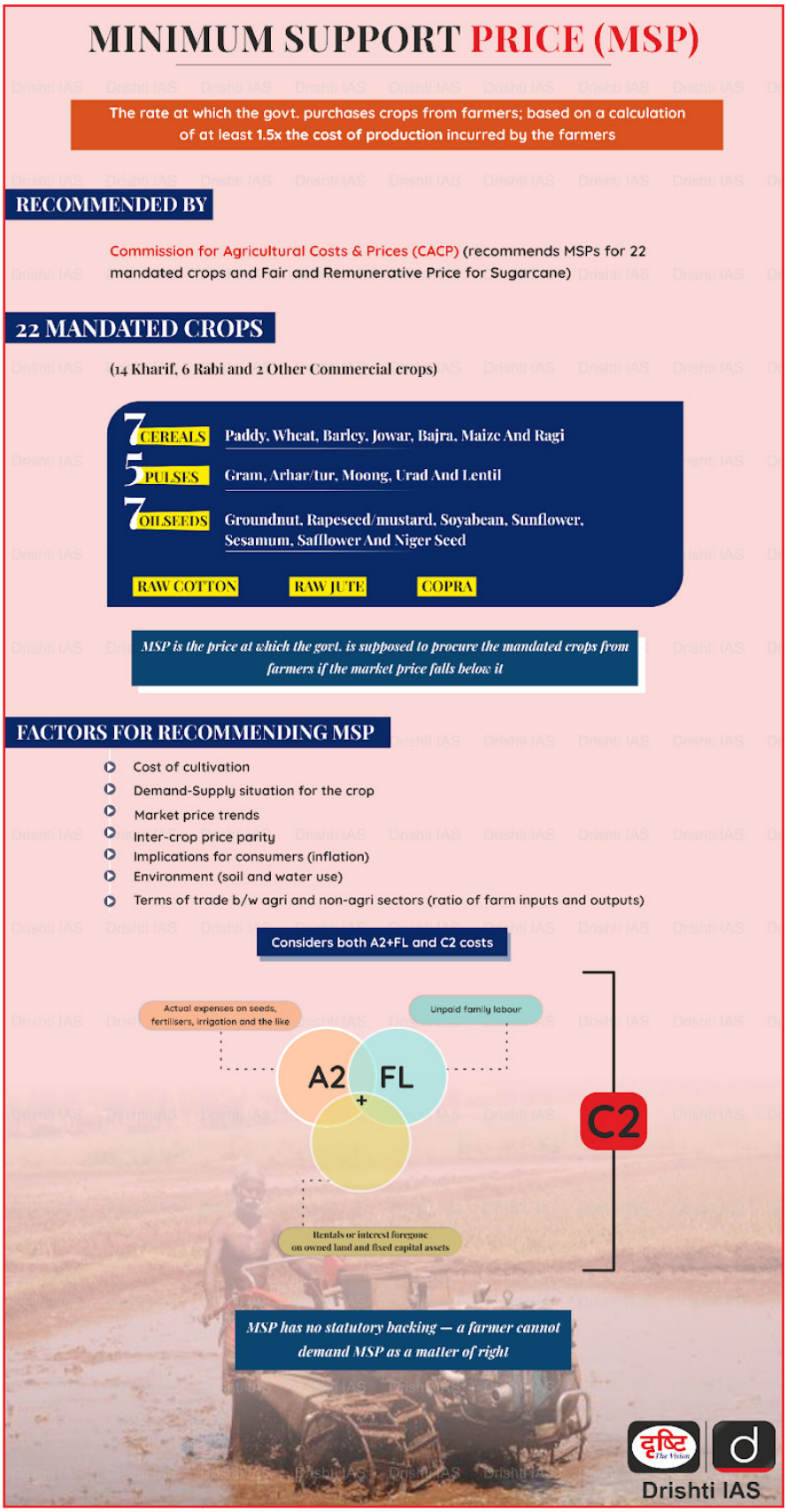
**Cabinet Committee on Economic Affairs (CCEA)**

- It is chaired by **the Prime Minister**, and **sets priorities for public sector investments.**
- It continuously **reviews economic trends** to develop an integrated economic policy framework and oversees policies and activities in the economic field, including foreign investment, requiring high-level decisions.

Note:

### *What is the Minimum Support Price?*

- **About:**
  - The MSP **regime was established in 1965** by setting up the **Agricultural Prices Commission (APC)** (later renamed as CACP) as a form of market intervention to enhance **national food security** and protect farmers from significant decline in market prices.
- **MSP Calculation:**
  - **The CACP** calculates **three categories of production costs for each crop**, both at the state level and as all-India averages.
    - **A2:** Covers all paid-out costs directly incurred by the farmer in cash and kind on seeds, fertilisers, pesticides, hired labour, leased-in land, fuel, irrigation, etc.
    - **A2+FL:** Includes an estimated value of unpaid family labour with A2.
    - **C2:** It is a **more comprehensive cost** that factors in **rentals and interest for owned land and fixed capital assets**, on top of A2+FL.
  - The government maintains that the **MSP was fixed at a level of at least 1.5 times the all-India weighted average Cost of Production (CoP)**, but it calculates this cost as 1.5 times the A2+FL cost.




Note:

### *What are the Concerns Related to MSP in India?*

- **Limited Coverage:** According to the **Shanta Kumar Committee's 2015 report**, only **6% of farmers benefit** from the MSP. Mainly those in regions with access to procurement infrastructure, such as Punjab and Haryana, while a large number of farmers in other states are left out.
- **Skewed Crop Focus:** The MSP system is **focused primarily on a few crops, especially rice and wheat,** leading to a **lack of incentive for farmers to grow other crops**, which affects crop diversification and can contribute to overproduction of these staple crops.
- **Overburdening Procurement System:** The MSP often leads to **large-scale government procurement**, especially of rice and wheat, **causing storage challenges and wastage**, and straining the **Food Corporation of India's (FCI)** resources.
- **Environmental Impact:** The **focus on certain water-intensive crops like rice** (supported by MSP) leads to **environmental concerns** such as groundwater depletion, particularly in regions like Punjab.
- **Dependence on Middlemen:** In some cases, even when MSP is declared, farmers face difficulties in **accessing procurement agencies directly**, leading to dependence on middlemen who may exploit them by offering lower prices.

### *What are the Needs and Challenges for Legalising MSP in India?*

- **Need:**
  - **Income Security for Farmers:** Legalising MSP would **ensure guaranteed income for farmers,** protecting them from fluctuations in market prices.
    - Ensured income is crucial as **many farmers face distress due to price crashes**, especially during bumper harvests .
  - **Boost to Agricultural Investment:** A legally guaranteed MSP can **encourage farmers to invest more in agricultural inputs,** modern technology, and sustainable farming practices.
    - With assured returns, **farmers are more likely to adopt measures that improve productivity and sustainability.**
  - **Reduction of Rural Poverty:** By offering a stable price, **legal MSP can reduce rural poverty** and improve the standard of living for small and marginal farmers.
  - **Stabilizing Agricultural Markets:** MSP serves as a price stabilization tool, preventing the volatility of crop prices in open markets and **reducing inflation burden on the consumer.**
    - The **legal backing of MSP** could smoothen supply chain and ensure consistent crop procurement.
  - **Mitigation of Distress Sales:** Farmers often resort to distress sales due to a lack of remunerative prices. The **legally enforcing MSP could prevent distress sale.**
- **Challenges:**
  - **Fiscal Burden on the Government:** Legalising MSP across all crops would **require the government to procure large quantities at assured prices**, significantly increasing the fiscal burden.
    - As per government**,** extending MSP to all farmers and crops could cost over **Rs 10 lakh crore annually,** which is financially unviable for the government.
  - **Market Distortion:** Legal MSP could distort free market mechanisms by discouraging private traders and businesses from participating in the agricultural market.
    - Excessive reliance on **MSP could disrupt competitiveness** in the domestic and export market and leads to **legal battle for India at WTO.**
  - **Storage and Infrastructure Constraints:** Legalising MSP would require large-scale procurement, which in turn necessitates substantial improvements in storage and logistics infrastructure.
    - The government faces storage limitations, with **existing infrastructure being insufficient to handle** an expanded procurement system for all crops .
  - **Implementation Challenges:** Implementing **MSP uniformly across India** is **challenging due to diverse agricultural practices and climates,** making it hard to set MSP levels that benefit all farmers,
    - Differences in production costs across states further complicate uniform MSP enforcement .
  - **Overproduction and Environmental Impact:** Legalising MSP might incentivize overproduction of certain crops like wheat and rice, which are already extensively procured under the MSP system.

Note:

- This could lead to environmental degradation, including groundwater depletion and soil pollution.

# Haber-Bosch Process and Production of Fertilizers

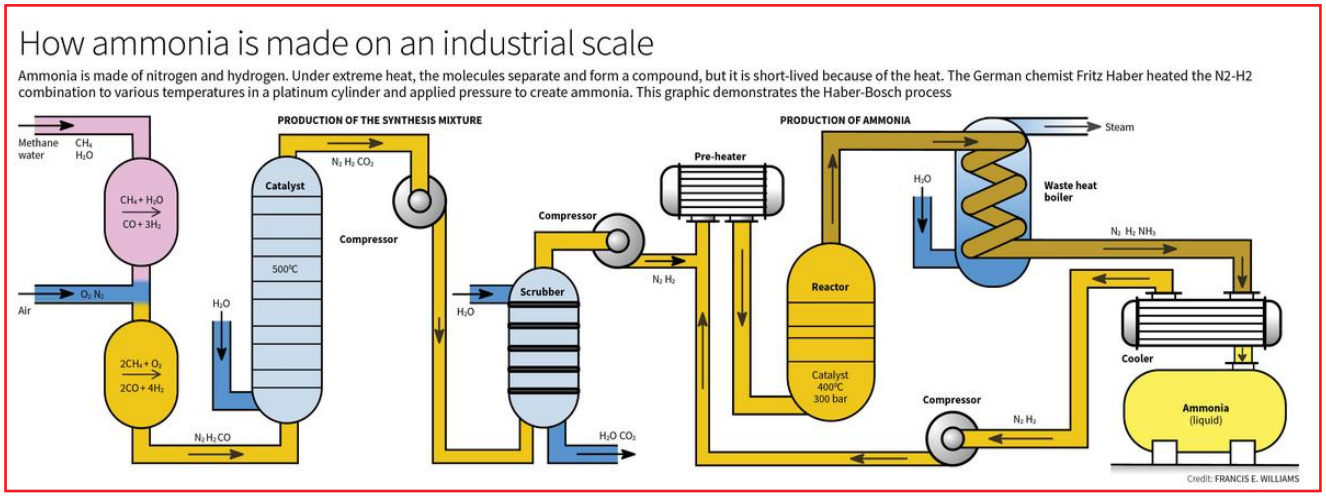
### *Why in News?*

Through **the Haber-Bosch process**, a hundred million tonnes of **nitrogen** **are extracted from the atmosphere and transformed into fertiliser,** resulting in the addition of 165 million tonnes of reactive nitrogen to the soil.

- In comparison, **natural biological processes** generate an estimated **100-140 million** tonnes of reactive nitrogen annually.

### *What is the Haber-Bosch Process?*

- **About:**
  - The **Haber-Bosch process** is an **industrial method for synthesizing ammonia** by combining nitrogen from the air with hydrogen, significantly contributing to fertiliser production.
- **Process:**
  - **Experimental Setup:**
    - The reaction occurs in a steel chamber at a pressure of 200 atm, allowing the **nitrogen-hydrogen mixture to circulate** effectively.
    - A specially designed valve withstands high pressure while allowing the $N_2$-$H_2$ mixture to flow through.
    - Haber implemented a system to transfer heat from the outgoing hot gases to the incoming cooler gases, optimizing energy efficiency.
  - **Catalyst Development:**
    - Haber **initially experimented with various materials** looking for suitable filament materials as Catalyst to speed up reaction.
    - Among the tested materials was **osmium, which, when placed in the pressure chamber with the $N_2$-$H_2$ mixture,** successfully cracked the nitrogen triple bond, **allowing for ammonia production.**
      - **Uranium** was another effective catalyst but both osmium and uranium were too expensive for large-scale applications.
      - The search for a **more cost-effective catalyst led to the identification of** specific iron oxides as viable options.
- **Applications:**
  - **Manufacturing:** As a refrigerant in industrial refrigeration systems and air conditioning.
  - **Household:** An ingredient in household **cleaning products, i**ncluding glass and surface cleaners.
  - **Automotive fuel:** An internal combustion **engine powered by ammonia is being explored** as an alternative propulsion technology.
  - **Chemicals:** A precursor for various chemicals, including nitric acid and explosives.
- **Key Milestones:**
  - **In 1913,** the **German chemical company opened its first ammonia factory**, marking a significant milestone in the production of fertilizers.
  - **Fritz Haber**, a German chemist, won the **Nobel Prize in Chemistry in 1919** for his work on **ammonia synthesis.**




Note:

### *What is the Nitrogen Cycle?*

- **About:**
  - Plants obtain reactive nitrogen from the soil by **absorbing nitrogen-based minerals like ammonium (NH4+) and nitrate (NO3–),** dissolved in water.
  - Humans and animals rely on plants for **nine essential nitrogen-rich amino acids,** as nitrogen makes up about 2.6% of the human body.
  - After being ingested, nitrogen **returns to the soil through excreta and decomposition of dead organisms,** but some nitrogen escapes back into the atmosphere as molecular nitrogen, leaving the cycle incomplete.
- **Natural Availability of Nitrogen:**
  - **Lightning:** Lightning bolts **possess enough energy to break the N2 bond,** combining nitrogen with oxygen to form nitrogen oxides (NO and NO2).
    - These **oxides mix with water vapour**, forming **nitric and nitrous acids**, which fall as **acid rain**, providing reactive nitrogen to the soil.
  - **Biological Fixation:** Some bacteria, like **Azotobacter and Rhizobia**, can **convert atmospheric nitrogen into reactive nitrogen**.
    - These bacteria often have **symbiotic relationships with plants such as legumes or aquatic ferns** like Azolla, which enhance nitrogen availability in the soil, making them valuable for agriculture.
- **Process of Nitrogen Replenishment:**
  - While **legumes can fix nitrogen naturally**, most **staple crops like rice,** wheat, corn, potatoes, cassava, bananas, and other fruits and vegetables **depend on soil nitrogen for growth.**
  - As **human populations grow,** the **depletion of nitrogen in agricultural soils accelerates**, requiring the use of fertilizers to restore soil fertility.
- **Historical Fertilization Methods:**
  - Farmers historically cultivated legumes to naturally replenish nitrogen in the soil or applied ammonia-based fertilizers to increase crop yields.
  - They also **utilized ammonium-rich minerals from volcanic eruptions** and naturally occurring nitrates found in caves and rocks to enhance soil fertility.

### *What is the Impact of Industrial Production of Fertilizers?*

- **Pros:**
  - The Haber-Bosch process enabled the **mass production of synthetic fertilizers,** significantly **boosting global food supply** during the 20th century, contributing to increased life expectancy.
  - An **estimated one-third of the world's population relies on food produced** using **nitrogen fertilizers.**
    - **Without the industrial production of ammonia** from nitrogen and hydrogen, it would have been **impossible to meet the growing global demand for food.**
- **Cons:**
  - Synthetic nitrogen fertilizers, although critical for food production, **have adverse environmental impacts.**
  - Excess nitrogen application leads to **plant over-nourishment, boosting bacterial activity and accelerating nitrogen release** into the atmosphere.
  - This **contributes to environmental degradation,** including **acid rain**, land corrosion, and surface water deoxygenation through runoff, causing excessive weed growth in water bodies.

## Looking Beyond Yield in Agriculture

### *Why in News?*

There is a need to **measure agricultural success** by its ability to **nourish people, sustain livelihoods**, and **protect our planet** for future generations and **not** merely emphasising on **Yield**.

### *Why are Issues Associated with Sole Focus on Yield in Agriculture?*

- **Micronutrient Deficiencies**: The push for **high-yielding** rice and wheat varieties has reduced their **nutritional content.**
  - An **ICAR study** found **zinc levels** in rice dropped by **33%** and **iron by 27%**, worsening **micronutrient** deficiencies.
- **Public Health Concerns**:The decline in nutritional quality of foodgrains is linked to rising **health issues.**

Note:

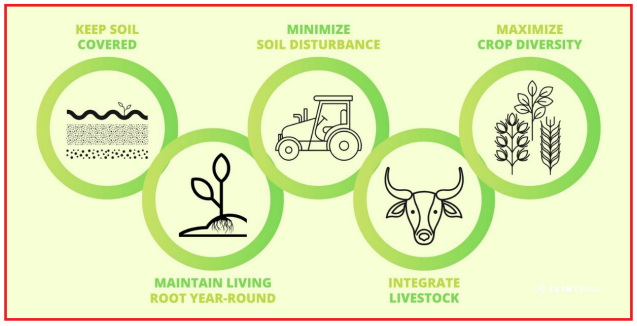
- The **NFHS-5 (2019-2021)** highlights that **35.5%** Indian children under five are **stunted, 19.3%** are **wasted** and **67.1%** are **anaemic.**

- **Fertiliser Dependency**: The response of crops to **fertilisers** has declined by **over 80% since the 1970s.**
  - Farmers have to use more fertilisers to achieve the same yield, raising **input costs** without a proportional increase in income.
- **Ignoring Crop Response Across Season:** A singular focus on **maximising yield** may help with seasonal outputs but may **not maximise output** the **whole year round.**
  - Little regard is paid to the **on-field symbiotic relations** between crops within and across seasons which compromises **overall nutritional output and profit** over the year.
- **Loss of Biodiversity**: Focusing solely on **yield** structurally promotes only a **few high-yielding varieties** of seeds everywhere, leading to **biodiversity loss.**
  - For instance, India has lost about 1,04,000 varieties of rice since the **Green Revolution** and only **6,000** of the **older varieties survived**.
    - It makes the farming system more vulnerable to **pests, diseases**, and the impacts of **climate change.**
- **Dwindling Agricultural Resilience:** **Monoculture farming** practices are vulnerable to events such as intensifying **floods, droughts, and heat waves** which has undermined agricultural resilience.
  - Many local varieties of crops have proven to be **more resilient** to extreme conditions.
  - Monoculture is the agricultural practice of growing a **single crop species** over a large area for multiple seasons
- **Disruption of Ecological Balance:** Monocropping ignores the benefits of **intercropping** and **crop rotations** which can diminish long-term agricultural productivity and profitability.
  - Intercropping **sugarcane with vegetables** in Andhra Pradesh improved income stability throughout the year but monocropping ignores this.
- **Neglect of Nutritious Crops:** The prioritisation of high-yielding rice and wheat varieties has led to the decline of **resilient and nutritious crops.**
  - For instance, the area sown under **coarse cereals** such as **millets** has **dropped by 10 million hectares** since the 1950s, whereas the share of **rice and wheat** has gone up by **13 million hectares and 21 million hectares**, respectively.
- **Income Volatility**: The reliance on a **single crop** for high yields can result in **economic instability**, particularly when **crop prices fluctuate** or climate conditions reduce yields.

### What are Agricultural Indicators?

- Agricultural indicators are **measurable variables** that provide insights into the **health, performance, and sustainability** of agricultural systems.
  - They help assess various aspects of agriculture, including **productivity, economic viability, environmental impact, and social factors**.
- **Some Key Agricultural Indicators:**
  - **Crop yield:** Crop yields refer to the amount of **harvested produce per unit of land** used for crops.
  - **Livestock Farming:** It is the practice of **raising animals** for their products. E.g, meat or eggs.
  - **Input Efficiency:** It implies production of **high quantity and quality of food**, from using only **finite resources** as inputs E.g., land, water, nutrients, energy etc.
  - **Soil Health:** It involves **nutrient availability**, oxygen availability to roots, **nutrient retention capacity** etc that determine how well the soil can function.
  - **Water Use Efficiency:** It refers to the amount of **carbon stored as biomass or grain produced** for each unit of water used by the crop.
  - **Nutrition:** Agriculture should focus on producing **healthy food** rich in micronutrients such as **iron, zinc, vitamin A, and folate**, which are vital for various bodily functions.
  - **Greenhouse Gas Emissions:** Techniques such as **precision farming, organic agriculture, agroforestry, and conservation tillage** should be adopted that help minimise inputs like fertilisers and fossil fuels, thereby reducing emissions.
  - **Resilience to Climate Change:** Adjusting planting dates, selecting **climate-resistant crop varieties** and agroforestry can increase agricultural resilience to climate change impacts.

Note:




### *How Looking Beyond Yield Can Improve Agriculture?*

- **Holistic Development**: Agriculture indicators should not be determined only by the **Ministry of Agriculture**, but collectively by the **Ministries of Health, Agriculture, Water, and Environment.**
  - It will ensure that agricultural policies account for diverse aspects like **public health, water management, and environmental conservation**.
- **Nutritional Security**: Transitioning from measuring output in terms of quantity **(kg/hectare)** to **nutritional output per hectare** ensures that food production contributes directly to **human well-being**.
  - This addresses critical issues like **malnutrition and micronutrient deficiencies** by prioritising the **quality of food**, not just the quantity.
- **Soil Health and Biological Activity**: Metrics such as **soil biological activity** and **soil organic carbon** are vital indicators of long-term **soil fertility**.
  - Maintaining healthy soil ensures sustained productivity without over-reliance on **chemical inputs**, which degrade **soil quality** over time. E.g., **Soil health cards**.
- **Water-Use Efficiency**: Improving **water efficiency** helps conserve a critical resource, making agriculture more **resilient** in the face of **climate change.**
  - Telangana's AI-powered **'Saagu Baagu'** pilot demonstrates how technology can **optimise irrigation** and improve water-use efficiency.
- **Crop Diversification:** Growing **more than one crop** in an area ensures that regions don't become overly dependent on a **single crop**, reducing vulnerability to pests, diseases, and price fluctuations.
  - **Landscape Diversity Score** should be developed to assess the **regional diversity of crops.**
- **Income Diversification:** Crop diversification, combined with **income diversification** like **livestock rearing and intercropping,** creates more economically resilient farming systems.

**What are Government Initiatives for Sustainable Agriculture?**

- National Mission on Sustainable Agriculture
- Paramparagat Krishi Vikas Yojana (PKVY)
- Sub-mission on AgroForestry (SMAF)
- Rashtriya Krishi Vikas Yojana
- Mission Organic Value Chain Development for North Eastern Region (MOVCDNER)

## 3 Years of PM GatiShakti National Master Plan

### *Why in News?*

Recently the **Prime Minister** praised the successful completion of 3 years of **PM GatiShakti National Master Plan**, calling it a **transformative step** in India's infrastructure growth.

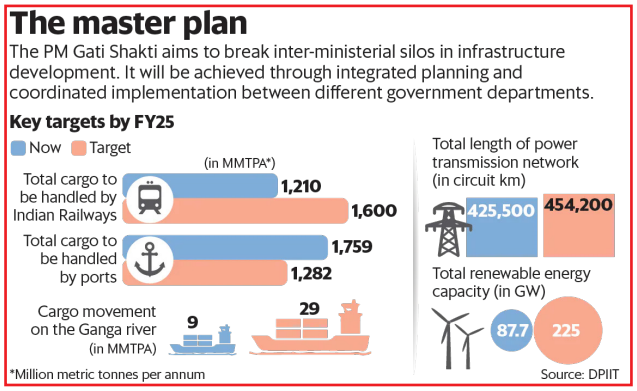
- The Prime Minister highlighted that GatiShakti is enhancing **multimodal connectivity and boosting efficiency** across sectors, benefiting logistics, job creation, and innovation.

### *What is PM GatiShakti National Master Plan?*

- **About:**
  - The PM Gati Shakti National Master Plan, launched in October 2021 is a transformative Rs. 100 lakh crore initiative aimed at **revolutionising India's infrastructure** over the next five years.
  - It has been developed as a **Digital Master Planning tool** by **BISAG-N (Bhaskaracharya National Institute for Space Applications and Geoinformatics).**
    - It has been prepared in a **dynamic Geographic Information System (GIS) platform** wherein data on specific action plans of all the Ministries/ Departments have been incorporated within a comprehensive database.
  - The plan seeks to **accelerate project completion**, reduce timelines, and enhance India's global competitiveness by breaking down inter-ministerial obstacles.

Note:

- The vision of PM GatiShakti is to **create a world-class infrastructure** that improves the **ease of living, boosts** economic growth and makes Indian businesses more competitive.




➢ **Key Features:**

- **Digital Integration**: It is a **digital platform** designed to **integrate the efforts of 16 ministries**, ensuring seamless infrastructure planning and execution across sectors.
- **Multi-Sector Collaboration**: The platform incorporates infrastructure initiatives from several major programs, including **Bharatmala, Sagarmala**, inland waterways, dry ports, and **UDAN.**
- **Economic Zones**: Focuses on developing key economic areas such as **textile clusters**, pharmaceutical hubs, **defence corridors**, and agricultural zones to boost economic productivity.
- **Use of Technology:** Advanced spatial planning tools and **ISRO satellite imagery**, developed by BiSAG-N, provide data-driven insights for project planning and management.

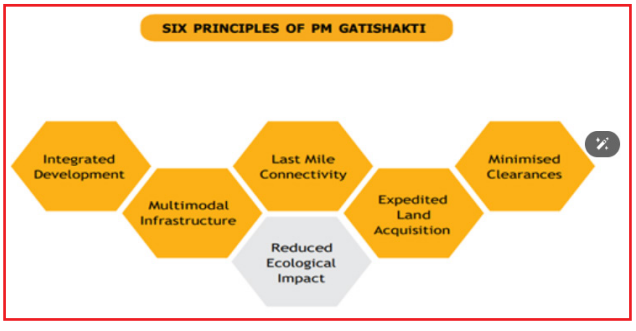
➢ **Key Engines Driving PM GatiShakti:**

- The National Master Plan revolves around **seven primary sectors** that drive economic growth and connectivity:

- These key engines are further supported by **complementary sectors** like energy transmission, IT communication, bulk water and sewerage, and social infrastructure.
- Together, these engines are designed to work in synergy, **ensuring seamless logistics and connectivity** across the nation.

➢ **The 6 Pillars of PM GatiShakti:**

- **Comprehensiveness**: The plan integrates existing and planned initiatives across all ministries through a centralised portal, offering **visibility into critical data** and enabling efficient planning.
- **Prioritisation**: Ministries can prioritise projects more effectively by **leveraging cross-sectoral interactions**, ensuring that resources are allocated optimally based on national priorities.
- **Optimisation**: The plan identifies key gaps in infrastructure, helping to select the most efficient routes for **transportation, reducing costs**, and minimising delays.
- **Synchronisation**: Coordination across ministries ensures that projects are aligned and work in harmony, **avoiding delays** caused by silos and uncoordinated efforts.
- **Analytical Capabilities**: With over 200 data layers available on the **GIS-based platform,** PM GatiShakti provides comprehensive spatial planning tools for better decision-making and infrastructure visibility.
- **Dynamic Monitoring**: Real-time project monitoring through **satellite imagery** ensures that ministries can track progress and make necessary adjustments to keep projects on schedule.




Note:

### *What are the Achievements of PM GatiShakti National Master Plan?*

- **District-Level Expansion:** PM GatiShakti has extended its **platform to 27 aspirational districts**, with plans to reach 750 districts in the coming months.
- **Technological Integration:** The use of **geospatial tools and dynamic data layers** has significantly improved real-time infrastructure planning and decision-making.
- **Global Showcasing:** The GatiShakti tool has been showcased to **30 countries in Central Asia and Southeast Asia**, and was recently highlighted at the **UNESCAP conference in Hong Kong** and the **Asia Pacific Business Forum.**
- **Social Sector Integration:** Ministries such as the Ministry of Health and Family Welfare have identified **internet-show areas** and mapped sites for new healthcare facilities using **NMP**.
  - Uttar Pradesh has utilised the platform to select sites for new hospitals and wheat purchase centres.
- **Rural and Urban Impact:** Districts like Dahod in Gujarat have used satellite imagery for planning **low-cost drip irrigation systems,** while Arunachal Pradesh has leveraged data visualisation to **develop tourist potential** around the Bichom Dam.
  - In cities like Kanpur, Bengaluru, and Srinagar, city **logistics plans** have been developed to improve first- and last-mile connectivity.
- **Employment and Vocational Training:** The **Ministry of Skill Development** and Entrepreneurship is using the Gati Shakti approach to identify locations for setting up training institutes near industrial clusters and special economic zones.

### *What are the Challenges of PM GatiShakti National Master Plan?*

- **Data Integration and Accuracy:** Combining **real-time data** from multiple ministries is difficult, and some of the data is **outdated or incomplete**, making planning less effective.
  - For example, while **land records are digitised in 13 states,** the rest lag behind, slowing down project execution.
- **Inter-Ministerial Coordination:** Ministries **often work in silos,** causing delays and resource conflicts for major projects like roads and railways.
  - A lack of proper coordination between states and ministries, as seen in the **Sagarmala and Bharatmala projects,** leads to slower progress
- **Regulatory Bottlenecks:** Projects face long **delays in getting approvals,** especially for environmental and land clearances.
  - Even with **tools for route optimization, power transmission projects in hilly areas** take time to clear, slowing overall progress.
  - Power and road projects in hilly areas often face delays due to environmental concerns, displacement issues, and local protests, slowing approval and progress.
- **Financing and Resource Allocation:** Securing enough funding for large projects, especially at the local level, is a challenge.
  - **Public-private partnerships (PPPs)** are limited in many regions, leaving the government to bear the financial burden, which delays project completion.
- **Lack of Skilled Manpower:** Not all states have the necessary technology or skilled staff to fully use the GatiShakti platform, unlike states like Uttar Pradesh and Gujarat, which utilize it effectively.
- **Project Monitoring and Accountability:** Although the platform allows for **real-time tracking,** project updates are not always regular, which delays completion.
  - For instance, rural road projects in many districts are not properly tracked, leading to slow progress.

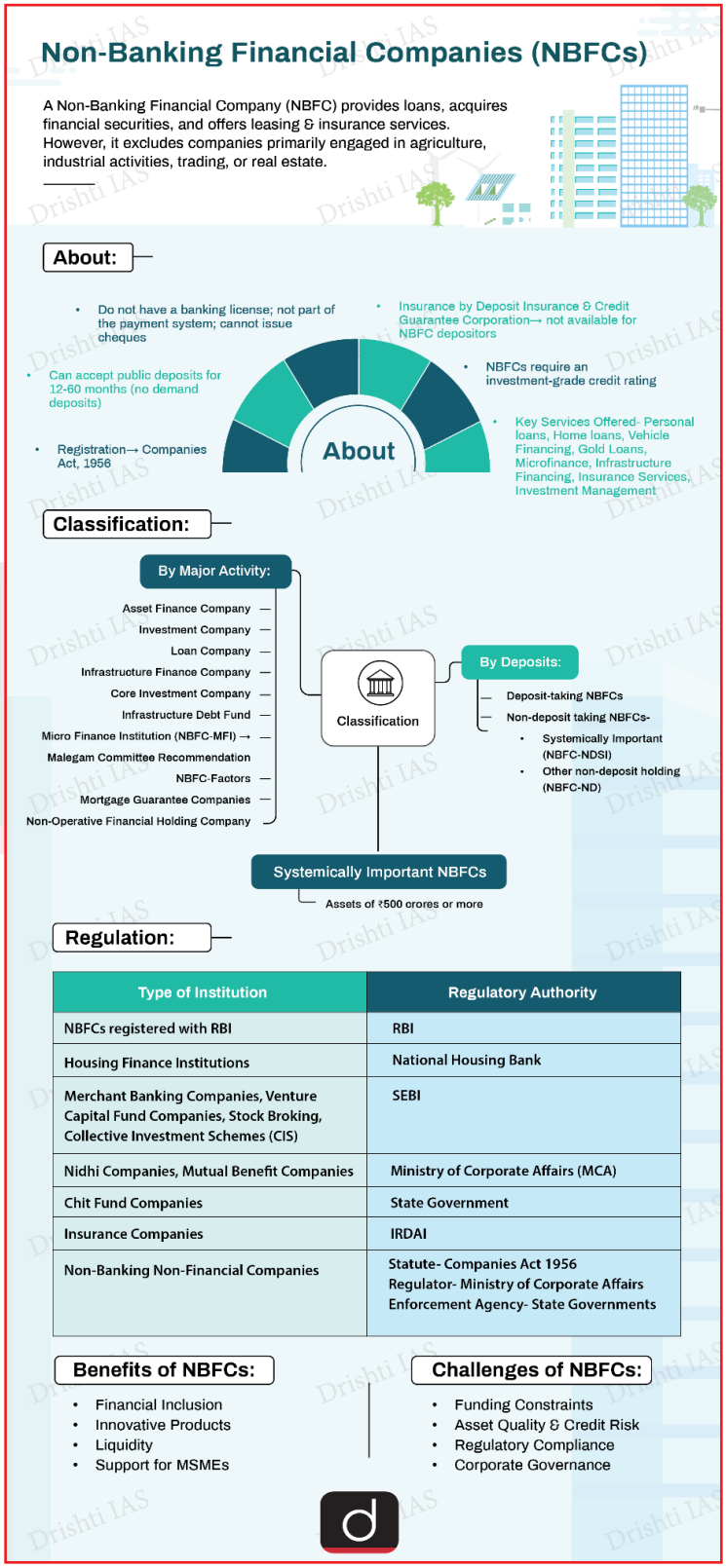
### *How Can the Implementation of PM GatiShakti National Master Plan Be Enhanced?*

- **Improve Real-Time Data:** Ministries should **expand their use of satellite imagery** and geospatial data to keep project data accurate and up-to-date.
  - Accelerating **land record digitization** across all states will ensure smoother project implementation and reduce delays caused by outdated information.

Note:

- **Enhance Inter-Ministerial Coordination:** Create **inter-ministerial task forces** to improve communication and synchronisation between ministries.
  - Use the GatiShakti platform to ensure all ministries can **track each other's activities in real-time**, reducing delays and resource conflicts for large projects.
- **Provide Training and Support for Technology Adoption:** Expand Gati Shakti Vishwavidyalaya and set up regional centers to provide training in infrastructure planning and project management, ensuring states can fully use **GatiShakti tools.**
- **Streamline Regulatory Approvals:** Use **GIS-based tools for faster environmental** and land clearance processes.
  - Fast-tracking approvals, especially for critical infrastructure projects, will help reduce the regulatory bottlenecks that slow down projects.
- **Attract Private Investment:** Use Infrastructure Investment Trusts (InvITs), Real Estate Investment Trusts (REITs) and Sovereign Wealth Funds to finance large-scale projects.
  - This will help **reduce the financial load** on the government, improve resource allocation, and attract more private and international investors.
- **Promote Sustainable Practices:** Incorporate environmentally friendly practices into all infrastructure projects.
  - **Engage local communities early** in the planning process to address environmental and social concerns, **minimising resistance** and ensuring smoother execution, especially in sensitive areas like the Himalayas.

## *Non-Banking Financial Companies (NBFC)*

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Note:

# International Relations

## Highlights


- *7th India-Germany Intergovernmental Consultations*
- *United Nations Day 2024*
- *16th BRICS Summit & India-China Border Agreement*
- *Nuclear Disarmament*
- *India-Bhutan Relations*
- *NBWL Approves Road Expansion in Ladakh*
- *India - Canada Relations*
- *What are the Major Challenges in India-Canada Relations?*
- *Strengthening India-Pakistan Relations and SCO*


## 7th India-Germany Intergovernmental Consultations

### *Why in News?*

Recently, India's Prime Minister and Germany's Federal Chancellor co-chaired the **7th round of India-Germany Intergovernmental Consultations (7th IGC)** in New Delhi.

- Under the motto **"Growing Together with Innovation, Mobility and Sustainability,"** it focused on **technology, innovation, climate action, and strategic cooperation.**
- Earlier, Germany has accorded a **special status** to India, which will allow for **quicker approvals for military purchases.**

### *What are the Key Highlights of the India-Germany Meeting?*

- **Germany's "Focus on India" Document:** It outlines a **blueprint** for how India and Germany can **collaborate** to become a **"Force for Global Good"** e.g., partnership on **innovation and technology leadership**, **Sustainable Development Goals** etc.
- **Visas for Skilled Indians:** Germany has decided to increase **visas for the skilled Indian** workforce from 20,000 to **90,000.**
- **Digital and Technology Partnerships**: Both countries finalised a work plan for internet governance, tech regulations, **digital transformation** of the economy, **emerging digital technologies**, **Digital Agriculture**, **AI** and **IoT** to foster innovation.
- **Critical and Emerging Technologies**: Both reaffirmed the priorities outlined in the **Innovation and Technology Partnership Roadmap** in critical and emerging technologies, innovation, and skill development.
- **Disaster Mitigation**: MoUs were signed between the **Indian National Centre for Ocean Information Services (INCOIS)** and **National Centre for Polar and Ocean Research (NCPOR)** to enhance research in disaster mitigation and related fields.
- **Space Cooperation**: **New Space India Ltd** and **GAF AG** (Germany based remote sensing company) agreed for upgrading the **international ground station** in Neustrelitz, Germany for processing of data from **OceanSat – 3** and **RISAT – 1A satellites**.
- **Green and Sustainable Future:** Both sides stressed the need to work jointly on the **New Collective Quantified Goal (NCQG)** which calls for **at least USD 100 billion per year** for developing countries.
  - Both sides launched the **Indo-German Green Hydrogen Roadmap** and promotion of **sustainable urban mobility** in India.
- **India-EU Strategic Partnership:** Both supported the **India-EU Trade and Technology Council** and coordinated efforts to advance **connectivity initiatives**, including the **India-Middle East-Europe Economic Corridor**.
- **Track 1.5 Dialogue:** The leaders emphasised the importance of the **India-Germany Track 1.5 dialogue** involving think tanks and experts to foster a **deeper understanding** of mutual perspectives.
- **Triangular Development Cooperation (TDC)**: The leaders agreed to upscale successful pilot projects in **Cameroon, Ghana, and Malawi**, while launching new projects related to millet in **Ethiopia and Madagascar.**

Note:

- **TDC** involves partnerships between **two or more developing countries** supported by a **developed country(ies)/or multilateral organisation(s)** to implement development projects.

➢ **Mutual Legal Assistance Treaty (MLAT):** India and Germany concluded the **MLAT** in **criminal matters** aims to bolster cooperation on **legal issues**, enhancing India and Germany's ability to **jointly address security challenges**.

### *Why are Germany and India Important for Each Other?*

➢ **Trade Relations:** Germany is India's **largest trading partner in Europe**.
- In **FY 2020-21**, bilateral trade amounted to **USD 21.76 billion**, reflecting a robust trade relationship.

➢ **Foreign Direct Investment (FDI):** Germany ranks as the **seventh-largest source of FDI for India**, with over **USD 13 billion** invested from **April 2000 to September 2021.**
- As Germany seeks to **reduce its economic dependency on China**, India is positioned as a key partner for **diversifying trade relations** in Asia.

➢ **Innovative Collaborations:** German investments include **automotive technology and manufacturing plants**, emphasising collaboration in advanced sectors like connected and autonomous technologies.
- Such partnerships foster **innovation and skills development** in India.

➢ **Market Entry Support**: Initiatives like the **"Make in India Mittelstand"** program assist **German SMEs** in entering the Indian market, promoting mutual growth.

➢ **Financial Support**: Germany's assistance, primarily through **soft loans and technical support**, strengthens India's infrastructure and sustainable development efforts.

➢ **Free Trade Agreements**: Both nations are committed to progressing towards an **India-EU Free Trade Agreement** and an **Investment Protection Agreement**, which could further enhance trade and investment flows.

➢ **Indian Investments in Germany**: More than **213 Indian companies** operate in **Germany**, primarily in **IT and automotive sectors**, showcasing the growing bilateral economic interdependence.

➢ **Shared Security Concerns**: Both nations recognize the threats posed by **China** in the **Indo-Pacific region.**
- India is actively seeking to **reduce its dependence on arms imports** in which Germany helps through **arms co-production and innovation** in defence e.g., proposed joint development of **P-75I submarine**.

➢ **Joint Initiatives on Climate**: The partnership is characterised by cooperation on **climate change**, particularly through the **Agenda for Green and Sustainable Development**, which has led to numerous agreements focusing on green hydrogen and energy security.

➢ **People-to-People Connections:** Young educated Indians are **seeking jobs**, while Germany has a high demand for **skilled workers**, creating a potential **'win-win-win'** situation for both countries and their youth.

### *What are the Challenges in India-Germany Relations?*

➢ **Lack of Depth in Partnership**: Although India and Germany have been **strategic partners since 2000**, the relationship has often been described as **underwhelming.**
- Compared to the warmth in the **Indo-French relationship**, India and Germany's partnership has not achieved the same level of engagement and collaboration.
- The absence of a **standalone Bilateral Investment Treaty (BIT)** between **India and Germany** limits investor **confidence and protections**.

Note:

- It hinders **deeper economic engagement** as Germany relies on the **EU's BTIA with India** to address concerns related to investment**.**

- **Sniping on Democratic Values**: Germany's tendency to voice concerns about India's **democratic practices** has created friction.
  - Incidents, such as Germany's comments on **political arrests** in India, led to resentment in New Delhi.
- **Divergence on Russia:** India's reluctance to condemn **Russia's invasion of Ukraine** has led to disappointment in Germany, which in turn has strained India's perception of Germany as a **reliable partner**.
- **Limited Defence Cooperation:** Germany's **historical reluctance** to engage in defence cooperation with India has been a **barrier to deeper collaboration**.
- **Public Engagement and Awareness:** There has been a **greater interest in China** compared to India within Germany, reflected in **funding allocations and media coverage.**
- **Paternalistic Attitudes:** Dismissive language regarding the **Global South** reflects a **lack of appreciation for India's position** and contributions on the global stage.
  - Such attitudes can undermine mutual respect and cooperation.

# United Nations Day 2024

## *Why in News?*

**United Nations Day is celebrated each year on 24th October** to mark the anniversary of the **UN Charter** coming into effect in 1945, following the end of **World War II.**

- The day **aims to raise awareness** about the goals and achievements of the international body.

## *What is the UN Charter?*

- **Background:**
  - It was **signed on 26th June, 1945**, in San Francisco at the end of the UN Conference on International Organisation and **came into force on 24th October 1945.**
    - **India** is one of the founding members and ratified the UN charter on 30th October, 1945.
  - The **predecessor of the UN was the League of Nations**, established in 1919, after **World War I**, under the **Treaty of Versailles** "to promote international cooperation and to achieve peace and security."
- **About:**
  - The Charter of the **United Nations** serves as the foundational document of the UN. It is an instrument of **international law**, and UN Member States are bound by it.
    - It outlines key principles of international relations, including the equal rights of all countries and the ban on using force between nations.
    - It has been **amended** three times since its incorporation – in **1963, 1965, and 1973**.
- **Significance:** The UN focuses on maintaining international peace and security, providing humanitarian assistance, protecting human rights, and upholding international law.
  - It has **been a key player in international cooperation, peace, and development** for over 75 years.

## *What are the Different Organs of the UN?*

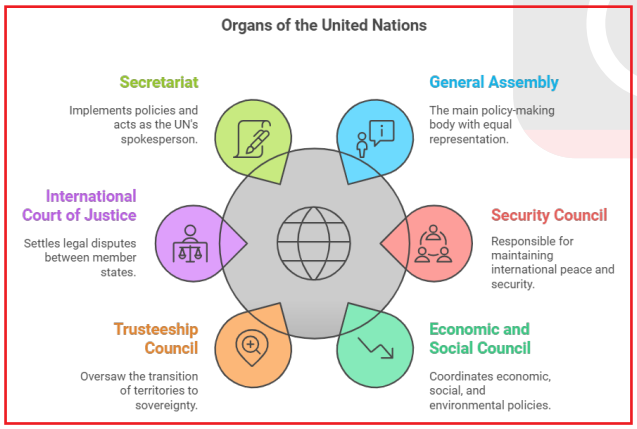
- **General Assembly:** The **UN General Assembly (UNGA)** is the main policy-making organ of the Organisation. Comprising all Member States, it provides a unique forum for multilateral discussion of the full spectrum of international issues covered by the Charter of the UN.
  - Each of the 193 Member States of the UN has an equal vote.
- **The UN Security Council:** The **Security Council** consists of 15 members.
  - Five permanent members (China, France, Russian Federation, the United Kingdom, and the United States), and ten non-permanent members elected for two-year terms.
  - India has been a non-permanent member of the UNSC eight times.
- **UN Economic and Social Council: ECOSOC** consists of 54 Members of the UN elected by the UNGA.
  - It is the principal body for coordination, policy review, policy dialogue and recommendations on economic, social and environmental issues
- **Trusteeship Council:** One of the main organs of the UN, was established to supervise the administration of trust territories as they transitioned from colonies to sovereign nations.

Note:

- **International Court of Justice:** The ICJ is the only international court that settles disputes between the 193 UN Member States.
  - **The court can rule on two types of case: "contentious cases"** are legal disputes between States and **"advisory proceedings"** are requests for advisory opinions on legal questions referred to it by UN organs and certain specialised agencies.
- **Secretariat:** The Secretary-General is appointed by the UNGA based on the Security Council's recommendation and serves as the chief administrative officer of the organisation.

**Note:**

- Five of the UN's six principal organs namely, the UNGA, the UNSC, ECOSOC, the Trusteeship Council, and the UN Secretariat are **based at UN Headquarters in New York**.
  - However, **the ICJ is located in The Hague**, Netherlands.




## *What are the Challenges Related to the UN?*

- **Power Alignments:** The UN struggles with power imbalances between wealthy and developing nations, making it difficult to implement its goals. These alignments challenge the organisation's ability to act impartially and effectively address global issues.
- **Security and Terrorism:** The UN faces evolving security challenges, including terrorism and ideological conflicts. While addressing traditional threats, it must also tackle broader issues like human security, poverty, and disease, expanding its role in conflict prevention and global safety.
- **Peace-keeping:** Modern peacekeeping faces difficulties, particularly in internal conflicts where combatants often ignore UN neutrality. The challenge lies in transitioning from traditional peacekeeping to peace-observation, using rapidly deployable teams to address conflict zones effectively.
- **Human Rights Challenges:** The UN faces the challenge of establishing and reinforcing national human rights institutions, especially in post-conflict countries. Ensuring these systems adhere to international norms is crucial for long-term protection and promotion of human rights globally.
- **Financial Constraints and Arrears:** The UN grapples with financial instability due to delays in assessed contributions from member states, hindering its operational effectiveness and capacity to fulfill global commitments.

## *What are the Proposals to Reform the UN?*

- **Expanding Permanent Membership & Inclusive Representation:**
  - Expanding the number of permanent members beyond the P5 and addressing the veto power could result in a more representative and democratic Security Council.
  - It would **potentially give more countries, especially from underrepresented regions** like Africa a voice in decision-making.
- **Reducing Inefficiencies in Administrative Processes:**
  - Streamlining the UN's administrative procedures and reducing bureaucratic complexities can significantly improve its efficiency.
- **India's Role in UN Reform:**
  - India has consistently demonstrated its commitment to global peace, security, and development through its **participation in UN peacekeeping missions**, humanitarian assistance programs, and contributions to various UN agencies.
  - **India seeks a permanent seat on the Security Council**, emphasising that such a step would make the Council more representative and responsive to the needs of the 21st century.

Note:

# 16th BRICS Summit & India-China Border Agreement

## *Why in News?*

Recently, the 16th **BRICS Summit** was held in Kazan, Russia.

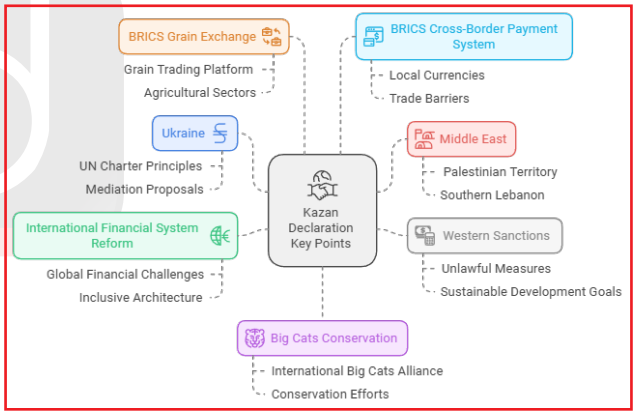
- On the sidelines of the Summit, the PM welcomed the **recent agreement with China for "complete disengagement and resolution"** of **2020 border issues**, marking their first bilateral meeting since 2020.

**Note:**

- In January, 2024, the alliance added four new members – **Egypt, Ethiopia, Iran and the UAE**.
- Saudi Arabia is **yet to formalise its BRICS membership**, however its foreign minister attended the summit.

## *What are the Key Highlights of the Summit?*

- **New Members Participation:**
  - The summit showcased the **participation of new member countries**, underscoring the increasing influence and diversity within the BRICS+ alliance.
- **Focus on Multilateralism:**
  - Leaders engaged in discussions about strengthening multilateralism, countering terrorism, fostering economic growth, pursuing sustainable development, and **addressing the concerns of the Global South**.
- **Kazan Declaration:**
  - **Stand on Geopolitical Conflicts:**
    - **On Ukraine:** Emphasised mediating a peaceful resolution through dialogue and diplomacy.
    - **On West Asia Crisis:** Expressed deep concern over the escalating humanitarian crisis in Gaza Strip and West Bank.
      - Condemned the loss of civilian lives and infrastructure damage from Israeli attacks in Southern Lebanon.
    - **On Western Sanctions:** Emphasised the disruptive effects of unlawful unilateral coercive measures, including illegal sanctions, on the global economy, international trade, and the achievement of SDGs.
  - **On BRICS Grain Exchange:** Explored the establishment of a grain trading platform within BRICS, known as the **BRICS Grain Exchange**, with plans for future development that may include other agricultural sectors.
  - **Financial Integration Support:** The summit emphasised the need for greater financial integration among member countries. Key Aspects Highlighted:
    - Importance of trade in local currencies.
    - Facilitating smooth **cross-border payments**
    - **India's UPI** was highlighted as a successful model.
    - BRICS-led payment system to rival **SWIFT**
  - **On Big Cats:** Supported the efforts of member countries to preserve rare species, particularly big cats, and notes India's initiative to create an International **Big Cats Alliance**.
    - BRICS countries are encouraged to collaborate further on conservation efforts for these vulnerable species.



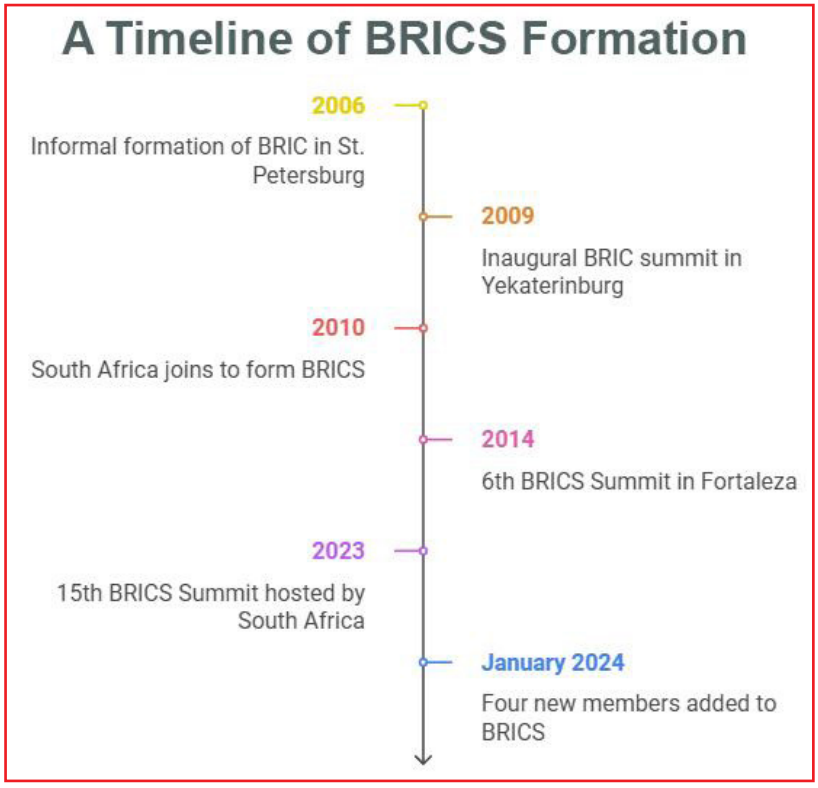

### What are the Key Highlights of India-China Bilateral Meeting?

- **About:**
  - The meeting followed **significant incidents in 2020** which deteriorated relations between the two countries and aimed to revive bilateral relations.
- **India-China Border Agreement:**
  - The importance of the agreement is highlighted by China's previous unwillingness to discuss the **Depsang Plains and Charding Nullah** while negotiating disengagement at other points.
  - Both nations have consented to **allow troops to patrol up to the old Patrolling Points (PPs)** along the LAC in the Depsang Plains and Demchok.

Note:

### *What is BRICS?*

- **About:** First informally formed during a meeting of the leaders of Brazil, Russia, India, and China (BRIC) on the sidelines of the G8 (now G7) Outreach Summit in 2006, BRICS represents the grouping of the world's leading emerging economies.
  - In 2010, South Africa joined the grouping to form what is known as BRICS.
    - It now includes 9 countries - Brazil, China, Egypt, Ethiopia, India, Iran, Russian Federation, South Africa and UAE.
  - The **inaugural BRIC summit was held in Yekaterinburg, Russia**, in 2009.
  - During the **6th BRICS Summit in Fortaleza (2014)** the leaders signed the Agreement establishing the **New Development Bank (NDB)**.




- **Significance:**
  - As of August 2023, the BRICS contributes **40% of the world's population** which controls 26% of the global GDP.

### *Why BRICS Matters?*

- **Engagement of Non-Western Countries with Russia:** The Kazan Summit highlighted that non-Western nations acknowledge Russia's strategic significance and its role as a key supplier of weapons and energy.
- **BRICS as a Cohesive Institution:** Despite diverse membership, BRICS has demonstrated effective management as a cohesive institution. Critics argue that economic disparities hinder unity, with some economies vastly larger than others.
  - However, **BRICS has maintained collaboration through annual Summits** and the establishment of institutions like the NDB, which has funded projects worth USD 30 billion since 2015. The Summit schedule has remained intact despite geopolitical tensions.
- **Emergence as an Influential Bloc:** BRICS has become an important group in global politics, causing concern in the West about its ability to compete with the **G7** and influence the **G20**.
  - Although it focuses mainly on economic issues, **BRICS also addresses political matters, emphasising discrimination and inequality in international institutions**. Its members believe they are underrepresented in major organisations like the **UNSC**, **IMF**, and World Bank, especially as Western influence decreases.
  - The Kazan Declaration **reflected BRICS's collective ambition to reform existing international frameworks**, aiming for enhanced representation and influence on the global stage.

Note:

### *What are the Challenges Related to the BRICS?*

- **Countering the Dollar:** Despite ambitions to dethrone the dollar and foster a multipolar financial system, BRICS faces significant hurdles. The NDB, established as an alternative to the World Bank, has made limited progress, with its lending far overshadowed by the World Bank's figures.
  - Efforts to promote non-dollar currencies in international transactions have also been sluggish.
- **Geopolitical Contradictions:** The diversity of new members introduces complexities. The UAE and Egypt maintain alliances with the US, while Iran stands as a direct adversary. These contradictions could challenge BRICS in maintaining a unified agenda.
- **Decision-Making Difficulties:** The expansion of BRICS could complicate decision-making, as the group operates on a consensus basis. With more members, achieving consensus may become increasingly challenging, potentially leading to a situation similar to that of the Non-Aligned Movement (NAM) and the Group of 77 (G77), which, although still in existence, hold limited influence.
  - Additionally, the organisation **may reflect broader geopolitical rivalries among its members**, particularly concerns that tensions in West Asia could hinder its functionality.

## Nuclear Disarmament

### *Why in News?*

The Nobel Peace Prize 2024 **was awarded to Nihon Hidankyo**, an organisation representing Japanese atomic bomb survivors, in recognition of its dedicated efforts **to achieve a nuclear-free world**.

- This award emphasises the **critical importance of advocacy for** nuclear disarmament, which is deeply rooted in the catastrophic impacts of nuclear weapons experienced during the bombings of Hiroshima and Nagasaki.

**Modern Threat of Nuclear Weapons**

- The Hiroshima bomb had a yield of 15 kilotons (Kt), while modern weapons, such as the **Tsar Bomba tested by Russia in 1961**, can reach 50 megatonnes (Mt), making them over 3,800 times more powerful.
- Modern nuclear arsenals include not only large-scale strategic warheads but also tactical weapons **designed for battlefield use**, increasing the risk of nuclear conflict.

### *What is Nuclear Disarmament?*

- **About:**
  - Nuclear disarmament refers to the **process of reducing or eliminating nuclear weapons to promote global security** and prevent the potential catastrophic consequences of nuclear warfare.
    - It encompasses several efforts aimed at controlling and ultimately abolishing nuclear arsenals, **with the end goal of achieving a nuclear-free world**.
- **Need:**
  - **Humanitarian Impact:** The immediate consequences of a nuclear explosion include **widespread loss of life**, mass destruction, severe burns, and radiation sickness.
    - In addition, long-term effects such as cancer **and genetic damage** can affect survivors and their descendants for generations.
  - **Environmental Consequences:** A nuclear detonation can cause large-scale environmental damage, including **"nuclear winter,"** where smoke from explosions blocks sunlight, **leading to drastic global cooling, agricultural collapse,** and disruptions to ecosystems.
  - **Ethical and Moral Considerations:** The sheer destructiveness of nuclear weapons raises ethical questions about their use.
    - The indiscriminate nature of their impact goes against the principles of just war theory and humanitarian law.
  - **Economic Costs:** Maintaining and upgrading nuclear arsenals require significant financial resources that could be used for development and addressing other pressing issues like poverty and climate change.

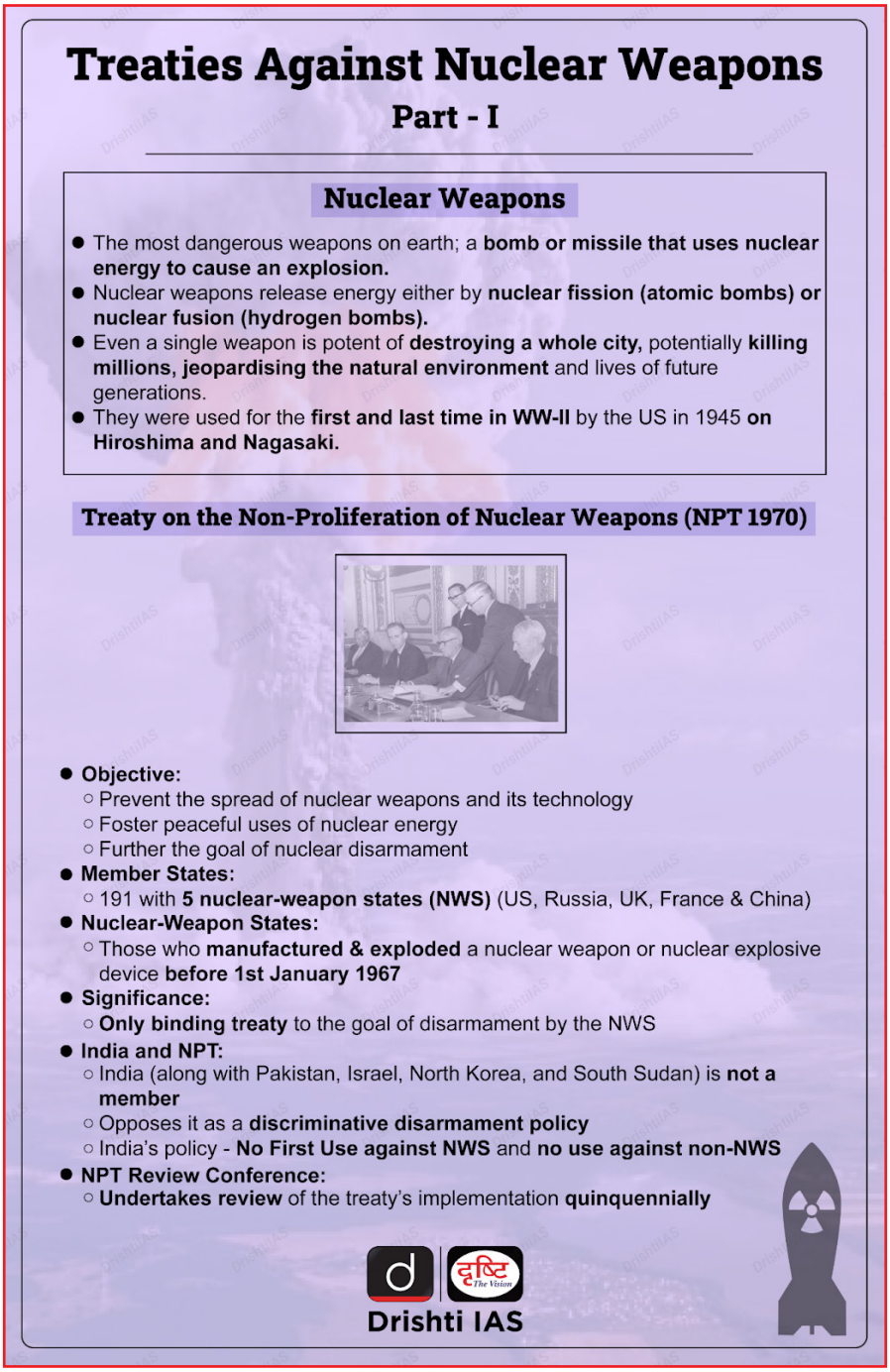
### *What are the Historical Efforts of Nuclear Disarmament Efforts?*

- **Treaty on the Non-Proliferation of Nuclear Weapons (NPT):** The NPT entered into force in 1970 to prevent the spread of nuclear weapons and promote disarmament.

Note:

- However, it has faced criticism for being discriminatory, creating a divide between nuclear-armed and non-nuclear states.

- **Comprehensive Nuclear-Test-Ban Treaty (CTBT):** Though not yet fully in force, the **CTBT** bans all nuclear explosions, aiming to curb the development of new weapons.
- **Treaty on the Prohibition of Nuclear Weapons (TPNW):** **TPNW** includes a comprehensive set of prohibitions on participating in any nuclear weapon activities.
  - These include undertakings not to develop, test, produce, acquire, possess, stockpile, use or threaten to use nuclear weapons.

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### *What are the Different Frameworks for Nuclear Proliferation and Nuclear Disarmament?*

- **Global:**
  - **International Atomic Energy Agency (IAEA):** The IAEA plays a crucial role in monitoring compliance with nuclear agreements and ensuring that nuclear technology is used for peaceful purposes.
  - **Regional Nuclear-Weapon-Free Zones (NWFZs):** These zones, where countries commit to prohibiting nuclear weapons, represent significant progress toward disarmament. Expanding NWFZs could help build momentum for a global ban.
    - The **first NWFZ was established in Latin America** (Treaty of Tlatelolco).
- **India's Stance:**
  - **No First Use (NFU) Policy:** India has pledged not to use nuclear weapons first but reserves the right to retaliate if attacked.
    - NFU policy aims to reduce the risk of a nuclear conflict while maintaining deterrence.
  - **Refusal to Join the NPT as a Non-Nuclear Weapon State:** India has not signed the NPT, arguing that it is discriminatory because **it allowed the five UNSC Permanent members (P5)** to retain their nuclear arsenals while requiring other states to give up their nuclear weapons.
  - **Promotion of Peaceful Nuclear Energy:** India supports the peaceful use of nuclear technology for energy and scientific development under international safeguards.
  - **Other Related Initiatives:** Wassenaar Arrangement & the Australia Group
    - Though these initiatives are not directly focused on nuclear disarmament, they do **play supportive roles** in preventing nuclear proliferation and enhancing global security.

Note:

**Note:**

- **International Day Against Nuclear Tests:** The objective of observing this day, celebrated on 29th August, is to **educate the public about the need to ban nuclear tests** and prevent their harmful effects on people's lives and health.
- **International Day for Disarmament and Non-Proliferation Awareness:** Observed on 5th March and **focuses on disarmament to maintain international peace and security**, protect civilians, and promote sustainable development.
- **International Day for the Total Elimination of Nuclear Weapons:** The International Day for the Total Elimination of Nuclear Weapons is celebrated on 26th September every year to raise awareness about the threat of nuclear weapons and to promote their elimination.

### *What are the Challenges Related to Nuclear Disarmament?*

- **Global Scenario:**
  - **Geopolitical Rivalries:** Nuclear weapons are viewed by some nations as a deterrent against aggression, leading to an arms race. **For instance, the nuclear arms race among nuclear-armed states like the US, Russia, and Pakistan** complicates efforts toward disarmament.
    - **Some countries, such as the USA, lack an NFU policy**, which raises concerns for nations like China and Russia, prompting them to expand and **modernise their nuclear arsenals** in response to perceived potential threats.
  - **Verification and Compliance Issues:** Ensuring that countries follow disarmament treaties is difficult because **nuclear weapons programs are generally unknown**, making it hard to verify whether weapons have been dismantled properly.
  - **Technological Developments:** New technologies, such as **hypersonic missiles**, anti-missile defence systems, and cyber capabilities, add layers of complexity to the nuclear arms race, making disarmament negotiations difficult.
- **India's Scenario:**
  - **China-Pakistan Nexus:** China's rapid nuclear modernisation and its military partnership with Pakistan pose a dual strategic challenge for India.
    - These developments, coupled with **ongoing border tensions (at both fronts)**, compel India

Note:

to bolster its nuclear capabilities to ensure a credible deterrence.

- **India's Dual Approach:** India faces the challenge of balancing its nuclear deterrence while advocating for global disarmament. The country is modernising its arsenal, including developing **Submarine-Launched Ballistic Missiles (SLBMs) like the K-4**.
  - India promotes **universal nuclear disarmament** and a time-bound framework at international forums, **but this dual approach creates diplomatic tensions** as it seeks greater global integration while remaining outside the NPT.
- **Absence of Formal Arms Control Agreements:** India does not have formal arms control agreements with its nuclear neighbours, unlike the **bilateral arms control treaties that existed between the US and Russia (USSR)** during the **Cold War**.
  - The lack of such agreements complicates efforts to build trust and manage nuclear risks in the region effectively.

# India-Bhutan Relations

## *Why in News?*

**Bhutanese PM Tshering Tobgay's recent visit to India** highlighted the strong diplomatic relations and cooperation between **Bhutan** and **India**.

- Several key events and meetings took place during his visit, which underscored their **shared commitment to sustainability, green energy,** and deepening bilateral ties.

**Note:**

- Bhutan is the **world's first carbon-neutral country**.
- Bhutan is best **known for promoting Gross National Happiness (GNH)** over **Gross Domestic Product (GDP)**.

## *What are the Key Highlights of the Bilateral Meeting?*

- **Showcasing India's Green Hydrogen Advancements:** India showcased its progress in **green hydrogen technology** by presenting a **hydrogen-fueled bus**, highlighting the country's advancements in sustainable mobility.
  - India emphasised the country's commitment to sustainable energy solutions and expressed **eagerness to collaborate with Bhutan** to promote a cleaner, greener future.
- **Opportunities for Energy Collaboration:** The discussion also focused on expanding bilateral cooperation, particularly in the energy sector.
  - Bhutan's delegation expressed a **keen interest in adopting green hydrogen mobility**, aligning with Bhutan's spirit for environmental sustainability and transitioning to clean energy solutions.
- **Significance:** India aims to position itself as a global leader in green hydrogen production, presenting **its advancements to Bhutan's leadership and highlighting mutual benefits**.
  - The shared vision for sustainable development between the two nations establishes a strong basis for collaboration in **renewable energy**, positioning Bhutan as a key partner in **India's green energy transition**.

## *How Have India-Bhutan Relations Been?*

- **Diplomatic Background:** Diplomatic ties between India and Bhutan began in 1968, grounded in the 1949 **Treaty of Friendship and Cooperation**, which was updated in 2007 to better reflect contemporary needs.
- **Cultural Ties:** The India-Bhutan Foundation, established in 2003, promotes educational, cultural, and scientific exchanges.
  - **Pilgrimage to Buddhist sites in India** remains a significant cultural connection.

Note:

- **Recognition and Awards:** On **Bhutan's 114th National Day**, the Prime Minister of India received the **Order of the Druk Gyalpo,** Bhutan's highest civilian honour, for his contributions to the India-Bhutan relationship.
- **Development Partnership:** India has been a **consistent partner in Bhutan's socio-economic development**, supporting its Five-Year Plans since the first one in 1971.
  - For **Bhutan's 12th Five-Year Plan (2018–2023),** India provided Rs 5,000 crores, covering various developmental projects.
- **Hydropower Cooperation:** Hydropower cooperation is a cornerstone of India-Bhutan relations. India has helped construct **four major** hydroelectric projects (HEPs) in Bhutan.
  - Bhutan has been permitted to sell 64 MW Basochhu HEP's electricity in India's Day Ahead Market (DAM).
- Cooperation in New and Emerging Areas:
  - **Space Cooperation:** A significant new area, with the **India-Bhutan SAT**, launched in November 2022.
    - The satellite aids in natural resource management and has a digital repeater serving the amateur radio community.
  - **Fin-tech:** Launches include the RuPay Card (2019, 2020 phases) and the Bharat Interface for Money (BHIM) app (2021) to enable cashless payments and cross-border interoperability.
- **Commerce and Trade:** India is **Bhutan's top trading partner**, with bilateral trade tripling from USD 484 million in 2014-15 to USD 1,615 million in 2022-23.
  - The 2007 India-Bhutan Friendship Treaty and the 2016 **Trade, Commerce, and Transit Agreement establish a** free trade regime, with duty-free transit for Bhutan's goods through India.
  - Indian investments constitute 50% of Bhutan's Foreign Direct Investment (FDI), spanning various sectors like banking, manufacturing, hospitality, and education.
  - Bhutan's **plans for a regional economic hub in Gelephu**, mark a significant step towards regional development and connectivity.
    - The project, **initiated by Bhutan's King in December 2023**, aims to establish the Gelephu Mindfulness City (GMC) spanning 1,000 square kilometres.
- **Financial Support:** In November 2022, a USD 200 million arrangement was made under the South Asian Association for Regional Cooperation (SAARC) **currency swap arrangement** to manage Indian rupee liquidity and ease foreign exchange pressures.
- **Healthcare Cooperation:** India supported Bhutan during the Covid-19 pandemic by providing **Covishield vaccine** doses and medical consignments.
  - India has also assisted in building hospitals and providing medical supplies.
- **Indian Diaspora in Bhutan:** Approximately 50,000 Indians work in Bhutan, contributing significantly to various sectors.
  - In 2023, Indian academic Sanjeev Mehta was awarded the **Pravasi Bharatiya Samman** for his contributions to education in Bhutan.

**Significance of Bhutan For India**

- **Strategic Location:** Bhutan's location between India and China makes it crucial for India's security. It acts as a **buffer state**, preventing direct Chinese access to the Indian territory.
- **Shared Heritage:** India and Bhutan share deep cultural and historical ties, primarily through Buddhism. This cultural connection enhances mutual understanding and people-to-people relations.
- **Biodiversity Conservation:** Bhutan's rich biodiversity is of ecological significance, and India's involvement in conservation efforts supports regional environmental goals.

### *What are the Challenges in India-Bhutan Relations?*

- **Bhutan-India-China Border Dispute:**
  - The Doklam plateau represents a crucial point in the strategic triangle involving Bhutan, India, and China. The area has become increasingly significant due to the growing presence of the People's Liberation Army (PLA), raising concerns for India.
  - While China and Bhutan are **pursuing diplomatic efforts through a three-stage roadmap** to resolve boundary disputes, the region's geopolitical implications remain sensitive.
    - For India, any shift in control over the disputed Doklam area could endanger the Siliguri corridor (India's narrow link to its northeastern states).

Note:

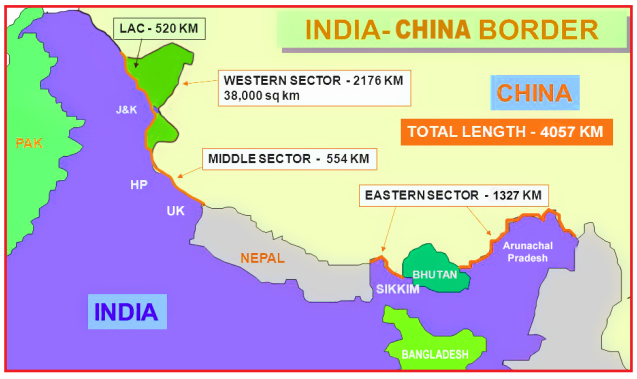
- **Concerns Over Hydropower Project:** Bhutan's hydropower industry plays a crucial role in its economy, with India being a significant partner in its advancement.
  - Concerns have emerged in Bhutan about the favourable conditions of certain hydropower projects for India, **leading to public dissent against Indian involvement in the sector**.
- **BBIN Initiative:** The original **BBIN (Bangladesh, Bhutan, India, and Nepal) Motor Vehicles Agreement** was signed by all four nations in June 2015. However, following objections in **Bhutan related to sustainability and environmental issues**, the Bhutanese parliament opted not to endorse the plan.
  - As a result, the other three countries moved forward with the vehicular movement initiative **(BIN-MVA) in 2017**. This highlights the **challenge of fostering regional cooperation** among the countries due to differing priorities, political dynamics, and economic disparities.

# NBWL Approves Road Expansion in Ladakh

### *Why in News?*

The standing committee of the **National Board for Wildlife (NBWL)** has approved five key road stretches in Ladakh (four of which pass through **Karakoram Wildlife Sanctuary**), including a route to **Daulat Beg Oldie (DBO)**.

- The NBWL approved the road stretches with conditions to implement wildlife passage plans to protect species in the Karakoram sanctuary.
- The move significantly aids the Ministry of Defence, enhancing infrastructure development along the LAC in response to the 2020 **India-China clashes in Galwan Valley**.




### *What is the Strategic Significance of this Move?*

- These routes are crucial for troop movement and logistics and supporting the civilian population particularly after the 2020 **Galwan Valley** clashes.
  - The **existing Durbuk-Shyok-DBO (DS-DBO) route, which is 255 km long**, runs along the LAC and is within sight of Chinese-held territory to its east.
  - Daulat Beg Oldie (DBO) is the **country's sorthernmost military outpost in Ladakh** and houses its highest airstrip.
- The Leh-Chalunka road (one of the five approved road stretches), connects the Indus Valley with the Shyok Valley and traverses the Ladakh range, representing the **sole motorised route over this range.**

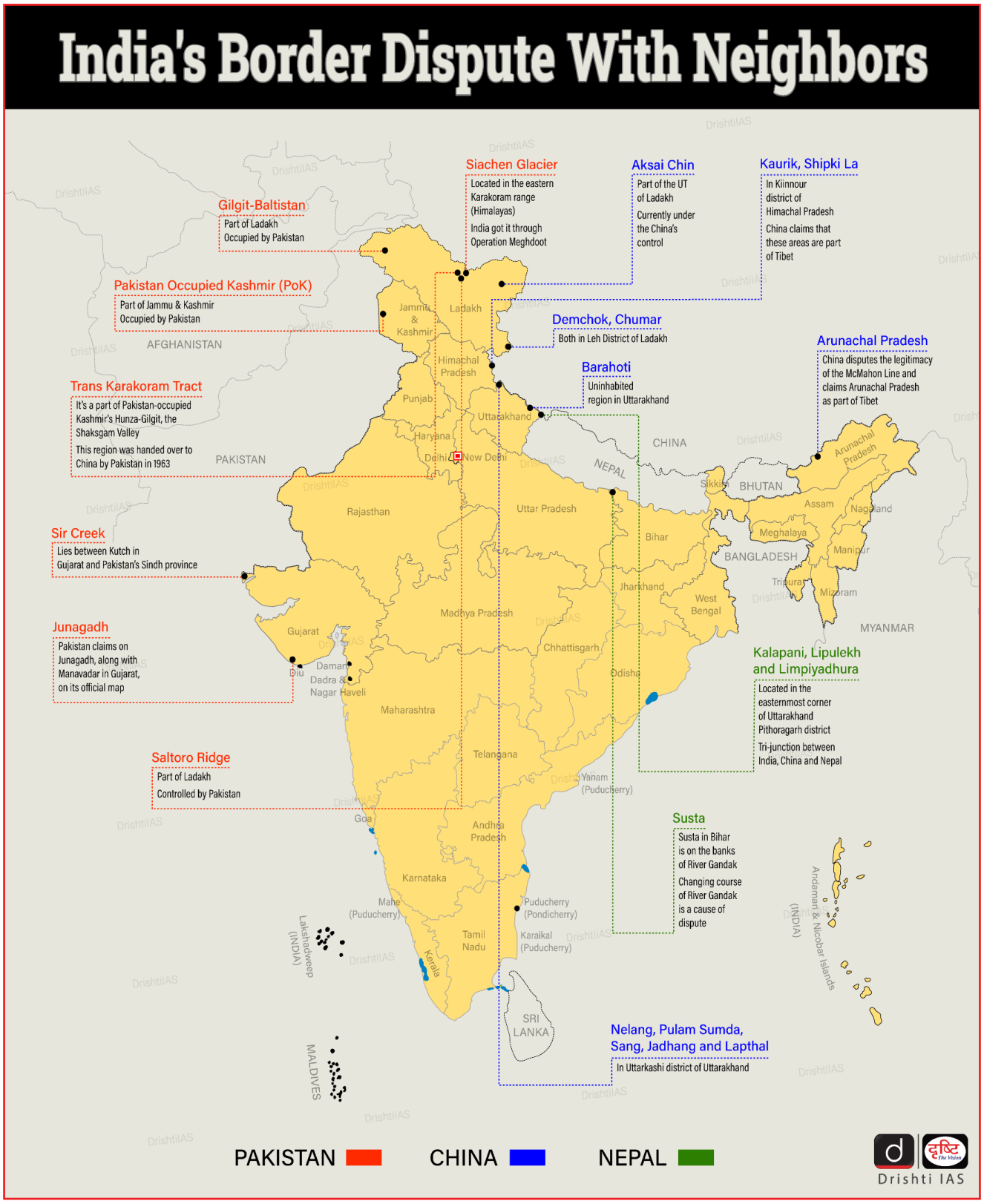
### *What are the Other Major Developmental Projects along India's Border?*

- **India-China Border:**
  - **Vibrant Villages Programme (VVP)**
  - **Border Area Development Programme (BADP)**
- **India-Pakistan Border:**
  - **Smart Fencing in India (Comprehensive Integrated Border Management System – CIBMS)**

#### National Board for Wildlife (NBWL)

- National Board for Wildlife is a statutory Board constituted officially in 2003 under the **Wild Life (Protection) Act, 1972**.
  - It replaced the Indian Board for Wildlife, established in 1952.
- The **NBWL is chaired by the Prime Minister** and is responsible for promotion of conservation and development of wildlife and forests.
- The board is **'advisory'** in nature and can only advise the Government on policy making for conservation of wildlife.
- It serves as **an apex body for the review of all wildlife-related matters** and for the approval of projects in and around national parks and sanctuaries.
- The standing committee of **NBWL is chaired by the Minister of Environment Forest and Climate Change.**
  - The standing committee approves all the projects falling within protected wildlife areas or within 10 km of them.

Note:




**Read More:** India's Border and It's Management

Note:

# India - Canada Relations

### *Why in News?*

Recently, **India-Canada relations** have faced serious setbacks following allegations of Indian involvement in the killing of a **Khalistani leader** in Canada.

### *What are the Recent Developments in India-Canada Relations?*

- **Assassination of Nijjar:** The assassination of Hardeep Singh Nijjar, **a Khalistani leader**, in British Columbia has led to accusations from the Canadian Prime Minister that Indian officials were involved, which India has **categorically denied as "absurd."**
- **Diplomatic Fallout:** Diplomatic relations have deteriorated sharply, with both countries **expelling each other's diplomats** and froze **consular services**.
- **Support from Five Eyes Alliance:** Canada has enlisted the **Five Eyes intelligence alliance** to gain international support amid rising diplomatic tensions with India over serious allegations.

**What is the Five Eyes Alliance?**

- **About:**
  - The Five Eyes is an intelligence alliance comprising nations including **Australia, Canada, New Zealand, the United Kingdom and the US.**
  - These countries are parties to the multilateral **UK-USA Agreement,** a treaty for joint cooperation in **signals intelligence.**
- **Features:**
  - These partner nations exchange a wide spectrum of intelligence within one of the **world's most tightly-knit multilateral agreements** as part of the collaboration.
  - Following its origin, the agency later enlarged its core group to **'Nine Eyes' and 14 Eyes alliances as well,** encompassing more countries as security partners.
    - The 'Nine Eyes' group expands to cover the **Netherlands, Denmark, France and Norway,** whereas the 14 Eyes bloc further includes **Belgium, Italy, Germany, Spain and Sweden.**

### *What are the Significant Areas of India-Canada Relationship?*

- **Political Relations:**
  - India and Canada established **diplomatic relations in 1947**. Both nations uphold **democratic values**, **human rights, rule of law**, and pluralism, forming a foundation for their bilateral interactions.
  - Both countries collaborate in international forums such as the **Commonwealth**, **G20**, and **United Nations**, addressing global issues like **climate change**, security, and sustainable development.
- **Economic Cooperation:**
  - Total bilateral trade in goods between India and Canada was worth **USD 9.36 billion in 2023**, with Canada being the **18th largest foreign investor** in India, with investments of around **USD 3.3 billion** from April 2000 to March 2023.
  - Ongoing negotiations for a **Comprehensive Economic Partnership Agreement (CEPA)** aim to enhance economic relations by covering trade in goods, services, investment, and trade facilitation.

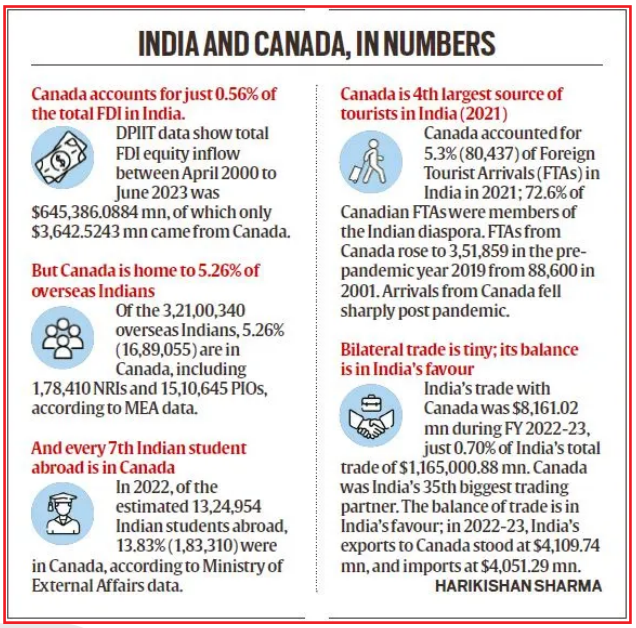
Note:

- **Diaspora Connections:**
  - Canada is home to over **5.75 million people of Indian origin,** including approximately **1 million** **Non-Resident Indians (NRIs),** making it one of the largest **Indian diasporas** globally.
  - The diaspora significantly contributes to cultural exchange, economic activities, and bilateral relations, fostering strong social and familial ties between the two nations.
- **Education and Space Innovation:**
  - Joint research initiatives in healthcare, agricultural biotechnology, and waste management are being advanced through programs like **IC-IMPACTS**, promoting innovation.
  - Space collaboration includes agreements between **ISRO** and the **Canadian Space Agency**, with successful launches of Canadian satellites by ISRO.
  - Education exchange is significant, with Indian students comprising **around 40%** of Canada's international student population, enhancing cultural diversity.
  - A **Nuclear Cooperation Agreement signed in 2010, effective since 2013**, allows uranium supply and establishes a Joint Committee for oversight.
- **Strategic Importance:**
  - India plays a crucial role in **Canada's Indo-Pacific strategy**, aiding in the diversification of the **Canadian economy** and enhancing regional security dynamics.
  - Collaboration on **maritime security**, **counter-terrorism**, and maintaining regional stability in the **Indo-Pacific region.**

**Note:**

**What is the Comprehensive Economic Partnership Agreement (CEPA)?**

- It is a kind of **free trade pact** that covers negotiation on the trade in services and investment, and other areas of economic partnership.
- It may even consider negotiation in areas such as trade facilitation and customs cooperation, competition, and **IPR.**
- Partnership agreements or cooperation agreements are more comprehensive than **Free Trade Agreements.**
- CEPA also looks into the regulatory aspect of trade and encompasses an agreement covering the regulatory issues.



## INDIA AND CANADA, IN NUMBERS

**Canada accounts for just 0.56% of the total FDI in India.**

DPIIT data show total FDI equity inflow between April 2000 to June 2023 was $645,386.0884 mn, of which only $3,642.5243 mn came from Canada.

**But Canada is home to 5.26% of overseas Indians**

Of the 3,21,00,340 overseas Indians, 5.26% (16,89,055) are in Canada, including 1,78,410 NRIs and 15,10,645 PIOs, according to MEA data.

**And every 7th Indian student abroad is in Canada**

In 2022, of the estimated 13,24,954 Indian students abroad, 13.83% (1,83,310) were in Canada, according to Ministry of External Affairs data.

**Canada is 4th largest source of tourists in India (2021)**

Canada accounted for 5.3% (80,437) of Foreign Tourist Arrivals (FTAs) in India in 2021; 72.6% of Canadian FTAs were members of the Indian diaspora. FTAs from Canada rose to 3,51,859 in the pre-pandemic year 2019 from 88,600 in 2001. Arrivals from Canada fell sharply post pandemic.

**Bilateral trade is tiny; its balance is in India's favour**

India's trade with Canada was $8,161.02 mn during FY 2022-23, just 0.70% of India's total trade of $1,165,000.88 mn. Canada was India's 35th biggest trading partner. The balance of trade is in India's favour; in 2022-23, India's exports to Canada stood at $4,109.74 mn, and imports at $4,051.29 mn.

HARIKISHAN SHARMA

## What are the Major Challenges in India-Canada Relations?

- **Diplomatic Immunity Issue:**
  - Canada has invoked the **Vienna Conventions**, emphasizing the need to protect its diplomatic staff and citizens in India amid heightened tensions.
  - India's response to these concerns, along with its adherence to diplomatic norms, will play a crucial role in shaping the future of bilateral relations.
- **Khalistan Issue**:
  - India perceives Canada's tolerance of Khalistani separatist groups as a direct threat to its territorial integrity.
  - Canada's investigation into alleged Indian involvement in the assassination of Hardeep Singh Nijjar, a prominent Khalistan supporter, has further escalated tensions. This ongoing issue continues to strain diplomatic and political trust between the two nations.
- **Economic and Trade Barriers**:
  - Amid the growing political rift, efforts to finalize the **Comprehensive Economic Partnership Agreement (CEPA)** has stalled.

Note:

- Bilateral trade **has slowed,** and Canadian investments in India have faced uncertainty due to the **diplomatic crisis.**

- **Visa and Immigration Issues:**
  - Due to a reduction in Canadian diplomatic staff in India, **Indians applying for visas are facing significant delays**. This has implications for new applicants, particularly students seeking to enroll in Canadian institutions.
- **Geopolitical Implications:**
  - The **India-Canada diplomatic** standoff may harm India's G20 reputation if allegations are substantiated, affecting relations with nations linked to both countries.
  - Canada's **G7 membership** and ties with the **Five Eyes alliance** complicate the situation for strategic partners of India, including the **US, UK, Australia, and Japan.**
  - **Canada's Indo-Pacific strategy,** once focused on engaging India, is now facing hurdles due to these political tensions, limiting cooperation on security and economic issues in the region.

**What is the Vienna Convention on Diplomatic Immunity ?**

- **Vienna Conventions:**
  - The **Vienna Convention on Diplomatic Relations (1961)** establishes the framework for diplomatic relations between independent countries. It outlines the rights and responsibilities of diplomatic missions and their personnel.
  - The **Vienna Convention on Consular Relations (1963)** governs the functions of consular officers and the treatment of foreign nationals.
- **Key Provisions:**
  - **Diplomatic Immunity:** Diplomats are granted immunity from arrest and detention, protecting them from legal processes in the host country.
  - **Inviolability of Diplomatic Premises:** Diplomatic missions cannot be entered without permission, ensuring the safety and confidentiality of communications.
  - **Protection of Consular Officers:** The conventions ensure that consular officers can perform their duties without interference, providing assistance to their nationals abroad.

# Strengthening India-Pakistan Relations and SCO

### *Why in News?*

Recently, India's External Affairs Minister had an **informal interaction** with Pakistan's Prime Minister and Foreign Minister during the **SCO Council of Heads of Government** meeting in **Islamabad, Pakistan.**

- The atmosphere of exchanges has been said to be **more positive** than in previous encounters.
- **The Shanghai cooperation organisation (SCO) Council of Heads of Governments** is the **second-highest council** after the SCO Council of Heads of States.

### *What were the Positive Developments Between India and Pakistan at the SCO Summit?*

- **Avoidance of Contentious Language:** Both India and Pakistan avoided using contentious language in their national statements.
  - There were **no direct references** to sensitive issues like **Kashmir** from Pakistan while India **avoided** specific references to **Pakistan while addressing cross-border terrorism.**
- **Productive Meeting:** India commended the Pakistani leadership for organising a **productive SCO meeting**, signalling a positive tone in his **departure remarks.**
- **Collaboration on Regional Issues:** Topics like **trade, connectivity, energy flows**, and cooperation against **terrorism, separatism, and extremism** were discussed, with an emphasis on **collaboration** rather than confrontation.
  - **TAPI (Turkmenistan-Pakistan-Afghanistan-India)** energy pipeline and other issues were discussed with some SCO members.
- **Initiatives for Economic Cooperation:** The summit resulted in proposals for an **Economic Dialogue Programme** and strategies to enhance **economic cooperation**.
  - The joint statement emphasised cooperation in areas like **green development, digital economy, trade, poverty alleviation, and renewable energy**.

Note:

### *Why are Positive Developments Significant?*

- **Revocation of Article 370 (2019)**: India's decision to revoke the special status of Jammu and Kashmir (**Article 370**) in August 2019 **strained already fragile relations.**
  - Pakistan views this as an **illegal annexation**, while India considers it an **internal matter.**
- **Downgrade in Bilateral Relations:** On 7th August 2019, Pakistan **unilaterally downgraded** diplomatic relations with India to the **chargé d'affaires level** and **expelled the Indian High Commissioner**, in response to India's revocation of Article 370 in Jammu and Kashmir.
- **Indus Waters Treaty:** Disputes over the **Kishanganga and Ratle hydroelectric projects**, in particular, have raised tensions, with Pakistan alleging that India is violating the treaty.
  - India has formally requested a **review and modification** of the **Indus Waters Treaty (IWT)** with Pakistan which has not gone well with Pakistan.
- **Limited Trade**: After the **Pulwama attack** in 2019, India revoked Pakistan's **Most Favoured Nation (MFN)** status, and Pakistan suspended bilateral trade.
  - Revocation of **Article 370** led to a halt in **bilateral trade**. In 2018-19, trade amounted to **USD 2.06 billion of exports and USD 0.495 billion of imports.**
- **Internal Interference:** Pakistan has accused India of fomenting unrest in its **Balochistan** province and supporting separatist movements there.
  - India accuses Pakistan of **radicalising** Kashmiri youth and **internationalising** Kashmir issue.

### *How can Multilateral Forums Improve India-Pakistan Relations?*

- **Neutral Platforms for Dialogue:** Multilateral settings like the **SCO** provide **neutral environments** for India and Pakistan to engage without the bilateral tensions that usually impede dialogue.
  - These forums allow **informal conversations** and **track-two diplomacy** (unofficial, non-governmental discussions) which can **ease tensions** and keep lines of **communication open**.
- **Regional Cooperation:** Through **SAARC**, both nations have **previously collaborated** on regional trade agreements.
  - The potential for cooperation in areas like **climate change, disaster management**, and public health remains high.
- **Security Concerns:** Both India and Pakistan are part of the **SCO's Regional Anti-Terrorist Structure (RATS)**, which aims to promote cooperation on **combating terrorism, separatism, and extremism.**
  - This offers a framework where both countries can work together on **common security threats,** even if their bilateral relations are strained.
- **Reducing Mistrust:** **UN General Assembly** and other international forums involve the participation of several countries, which can act as mediators for **constructive dialogue**.
  - Multilateral diplomacy can ease tensions, as witnessed in the **Kargil conflict** in 1999, where international pressure played a role in **de-escalating the situation**.
- **Economic Exchanges:** Projects like the **Turkmenistan-Afghanistan-Pakistan-India (TAPI) Pipeline** and **Iran-Pakistan-India (IPI) pipeline** of mutual benefit can foster cooperation even between adversaries.

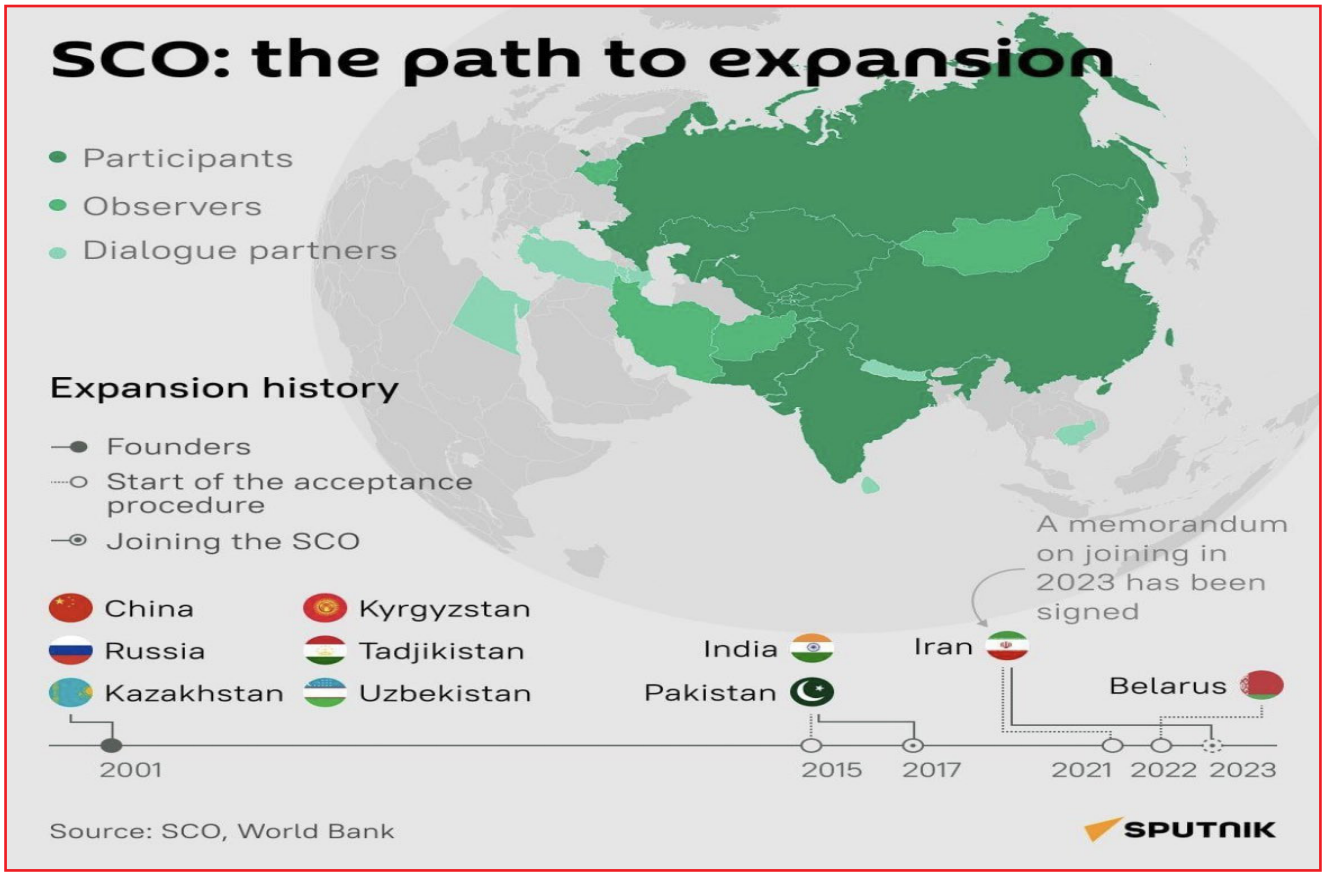
### *What are the Key Facts About SCO?*

- **About SCO:** It is a **permanent intergovernmental international organisation** founded on **15th June 2001**, in Shanghai, China.
- **Establishment:** It was established by **six founding countries** namely Kazakhstan, China, Kyrgyzstan, Russia, Tajikistan, and Uzbekistan, evolving from the **Shanghai Five mechanism.**
- **Objectives of the SCO:** It aims to strengthen **mutual trust** among member states, enhance cooperation in various fields, ensure **regional peace and stability**, and promote a fair international **political and economic order.**
- **Principles of SCO:** The SCO adheres to the **Shanghai spirit,** characterised by **mutual trust, mutual benefit, equality, consultation**, respect for cultural diversity, and the pursuit of common development.
- **Decision-Making Bodies:** The **SCO's supreme** decision-making body is the **Council of Heads of States (CHS)**, which meets annually to address key organisational issues.

Note:

- The **Council of Heads of Government (CHG)** convenes yearly to discuss cooperation strategies, prioritise areas, and approve the budget.

- **Standing Bodies:** The SCO has **two permanent bodies.**
  - The **Secretariat** is located in **Beijing**, responsible for the organisation's day-to-day operations.
  - The **Executive Committee of the Regional Anti-Terrorist Structure (RATS)** in **Tashkent**, which focuses on regional security and **counter-terrorism efforts.**
- **Current Membership:** SCO has **10 full members** namely China, Russia, Kazakhstan, Kyrgyzstan, Tajikistan, Uzbekistan, India, Pakistan, **Iran (2023) and Belarus (2024).**




- **SCO-Afghanistan Contact Group:** In **2005**, the SCO formed the **SCO-Afghanistan Contact Group** to address **security and stability** concerns in Afghanistan, demonstrating its commitment to regional security issues.
- **Official Languages:** The official languages of the SCO are **Russian and Chinese,** facilitating communication among member states.
- **Partnerships and Collaborations:** The SCO has developed **partnerships** with various organisations, including the **Commonwealth of Independent States (CIS), Association of Southeast Asian Nations (ASEAN), Collective Security Treaty Organization (CSTO),** and multiple United Nations agencies.

■■■

Note:

# Social Issues

## Highlights

- *Gender-Responsive Climate Policies*
- *Chenchu Tribe*
- *Communal Violence*
- *India's Ageing Population*
- *Global Hunger Index 2024*
- *Ban on Child Betrothals*
- *Offence of 'Abetment of Suicide'*

## Gender-Responsive Climate Policies

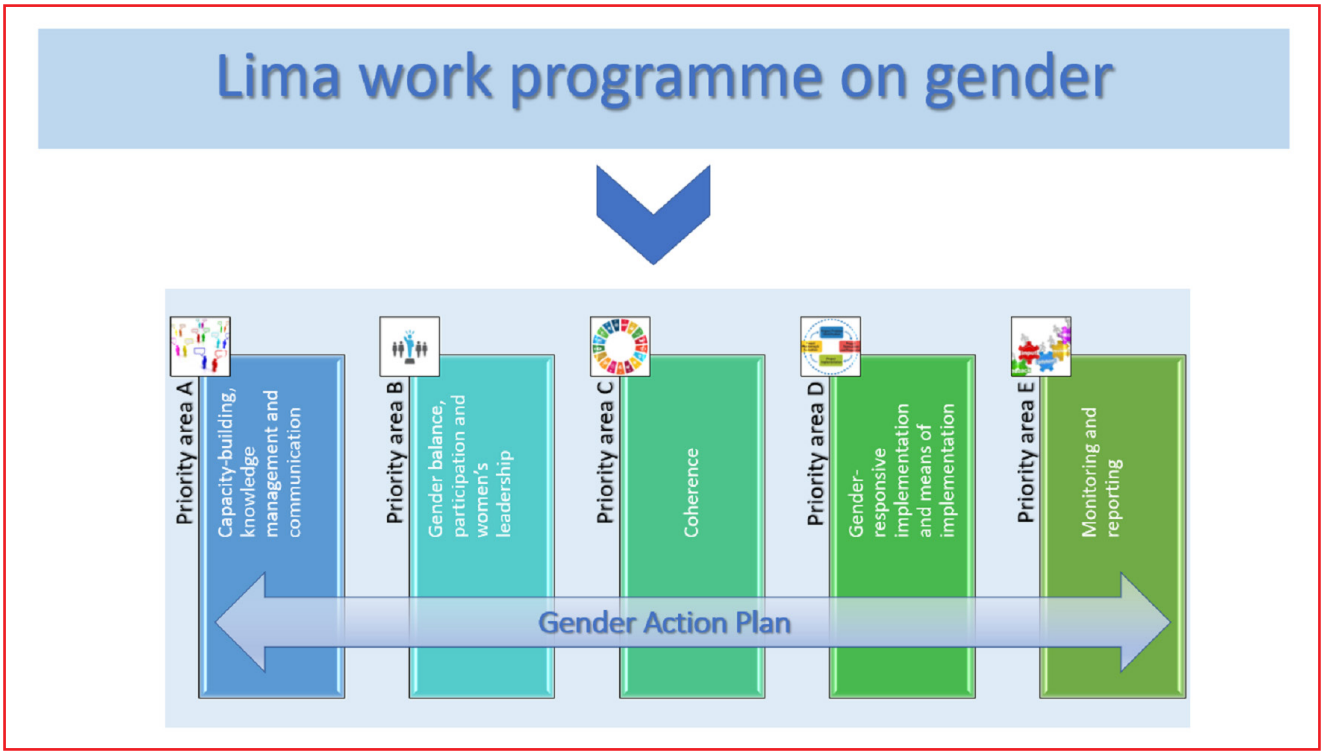
***Why in News?***

A new synthesis report by the **UN Climate Change** secretariat highlights a **rise in gender-responsive climate policies globally**.

- Since the **adoption of the first UNFCCC Lima Work Programme on gender (LWPG)** in 2014, and of the enhanced LWPG in 2019, gender integration in all reports and communications, including **Nationally Determined Contributions (NDCs)**, has been increasing in quantity and quality.

**Note:**

- LWPPG was **established to advance gender balance and integrate gender consideration** into the work of Parties and the secretariat in implementing the **Convention and the Paris Agreement** so as to achieve gender responsive climate policy and action.




Note:

### *What are the Key Highlights of the Report?*

- **Key Highlights:**
  - **Increase in Gender References:** Approximately 81% of **Parties to the Paris Agreement** have now included references to gender in their NDCs.
    - This marks a significant improvement from 2015, when very few NDCs mentioned gender.
  - **Strengthening Institutional Mechanisms:** About 62.3% of Parties highlighted efforts to enhance institutional mechanisms for integrating gender considerations into climate action.
  - **Gender Balance Initiatives:** Approximately 11.5% of Parties detailed initiatives aimed at increasing gender balance and diversity among stakeholder groups involved in monitoring and evaluating adaptation efforts, particularly in **agriculture**, forestry, and water resources.
- **Need For Gender Responsiveness:**
  - **Commitment to Gender Equality:** Around 55.7% of Parties affirmed their commitment to gender equality in climate action, indicating a growing recognition of its importance.
  - **Impact on Food Security:** The report identifies how climate change threatens **food security** across availability, accessibility, utilisation, and stability.
    - **Women, responsible for 45-80% of food production** in developing countries, are disproportionately affected, particularly as traditional food sources become unreliable and food prices rise.
  - **Vulnerability Considerations:** While the report emphasises women's heightened vulnerability to climate change, it also notes that men in vulnerable situations are often overlooked in policy planning.
- **Recommendations & Future Aspect:**
  - **Enhancing Climate Initiatives:** Stakeholders view gender-responsive strategies as essential for improving the ambition and effectiveness of climate initiatives.
    - Most Parties reiterated their **commitment to promoting gender equality** as a fundamental aspect of climate action.
  - **Global Stocktake Outcomes:** The outcomes of the first Global Stocktake, agreed upon at the **28th Conference of Parties to UNFCCC**, encourage Parties to implement gender-responsive climate policies and actions.
  - **Next Round of NDCs (NDCs 3.0):** The upcoming submission of NDCs in 2025 presents a critical opportunity to strengthen collaborative efforts towards achieving gender equality and effective climate outcomes.

**India's Nationally Determined Contributions (NDCs)**

- India has committed to **reducing emissions intensity of its GDP by 45% by 2030**.
- The updated NDC marks an important step towards achieving **India's long-term goal of reaching net-zero emissions by 2070**.
- A new framework for transition to cleaner energy for the period **2021-2030 aims to increase green jobs,** boost manufacturing of low emissions products such as **Electric Vehicles** and super-efficient appliances, and promote innovative technologies such as **green hydrogen**.
- The country committed to **stronger adaptation targets**.
  - It will enhance investments in development programmes focused on sectors and areas vulnerable to **climate change**.
- India will build capacities for quick diffusion of **cutting-edge climate technology**.

### *Why Does Gender Equality Matter in Climate Action?*

- **Impact on Agriculture:** Women play a vital role in agricultural production but lack equal access to resources, services, and decision-making processes.
  - If women smallholders had the same access to resources as men, **farm yields could increase by 20-30%**, potentially alleviating hunger for 100-150 million people and reducing carbon dioxide emissions by 2.1 gigatons by 2050.
- **Land Ownership and Resource Control:** Women make up a third of the global agricultural workforce but only 12.6% of landowners.
  - This **disparity restricts their access to agricultural aid and increases their vulnerability** due to limited information on adaptation techniques and cropping patterns.

Note:

- **Decision-Making and Climate Leadership:** Involving women in climate-related decision-making is essential for creating effective climate policies.
  - However**, women often undertake 75% of unpaid care work globally**, which limits their participation. Climate-induced disasters further burden women, especially as they assist in household and community recovery.
- **Impact on Education and Employment:** Climate stressors can restrict access to education and labor markets for women and girls, perpetuating disempowerment.
  - In disaster situations, the risk of **gender-based violence** increases, highlighting the need for access to quality services and meaningful participation in decision-making.

**Examples of Gender-Responsive Climate Action**

- **Bhutan:** The country has trained Gender Focal Points in various ministries and women's organisations to coordinate and implement gender equality and climate change initiatives.
- **Zimbabwe:** A **renewable energy** fund has been established to create entrepreneurship opportunities for women.
- **Uzbekistan:** A pilot green mortgage scheme provided low-carbon energy technology access to rural households, with 67% of the mortgages being taken out by women-headed households.
- **Uruguay:** The country has set up a gender-responsive monitoring, reporting, and verification system to track the impact of NDCs on **gender equality**.

### *How can Gender-Responsive Climate Policies be Improved?*

- **Conducting Gender Analysis:** Assessing how climate change affects men and women differently helps identify inequalities and gaps in resource distribution and opportunities.
  - Gender analysis enables tailored, evidence-based climate policies that address the specific needs and vulnerabilities of all genders.
- **Gender-Responsive Budgeting:** Ensuring equitable distribution of climate action funding is vital for mobilizing all available skills, resources, and leadership capacities to combat climate change.
  - This budgeting approach considers the differing impacts of climate change on men and women, fostering inclusive and impactful climate solutions.
- **Integrating Gender Equality Objectives:** Climate policies aligned with gender equality goals are more likely to achieve necessary structural changes to tackle the climate crisis and promote social justice.
  - **Addressing the root causes** of gender-based vulnerabilities leads to more resilient communities and sustainable climate outcomes.
- **Promoting Gender Balance in Stakeholder Engagement:** Encouraging gender diversity in monitoring and evaluating climate actions can improve the overall effectiveness of climate initiatives.
  - **Involving women and other underrepresented groups** in decision-making ensures a broader range of perspectives and experiences are considered.
- **Supporting Developing and Least Developed Countries (LDCs):** Developing countries and **LDCs** have shown leadership in integrating gender considerations into climate policies.
  - Developed nations should adopt this approach to foster a global framework for gender-responsive climate action. **Collaborative efforts are vital to integrate gender equality** into international climate policies and strategies.

## Chenchu Tribe

### *Why in News?*

The **Chenchu tribe** in Andhra Pradesh is encountering growing difficulties as a result of the **discontinuation of the Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGS)** Chenchu Special Project, which has **negatively impacted** their livelihoods, food security, and access to essential services such as healthcare and education.

### *Who are Chenchus?*

- The Chenchus, also called **'Chenchuvaru' or 'Chenchwar'**, is numerically the smallest **Scheduled Tribe** of Odisha.
  - Their traditional way of life has been based on **hunting and food gathering.**

Note:

- They are **considered one of the oldest Telugu-speaking tribes**.

- They are one of the 12 **Particularly Vulnerable Tribal Groups (PVTGs)** in Andhra Pradesh, a classification given to tribes with low literacy, stagnant population growth, and limited access to development.
- They mainly reside in forested regions, **including the Nallamala forest** and surrounding areas, relying on forest produce for their livelihood.

| Major Initiatives for PVTGs |
|---|
| ➢ **Janjatiya Gaurav Divas.** |
| ➢ **Viksit Bharat Sankalp Yatra.** |
| ➢ **PM PVTG Mission.** |

### *What is MGNREGS?*

- **About:**
  - It is one of the largest work guarantee programmes in the world **launched in 2005** by the **Ministry of Rural development**.
  - It provides a legal guarantee for **one hundred days of employment** in every financial year to adult members of any rural household willing to do public work-related unskilled manual work at the statutory minimum wage.
- **Legal Right to Work:**
  - Unlike earlier employment guarantee schemes, the act aims at addressing the causes of chronic poverty through a rights-based framework.
  - At least **one-third of beneficiaries have to be women**.
  - Wages must be paid according to the statutory minimum wages specified for agricultural labourers in the state under the **Minimum Wages Act, 1948**.

## Communal Violence

### *Why in News?*

Recently, **communal violence** erupted in Bahraich, Uttar Pradesh, during a religious procession, leading to death and multiple injuries. The situation has prompted increased police presence and actions to maintain order.

### *What is Communal Violence?*

- **About:**
  - The **Indian Penal Code (IPC)** defines **communal violence** as any act that promotes enmity between different groups on grounds of **religion, race, place of birth, residence, language**, etc., and does acts prejudicial to the maintenance of harmony.
- **BNS Provisions on Communal Violence:**
  - **Bharatiya Nyaya Sanhita Section 196** aims to **prevent and punish actions that promote enmity and hatred** between different groups based on various grounds.
  - It seeks to maintain social harmony by penalizing such acts with imprisonment and fines, especially when these actions occur in places of worship or during religious gatherings.

### *What are the Causes of Communal Violence in India?*

- **Political Factors**:
  - Political parties often exploit communal sentiments to gain **electoral advantages,** using **communal polarization** as a strategy to retain power.
  - Ineffective political institutions exacerbate this issue by failing to prevent or address communal conflicts, leading to a culture of impunity for offenders.
- **Social Dynamics**:
  - Deep-rooted prejudices and stereotypes hinder **inter-community trust.**
  - The influence of **extremist groups** exacerbates communal tensions.
  - Religious symbols are manipulated to incite communal hatred.
- **Economic Factors**:
  - Competition for limited resources fosters conflict between communities.
  - **Marginalized groups** often perceive systemic discrimination.
- **Cultural Conflicts**:
  - Divergent values and lifestyles contribute to friction. Cultural pluralism faces challenges from rising religious conservatism.

Note:

- Sacred sites often become flashpoints for cultural appropriation or desecration.

- **Lack of Education and Awareness**:
  - Widespread misinformation breeds mistrust, making communities susceptible to violence.

**What is the Role of Government in Maintaining Communal Harmony?**

- Ministry of Home Affairs (MHA) in India has several initiatives related to communal harmony, including the National Foundation for Communal Harmony (NFCH) and the National Communal Harmony Award:
  - **National Foundation for Communal Harmony (NFCH):** An autonomous organization that promotes communal harmony and national integration. The NFCH's activities include:
    - Providing financial support to rehabilitate child victims of violence
    - Encouraging interfaith dialogue
    - Promoting awareness programs
  - **National Communal Harmony Award**
    - An award is given annually to individuals, student unions, and organizations that contribute to communal harmony and national integration.
    - The award is announced on **January 26th** every year. The jury for the award includes the **Vice-President of India, the Principal Secretary to the Prime Minister, the Home Secretary**, and two eminent people nominated by the Union Home Minister.
  - **Communal harmony guidelines**
    - The MHA has guidelines on **communal harmony** that include information on managing information and assigning nodal responsibilities.

## *What are the Impacts of Communal Violence in India?*

- **Loss of Human Lives**: Communal violence results in significant loss of life, tearing apart families and communities. This loss creates enduring scars that affect social dynamics for generations.
- **Destruction of Property**: Homes, businesses, and places of worship are often destroyed, leading to substantial economic losses. Such destruction disrupts livelihoods and damages community infrastructure.
- **Social Disintegration**: Communal violence weakens social cohesion, eroding trust and unity among communities. Long-standing relationships can become strained or severed, resulting in divided societies.
- **Economic Setbacks**: Violence leads to resource diversion and creates an unfavorable investment climate. Economic activities are disrupted, hindering growth and development.
- **Psychological and Political Impact**: Survivors experience trauma, anxiety, and depression, affecting their mental well-being. Politically, communal violence undermines democracy, the rule of law, and can contribute to authoritarianism and increased corruption.

**Note:**

- The Communal Violence (Prevention, Control, and Rehabilitation of Victims) Bill, 2005:
  - The Bill aims to prevent communal violence, ensure swift action during conflicts, and rehabilitate victims.
  - It empowers both central and state governments to intervene and control communal disturbances.
  - Public officials can be held accountable for failure to control violence or for negligence.
  - Special courts may be established to expedite trials.
  - Provides legal provisions for the compensation and rehabilitation of victims.

## *What Are the Solution to Prevent Communal Violence?*

- **Strengthening Legal Frameworks**: Enhance laws to address hate speech and communal violence, ensuring strict enforcement and accountability for perpetrators.
  - The **State Level Integration Committee,** along with **district administration**, plays a crucial role in maintaining communal harmony by monitoring potential communal tensions and ensuring timely intervention.
- **Promoting Inter-Community Dialogue**: Facilitate discussions between different communities to foster understanding, trust, and collaboration, reducing misconceptions.

Note:

- Interfaith marriages can promote social harmony by bridging cultural, religious, and societal divides.

- **Community Engagement Initiatives**: Involve local communities in **peacebuilding efforts** through awareness programs and community-driven conflict resolution strategies.
- **Proactive Monitoring and Response**: Establish State Level Integration Committees to monitor tensions and coordinate timely interventions by district administration.
- **Awareness Programs**: Implement educational initiatives to promote secular values and tolerance, targeting schools and community organizations.

# India's Ageing Population

### *Why in News?*

Recently, some **Southern states** expressed concerns about their **ageing and shrinking population** and emphasised a **law to incentivise** residents of the state to have **more children.**

- The **ageing population** is a **demographic trend** with an increasing proportion of individuals **aged 65 and older** compared to the **working-age population (15-64)**.

### *What do Data Say on Ageing and Overall Population Size in India?*

- **Overall Population Increase**: India's population is projected to increase by **31.1 crore (311 million)** between **2011 and 2036**.
- **Concentration of Growth**: Almost half i.e., **17 crore** will be added in five states of **Bihar, UP, Maharashtra, West Bengal, and Madhya Pradesh.**
- **Regional Disparities**: **Uttar Pradesh** is projected to account for **19%** of total population growth, while the five Southern states **Andhra Pradesh, Karnataka, Kerala, Telangana, and Tamil Nadu** will contribute only **29 million**, or **9%** of the total growth.
- **Ageing Population Trends:** The number of individuals aged 60 years and older is expected to more than double from **10 crore (100 million)** in **2011** to **23 crore (230 million)** by **2036**, with their share of the total population rising from **8.4%** to **14.9%**.

**POPULATION BY PERCENTAGE IN DIFFERENT AGE BRACKETS**

| INDIA | 2011 | 2036 (PROJECTED) |
|---|---|---|
| 0-14 years | 30.9 | 20.1 |
| 15-59 years | 60.7 | 64.9 |
| 60+ years | 8.4 | 14.9 |

| Andhra Pradesh | 2011 | 2036 |
|---|---|---|
| 0-14 years | 25.2 | 15.7 |
| 15-59 years | 64.8 | 65.3 |
| 60+ years | 10.1 | 19 |

| Uttar Pradesh | 2011 | 2036 |
|---|---|---|
| 0-14 years | 36 | 22 |
| 15-59 years | 56.7 | 66.1 |
| 60+ years | 7.3 | 11.9 |

*Source: Population Projection by Ministry of Health and Family Welfare*

- **State Variations in Ageing Population**: In **Kerala**, the proportion of individuals aged 60 and older is projected to rise from **13% in 2011 to 23% by 2036**, meaning nearly **1 in 4** individuals will be in this age group.
  - In **Uttar Pradesh**, the share of the **60+ population** is expected to rise from **7% in 2011 to 12% in 2036**.
- **North-South Divide:** The increase in the proportion of people aged 60 and older will be **smaller in Northern states** compared to the South.
  - Southern states **transitioned to lower fertility rates earlier**. E.g., **Uttar Pradesh** is projected to reach the **Replacement Level of Fertility** (2.1 children per woman) in **2025**, over two decades later than **Andhra Pradesh (2004)**.

**Note:** The above data is based on the **latest population projections from a 2020 report** by a technical group within the **Union Ministry of Health and Family Welfare**.

### *What are the Causes of Ageing and Shrinking Population?*

- **Contraception and Family Planning**: The increased availability of **contraception and abortion** services allows individuals to have greater control over their reproductive choices.
- **Women's Economic Participation**: As women have increasingly entered the workforce, many have chosen to **delay childbirth or forego having children** altogether.
  - This shift is often driven by **career aspirations, financial stability**, and the pursuit of personal goals.

Note:

- **Improved Child Survival Rates**: According to the World Health Organization (WHO), the under-five mortality rate (deaths per 1,000 live births) in India declined t**o 34 in 2019 from 126 in 1990.**
  - Between **1990 and 2019**, India achieved a **4.5% annual reduction** in under-five mortality, decreasing deaths from **3.4 million** in 1990 to **824,000** in 2019.
  - Due to decline in the under-five mortality rate, people are **less likely to give birth** to more children.
- **Urbanisation**: As more people move to urban areas, the **cost of living often rises**, making it more difficult for families to **afford children**. Urban lifestyles may also **prioritise careers** over family expansion.
- **Migration:** Indian migration due to foreign countries like UAE and USA also leads to decline in India's population.

### *What Concerns are Associated with the Ageing Population?*

- **Small Representation in Parliament:** Southern states with an ageing population and consequently **smaller populations** fear they could end up getting **penalised by way of fewer seats in Lok Sabha** for having made the demographic transition before the North.
  - **Bihar, Madhya Pradesh, Rajasthan, and Uttar Pradesh** might gain more political representation at the **expense of Southern states**, affecting policy priorities.
- **Slowing GDP Growth**: An ageing population often leads to a **decline in the growth rate of** GDP primarily due to a decrease in the **labour force.**
  - Eg. In the US, the growth of the 20 to 64-year-old population is expected to decrease from **1.24% per year (1975-2015)** to only **0.29% (2015-2055)** leading to a **corresponding decline** in the growth rate of **GDP** and **aggregate consumption.**
- **High Dependency Ratio:** As the population ages, there will be a **higher ratio of dependents (both elderly and children)** to working-age individuals which increases the **burden** on the working-age population (15- to 64-year-olds).
  - According to the **World Bank** collection of development indicators, India's current age **dependency ratio of 47% in 2023** is expected to rise significantly.
- **Higher Public Expenditure**: The cost of public programs for **health care, pensions, and long-term care** will increase significantly as populations age.
  - Governments will need to **raise taxes or cut benefits** to manage these rising costs.
- **Intergenerational Equity Issues**: Younger populations might feel **unfairly taxed** to support the older generation, leading to potential societal divides and a **sense of injustice** regarding resource allocation.
- **Pressure for Institutional Reform**: As the population ages, there may be growing calls for reforms in **retirement age, social security benefits, and healthcare systems**.

**Shift from Population Explosion to Population Shrinkage**

- Roughly **five decades ago**, the main **concern** facing India was **rapid population growth**, fuelled by **high levels of fertility** (births per woman).
- Over the decades, India has been able to **arrest the pace** of population growth which has been **led by several Southern states.**
  - **Andhra Pradesh** achieved the Replacement Level of Fertility in **2004,** making it the **5th Indian state** to do so after **Kerala (1988), Tamil Nadu (2000), Himachal Pradesh (2002), and West Bengal (2003).**
- **Andhra Pradesh** used to have a law that **barred people from contesting in local polls** if they had more than two children. The law was later repealed.
- Despite lower fertility levels in individual states, India is the **most populous country** in the world.

### *How do Countries Respond to Ageing Population?*

- **China's Three-Child Policy**: In **2016**, China moved to allow its citizens to have **two children** and in **2021**, China announced that families are permitted to have **three children.**
  - From **1980 to 2016**, China imposed a **one-child policy**, which slowed population growth.
- **Japan's Parental Leave:** It includes mandating **twelve-month parental leave**, offering direct financial aid to parents, and investing heavily in **subsidised childcare**.

Note:

- **Extended Retirement Age:** Some countries, such as **France and the Netherlands**, extended the retirement age or the age at which people are eligible for **pension benefits** to alleviate pressure on **pension systems**.
- **Open Immigration Policy: Australia, Canada**, and other countries have adopted more **open immigration policies** to counter labour shortages due to their declining populations.

## Global Hunger Index 2024

### *Why in News?*

Recently, India ranks **105th out of 127** countries in the **Global Hunger Index (GHI) 2024** with a score of **27.3**, highlighting a **"serious" hunger crisis** driven by ongoing challenges of food insecurity and malnutrition.

**What is GHI?**

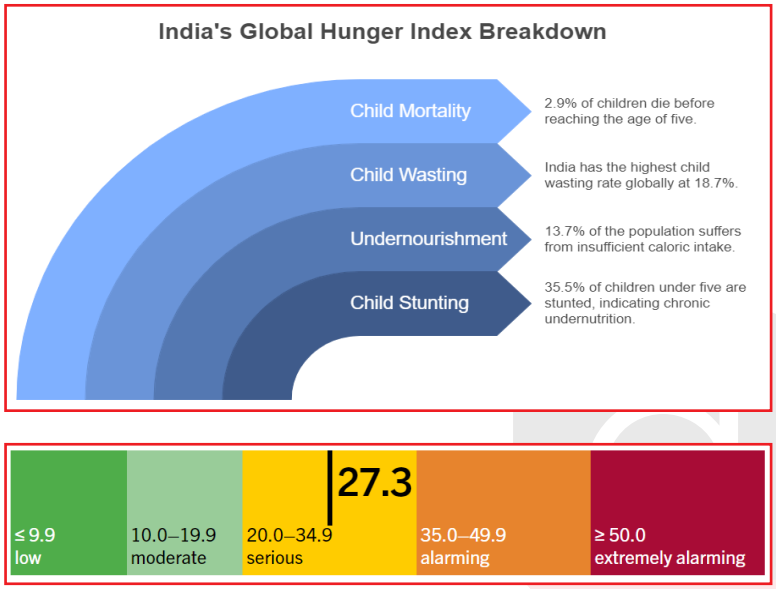
- The Global Hunger Index (GHI) is a **peer-reviewed report**, published on an annual basis by Concern Worldwide and Welthungerhilfe.
- The GHI is a tool designed to comprehensively measure and track hunger at global, regional, and national levels, reflecting multiple dimensions of hunger over time.
- The **GHI score is calculated on a 100-point scale** reflecting the severity of hunger - 0 **is the best score (implies no hunger) and 100 is the worst.**
- **Four Component Indicators:**
  - **Undernourishment:** The share of the population whose caloric intake is insufficient; It refers to Insufficient calorie intake to sustain a healthy life, as defined by the Food and Agriculture Organization of the United Nations.
  - **Child Stunting:** The share of children under the age of five who have **low height for their age,** reflecting chronic undernutrition;
  - **Child Wasting:** The share of children under the age of five who have **low weight for their height,** reflecting acute undernutrition; and
  - **Child Mortality:** The share of children who die before their fifth birthday, reflecting in part the fatal mix of inadequate nutrition and unhealthy environments.

**Note:**

- **Concern Worldwide** is an international humanitarian organization focused on addressing poverty and alleviating suffering in the world's poorest countries.
- **Welthungerhilfe**, founded in **1962 as the German branch** of the **"Freedom from Hunger Campaign,"** is a private aid organization based in Germany.

### *What are the Key Findings of the GHI 2024?*

- **India-Specific Findings**: GHI Score (2024) - 27.3 ('serious') slightly improved from GHI Score (2023) - 28.7 ('serious').
  - Undernourished children - 13.7%
  - Stunted children - 35.5%
  - Wasted children - 18.7% **(highest globally)**
  - Child mortality rate - 2.9%







- **Global Trends in GHI 2024:**
  - The 2024 GHI score for the world is **18.3,** a slight improvement from **18.8** in **2016,** and is considered "moderate."
  - South Asian neighbours like Bangladesh, Nepal, and Sri Lanka perform better, ranking in the **"moderate" category.**
- **Recognizing India's Efforts:** The report acknowledges India's significant efforts to improve the food and nutrition landscape through various initiatives such as Poshan Abhiyan (National Nutrition Mission), PM Garib Kalyan Yojana (PMGKAY), National Mission for Natural Farming.
- **Insufficient GDP Growth:** The report highlights that **Gross Domestic Product (GDP)** growth does not guarantee reduced hunger or improved nutrition, urging the need for policies focused on pro-poor development and addressing social and economic inequalities.

### *What is India's Response to GHI 2024?*

- **Faulty Methodology:** The Ministry of Women and Child Development criticized the absence of data from their Poshan Tracker, which reportedly indicates a much lower child wasting rate of 7.2%.
- **Focus on Child Health:** The government noted that **three out of the four GHI** indicators pertain to children's health and may not provide a complete representation of the entire population.
- **Small Sample Size:** The government expressed doubts about the accuracy of the **"Proportion of Undernourished Population"** indicator, as it is based on a small sample size opinion poll.

**What are India's Initiatives to Address Hunger?**

- Eat Right India Movement
- POSHAN Abhiyan(National Nutrition Mission)
- Mid-day Meal (MDM) scheme
- Pradhan Mantri Matru Vandana Yojana
- National Food Security Act, 2013
- Mission Indradhanush
- Integrated Child Development Services (ICDS) Scheme

### *What are the Challenges Related to Hunger in India?*

- **Inefficient Public Distribution System (PDS):** Despite improvements, India's PDS still faces challenges in reaching all intended beneficiaries.
  - The **National Food Security Act (2013)** covers 67% of the population, but more than 90 million eligible people have been excluded from legal entitlements under the Targeted Public Distribution System (TDPS).
- **Income Inequality and Poverty:** While India has made strides in poverty reduction (24.82 crore Indians escaped **Multidimensional Poverty** in the last 9 years), significant income disparities persist, affecting food access.
- **Nutritional Challenges and Dietary Diversity:** Food security in India often focuses on calorie sufficiency rather than nutritional adequacy.

Note:

- **Urbanization and Changing Food Systems:** Rapid urbanization in India is transforming food systems and consumption patterns.
  - A 2022 study by the Tata-Cornell Institute found that 51% of urban slum households in Delhi experienced food insecurity.
- **Gender-Based Nutritional Gap:** Gender-based disparities worsen hunger and malnutrition in India. Women and girls often face unequal access to food within households, receiving smaller portions or lower-quality meals.
  - This inequity, combined with the demands of maternal and child care, increases their vulnerability to chronic undernutrition.

# Ban on Child Betrothals

## *Why in News?*

The Supreme Court highlighted that marriages arranged during a **child's minority infringe upon their "free choice" and "childhood,"** and urged the Parliament **to outlaw child betrothals.**

- According to the court, India had yet to fully address the issue of minor betrothals, despite the **Convention on the Elimination of All Forms of Discrimination against Women (CEDAW)** recognizing the problem in 1977.
- The **Prohibition of Child Marriage Act (PCMA) of 2006** criminalised **child marriage** but the practice of betrothal is not **explicitly prohibited under the Act.**

**Note:**

- Child marriage involves individuals below the legal age (typically under 18) who are formally wed and often cohabitate, facing the full legal and social obligations of marriage.
- Child Betrothal involves a promise of marriage between children or between a child and an adult, intended to take place later when they are older.
  - During the betrothal, the children usually stay with their families but are bound by this promise, which can create social and legal obligations for them and their families.

**The Convention on the Elimination of All Forms of Discrimination against Women (CEDAW)**

- It is an **international treaty** that **aims to achieve gender equality** and protect women's rights.
- It is **considered an international bill of rights for women** and is one of the core human rights treaties of **the United Nations.**
- CEDAW was adopted by the **UN General Assembly in 1979** and **came into effect in 1981** after 20 countries ratified it.
  - **India signed CEDAW in 1980** and **ratified it in 1993**.

## *What is the Status of Child Marriage in India?*

- **History:**
  - Historical texts suggest that early marriages were prevalent, particularly for girls, often for socio-economic reasons or to ensure family alliances.
  - During the medieval era, the practice became more entrenched due to the **influence of certain religious and cultural norms**. The age of marriage for girls decreased significantly, with marriages often **arranged soon after puberty.**
  - The British colonial government, **influenced by socio-religious reformers like Raja Ram Mohan Roy and Ishwar Chandra Vidyasagar**, recognized the harm of child marriage and began addressing the issue.
    - The British government introduced legislative measures to curb the practice, notably the **Age of Consent Act of 1891**, which raised the age of consent for marriage to 12 years.
    - The **Child Marriage Restraint Act (1929)**, also known as **the Sarda Act,** set the minimum age for marriage at 14 for girls and 18 for boys, marking the first legal intervention to control child marriages.
- **Status of Child Marriage in India:**
  - Girl child marriages declined from **49% in 1993 to 22% in 2021.** Boy child marriages reduced from **7% in 2006 to 2% in 2021**, indicating an overall national decline.
  - However, between **2016 and 2021,** the progress plateaued, with certain states experiencing a troubling rise in child marriages.

Note:

- Notably, six states witnessed an **increase in girl-child marriages**, including **Manipur, Punjab, Tripura, and West Bengal.**
- Eight states observed a rise in boy-child marriages, encompassing **Chhattisgarh, Goa, Manipur, and Punjab.**

- **Legal Measures to Prevent Child Marriage:**
  - **Prohibition of Child Marriage Act (PCMA) in 2006.**
  - In the case of ***Independent Thought v. Union of India, 2017***, the Supreme Court of India held that **sexual intercourse between a man and his wife**, if she is aged between 15 and 18 years, **constitutes rape**.
    - The above judgement **narrowed the scope of exception 2 to Section 375** of the **Indian Penal Code (BNS)** and raised the age of consent to 18 years for marital sexual intercourse.
- **Government Initiatives:**
  - **Beti Bachao Beti Padhao scheme**
  - **Dhanalakshmi Scheme:** It is a conditional cash transfer scheme for a girl child with insurance coverage.
    - It also aims to **eliminate child marriage by offering parents insurance coverage** of medical expenses and encouraging the education of the girl child.

### *What is the Prohibition of Child Marriage Act (PCMA) 2006?*

- **Objective:** The Act **prohibits the solemnisation of child marriages** and aims to protect children from being married before the legal age.
- **Legal Age for Marriage:** Under the Act, the **legal age for marriage** is set at **18 for women and 21 for men.**
- **Voidable Marriages:** Marriages involving minors can be declared voidable at the option of either party, and they may seek **annulment within two years** of attaining adulthood.
- **Punishments:** The **Act prescribes penalties**, including **imprisonment and fines**, for those who solemnise, conduct, or abet child marriages, as well as for parents or guardians involved.
- **Child Marriage Prohibition Officers:** The Act empowers states to appoint **Child Marriage Prohibition Officers** to prevent child marriages and ensure the law is enforced.
- **Protection and Maintenance:** It provides for the protection of minors involved in such marriages, including the **right to maintenance for the child bride until her remarriage**.
- **Applicability:** The Act **overrides any customs, laws,** or personal religious laws that allow for child marriages, ensuring universal protection across India.

### *What did the Court Judgement say?*

- **Equal Right to Childhood:** The court pointed out that **patriarchal ideas of masculinity and sexual dominance**, along with misinformation from peers, **often lead young boys to commit violence** against their child brides.
  - While girls are disproportionately affected, the judgement emphasised that the **right to childhood belongs to all sexes.**
  - The court **declared a child** whose marriage was fixed as "**a minor** in need of care and protection" under **the Juvenile Justice Act.**
- **Child Marriage Threatening Modern Laws:** The Court noted that the centuries-old practice of child marriage undermines modern laws like the **POCSO Act, 2012**, as it exposes **minor girls to sexual abuse** despite legal protections.
- **Objectification in Child Marriages:** The Court held that child marriages **objectify children and impose adult responsibilities**, including expectations of compulsory heterosexuality and fertility.
- **Disruption of Natural Sexuality:** The Court noted that child marriage systematically **dismantles a person's ability to organically experience sexual desire and navigate intimacy**, all under the guise of tradition.

### *What are the Guidelines Issued By the Court?*

- **Guidelines for Sexuality Education:** The Court directed the government to implement age-appropriate and **culturally sensitive sexuality education** for children in schools.
- **Child Marriage Free Village Initiative:** It proposed a **drive to create 'Child Marriage Free Villages,'** akin to the '**Open Defecation Free Village' initiative**, engaging local and community leaders in the effort.
- **Online Reporting Portal:** The court recommended the Home Ministry to establish a designated **portal for** the **online reporting of child marriages.**

Note:

- **Compensation Scheme:** The Court urged the Ministry of Women and Child Development to initiate a **compensation scheme for girls who choose to exit child marriages.**
- **Annual Budget Allocation:** It also called for the **allocation of an annual budget dedicated to preventing child marriages** and providing support to affected individuals.

**Protection of Children from Sexual Offences Act (POCSO) 2012**

- **Purpose:**
  - The POCSO Act **aims to protect children from sexual assault, sexual harassment, and pornography.** It also aims to punish offenders based on the severity of the crime.
- **Features:**
  - It is **gender neutral** as it applies to both boys and girls. It also includes provisions for special courts to try cases, compensation for victims, and medical examinations in the presence of a trusted adult.
- **Amendments:**
  - It was **amended in 2019** to introduce more **stringent punishments,** including the death penalty.
- **Reporting:**
  - The **Union Ministry of Women and Child Development** launched the **POCSO e-box** to facilitate reporting of sexual offenses against children.
- **Compensation:**
  - **Victims** may receive **interim compensation for immediate needs**, and final compensation for any loss or injury. Compensation is given regardless of whether the accused is found guilty.

### *What are the Challenges to Implement PCMA?*

- **Cultural Norms and Societal Attitudes:** Deep-rooted **cultural beliefs and practices continue to support child marriage** in many communities, making it difficult to change attitudes.
  - Certain cultural and religious laws, such as **Muslim personal law and tribal customs in the Northeast, permit child marriage**, making the Prohibition of Child Marriage Act (PCMA) inapplicable in these cases.
  - According to **the National Family Health Survey (NFHS-5)** 2019-21, nearly **23% of women aged 20-24** were **married before the age of 18,** indicating persistent acceptance of the practice.
- **Inadequate Enforcement of Laws:** Despite the existence of the PCMA 2006 enforcement remains weak. **Local authorities may lack the resources or commitment to take action** against child marriages, resulting in low conviction rates.
- **Gender Inequality: Gender-based discrimination** perpetuates child marriage, as **girls are often viewed as economic burdens.**
- **Influence of Peer Pressure: Misinformation and peer pressure** among children can lead to acceptance of child marriage. Community engagement and peer education programs are necessary to counter these influences.
- **Lack of Awareness and Education:** Many communities **lack awareness of the legal provisions against child marriage** and its negative impacts.
  - Educational campaigns are needed to inform families about the **benefits of delaying marriage and the rights of children.**

## Offence of 'Abetment of Suicide'

### *Why in News?*

Recently, the Supreme Court has interpreted the crime of 'abetment of suicide,' detailing the criteria for determining guilt in such cases.

### *What is Abetment of Suicide?*

- **About:** Abetment of suicide is an offence under **Section 306 of the Indian Penal Code (IPC)** (**Section 108 of the Bharatiya Nyaya Sanhita (BNS)**).
  - The punishment for this crime is **up to 10 years of imprisonment** and a fine.
  - **Section 45 of the Bharatiya Nyaya Sanhita (BNS)** defines abetment as when a person either instigates someone to commit an act, conspires with others to do something (leading to an illegal act or omission), or intentionally aids in its execution.

Note:

- **SC's Interpretation:**
  - The offence requires **"direct and alarming encouragement or incitement"** that leaves no option but fatal step.
  - The **court laid down following guidelines** to determine whether a situation involved unbearable harassment or emotional exploitation that drove the deceased to suicide.
    - The **accused created unbearable harassment or torture**, leading the victim to view suicide as the only escape.
    - The **accused exploited the victim's emotional vulnerability**, making them feel worthless or undeserving of life.
    - The **accused threatened harm to the victim's family** or caused financial ruin.
    - The **accused made false allegations** that damaged the victim's reputation, leading to public humiliation and loss of dignity.
- **Related Cases:**
  - ***M Mohan v The State, 2011:*** The SC ruled that proving abetment of suicide under Section 306 IPC requires a direct act with intent, leaving the victim no option but suicide.
  - ***Ude Singh v State of Haryana, 2019:*** The SC held that proving abetment of suicide depends on case specifics, requiring direct or indirect incitement that leaves the victim no choice but suicide.
- Government Initiatives for Suicide Prevention:
  - **Mental Healthcare Act (MHA), 2017**
  - **KIRAN Helpline**
  - **Manodarpan Initiative**
  - **National Suicide Prevention Strategy 2022**

## What is the Statistics Related to Suicide in India?

- The data compiled by the **NCRB** is based on police-recorded first information reports **(FIRs)**.
  - **Surge in Student Suicides:** Student suicides in India have surged by 4% annually, outpacing the **overall suicide rate increase of 2%**, despite a likely "under reporting" of student suicide cases.
  - **Gender Disparity:** In 2022, **male students constituted 53%** of total student suicides. While male suicides decreased by 6% from 2021, **female student suicides saw a 7% rise.**
  - **Decade Trend:** Over the past decade, despite a slight decrease in the **0-24 age** group population, student suicides **rose significantly from 6,654 to 13,044**.
  - **State-Wise Distribution: Maharashtra, Tamil Nadu, and Madhya Pradesh** reported the highest numbers of student suicides, collectively accounting for one-third of the national total.
- **Legal Norms Related to Suicide:**
  - **Section 115 of Mental Healthcare Act, 2017 (MHCA)** states that attempted suicide is to be considered the result of severe stress, and the individual is not to be prosecuted**.**
  - **BNS removes the Section of attempt to commit suicide** from the statute books, it doesn't entirely decriminalize the offence of attempting to die by suicide.
    - **Section 224 of the BNS** states that attempting to commit suicide with the intent to compel any public servant to discharge their official duties shall be punishable by imprisonment for up to one year, a fine, or both.

■■■

Note:

# Science & Technology

## Highlights

- *Stem Cell Transplants*
- *China's JUNO Experiment to Study Neutrinos*
- *Precision Medicine and Biobanks*
- *Cancer Detection with Ultrasound*
- *Parkinson's Disease*
- *Installation of X-Band Radar*
- *Mid-Air Booster Recovery*

## Stem Cell Transplants

### *Why in News?*

A recent study published in ***Science Translational Medicine*** examined long-term outcomes in patients who underwent **hematopoietic stem cell transplants (HSCT)**, focusing on how transplanted stem cells evolve and mutate over time.

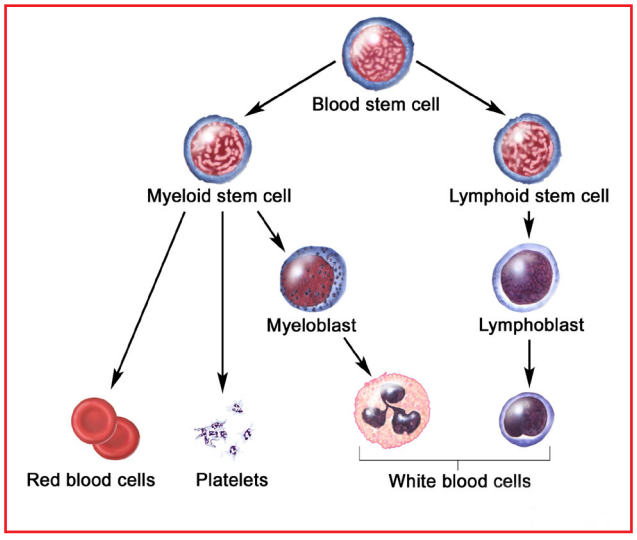
### *What are the Key Findings of the Study?*

- The research involved 16 pairs of donors and recipients where both exhibited surprisingly low mutation rates, average 2% in donors and 2.6% in recipients annually.
  - This finding suggests a stable clonal expansion of stem cells over decades.
- While all donors exhibited some level of **clonal hematopoiesis**, the absence of widespread clonal expansion indicates a robust regenerative capacity of the bone marrow.
- **Implications:**
  - Crucial for improving long-term transplant outcomes.
  - Potential risk of developing blood cancers or chronic diseases in recipients due to the presence of clonal hematopoiesis

**Note: Clonal hematopoiesis** occurs when one type of blood cell increases in number compared to others in the blood system. Common examples of this condition include **chronic myeloid leukemia** and **myelodysplastic syndromes (MDS)**.

### *What are Hematopoietic Stem Cells ?*

- **Stem Cells:** Stem cells are the body's raw materials — cells from which all other cells with specialised functions are generated.
- **Hematopoietic Stem Cells (HSC):** They are immature cells capable of developing into all blood cell types, including white blood cells, red blood cells, and platelets. It was first explored for use in humans in the 1950s.
  - Hematopoietic stem cells are located in peripheral blood and bone marrow, also known as **blood stem cells.**
- **Transplant of HSCs:** It involves administering healthy hematopoietic stem cells to patients with dysfunctional or depleted bone marrow.
  - Hematopoietic stem cell transplants **can save lives for those with blood cancers**.
  - After the transplant, the donated stem cells help restore the recipient's blood cell production system.




Note:

# China's JUNO Experiment to Study Neutrinos

### *Why in News?*

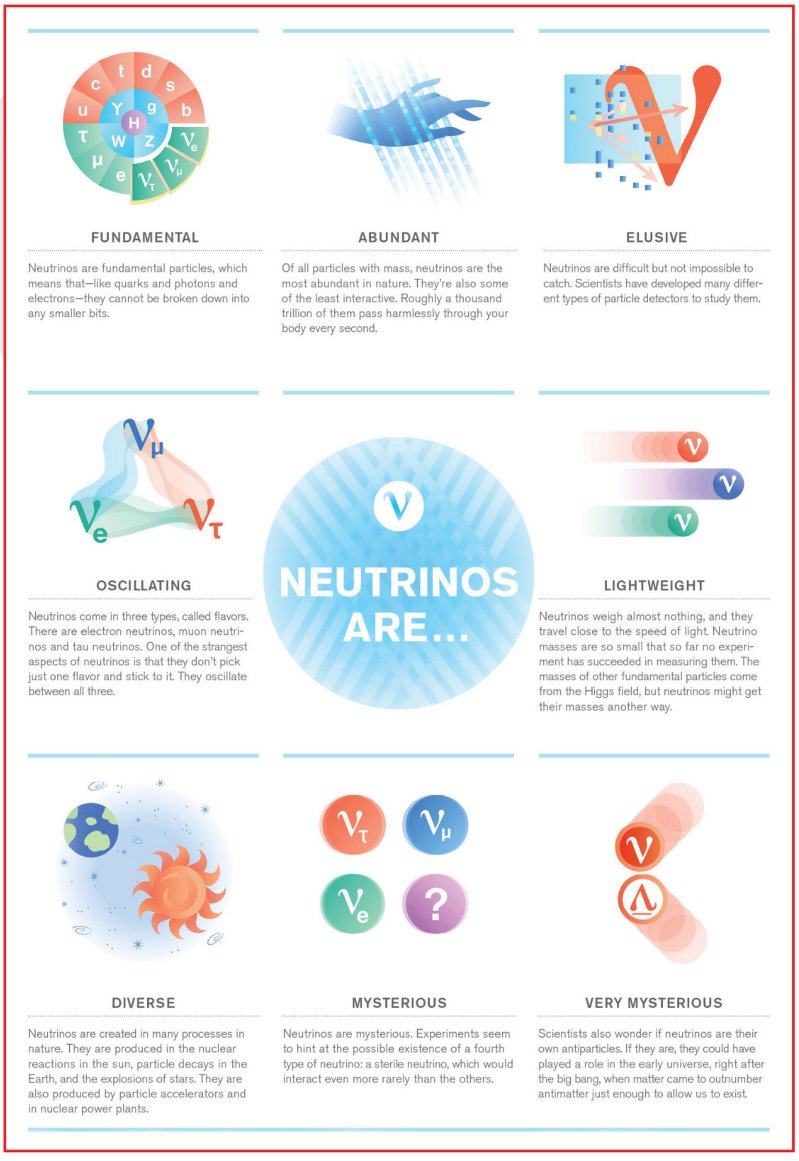
After years of construction, **China's Jiangmen Underground Neutrino Observatory (JUNO)** is set to begin data collection on **neutrinos**. This cutting-edge particle physics experiment aims to greatly enhance our understanding of the subatomic particles.

### *What are the Features of JUNO?*

- JUNO will observe solar neutrinos for a real-time view of solar processes and study neutrinos from uranium and thorium decay within Earth to gain insights into mantle convection and **tectonic plate movement.**
- Set to **become operational in late 2025**, JUNO will **start ahead of the US Deep Underground Neutrino Experiment (DUNE)**, scheduled **around 2030**.
- **International Collaboration:** JUNO's research team includes scientists from the **US, France, Germany, Italy, Russia, and Taiwan,** demonstrating extensive international cooperation.
- **Future Applications of Neutrino Research:** While direct applications for neutrinos remain distant, researchers speculate about potential communication uses, such as **transmitting long-distance messages through solid matter at near-light speed.**

### *What are Neutrinos?*

- Neutrinos are **subatomic particles** that have **no electric charge**, have a small mass, and **are left-handed (the direction of its spin is opposite to the direction of its motion).**
  - They are the **most abundant massive particles in the universe.** They are produced whenever **atomic nuclei combine (as in the sun)** or **split apart (as in a fission reactor or particle accelerator).**
- The only ways neutrinos interact is through **gravity** and the **weak nuclear force.**
- They can change from one type (**electron-neutrino, muon-neutrino, tau-neutrino**) to another as they travel and interact with other particles, a phenomenon sometimes called **neutrino oscillation.**
- Neutrinos can **carry information across large distances** due to their low interaction rate with matter.
  - They could **potentially be used to transmit information, replacing electromagnetic waves in communication channels.**




Note:

**Deep Underground Neutrino Experiment (DUNE)**

- It will be based in South Dakota, US, situated approximately 1,500 meters underground.
- **Objectives:** To **investigate neutrino oscillations** to understand the **fundamental properties of neutrinos**, including their **mass hierarchy.**
  - Study the **asymmetry between matter and antimatter,** neutrino interactions, and **potential proton decay.**
- **Global Collaboration: Involves scientists from over 30 countries,** including the US, UK, India, Japan, and Brazil, making it one of the **largest international collaborations** in particle physics.
- **Scientific Significance:** Expected to **reveal insights into particle physics** that could impact theories of the universe's evolution.

**Indian Neutrino Observatory (INO)**

- It is a proposed particle **physics research mega project** with the objective to **study neutrinos in a 1,200-metre deep cave.**
- The project is proposed to be set up at **Pottipuram village in Theni district in Tamil Nadu.**
- The project was initially mooted by the **Institute of Mathematical Sciences** and then by the **Tata Institute of Fundamental Research.**
- As of **October 2024**, the **construction of the INO project is stalled due to opposition** from the **state government and ecologists.**

# Precision Medicine and Biobanks

## *Why in News?*

**Precision medicine** is ushering in a new era of personalised healthcare. This field began to take concrete form as scientists completed **the Human Genome Project (HGP).**

- It now encompasses genomics for diagnosing and treating cancers, chronic, immunological, cardiovascular, and liver diseases.

**Note:**

- Acknowledging the **unique genetic diversity of the Indian population**, the HGP aims to identify and catalogue genetic variations among various Indian groups by sequencing the entire genomes of **10,000 healthy individuals from all major ethnic communities across the country**.

## *What is Precision Medicine?*

- **About:**
  - It is an **innovative strategy for treating and preventing diseases** that considers individual differences in genetics, environment, and lifestyle.
  - It emphasises **tailoring medical care to the unique characteristics of each patient** rather than using a one-size-fits-all approach.
  - This method **enables** healthcare professionals and researchers to **more accurately** forecast which **treatments and preventive measures** are effective for specific groups of individuals.
- **Role of Biobanks:**
  - Biobanks store **biological samples (e.g., DNA, cells, tissues)** for research. Their **diversity is crucial for precision medicine** to benefit broader populations.
  - Recent studies using **biobank data helped identify undiagnosed rare genetic disorders.**

**Role of Emerging Technologies**

- **Gene Editing:** Techniques like **CRISPR** have opened avenues for correcting **genetic defects**, thereby providing potential cures for previously untreatable conditions.
- **mRNA Therapeutics:** The **Covid-19 pandemic** demonstrated the power of **mRNA technology,** allowing for the rapid development of vaccines. This innovative approach earned a **Nobel Prize**, highlighting its significance in modern medicine.

## *What is the State of Precision Medicine and Biobanks in India?*

- **Market Growth:**
  - The Indian precision medicine market is projected to **grow at a Compound Annual Growth Rate (CAGR) of 16%**, expected to **exceed USD 5 billion by 2030.**

Note:

- Currently, it **accounts for 36% of the national bioeconomy**, encompassing areas such as cancer immunotherapy, **gene editing**, and biologics.

➢ **Policy Development:**
- The advancement of precision therapeutics is included in the **new 'BioE3' policy.**
  - It is aimed at fostering high-performance **biomanufacturing**, which involves the production of **bio-based products across various sectors.**

➢ **Recent Approvals and Developments:**
- In 2023, **the Central Drugs Standard Control Organisation** approved **NexCAR19**, India's domestically developed **CAR-T cell therapy.**
  - In 2024, the government also established a dedicated center for CAR-T cell therapy at IIT Bombay.

➢ **State of Biobanks in India:**
- **Genome India Programme:** The **'Genome India' program** completed the sequencing of 10,000 genomes from 99 ethnic groups, aimed at identifying treatments for rare genetic diseases, among other goals.
- **Phenome India Project:** The pan-India **'Phenome India' project** has gathered 10,000 samples to enhance prediction models for cardio-metabolic diseases.
- **Paediatric Rare Genetic Disorders (PRaGeD) Mission:** This mission aims to identify new genes or variants to develop targeted therapies for genetic diseases affecting children.
- **Regulatory Challenges:** Biobanking regulations in India pose **significant hurdles to realizing the full potential of precision medicine.**
  - In contrast to countries like the UK, US, Japan, and many European nations, which have **comprehensive regulations addressing biobanking issues** (e.g., informed consent, privacy, data protection), India's regulatory framework is inconsistent.

# Cancer Detection with Ultrasound

## *Why in News?*

Recently, scientists developed an **innovative ultrasound technique for cancer detection**, offering a less invasive, cost-effective alternative to traditional biopsies by releasing biomarkers like RNA, DNA, and proteins from tissue into the bloodstream.

## *What is Cancer?*

➢ **About:** Cancer is a condition where certain cells in the body grow uncontrollably and spread to other areas.

➢ **Cause:** Cancer develops in any part of the body when normal cell growth and cell division malfunction, leading to the formation of abnormal cells that may create tumours, which can be either cancerous or non-cancerous.

| Types of Cancer | |
|---|---|
| **Carcinoma** | Originates in epithelial cells (skin, glands). Examples: breast, lung, prostate cancer |
| **Sarcoma** | Forms in bone and soft tissues like muscle or fat |
| **Leukemia** | Affects blood-forming tissues, resulting in abnormal white blood cell production |
| **Lymphoma** | Begins in immune cells (lymphocytes). Main types: Hodgkin and non-Hodgkin lymphoma. |
| **Multiple Myeloma** | Cancer of plasma cells in bone marrow |
| **Melanoma** | Starts in pigment-producing cells, usually affecting the skin. |

| Normal Cells | Cancer Cells |
|---|---|
| Grow only when they receive growth signals. | Grow without the need for growth signals. |
| Follow signals to stop dividing or die when needed. | Ignore signals for cell death, continue to divide. |
| Immune system identifies and eliminates damaged cells. | Hide from the immune system and evade detection. |
| Maintain a stable chromosome number and structure. | Accumulate chromosomal abnormalities (duplications, deletions, extra chromosomes). |

Note:

**What are the Highlights of the Research Conducted?**

- The **gold standard to detect many cancers is a biopsy** where a small piece of tissue or cells is extracted using a large needle from the part of the body where cancer is suspected to be present.
  - Biopsy is, however, a cumbersome, painful, and potentially injurious process.
- The study has found that high-energy ultrasound (at frequencies greater than those used in ultrasound scans) can break off a small piece of cancerous tissue into droplets and release their contents into the bloodstream.
  - This method would allow **blood samples to be used to detect cancer types** and the mutations they contain, which is **currently undetectable in blood.**
- The main advantage of this approach is its **non-invasiveness**, which will prevent patient discomfort. However, more studies in a large cohort of patients would be required before this technique can be brought in as a conventional mode of detecting cancer.

**Note:**

- Ultrasound (also called sonography or ultrasonography) is a noninvasive imaging test that shows structures inside the body **using high-intensity sound waves.**
  - **Applications in Medical Field:**
    - Pregnancy Monitoring
    - Detecting internal issues such as abnormal growths (e.g., tumors, cysts), gallstones, kidney stones, or blood clots
    - Guidance for Procedures (needle placement for biopsies)
    - Doppler ultrasound evaluates blood flow in arteries and veins

# Parkinson's Disease

### *Why in News?*

A recent research has proposed a significant shift in understanding **Parkinson's Disease (PD)** through the **"gut-first hypothesis"**, suggesting a gut-brain connection in its onset and progression.

- The research is significant as it may shift the understanding of the diagnosis, development and treatment of this neurodegenerative disorder.

### *What are the Key Points of Research?*

- The **"gut-first hypothesis"** suggests that PD may begin in the gut, with implications for understanding disease progression and therapeutic strategies.
  - The **gut microbiome** spans from the mouth to the colon. It is the network of microorganisms — bacteria, viruses, fungi and more — and their collective genetic material that lives within the intestinal tract.
  - The research identifies gastrointestinal symptoms, like constipation, as early signs of PD, potentially reshaping diagnosis and treatment approaches.
- Abnormal protein aggregates (Lewy bodies) linked to PD are found in both the gut and brain, indicating a complex interplay in disease development.
  - Lewy bodies are primarily composed of alpha-synuclein, a protein that misfolds and clumps together, contributing to the death of dopamine-producing neurons in the brain.

### *What is Parkinson's Disease?*

- **About:** Parkinson's Disease (PD) is a progressive **neurodegenerative disorder** marked by motor symptoms like tremors, rigidity, **bradykinesia (slow movement)**, and postural instability. Non-motor symptoms include cognitive issues, mental health disorders, sleep disturbances, pain, and sensory problems.
  - **Bradykinesia** means slowness of movement and speed (or progressive hesitations/halts) as movements are continued.
- **Causes:** The exact cause of Parkinson's disease is not fully known yet, but it is believed to involve a combination of genetic and environmental factors**.**
  - It is primarily characterised by the loss of dopamine-producing neurons in the brain, leading to motor and non-motor symptoms.
- **Prevalence:** The global prevalence of PD has doubled in the past 25 years. Global estimates in 2019 showed over 8.5 million individuals with PD.
  - Every year, 13th April is observed as World Parkinson's Day.

Note:

- **Treatment:** There is no cure for Parkinson disease, but therapies including medicines, surgery and rehabilitation can reduce symptoms.
  - **Levodopa/carbidopa**, a combination medicine that increases the amount of dopamine in the brain, is the most common medication.

**What are Neurodegenerative Disorders?**

- **About:**
  - Neurodegenerative diseases are conditions that gradually damage and destroy parts of the nervous system, especially areas of the brain.
- **Types:**
  - **Dementia-type diseases:** These cause progressive damage to various areas of your brain, causing neurons in several areas of your brain to die. For example, Alzheimer's disease, frontotemporal dementia, chronic traumatic encephalopathy (CTE), Lewy body dementia.
  - **Parkinsonism-type diseases:** It results from damage to specific brain neurons responsible for coordination and muscle control, including Parkinson's disease and similar conditions.
  - **Motor neuron diseases:** These happen when neurons that control movement die off. Examples include **amyotrophic lateral sclerosis**.

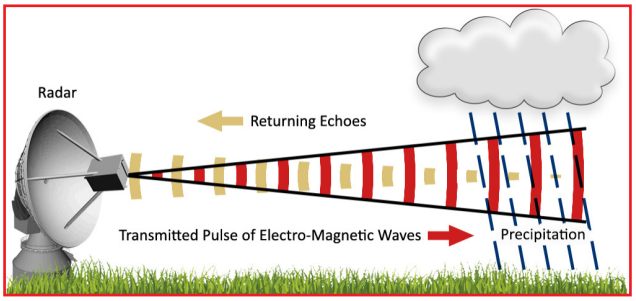
# Installation of X-Band Radar

### *Why in News?*

Recently, the **Ministry of Earth Sciences** approved an X-band radar to be installed in Kerala's Wayanad district after devastating floods and landslides.

### *What are Key Facts About X-Band Radars?*

- **About Radar:** Radar is a device that uses radio waves to **detect and locate objects** by measuring the **reflection of the waves.**
  - Radar stands for **radio detection and ranging.**
- **Working of Radar:** The radar device comprises a **transmitter** that emits a signal aimed at an object whose characteristics are to be ascertained (e.g., **cloud in meteorology**).
  - A part of the emitted signal is **echoed** by the object back to the device, where a **receiver** tracks and analyses it.
- **Applications in Meteorology:** Doppler radars **(weather radar)** reveal how fast a **cloud is moving** and in which **direction** based on the cloud's relative motion changes the **frequency** of the radiation striking it.
  - A Pulse-Doppler radar can measure the **intensity** of rainfall by emitting radiation in **pulses** and tracking how often they're reflected to the receiver.
  - Doppler effect is the **change in frequency of sound waves** as their source moves towards and away from a listener.
  - Doppler radars rely on Rayleigh scattering in which light or other electromagnetic radiation is scattered by particles much smaller than the **wavelength** of the light.
  - Modern Doppler radars can monitor weather conditions and anticipate **new wind patterns, the formation of storms**, etc.
- **X-Band Radar:** An X-band radar is radar that emits radiation in the **X-band** of the electromagnetic spectrum **(8-12 GHz)** corresponding to wavelengths of around **2-4 cm** (this is in the **microwave part** of the spectrum.)
  - It uses radiation of **lower wavelengths** to observe smaller particles like **rain droplets or fog.**
  - The smaller wavelengths allow the radar to produce images of **higher resolution** but X-band radars have a relatively **shorter range.**
- **Role of X-Band Radar in Wayanad:** It will monitor **soil particle movements**, assisting in the issuance of landslide warnings.
  - It will conduct **high temporal sampling**, allowing for rapid detection of changes in particle movement over brief periods.




### *How many radars does India have?*

- **Historical Context:** The India Meteorological Department (IMD) began using radar for weather in the early 1950s.

Note:

- In **1970,** it installed the first **indigenously designed** X-band storm detection radar in **New Delhi**. By **1996**, IMD upgraded 10 outdated X-band radars to **digital versions.**

- **Types of Radar Network:** In its X-band radar network, India has both **wind-finding and storm-detecting radars**, and some with **dual capabilities.**
  - India also uses **S-band radars (2-4 GHz)** for long-range detection.
  - The first **S-band cyclone detection radar** was installed in **Visakhapatnam in 1970** and the first **locally made variant** was commissioned in **Mumbai in 1980.**
- **Recent Initiatives:** As of September 2024, India plans to install **56 additional Doppler radars**, part of the Rs 2,000-crore **Mission Mausam** initiative aimed at enhancing meteorological infrastructure by **2026**.
  - The government is also in the process of acquiring and installing **10 X-band Doppler radars** in northeastern states and Himachal Pradesh's **Lahaul and Spiti district.**
  - A **C-band radar (4-8 GHz)** with an observational range of 250 km will be installed in **Mangaluru.**

## Mid-Air Booster Recovery

### *Why in News?*

Recently, **Elon Musk's SpaceX** used a pair of **giant robotic arms** named **Mechazilla** to grab Starship's booster **Super Heavy**, mid-air after separation from the **Starship rocket.**

- This **novel approach** improves the booster's **reusability** by avoiding ocean landings and **reducing costs and turnaround time.**

### *What are the Key Points of the Mechazilla (Mid-Air Booster Recovery)?*

- **About Mechazilla:** It refers to SpaceX's **towering structure** equipped with a pair of **giant robotic arms** designed to **catch and recover** the parts of launch vehicles during its descent.
- **Working of Mechazilla:** Once the launch vehicle separates from the booster, the booster returns to the launch site, using **grid fins** to control its **descent and orientation**.
  - As it nears the launch tower, the robotic arms, which are controlled by **precision motors and actuators**, align vertically along the tower.
- **Difference from Falcon 9 Recovery:** **Falcon 9** booster lands on **specially-built platforms** using **landing legs** strapped to its side, rather than being caught in mid-air.
- **Comparison with Competitors:**
  - **Rocket Lab:** It employs **helicopters** to catch boosters mid-air using parachutes.
  - **Blue Origin**: It uses its **New Shepard** rocket to **land vertically**, relying on its engines to slow descent.
  - **United Launch Alliance (ULA)**: It focuses on recovering **key engine components** instead of the entire booster. **ULA** is a **joint venture** between **Boeing and Lockheed Martin**.
  - **NASA:** **NASA** uses **parachutes** for rocket recovery and is experimenting with **hypersonic inflatable aerodynamic decelerators (HIAD)**.
    - HIAD consists of a **Flexible Thermal Protection System (F-TPS)** that protects the entry vehicle through **hypersonic atmospheric entry**.
- **Significance of the Mission:** The successful capture of the booster brings SpaceX closer to the goal of **reusing rockets** in **rapid succession** by eliminating costly and time-consuming processes of ocean landings or parachute-based systems.

**Note:** The **Indian Space Research Organisation (ISRO)** successfully completed the third and final **Reusable Launch Vehicle Landing Experiment (RLV LEX-03)** for the **Pushpak vehicle**.

- Pushpak is **India's first uncrewed flying testbed** developed by ISRO.

### *What is Starship?*

- **About Starship:** Starship is a **two-stage heavy lift vehicle** comprising a **booster (called Super Heavy)**, and an upper section (the Starship spacecraft).
  - It is the **largest rocket ever (120 metres)**, taller than even the **Saturn V** (111 metres), which took **Neil Armstrong** to the Moon.
- **Applications:** It is designed to carry **crew and cargo** to **Earth orbit, the Moon, Mars,** and beyond, and once fully operational, can revolutionise space travel.
- **Importance for future space Exploration:** SpaceX wants to use the **Starship HLS (Human Landing System)** to take NASA astronauts back to the moon by **2026** as a part of the **Artemis III mission**.
  - Eventually, **SpaceX** hopes that Starship will put the first humans on **Mars.**

Note:

# Environment and Ecology

## Highlights


- *Differential Impact of Coastal Flooding on Tree Species*
- *Particulate Matter & $SO_2$ Control*
- *Emissions Gap Report 2024*
- *International Snow Leopard Day 2024*
- *Carbon Dioxide Emissions From Forest Fires*
- *Blackbuck*
- *Marine Heat Waves and Twilight Zone*
- *Vertical Migration of Plankton*
- *Funga Taxonomic Kingdom*
- *Warming of Key Biodiversity Areas (KBAs)*
- *Nonylphenol Ethoxylates and Nonylphenol*
- *Threat to Mesophotic Coral Ecosystems*
- *Guidelines to Combat Greenwashing*
- *Disruption in Emissions and Uptake of Methane*
- *Forest Destruction in Ukraine War*


## Differential Impact of Coastal Flooding on Tree Species

### *Why in the News?*

A recent study in **Frontiers in Forests and Global Change** highlights that rising sea levels, driven by **global warming**, result in varying effects on coastal tree species as a result of coastal flooding.

**Note:**

- The study used **dendrochronology (tree-ring dating)** and a **machine-learning technique** called **gradient-boosted linear regression** to examine how rainfall, temperature, and tidal levels affect tree growth, revealing complex interactions between these factors.

### *What are the Key Findings of the Study?*

- **Diverse Effects on Tree Species:** The study indicates that species like **American holly (Ilex opaca)** prosper with elevated water levels, while **loblolly pine (Pinus taeda)** and **pitch pine (Pinus rigida)** show restricted growth under these conditions.
- **Resilience by Species:** Certain species are better suited to adapt to shifts in precipitation, temperature, and sea levels.
  - Trees are adapting rapidly to these changes; as sea levels rise by a few millimetres(mm) each year, many coastal tree species are gradually migrating inland to regions with lower tides and reduced salt exposure.
- **Broader Impact:** Over **three billion people** reside near coastlines and depend on coastal ecosystems. Protecting coastal vegetation is essential for sustaining ecosystem services and supporting livelihoods.
- **Future Implications:** Since 1993, sea levels have doubled their rise from 2mm per year, with researchers forecasting a threefold increase in coastal floods and double the flood days by 2050.
- **Study Relevance:** Findings help forest managers prioritize species protection in coastal areas, emphasizing the importance of local conditions in assessing forest vulnerability to climate change.

**What is Coastal Flooding?**

- **About:** **Coastal flooding** is a sudden inundation of coastal areas caused by short-term water level increases from storm surges and extreme tides, influenced by local topography and bathymetry.
- Mechanisms of Coastal Flooding:
  - **Overtopping:** Waves can breach barriers like seawalls or dikes, leading to flooding behind these defences.
  - **Inundation:** High sea levels or extreme weather can flood low-lying coastal areas even without overtopping.
  - **Backflow:** Storm surges or high tides can overwhelm rivers or drainage, causing water to flow back into coastal zones.

Note:

**Overview of India's Coastal Landscape**

- **India's coastline stretches 7,516.6 km,** with 6,100 km along the **mainland** and **1,197 km around its islands**, spanning 13 States and Union Territories.
- Among the states, Gujarat has the longest coastline (1,214.7 km), followed by Andhra Pradesh (973.7 km) and Tamil Nadu (906.9 km).
- The Andaman & Nicobar Islands hold the longest coastline among UTs at 1,962 km.
- **Vulnerable Areas:**
  - **Vulnerable Coastal States:** Coastal states like Odisha, Andhra Pradesh, Tamil Nadu, Kerala, West Bengal, Gujarat, and Maharashtra face heightened risks due to their geographic exposure and socio-economic conditions.
  - **Low-Elevation Flood Risks:** Regions with low elevation, such as the Sundarbans in West Bengal and Odisha's coastal plains, are particularly prone to coastal flooding.

***How does Global Warming Impact Coastal Region?***

- **Sea-Level Rise:** As global temperatures increase, glaciers and ice sheets melt, adding more water to the oceans and contributing to sea-level rise.
- **Increased Coastal Flooding: Higher sea levels** and stronger **storm surges** result in more frequent and intense coastal flooding, impacting infrastructure and habitats.

Note:

- **Erosion of Coastlines:** The combination of rising seas and more powerful storms accelerates erosion, causing the loss of beaches and wetlands that act as natural buffers.
- **Impact on Marine Ecosystems:** Changes in **ocean temperatures and acidification** due to increased $CO_2$ affect marine life, including coral reefs, fish populations, and biodiversity crucial to coastal economies.
- **Increased Storm Intensity:** Warmer seas contribute to more powerful tropical storms and hurricanes, resulting in destructive storm surges that threaten coastal communities.

**What are India's Initiatives for Coastal Management?**

- **Managing Coastal Flood: MISHTI Initiative,** a government-led initiative aimed at increasing the mangrove cover along the coastline and on saltpan lands.
- **National Centre for Sustainable Coastal Management:** It aims to promote integrated and sustainable management of the coastal and marine areas in India for the benefit and well-being of the traditional coastal and island communities.
- **Integrated Coastal Zone Management Plan:** It is a process for the management of the coast using an integrated approach, regarding all aspects of the coastal zone, including geographical and political boundaries, in an attempt to achieve sustainability.
- **Coastal Regulation Zone:** The **Coastal Regulation Zone** notification was issued in 1991 under the **Environmental Protection Act, 1986,** by theMinistry of Environment, Forest and Climate Change to regulate activities in coastal areas of India.
- **Solutions for Flood Management:**
  - **Storage Reservoirs:** These man-made structures retain water during periods of high flow and discharge it when flows are low.
  - **Embankments:** These are raised structures that confine the flow of water within a channel or along a bank.
  - **Flood Forecasting and Warning:** This system predicts potential floods using meteorological and hydrological data.
    - For instance, the **Central Water Commission (CWC)** runs a network of flood forecasting stations in India, providing daily updates and alerts on flood conditions.

## *What are the Challenges Related to Coastal Flooding?*

- **Infrastructure Damage:** Coastal flooding severely damages infrastructure like roads, buildings, ports, and bridges, leading to high repair costs and disrupting transportation and communication systems in coastal areas.
- **Economic Losses:** Industries such as tourism, fisheries, and agriculture suffer due to flooding, with coastal regions facing direct losses from halted operations, reduced productivity, and damaged assets.
- **Loss of Biodiversity:** Flooding leads to habitat loss for coastal flora and fauna, impacting biodiversity. Wetlands, mangroves, and other critical ecosystems are particularly vulnerable, leading to reduced natural resilience against future flooding.
  - Saltwater intrusion from coastal flooding contaminates freshwater resources, affecting drinking water, agriculture, and local ecosystems.
  - Soil salinity also disrupts crop production, impacting food security in affected regions.
- **Displacement and Human Migration:** Persistent flooding can render areas uninhabitable, forcing communities to relocate.
  - This results in internal migration, strain on urban infrastructure, and potential social conflicts in destination areas.

## *What Strategies Can Protect Forests from Coastal Flooding?*

- **Forest Resilience:** Forest managers should inventory species composition to prioritize forests that are most at risk, rather than applying blanket strategies.
  - Coastal habitats such as **Mangroves**, **Coral Reefs** and lagoons are recognized as the best defence against sea storms and erosion, deflecting and absorbing much of the energy of sea storms.
  - For example, forests dominated by **loblolly pine** may need more urgent interventions due to their susceptibility to tidal flooding.
- **Localized studies:** Localised studies such as soil health and rainfall, are crucial to understanding the **site-specific** challenges that coastal ecosystems face and for assessing coastal forests' vulnerability to sea-level rise, not just flooding.
- **Dune Construction and Restoration:** Building or restoring sand dunes can act as a buffer against high tides and storm surges.
- **Species Selection:** Choosing salt-tolerant and flood-resistant tree species can help sustain forest health in flood-prone areas

Note:

- **Infrastructure and Engineering Solutions:** Exploring innovative engineering solutions like **seawalls, levees, and stormwater** management systems.

# Particulate Matter & $SO_2$ Control

## *Why in News?*

Recently, **CSIR-National Environmental Engineering Research Institute (NEERI)** advised against further **Flue Gas Desulfurization (FGD)** installations in **Indian thermal power plants (TPPs)**, stating that **Sulphur Dioxide ($SO_2$) emissions** have minimal impact on ambient air quality.

- The report of the institute indicated that the focus should **shift to controlling Particulate Matter (PM)** rather than solely on $SO_2$ emissions.

**Note:**

- CSIR-NEERI is a **research institute created and funded by the Government of India**. It functions under the **Ministry of Science & Technology**.
- It was **established in Nagpur in 1958 with focus on** water supply, sewage disposal,communicable diseases and to some extent on industrial pollution and occupational diseases found common in post-independent India.

## *What is Flue Gas Desulfurization (FGD)?*

- **About:**
  - FGD is the **process of removing sulphur compounds from the exhaust emissions** of fossil-fueled power stations.
  - This is done through the **addition of absorbents**, which can remove up to 95% of the sulphur dioxide from the **flue gas**.
    - **Flue gas** is the material emitted when **fossil fuels** such as coal, oil, natural gas, or wood are burned for heat or power.
- **Categorisation:**

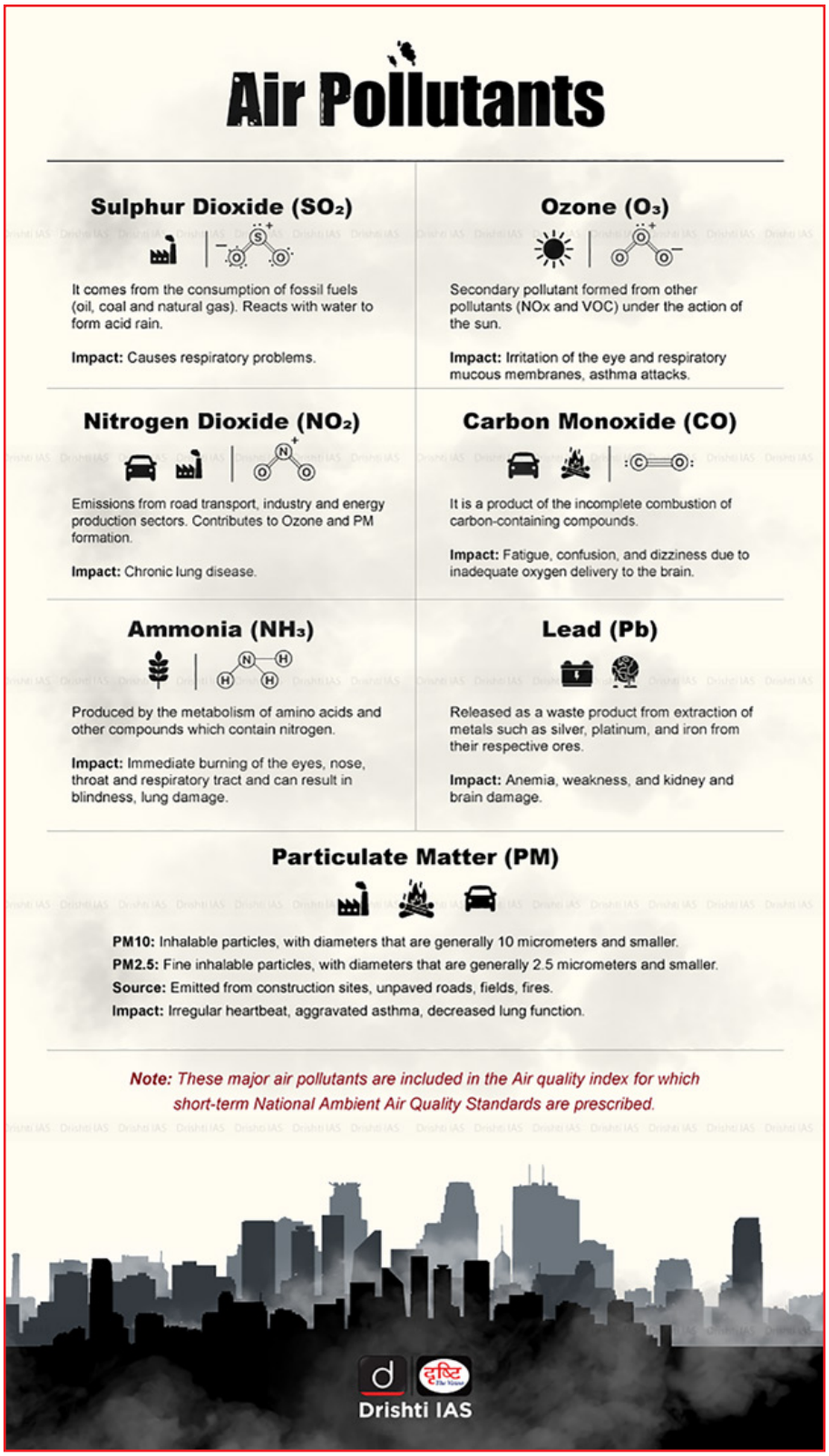
| Category | Location/Area | Timelines for Compliance |
|---|---|---|
| A | Within 10 km radius of NCR or cities with million-plus population **(2011 Census)** | Up to 31st December 2024 |
| B | Within 10 km radius of Critically Polluted Areas or Non-attainment cities (as defined by **CPCB**) | Up to 31st December 2025 |
| C | Areas not included in Categories A and B | Up to 31st December 2026 |

## *What is Air Pollution?*

- **About:**
  - Air pollution **encompasses the presence of solids, liquids, gases, noise, and radioactive radiation** in the atmosphere, at concentrations harmful to humans, living organisms, property, or environmental processes.
    - These substances, **known as pollutants, can be either natural or human-made** and can originate from various sources such as **industrial processes, vehicle emissions,** agricultural activities, and natural events like wildfires and volcanic eruptions.
- **Particulate Matter (PM):**
  - PM **refers to a complex mixture of extremely small particles** and liquid droplets suspended in the air. These particles come in a wide range of sizes and can be made up of hundreds of different compounds.
    - **PM10 (coarse particles) -** Particles with a diameter of 10 micrometres or less.
    - **PM2.5 (fine particles) -** Particles with a diameter of 2.5 micrometres or less.
- **Sulphur Dioxide:**
  - $SO_2$ emissions are a significant contributor to air pollution. It can react with other compounds in the atmosphere to form small particles.
    - These **particles contribute to PM pollution**.
  - The greatest source of $SO_2$ in the atmosphere is the **burning of fossil fuels in power plants** and other industrial facilities.
    - **Other sources include** industrial processes such as extracting metal from ore, natural sources such as volcanoes, and locomotives, ships and other vehicles and heavy equipment that burn fuel with high sulphur content.
- **Government Initiatives for Controlling Air Pollution:**
  - **National Clean Air Programme**
  - **System of Air Quality and Weather Forecasting and Research (SAFAR) Portal**
  - **New Commission for Air Quality Management**
  - **Graded Response Action Plan (for Delhi)**

Note:

**Note:** In **M.C. Mehta vs. Union of India (1986)**, the Supreme Court treated the right to live in pollution free environment as a part of **fundamental right** to life under Article 21 of the Constitution.




Note:

# Emissions Gap Report 2024

### *Why in News?*

Recently, the **United Nations Environment Programme (UNEP)** released the **Emissions Gap Report 2024** ahead of the **COP 29 of the UNFCCC** meeting in **Baku, Azerbaijan.**

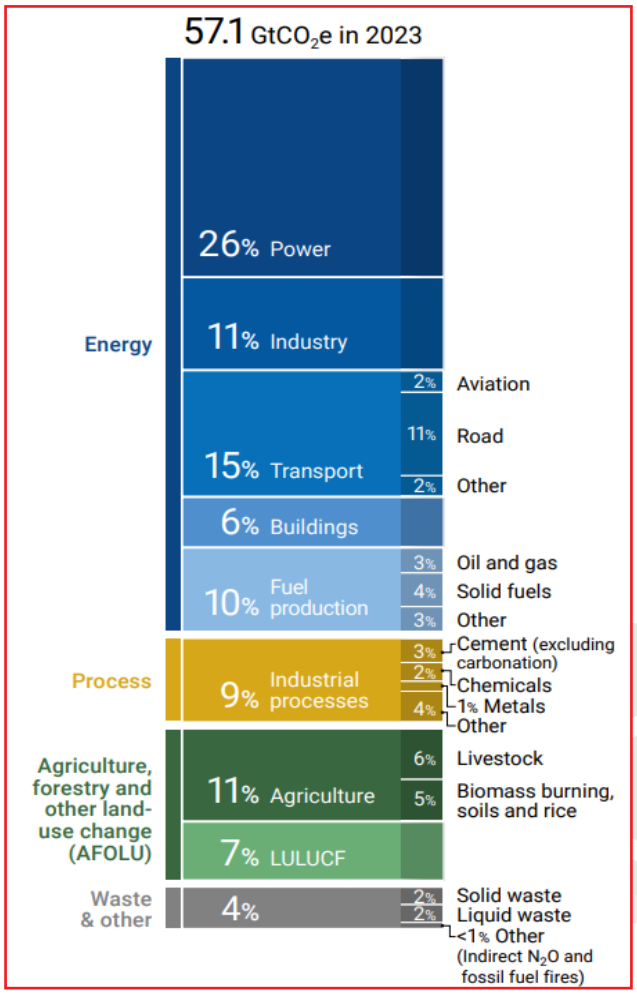
### *What are Key Highlights of the Report?*

- **Current Trajectory**: The report highlighted that if countries maintain **current environmental policies**, global temperatures will likely rise by **3.1°C above pre-industrial levels**.
- **Paris Agreement at Risk:** Full implementation of all **Nationally Determined Contributions (NDCs)** would still lead to **2.6°C of warming**.
  - The **Paris Agreement** target is to keep the global temperature rise **well below 2°C above pre-industrial levels**, with an effort to **limit it to 1.5°C**.
  - To limit global warming to 1.5°C, **greenhouse gas emissions** must **peak** before **2025** at the latest and **decline 43% by 2030.**
- **Record High Emissions**: **Global greenhouse gas** emissions hit **57.1 gigatons of $CO_2$ equivalent gases ($tCO_2e$)** in 2023**.**
  - **India's** emissions grew **by 6.1%** while **overall** global emissions rose by **1.3% in 2023** compared to 2022.
- **Major Emitters:**
  - **G20's Contribution**: **G20 countries** (excluding the **African Union**) contributed 77% of global emissions in 2023.
  - **High Emissions from Key Players**: Six of the **largest emitters** accounted for **63%** of emissions globally.

| | Total GHG emissions in 2023 | Change in total GHG emissions, 2022–2023 | Per capita GHG emissions in 2023 | Historical $CO_2$ emissions, 1850–2022 |
|---|---|---|---|---|
| | $MtCO_2e$ (% of total) | % | $tCO_2e$/capita | $GtCO_2$ (% of total) |
| China | 16,000 (30) | +5.2 | 11 | 300 (12) |
| United States of America | 5,970 (11) | -1.4 | 18 | 527 (20) |
| India | 4,140 (8) | +6.1 | 2.9 | 83 (3) |
| European Union (27 countries) | 3,230 (6) | -7.5 | 7.3 | 301 (12) |
| Russian Federation | 2,660 (5) | +2 | 19 | 180 (7) |
| Brazil | 1,300 (2) | +0.1 | 6.0 | 119 (5) |

- **Per Capita Emissions:**
  - **India's per capita GHG emissions** in 2022 were **2.9 $tCO_2e$**, significantly lower than **China (11 $tCO_2e$)** and the **US (18 $tCO_2e$)**.
  - **Developed countries** have per capita emissions about **three times the global average (6.6 $tCO_2e$)**, while India, African Union, and least developed countries remain below it.
- **Necessary Emissions Cuts**: A reduction of at least **7.5% each year until 2035** is essential to keep the **1.5°C target within reach.**
- **Cost of Bridging the Gap**: Achieving **net-zero by 2050** requires **USD 900 billion to USD 2.1 trillion annually, or about 1% of global GDP**.
- Emission Reduction Pathways:
  - Scaling **solar and wind energy** can deliver **27%** of required emissions reductions **by 2030**.
  - Forest conservation and restoration could account for around **20% of reductions**.

Note:




### About United Nations Environment Programme (UNEP)

- **Established**: Founded in **1972**, following the **United Nations Conference on the Human Environment** in **Stockholm**.
- **Headquarters**: Nairobi, Kenya.
- **Governing Body:** The **United Nations Environment Assembly (UNEA)** is the governing body of UNEP.
  - **UNEA** is the world's **highest-level decision-making body** for matters related to the environment, with a universal membership of all **193 Member States**.
- **Programs and Initiatives**: Runs major initiatives, including the **Climate Action, Ecosystem Restoration, Clean Seas, and Sustainable Development Goals (SDGs)** support.
- **Reports**: Publishes influential reports like the **Emissions Gap Report, Global Environment Outlook, and Adaptation Gap Report** to guide global policies.

# International Snow Leopard Day 2024

## *Why in News?*

**International Snow Leopard Day** is celebrated every year on **23rd October.**

### International Snow Leopard Day

- It came into being in **2013**, following the adoption of the **Bishkek Declaration** in Kyrgyzstan where **12 countries** that host snow leopard populations agreed to **collaborate** in their **conservation efforts.**
  - **Countries Hosting Snow Leopards:** Afghanistan, Bhutan, China, **India**, Kazakhstan, Kyrgyzstan, Mongolia, Nepal, Pakistan, Russia, Tajikistan, and Uzbekistan.

## *What are Facts About Snow Leopards?*

- **About:** Snow leopards **(Panthera uncia)** are considered **medium-sized cats** that are known for their **elusive nature** and ability to thrive in **harsh, high-altitude environments**.
- **Habitat:** They are native to the mountains of **Central and South Asia** and typically found at elevations between **9,800 and 17,000 feet** in mountain ranges, including the **Himalayas.**
  - Population estimates range between **3,500 and 7,000 individuals** in the wild.
- **Adaptations:** They are known as **"ghosts of the mountains"** due to their elusive nature and ability to blend into their surroundings.
  - They possess **thick, greyish-white fur** that provides **camouflage** against snow and rocks.
- **Behaviour:** Snow leopards **do not roar.** They communicate through **growls, hisses, meows**, and a unique sound called a **"chuff."**
  - The animal is most active at **dawn and dusk.**
  - Like most species of cats, snow leopards are **solitary animals**.
- **Reproduction:** They usually mate between **January and March**, a time when both sexes **mark their territories** intensively leaving signs such as **scrapes, faeces, urine and scent-spray** in prominent locations along their travel routes.

Note:

- **Ecological Importance:** Serve as **top predators** and **Indicator species**, as their presence **reflects the health** of their **high-altitude ecosystems.**
  - Their kills provide **food for scavengers** like **vultures** and wolves, supporting other species.

**Snow Leopard Population in India**

- As per the **Snow Leopard Population Assessment in India (SPAI) Program**, the Snow leopard population is **718 individuals** in India.
  - The estimated population in different states are as follows: **Ladakh (477), Uttarakhand (124), Himachal Pradesh (51)**, Arunachal Pradesh (36), Sikkim (21), and Jammu and Kashmir (9).
- The Government of India has identified the snow leopard as a **flagship species** for the **high-altitude Himalayas.**
- **Hemis National Park** in Ladakh is called the **Snow Leopard capital** of the world.

Note:

# Carbon Dioxide Emissions From Forest Fires

### *Why in News?*

Recently, a study by the **Centre for Wildfire Research** has found that global CO2 emissions from forest fires have surged by **60% since 2001**.

- Emissions from **boreal forests in Eurasia and North America** have nearly **tripled,** with climate change being identified as a major driver behind this increase.

**What is Forest Fire?**

- **About:**
  - A wildfire, also known as a **bushfire or vegetation fire**, refers to any uncontrolled and non-prescribed burning of plants in natural environments such as forests, grasslands, or tundras.
  - These fires spread based on environmental factors like wind and topography and consume natural fuels. For a wildfire to sustain combustion, three essential elements are required: fuel (plant material), oxygen, and a heat source.
- **Classification:**
  - **Surface Fire:** Burns along the ground, consuming dry grasses, leaves, and twigs on the forest floor.
  - **Underground/Zombie Fire:** Low-intensity fires burning beneath the forest floor, affecting organic matter.
  - **Canopy/Crown Fire:** Spreads through the tree canopy, driven by wind and dry conditions, often intense and hard to control.
  - **Controlled Deliberate Fires:** Prescribed burns by forest agencies to reduce fuel loads, lower wildfire risks, and maintain ecosystem health.

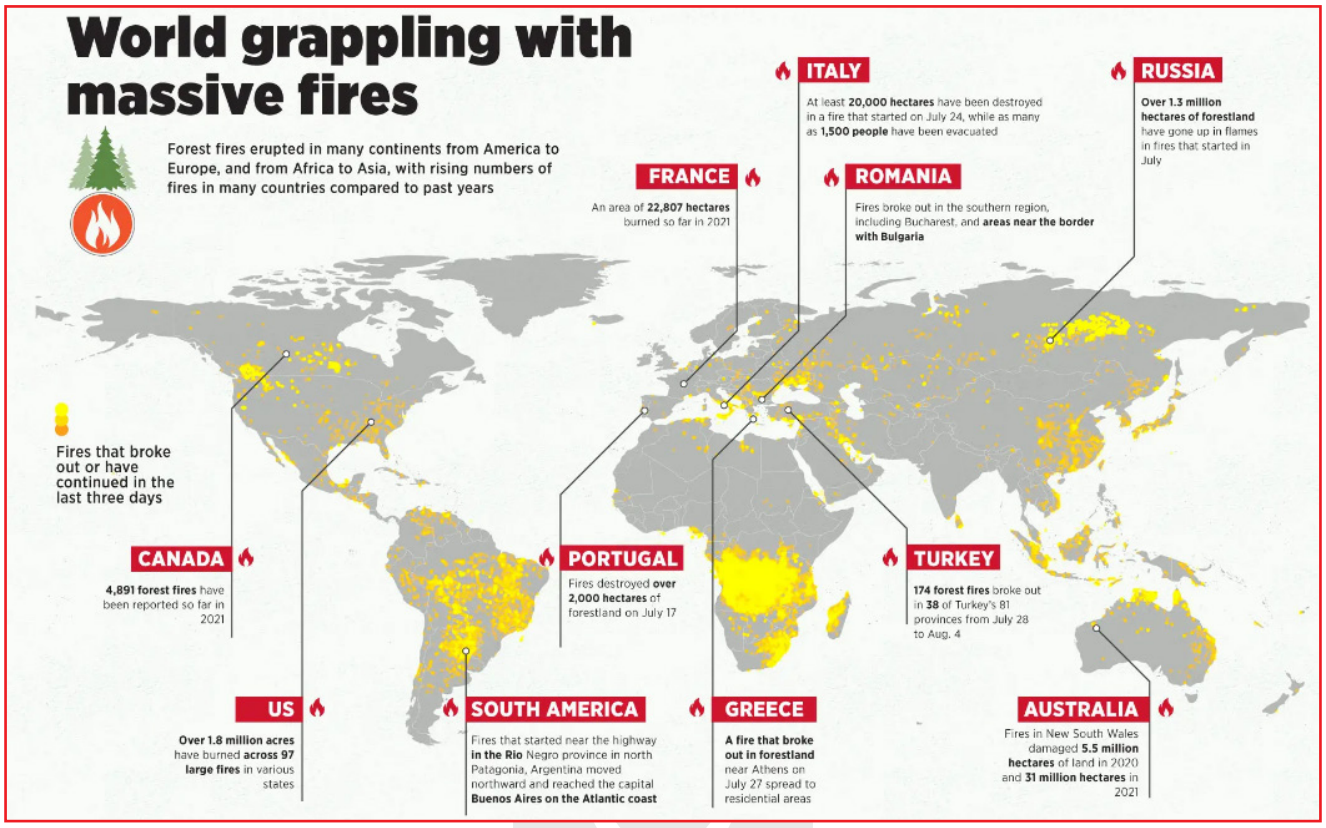
### *What are the Key Findings of the Study?*

- **Pyromes and Global Fire Patterns**: The study uses machine learning to group global forest ecoregions into 12 distinct **"pyromes," zones** where forest fires exhibit similar patterns influenced by **climate, vegetation, and human activities.**
  - Grouping these regions aids in understanding fire behavior and predicting the effects of climate change or land use, supporting better fire management and risk assessment.
- **Geographical Shift in Fire Emissions:** The analysis also revealed that apart from **tropical and subtropical forest areas, extratropical forest fire carbon emissions** from areas located outside the tropics have increased significantly due to climate change.
- **Fire Severity and Carbon Combustion**: Globally, the carbon combustion rate in forest fires has **risen by 47%**, with forests now contributing more to fire emissions than savannahs and grasslands.
  - Increased fire severity is indicated by more fuel being consumed per unit of burned forest area.
- **Climate Change and Fire Weather**: Anthropogenic climate change is driving more frequent and severe droughts, creating **"fire weather"** conditions, characterized by low fuel moisture and dry, flammable vegetation.
  - Increased lightning frequency, especially in high-altitude regions, is also contributing to the rise in forest fires.
- **Forest Carbon Stock Destabilization**: Carbon stocks in multiple forest types including temperate coniferous forests, boreal forests, Mediterranean forests, and subtropical dry and moist broadleaf forests, are destabilizing due to increased fire severity.
- **Impact on Carbon Accounting**: The rise in carbon emissions from forest fires presents challenges to **carbon accounting and greenhouse gas (GHG)** inventories submitted to the United Nations.
  - For example, Canada's 2023 wildfires are thought to have offset much of the carbon sink accumulated in its forests over the previous decade.

**Carbon Capture and Storage (CCS)**

- It is a process designed to mitigate the emissions of carbon dioxide (CO2) generated from industrial processes and the burning of fossil fuels, particularly in power plants.
- The goal of CCS is to prevent a significant amount of CO2 from entering the atmosphere and contributing to global warming and climate change.

Note:




### *What Are the Challenges Related to Forest Fires?*

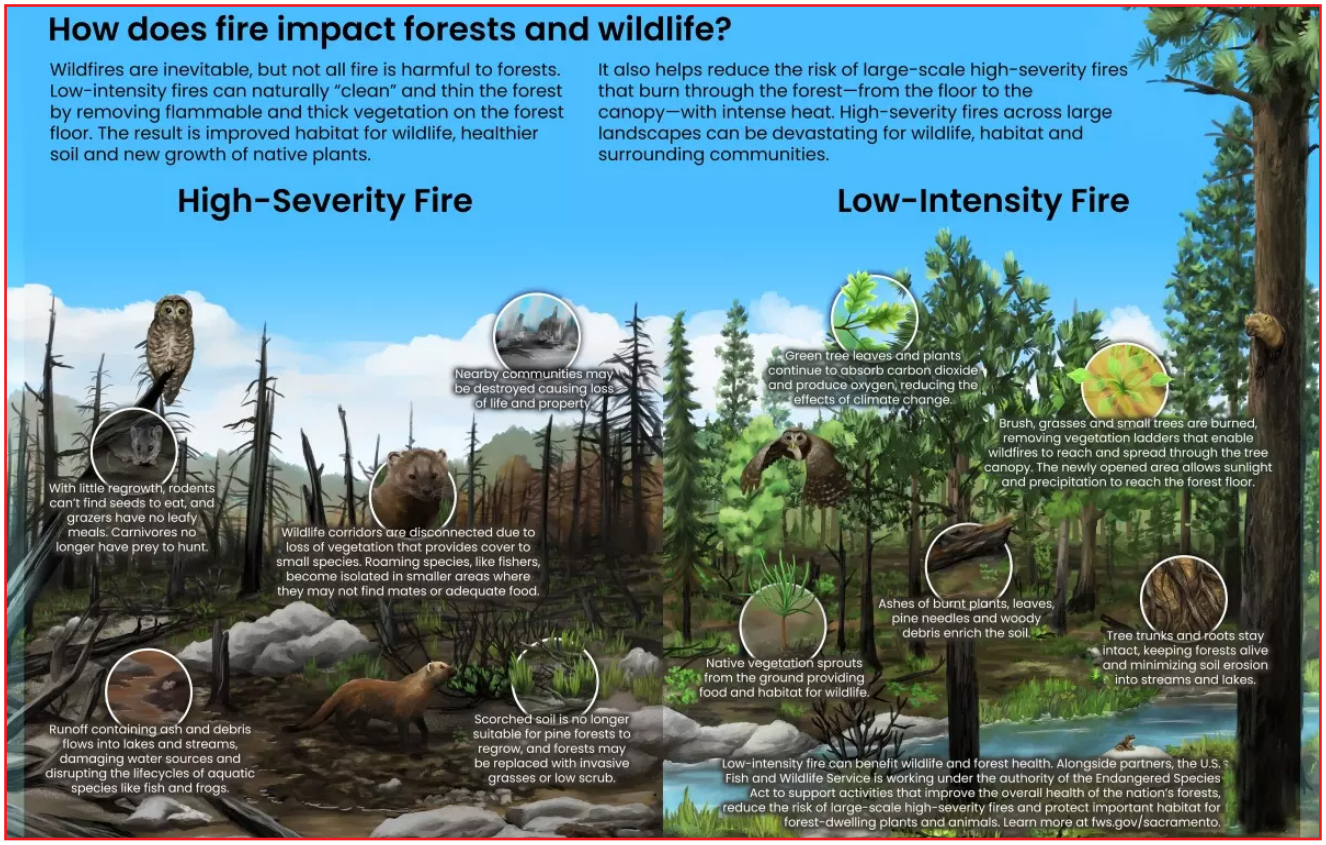
- **Environmental Impact:** Forest fires cause massive loss of biodiversity, damage ecosystems, and release large amounts of carbon dioxide, contributing to climate change.
  - Fires emit harmful pollutants **like particulate matter and greenhouse gases**, affecting air quality and causing respiratory issues.
- **Soil Degradation:** High-intensity fires destroy nutrients in the soil, reducing fertility and disrupting ecosystems.
- **Resource Loss:** Forests provide essential resources like timber, food, and livelihoods for local communities, which are endangered by fires.
- **Difficult Management:** The increasing frequency and intensity of fires, exacerbated by climate change, make effective management and control challenging.
- **Human Health:** Fires cause health problems for nearby communities due to air pollution and heat exposure, leading to increased healthcare burdens.
- **Economic Loss:** Forest fires result in significant economic losses, including costs for firefighting, property damage, and recovery efforts.

### What are the Forest Fires Scenario in India?

- **Forest Fire Season and Incidence:**
  - India's forest fire season extends from November to June, peaking in April-May.
  - According to the **Forest Survey of India (FSI)**, 35.47% of India's forests are fire-prone, with varying degrees of risk across regions.
  - Most vulnerable areas include Northeast India, Odisha, Maharashtra, Jharkhand, Chhattisgarh, and Uttarakhand.
- **Recent Incidents (2024):**
  - Uttarakhand reported 1,309 forest fires between January and June 2024, an increase from previous years.
  - ISRO data shows rising fires since March 2024, impacting multiple regions, including Maharashtra, Gujarat, and Odisha.
- **Government Initiatives:**
  - **National Action Plan for Forest Fires (NAPFF):** Launched in 2018 to engage forest communities and reduce fire occurrences.

Note:

- **Forest Fire Prevention and Management Scheme (FPM):** Initiated in 2017 to assist states in managing forest fires through technical and financial support.




### FAO Fire Management Guidelines

- **Integration of Knowledge:**
  - The guidelines stress the importance of **integrating science and traditional knowledge** from Indigenous Peoples and local knowledge holders.
  - This approach enhances fire management decisions, helps in preventing wildfires, managing fire outbreaks, and restoring areas affected by severe burning.
  - **Gender inclusion** and diverse fire management knowledge are also promoted.

## Blackbuck

### *Why in News?*

Recently, bollywood actor Salman Khan faced backlash from the Bishnoi community for allegedly hunting blackbucks (***Antilope cervicapra***) in 1998.

### *What are Blackbucks?*

- **About:**
  - The **Blackbuck (*Antilope cervicapra*),** or the Indian Antelope, is a species of antelope native to India and Nepal.
  - It is widespread in **Rajasthan, Gujarat, Madhya Pradesh, Tamil Nadu, Odisha**, and other areas throughout peninsular India.
  - It is considered as the epitome of grassland.
  - The blackbuck is a diurnal antelope (active mainly during the day).
- **Recognition:** It has been declared as the State Animal of Punjab, Haryana, and Andhra Pradesh.
- **Cultural Importance:** It is a symbol of purity for Hinduism as its skin and horns are regarded as sacred objects. For Buddhism, it is a symbol of good luck.
- **Protection Status:**
  - Wildlife Protection Act 1972: **Schedule I**
  - IUCN Status: **Least Concern**
  - CITES: **Appendix III**

Note:

- **Threat:**
  - Habitat Fragmentation, **Deforestation**, Natural Calamities, Illegal Hunting.
- **Related Protected Areas:**
  - Velavadar Blackbuck Sanctuary - **Gujarat**
  - Point Calimere Wildlife Sanctuary - **Tamil Nadu**
  - Tal Chhapar Sanctuary- **Rajasthan**

Note:

**What are the Key facts about the Bishnoi Community?**

- **About:**
  - The Bishnoi, a **primarily Hindu sect** (historically the British classified them as Muslim)**,** mainly reside in **western Rajasthan's Thar Desert**.
  - The **Bishnoi community**, **founded on 29 principles by Guru Jambheshwarji**, who was born in 1451 CE, protects wildlife, especially blackbucks and chinkaras.
    - Eight of these principles emphasise compassion towards living beings and protecting biodiversity.
    - In addition to their 29 principles, **Guru Jambhoji wrote a set of 120 statements or shabdas**.
  - The Bishnoi's eco-conscious beliefs stem from their historical sacrifices for nature, including the **Khejarli massacre in 1730.**
    - In the 1730 Khejarli massacre, 363 Bishnoi along with **Amrita Devi** sacrificed their lives protecting Khejri trees from **Maharaja Abhay Singh's (Maharaja of Jodhpur) soldiers**. The community has also defended Thar's wildlife from hunters and poachers.
- **Conservation Efforts:**
  - **Wildlife** is concentrated around Bishnoi villages in Rajasthan's desert region, where the community actively protects flora and fauna.
  - The Bishnoi give special protection to **Blackbuck, Chinkara, Great Indian Bustard, and the Khejri tree**.

| Species | Protected Area | Protection Status |
|---|---|---|
| Chinkara, or Indian Gazelle **(Gazella bennettii)** | Antelope species native to India, Pakistan, and Iran.<br>Melghat Tiger Reserve **(Maharashtra)** | **Wildlife Protection Act 1972:** Schedule I<br>**IUCN Status:** Least Concern<br>**CITES:** Appendix III |

# Marine Heat Waves and Twilight Zone

### *Why in News?*

Recently, in a study researchers investigated **Marine Heatwaves (MHWs)** and cold spells within the largely **underexplored twilight zone of the ocean.**

- A cold spell refers to a period of unusually cold weather, often lasting several days or longer.

**Marine Heat Waves (MHWs)**

- An MHW is an extreme weather event. It occurs when the **surface temperature** of a particular region of the **sea rises to 3 or 4 degree Celsius** above the **average temperature for at least five days.** MHWs can last for **weeks, months or even years.**
- These events are linked to **coral bleaching, seagrass destruction**, and loss of kelp forests, affecting the **fisheries sector** adversely.
- The most common drivers of marine heatwaves include **ocean currents which can build up areas of warm water** and air-sea heat flux or warming through the ocean surface from the atmosphere.
- Winds can enhance or suppress the warming in a marine heatwave, and **climate modes like El Niño** can change the likelihood of events occurring in certain regions.

### *What are Key Findings Related to MHWs?*

- **Marine heatwaves (MHWs) occurring in the deep ocean** are under-reported.
  - To monitor temperature changes at great depths, **specialized buoys suspended in the ocean were deployed globally** for extended data collection.

Note:

- **Argo floats,** robotic devices that can dive to 2,000 meters and resurface, were **used to gather crucial temperature and salinity data**.

- Global warming is affecting surface ocean temperatures, while the impact on deep ocean waters reveals the deeper, less understood consequences of climate change on oceanic ecosystems.
- Unlike surface-level marine heatwaves, **atmospheric factors do not influence temperature changes in the deep ocean**.
  - Instead, **eddy currents**, which are **large, swirling loops of water that can extend hundreds of kilometers** and reach depths over 1,000 meters, **play a crucial role** in transporting warm or cold water across vast distances.
  - The overall ocean warming is leading to stronger eddy currents, amplifying these extreme temperature changes.
- **MHW impact on Biodiversity:**
  - Extreme temperature shifts in the **twilight zone** are alarming due to the presence of many **fish species and plankton,** which are **vital to the oceanic food chain** and serve as a key food source for small fish.
  - MHW can **reduce oxygen levels and deplete nutrients in the water,** endangering marine life and the balance of the ecosystem.

**Twilight Zone in the Ocean**

- The twilight zone, also known as the **mesopelagic or dysphotic zone**, is a layer of the ocean that extends from 200 to 1,000 meters below the ocean's surface.
- It is a vast **ecosystem inhabited by extraordinary creatures**, including **organisms that live in darkness** and those that migrate to and from the surface.
- It **plays a vital role in the ocean's ability to absorb and store carbon dioxide** from the atmosphere. This region also hosts the largest animal migration on Earth.
- Organisms in the twilight zone have adapted in several ways, including **bioluminescence** (used for camouflage) and **large mouths (**help maximize rare encounters with prey in the dark).

**Eddy Currents**

- An eddy current in the ocean is a **small, circular water current that detaches from the main current** and **moves independently.**
  - They are **formed when segments of a current pinch off,** similar to small whirlpools seen in rivers while canoeing.
- Eddies can **span hundreds of kilometers and extend to depths** exceeding 1,000 meters. They **can be detected from space using infrared sensors.**
- They are responsible for several developments.
  - Cold-core eddies trap nutrient-rich water and transport it along with plankton.
    - Eddies can create swirling patterns in **phytoplankton blooms.**
  - It can **displace warm surface water downward or lift cold water upward,** leading to rapid temperature changes.

# Vertical Migration of Plankton

### *Why in News?*

Recently, researchers studied **vertical migration** of **Pyrocystis noctiluca**, a specific **bioluminescent phytoplankton** species which is capable of **inflating (ballooning) its size** during its migration.

- This species can expand to **six times** its original size of a **few hundred microns**, aiding its **buoyancy.**

### *What are Key Facts Related to Vertical Migration of Phytoplankton?*

- **Vertical Migration:** Many plankton travel from the **cold, dark depths of the ocean** to the **surface**, then **drift back down** into the darkness in a continuous cycle called **vertical migration**.
  - The movement mechanism of **single-celled phytoplankton,** especially those without swimming appendages, remains largely **unexplained.**
- **Density Dynamics of Phytoplankton:** Phytoplankton are generally **5%-10% denser than seawater,** which poses a challenge for their ability to remain near the surface for photosynthesis.
  - Pyrocystis noctiluca cells behave like **little submarines** which can control their **density** so they can choose where they want to reach the ocean's surface.

Note:

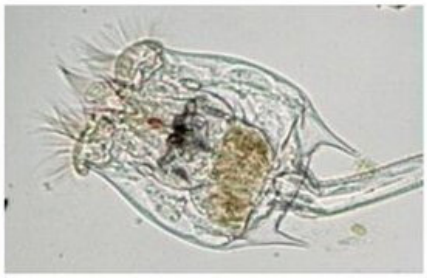
- **Ballooning Mechanism:** The research team utilised a **"gravity machine"** which can **alter water pressure and density,** mimicking the ocean's depths.
  - The team found that **inflated cells** were less dense than the surrounding seawater, allowing them to **float** toward the surface **despite gravity.**
- Ballooning **During Cell Division:** The inflation (ballooning) process **occurs naturally** during the phytoplankton's cell cycle.
  - When a **single cell divides**, an internal structure called a **vacuole** acts as a **flexible water tank,** taking in freshwater and causing the **new cells to swell**.
  - This **inflation (ballooning)** allows the lighter **daughter cells to float upward**, reaching the nutrient-rich surface waters.
    - The entire cell cycle of **Pyrocystis noctiluca** lasts approximately **seven days**, which aligns with the vertical pursuit of **light and essential nutrients.**

### *What are Planktons?*

- **About Planktons:** Plankton are **microscopic organisms** that play a crucial role in marine ecosystems, serving as the **foundation** of the entire **marine food web**.
  - An organism is classified as **plankton** if it is carried by tides and currents and **lacks the ability to swim** against these forces.
- **Types of Plankton:**
  - **Phytoplankton**: **Plant-like organisms** that perform **photosynthesis**, converting sunlight into energy, and are vital for producing oxygen and absorbing carbon dioxide. E.g., **Cyanobacteria**, **Blue-green algae**, **diatoms**, **dinoflagellates**.
    - Phytoplankton depend on nutrients like **phosphate, nitrate, and calcium** from their environment to thrive.
  - **Zooplankton**: **Animal-like organisms** that include microscopic animals (such as **krill and sea snails**) and weak swimmers like **jellyfish**. E.g., Radiolarians, Foraminiferans, **cnidarians**, **crustaceans**, **chordates, and molluscs.**
- **Size of Planktons:** Plankton can vary in size, from **microscopic organisms** to larger species like **crustaceans and jellyfish**.
- **Role in the Marine Food Web:** Phytoplankton form the base of the marine food web, supporting various marine life.
  - **Zooplankton** primarily **feed on phytoplankton** and, in turn, serve as food for larger marine animals, creating a **critical food chain link.**
  - **E.g., Krill** are a major component of the diet of **humpback, right, and blue whales.**
- **Migration Patterns:** During the **day**, zooplankton drift to **deeper waters** to evade predators, but at **night**, they **rise to the surface** to feed on phytoplankton**.**
  - This process is considered the **largest migration** on Earth; so many animals make this journey that it can be **observed from space**.
- **Habitat:** Plankton inhabit both **saltwater and freshwater ecosystems**.
  - **Clearer waters** typically indicate **fewer plankton**, while more **turbid waters (cloudy or muddy)** are often **richer in plankton.**

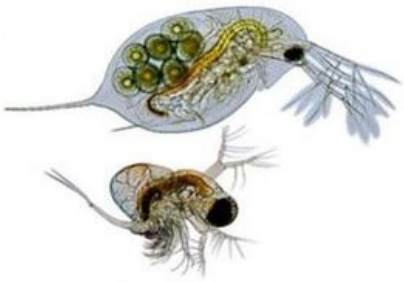
Note:

Copepods


Rotifers

Ostracods

Protozoans


Cladocerans

Crustaceans

# Funga Taxonomic Kingdom

### *Why in News?*

Recently, **Chile and the United Kingdom** have prepared a proposal named **'pledge for fungal conservation'** to give fungi its **own taxonomic kingdom** named **'funga'**.

- The proposal would be submitted during the 16th Conference of Parties (COP16) of the **UN Convention on Biological Diversity (CBD)** in Cali, Colombia in October 2024.

### *What are the Key Highlights of the Pledge for Fungal Conservation?*

- **About the Proposal:** It aims to recognise fungi as an **independent kingdom**, termed Funga, alongside **plants (flora) and animals (fauna)**.
  - It advocates for the recognition of fungi in **legislation, policies, and global agreements** to maintain fungi's ecological benefits.
- **Current Status:** In August 2021, the **International Union for the Conservation of Nature Species Survival Commission (IUCN SSC)** and **IUCN Re:wild** became the first organisations to recognise fungi as one of three kingdoms of life.
  - The **Chilean-British-led "3F" (Flora, Fauna, and Funga) initiative** emphasises the need for international recognition and protection of fungi.
- **Wide Diversity:** As per **Mycologists**, only **8%** of the total **2.2 and 3.8 million species** of fungi are scientifically known and about **2,000 new species** are discovered annually across the world.
  - **Mycologist studies fungi** such as moulds, yeasts, and mushrooms.
- **Ecological Importance of Fungi:** Fungi help in **decomposition, forest regeneration, carbon sequestration**, and maintaining the global nutrient cycle.
  - They play a vital role in **mammalian digestion** and are crucial in the production of **antibiotic medication**.
  - Several common food products, including **bread, cheese, wine, beer, and chocolate**, depend on fungi for their production
  - Fungi also help in **cleaning polluted soils** and offer sustainable food alternatives to animal products e.g., **amino acids, fibre, and antioxidants**.
  - Boreal forest fungi **absorb** significant amounts of **carbon** through **root symbiosis** with plants, thus contributing to mitigating climate change.

Note:

- **Threats to Fungi: Overharvesting, nitrogen enrichment in soils**, deforestation, climate change, pollution, and the wide scale use of fungicides endanger fungal species.
  - These threats jeopardise the **symbiotic relationships** fungi have with plants and animals, disrupting ecosystem stability.

### *What are Key Facts About Fungi?*

- **About Fungi:** Fungi is a group of **eukaryotic, non-phototrophic organisms** with rigid cell walls. It includes **mushrooms, moulds and yeasts**.
- **Cell Structure:** Fungi have a unique cell wall composed of **chitin** which is a defining feature of the fungal kingdom.
  - **Plants** have cell walls made of **cellulose**, and **bacteria** have **peptidoglycan** in their walls.
- **Nutritional Mode:** Fungi are **heterotrophic**, meaning they obtain nutrients by absorbing organic matter from their environment.
  - They do this through **external digestion**, where they **secrete enzymes** to break down complex substances before absorbing the simpler molecules.
- **Reproductive Strategies:** Fungi reproduce through both **asexual** and **sexual** means, often utilising spores.
- **Growth Form:** Fungi typically grow as **mycelium**, a network of **filamentous** structures called **hyphae**.
- **Symbiotic Relationships:** Fungi are known for forming **symbiotic relationships** with other organisms, such as **mycorrhizal associations** with plants.
  - Some fungi also form **lichens** in association with **algae**.

## Warming of Key Biodiversity Areas (KBAs)

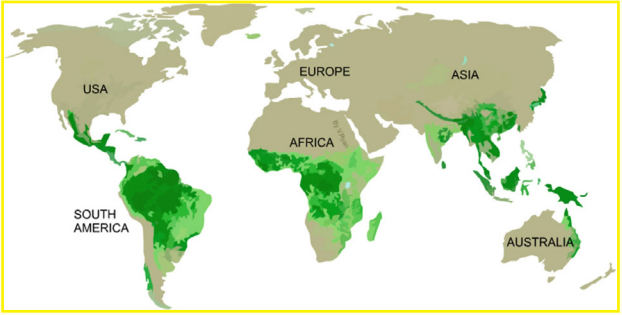
### *Why in News?*

Recently, a study has shown that **key biodiversity areas (KBAs)** in tropical forests have transitioned to **new temperature regimes (higher temperature)** due to **global warming** and **climate change**.

- The **Kunming-Montreal Global Biodiversity Framework** aims to conserve at least **30% of the world's land by 2030**, with **Key Biodiversity Areas (KBAs)** as a **core priority.**

**Note:**

- Tropical rainforests are **dense and warm forests** typically found between **23.5 degrees to the north and south of the Equator**.




**What is the Kunming-Montreal Global Biodiversity Framework (KMGBF)?**

- **About:** It is a **multilateral treaty** aimed at halting and **reversing biodiversity loss globally by 2030**. It was adopted in December 2022 during the **15th meeting of the Conference of the Parties (CoP) of UN CBD**.
- **Purpose and Goals:** It ensures that by 2030 at **least 30%** of areas of degraded **terrestrial, inland water, and marine and coastal ecosystems** are under effective restoration.
  - It has **23 action-oriented global targets** for urgent action over the decade to 2030 with **Key Biodiversity Areas (KBAs)** as a **core priority**.
- **Long-Term Vision:** The framework envisions that **by 2040**, there will be a collective commitment to living in **harmony with nature**, serving as a foundational guide for current actions and policies on biodiversity conservation and sustainable use.

### *What are Key Highlights of the Study?*

- **Temperature Changes in KBAs:** Up to 56% of tropical forest KBAs have entered a new phase characterised by new mean annual temperature regimes.
- **Regional Temperature Shifts:** The **percentage** of Key Biodiversity Areas (KBAs) experiencing temperature changes was **72% in Africa, 59% in Latin America, and 49% in Asia and Oceania**.
  - However, in Asia and Oceania, 12% of KBAs have not transitioned to the new temperature scenario though **23% of these are unprotected**.

Note:

drishti

- **Vertical Temperature Change:** The environment beneath the forest canopy is climatically stable, with less temperature variation than in open habitats.
- **Disproportionate Impact:** Some KBAs in **Latin America (2.9%) and Asia and Oceania (0.4%)** have shifted to nearly entirely **new temperature conditions**, with over **80%** of measurements falling outside their previous ranges.
  - These include areas in the tropical **Andes Mountains** in Ecuador, Colombia, Venezuela, and Panama.
- **Stable KBAs:** Around 34% of tropical forest KBAs have not yet experienced new temperature pattern, and over half of these are under some form of protection.
  - Northern Australia's **tropical forests** are among the least affected by novel temperature conditions.

### *What are Key Biodiversity Areas (KBAs)?*

- **Origin of the Concept:** **BirdLife International** initiated the idea by identifying **Important Bird and Biodiversity Areas (IBA)**. The success of this model led to the inclusion of other taxonomic groups, such as **plants, butterflies, and freshwater and marine biodiversity.**
  - At the **World Conservation Congress** **in Bangkok in 2004**, the **International Union for Conservation of Nature (IUCN)** recognized the need for a unified framework, which culminated in the **2016 global KBA Standard.**
- **About KBAs:** KBAs are **sites contributing significantly to the global persistence of biodiversity**.
  - They may contain **unique species or species found only in limited areas**, and are **critical** for the planet's health.
- **Criteria for Recognition:** There are **11 criteria** grouped under **five categories** that a site must meet to qualify as a KBA. These categories are:
  - **Threatened biodiversity**
  - **Geographically restricted biodiversity**
  - **Ecological integrity**
  - **Biological processes**
  - **Irreplaceability**
- **Global KBA Presence:** To date, more than **16,000 KBAs** have been mapped worldwide.
  - The **Key Biodiversity Areas Partnership**, comprising **13 global conservation organisations**, is working to identify, map, and conserve KBAs across the globe.
    - India has **862 Key Biodiversity Areas (KBAs)**, which are crucial for the conservation of biodiversity E.g., **Western Ghats.**

Note:

### *What are the Impacts of Rising Temperatures on Tropical Forests and KBAs?*

- **Disruption of Stable Microclimates:** Sudden changes can exceed their **thermal tolerance**, leading to stress or mortality. Species that occupy **specific niches** within stable microclimates may face **habitat loss or degradation.**
- **Threat to Biodiversity:** Increased temperatures can lead to **habitat degradation**, particularly in sensitive ecosystems like **rainforests, mangroves, and coral reefs**.
- **Alteration of Ecosystem Services:** Rising temperatures can impair ecosystem services such as **carbon sequestration, water regulation, and nutrient cycling.**
- **Threat of Invasive Species:** Warmer temperatures may allow **invasive species** to thrive and outcompete native species.
- **Deforestation and Degradation:** Higher temperatures may exacerbate **deforestation and forest degradation** by making ecosystems more vulnerable to **fires, pests, and diseases.**
- **Shifts in Species Composition:** Many species may migrate towards **higher altitudes or latitudes** in search of cooler conditions leading to **local extinction of species.**
- **Impacts on Human Communities:** Rising temperatures can affect **forest productivity** threatening the livelihood of indigenous and local communities dependent on tropical forests for **food, medicine, and shelter.**

| How to Protect Key Biodiversity Areas from Rising Temperatures? | |
|---|---|
| **Develop and Scale Up Nature-based Solutions** | Leverage ecosystems to mitigate climate change effects while avoiding maladaptive practices like **monoculture plantations** and focusing on diverse, resilient ecosystems. |
| **Restore Ecosystems** | Prioritise the protection and restoration of forests, **wetlands**, peatlands, and mangroves to enhance carbon sequestration and biodiversity. |
| **Rewilding Initiatives** | Explore rewilding strategies, including the **reintroduction of native species**, to restore ecosystems. |
| **Habitat Connectivity Initiatives** | Create corridors to connect **fragmented habitats**, allowing species to migrate and adapt to changing climatic conditions. |
| **Invasive Species Management** | Monitor and inspect goods (plants, animals, soil) at borders to prevent the introduction of invasive species and introduce **natural predators** that specifically target the invasive species. |

## Nonylphenol Ethoxylates and Nonylphenol

### *Why in News?*

A report titled **"Nonylphenol — An Endocrine Disrupting Chemical"** was **released by Toxics Link,** an environmental research organisation, and the US-based non-profit Environmental Defense Fund.

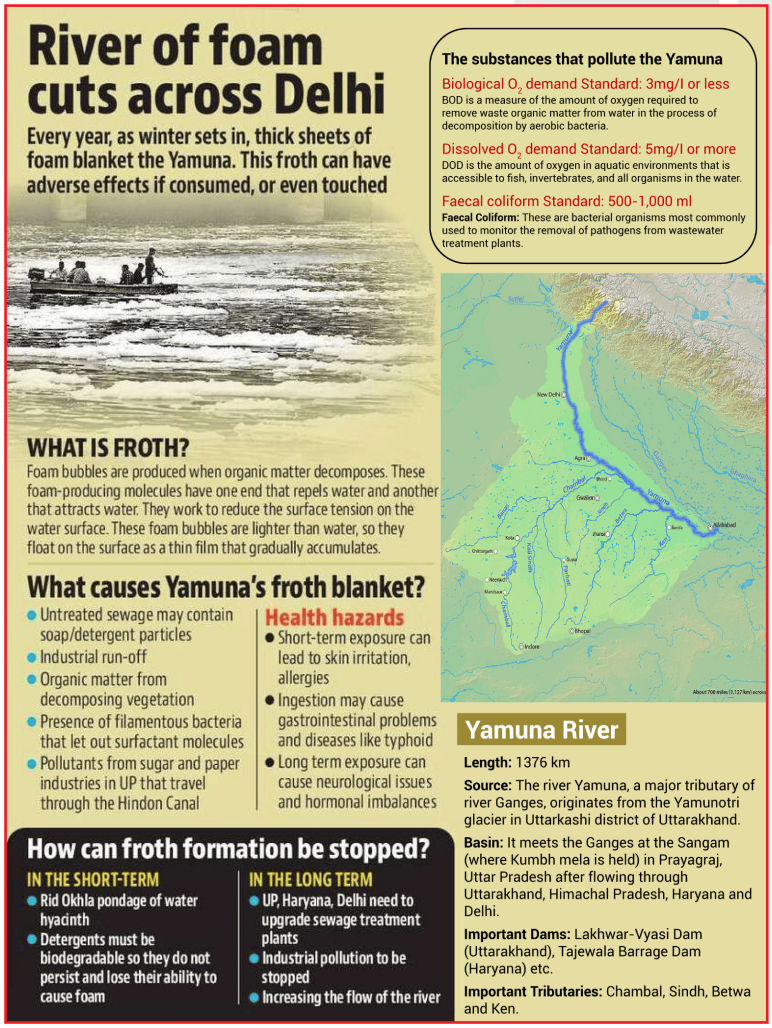
- The report **highlights the widespread use of Nonylphenol Ethoxylates (NPEs) and Nonylphenol (NP) in India** and the associated environmental and health risks

### *What are Nonylphenol Ethoxylates (NPEs) and Nonylphenol (NP)?*

- **Chemical Characteristics:** These are **surfactants that contribute to environmental pollution**, particularly **causing frothing in the Yamuna River,** indicating high levels of pollutants.
  - These are recognised as an **endocrine-disrupting chemical**, toxic to aquatic life, and detrimental to human health, affecting reproductive and developmental processes.
- **Regulatory Status:** NPEs are **banned in many countries** for use in detergents; however, **India currently lacks specific regulations** governing these chemicals.
  - NP was **banned in the cosmetics sector** in India in 2007.
- **Usage in Industries:** NP and NPEs are **prevalent in various sectors**, including textiles and leather, detergents and cleaning products, paper and pulp, food packaging, cosmetics, construction, automotive, agrochemicals, paints, and metalworking fluids.

Note:

- **Health and Ecological Concerns:**
  - **Toxicity to Aquatic Life:** NP **is toxic to fish, aquatic plants, and invertebrates,** causing acute and chronic poisoning that reduces survival rates, impairs growth, and leads to reproductive failure.
  - **Human Health Risks:** NP acts as an **endocrine-disrupting chemical, mimicking estrndroogen and causing hormonal imbalances,** which can lead to reproductive disorders and increased cancer risk.
  - **Environmental Persistence:** NP is resistant to degradation and **can remain in aquatic ecosystems for long periods**, continuously impacting wildlife and potentially entering the human food chain.
- **Recommendations for Safer Alternatives:**
  - The report suggests **adopting safer, cost-effective, and technically viable alternatives to NP and NPEs**. However, the transition towards such alternatives has been slow in India.




# Threat to Mesophotic Coral Ecosystems

## *Why in News?*

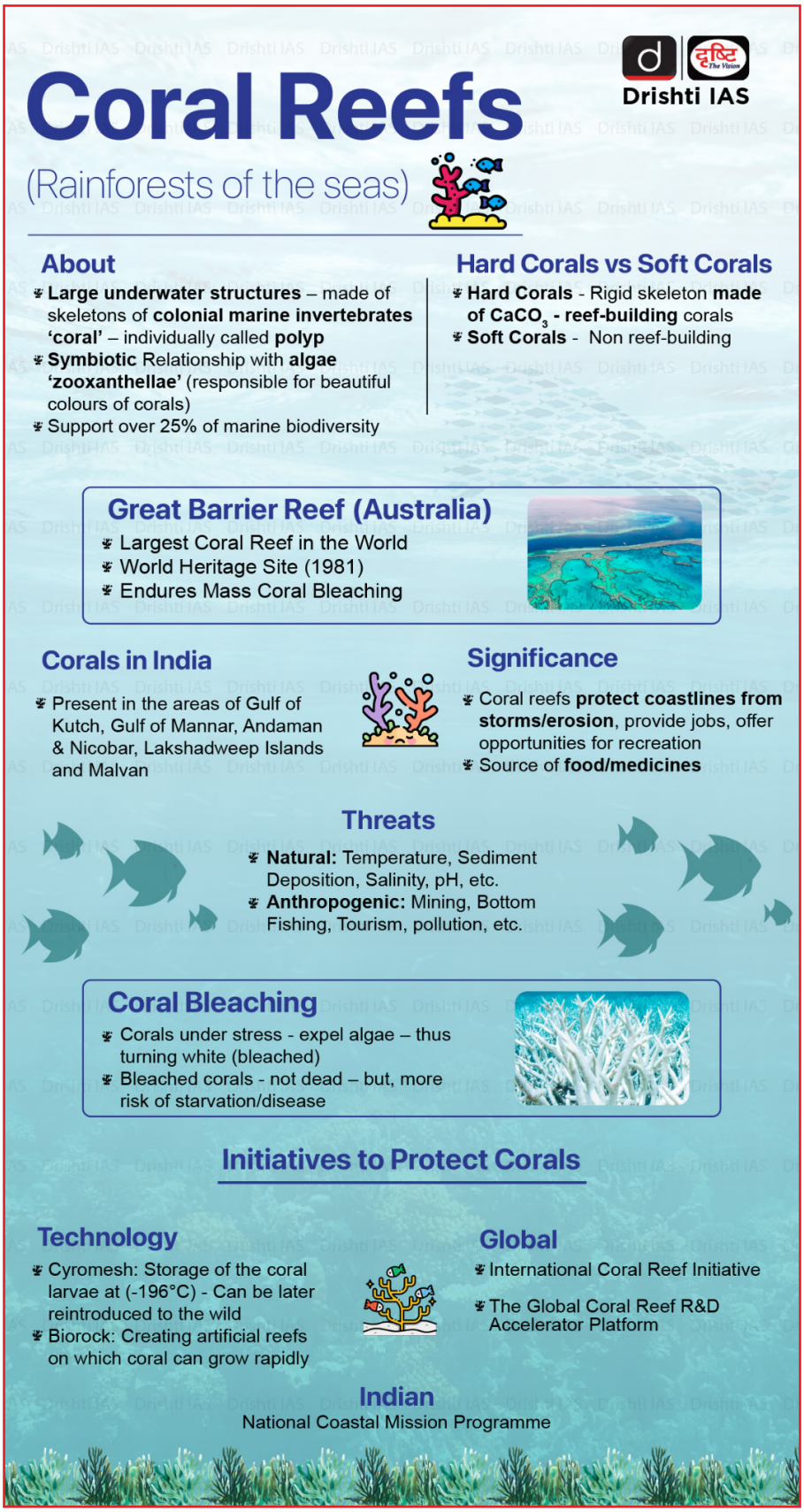
Researchers from the Max Planck Institute for Chemistry have found that **mesophotic coral ecosystems** in the **Eastern Tropical Pacific** face a **two-pronged threat**, with bleaching from warm water above and cold-water exposure from below.

- Published in Science of the Total Environment, the **study highlights the increasing risks to these reefs' health and functionality**.

## *What are Mesophotic Coral Ecosystems?*

- **About:**
  - Mesophotic coral ecosystems are **found in tropical and temperate regions** at depths between 100 and 490 feet.
    - **Key organisms** in these ecosystems include **corals, sponges, and algae,** which provide structural habitat.
- **Significance:**
  - These **ecosystems may help replenish shallow coral reefs** and serve as essential habitats for fish species crucial for spawning, breeding, and feeding.
  - Mesophotic corals contain organisms with specialised defences that could lead to the **development of natural products for medical use.**
- **Limited Research:**
  - Limited research on these ecosystems existed due to technological barriers, **as they are too deep for conventional scuba diving** and **too shallow for deep-sea equipment.**
    - Recent **advances in underwater technology** have now made it possible to study these ecosystems.

Note:




### *What are the Implications for Mesophotic Coral Reefs Under Climate Change?*

- **Increasing Intensity and Frequency of La Niña Events:** Recent research indicates that **major La Niña events**, characterized by **strong easterly winds**, are projected to become both stronger and more frequent in the near future.
  - This **change in climatic patterns** can have **direct consequences on marine ecosystems.**
- **Sequential Events:** Climate models predict that extreme La Niña events will increasingly follow extreme **El Niño events.** This could lead to **rapid shifts in environmental conditions**, impacting coral health.
- **Cold-Water Exposure:** If these predictions hold true, **deep and mid-depth coral reefs in the Eastern Tropical Pacific could face** increased **exposure to unusually cold water** immediately **after experiencing warm thermal stress** from the surface.
  - This dual exposure may lead to compounded stress on coral ecosystems.
- **Long-Term Impacts of Cold-Water Bleaching:** The observed cold-water bleaching is particularly concerning, as it suggests that the impacts of such events on deep coral reefs **may not be transient**.

Note:

- Given the severity of the observed bleaching and the associated coral mortality, these cold-water events could **significantly disrupt the health and functionality** of mesophotic coral ecosystems for extended periods.

- **Broader Context of Coral Bleaching:** The concerns are **amplified by** similar reports of **warm-water bleaching affecting mesophotic reefs in other regions**, including the Red Sea and the Indian Ocean. This indicates that coral ecosystems worldwide may be increasingly vulnerable to temperature-related stressors due to climate change.

### *What are the Implications of Coral Bleaching?*

- **Loss of Biodiversity:** Coral reefs are **home to a vast array of marine species**. Bleaching disrupts these ecosystems, leading to **the decline or extinction of species** that **depend on corals for shelter and food.**
- **Economic Impact:** Coral reefs **support fishing, tourism, and coastal protection**. Bleaching reduces fish populations and damages the beauty of coral reefs, negatively impacting tourism and fisheries, which are major economic drivers in many regions.
- **Coastal Erosion:** Coral reefs act as **natural barriers that protect coastlines** from storm surges, erosion, and waves. Bleached and **dying reefs lose their structural integrity**, making coastal areas more vulnerable to damage.
- **Climate Change Feedback Loop:** Coral reefs play a **role in carbon sequestration.** When they die due to bleaching, they no longer absorb carbon dioxide, contributing to the acceleration of climate change.
- **Decline in Natural Medicines:** Coral reefs are **sources of compounds used in developing medicines**. The loss of coral reefs reduces opportunities to discover new medicinal compounds that could benefit human health.

### *What are the Various Ways to Save Coral from Bleaching?*

- **Reduce Global Warming:** The primary cause of coral bleaching is rising ocean temperatures **driven by climate change**.
  - Reducing greenhouse gas emissions by transitioning to renewable energy, increasing energy efficiency, and promoting sustainable transportation can help slow down global warming and protect coral reefs.
- **Restore Coral Reefs:** Active restoration programs, such as **coral gardening** and **transplanting healthy corals to degraded areas**, can help revive damaged reefs.
  - These initiatives also involve **breeding resilient coral species** that can better withstand rising temperatures.
- **Enhance Marine Protected Areas (MPAs):** Expanding and effectively managing MPAs can provide coral reefs with a safe environment to thrive. MPAs **help protect coral ecosystems from human activities** and allow them to recover from bleaching events.
  - For example, **Overfishing and harmful fishing practices damage coral reefs.** Sustainable methods, like marine protected areas, can safeguard coral ecosystems and aid reef recovery.
- **Support Scientific Research:** Investing in research to **better understand coral resilience and developing coral species** that are **more tolerant to warmer waters** can be key in saving coral reefs.
  - Scientists are studying heat-resistant corals and methods to promote their growth.
- **Encourage Eco-friendly Tourism:** Limiting harmful tourism activities like anchoring boats on reefs, touching corals, or walking on them can help preserve these fragile ecosystems. Sustainable tourism guidelines can minimize human impact on coral reefs.

## Guidelines to Combat Greenwashing

### *Why in News?*

Recently, the Central Consumer Protection Authority (CCPA) released guidelines to regulate greenwashing and misleading environmental claims. This initiative seeks to ensure transparency and consumer trust in eco-friendly marketing practices.

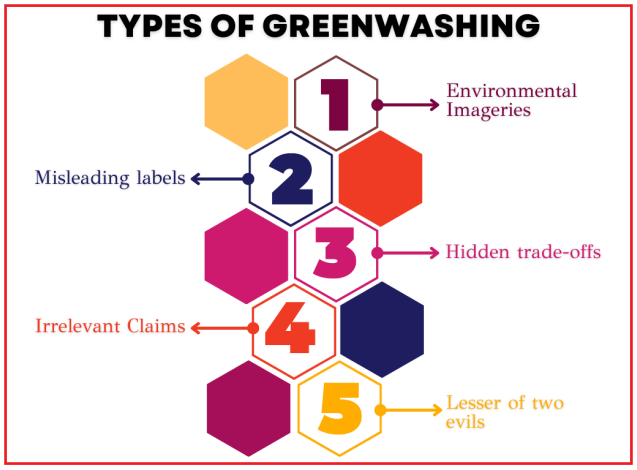
**Central Consumer Protection Authority (CCPA)**

- CCPA is the regulatory body established under Section 10 of the Consumer Protection Act (CPA), 2019, it regulates matters related to consumer rights violations and unfair trade practices.
  - The act empowers the CCPA to prevent false or misleading advertisements and ensure consumer rights are protected.
- It operates under the **Ministry of Consumer Affairs, Food and Public Distribution.**

Note:

### *What is Greenwashing?*

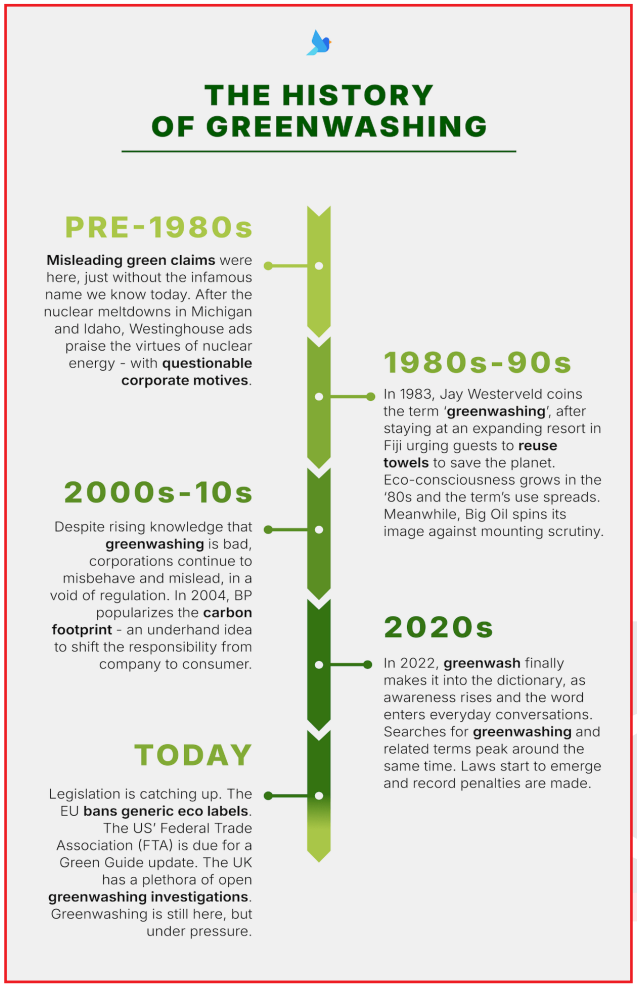
- **About:**
  - The term greenwashing was first used in **1986 by Jay Westerveld**, an American environmentalist and researcher.
  - Refers to any deceptive or misleading practice involving exaggeration, omission, or **false environmental claims.**
    - Use of misleading symbols, imagery, or language that highlights positive environmental aspects while concealing harmful ones.
    - **Exclusions**: It does not include obvious hyperbole, puffery, or generic colour schemes/images that aren't deceptive.
    - **Environmental Claims** refer to the representations about goods or services, including their components, manufacturing processes, packaging, usage, or disposal, that **suggest environmentally friendly attributes.**
- **Examples of Greenwashing:**
  - **Volkswagen Scandal:** The German car manufacturer was discovered to have manipulated emissions tests for its allegedly eco-friendly diesel vehicles, which constituted an instance of greenwashing.
  - Several other multinational corporations, including oil giants like **Shell and BP, and Coca Cola** have faced accusations of greenwashing.




### *What are the Key Points From the Greenwashing Guidelines?*

- **Objective:**
  - The aim is to combat **greenwashing,** a practice where companies falsely promote products as environmentally friendly without credible proof, protecting consumers from **deceptive marketing tactics**.
- **Applicability:**
  - These guidelines target **manufacturers, service providers, traders, ad agencies, and endorsers,** requiring them to substantiate environmental claims.
  - Terms like **eco-friendly, green, sustainable, natural,** and others must be backed by **credible evidence**, avoiding vague or misleading descriptions.
    - For instance, terms like **100% eco-friendly or zero emissions** must be qualified with precise information on the product or service.
  - The guidelines **do not apply** to advertisements or communications **that are not specific to a product or service unless they directly or indirectly refer to one.**
- **Verification & Disclosure:**
  - Companies must support their environmental claims with **independent studies, third-party certifications, or reliable scientific evidence**.
  - Claims must specify which part of the product (e.g., packaging, manufacturing) is eco-friendly and must be accessible via **QR codes**, **URLs, or clear advertisements.**
- **Penalties for Misleading Claims:**
  - Any company found violating these guidelines may face penalties for misleading advertising and **unfair trade practices under consumer protection laws.**
  - **Future-oriented claims** (e.g., goals to reduce carbon emissions) can only be made if backed by actionable and transparent plans.
  - Specific environmental claims like **"compostable," "plastic-free," "recyclable,"** etc., must be supported by **scientific evidence or third-party verification**, and should be made available for consumer reference.
- **Technical Terms:**
  - To improve consumer understanding, companies are required to explain technical terms like **greenhouse gas emissions** or **Environmental Impact Assessments (EIA)** in user-friendly language.
- **Central Consumer Protection Authority's (CCPA) Role:**
  - The **CCPA will oversee the enforcement** of these guidelines, working with various stakeholders to ensure compliance, prevent consumer harm, and promote truthful **environmental advertising.**

Note:




### *What are the Key Factors Driving Greenwashing in India?*

- **Growing Environmental Awareness:** Increasing awareness among Indian consumers about environmental issues has led to a demand for eco-friendly products.
  - Companies may exaggerate claims to meet this demand, with consumers willing to pay more for green products.
- **Regulatory Pressure**: Government regulations like the Extended Producer Responsibility (EPR) policy create pressure on companies to appear environmentally responsible, sometimes leading to false compliance claims.
- **Corporate Social Responsibility (CSR):** Companies overstating their environmental efforts to meet the mandatory 2% CSR spending requirement under the Companies Act, 2013, is a driver of greenwashing.
- **Media and NGO Activism:** Media and NGOs uncover greenwashing practices, pushing companies towards greater transparency.
  - Investigations reveal deceptive environmental claims, like misleading **biodegradability labels.**
- **Consumer Scepticism:** Due to frequent greenwashing, Indian consumers distrust sustainability claims, leading to higher demand for third-party certifications.

**Global Initiatives to Combat Greenwashing**

- **UNFCCC COP27 Declaration:** UN Secretary-General calls for zero tolerance for greenwashing, urging corporations to amend their practices.
- **EU Green Bond Standards:** In October 2023, the EU approved new standards to combat greenwashing, promoting transparency.
- **European Green Bond Label:** Requires **85% of funds** to be directed toward sustainable activities, supporting climate neutrality goals.

### *What are the Concerns Surrounding Greenwashing?*

- **Dilution of Climate Goals:** Misleading claims undermine the credibility of genuine environmental efforts.
- **Unfair Recognition:** Entities practising greenwashing may gain undue rewards for irresponsible behavior.
- **Market Distortion:** Greenwashing creates an uneven market, disadvantaging companies with genuine environmental standards.
- **Lack of Regulations:** Insufficient standards for environmental claims allow greenwashing to persist unchecked.
- **Carbon Credit Integrity:** Greenwashing weakens the reliability of carbon credit systems, particularly in unregulated markets.

## Disruption in Emissions and Uptake of Methane

### *Why in News?*

Recently, new research warned that climate change could disrupt the Methane Cycle (methane emissions and uptake) in the Amazon rainforest, leading to significant **global consequences.**

Note:

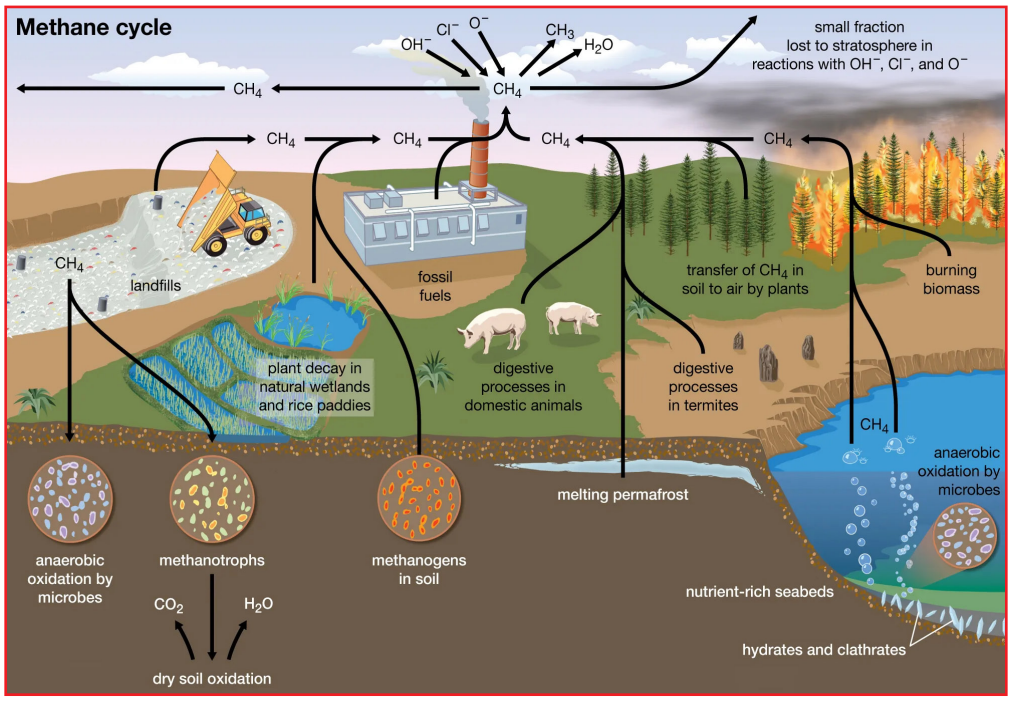
- The methane cycle refers to the series of **processes** that control the **production, consumption, and release** of methane ($CH_4$) in the environment.

### *What are the Key Highlights of the Research on Methane?*

- **Floodplain Ecosystems**: **Floodplains** (waterlogged areas) in the Amazon contribute up to **29% of global wetland methane emissions**. Climate changes increase the risk of methane-producing **microbes.**
- **Upland Forests**: **Upland forests** in the Amazon function as **methane sinks.**
  - The study found that **methane uptake** in upland forest soils **dropped by 70%** under warmer, drier conditions, signalling a reduction in their capacity to mitigate methane emissions.
- **Methane Cycling:** The research also delved into the role of **methanotrophic microorganisms**, which consume methane.
  - Isotope analysis showed that both **aerobic and anaerobic** methane-consuming microbes were active in **floodplains**, highlighting the complex interactions in **methane cycling** in the Amazon.

### *What is a Methane Cycle?*

- There are many **sources** like **wetlands** that release **methane ($CH_4$)** into the atmosphere. There are also **sinks** or ways that methane is **trapped or destroyed.**
- The methane cycle **begins in the soil** where methane gas is created by **microbes.**
- Soil methane is **consumed by methanotrophs**, microorganisms that feed on methane.
- **Methanogens** make more methane that methanotrophs consume.
  - Methanotrophs live in **drier oxygen-rich upper layers of soil** because they need **oxygen** to function.
  - Their **food bubbles r**ise to the surface, releasing **methane into the atmosphere.**
  - This methane joins methane from other sources, such as **landfills, livestock** and exploitation of **fossil fuels.**
- The main mechanism for **removal** of methane from the earth's atmosphere is **oxidation** within the **troposphere** by the **hydroxyl radical (OH)**.
  - Hydroxyl radicals are a form of **sink** because they **scrub the atmosphere clean of pollutant** molecules and break them down. For this reason **OH is known as the 'cleanser of the atmosphere'.**
  - After reacting with OH, **atmospheric methane is converted to CO2** by a long series of chemical reactions.
- Some of the methane present in the troposphere passes into the **stratosphere** where a **similar process removes it** from the atmosphere..




Note:

### *How Global Warming Can Impact Methane Cycle?*

- **Imbalance in Sources and Sinks:** In an **ideal world**, methane sources would be **balanced** with methane sinks, as with CO2, however, global atmospheric **methane concentrations are rising** as a result of human activities.
  - Scientists are worried because as the **planet warms**, even more methane will be released from soils or other places adding to the global warming problem.
- **Methane Clathrates:** Methane crystals form in **cold, oxygen-poor undersea sediments**. Clathrates are also trapped in **permafrost**, the permanently frozen soil in the **arctic and subarctic latitudes.**
  - Clathrate ice, also called **methane hydrate,** is **solid and white**, similar to water ice. However, this ice consists of **water molecules** that are **frozen around molecules of methane.**
- **Role of Clathrate Deposits:** Clathrate deposits were **once sinks** where methane was isolated.
  - However, as the planet warms, some of these deep, cold sediments are melting, sending methane bubbling to the surface.
  - Because **$CH_4$ is a greenhouse gas,** it traps heat in the atmosphere and warms the planet more.

### *How Disruption in the Methane Cycle Can Have Global Consequences?*

- **Contributor to Global Warming:** Methane is the second most significant **greenhouse gas** driving climate change, following **carbon dioxide ($CO_2$).**
  - Due to its high **global warming potential** (28 times greater than carbon dioxide over a 100-year period), even small amounts of methane can significantly contribute to **global warming.**
- **Halts Checking Global Warming Efforts:** According to data from the **United States National Oceanic and Atmospheric Administration**, even as carbon dioxide emissions decelerated during the **Covid-19 lockdowns** of 2020, atmospheric **methane shot up.**
- **Health Impacts:** Methane is a key precursor gas of the harmful **air pollutant**, **tropospheric ozone.**
  - Ozone is responsible for about **1 million premature respiratory deaths** globally.
  - Globally, increased methane emissions are responsible for **half of the observed rise in tropospheric ozone levels.**
- **Effects on Air Quality:** Increased methane emissions **deplete hydroxyl radicals (OH)**, which act as a **natural detergent** for atmospheric pollutants. This reduction allows other air pollutants to persist longer, worsening air quality.
- **Agriculture Impacts:** Methane contributes to **staple crop losses of up to 15% annually** by increasing atmospheric temperatures and producing tropospheric ozone.
- **Economic Impacts:** Methane's impacts on **climate change and public health** contributes to a yearly loss of roughly **400 million hours of work globally** due to extreme heat.
- **Biodiversity Threats**: Methane-induced climate change disrupts ecosystems, causing **shifts in species distributions, loss of biodiversity**, and destabilisation of ecological interactions, impacting plant and animal health.

### *What can be done to Balance the Methane Cycle?*

- **Enhanced Landfill Design**: **Lining systems and gas collection wells** in landfills can be used to **capture methane for energy** use rather than allowing it to escape into the atmosphere.
- **Livestock Management:** Additives such as **seaweed or specific enzymes** have been shown to lower methane emissions from **ruminants** which can help **mitigate emissions** from livestock.
- **Aerobic Treatment Methods**: Technologies such as **aerobic digestion** can effectively eliminate **organic matter** from wastewater without producing methane.
- **Rice Cultivation Practices:** Implementing **alternative wetting and drying practices** in rice cultivation can minimise methane emissions by reducing the time fields are flooded.
- **Soil Health Management**: Enhancing **soil health** through the use of **organic fertilisers** and **crop rotation** can reduce methane emissions by promoting **aerobic conditions** in the soil, which are less conducive to methane production.

Note:

- **Pest Management**: Research into environmentally friendly **pest management** strategies could help regulate **termite populations** in areas where their emissions are significant.
- **Coastal Ecosystem Restoration**: Protecting and restoring coastal ecosystems, such as **mangroves** and **salt marshes**, can enhance their ability to absorb carbon and mitigate methane emissions from sediments.
- **Safe Extraction Practices**: If **methane hydrates** are to be extracted for energy, developing safe extraction technologies that minimise methane leakage is crucial.
- **Reducing Fossil Fuel Use**: Transitioning to **renewable energy sources** can reduce overall methane emissions associated with fossil fuel extraction and consumption.

# Forest Destruction in Ukraine War

### *Why in News?*

Recently, a fire caused by a blast wiped out three hectares of **80 year old pine trees** at the **Sviati Hory national park** in eastern **Ukraine.**

### *How the Ukraine War Caused Forest Destruction?*

- **Widespread Forest Destruction**: Eastern Ukraine's **pine forests**, including the rare **chalk pine**, have suffered severe damage, with about **80% of Luhansk (Russian-held areas)** region's pine forests destroyed.
  - Around **425,000 hectares** of forest across Ukraine have been contaminated with **mines and unexploded ordnance**.
- **Impact on Wildlife:** The conflict has left **vast areas stripped of wildlife habitats**, affecting species such as **deer, boars, woodpeckers**, and the **endangered Przewalski's horses**.
- **Environmental Damage**: **Forest fires** caused due to war **emitted** an equivalent of **6.75 million metric tons of carbon dioxide**, equal to the annual emissions of **Armenia.**
  - The **carbon capture potential** of forests has been lost due to the destruction of trees, compounding environmental damage.
- **Soil and Water Contamination:** The war has **poisoned soil and rivers** across Ukraine, creating long-term environmental hazards.
  - It has left the **land unsuitable** for habitation and regeneration.
- **Long-Term Consequences**: Experts estimate that **demining (landmine clearance) efforts** could take **70 years**, and the subsequent **regeneration** of forests could take even longer.
- **Economic Cost**: The **World Bank** estimated the total damage to forests and natural protected areas, including wetlands, exceeds **USD 30 billion**.
  - This includes **USD 3.3 billion** in direct damage, **USD 26.5 billion** in broader economic and environmental costs, and a **USD 2.6 billion** repair bill.

### *What are the Consequences of Forest Destruction?*

- **Global Warming**: **Deforestation** is responsible for **11% of global greenhouse gas emissions**, including gasses like **$CO_2$, $CH_4$ (methane), $N_2O$ (nitrous oxide), $SO_2$ (sulfur dioxide), and chlorofluorocarbons (CFCs).**
  - Since 1990, **420 million hectares** of forests have been lost due to conversion to **agriculture, industrial use** etc to support the rising global population.
- **Impact on Climate and Rainfall**: Trees release water into the atmosphere through **transpiration**, contributing to rainfall.
  - Deforestation reduces this process, leading to **diminished rainfall** and disruptions in the water cycle, amplifying the **double effects** on climate and agriculture.
- **Depletion of Clean Water Sources**: According to experts, a **1% increase in deforestation** results in a **0.93% decrease** in the availability of clean drinking water in **rural communities** that rely on open wells and flowing streams.
- **Rise in Infectious Diseases**: Deforestation leads to **spikes in infectious diseases** like **malaria** and **dengue**, as it disrupts ecosystems and facilitates the spread of disease-causing germs.
- **Soil Degradation**: The loss of forests results in **soil degradation**, further harming **agriculture and natural ecosystems**.

Note:

- Forests play a crucial role in preventing **soil erosion**, maintaining **nutrient cycles**, and conserving **water resources**.

- **Loss of Biodiversity**: Deforestation is responsible for **destroying the habitats** of millions of animals, plants, and insects, leading to **species extinction.**
  - In the Amazon alone, **10,000 species** are at risk, including **2,800 animal species**.
  - **Palm oil production**, in particular, has driven species like **orangutans** to the brink of **extinction.**

### *What Initiatives Can be Taken to Preserve Forest?*

- **Strengthening International Treaties:** Support initiatives like the **Environmental Modification Convention (ENMOD)**, which bans the use of **environmental destruction as a method of warfare.**
  - Expand international laws to explicitly **prohibit deliberate destruction of forests** during warfare, akin to **war crimes.**
- **War-Free Conservation Zones**: Establish **peace parks** or **conservation zones** in conflict areas, where **forests and biodiversity are shielded** from the direct impacts of war.
- **Post-War Reforestation:** Implement large-scale **reforestation projects** in areas that suffered forest loss due to war.
  - **International organisations**, such as the **UN Environment Programme (UNEP)**, can play a critical role in coordinating these efforts.
- **Limiting Resource Exploitation During War**: Track and block the **trade of conflict timber**, similar to how **conflict diamonds** are regulated, to stop financing war through environmental destruction.
- **Zero Deforestation Policies**: By implementing **"zero deforestation" policies**, companies can clean up their **supply chains**, ensuring that commodities like **timber, beef, soy, palm oil, and paper** are produced in ways that do not fuel **deforestation.**
- **Third-party Certification: Third-party certification**, such as the **Forest Stewardship Council (FSC)**, can be a useful tool to ensure that any **virgin fibre** used is sourced in a **legal, environmentally, and socially** responsible way.
  - FSC is an international, **non-governmental organisation** dedicated to promoting responsible management of the world's forests via **timber certification.**
- **Supporting Indigenous Peoples**: **Indigenous Peoples** is crucial in preserving forests.
  - **E.g.,** The **Munduruku people of the Amazon** are fighting to protect their forests from destructive projects like logging and dam construction.
- **Sustainable Consumer Choices**: **Informed daily choices** such as avoiding **single-use packaging**, and choosing **responsibly-produced wood products** can help reduce deforestation.
  - Reducing or adopting a **plant-based diet** is also encouraged to help protect forests.
- **Government Policies**: Treaties like the **Convention on International Trade in Endangered Species (CITES)**, the **Convention on Biological Diversity**, and the **UN Framework Convention on Climate Change** can help protect forests globally.

### *What are the Various Global Afforestation Initiatives?*

- **Bonn Challenge**
- **The Trillion Trees**
- **United Nations Decade on Ecosystem Restoration (2021-2030)**
- **Great Green Wall**
- **Global Forest Financing Facilitation Network**

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Note:

# History

## Highlights

- *Copper Plates Discovered from Vijayanagara Kingdom*

## Copper Plates Discovered from Vijayanagara Kingdom

### *Why in News?*

Recently, a **collection of copper plate inscriptions** featuring two leaves from the **16th Century CE** was discovered at the **Sri Singeeswarar temple in Mappedu village**, Tiruvallur district of Tamil Nadu.

- The **two leaves of the copper plates** strung together **using a ring** featuring the **seal of the Vijayanagara Kingdom.**
- The inscription, donating a village to Brahmins by the Raja of Chandragiri, is written in **Sanskrit and the Nandinagari script.** It was engraved in 1513 during the reign of **King Krishnadevaraya.**

### *Who was King Krishandevaraya?*

- **Reign of Krishnadevaraya:**
  - The **Kingdom of Vijayanagar** was ruled by **Krishnadevaraya from 1509 to 1529 AD.**
    - After Krishna Deva Raya, **Achyuta Raya** took over **in 1530**, followed by **Sada Siva Raya in 1542.**
  - He was known by **various titles**, including **"Kannadaraya" and "Kannada Rajya Ramaramana."**
  - He is regarded as one of the **greatest statesmen in Indian history** and is considered one of the most significant rulers of mediaeval South India.
- **Literary Contributions:**
  - He was an **eminent scholar** and **authored works** such as Madalasa Charita, Satyavedu Parinaya, Rasamanjari, **Jambavati Kalyana,** and **Amuktamalkyada.**
  - Fluent in multiple languages, he supported poets writing in **Sanskrit, Telugu, Tamil, and Kannada.**
- **Patronage of Learning and Literature:**
  - His court included the **Ashtadiggajas, eight prominent scholars**, among them **Allasani Peddana, known as the Andhra-kavitapitamaha**, famous for his work **Manucharitamu**.
  - Kannada poet **Thimmanna completed** the **Kannada Mahabharatha,** originally started by Kumara Vyasa, at Krishnadevaraya's request.
  - **Other notable poets** patronised during his reign.
    - Kannada poet Mallanarya, author of **Veerasaivamrita and Bhavachintaratna.**
    - **Chatu Vittalanatha**, who wrote **Bhagvatha.**
    - **Timmanna Kavi**, is known for his eulogy **Krishnaraya Bharata.**
    - **Peddanna**, a Telugu poet, was **honoured for his proficiency in Telugu and Sanskrit.**
- **Cultural Development:**
  - Krishnadevaraya played a significant role in nurturing the **Carnatic musical tradition**.
  - He also **encouraged classical dance forms,** including **Bharatanatyam and Kuchipudi.**

Note:

- **Infrastructural Development:**
  - He is **credited with building some fine temples** and adding impressive **gopurams to many important south Indian temples.**
  - He also founded a suburban township near Vijayanagar called **Nagalapuram after his mother.**

### *What are the Key Facts of the Vijaynagar Empire?*

- **Foundation and Duration of the Empire:**
  - The **Vijayanagara Empire** was established in the **Deccan region** from 1336 onwards, **founded by Harihara** (also known as Hakka) and his brother **Bukka Raya.**
    - They made **Hampi the capital city (declared a World Heritage site by UNESCO in 1986).**
    - Vijayanagar Empire was **ruled by four important dynasties** (Sangama, Saluva, Tuluva, Aravidu).
  - The empire **lasted from 1336 until around 1660,** although it faced a gradual decline in its final century following a devastating defeat by an alliance of deccan sultanates, leading to the capital being captured, looted, and destroyed.
- **Portuguese Relations:**
  - Around **1510, the Portuguese captured Goa,** which had been under the Sultan of Bijapur, with the support of Vijayanagara.
  - The **Portuguese supplied** the Vijayanagara Empire **with guns and Arabian horses**, while the **empire exported cotton, rice, sugar, spices, indigo, and wooden goods.**
- **Cultural and Architectural Flourishing:**
  - The empire is generally regarded as **reaching its zenith during the reign of Krishna Deva Raya,** who conquered territories east of the Deccan that were formerly part of Orissa.
  - Many of the empire's notable monuments, including the **Hazara Rama temple, Krishna temple, and Ugra Narasimha idol**, date back to his time.
  - Vijayanagara rulers promoted the construction of grand temples, such as the **Virupaksha Temple and Vittala Temple**, known for their intricate carvings and stunning architecture.
- **Dominance in Southern India:**
  - Over two centuries, the Vijayanagara Empire **dominated southern India** and was the strongest power in the Indian subcontinent during this period.
  - The empire **served as a defense against invasions from the Turkic Sultanates** of the Indo-Gangetic Plain.
- **Tussle with the Deccan Sultanates and Mughals:**
  - The foundation of the Vijayanagara Empire was partly in response to the **weakening of the Delhi Sultanate under Muhammad bin Tughlaq,** whose policies led to unrest in the Deccan.
    - His **attempt to shift his capital from Delhi to Daulatabad a**nd his harsh taxation policies caused revolts, contributing to the rise of independent regional states, including Vijayanagara.
  - The empire **frequently clashed with the Bahmani Sultanate**, which had emerged after the collapse of Tughlaq's control in the Deccan.
  - Territorial conflicts with the Deccan Sultanates, particularly over the **Raichur Doab,** were driven by competition for strategic and economic resources rather than purely religious differences.
- **Area of Rule under Vijayanagar:**
  - At its peak, the Empire covered a **vast area across southern India,** including parts of present-day Karnataka, Andhra Pradesh, Tamil Nadu, Kerala, and Telangana.
  - It **extended from the Krishna River in the north to the southernmost tip of the Indian Peninsula,** and from the Arabian Sea on the west to the Bay of Bengal on the east.
- **Decline and Fall:**
  - In **1565, the Battle of Talikota (Battle of Rakkasagi–Tangadagi)** resulted in a decisive defeat for the Vijayanagara army by the allied Deccan sultanates.

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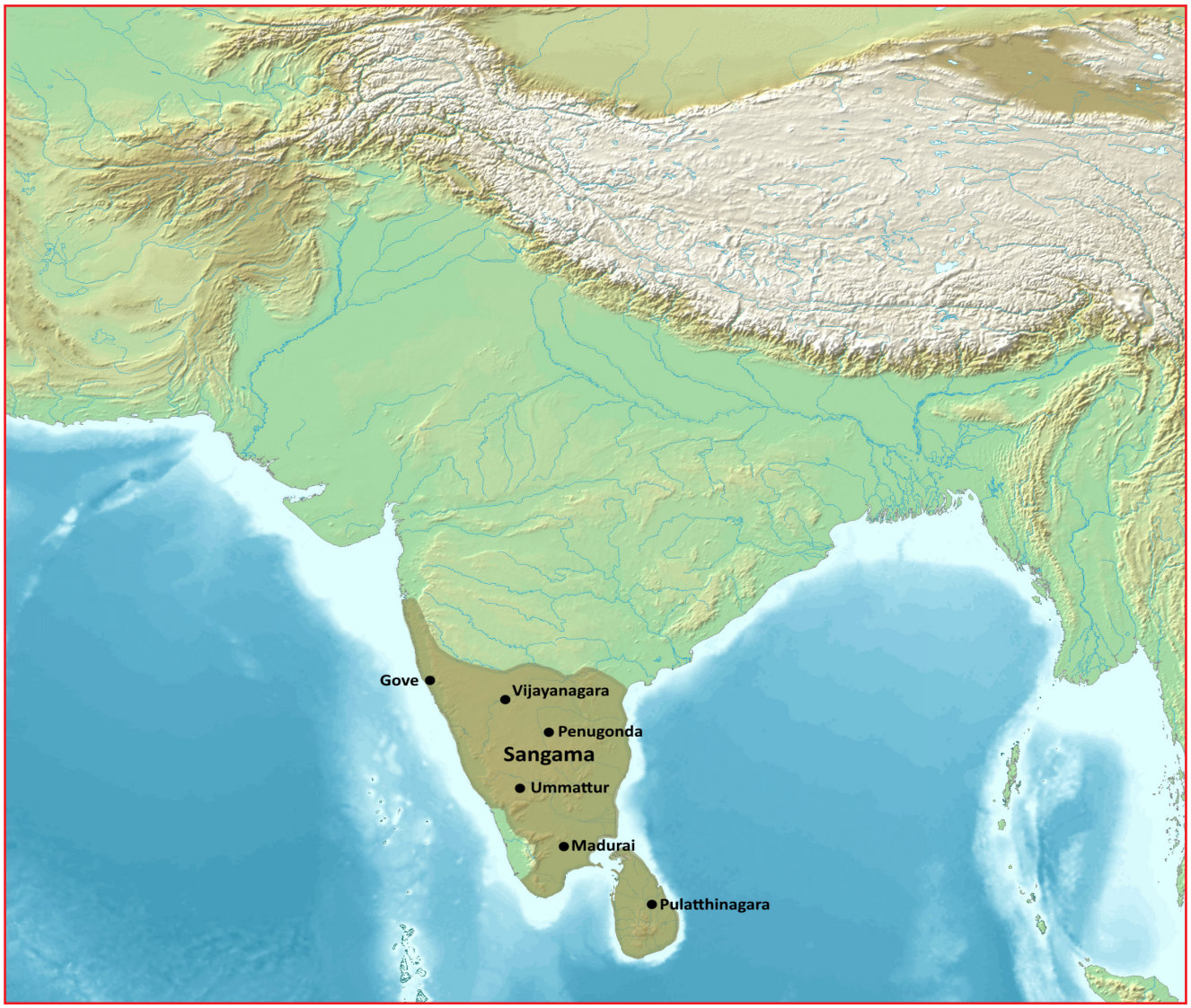


**Nayakas**

- The **Nayakas were military commanders** who were granted land (amaram) by the king in return for maintaining troops and financial contributions.
- They held substantial autonomy in their territories, managing local administration and defense while remaining loyal to the central authority.
- The Nayakas were responsible for local governance, including **land distribution and tax collection, creating a feudal-like system.**
- Over time, some Nayakas gained significant power, leading to conflicts with the central authority, especially during the decline of the empire.

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Note:

# Art and Culture

## Highlights

- *Revival of National Mission for Manuscripts (NMM)*
- *International Abhidhamma Divas*

## Revival of National Mission for Manuscripts (NMM)

### *Why in News?*

Recently, the Union **Ministry of Culture** is set to **revive and relaunch** the **National Mission for Manuscripts (NMM).**

### *What are the Key Points of the Revived NMM?*

- **National Manuscripts Authority:** The Union Ministry of Culture plans to form an autonomous body named **National Manuscripts Authority** under the Ministry of Culture.
  - **Presently**, NMM is a part of the **Indira Gandhi National Centre for Arts**.
- **Achievements of NMM:** Between 2003-24, metadata of **52 lakh manuscripts** have been prepared, **over 3 lakh titles have been digitised** and **one-third** of them have been u**ploaded.**
- **Concerns:** Only about **70,000 of the 1.3 lakh uploaded** manuscripts are accessible.
  - A significant **portion** of manuscripts is **privately owned**, with limited incentive for owners to make them publicly accessible.
- **Future Roadmap:**
  - Establishment of **university chairs** abroad in departments focusing on ancient **Indian studies.**
  - Suggestions for involving **Intellectual property rights (IPRs)** and **legal experts** to address issues related to the **sale of manuscripts abroad and private ownership.**
  - Emphasis on preserving **non-Brahmi** and lesser-known scripts.

**Manuscripts**

- **Definition**: A manuscript is a **handwritten composition** created on materials such as **paper, bark, cloth, metal, or palm leaf**, and it must be **at least 75 years old**.
- **Exclusions**: **Lithographs** and printed volumes are **not** considered manuscripts.
- **Script Variability**: Often, one language is represented in **multiple scripts**. For instance, **Sanskrit** is written in scripts like **Oriya, Grantha, and Devanagari.**
- **Distinction from Historical Records**: Unlike historical records (e.g., **epigraphs, firmans, revenue records**), which document **historical events**, **manuscripts** primarily contain **knowledge** content.
  - Manuscripts provide knowledge on **philosophy, science, literature, and art**.
- **Historical Interest**: In the 18th century, the **Nawab of Awadh** presented an illuminated manuscript of the **Padshahnama** to **King George III of England.**
  - **Hiuen Tsang**, a 7th century Chinese traveller, took many **manuscripts back to China.**
- **British Interest: William Jones**, **C.P. Brown**, **John Leyden**, **Colin Mackenzie**, **Charles Wilkins**, **H.H. Wilson**, and **HT Colebrooke** played significant roles in studying and preserving Indian manuscripts.
- **Early Efforts in Cataloging**: Efforts to catalogue Indian manuscripts began as early as **1803** with the efforts of **HT Colebrooke**, **Asiatic Society of Bengal's** fourth president.

### *What are the Key Facts About NMM?*

- **About:** It is an initiative of the **Ministry of Culture** to preserve and document India's vast collection of manuscripts.
  - It was launched in **2003** to **uncover, document, conserve**, and make **accessible** India's vast manuscript heritage.

Note:

- **Implementing Bodies**: The **Department of Culture** is responsible for implementing the mission, while the **Indira Gandhi National Centre for the Arts (IGNCA)** serves as the nodal agency.
- **Objectives**: It is dedicated to **conserving manuscripts and disseminating** the knowledge contained in them, working toward its motto "**conserving the past for the future**."
- **Scope and Collection**: India possesses an estimate of **five million manuscripts**, probably the **largest** collection in the **world**.
  - **70%** of manuscripts are in **Sanskrit.**

# International Abhidhamma Divas

### *Why in News?*

Recently, India's Prime Minister addressed a ceremony in celebration of **International Abhidhamma Divas (IAD)** and recognition of **Pali** as a **classical language**.

- It was organised by the **International Buddhist Confederation (IBC)** and the **Ministry of Culture.**

### *What are Key Facts About International Abhidhamma Divas?*

- **About IAD:** Abhidhamma Divas commemorates the **descent of Lord Buddha** from the **celestial realm** of the thirty-three divine beings **(Tāvatiṃsa-devaloka)** to Sankassiya (Sankisa Basantapur, Farrukhabad) in **Uttar Pradesh**.
  - The importance of this location is highlighted by the presence of the **Asokan Elephant Pillar.**
- **Story behind Abhidhamma:** According to the Pali texts, Buddha preached the **Abhidhamma** first to the **Gods** of the **Tavatimsa heaven**, who were headed by his **mother.**
  - After having returned to the earth again, he conveyed the message to his disciple **Sariputta.**
- **Mark of Event:** Abhidhamma Divas coincides with the end of the **rainy retreat (Vassa)** and the **Pavāraṇā festival.**
  - **Rainy retreat (Vassa)** is an annual **three-month monastic retreat** practised especially in the **Theravada Buddhist** tradition during the **monsoon season.**
  - The **Pavāraṇā festival** marks the **conclusion of Vassa**, where monks come together to **confess any faults or mistakes** made during the retreat and invite their fellow monks to point out any shortcomings they may have noticed.
  - Pavāraṇā festival is celebrated on **full moon day of the 11th lunar month** which usually in October.

**What is Abhidhamma Pitaka?**

- The **Abhidhamma Pitaka** is the **last of three Pitakas** that constitute to **Pali Canon**, one of the most popular scriptures of **Theravada Buddhism.**
  - Abhidhamma Pitaka is a **detailed scholastic analysis** and summary of the Buddha's teachings in the **Suttas**. It deals with the **philosophy, doctrine, psychology, metaphysics, ethics, and epistemology** of Buddhism
  - The other remaining Pitakas of Tipitaka are **Vinaya Pitaka and Sutta Pitaka.**
    - **Vinaya Pitaka** is the **monastic rules of conduct** for monks and nuns of the Sangha.
    - **Sutta Pitaka** contains **suttas (teachings/ discourses)** delivered by the Buddha and his close disciples.
- The Abhidharma Pitaka consists of **seven different books**.
  - **Dhammasangani** (Enumeration of Phenomena)
  - **Vibhanga** (Book of Treaties)
  - **Dhatukatha** (Discussion with Reference to the Elements)
  - **Puggalapanatti** (Description of Personality)
  - **Kathavatthu** (Points of Controversy)
  - **Yamaka** (Book of Pairs)
  - **Patthana** (Book of Relations)

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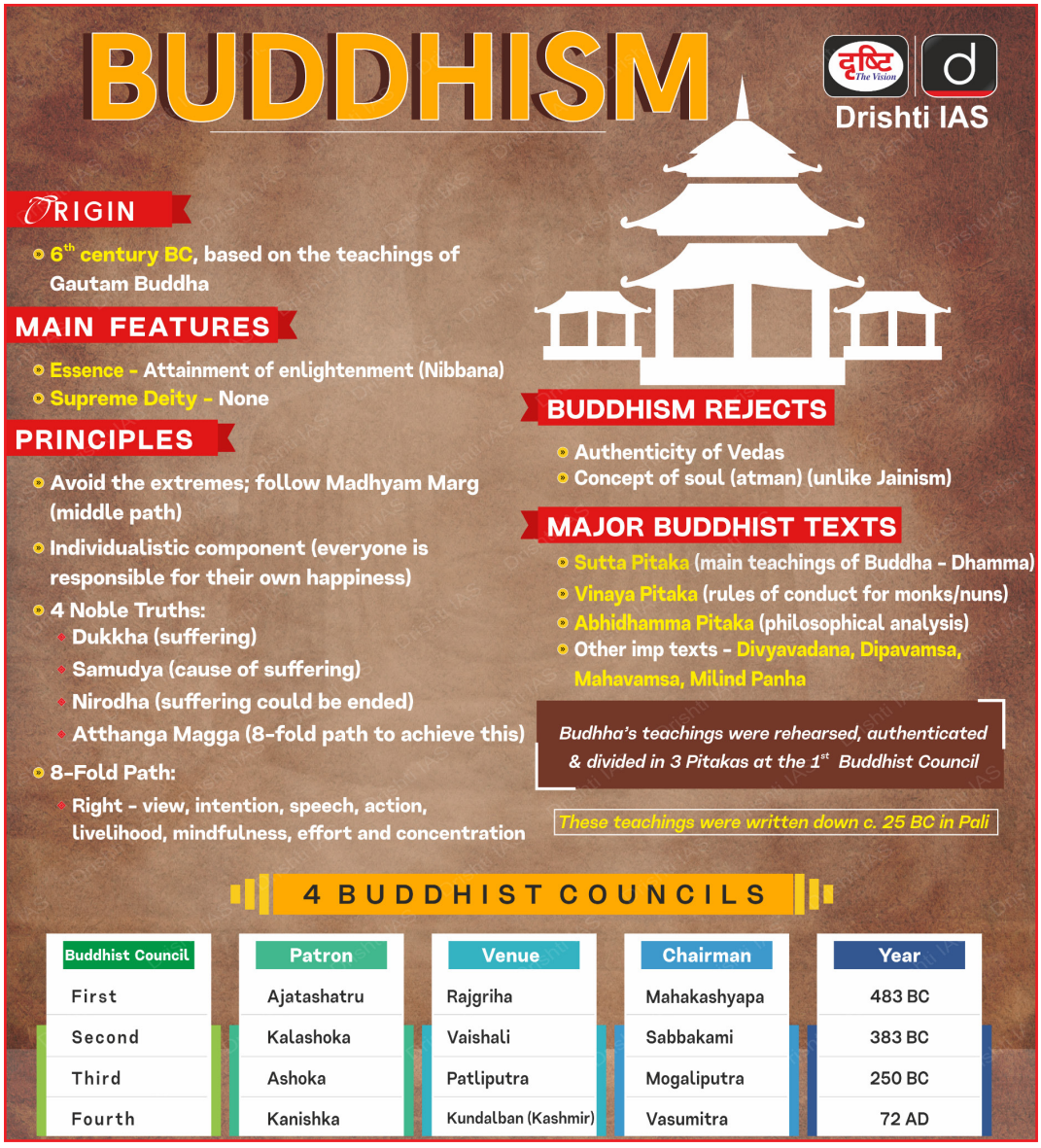


### *What are Key Facts About Pali Language?*

- **Origin of Pali:** Pali belongs to the **Indo-European language family**.
  - **Initially,** Pali was thought to be **identical with Magadhi**, the language of **Magadha** (modern-day Bihar).
  - Recent studies show **Pali** has a stronger resemblance to the **Prakrits of Western India.**
- **Classical Language:** The Union Cabinet has approved the recognition of **Pali** alongwith Prakrit, Marathi, Assamese, and Bengali as classical languages.
- **Connection with Ashoka:** Emperor Ashoka's inscriptions were written **Pali** especially in modern-day **Uttar Pradesh**.
- **Connection with Buddhism:** Pali is the language of the **three Theravada Buddhist canon** i.e., Vinaya Pitaka, Sutta Pitaka and Abhidhamma Pitaka.
- **Scripts of Pali:** Originally it was written in **Brahmi and Kharosthi scripts**. As Buddhism spread, Pali was written in local scripts like **Sinhalese** in Sri Lanka, **Burmese** in Myanmar, **Thai** in Thailand and **Khmer** in Cambodia.

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Note:

# Geography

## Highlights

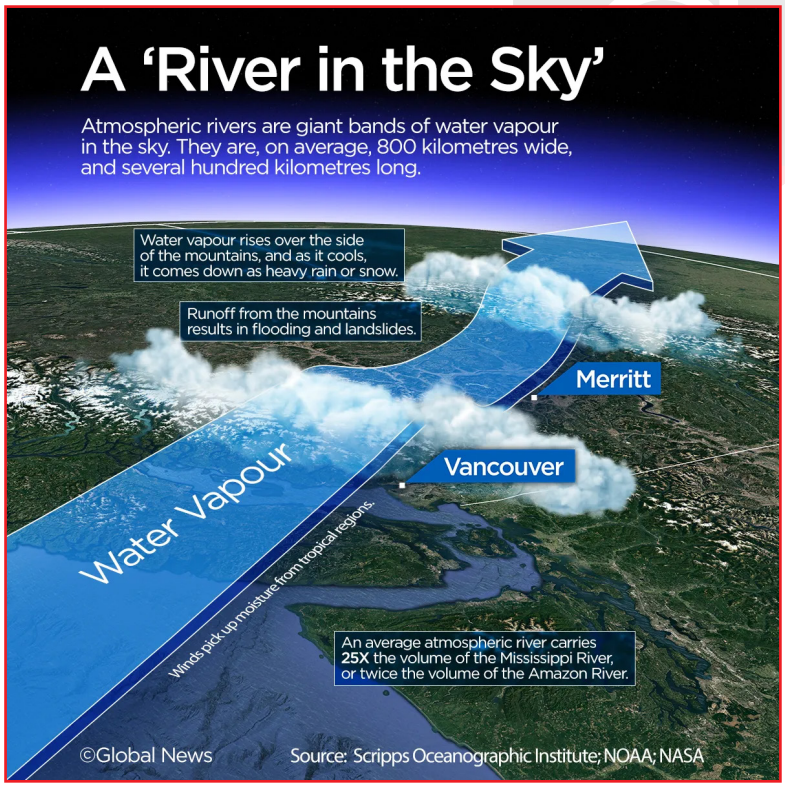
- *Poleward Shift of Atmospheric Rivers*
- *Cyclone Dana*
- *Volcanic Eruption and Ionospheric Disturbances*
- *Aurorae in Ladakh*

## Poleward Shift of Atmospheric Rivers

### *Why in News?*

A recent study reported that atmospheric rivers have shifted 6 to 10 degrees poleward over the past 40 years, influencing global weather patterns.

- This shift is increasing **droughts** in some regions while intensifying **floods** in others, with major implications for water resources and climate stability.




### *Why are Atmospheric Rivers Shifting Polewards?*

- **Sea Surface Temperature Changes:** Atmospheric rivers are shifting poleward due to **cooling of sea surface temperatures** in the **eastern tropical Pacific** since 2000, associated with **La Niña** conditions.
  - As a result, **subtropics may experience more prolonged droughts** and **water scarcity,** while **higher latitudes could see more extreme rainfall and flooding**.
- **Walker Circulation**: During **La Niña,** the **Walker circulation** strengthens over the **western Pacific**, expanding the tropical rainfall belt. This change, combined with alterations in atmospheric eddy patterns, creates high-pressure anomalies that steer ARs toward the poles.
  - The **Walker Circulation** is a cyclic pattern of air movement around the **equator** that plays a crucial role in **climate and weather.**
- **Long-term Climate Trends:** The **IPCC** reports that global temperatures have increased by approximately 1.1°C since the pre-industrial era. Warmer conditions have altered jet stream patterns, shifting them poleward. This movement pushes ARs toward higher latitudes, impacting weather patterns and raising the frequency of extreme events in those areas.

### *What are Implications of the Poleward Shift of Atmospheric Rivers?*

- **Water Resource Management**: Subtropics regions like California and southern Brazil, which rely on ARs for vital rainfall, may face **longer droughts and water shortages** as ARs become **less frequent**. This could lead to increased stress on agriculture and local communities.

Note:

- **Increased Flooding and Landslides**: Higher Latitudes areas like the US Pacific Northwest, Europe, and even polar regions could see more **extreme rainfall, flooding, and landslides** due to the poleward movement of ARs threatening infrastructure and safety.
- **Arctic Climate Impact:** The movement of ARs into the Arctic could **accelerate sea ice melting**.
  - Research found that atmospheric rivers contribute to **36% of the rise in summer moisture** over the Arctic since 1979.
- **Predictive Challenges:** The variability of natural processes, such as the oscillation between **El Niño** and **La Niña,** complicates predictions about future atmospheric river behaviour.
  - Current **climate models** may underestimate these natural variabilities, leading to potential miscalculations in forecasting weather patterns and water availability.

### *What are Atmospheric Rivers?*

- **About:**
  - **Atmospheric rivers (ARs)** are **long, narrow bands of moisture in the atmosphere** that **transport vast amounts of water vapour from tropical regions to mid-latitude areas** and **other areas**, particularly outside of the tropics.
  - E.g., The **"Pineapple Express"** is an atmospheric river transporting warm, humid air from the tropical Pacific near Hawaii to North America's west coast, particularly California.
- **Conditions Required for Formation of AR:**
  - **Strong Low-Level Winds:** These winds serve as pathways for transporting water vapour, with **jet streams** in the **Northern and Southern hemispheres** acting as **high-speed channels,** sometimes reaching up to 442 km/h (275 mph).
  - **High Moisture Levels**: Adequate moisture is critical to initiate precipitation processes.
  - **Orographic Lift:** When moist **air masses** ascend over elevated terrain, such as mountains, they cool as they rise. This cooling process increases humidity, leading to cloud formation and, under suitable conditions, precipitation.
- **Categories:**
  - **Category 1 (Weak):** A mild, short-duration event, with beneficial effects like **light rainfall** over 24 hours.
  - **Category 2 (Moderate):** A Category 2 atmospheric river is a **moderate storm** with mostly beneficial effects, but also somewhat hazardous.
  - **Category 3 (Strong):** A **stronger and more prolonged event**, bringing 5-10 inches of rain over 36 hours. It can help replenish reservoirs but may also raise some rivers near flood stage.
  - **Category 4 (Extreme):** Primarily hazardous, though with limited benefits. It can bring **intense rainfall** over several days, likely pushing many rivers to flood levels.
  - **Category 5 (Exceptional): Largely hazardous** e.g., an atmospheric river over Central California during the 1996-97 caused damages exceeding USD 100 billion.
- **Key Characteristics:**
  - **Length:** Often referred to as **"rivers in the sky,"** atmospheric rivers can extend for thousands of kilometres and vary in size and strength, similar to terrestrial rivers.
  - **Seasonal Occurrence**: In the Northern Hemisphere, they typically occur between December and February, while in the Southern Hemisphere, they are most common from June to August.
    - In August 2022, **New Zealand** experienced an atmospheric river that caused record **rainfall, flooding, and displacement**.
    - **California** was struck by **12 atmospheric rivers** between December 2022 and March 2023, resulting in intense **rainfall, flooding, and wind damage.**

Note:

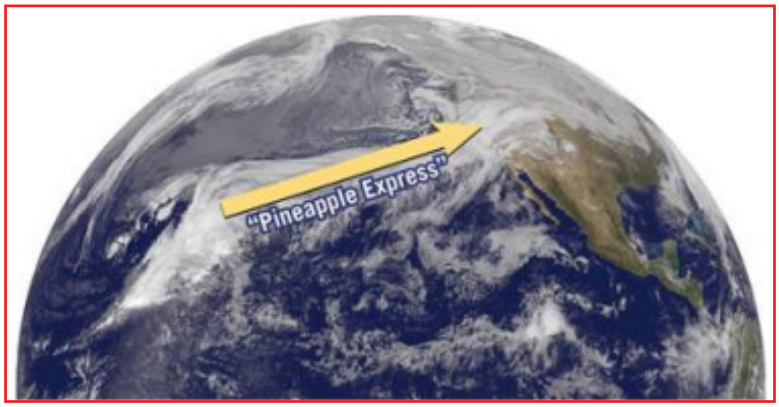
- **Water Vapour Capacity:** An average atmospheric river transports water vapour equivalent to the flow at the mouth of the Mississippi River, with exceptionally strong ones capable of carrying up to 15 times that volume.
- **Variability:** No two atmospheric rivers are alike; their characteristics differ based on factors like atmospheric instability and jet stream patterns.
- **Impact:** Atmospheric rivers can produce both beneficial rainfall and destructive flooding, highlighting their dual role in influencing weather patterns.

➢ **Atmospheric River on Reaching Land:**

- When an **atmospheric river reaches land**, the **moisture-laden air rises and cools** over mountain ranges, resulting in **heavy precipitation as rain or snow.** Unlike cold winter storms, atmospheric rivers are warm, leading to rapid snowpack melting, runoff, and flooding, impacting regions' water supply.

➢ **The Role of Climate Change:**

- Climate change is causing average temperatures on Earth to rise, leading to more water vapour in the atmosphere and increasing the likelihood of damaging atmospheric rivers.
- Studies indicate that atmospheric rivers in the Southern Hemisphere have been **shifting poleward by up to 0.72° per decade** due to anthropogenic factors.
  - These shifts influence **ocean temperatures, atmospheric CO2 levels,** and the ozone layer.
  - As the planet warms, the **intensity and frequency** of atmospheric rivers are **expected to increase**, leading to **more extreme rainfall events** by up to 40% in some areas.




**Note:**

➢ An atmospheric river is **not a physical river** on the Earth's surface, but rather an **invisible, elongated channel** in the atmosphere that transports substantial amounts of water vapour affecting weather conditions and precipitation.

### *What is the Role of Atmospheric Rivers?*

➢ **Positive Role :**

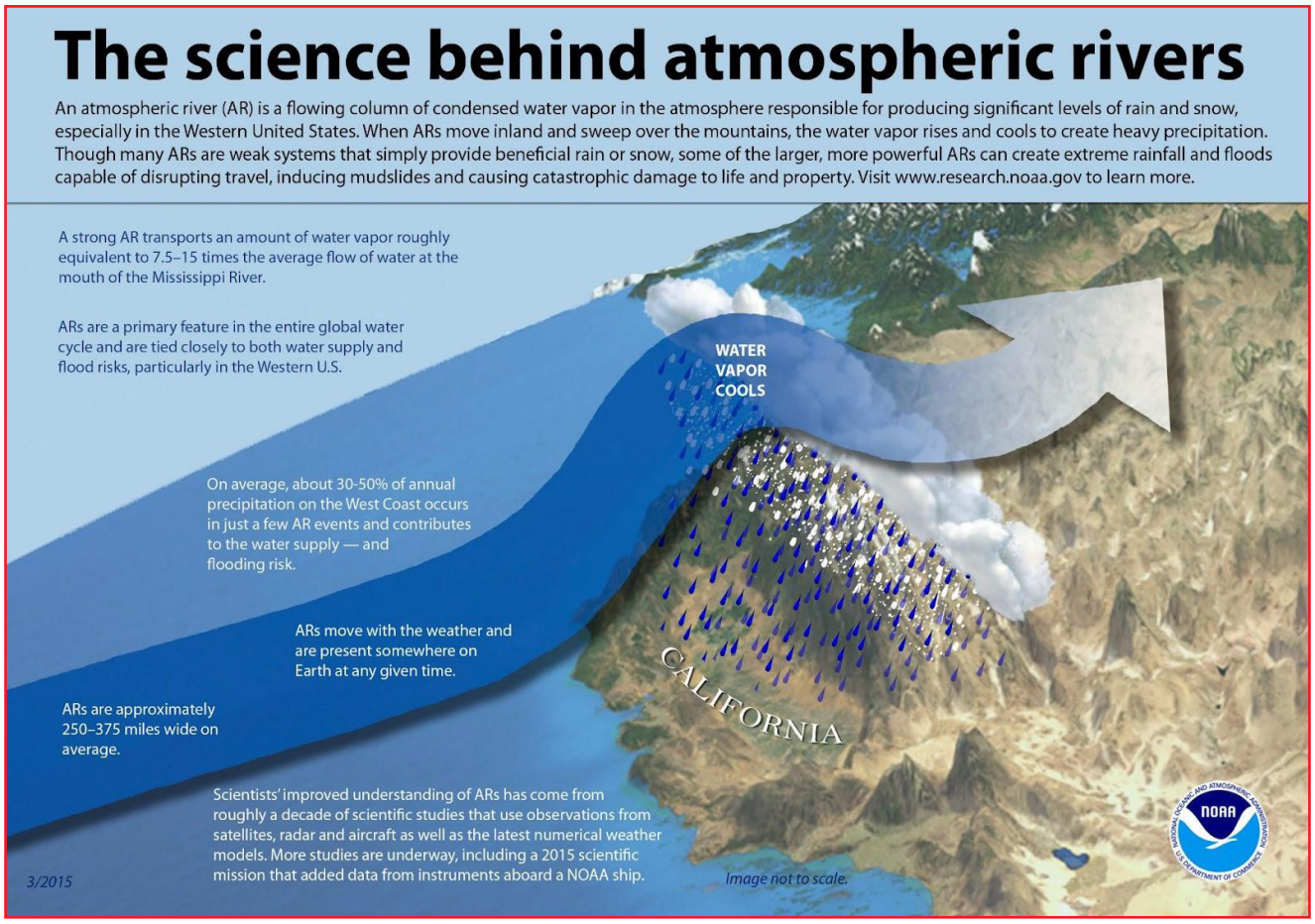
- **Redistribution of Freshwater:** AR are responsible for more than 50% of the mean annual runoff in many regions. For example, California relies on ARs for up to 50% of its annual rainfall, making them vital for water supply and agriculture.
- **Global Water Cycle:** AR plays a vital role in the **global water cycle**, influencing both water supply and flood risks, especially in the western United States. They are essential for replenishing snowpacks and can significantly impact weather patterns.
- **Snowpack Formation:** During colder months, atmospheric rivers deposit snow, which later melts to maintain water levels in warmer months. Snowpacks also reflect sunlight, helping cool Earth's surface.

➢ **Negative Role:**

- **Flooding:** Excessive precipitation can lead to soil saturation, which in turn causes flooding, particularly in areas without sufficient vegetation.
- **Landslides and Mudslides:** Steep terrain, deforested areas, and large amounts of rain increase the risk of landslides and mudslides.

Note:

- **Droughts:** A lack of atmospheric rivers can contribute to prolonged droughts, leading to water scarcity, **food insecurity,** and heightened human conflicts.




**Atmospheric Rivers in India:**

- A study has shown that atmospheric rivers (ARs) caused 70% of India's floods between 1985 and 2020, particularly during the summer monsoon.
- Major events like the **2013 Uttarakhand floods** and the **2018 Kerala floods** were linked to ARs, which are streams of water vapour in the atmosphere.
- Researchers found 596 significant AR events from 1951 to 2020, with over 95% occurring during the monsoon.
- The frequency and severity of ARs have increased due to rising global temperatures, leading to more extreme rainfall and flooding.
- The study highlights the need for improved monitoring and early warning systems for floods in India, as warmer ocean temperatures contribute to more intense ARs.

## Cyclone Dana

### *Why in News?*

According to the **India Meteorological Department (IMD)**, **Cyclone Dana** is expected to make **landfall** as a **severe cyclone (wind speed: 89 to 117 kmph)** along the **Odisha coast** near **Bhitarkanika National Park** and **Dhamra Port**.

Note:

### *What are Key Facts About Cyclone Dana?*

- **About:**
  - **Emergence:** It is the third cyclone to form in the **North Indian Ocean region** and the second to make **landfall** along the Indian coast in 2024 after **Cyclone Remal**.
    - It is the first cyclone in the **post monsoon cyclone** season.
  - **Naming of Dana:** The **World Meteorological Organisation (WMO)** states that Cyclone Dana was named by **Qatar**. In Arabic, "Dana" signifies **'generosity'** and also refers to 'the most perfectly sized, valuable, and beautiful pearl.'
- **Reasons for Intense Rainfall:**
  - **Intense Convection:** The cyclone is showing **intense convection** in its western sector, which extends up to the upper layers of the **atmosphere.**
    - Intense convection begins when **warm, moist air rises, cools, and expands**, causing moisture to condense into **water droplets and form clouds**.
    - As the **rising air continues** to cool and condense, it forms **cumulonimbus clouds**, typical of **thunderstorms** and creates conditions conducive to **heavy rainfall**
  - **Warm Moist Air:** There is an **influx of warm, moist air into the core of the cyclone,** which further **enhances convection** leading to more intense rainfall.
    - The influx of warm, moist air helps to **maintain and intensify the cyclone** and enhances the cyclone's strength which results in intense rainfall over a relatively small area.
  - **Madden Julian Oscillation (MJO) Influence:** Currently, MJO is **conducive for convection** hence heavy rainfall.
    - The **MJO** is made up of **two parts**: an **enhanced rainfall phase** and a **suppressed rainfall phase**.
      - During the **enhanced phase**, surface **winds converge**, causing **air to rise and create more rainfall**. In the suppressed phase, winds converge at the top of the atmosphere, causing air to sink and leading to less rainfall.
      - This dipole structure **moves west to east in the Tropics**, creating more **cloudiness and rainfall** in the **enhanced** phase, and more **sunshine** and **dryness in the suppressed phase**.

#### What are Key Points About the Naming of Cyclones?

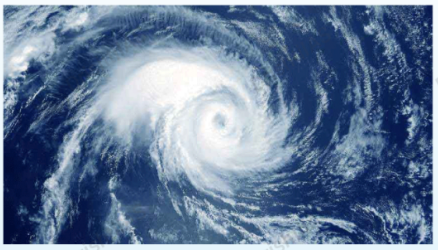
- **Historical Evolution:** In the late **1800s**, the practice began in the **Caribbean**, naming storms after **saints** from the **Roman Catholic calendar**.
  - After **World War II,** the use of **female names** became common for better organisation in tracking storms.
  - Following criticism of **gender bias**, the naming system was updated in **1979** to include both **male and female names**, alternating between the two.
- **Establishment of Naming System:** The practice of naming cyclones in the **North Indian Ocean** region began in **2000** by the **World Meteorological Organization (WMO),** a **specialised agency** of the UN.
- **Collaborative Naming Lists:** In the **North Indian Ocean**, a collaborative list of cyclone names was established by **Tropical Cyclone Regional Body (TCRB).**
  - TCRB in the North Indian Ocean is a group of **13 countries** namely B**angladesh, India, Maldives, Myanmar, Pakistan, Sri Lanka, Oman, Thailand, Iran, Qatar, Saudi Arabia, United Arab Emirates and Yemen**.
- **Suggestion Submission Process:** Each of the **13 member countries** is required to provide **13 suggestions** for names to a WMO panel which reviews and finalises the name.
- **Global Standardisation:** Naming cyclones facilitates **easier identification** for both the media and the public, helping them follow the cyclone's progress and potential threats.
- **Rotation and Retirement of Names:** Names on the cyclone list are **rotated periodically,** ensuring a fresh selection over time.
  - **Retired names**, typically those associated with **deadly or destructive storms**, are replaced with new suggestions to avoid negative associations.

Note:

# CYCLONE

Drishti IAS

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

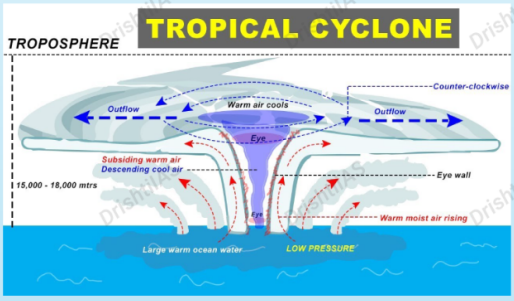


## Cyclone v/s Anticyclone

| 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)**

Note:

### *What Factors are Responsible for Formation of Tropical Cyclones?*

- **Warm Ocean Waters:** Sea surface temperatures of at **least 27°C** are essential for tropical cyclone development. Warm water provides the **heat and moisture** needed to fuel the **storm's rising air and convection process**.
- **Coriolis Force:** The **Coriolis effect,** caused by Earth's rotation, is necessary to give the cyclone its **spin**. This force is **weak near the equator**, so tropical cyclones generally form at **least 5° north or south of the equator**.
- **Low Wind Shear:** Low vertical **wind shear** (the difference in wind speed and direction at different altitudes) is crucial. High wind shear can disrupt the vertical structure of the storm, preventing it from strengthening.
- **Pre-existing Disturbance:** A tropical disturbance, such as a **low-pressure system,** provides the initial organisation of **air circulation** around which a cyclone can form.
- **Convergence of Air:** The convergence of **warm, moist air at the surface**, which rises and cools, creating **clouds and thunderstorms**, is fundamental to developing the cyclone's core.

### *What are the Impacts of Cyclone?*

- **Human Impact**: Cyclones can cause **widespread casualties** due to strong winds, storm surges, and **flooding**. Thousands of people may be **evacuated or displaced**, leading to temporary or permanent loss of homes.
- **Infrastructure Loss:** Strong winds can cause **power outages** and structural damage, while flooding **disrupts transportation and communication**.
- **Environmental Impact:** High winds and storm surges **erode coastlines, destroying natural habitats** and human structures along the shore.
  - Cyclones can cause long-term damage to **forests, wetlands, and marine ecosystems**, affecting biodiversity.
- **Agriculture Loss:** Low-lying agricultural areas are vulnerable to **seawater intrusion** and **waterlogging** from heavy rains, which can destroy crops and reduce agricultural productivity.
  - Prolonged rainfall may lead to **water accumulation** in fields, affecting **soil health and damaging crops.**

**Four-Stage Cyclone Warning System**

- **Pre-Cyclone Watch (Green):** Issued **72 hours in advance**. Alerts about **potential cyclonic disturbances** and expected adverse weather in coastal areas.
- **Cyclone Alert (Yellow):** Issued at **least 48 hours** before adverse weather begins. Provides information on the **storm's location, intensity**, and advises on safety measures.
- **Cyclone Warning (Orange):** Issued at **least 24 hours** before the onset of adverse weather. Offers detailed updates on **cyclone position, expected landfall,** and associated impacts like **heavy rainfall and strong winds**.
- **Post Landfall Outlook (Red):** Issued at **least 12 hours before landfall**. Detailed adverse weather conditions likely to **affect inland areas after landfall.**

### *What Measures are Needed for Effective Cyclone Disaster Preparedness and Mitigation?*

- **Before Cyclone:**
  - **Land Use Planning:** Implement **land use and building codes** to restrict habitation in **vulnerable zones**, reserving them for **parks or flood diversion.**
  - **Cyclone Early Warning System:** Utilise the new **Impact-Based Cyclone Warning System** to communicate risks and preparedness actions, focusing on local populations and land use patterns.
  - **Engineered Structures:** Build structures designed to withstand **cyclone winds**, including public infrastructures like hospitals and communication towers.
  - **Mangrove Plantation:** Promote **mangrove planting** initiatives to shield coastal areas from storm surges and erosion, engaging community participation in these projects.

Note:

- **During Cyclone:**
  - **Cyclone Shelters:** Establish cyclone shelters in **high-risk areas** and ensure that shelters are connected to **major roads** for **quick evacuation and access** during emergencies.
  - **Flood Management:** Implement **sea walls, embankments, and drainage systems** to control water flow and reduce flooding from storm surges and heavy rainfall.
- **After Cyclone:**
  - **Hazard Mapping:** Create maps that indicate the **frequency and intensity of cyclones** based on historical data, including storm surges and flooding risks.
  - **Retrofitting Non-Engineered Structures:** Educate communities on retrofitting techniques, such as **building steep-slope roofs** and **anchoring poles**, to enhance the resilience of non-engineered homes.

## Volcanic Eruption and Ionospheric Disturbances

### *Why in News?*

Recently, a new study revealed a **connection** between the **Hunga Tonga-Hunga Ha'apai volcano eruption** and the formation of **Equatorial Plasma Bubbles (EPBs)** over the Indian subcontinent.

- Tonga volcano is a **submarine volcano** in the South Pacific Ocean.

### *What are the Key Highlights of the Study?*

- **Volcanic Eruption and Space Weather:** The Tonga eruption triggered **ionospheric disturbances**, contributing to space weather events that affect **satellite signals**.
- **Atmospheric Gravity Waves:** The eruption produced strong **atmospheric gravity waves** that propagated into the upper atmosphere triggering favourable ionospheric conditions for the formation of EPBs.
  - Atmospheric gravity waves form when **buoyancy pushes air upward, and gravity pulls it back down**.
- **Plasma Instabilities: Plasma blobs**, an increase in the ionospheric eastward **electric field at dusk** were detected, indicating further ionospheric disturbances due to the eruption.

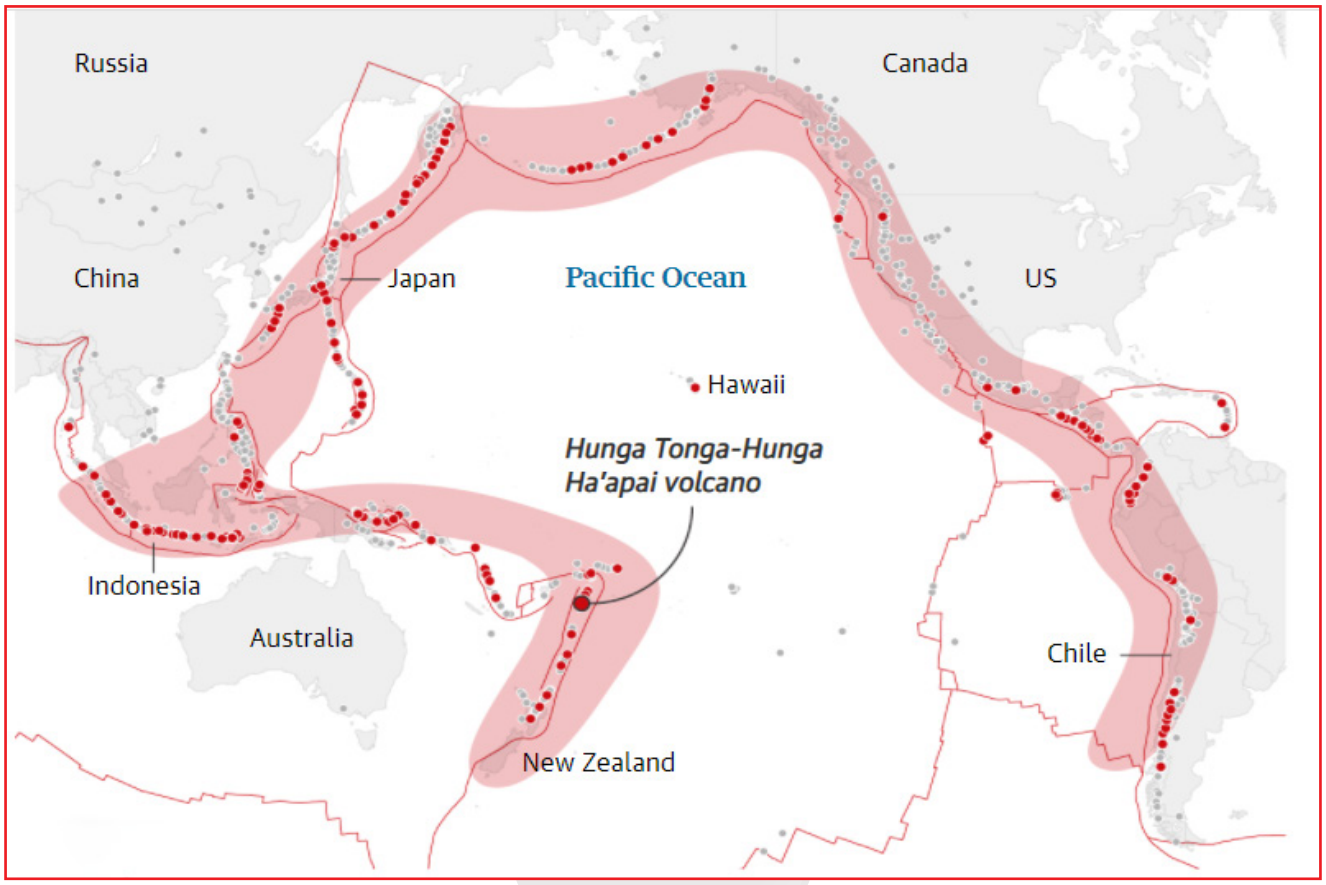
### *What are Key Points about Equatorial Plasma Bubbles (EPBs)?*

- **About EPBs:** EPBs are ionospheric phenomena that are generated through **plasma instabilities**, particularly in the equatorial **ionosphere**.
  - EPBs are regions of **depleted plasma** in the ionosphere that form near the **magnetic equator** during post-sunset hours.
  - EPBs originate in the equatorial ionosphere but can **extend**, affecting the global ionosphere **15° North and South of the Earth's equator**.
- **Impact on Radio Wave Propagation:** As radio waves propagate through the ionosphere, irregularities associated with EPBs can **scatter them, leading to signal degradation.**
  - It is a major concern for communication systems that rely on **high-frequency radio waves**, such as satellite communications and GPS.
- **Seasonal and Regional Variability:** EPBs are most frequent during the **Winter solstice (21st or 22nd December)** and **least frequent during the Summer solstice (21st June)**.

### *What are Key Facts About the Hunga Tonga-Hunga Ha'apai Volcano?*

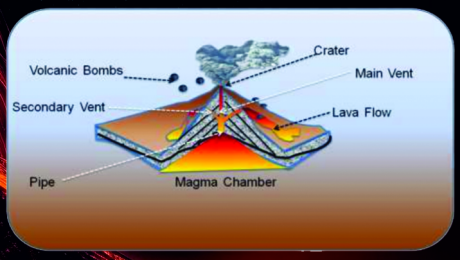
- **Location:** It is located in the **western South Pacific Ocean**, west of the main inhabited islands in the Kingdom of **Tonga**.
- **Geology:** It is one of 12 confirmed submarine volcanoes along the **Tofua Arc**, a segment of the larger **Tonga-Kermadec volcanic arc**.
  - The **Tonga-Kermadec arc** formed as a result of subduction of the **Pacific Plate beneath the Indo-Australian Plate.**
  - It is a part of the **Ring of Fire**.
- **Submarine Volcano:** It is an **undersea Volcano** consisting of two small uninhabited islands, **Hunga-Ha'apai and Hunga-Tonga**.

Note:




# VOLCANOES

*A volcano is a vent or a fissure in the crust from which lava (molten rock), ash, gases, rock fragments erupt from a magma chamber below the surface*




- **Types: On basis of -**
  - **Periodicity of Eruption:**
    - **Active volcano:** Recently Erupted
    - **Dormant Volcano:** Potential for eruption, no imminent signs
    - **Extinct:** No recent eruptions, low possibility in future
  - **Nature of Eruption:**
    - **Hawaiian:** Calmest types (low gaseous content)
    - **Strombolian:** Formation of large gas bubbles in magma
    - **Vulcanian:** More explosive
    - **Plinian eruptions:** Magma's volatile gases rise via a narrow conduit
    - **Icelandic:** Often build lava plateaus
  - **Shape of Volcanoes:**
    - Shield volcanoes: Composed of basaltic lava, low slope
    - Cone volcanoes (Cinder Cones): Most abundant
    - Composite cones (stratovolcanoes): Formed by layers of diverse materials.
- **Volcanic Features:**
  - **Extrusive :**
    - **Crater:** Cone-shaped vent for magma
    - **Caldera:** Large, crater-like depression
    - **Volcanic Plateaus:** Leveled areas from fissure eruptions
  - **Intrusive:**
    - **Batholiths:** Central core of a volcanic mountain.
    - **Dyke:** Vertical intrusion cutting across country rock bedding.
    - **Sills:** Tabular intrusions along sedimentary bedding.
    - **Laccoliths:** Magma injection along horizontal sedimentary bedding.
  - **Minor:**
    - **Geysers:** Underground water above 100°C, powered by magma, results in powerful eruptions with steam and diluted minerals.
    - **Hot Springs:** Heated water flows quietly along fault zones.
- **Distribution of Volcanoes:**
  - Subduction zones (Circum Pacific Belt)
  - Divergence zones (Mid Atlantic Ridge)
  - Intra-plate oceanic volcanism (Hawaiian chain)
  - Mid-continental belt and volcanoes in Mediterranean region
- **Volcanoes in India:**
  - No volcanoes in Himalayans
  - Barren Island (Only active volcano)
- **Products of Volcanic Eruption:**
  - **Gases:** H, C, O, S, N, CH4, NH3
  - **Solid:** Pyroclastic materials
  - **Liquid:** Lava

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Note:

**Ionosphere**

- It is **not a distinct layer** like the Troposphere or Stratosphere. Instead, the ionosphere **overlaps** the **mesosphere, thermosphere, and exosphere**.
- It's a very **active part** of the atmosphere, and it **grows and shrinks** depending on the energy it absorbs from the sun.
  - It is an **electrically conducting region** capable of **reflecting radio signals** back to Earth.
- The **electrically charged atoms and molecules** that are formed in this way are called **ions**, giving the ionosphere its name.

**Read More:** Tonga Volcano Impacting Weather

Note:

# Aurorae in Ladakh

### *Why in News?*

Recently, **auroras** were sighted in **lower-latitude regions** (below 66.5 degrees north and south latitudes) like **India (Hanle and Merak in Ladakh), Mexico and Germany**.

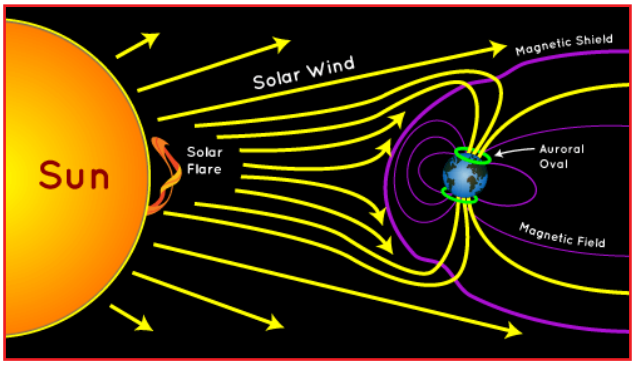
- Their occurrence in lower-latitude regions is an indication of **heightened solar activity.**

### *What are the Key Highlights About Aurora Sightings?*

- **Aurora and Peak Solar Cycle:** Auroras occur when **coronal mass ejections (CMEs)** interact with **Earth's Magnetosphere**.
  - **Coronal mass ejections (CMEs)** are part of the **solar activity cycle,** which lasts around **11 years.**
  - The current solar cycle called **Solar Cycle 25** is at its peak in **2024.**
- **Lower Latitude Aurora:** A **severe solar storm**, initially classified as a **level 4** on a scale from 1 to 5, is the reason for aurora sightings in lower-latitude regions.
  - It typically appears in northern regions like **Canada, Norway, Sweden, Finland, Alaska, Russia, Iceland, and Greenland.**
    - **Severe** solar storms can trigger auroras and accelerate **satellite decay,** while **extreme** storms may destroy satellites, **disrupt power grids,** and cause **widespread communication blackouts.**

### *What are Key Facts About Auroras?*

- **About Aurora:** An aurora is a mesmerising **natural light display** visible in the **night sky,** often characterised by shifting colours such as **blue, red, yellow, green, and orange**.
  - The more common **green-yellow auroras** result from ions striking oxygen atoms at **lower altitudes.**
  - **Reddish and bluish lights**, seen in the lower edges of auroras, are caused by ions interacting with **nitrogen atoms**.
  - Collisions with **hydrogen and helium atoms** can produce **blue and purple auroras,** but these colours are **rarely visible** to the naked eye.
- **Geographical Occurrence:** Auroras are most commonly seen near the **Arctic** and **Antarctic Circles**, approximately **66.5 degrees north and south of the Equator**.
  - The **northern** aurora is called the **aurora borealis (northern lights)**, while the **southern** counterpart is known as **aurora australis (southern lights).**
- **Cause of Auroras:** Auroras are caused when **charged particles** from solar storms interact with the **Earth's magnetosphere**, which acts as a **shield** against harmful **solar and cosmic rays.**
  - Solar storms occur when the **Sun's magnetic field intensifies and weakens**, allowing charged particles to **penetrate** the Earth's magnetic field.
- **Role of Solar Wind and Earth's Magnetosphere:** Auroras form when **charged ions** from the solar wind collide with **oxygen and nitrogen atoms** in the Earth's ionosphere, usually at altitudes between **97 and 1,000 kilometers.**
  - The Earth's magnetosphere deflects most of the solar wind, but some ions get trapped near the geomagnetic poles, creating these stunning light displays.




- **Scientific Study of Auroras: NASA's IMAGE satellite**, which operated until 2005, was designed specifically to **study auroras.**
  - Using **ultraviolet and radio waves**, IMAGE gathered important data on how auroras form and behave.
- **Aurora on Other Planets:** Planets with an **atmosphere and magnetic field** likely experience auroras.
  - E.g., Stunning auroras have been observed on **Jupiter and Saturn**.

Note:

**What are Key Facts About Hanle Observatory?**

- **Location**: It is located on **Mt. Saraswati** in the **Nilamkhul Plain, Hanle Valley**, Ladakh. at a height of approximately 4,500 metres above sea level.
  - It is also known as the **Indian Astronomical Observatory** managed by **Indian Institute of Astrophysics.**
- **Recognition:** It is recognised for its exceptionally **dark and cloudless skies** ideal for stargazing and **astronomical observations.**
- **Observational Capabilities**: It is home to a 2-metre optical infrared telescope for space observation.
- **Dark Sky Reserve**: Hanle is designated as a **Dark Sky Reserve** by the **International Dark-Sky Association (IDA)** to protect the quality of night skies by minimising light pollution.

■■■

Note:

# Security

## Highlights

- *Cyberfraud Costs 0.7% of GDP*

## Cyberfraud Costs 0.7% of GDP

### *Why in News?*

Recently, the **Indian Cyber Crime Coordination Centre (I4C)**, which runs under the Union Ministry of Home Affairs (MHA) made important **projections related to cyber frauds**.

**What is the Indian Cyber Crime Coordination Centre (I4C)?**

- **About:**
  - I4C was launched by the **Ministry of Home Affairs in 2020** to deal with all types of **cyber crimes** including **cyber fraud** in a comprehensive and coordinated manner.
- **Objectives of I4C:**
  - To act as a **nodal point** to curb **Cybercrime** in the country.
  - To **strengthen the fight** against Cybercrime committed against **women and children.**
  - Facilitate **easy filing Cybercrime related complaints** and identifying Cybercrime trends and patterns.
  - To act as an **early warning system for Law Enforcement Agencies** for proactive Cybercrime prevention and detection.
  - **Awareness creation** among public about preventing Cybercrime.
  - Assist States/UTs in **capacity building of Police Officers**, Public Prosecutors and Judicial Officers in the area of cyber forensic, investigation, cyber hygiene, cyber-criminology, etc
- **National Cyber Crime Reporting Portal:**
  - Under I4C, the **National Cyber Crime Reporting Portal** is a **citizen-centric initiative** which will enable citizens to **report cyber fraud online** and all the complaints will be accessed by the concerned law enforcement agencies for taking action as per law.

### *What are the Key Highlights of the I4C Projection?*

- **Financial Impact:** Indians are expected to lose over **Rs 1.2 lakh crore in 2025** to cyber fraud, siphoning off **0.7% of India's GDP.**
  - From **January to June, 2024 Rs 11,269 crore** was lost to financial fraud.
- **Contributors to Cyber Fraud:** Approximately **4,000 mule bank accounts** are identified daily by I4C.
  - I4C has identified **18 ATM hotspots** across the country from where money was **fraudulently withdrawn.**
  - A **mule account** refers to a bank account that is used to **facilitate illegal activities** such as **money laundering and fraudulent transactions**.
- **Origin of Scam:** The government has identified **"scam compounds"** in South East Asian countries such as **Cambodia, Myanmar and Laos** from cyber fraudsters.
  - Most scams have origins in **China or Chinese-linked entities**.
- **Modus Operandi:** International Scam Compounds resemble **call centres** and have emerged as a hub of **investment scams.**
  - Fraudsters make calls to **unsuspecting people** from **Indian mobile phone numbers** and dupe people of their money through various methods like **lottery and prize scams,** etc.
- **Illegal Activities:** Cyber scams can be used for **terror-financing** and **money laundering.**

Note:

- For instance, during **March to May 2024**, crypto currency worth **Rs 5.5 crore** was purchased using Indian accounts and laundered outside India.
- **Cash withdrawals** using mule account debit cards have been reported at overseas ATMs in **Dubai, Hong Kong, Bangkok, and Russia.**

### *What is Cyberfraud?*

- **About:** Cyber fraud is a kind of **cyber crime** that aims to **steal money** (or other valuable assets) from an entity.
  - It involves using **online solutions (internet based)** to commit fraud.
- **Types of Cyberfraud:**

| Cyber Threat | Description |
|---|---|
| Phishing | **Phishing** involves emails that appear to be from trusted sources, tricking users into clicking links that lead to fake websites and attackers gain sensitive details e.g., credit card numbers. |
| Malware | **Malware** is used to steal personal information that allows cyber criminals to gain control of a victim's computer. |
| Ransomware | **Ransomware** encrypts a victim's files and demands payment for decryption. E.g., **WannaCry attack** in 2016 |
| Cyberbullying | **Cyberbullying** includes any threat to a person's safety, coercion to say or do anything. |
| Cyber Spying | **Cyber Spying** target a public or private entity's network to gain access to classified data, private information, or intellectual property. |
| Business Email Compromise (BEC) | Scammers **hack legitimate email accounts** to impersonate suppliers, employees, or tax office members, considered a white-collar crime. |
| Dating Hoodwinks | Hackers use dating websites, chat rooms, and online dating apps to pose as potential partners and gain access to personal data. |

- **Consequences of Cyber Fraud:**
  - **For Individuals:** Cyber crimes can lead to **unauthorised purchases** on credit cards and loss of access to financial accounts. Personal data may be used to **harass and blackmail victims,** creating further personal distress.
  - **For Businesses:** Companies that fail to protect client data may be subject to **heavy fines and legal penalties**. Cyber attacks can reduce the overall value of a firm, impacting stock prices.
  - **For Government:** Cyber breaches are often intended to **corrupt or monetise national defence and security information**, posing severe risks to a country's safety.

### *What is the Scenario of Cyber Fraud in India?*

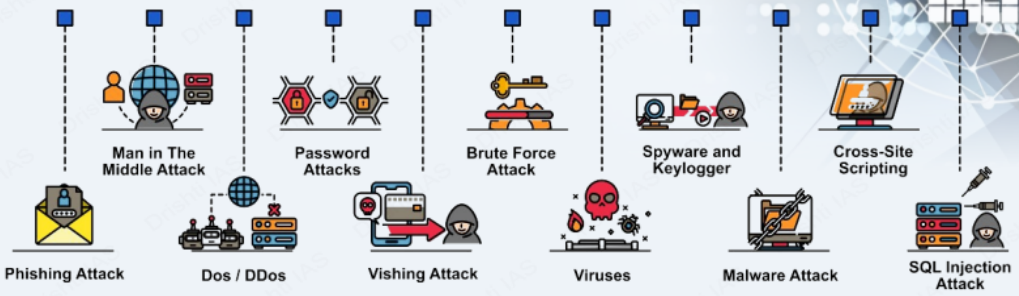
- **Overview:** India has approximately **658 million internet users**, making it the world's **second-largest internet population**.
  - According to the "**The ThreatLabz 2024 Phishing Report**" by cybersecurity firm **Zscaler**, India ranked as the **third-largest** country globally for **phishing attacks** after the **US and UK**.
- **Commitment to Cybersecurity:** India has achieved **Tier 1 status** in the **Global Cybersecurity Index (GCI) 2024** published by the **International Telecommunication Union (ITU).**
  - With a remarkable score of **98.49 out of 100**, India joins the ranks of **'role-modelling' countries**, demonstrating a **strong commitment to cybersecurity** practices across the globe.
- **Notable Cyberfraud Incidents:**
  - **Aadhar Data Breach (2018)**: Personal data of **1.1 billion Aadhar cardholders** was compromised, including information such as **Aadhar numbers, Permanent Account Number (PAN), and bank details.**
  - **Canara Bank ATM Attack (2018):** Hackers used skimming devices on **300 debit cards,** stealing over Rs 20 lakh.
  - **Pegasus Spyware:** This Israeli-made spyware, **Pegasus**, was used to **collect data from devices without user consent**, affecting over 300 verified Indian phone numbers.

Note:

# CYBER SECURITY

***Cybersecurity refers to any technology, measure, or practice for preventing cyberattacks or mitigating their impact.***

## CYBER SECURITY ATTACKS




***'Crime in India' Report 2022 (NCRB) highlighted 24.4% surge in cybercrimes in India since 2021.***

## Common Cybersecurity Myths

- Strong passwords alone are adequate protection
- Major cybersecurity risks are well-known
- All cyberattack vectors are contained
- Cybercriminals don't attack small businesses

## Cyber Warfare

- Digital attacks to disrupt vital computer systems, to inflict damage, death, and destruction.

## CYBER THREAT ACTORS

| CYBER THREAT ACTOR | MOTIVATION |
|---|---|
| NATION-STATES | GEOPOLITICAL |
| CYBERCRIMINALS | PROFIT |
| HACKTIVISTS | IDEOLOGICAL |
| TERRORIST GROUPS | IDEOLOGICAL VIOLENCE |
| THRILL-SEEKERS | SATISFACTION |
| INSIDER THREATS | DISCONTENT |

## Types of Cybersecurity

- Critical infrastructure security (Robust access controls)
- Network security (Deploying firewalls)
- Application security (Code reviews)
- Cloud Security (Tokenization)
- Information security (Data masking)

## Recent Major Cyber Attacks

- WannaCry Ransomware Attack (2017)
- Cambridge Analytica Data Breach (2018)
- Financial data of 9M+ cardholders, including SBI, leaked (2022)

## Regulations & Initiatives

- **International:**
  - UN Group of Governmental Experts (GGE) on Advancing Responsible State Behaviour in Cyberspace
  - NATO's Cooperative Cyber Defense Centre of Excellence (CCDCOE)
  - Budapest Convention on Cybercrime, 2001 **(India not a signatory)**
- **India:**
  - IT Act, 2000 (Sections 43, 66, 66B, 66C, 66D)
  - National Cyber Security Policy, 2013
  - National Cyber Security Strategy 2020
  - Cyber Surakshit Bharat Initiative
  - Indian Cyber Crime Coordination Centre (I4C)
  - Computer Emergency Response Team-India (CERT-In)

## Steps Needed for Cyber Security

- Network Security
- Malware Protection
- Incident Management
- User Education and Awareness
- Secure Configuration
- Managing User Privileges
- Information Risk Management Regime

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Note:

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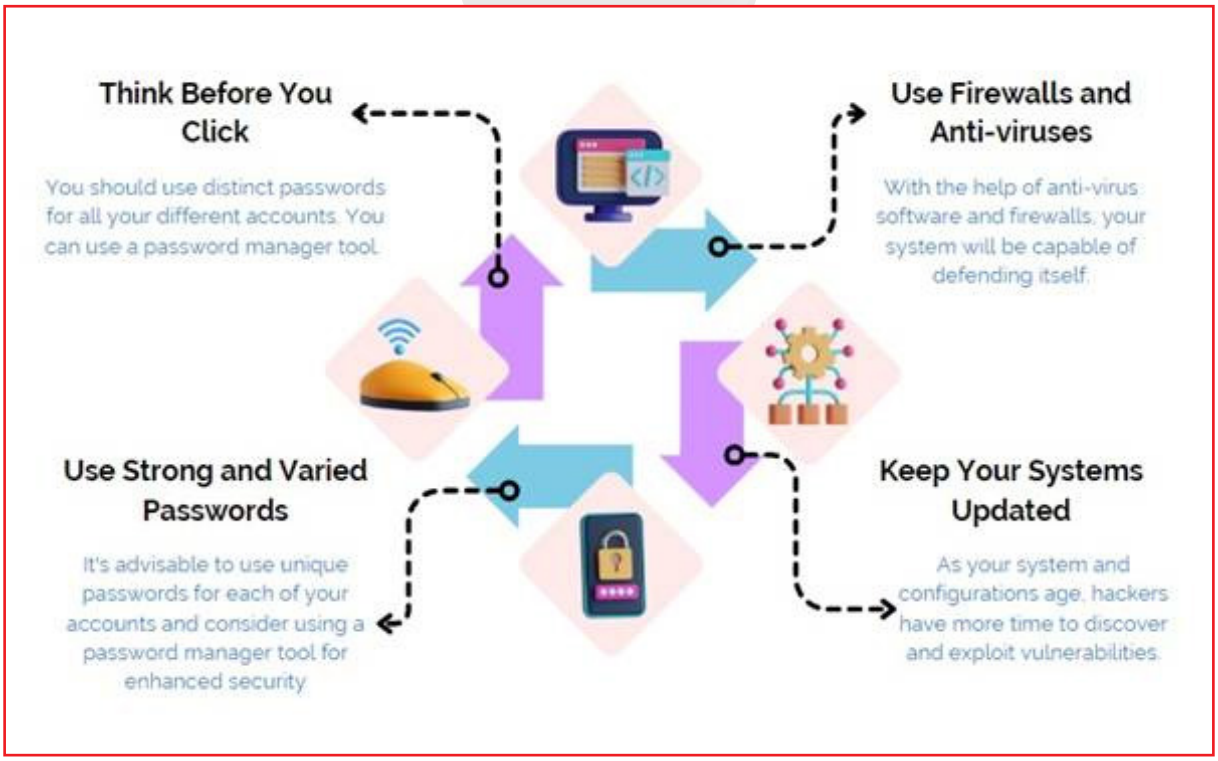
**What are the Key Government Initiatives Related to Cyberfraud in India?**

- National Cyber Security Policy
- Computer Emergency Response Team - India (CERT-In)
- Cyber Surakshit Bharat Initiative
- Cyber Swachhta Kendra
- National Critical Information Infrastructure Protection Centre (NCIIPC)
- Digital Personal Data Protection Act, 2023
- Cyber Crime Coordination Centre
- Citizen Financial Cyber Fraud Reporting and Management System

### *What can be Done to Address Cyber Fraud?*

- **Adopt Cybersecurity Best Practices:** Use **firewalls** that act as the first line of defence for computers, **monitoring and filtering network traffic** to prevent unauthorised access.
  - Keep all software and hardware systems **up-to-date** to patch security vulnerabilities.
- **For Individuals:** Be cautious of **unsolicited emails, texts, and phone calls**, especially those that attempt to coerce users into bypassing security measures.
  - Use strong, **unique passwords** that combine numbers, letters, and special characters for each account.
- **For Businesses:** Implement two-factor authentication for all employee accounts to add an **extra layer of security.**
  - Use **encryption** to protect sensitive business data, including **financial records,** customer information, and **intellectual property.**
- **Role of Banks:** Banks should monitor for **unusually high-value transactions** in **low-balance or salaried accounts** and alert authorities.
  - Typically, the stolen money is **temporarily parked** in these accounts before being converted into **cryptocurrency and transferred abroad.**
- **System Upgrades Needed:** Banks should upgrade their systems to detect multiple account logins from a single IP address, especially if the IP is outside the country.
- **For Content Creators:** Invest in **creator insurance** to safeguard intellectual property, **legal fees**, and potential financial losses from disputes or data breaches.

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Note:

# Miscellaneous

## Highlights

- *Excluded Sports From Commonwealth Games 2026*
- *Poor Performance of India in Science Nobel Prizes*
- *Nobel Prize for Economics 2024*
- *Birth Anniversary of Dr APJ Abdul Kalam*

## Excluded Sports From Commonwealth Games 2026

### *Why in News?*

In the Commonwealth Games (CWG) **2026 Glasgow**, **six of the 12 sports** in which India won medals at the 2022 Commonwealth Games have been excluded**.**

- The games that are excluded are Badminton, cricket, hockey, squash, table tennis, and wrestling.
- India strongly protested the exclusion of key sports from the Glasgow Games, as they are **India's top-performing events.**

### *What are the Recent Developments Related to CWG 2026?*

- **About:**
  - The **23rd edition** of the **Commonwealth Games** will be held in **Scotland** from **23rd July to 2nd August 2026**, marking a return to the city 12 years after the 2014 Games.
- **Excluded Games:**
  - **Hockey:**
    - Hockey has been **part of the CWG since 1998**, with **India ranked** as the **second-best** team in CWG history, securing six medals: one gold, four silver, and one bronze for both men's and women's teams.
    - In the **Birmingham 2022 edition**, the Indian men's team finished second, while the women's team earned a bronze.
  - **Wrestling:**
    - India has **historically excelled in wrestling**, with 114 medals to date, including 49 gold, 39 silver, and 26 bronze.
    - In the Birmingham CWG, the country won 12 medals in wrestling, including six gold.
  - **Badminton:**
    - India achieved **six medals in badminton at the Birmingham Games,** comprising three golds
  - **Table Tennis:**
    - **Introduced in the CWG in 2002**, India has won medals in table tennis at every edition, totaling 20 medals.
  - **Squash and Cricket:**
    - They were included at the **1998 CWG, in Kuala Lumpur (Malaysia).**
- **Reason for Exclusion:**
  - The exclusion of certain sports from the CWG 2026 is **due to budget limitations.**
  - **Victoria (Australia)**, withdrew from hosting due to high costs, and **Glasgow**, now hosting on a tight budget, has reduced the Games to four venues.

### *What are the Key Facts Related to CWG?*

- It is a **quadrennial international multisport event** contested by athletes from the Commonwealth of Nations.
- It is managed by the **Commonwealth Games Federation (CGF).**
  - It is the organisation responsible for the **direction and control** of the **Commonwealth Games and Commonwealth Youth Games.**
  - It is an organisation **headquartered and incorporated in the UK**, but working across **72 member nations and territories.**
- The **first Commonwealth Games** were held in **Hamilton, Ontario, Canada** in August **1930.**

Note:

**Commonwealth**

- The **Commonwealth of Nations is a group of 56 countries** composed mostly of **former British colonies.**
- It was **established by the London Declaration in 1949.**
- While members of the Commonwealth are predominantly located in **Africa, the Americas, Asia, and the Pacific,** with many of them **emerging economies**, the **three European members of the group are Cyprus, Malta, and the U.K.**
- The **developed nations** of the Commonwealth are **Australia, Canada, and New Zealand.**

# Poor Performance of India in Science Nobel Prizes

### *Why in News?*

It has been 94 years since an Indian won a Nobel Prize in the sciences — **Physics, Chemistry or Medicine** — while working in India.

- India's limited success at the Nobel Prizes is often viewed as an **indicator** of the state of its science, though other factors also contribute.
- The last Indian to receive a Nobel Prize in science was CV Raman for scattering of light in Physics in **1930.**

### *What are the Reasons for Poor Performance of India in Science Nobel Prizes?*

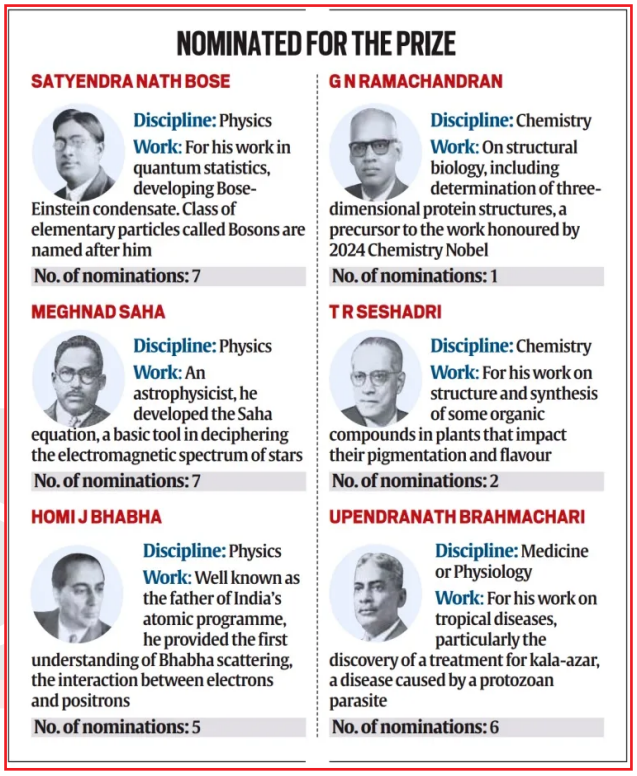
- **Low Public Funding for Research**: The Indian government provides **insufficient funding** for scientific research, which hinders the development of **groundbreaking work**.
  - In India, direct funding for basic research has remained at a low of **0.6-0.8% of** GDP over the last decade, much lower than that of other BRICS nations.
  - India's **total expenditure on R&D** has, in fact, fallen from **0.82% to 0.64%** of the GDP between **2005 and 2023.**
- **Excessive Bureaucracy**: Bureaucratic **red tape** within India's research institutions stifles innovation and slows down scientific progress. Eg.
  - To order **equipment** in IIT Delhi, it takes **11 months.**
  - **Rs 150 crore GST notice served to IIT Delhi** is an example of how tax policies create financial strain on academic institutions.
  - Government e-Marketplace (GeM) places a burden for mandatory procurement platforms for government institutions.
- **Small Researcher Pool**: India has a **disproportionately low** number of researchers relative to its population.
  - The number of researchers in India is **five times lower than the global average**, shrinking the pool of potential **Nobel contenders**.
- **Dependence on Individual Brilliance**: In the absence of a strong research ecosystem, India's chances of winning **future Nobel Prizes** are largely dependent on the **individual brilliance** of its scientists, rather than systematic support or infrastructure.
- **Discretion in Research Institutions:** Instead of focusing on breakthrough research, many heads of research institutions allegedly use these powers for **personal career growth**, such as securing prestigious awards like the Padma Shri or Bharat Ratna, or extending their post-retirement tenures.
- **Lack of Clear Research Direction:** Many scientists pursue **outdated or irrelevant topics**, often based on failed experiments in the USA or EU, which have no practical applications in India.
  - E.g., Ignoring **water technologies and agricultural innovation** for high-energy particle accelerators or complex nuclear fusion projects.
- **Focus on Quantity Over Quality:** Most of the research carried out in government-funded research institutions is geared towards generating **"number sake" publications** rather than producing meaningful innovations.
- **Dependence on Foreign Technologies:** Instead of developing original solutions, Indian scientists are often involved in merely **duplicating or adapting** technologies developed abroad, which does not require deep scientific innovation or merit.
- **Over Reliance on Private Sector Success**: Recent successes in **vaccine development** during the Covid-19

Note:

pandemic were primarily achieved by **private sector labs**, illustrating a disconnect between government-funded research institutions and successful scientific breakthroughs.

- This reliance further **undermines the credibility and necessity** of government labs in significant scientific advancements.

- **Legacy of Mediocrity:** Even when foreign-trained scientists return to India, they often **fail to live up to their potential** due to the **unhealthy institutional environment**.
  - They become trapped in a **cycle of publishing irrelevant research and seeking promotion**s, rather than pursuing excellence or tackling significant scientific challenges.
- **Historical Missed Opportunities**: Several notable Indian scientists produced groundbreaking work but were either **overlooked or not nominated** for a Nobel. For example.
  - **Jagadish Chandra Bose**: Demonstrated wireless communication in 1895 but was not nominated, while the Nobel was awarded to **Guglielmo Marconi and Ferdinand Braun** for the exact work in **1909.**
  - **K S Krishnan**: Co-discovered the Raman scattering effect with C.V. Raman, but was never nominated for the Nobel.
  - **ECG Sudarshan**: The Nobel Prizes in Physics, in **1979 and in 2005**, were given for work in which the most fundamental contributions had come from Sudarshan but he was overlooked for the prize.
    - ECG Sudarshan worked on **electromagnetic interaction** between elementary particles.
- **Nominations but No Wins**: Several Indian scientists, such as **Meghnad Saha, Homi Bhabha, Satyendra Nath Bose, G N Ramachandran, and T Seshadri**, were nominated multiple times for Nobel Prizes but did not win.
- **Western Dominance in Nobel Prizes**: Nobel Prizes have been dominated by scientists from the **US and Europe**, which have stronger scientific infrastructure and research ecosystems.
  - Of the **653 people** who have won the Nobel Prize for Physics, Chemistry or Medicine, more than **150 belong to the Jewish community**, an astoundingly high proportion. But **Israel** has won **only four Nobel Prizes in science**.



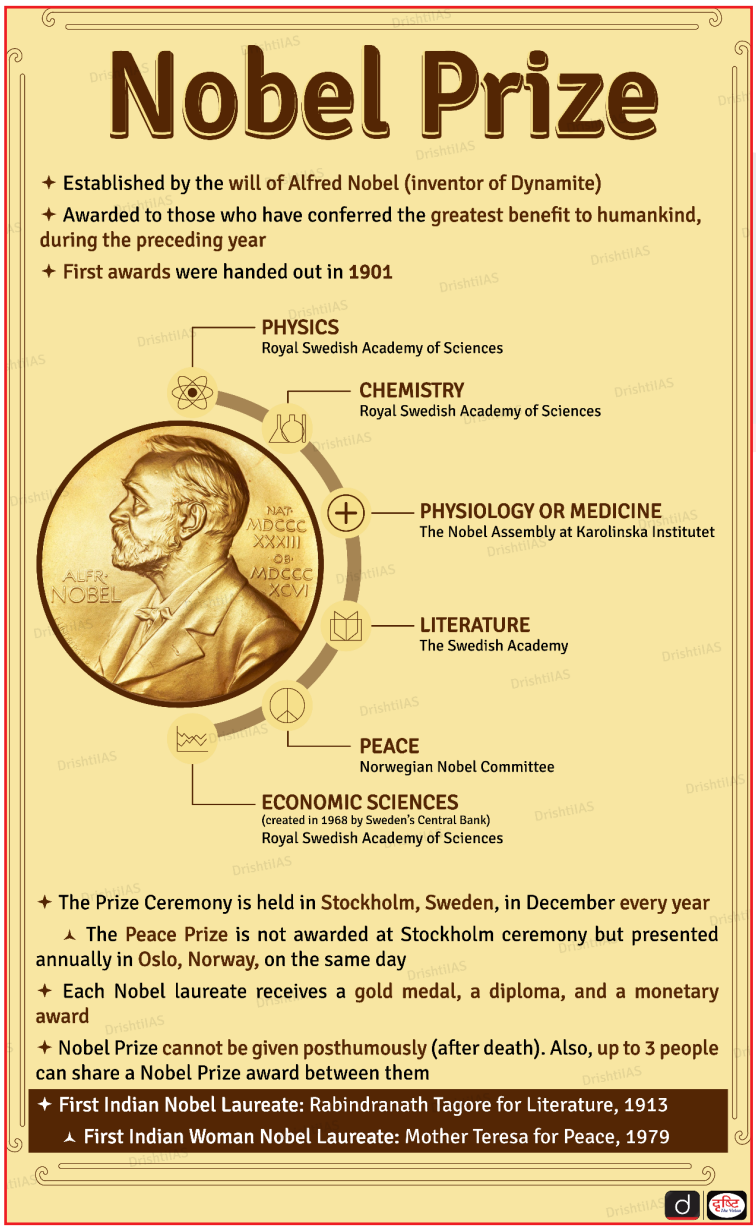

**Indian-Origin Scientists to Win Nobel Prize in Sciences**

- **Hargovind Khorana (in Medicine in 1968):** For interpretation of the **genetic code and its function in protein synthesis.**
- **Subrahmanyan Chandrasekhar (in Physics in 1983):** For his theoretical studies of the physical processes of importance to the **structure and evolution of the stars**.
  - He showed that when the hydrogen fuel of stars of a certain size begins to run out, it collapses into a compact, brilliant star known as a white dwarf.
- **Venkatraman Ramakrishnan (in Chemistry 2009):** For studies of the structure and function of the ribosome.

Note:

## Indian Residents Who Won the Nobel Prize

- **Economics:**
  - **Amartya Sen:** The Nobel Prize for Economics for the year 1998 was awarded to him for his contributions to **welfare economics**.
- **Peace:**
  - **Mother Teresa:** The Nobel Peace Prize was awarded to Mother in 1979 for her work for bringing help to suffering humanity.
  - **Kailash Satyarthi:** He was awarded with the **Nobel Peace Prize in 2014** for struggle against the suppression of children and young people and for the right of all children to education.
- **Literature:**
  - **Rabindranath Tagore:** He was awarded the **Nobel Prize for Literature in 1913** for his profoundly sensitive, fresh and beautiful verses.




## What are the Major Government Initiatives for Promotion of Research?

- Anusandhan National Research Foundation (ANRF)
- Technology Incubation and Development of Entrepreneurs (TIDE 2.0)
- VAIBHAV Fellowship
- Information on Impacting Research Innovation and Technology (IMPRINT - II)
- Information on SERB Science and Technology Award for Research (SERB-STAR)
- Impactful Policy Research in Social Science (IMPRESS)
- Scheme for Promotion of Academic and Research Collaboration (SPARC)

# Nobel Prize for Economics 2024

### *Why in News?*

The Nobel Prize for Economics **2024** is awarded to **Daron Acemoglu, Simon Johnson, and James A. Robinson** "for their **studies of how institutions are formed and affect prosperity**".

- The modern-day significance of **their work in understanding why some countries are wealthy while others remain poor.**
- The **prize of 11 million krona (USD 1.1 million)** will be shared between the recipients in recognition of their contributions.

Note:

### *What are the Key Focus Areas of the Study?*

- The research by the three economists **explored how different institutional structures,** particularly in countries colonised by Europeans, **influenced the path to prosperity.**
  - In **regions where Europeans faced high mortality rates**, they were **less likely to settle and more likely to establish extractive institutions**, which often persisted into the modern era.
- The study highlighted that **institutional differences**, rather than geography or culture, **play a decisive role in economic outcomes.**
  - The **example of** the **divided city of Nogales**, where the US side has greater economic opportunities and political rights compared to the Mexican side, illustrated how institutions impact prosperity.
    - **Nogales** is Arizona, on the **US-Mexico border**. It is directly adjacent to Heroica Nogales, its **twin city located in Mexico.**
    - The two cities are **separated by International Avenue**, which serves as the **border between the two nations.**

### *What are the Key Facts About Winners?*

- **Simon Johnson:**
  - He is best known for his time at the **International Monetary Fund (IMF)** (2007-2008), and currently a **professor at the Massachusetts Institute of Technology (MIT)**.
  - **Co-authored** the book **Power and Progress: Our Thousand-Year Struggle Over Technology and Prosperity (2023)** with Daron Acemoglu.
  - Emphasised that **poverty** in many countries stems from **entrenched political and economic institutional arrangements,** making solutions complex and long-term.
- **Daron Acemoglu:**
  - **Professor at MIT** and a frequent collaborator with Simon Johnson.
  - Noted that their work broadly supports democracy, stating that **countries transitioning from non-democratic regimes** typically see significant economic growth within 8-9 years, but cautioned that **democracy is not an easy solution.**
  - **Co-authored Why Nations Fail: The Origins of Power, Prosperity, and Poverty (2012)** with James A. Robinson.
- **James A. Robinson:**
  - **Professor at the University of Chicago** and co-author of Why Nations Fail with Daron Acemoglu.
  - Based on their work, he **expressed scepticism about China's ability to maintain economic prosperity** under its repressive political system, citing historical examples like the Soviet Union.
    - Highlighted that many societies, including the United States, have transitioned into inclusive societies, overcoming past systems of oppression and privilege.

### *What is the Nobel Prize in Economic Sciences?*

- **About:**
  - The prize, formally known as the Sveriges Riksbank Prize in Economic Sciences in Memory of Alfred Nobel, was **established in 1968 by the Swedish central bank.**
  - It **complements the annual Nobel Prizes in physics, chemistry, medicine, literature, and peace,** which were set up according to Alfred Nobel's will.
- **Other Economics Notable Laureates:**
  - In **2023, Claudia Goldin** received the award for her **research on gender pay gaps.**
  - In **2022, Ben Bernanke, Douglas Diamond, and Philip Dybvig** won for their **work on banks and financial crises.**
  - Other notable laureates include **Friedrich Hayek for economic theory,** William Nordhaus for climate change analysis, and **Paul Krugman for trade theory.**
  - In **2019, Abhijit Banerjee, Esther Duflo, and Michael Kremer** were recognized for their **work on poverty alleviation.**
- **Gender disparity in Nobel Prizes:**
  - The economics prize is the **second most male-dominated after physics, with only three female recipients.**

Note:

- This reflects the historical underrepresentation of women in scientific and economic fields.

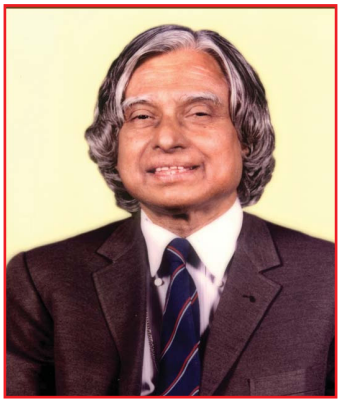
**Other Nobel Prize 2024**

- **Literature:** South Korean author Han Kang
- **Physics:** John J. Hopfield and Geoffrey E. Hinton
- **Physiology or Medicine:** Victor Ambros and Gary Ruvkun
- **Chemistry:** David Baker, Demis Hassabis and John M. Jumper

# Birth Anniversary of Dr APJ Abdul Kalam

### *Why in News?*

Recently, President Droupadi Murmu honoured former President Dr. APJ Abdul Kalam on his birth anniversary.



### *What are the Key Facts of Dr APJ Abdul Kalam?*

- **About:**
  - Born on **15th October 1931** at Rameswaram in Tamil Nadu.
  - He planned programmes to produce a number of successful missiles, which helped earn him the nickname **"Missile Man of India"**.
  - He was sworn in as **India's 11th President in 2002** and completed the full term in 2007.
- **Awards Received:**
  - He was awarded the coveted civilian awards - Padma Bhushan (1981) and Padma Vibhushan (1990) and the highest civilian award Bharat Ratna (1997).
  - Dr. Kalam, a renowned Indian scientist, **holds honorary doctorates from 48 universities and institutions** in India and internationally.
- **Literary Works:**
  - Wings of Fire
  - India 2020 - A Vision for the New Millennium
  - My journey and Ignited Minds-Unleashing the power within India
  - Indomitable Spirit
- **Contributions:**
  - **Pioneer in Fiberglass Technology:** He was a pioneer in fibreglass technology and led a young team to initiate this effort in ISRO.
  - **Satellite Launch Vehicle (SLV-3):** As Project Director, he played a key role in developing India's first indigenous **Satellite Launch Vehicle (SLV-3)**, which successfully launched the Rohini satellite into orbit in July 1980, marking India's entry into the Space Club.
  - **Indigenous Guided Missiles:** He was the Chief Executive of Integrated Guided Missile Development Programme (IGMDP)
    - He led the weaponization of strategic missile systems and the Pokhran-II nuclear tests in collaboration with the Department of Atomic Energy.
  - APJ Abdul Kalam witnessed the country's **first nuclear test, Smiling Buddha, and later directed Project Devil and Project Valiant** -- efforts to develop ballistic missiles from the technology of the successful SLV programme.
  - **Technology Vision 2020:** In 1998, he proposed **Technology Vision 2020**, a national plan aimed at transforming India from a developing to a developed nation within 20 years.
  - **Medical and Healthcare:** APJ Abdul Kalam, in collaboration with cardiologist B. Soma Raju, developed the affordable **'Kalam-Raju Stent'** for coronary heart disease, making healthcare more accessible.

**Read More:** President of India, Presidential Election, Top 10 ISRO Missions

■■■

Note:

# Rapid Fire Current Affairs

## Highlights

- *Taipei Economic and Cultural Centre (TECC)*
- *Anti-Submarine Ship Abhay*
- *Expansion of Indian Sign Language (ISL)*
- *Landfall of a Cyclone*
- *Smart Insulin for Diabetes*
- *Giant Fertilizer Bomb*
- *Indian Bonds Join FTSE Index*
- *ITBP Raising Day 2024*
- *State Contingent Debt Instruments (SCDIs)*
- *Kartarpur Corridor Agreement Renewed*
- *New Disability Certificate Rules*
- *New Genus of Jumping Spiders*
- *Z-Morh Tunnel*
- *SATHI Portal*
- *Conservation Efforts for Great Indian Bustard*
- *eShram-One Stop Solution*
- *National Learning Week Under Karmayogi Mission*
- *Trends in Tax Revenue Collection*
- *Binary Brown Dwarfs*
- *Malabar Exercise 2024*
- *Cloud Chamber Under Mission Mausam*
- *Eliminating Kala-azar*
- *Exercise Naseem Al Bahr*
- *13th Major Port of India at Galathea Bay*
- *Hybrid and Non-Kinetic Warfare*
- *International Workshop on Urban Land Records*
- *4th Nuclear-Powered Ballistic Missile Submarine*
- *Hyperuniformity*
- *Supreme Court Unveils New Justice Statue*
- *Fortified Rice*
- *WHO Approves First Mpox Diagnostic Test*
- *Presidential Visit to Malawi and Mauritania*
- *First Chief Minister of J&K UT Takes Charge*
- *Increase in Global Public Debt by 2030*
- *NOTTO Initiatives*
- *World Telecommunication Standardisation Assembly (WTSA-24)*
- *MQ-9B Drone Deal*
- *Anusandhan National Research Foundation's PMECRG & MAHA-EV Mission*
- *STARS Workshop of Education Ministry*
- *iDEX Scheme*
- *62nd Anniversary of the Battle of Walong*
- *Tracing Roots of Ancient Indians*
- *Ranthambore Tiger Reserve*
- *Siberian Cranes, Flamingos and Great White Pelicans*
- *NPPA Revises Drug Prices 154*
- *World Food Day 2024*
- *Birth Anniversary of Nanaji Deshmukh*
- *Birth Anniversary of Loknayak Jayaprakash Narayan*
- *DigiLocker Partners with UMANG*

## Taipei Economic and Cultural Centre (TECC)

Recently, **China has expressed its opposition** to the Taiwanese government establishing the **Taipei Economic and Cultural Centre (TECC)** in Mumbai. It is **Taiwan's third office in India,** following the openings in **New Delhi (1995) and Chennai (2012).**

- **About TECC:**
  - In 1993, India and Taiwan set up representative offices: the **India-Taipei Association in Taipei and the TECC in New Delhi.**
  - Other countries, like the **US, Australia, and Russia,** also maintain such centers to support visa services and cultural-economic exchanges.

Note:

- **China's Stand on TECC:**
  - **China's official stance** is that there is **only one China, which includes Taiwan** as an inseparable part, with the **People's Republic of China (PRC)** as the sole legitimate government.
  - **India recognised the PRC in 1950,** becoming one of the earliest countries to do so, and **does not officially recognise Taiwan.**
- **India-Taiwan Relations:**
  - After Independence, India did not formally recognize Taiwan or the Republic of China, lacking diplomatic relations with Taiwan. However, in **1995, India and Taiwan established unofficial relations**, opening representative offices.
  - Over the years, India's approach to Taiwan has changed significantly, with relations advancing considerably.
    - India's economic rise and growing international profile in the 2000s facilitated Taiwan's engagement with India.
    - A 2023 press release from Taiwan's Foreign Ministry noted **India-Taiwan trade growth from USD 2 billion in 2006 to USD 8.9 billion in 2021.**
    - As a key **tech hub and top semiconductor producer,** Taiwan shares India's interest in stronger ties, with its **2016 "New Southbound Policy"** aiming to **reduce reliance on single markets, especially China.**

**Read More: China-Taiwan Conflict**

## Anti-Submarine Ship Abhay

Recently, the 7th **Anti-Submarine Warfare** Shallow Water Craft (ASW SWC), **Abhay** was launched.

- Over **80% of the Abhay's content is indigenous** demonstrating India's commitment to **self-reliance** in defence manufacturing.
- The **Ministry of Defence (MoD)** signed a contract with **Garden Reach Shipbuilders & Engineers (GRSE), Kolkata**, to build **eight ASW SWC ships.**
- Its capabilities include **search attack unit (SAU)** and **coordinated ASW operations** with aircraft, interdiction/ destruction of sub-surface targets in coastal waters.
  - It can be deployed in **Low-Intensity Maritime Operations (LIMO)** and **Mine Laying Operations.**
- It has low-frequency **variable depth sonar**, hull-mounted sonar, and expendable bathythermograph.
  - Bathythermographs detect **changes in water temperature with changing depth**.
- These vessels are propelled by **water jets** and are loaded with anti-submarine weapons like **lightweight Torpedoes**.
  - They are part of the **Arnala-class**, intended to replace the in-service **Abhay-class ASW Corvettes**.

**Read More: Anti-Submarine Warfare Launch**

Note:

## Expansion of Indian Sign Language (ISL)

Recently, India added some **2,500 new terms** including words in **English and Hindi** to the **Indian Sign Language (ISL) dictionary** e.g., **Aadhaar card**, **Blockchain**, **Ursa Nebula** etc.

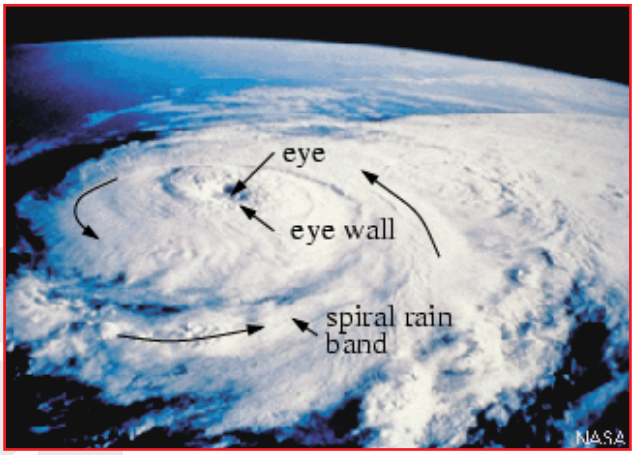
- New terms were added during the celebration of **International Day of Sign Languages 2024** with the theme "**Sign up for Sign Language Rights".**
  - The **UN General Assembly** has proclaimed **23rd September** as the International Day of Sign Languages in **2017** and it was **first celebrated in 2018.**
  - The **World Federation of the Deaf (WFD)** was established on **23rd September 1951.**
- Expansion of the ISL facilitated the **deaf community's engagement** particularly in **scientific, cultural, and internet** related contexts.
- The expansion of the ISL dictionary was spearheaded by the **Indian Sign Language Research and Training Centre (ISLRTC).**
  - ISLRTC is an **autonomous organisation** established under **Societies Registration Act, 1860** and functions under the **Ministry of Social Justice and Empowerment.**
  - It is dedicated to researching, fostering educational access and **promoting Indian sign language** as a linguistic system.

**Read More:** **Empowering Persons with Disabilities**

## Landfall of a Cyclone

Recently, **Cyclone Dana** made landfall in Odisha.

- Landfall is the event of a **tropical cyclone moving from water onto land**, specifically when the storm's center **(eye of the cyclone)** crosses the coast.
  - It differs from a direct hit **where the core of high winds (or eye-wall) comes onshore** but the center of the storm may remain offshore.
- The Eye of the Cyclone is a **central region of clear skies**, warm temperatures, and low atmospheric pressure.
- **Other Components of the Cyclone:**
  - **Eyewall:** It is the most dangerous part of a tropical cyclone, with the strongest winds, heaviest rainfall, and towering convective clouds rising up to 15,000 meters (49,000 feet).
  - **Rainbands:** Curved bands of clouds and thunderstorms trail away from the eye wall in a spiral form, **capable of producing heavy bursts of rain**, strong winds, and even tornadoes.




**Read More:** **Cyclone Dana**

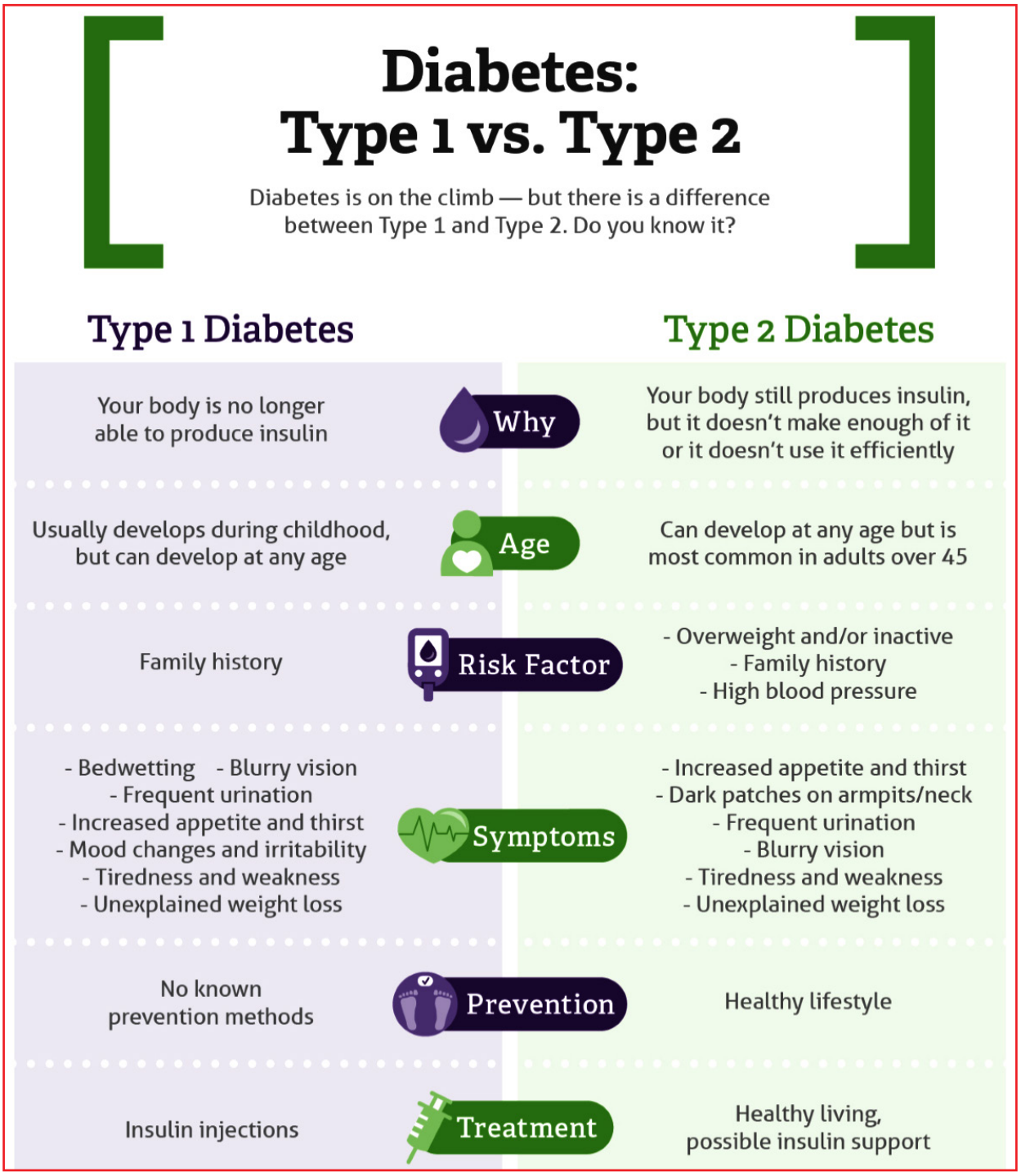
## Smart Insulin for Diabetes

The latest study introduces **an engineered insulin molecule, named NNC2215**, which includes a built-in **"on-and-off switch"** that allows it to automatically respond to fluctuations in blood glucose levels.

- **Two Main Components of NNC2215:**
  - A **Ring-Shaped Structure** allows the insulin molecule to change shape depending on blood sugar levels.
  - A **Glucoside Molecule** resembles glucose in structure and helps control the activation of insulin.
- **About Diabetes:** **Diabetes** is a chronic disease that occurs either when the pancreas does not produce enough insulin or when the body cannot effectively use the insulin it produces.
  - As per the **WHO**, in 2019, **diabetes was the direct cause of 1.5 million deaths across the globe and 48% of all deaths** due to diabetes occurred before the age of 70 years.

Note:

- **Related Initiatives:**
  - National Programme for Prevention and Control of Cancer, Diabetes, Cardiovascular Diseases and Stroke (NPCDCS).
  - World Diabetes Day (14th November)
  - Global Diabetes Compact



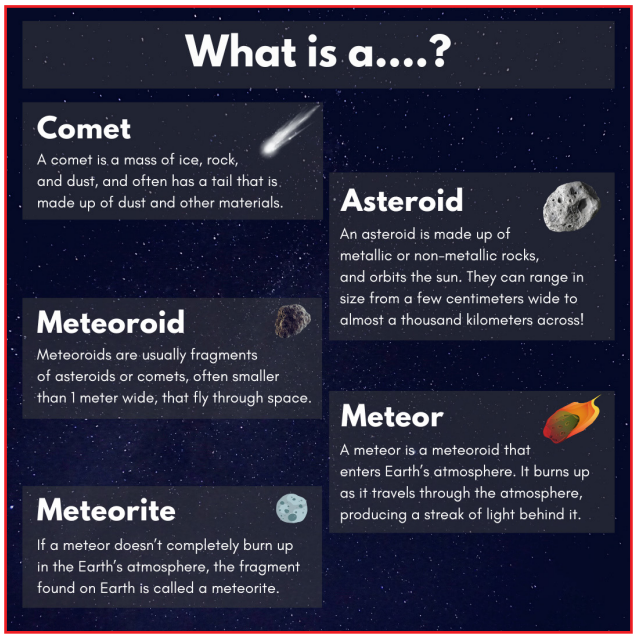

**Read More:** Diabetes Mellitus and Tuberculosis

Note:

## Giant Fertilizer Bomb

A study in "**Proceedings of the National Academy of Sciences"** suggests that a meteorite impact **3.26 billion years** ago acted as a **giant fertilizer bomb** for early life on earth.

- **Nutrient Delivery**: Ancient rocks from the **Barberton Greenstone Belt in northeastern South Africa** provided evidence of recovery and growth in **microbial life** after the meteorite impact.
  - The **carbonaceous chondrite meteorite** delivered essential nutrients like phosphorus and iron, enabling early microbes and archaea to thrive.
- **Effect of the Impact**: The meteorite, measuring **23-36 miles** in diameter and **50-200 times larger than** the asteroid that killed the dinosaurs, caused widespread devastation.
  - Its impact created a **massive vapor cloud and tsunami**, resulting in prolonged darkness and heating that severely affected life at the time.
- **Resilience of Early Life**: Despite initial devastation, life rebounded quickly, with microorganisms adapting and thriving in nutrient-rich environments created by the impact.
  - The findings challenge the notion that meteorite impacts are solely destructive, highlighting their potential role in fostering early life.




**Readmore: Diyodar Meteorite.**

## Indian Bonds Join FTSE Index

Recently, **FTSE (Financial Times Stock Exchange) Russell** announced that it will add **India's sovereign bonds** to its **Emerging Markets Government Bond Index (EMGBI)** in September 2025.

- **About:**
  - FTSE Russell (a leading global index provider), has become the third organization to include Indian bonds in its emerging market bond index, following **JPMorgan** and Bloomberg.
    - The EMGBI **tracks local currency government bond performance from 16 countries**, serving as a broad benchmark for portfolio managers.
- **India's Representation:**
  - Indian government bonds, after being on FTSE's watch list for three years, will now **represent 9.35%** of the EMGBI.
- **Impact on India's Bond Market:**
  - This inclusion **could inject billions into India's bond market,** increasing demand for Indian bonds and enhancing investor sentiment.
  - Indian bonds have **attracted approximately USD 18.5 billion in foreign inflows,** indicating growing global interest.
- **Government Bonds:**
  - It **is a tradable debt instrument** issued by the **Central or State Governments.**
  - It is used by the government to **borrow money from the public to finance its fiscal deficit.**

**Read More: India's Inclusion in JPMorgan GBI-EM Index**

## ITBP Raising Day 2024

Recently, the Prime Minister greeted **the Indo-Tibetan Border Police (ITBP)** Himveers and their families on the occasion of ITBP Raising day. ITBP is a **Central Armed Police Force** functioning under the Ministry of Home Affairs.

- It was **raised on 24th October, 1962** during the **India-China War** and is a border guarding police force specialising in high altitude operations.

Note:

- In 2004, based on the center's **"One Border One Force"** recommendation, the entire 3,488 km **India-China border from Karakoram Pass in Ladakh to Jachep La in Arunachal Pradesh** was assigned to the ITBP.
- The ITBP then took over border guarding duties from the **Assam Rifles** in Sikkim and Arunachal Pradesh.

- **Motto: "Shaurya-Dridhata-Karma Nishtha"**.
- Currently, it is posted in **Jammu & Kashmir, Himachal Pradesh, Uttarakhand, Sikkim, and Arunachal Pradesh.**
- ITBP also **conducts relief and rescue operations as 'First Responders' for natural calamities** in the **Himalayan region**.

**Read More:** India's Border and It's Management

Note:

## State Contingent Debt Instruments (SCDIs)

The Global Sovereign Debt Roundtable (GSDR), which **addresses challenges in debt restructuring processes**, is set to discuss **State Contingent Debt Instruments (SCDIs)**.

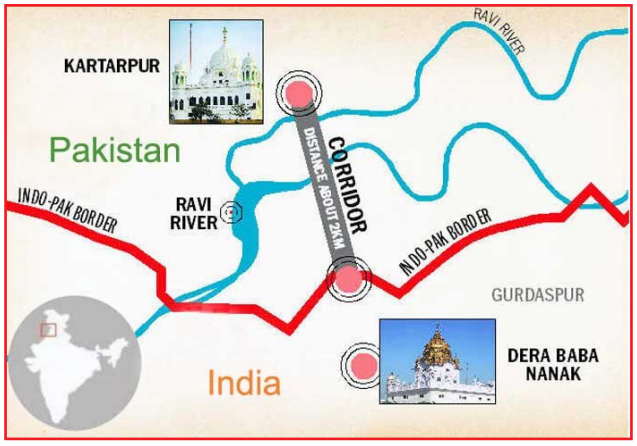
- **SCDIs:**
  - It helps speed up debt restructuring by offering bonds with **payouts contingent** on countries meeting specific economic or fiscal targets.
    - E.g., GDP-linked bonds issued by **Ukraine** that are tied to **economic growth.**
  - They do **not** have a **fixed interest rate**.
    - Payout structure varies depending on **economic growth, natural resource revenue, or tax receipts**.
  - SCDIs act as **"deal accelerators,"** especially in cases where there are fundamental disagreements about a country's **economic outlook**.
- **GSDR:**
  - GSDR, which is **co-chaired by the IMF**, World Bank, and the G20 **Presidency** (currently Brazil), started functioning in 2023.
  - It comprises **official bilateral creditors** (both traditional creditors members of the Paris Club and new creditors), **private creditors** and **borrowing countries**.
    - The **Paris Club (1956)** is an **informal group** of **creditor countries** that work together to support nations facing **financial difficulties**, chiefly those **struggling to pay off debts.**

**Read More:** UN Report on Global Debt Crisis

## Kartarpur Corridor Agreement Renewed

Recently, India and Pakistan have extended the Kartarpur Corridor agreement **until 2029,** ensuring **visa-free movement of Indian pilgrims to the** Kartarpur Sahib Gurudwara in Pakistan for five more years.

- **About Kartarpur Corridor:**
  - It **connects the Darbar Sahib Gurdwara in the Narowal district of Pakistan** with the Dera Baba Nanak shrine in the Gurdaspur district in India's Punjab province.
  - It is located on the east bank of the Ravi River in India, around 1 km from the Indo-Pakistan border.
  - It was built to commemorate **the 550th birth anniversary** celebrations of Guru Nanak Dev on 12th November 2019.
- **Guru Nanak Dev:**
  - He was the **founder of Sikhism** and was the **first of the 10th Sikh gurus.**
  - He was born in **1469** in a place that is now called Nankana Sahib in Pakistan
  - He advocated the **'Nirguna'** form of bhakti. He rejected sacrifices, ritual baths, image worship, austerities and the scriptures of both Hindus and Muslims.




**Read More:** SCO Summit 2024

Note:

## New Disability Certificate Rules

Recently, the **Ministry of Social Justice and Empowerment of India** introduced the **Rights of Persons with Disabilities (Amendment) Rules, 2024.**

- **Changes in Certification Process**:
  - **Authority Requirement**: Only a **designated medical authority** at the **district level** can issue disability certificates.
  - **Colour-Coded UDID Cards**: Color-coded **Unique Disability Identity (UDID) cards**—**white, yellow, and blue**—were introduced to indicate disability levels. **Blue** represents a disability level of **80% or higher**.
  - **Online-Only Applications**: New norms make it **mandatory** to apply for the disability certificate **online.**
  - **Extended Processing Time**: The issuance period for disability certificates has been extended from **one month to three months**.
  - **Reapplication Requirement**: If no action is taken on a disability certificate application within **two years**, the applicant must **reapply**.

**Read More: Empowering Persons with Disabilities**

## New Genus of Jumping Spiders

Recently, a team of **arachnologists (those who study spiders and other arachnids)** has identified a **new genus of jumping spiders named 'Tenkana,'** found throughout southern India.

- They also introduced a new species, **Tenkana jayamangali**, discovered in Karnataka.
  - It is named after the **Jayamangali River in Karnataka**, where it was initially observed.
- **About the Tenkana Spider:**
  - This new group belongs to the **Plexippina subtribe** of jumping spiders and is different from related groups such as **Hyllus and Telamonia.**
    - The genus name Tenkana is **derived from the Kannada word for "south,"** highlighting that **all known species are indigenous to southern India and northern Sri Lanka.**
  - Tenkana spiders favour dry environments and ground habitats.
    - They have been discovered in **Tamil Nadu, Puducherry, Karnataka, Telangana, and Andhra Pradesh.**
  - Two species formerly classified under the genus **Colopsus—Tenkana manu,** located in South India and Sri Lanka, and **Tenkana arkavathi,** originating from Karnataka—have been **reclassified into the newly established genus Tenkana.**

**Read More: Discovery of Peucetia Chhaparajnirvin**

## Z-Morh Tunnel

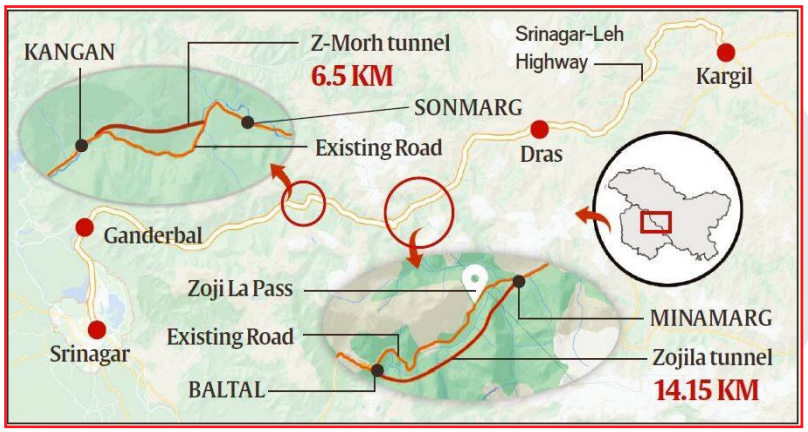
In a militant attack, seven persons were killed in the **Z-Morh tunnel**, a strategic infra project on **the Srinagar-Sonamarg highway**. This is the **first militant attack on a key infrastructure project in J&K.**

- **About Z-Morh Tunnel:**
  - It is a 6.4 km long tunnel envisaged to **provide all-weather connectivity to Sonamarg,** a renowned tourist spot along the Srinagar-Leh highway.
  - Originally planned by the **Border Roads Organisation (BRO) in 2012**. Re-tendered later by the **National**

Note:

**Highways & Infrastructure Development Corporation Limited (NHIDCL)** to a private company.

- **Strategic Importance:**
  - The tunnel is being **constructed in an area prone to snow avalanches,** making the road to Sonamarg impassable during most part of the winter.
  - It is a **key part of** the larger Zojila tunnel project and is essential for all-weather connectivity to Ladakh facilitating quick access for military personnel to the border areas of Ladakh.
  - This connectivity is **crucial for Indian defense forces stationed near the Pakistan border** and for deployments against Chinese forces in Eastern Ladakh




**Read More:** Government Push For Infrastructure Projects

## SATHI Portal

Recently, the Department of Agriculture & Farmers' Welfare (DA&FW) organised a National Workshop on the **SATHI (Seed Authentication, Traceability, and Holistic Inventory) Portal** in New Delhi.

- Developed by the National Informatics Centre (NIC), the Portal is aimed at revolutionising seed certification and inventory management, addressing concerns about seed quality and traceability for farmers.
  - It will **optimise processes to minimise transactional time for** registrations, approvals, and certifications, while also offering environmentally friendly operational alternatives..
- NIC, under the Ministry of Electronics and Information Technology (MeitY) is the technology partner of the Government.
  - It was **established in 1976 with an objective to provide technology-driven solutions** to Central and State Governments in various aspects of development.
- **Other Related Intiatives:** Digital Agriculture Mission, Unified Farmer Service Platform (UFSP), and National e-Governance Plan in Agriculture (NeGP-A)

**Read More:** Initiatives for Agriculture

## Conservation Efforts for Great Indian Bustard

Recently, a **Great Indian Bustard *(Ardeotis nigriceps)*, the state bird of Rajasthan**, successfully hatched an offspring through artificial insemination in Jaisalmer district, marking a significant milestone in conservation efforts.

- Official estimates indicate that **fewer than 150 GIBs are left** in the wild in India, with 90% residing in the desert regions of Rajasthan and the remainder **found in Gujarat, Maharashtra, Andhra Pradesh, and Karnataka**.
- The Jaisalmer breeding center was set up by the Rajasthan Forest Department as part of the **Union environment ministry's** Bustard Recovery Program**, launched in 2016**.
- **Protection Status of GIB:**
  - IUCN**:** Critically Endangered
  - CITES**:** Appendix 1
  - Convention on Migratory Species (CMS)**:** Appendix I
  - Wildlife (Protection) Act, 1972**:** Schedule I

Note:

## PRESENT GIB POPULATION

| State | Birds |
|---|---|
| Rajasthan | 128 |
| **Gujarat** | **10** |
| Maharashtra | 8 |
| Karnataka & AP | 10 |

**THREATS**

- Fatal collision with power-lines
- Nest predation by native predators (fox, mongoose, crow, monitor lizard) and free-ranging dogs
- Hunting in Pakistan
- Agricultural expansion
- Pesticide prevalence (food reduction and contamination),
- Grazing pressure
- Plantation of shrubs and tree species in grasslands,
- Poor land-use policies
- Habitat Loss

**POPULATION DECLINE**

- GIB population fell by 90% in the 50 years since 1969
- Population size was 1,260 individuals in 1969
- Fell to 745 in 1978
- 600 in 2000
- 250 around 2011
- Less than 150 GIB in 2019

**Read More:** Safeguarding Great Indian Bustards

## eShram-One Stop Solution

Recently, the Central Government launched eShram-One Stop Solution platform which has integrated the 12 welfare schemes for unorganised sector workers.

- Launched in 2021, the eShram portal is designed to create a **National Database of Unorganised Workers (NDUW)** in India.
  - It aims to **register unorganised workers** such as construction workers, migrant labourers, street vendors, and domestic workers.
- The Workers registered on the portal get an **e-Shram card** with a unique 12-digit number, providing accident insurance of **Rs 2 lakh** for death or permanent disability and **Rs 1 lakh** for partial disability.
- **Welfare Schemes** for eShram registered workers:
  - Pradhan Mantri Shram Yogi Maan-Dhan Yojana (PM-SYM)
  - National Pension Scheme for Traders and Self-employed Persons (NPS)
  - Pradhan Mantri Jeevan Jyoti Yojana (PMJJBY)
  - Pradhan Mantri Suraksha Bima Yojana (PMSBY)
  - Atal Pension Yojana
  - Public Distribution System (PDS)
  - Pradhan Mantri Awaas Yojana – Gramin (PMAY-G)
  - National Social Assistance Programme (NSAP) - Old Age Protection
  - Ayushman Bharat-Pradhan Mantri Jan Arogya Yojana (AB-PMJAY)
  - Pradhan Mantri Kisan Mandhan Yojana
  - National Safai Karamcharis Finance and Development Corporation (NSKFDC)
  - Self Employment Scheme for Rehabilitation of Manual Scavengers
  - Health Insurance Scheme for Weavers (HIS)

**Read More:** e-Shram Portal Showcased at International Labour Conference

Note:

## National Learning Week Under Karmayogi Mission

Recently, the PM **inaugurated the National Learning Week (NLW)**, marking a new chapter in civil service capacity building under the **Mission Karmayogi initiative**.

- Karmayogi Saptah/NLW is an initiative **aimed at motivating and empowering civil servants** to embrace a culture of continuous learning and capacity building, serving as a platform to realign national service objectives.
  - NLW seeks to establish a unified **"One Government"** message, align all stakeholders with national objectives, and encourage lifelong learning.
- Mission Karmayogi – National Programme for Civil Services Capacity Building (NPSCCB) **aims to build a Future-Ready Civil Service** with the right attitude, skills, and knowledge.
  - The **Karmayogi Bharat Portal serves as an online learning platform** to create a competent civil service rooted in Indian ethos, aligned with India's priorities for efficient public service delivery.
- **Other Related Initiatives:** National Standards for Civil Service Training Institutions (NSCSTI) and Aarambh.

**Read More:** Civil Services Reforms

## Trends in Tax Revenue Collection

Recently, a recent data released by the **Central Board of Direct Taxes (CBDT)** under the **Ministry of Finance** revealed the **trends in tax revenue** collection for the **FY 2023-24.**

- **Direct taxes** surged to **56.72%** of total revenue in **FY24, the highest in 14 years** while **indirect taxes** dropped to **43.28%**.
  - A Direct tax is **imposed directly on the taxpayer** and **paid directly to the government** by the persons (juristic or natural) on whom it is imposed.
  - An indirect tax is one collected by an **intermediary (like a store)** from the person who **ultimately pays it (the customer)**. The taxpayer can **pass this tax** on to others.
- **Personal income tax (PIT)** (**Rs 10.45 lakh crore**) was higher than **corporate tax** (**Rs 9.11 lakh crore**) collections.
- The direct **tax-to-GDP ratio** climbed to a 20-year high of **6.64%**.
- **Tax buoyancy**grew to **2.12** in 2023-24.
  - A tax buoyancy **above 2** means **tax revenues grew more than twice as fast as nominal GDP**, reflecting strong tax collection growth.
- Top 3 Direct Tax Collection (States): **Maharashtra (39%), Karnataka (12%) and Delhi (10.4%)**.

**Read More:** Rising Share of Personal Income Tax and Indirect Tax

## Binary Brown Dwarfs

Recently, researchers discovered that a **brown dwarf Gliese 229B** found in **1995** is actually **two (binary) brown dwarfs** (**Gliese 229Ba and 229Bb**) orbiting closely around each other while circling a **small star**.

- This rare **binary brown dwarf** is located **19 light-years** (1 light year = 9.5 trillion km) away in the **constellation Lepus.**
- It orbits a common **red dwarf star** with a mass about **six-tenths that of our sun.**
  - A **red dwarf** is the **smallest, coolest type of star**, making up **60-70%** of stars in the **Milky Way**. Its **red colour** indicates a **low temperature.**
- **About Brown Dwarf:** Brown dwarfs are **celestial objects** between **planets and stars**, too small for **nuclear fusion** but **larger** than the **biggest planets like Jupiter**.
  - They are capable of **burning deuterium** (a heavy form of **hydrogen**) but **lack** the mass to sustain the **fusion of regular hydrogen like stars**.

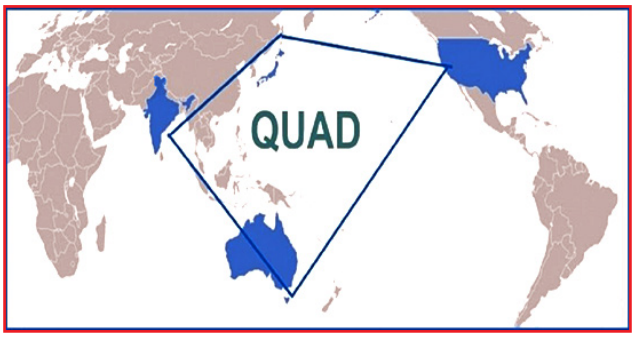
**Read More:** Star Formation in Dwarf Galaxies

Note:

## Malabar Exercise 2024

Recently, the **sea Phase of Malabar 2024** concluded at **Visakhapatnam**.

- **Major events of 2024 Malabar Exercise:**
  - **Participants and Major Exercises:** Warships, helicopters, patrol aircraft, and a submarine engaged in surface, sub-surface, and air warfare exercises.
- **About Malabar Exercise:**
  - **Initiated in 1992** as a bilateral naval exercise between India and the US, this multilateral **war-gaming exercise expanded in 2007** to include **Japan and Australia.**
    - **Quad and Malabar Exercise are closely linked** through their shared objective of enhancing security cooperation in the **Indo-Pacific region**.
  - **Quad:** Known as the **'Quadrilateral Security Dialogue' (QSD)**, the Quad is an informal strategic forum comprising four nations, namely -US, India, Australia and Japan.
    - The group met for the first time in 2007 on the sidelines of **ASEAN**.
    - Quad Leaders launched the Regional **Maritime Initiative for Training in the Indo-Pacific (MAITRI)** to maximise tools provided through **Indo-Pacific Partnership for Maritime Domain Awareness (IPMDA).**
  - **Other Military Exercises:**
    - **La Perouse:** India, Australia, United States, France, Japan, and United Kingdom.
    - **SALVEX:** India and USA
    - **Sea Dragon:** India, USA, Japan, Canada and South Korea
    - **Ex Veer Guardian:** Air Exercise between India and Japan
    - **Exercise Kakadu:** A biennial exercise (hosted by Australian Navy) between Malabar countries.




**Read More:** Malabar Exercise 2021, Major Military Exercises of India

## Cloud Chamber Under Mission Mausam

India plans to establish a **cloud chamber** at the **Indian Institute of Tropical Meteorology (IITM), Pune** as part of **Mission Mausam**.

- It will enable detailed studies of **cloud formation and behaviour**, particularly relevant to **Indian monsoon** conditions.
- The cloud chamber is a **closed cylindrical drum** where **water vapour and aerosols** are injected.
  - Under controlled **humidity and temperature**, the chamber allows scientists to study **seed particles** that contribute to **cloud droplets and ice particles**.
- India's cloud chamber will have **convection properties** to gain a better understanding of **cloud physics** under conditions commonly affecting **Indian weather systems**.
- India has prior experience with **cloud seeding**, notably through the **Cloud Aerosol Interaction and Precipitation Enhancement Experiment (CAIPEEX)**.
  - **CAIPEEX** has shown that rainfall could **increase** by up to **46% (±13%)** at some locations on an average and about **18% (±2.6%)** over a 100 square kilometre area in the **rain shadow region.**
- **Mission Mausam** aims to enhance **weather forecasting** and manage specific weather events in India like enhancing or suppressing **rainfall, hail, fog, and lightning strikes**.

Note:

# Cloud Seeding

Drishti IAS

Cloud seeding is the process of spreading either dry ice or more commonly, silver iodide aerosols, into the upper part of clouds to try to stimulate the precipitation process and form rain.

It uses planes to spray clouds with chemicals to condense smaller particles into larger rain droplets.

## Cloud Seeding Methods:

**Hygroscopic Cloud Seeding:**

- Disperses salts through flares or explosives in the lower portions of clouds. The salt grows in size as water joins with them.

**Static Cloud Seeding:**

- It involves spreading a chemical like silver iodide into clouds. The silver iodide provides crystal around which moisture can condense. Silver iodide essentially makes rain clouds more effective at dispensing their water.

**Dynamic Cloud Seeding:**

- It aims to boost vertical air currents, which encourages more water to pass through the clouds, translating into more rain.

## Applications:

**Agriculture:**

- It creates rain, providing relief to drought-stricken areas. 'Project Varshadhari' in Karnataka is an example.

**Power Generation:**

- Augment production of hydroelectricity during the last **40** years in Tasmania, Australia.

**Water and Air Pollution Control:**

- Settle down toxic air pollutants through the rain.

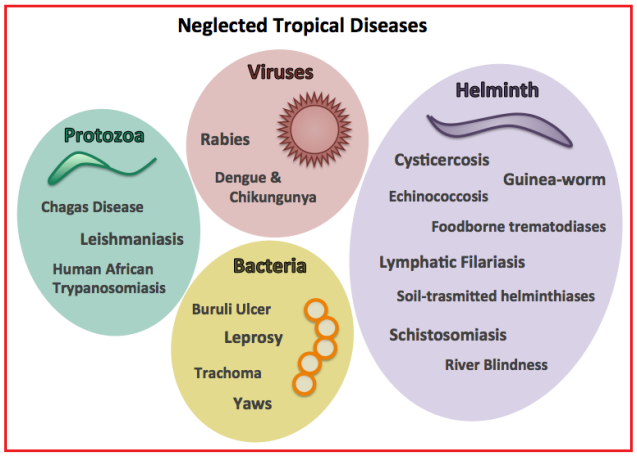
**Read More:** Cloud Seeding

Note:

## Eliminating Kala-azar

India is close to achieving the **elimination of Kala-azar** as a public health problem, meeting the **World Health Organization (WHO) certification criteria**.

- To receive WHO certification for eliminating kala-azar, a country must maintain **less than one case per 10,000 population** at the sub-district level for **three consecutive years**.
  - A country must demonstrate that **local transmission has been interrupted** for a set period and a system is in place to **prevent disease re-emergence**.
- India has achieved this for **two consecutive years** and needs to **maintain** this level for **one more year** to qualify for the certification.
  - With this, India can become the **2nd country** in the world after **Bangladesh** to eliminate Kala-azar.
- Kala-azar is the **second deadliest parasitic disease after malaria** in India.
- Kala-azar **(visceral leishmaniasis or Black fever)** is caused by a **protozoan parasite Leishmania donovani** and transmitted by the bite of an **infected female sandfly**.
  - If untreated, it is **fatal** in over **95%** of cases.
- **India** aimed to eliminate kala-azar by **2020**, while the **WHO** targets global elimination by **2030** as part of its **Neglected Tropical Disease roadmap**.




**Read More: Global Report on Neglected Tropical Diseases**

## Exercise Naseem Al Bahr

**Indo-Oman bilateral** naval exercise **Naseem-Al-Bahr** was held **in Goa** from October 2024. **INS Trikand and Dornier Maritime Patrol Aircraft** participated with the **Royal Navy of Oman Vessel Al Seeb.**

- **About Naseem Al Bahr:** The first exercise was conducted in 1993. It is conducted in **two phases**.
  - **Harbour phase:** Professional interactions, including expert exchanges and planning meetings, along with sports fixtures and social events.
  - **Sea phase:** Gun firings at surface inflatable targets, close-range anti-aircraft firings, and **Replenishment at Sea Approaches (RASAPS)**.
- **Other Exercises between India and Oman:**
  - **Army exercise: Al Najah.**
  - **Air Force exercise: Eastern Bridge.**
- **India and Oman:**
  - India is the **2nd largest market for Oman's crude oil exports** for the year 2022 after China.
  - **India is also the 4th largest market for Oman's non-oil exports** for the year 2022 after UAE, US and Saudi Arabia and 2nd largest source of its import after UAE.
  - India and Oman are currently engaged in **negotiations regarding a trade agreement.**

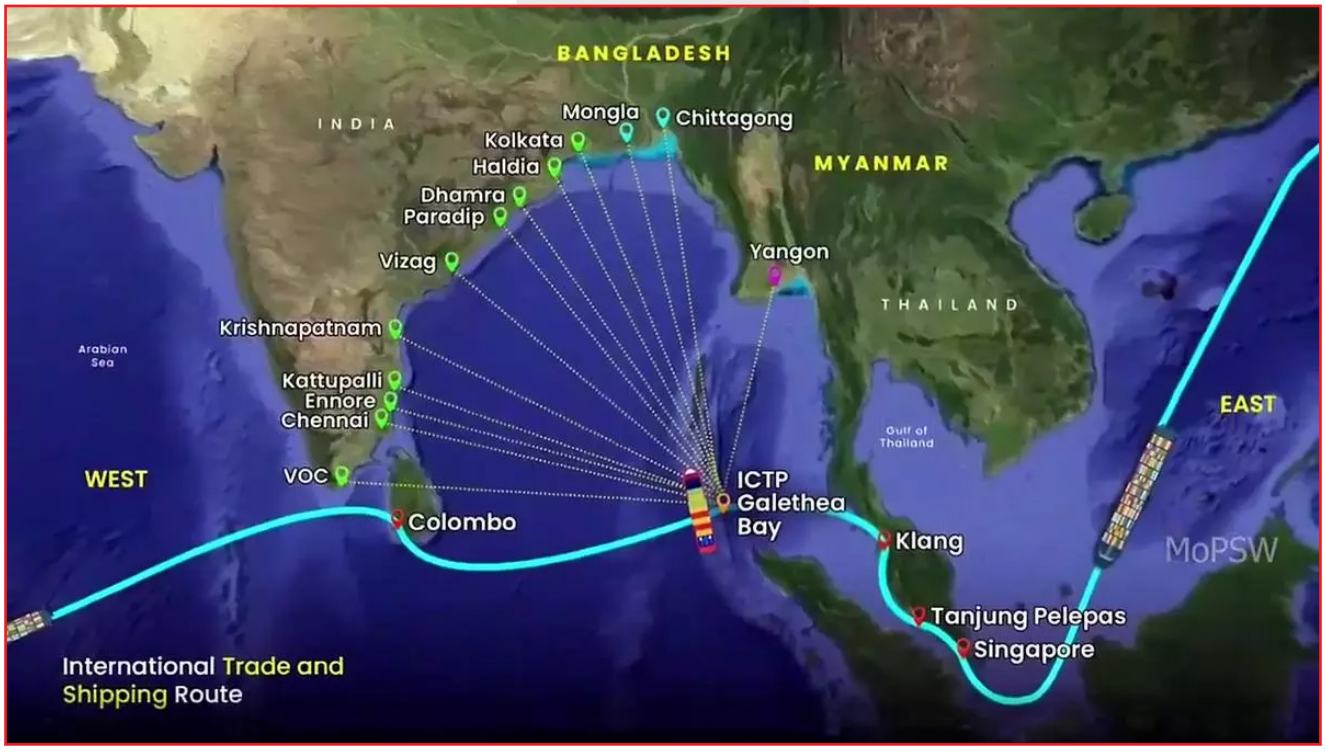
**Read More: India-Oman Bilateral Meet**

Note:

# 13th Major Port of India at Galathea Bay

The mega **International Container Transshipment Port (ICTP) at Galathea Bay**, located on **Great Nicobar Island** in the **Bay of Bengal,** has been officially designated as the **13th major port in India. Kamarajar Port** located on the **Coromandel Coast (Chennai**) was named the country's **12th major port.**

- **About ICTP at Galathea Bay:**
  - **Strategic Location:** The ICTP is along the **East-West international trade and shipping route,** close to key transshipment hubs such as **Singapore, Klang, and Colombo.** This location enhances its **importance within global trade networks.**
    - Located **just 40 nautical miles from the Malacca Strait**, a key shipping **route handling 35% of global sea trade**, the port has strong potential as a major transshipment hub for cargo from India's east coast, Bangladesh, and Myanmar.
  - **Economic Advantage:** Currently, nearly **75% of India's transshipped cargo is handled at foreign ports**,the ICTP aims to **reduce this dependency.**
    - It could help Indian ports save an estimated **USD 200-220 million annually in transshipment charges**.
- **Great Nicobar Island:**
  - It is the southernmost and largest of the Nicobar Islands. **The Andaman and Nicobar Islands** consist of 836 islands, divided into two groups: the northern Andaman Islands and the southern Nicobar Islands, **separated by the 10° Channel.**



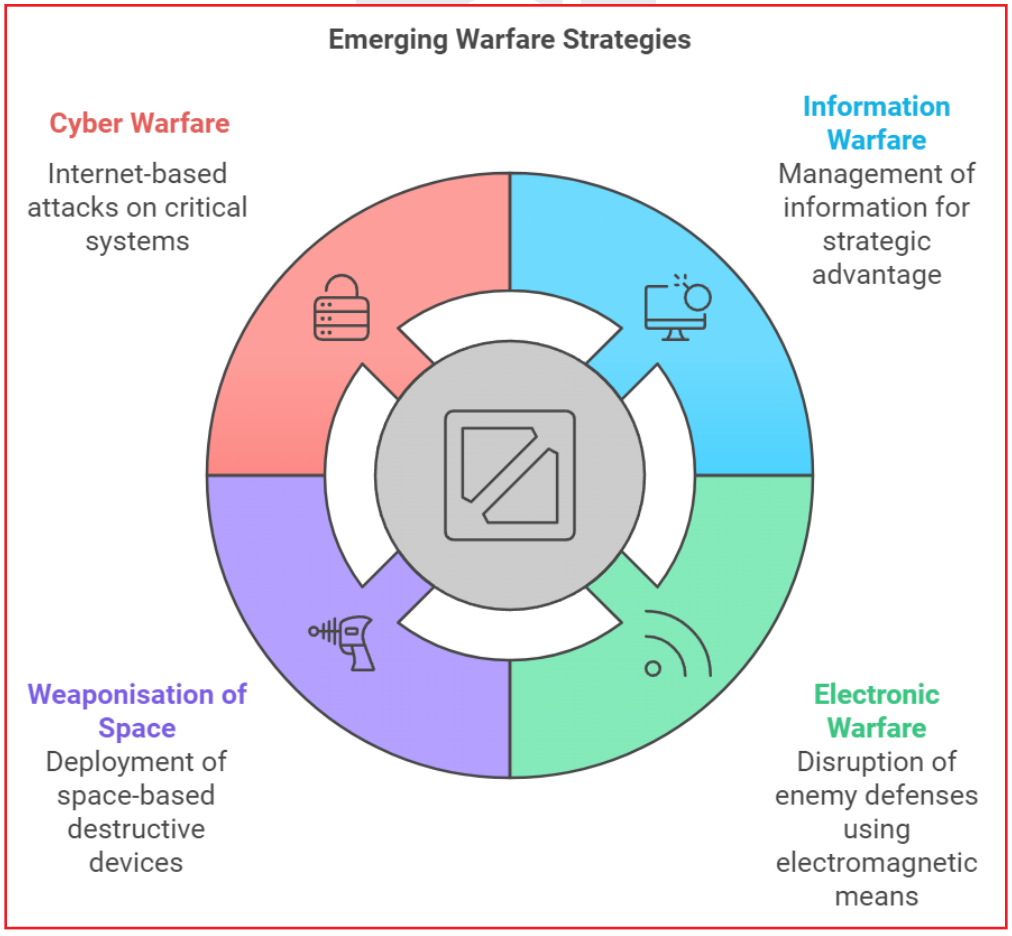

**Read More:** **International Container Transhipment Port in Great Nicobar Island**

Note:

# Hybrid and Non-Kinetic Warfare

Recently, the **Parliamentary Standing Committee on Defence (PSCoD)** has emphasised on the Indian armed forces' preparedness for **hybrid warfare**.

- **Hybrid warfare** refers to a combination of **conventional military tactics** (kinetic warfare) and modern strategies such as **cyber warfare, information manipulation, economic disruption, and psychological operations** (non-kinetic warfare).
  - Non-kinetic methods could be **deadlier** than traditional warfare e.g., **pager blasts in Lebanon.**
  - **Non-kinetic warfare** includes using **jamming, lasers, or electromagnetic waves** to disrupt drone operations instead of physically shooting down drones (Kinetic warfare).
- The tri-services **"future warfare"** course is designed to train officers from **Major Generals to Majors (and their equivalents)** in modern warfare techniques, both kinetic and non-kinetic.
  - It was recently conducted by the **Headquarters Integrated Defence Staff**.
- The Indian Army is observing **2024** as the **Year of Technology Absorption**, focusing on integrating disruptive technologies like **AI, hypersonic weapons, biotechnology, and quantum technology** into existing legacy systems.
- PSCoD is a **Departmentally-Related Standing Committees (DRSCs)** and functions under **Lok Sabha.**
  - The committee has **31 members—21 from Lok Sabha and 10 from Rajya Sabha**. Lok Sabha members are nominated by the **Speaker**, and Rajya Sabha members by the **Chairman**.




**Read More:** **Technological Penetration in Indian Army**

Note:

## International Workshop on Urban Land Records

Recently, the **Ministry of Rural Development** organised the International Workshop on the use of **"Modern Technologies in Survey-Resurvey for Urban Land Records"**.

- It reaffirmed the commitment of **digitising land records** under the **Digital India Land Records Modernization Programme (DILRMP).**
- A pilot program named **National Geospatial Knowledge-based Land Survey of Urban Habitations (NAKSHA)** was introduced to create urban land records in **over 100 cities/towns.**
- **Use of drones and aerial photography** with 3D imagery in land record creation was highlighted.
- **DILRMP** (erstwhile **National Land Record Modernization Programme**) is a **Central Sector Scheme** with effect from **1st April 2016** with **100% funding by the Centre**.
  - It aims to develop a **modern, comprehensive and transparent l**and record management system.
  - **Innovative Initiatives under DILRMP:**
    - **Unique Land Parcel Identification Number (ULPIN) or Bhu-Aadhar** (**14 digit Alpha–numeric unique ID** for each land parcel based on Geo-coordinates)
    - **National Generic Document Registration System (NGDRS) or E-Registration** (to have a **uniform process for registration** for deeds/documents).

**Read More:** Digitisation of Land Records

## 4th Nuclear-Powered Ballistic Missile Submarine

Recently, India launched its **4th nuclear-powered ballistic missile submarine** at the Ship Building Center (SBC) in Visakhapatnam.

- It has about **75% indigenous content** and is equipped with **Kalam-4 nuclear ballistic missiles** with a range of **3,500 km**, launched via **vertical systems**.
- The other three nuclear-powered ballistic missile submarines are **INS Arihant, INS Arighaat and INS Aridhaman.**
  - A nuclear-powered attack submarine of the **Russian Akula class** is set to join the force on lease in 2028.
  - **INS Chakra,** an Akula class vessel, was taken on lease from **Russia in 2012.**
- The government plans the construction of **three more advanced diesel attack submarines** at Mazagon Dockyards in collaboration with the **French Naval Group**.
- A nuclear submarine uses a **nuclear reactor for propulsion**, providing **unlimited range and endurance**. It is limited only by food supplies, crew fatigue, and maintenance.

**Read More:** India's Submarine Strength

## Hyperuniformity

Researchers have explored the mechanism behind the **emerging property of** a recently discovered **exotic disordered state of matter,** known as **"hyperuniformity".**

- **About Hyperuniformity:** It is a property of certain **heterogeneous media** where **long-wavelength density fluctuations decay to zero.**
  - Hyperuniform disordered materials are observed in **quasicrystals, large-scale cosmic structures, biological emulsions, and colloids.**
- **Mechanism Behind Hyperuniformity:**
  - In hyperuniform systems, suppressed **density fluctuations result from a conservation law that limits particle mobility**, explaining the reduced mass fluctuations as system size grows.
- **Comparison to Critical Point of Liquids:**
  - Hyperuniform matter **contrasts with liquid critical points,** where mass fluctuations diverge and cause critical opalescence.
  - In hyperuniform matter, **mass fluctuations are suppressed, positioning it between a crystal, amorphous solid, and liquid.**

Note:

- **Potential Applications of Hyperuniform Materials:**
  - Hyperuniform materials have unique properties with potential technological and biological applications, including **energy-efficient photonic devices for data transmission and controlling cellular functions.**

**Read More:** Transforming India: India's Digital Transformation

## Supreme Court Unveils New Justice Statue

Recently, the **Lady Justice statue was** unveiled at the Supreme Court, on the directions of the Chief Justice of India.

- The statue was **without the blindfold,** and with the Constitution held in place of the sword, signifying that the law in India is both informed and not driven by retribution.
- **About Lady Justice:**
  - Lady Justice is an **allegorical figure** representing the **moral authority within judicial systems.**
    - It is often depicted alongside Prudentia, another allegorical figure representing wisdom and prudence.
  - **Traditional Depiction:**
    - Traditionally, the blindfold symbolised equality before the law, **implying that justice should be delivered impartially**, without being swayed by the wealth, power, or status of the parties involved.
    - **The sword** historically represented the **authority of the law and its power to punish** wrongdoing.
  - **New Depiction:**
    - The new statue, **dressed in a saree** instead of Lady Justice's robe, **reflects a departure from colonial influences** like replacing colonial-era laws like the IPC and CrPC.
    - Despite the changes, **the scales of justice** in Lady Justice's right hand have been retained, representing societal balance and the **importance of carefully weighing facts and arguments from both sides** before reaching a verdict.

**Read More:** New Criminal Laws Come into Force

## Fortified Rice

The Union Cabinet has approved the continuation of fortified rice distribution under government schemes, including PMGKAY, from July 2024 to December 2028, aimed at combating micronutrient deficiencies in India.

- **About Fortification:** Fortification is the process of adding nutrients to food products that are not naturally present or are present in insufficient amounts.
  - Rice fortification can be achieved by either coating grains with a micronutrient premix or by blending extruded rice kernels enriched with micronutrients with regular rice.
  - Fortification **aligns with WHO guidelines** and is crucial as 65% of India's population consumes rice daily.
  - India's rice fortification program **started in 2019** as a pilot program and scaled up in a 3 phased manner.
  - Fortified rice has been distributed in states like **Jharkhand and Maharashtra**, with no reported adverse effects.
- **PM-GKAY:** PMGKAY aimed at providing each person who is covered under the National Food Security Act 2013 with an additional 5 kg grains (wheat or rice) for free, in addition to the 5 kg of subsidised foodgrain already provided through the Public Distribution System (PDS).

Note:

- **Safety Assurance:** Scientific evidence confirms that fortified rice is safe for individuals with **Thalassemia** and **Sickle Cell Anaemia**.
- **Labeling Update:** The requirement for health advisories on fortified rice packaging has been removed after a review found no safety risks, aligning with global practices where organizations like WHO and the FDA do not mandate such advisories.
  - Currently, 18 countries actively allow rice fortification.

**Read more:** **Fortification of Rice**

## WHO Approves First Mpox Diagnostic Test

Recently, the **World Health Organization (WHO)** has listed the first **Mpox** in **vitro diagnostic** under its Emergency Use Listing procedure.

- **About:** Mpox, also known as **monkeypox**, is a **DNA virus**. It was **first identified in monkeys in 1958** but has since been found to infect humans as well.
- **Transmission:** Primarily **transmitted to humans from animals**, particularly rodents and primates, through direct contact or through contaminated objects.
- **Symptoms:** Fever, headache, muscle aches, and a characteristic rash that progresses from macules to papules to vesicles and pustules.
- **Global Outbreak:** In August 2024, WHO declared the mpox outbreak a **public health emergency**, leading to coordinated efforts to control its spread.
- **Emergency Test:**
  - The emergency use approval of the **Alinity m MPXV assay,** developed by Abbott Molecular Inc, will play a **crucial role in enhancing diagnostic capacity** in countries experiencing Mpox outbreaks.
  - Currently, **35 laboratories across India are equipped to test** suspected cases of Mpox.

**Read more:** **WHO Declares Mpox a PHEIC**

## Presidential Visit to Malawi and Mauritania

Recently, India's President visited **Malawi and Mauritania.**

- This is the **first-ever visit** by an Indian **President** to **Malawi and Mauritania.**
- India is the **4th largest trading partner** of Malawi with bilateral trade of **USD 256.41 million** in 2021-22.
  - India's investment in Malawi stands over **USD 500 million**.
  - Malawi (formerly known as **Nyasaland**) is a **landlocked** country in **southeastern Africa.**

- In 2019-20, total bilateral trade between India and **Mauritania** was **USD 94.53 Million**.
  - Indigenous **Berber people** and the **Moors** inhabit Mauritania.
  - Mauritania lies in **western Africa** and is located in the **Atlantic Ocean.**
  - India opened its mission in **Nouakchott (Mauritania capital)** in June 2021.

**Read More:** **New Pathways in India-Africa Collaborations**

Note:

# First Chief Minister of J&K UT Takes Charge

Recently, **Omar Abdullah** of the National Conference was sworn in as the **Chief Minister of the UT (union territory) of Jammu and Kashmir.**

- **Oath of Office:** As per **Article 164(3)**, the CM and other ministers are administered the **oath of office by the Governor (or LG in Union Territories).**
  - The oath **signifies allegiance to the Constitution** and the discharge of duties in accordance with the law.
- Omar Abdullah is the **first CM of the UT to assume office** following the **abrogation of Article 370** and Jammu and Kashmir's transition from a state to a **Union Territory** in 2019.
- **President's Rule Revoked:** Following the election results, **President's Rule** was revoked in J&K.
  - **President's Rule: Article 356** of the Constitution allows the President to impose direct **governance (President's Rule) in a state/Uts** when the state government is unable to function as per constitutional provisions.

**Read More: Chief Minister**

# Increase in Global Public Debt by 2030

According to the latest report of the **International Monetary Fund (IMF)** on **fiscal policy**, global public debt is expected to reach a record USD 100 trillion.

- **Key Highlights of the Report:**
  - Global public debt is expected to reach **93% of global GDP** in **2024**, and to approach **100% by 2030.**

Note:

- The IMF introduced a **"debt-at-risk" method** to better assess uncertainties in debt projections, estimating that global public debt could surge to **115% of GDP by 2026 in a worst-case scenario**.
- Fluctuations in government borrowing costs are increasingly driven by global factors.
  - Implying that **high debt levels in major countries could raise the volatility of sovereign yields** and debt risks in other countries.

- **Recommendation:**
  - Countries should use the current period of lower inflation and interest rate cuts to strengthen their financial reserves.
  - Countries need to **implement fiscal adjustments between 3.0% and 4.5% of GDP** to bring global public debt under control.
- IMF came into formal existence in December 1945. It was set up along with **the World Bank** after **World War II** to assist in the reconstruction of war-ravaged countries.
  - IMF and WB agreed to be set up at a **conference in Bretton Woods in the US**. Hence, they are known as **the Bretton Woods twins.**
- Its primary purpose is to ensure the stability of the international monetary system.
- **Major reports of the IMF: Global Financial Stability Report** and **World Economic Outlook.**

**Read More: Financial Stability Report, June 2024**

## NOTTO Initiatives

Recently, the **National Organ and Tissue Transplant Organisation (NOTTO)** issued key initiatives regarding **cornea and tissue transplants**.

- **Centralised Database:** NOTTO is developing a centralised database for patients awaiting **cornea and other tissue transplants.**
- **Mandatory Linking**: All organ transplant, retrieval centres, **cornea transplant centres,** and **tissue banks** must link their data to **NOTTO's national registry.**
- **Eye Banks Performance:** Eye banks are expected to collect a minimum of **50 eyes or 100 corneas per year.**
  - Under the **Transplantation of Human Organs and Tissues Act, 1994 (THOTA)**, eye banks must collect at least **500 corneas over five years** to maintain their certification.
- **Presumed Consent for Cornea Donation:** NOTTO is considering an **opt-out model** for cornea donation, where hospital deaths are **presumed cornea donors** unless the individual has **explicitly opted out.**
- NOTTO is the **apex organisation** set up under the **Directorate General of Health Services**, Ministry of Health and Family Welfare to **monitor organ and tissue transplant** services.

**Read More: NOTTO Annual Report 2023-24**

## World Telecommunication Standardisation Assembly (WTSA-24)

While addressing the inaugural sessions of the **World Telecommunication Standardisation Assembly (WTSA-24)** and **India Mobile Congress-2024**, the Prime Minister advocated for the development of a **global regulatory framework for digital applications** along with **responsible use of Artificial Intelligence (AI).**

- **World Telecommunication Standardisation Assembly (WTSA-24):**
  - WTSA-24 is organised by **the International Telecommunication Union (ITU).**
    - ITU is a **specialized agency of the UN** responsible for matters **related to information and communication technologies.**
  - The WTSA is a governing conference that **takes place every four years** and is **a key event for the ITU Standardization Sector**.
- **India's Telecom Sector:**
  - It is the **second-largest telecommunications market in the world,** with **over one billion subscribers.** The sector is a key part of India's digital economy with a **6.5% contribution to the country's GDP.**
  - The telecom sector is expected to grow at a **compound annual growth rate (CAGR) of 9.4% from 2020 to 2025.**
  - India's initiative for providing safer and better telecom services:
    - **Telecommunication Act 2023**
    - **Digital Personal Data Protection Act 2023**
    - **National Cyber Security Strategy**
    - **Bharat 6G Alliance**
    - **BharatNet Project**

Note:

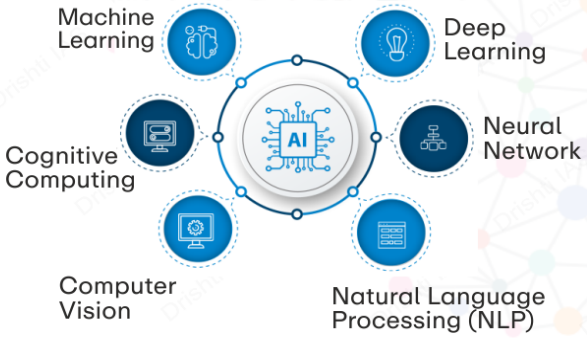
# Artificial Intelligence(AI)

***AI is the simulation of human intelligence in machines programmed to think and learn like humans, capable of problem-solving, reasoning, and adapting to new information.***

## AI Timeline - Major Milestones

- **1950s** – Turing Test Proposed; First AI Programs Developed
- **1956** – Dartmouth Conference Coins "Artificial Intelligence"
- **1960s** – Eliza Chatbot Created; Early Neural Networks Emerge
- **1996** – Deep Blue - a Chess-Playing Program
- **2012** – Deep Learning Breakthrough in Image Recognition
- **2014** – Generative Adversarial Networks (GANs) Introduced
- **2020** – GPT-3 Demonstrates Advanced Language Generation
- **2022** – Chatgpt Launches, Bringing Conversational AI to Masses
- **2023** – Generative AI Boom; Major Tech Companies Release AI Models

## KEY COMPONENTS OF AI

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## Applications of AI

- **Healthcare:** Personalised medicine
- **Finance:** Algorithmic trading
- **Transportation:** Autonomous vehicles
- **Marketing & Customer Service:** Targeted advertising, chatbots
- **Education:** Adaptive learning systems, personalised tutoring
- **Agriculture:** Crop monitoring
- **Cybersecurity:** Threat detection
- **Energy:** Smart grid management, consumption forecasting

## Concerns

- Deepfakes & misinformation
- Privacy issues
- Algorithmic bias
- Data ownership & liability issue
- Automation & job displacement
- Ethical decision-making complexes

## Regulating AI

- **Global Partnership on AI (GPAI)** launched in 2020
- **Bletchley Declaration (2023):** Enhance Global Collaboration on AI
- **G20 New Delhi Leaders' Declaration (2023):** Harnessing AI responsibly for good and for all
- **Hiroshima AI Process (2023)** by G7

## India and AI

- **National Strategy For AI 2018**
- **AI For All:** Self-learning online program
- **GPAI Summit 2023** hosted by India
- **IndiaAI Mission 2024**
- **US India Artificial Intelligence (USIAI) Initiative:** AI cooperation in critical areas
- **AIRAWAT** (AI Research, Analytics and Knowledge Assimilation Platform): Supercomputer

**Read More:** Bharat 6G Project

Note:

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# MQ-9B Drone Deal

Recently, India signed a **defence deal** worth **USD 3.5 billion** with the **US** to acquire **31 MQ-9B Predator armed drones** for its armed forces. **General Atomics**, the manufacturer of the drones, will set up a **maintenance, repair and overhaul (MRO) facility** in India.

- The deal has been conducted under the **foreign military sales (FMS)** system.
  - FMS is the US Government's program for transferring **defence articles, services, and training** to its international partners and international organisations.
- It will first help India boost **"deterrence by detection"** enabling India to **detect early adversarial advances** on land and at sea, particularly from China, helping to prevent conflict.
  - These **high-altitude long-endurance (HALE) drones** are capable of remaining airborne for **over 35 hours** and can carry **four Hellfire missiles** (short-range tactical missile) and around **450 kgs of bombs.**
- **India-US Defence Partnership:**
  - The US was the **3rd largest supplier of arms** to India during **2018-22** after **Russia and France.** Defence procurements from the US stands at almost **USD 20 billion** in **2023.**
  - Key defence agreements include the **Logistics Exchange Memorandum of Agreement (2016), Communications Compatibility and Security Agreement (2018), Industrial Security Agreement (2019), and Basic Exchange and Cooperation Agreement (2020).**

Note:

# INDIA-US PARTNERSHIP

## Economic Relations

- US became India's biggest trading partner in 2022-23 followed by China and UAE
- The bilateral trade has increased by 7.65% in 2022-23 (compared to 2021-22)

## Defence Cooperation

- India-US Defence Acceleration Ecosystem (INDUS-X), 2023: Start-ups and tech companies to collaborate on the co-development and co-production of advanced technologies
- Fighter Jet Deal, 2023: GE's F414 engine technology and manufacturing will be transferred for India's Tejas Mk2 jet, enhancing its indigenous capabilities
- Defence Technology and Trade Initiative (DTTI), 2012: To facilitate collaboration in defence manufacturing, research and development, and technology transfer
- New Framework for India-US Defence Relations, 2005: Updated for 10 years in 2015

*India intends to procure armed MQ-9B SeaGuardian UAVs*

## Science & Technology

- Initiative on Critical and Emerging Technologies (iCET), 2022: Cooperation on CETs in areas including AI, quantum computing, semiconductors and wireless telecommunications
- Critical Minerals Partnership: Recently, India joined the US-led Minerals Security Partnership (MSP) to boost global critical energy and minerals supply chains
- Collaboration in Space: NASA to train ISRO astronauts, aiming for a joint International Space Station (ISS) mission in 2024
  - Artemis Accord: A US-led alliance seeking to facilitate international collaboration in planetary exploration and research; signed by India
  - NASA-ISRO Synthetic Aperture Radar (NISAR): For understanding changes in Earth's ecosystems and other environmental changes

## Civil Nuclear Deal

- Civil Nuclear Cooperation: Bilateral civil nuclear cooperation agreement signed in October 2008

## Energy & Climate Change

- Joint Clean Energy Research and Development Centre (JCERDC), 2010: To promote clean energy innovations by teams of scientists from India and the United States
- Clean Energy Agenda 2030 Partnership: Launched at the Leaders climate summit 2021
- Global Biofuel Alliance (India, Brazil and US), 2023: Aimed at facilitating cooperation and intensifying the use of sustainable biofuels, including in the transportation sector

## Security

- Counter-Terrorism Cooperation Initiative, 2010: To expand collaboration on counter-terrorism, information sharing and capacity building

### *Four Foundational Agreements:*

- General Security of Military Information Agreement (GSOMIA), 2002: Allows militaries to share intelligence gathered by them
  - Industrial Security Annex, 2019 is a part of GSOMIA
- Logistics Exchange Memorandum of Agreement (LEMOA), 2016: Both countries gain access to designated military facilities for refuelling and replenishment.
- Communication Compatibility and Security Agreement (COMCASA), 2018: A legal framework for the transfer of highly sensitive communication security equipment from the US to India
- Basic Exchange and Cooperation Agreement for Geospatial Intelligence (BECA), 2020: Allow both countries to share geospatial and satellite data with each other

*In 2015, both countries issued Delhi Declaration of Friendship and adopted a Joint Strategic Vision for Asia-Pacific and the Indian Ocean Region*

*Popular Visa Among Indians include H-1B, L. Indian citizens set to become largest foreign student community in the US (20% growth in 2022)*

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**Read More:** India Approves Acquisition of MQ-9B Armed Drones from the US

Note:

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## Anusandhan National Research Foundation's PMECRG & MAHA-EV Mission

Recently, the Anusandhan National Research Foundation (ANRF) announced the launch of its first two initiatives: the **Prime Minister Early Career Research Grant (PMECRG)** and the **Mission for Advancement in High-Impact Areas - Electric Vehicle (MAHA-EV) Mission.**

- ANRF has been **established under the Anusandhan National Research Foundation Act, 2023** to seed, grow, and foster a culture of research and innovation throughout the country.
- Its operationalization commenced with the **First Meeting of the Governing Board (GB) in September 2024**, **chaired by the Prime Minister.**
  - The meeting focused on **strategic interventions to enhance India's global positioning in key sectors,** align R&D with national priorities, promote inclusive growth, and drive scientific advancements.
- **PMECRG:**
  - It **features a flexible budget and innovative initiatives** aimed at simplifying research processes, promoting high-quality work, and positioning India as a global leader in science and technology.
  - It emphasised on **nurturing young researchers, fostering a strong culture of research and innovation** across India.
- **MAHA-EV Mission:**
  - It aims to develop key **EV** technologies to **reduce import dependency, foster domestic innovation, and establish India as a global leader** in the EV sector, aligning with the government's **Atma Nirbhar Bharat vision.**
  - It also **supports the government's goal of achieving** a **Viksit Bharat by 2047**.

**Read More: Anusandhan National Research Foundation (ANRF)**

## STARS Workshop of Education Ministry

Recently, **the Ministry of Education** organized a **two-day Strengthening Teaching-Learning and Results for States (STARS) knowledge-sharing workshop** in Bhopal, Madhya Pradesh.

- **About:**
  - The workshop aimed to prepare students for future workforce challenges, focusing on the **"School-to-Work Transition"** and **"Strengthening the Assessment System."**
  - **School-to-Work Transition**
    - Under this, the role of the **National Education Policy, 2020**, **National Curriculum Framework (NCF)**, and **National Credit Framework (NCrF)** in supporting school-to-work transitions was discussed, with a focus on skill education, multidisciplinary learning, and internships.
  - **Strengthening Assessment System**
    - This emphasized the need to enhance current educational assessment models, with a focus on strengthening assessment systems to improve student outcomes and better prepare them for future education.
    - It also emphasizes the **"3 P approach"** to career counselling, which includes **Personal interest, Parental guidance, and Possible Opportunities**.
- **STARS Project:**
  - It was approved by the Cabinet in **October 2020,** as a centrally sponsored scheme.
  - The STARS Project became effective in **February 2021,** for a period of five years, concluding in the fiscal year 2024-25.
  - It is a **component of Samagra Shiksha**, specifically focusing on aspects of the scheme that directly enhance school education.

**Read More: Revamping India's Higher Education System**

## iDEX Scheme

The **Ministry of Defence** is seeking more funds to continue its **iDEX scheme, a central sector scheme** which started in 2021, as 90% of the approved budget for 2021-26 has already been used.

- The iDEX scheme helps **startups**, **MSMEs**, and innovators create new defence and aerospace technologies, resulting in the development of 37 products so far.

Note:

- **iDEX Prime**: **iDEX Prime** raises the grant limit from **Rs. 1.5 crore to Rs. 10 crore** to support more advanced defence systems.
- **ADITI Scheme**: The **ADITI scheme**, launched in 2024,offers **grants of up to Rs 25 crore** for developing 30 key defence technologies **under the iDEX framework.**
  - **ADITI 2.0** introduces **19 new challenges** in areas like **AI, quantum technology, anti-drone systems**, and adaptive camouflage, aiming to strengthen India's defence capabilities further.
- **Defence India Start-up Challenges (DISC):** To boost the iDEX initiative, DISC was launched with **Atal Innovation Mission** to support start-ups and MSMEs in defence innovation, with **12th edition of DISC** offering **41 challenges in key tech areas** like **Unmanned Aerial Vehicle(UAVs)** and AI, providing **grants up to Rs 1.5 crore.**

**Read More**: **Innovations for Defence Excellence**

## 62nd Anniversary of the Battle of Walong

The Indian Army is organising month-long events to mark the **62nd anniversary** of the **Battle of Walong**, which took place during the **1962 war with China**.

- The battle saw Indian troops, despite being outnumbered and low on resources, **successfully halted the Chinese army's** advance for 27 days in the challenging terrain of **Kibithu, Walong, and Namti Tri Junction** (Tiger's Mouth).
- The 11 Infantry Brigade, with Kumaon, Sikh, Gorkha, and Dogra regiments, played a key role in defending the area against Chinese forces.
- The battles occurred at 3,000 to 14,000 feet, but 62 years later, **improved infrastructure and increased Army** strength have changed the situation.
- This year's commemoration will include several adventure and community activities like **White water rafting, motorcycle and bicycle rallies**, battlefield and adventure treks, and a half marathon.
  - The newly renovated **Walong War Memorial** and **Shaurya Sthal** at **Lama Spur** will be inaugurated.
  - **Walong Day** on **14 November** features a wreath-laying ceremony, battle narration, and traditional performances by **Mishmi** and Meyor dancers.

**Read More: India-China Conflict**

## Tracing Roots of Ancient Indians

Recently, the **Indian government** has undertaken a **scientific study** using **ancient and modern genomics** to determine the **population history of South Asia.**

- **Project Name:** "Reconstruction of the population history of South Asia using ancient and modern genomics". It is anticipated to be completed by **December 2025.**
- **Conducting Agency:** The study is conducted by the **Anthropological Survey of India (AnSI)** under the **Ministry of Culture**, in collaboration with the **Birbal Sahni Institute of Palaeosciences, Lucknow.**
- **Study Mechanism:** It will analyse **300 ancient skeletal remains**, including teeth, from various **archaeological sites** in India and Pakistan.
  - It will help uncover clues about **ancient diets, living conditions, disease prevalence, environmental adaptation, and migration patterns**.
- **Archaeological Sites Involved:** Remains were collected from excavations sites such as **Harappa and Mohenjodaro**, Burzahom (J&K), **Nagarjunakonda** (Andhra Pradesh), Maski (Karnataka), Ropar (Punjab) and **Lothal** (Gujarat).
  - They were excavated between **1922 and 1958** by the **Archaeological Survey of India** and later entrusted to the **AnSI**, which now serves as their **custodian.**

**Read More: Genome India Project**

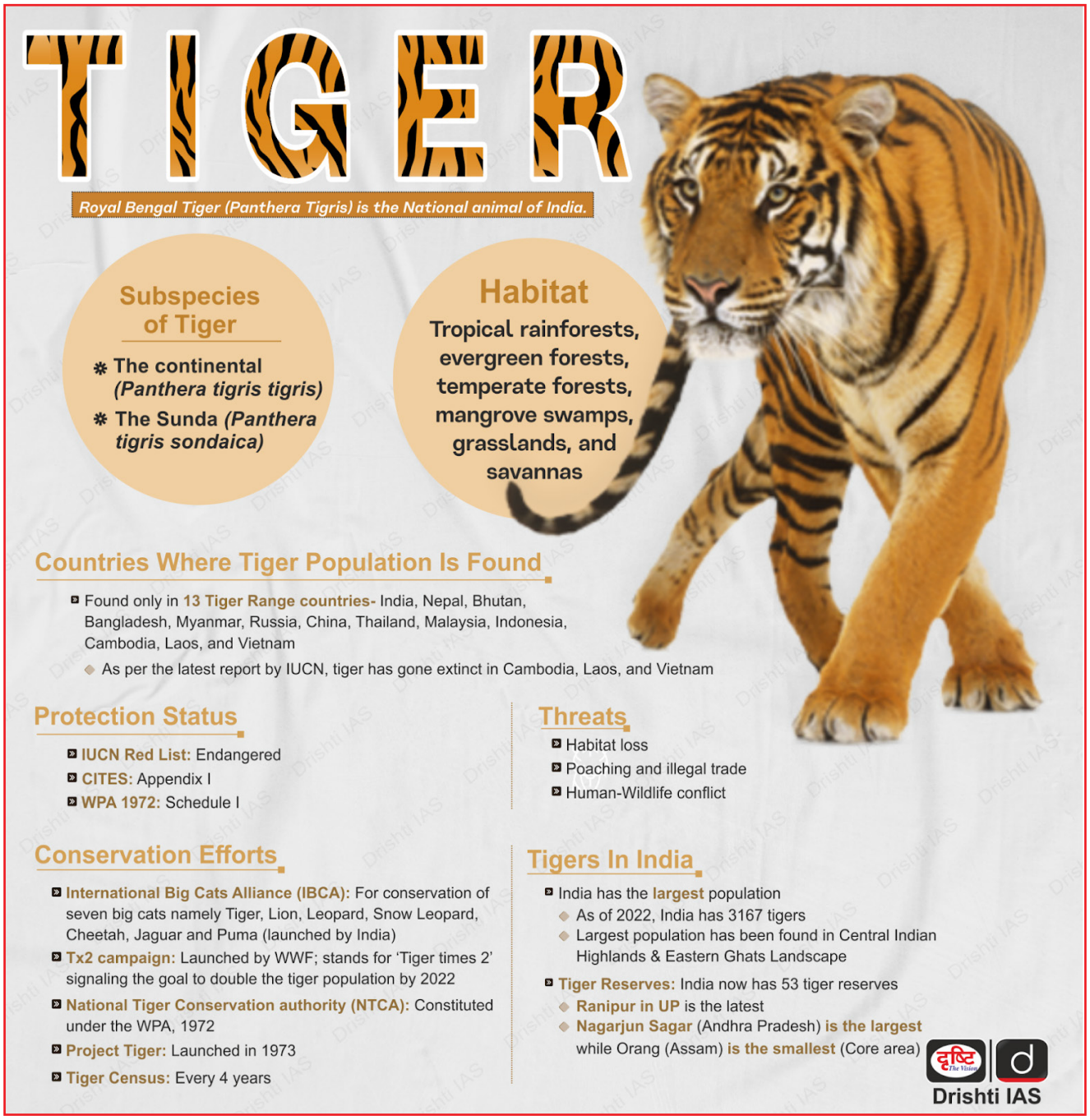
## Ranthambore Tiger Reserve

The Rajasthan forest department has stopped the **illegal construction** of a complex within the buffer zone of **Ranthambore Tiger Reserve**, **in Rajasthan**.

- **Ranthambore Tiger Reserve**, **housing 71 tigers as per the 2023 census**.
- There are 5 Tiger Reserves in Rajasthan namely, **Ranthambhore Tiger Reserve, Sariska Tiger Reserve, Mukundara Hills Tiger Reserve, Ramgarh Vishdhari Tiger Reserve, Dhlopur-Karauli Tiger Reserve**.
  - There are **55 Tiger reserves in India**.
- Ranthambore Tiger Reserve comprises the Ranthambore National Park as well as **Sawai Mansingh and Keladevi Sanctuaries**.

Note:

➢ **Madhya Pradesh has the highest tiger population in India**, with an estimated 785 tigers.




**Readmore:** Ranthambore Tiger Reserve, International Tiger Day 2023

## Siberian Cranes, Flamingos and Great White Pelicans

Along with **Siberian cranes and flamingos, Great white pelicans** are increasingly avoiding Indian wetlands due to **habitat destruction.**

➢ These birds primarily live in **Europe, West Asia, and parts of Africa,** migrating to India for warmth during harsh winters.

Note:

| Species | About | Protection Status |
|---|---|---|
| Siberian cranes | ➢ This species is mostly found in East Asia, with just a few left in the West and Central regions. | IUCN Status: **Critically Endangered**<br>CITES: **Appendix I** |
| Flamingos | ➢ Known for their vibrant pink feathers, flamingos have long legs and necks. | **IUCN Status:**<br>Vulnerable: Andean flamingo<br>Near Threatened: Lesser flamingo, Puna flamingo, and Chilean flamingo<br>**CITES:** Appendix II |
| Great white pelicans | ➢ The adult male is larger than the female.<br>➢ The male pelican has a pink patch of skin around the eyes. | IUCN Status: **Least Concern** |

- **Challenges in Migration:**
  - **Habitat Destruction**: Pollution and encroachment of wetlands hinder their migration.
  - **Climate Change**: Rising temperatures affect their wintering patterns.
  - **Antibiotic Pollution**: The leaking antibiotics into the food webs is also disrupting the natural habitats of these elegant white birds.

**Read more:** Wetlands

## NPPA Revises Drug Prices

Recently, the **National Pharmaceutical Pricing Authority (NPPA)** has **approved a 50% increase in the ceiling prices** of **eleven scheduled formulations** of eight drugs under **the Drugs Prices Control Order, 2013**.

- These drugs are indicated for the treatment of conditions such as **Asthma, Glaucoma, Thalassemia, Tuberculosis, and mental health disorders.**
- **National Pharmaceutical Pricing Authority (NPPA):**
  - NPPA was **formed in 1997** as an attached office of the **Department of Pharmaceuticals (DoP), Ministry of Chemicals & Fertilisers.**
  - An **independent regulator** that **sets drug prices and ensures their availability** and accessibility.
  - It derives authority from **the Drugs Prices Control Order, 2013**, and **the Drugs and Cosmetics Act, 1940.**
  - NPPA administers **'Pharma Sahi Daam'** and **'Pharma Jan Samadhan' platforms** for information on medicine prices and registering public grievances.
- The **Integrated Pharmaceutical Database Management System 2.0 (IPDMS)** is being implemented for online information collection from Pharma manufacturers.

**Read More:** Regulatory Challenges of Indian Drugs

## World Food Day 2024

Recently, **World Food Day** was observed on **16th October** focusing on the urgent need to **eradicate hunger** and build **resilient global food systems**.

- The **theme** for 2024 is the **Right to Food for a Better Life and a Better Future**.
- It marks the establishment of the **Food and Agriculture Organization (FAO)** by the **United Nations (UN)** on **16th October, 1945**.
- The World Food Day came into existence in 1979 during the **FAO's 20th General Conference** and the **UN General Assembly** endorsed it in **1984**.
- **Right to food** is recognized by the **Universal Declaration of Human Rights 1948.**
- Also, **WWF's Living Planet Report** praised India's food consumption pattern as the **most sustainable** among G20 countries.
  - It noted that **if the global population adopted India's consumption patterns, only 0.84 Earths** would be needed by **2050** to **sustain global food production.**
- **India's Commitment to Food Security**: **National Food Security Act, 2013, Pradhan Mantri Garib Kalyan Anna Yojana, PM POSHAN Scheme, Antyodaya Anna Yojana,**

Note:

Rice Fortification and Price Stabilisation Fund (PSF) to manage price volatility of essential commodities.

**Read More:** Food Security & National Security

## Birth Anniversary of Nanaji Deshmukh

Recently, the Prime Minister of India paid tribute to **Bharat Ratna Nanaji Deshmukh** on his birth anniversary.

- **About:**
  - Nanaji Deshmukh was **born on 11th October 1916 in Maharashtra**'s Hingoli district.
  - He was a **social reformer and politician** who focused on education, healthcare, and promoting rural self-reliance.
- **Ideology:**
  - He was inspired by Lokamanya Tilak's nationalist ideology and Dr Keshav Baliram Hedgewar, the founding head of the Rashtriya Swayamsevak Sangh (RSS).
- **Key Works:**
  - Actively **involved in social reform** with a focus on health, education, and rural self-reliance.
  - **Established Chitrakoot Gramoday Vishwavidyalaya**, India's **first rural university,** and served as its Chancellor.
  - Made significant contributions to anti-poverty initiatives and minimum needs programs.
  - He was **instrumental in shaping the** Janata Party.
  - Elected as a **Member of Parliament in the 1977** Lok Sabha election from Balrampur (UP).
  - **Nominated to Rajya Sabha in 1999** in recognition of his national service.
- **Death and Awards:**
  - He died on **27th February 2010.** He was awarded Padma Vibhushan **in 1999** and was **posthumously awarded the** Bharat Ratna **in 2019.**

**Read More:** Birth Anniversary of Nanaji Deshmukh

## Birth Anniversary of Loknayak Jayaprakash Narayan

Recently, the **Prime Minister paid tribute to** Loknayak Jayaprakash Narayan on his birth anniversary.

- **About:**
  - Jayaprakash Narayan was **born on 11th October 1902, in Sitabdiara, Bihar.**
  - He was an **Indian Independence activist,** social reformer and political leader.
- **Ideology:**
  - Influenced by Marxist ideas after studying in the United States.
  - **Strongly opposed British rule in India** and advocated for independence through socialist principles.
  - His objective was to bring about societal change in line with the ideals of Sarvodaya, a **Gandhian philosophy emphasising progress for all.**
- **Key Works:**
  - Joined the Indian National Congress **in 1929** and participated in the civil disobedience movement and Quit India Movement.
  - Co-founded the **Congress Socialist Party,** advocating for a left-wing approach within the Congress Party.

Note:

- Promoted the **Bhoodan Gramdan Movement,** (initiated by **Acharya Vinoba Bhave**) advocating land redistribution for the landless.
- In 1959, **proposed a decentralized political structure** with a four-tier system of governance.
- He led the **Total Revolution movement** against the **Emergency (1975 to 1977) and** became a **vocal critic of** corruption and authoritarianism.

➢ **Death and Award:**

- He died on 8th October 1979, and was **posthumously awarded the Bharat Ratna in 1999.**

**Read More: Jayaprakash Narayan**

## DigiLocker Partners with UMANG

Recently, the **National e-Governance Division (NeGD)** has integrated the UMANG app with **DigiLocker, India's Digital Wallet**. This collaboration enhances citizen access to government services, allowing users to manage multiple services conveniently through a unified platform.

➢ **The National e-Governance Division (NeGD):** In 2009, the NeGD was created by the **Ministry of Electronics & Information Technology** as an Independent Business Division under the **Digital India Corporation.**

- It was created as a facilitator and catalyst for the implementation of the Digital India Program by various Ministries and State Governments.

➢ **UMANG app:** The **UMANG mobile app** is an all-in-one single, unified, secure, multi-channel, multi-lingual, multi-service mobile app. It provides access to high-impact services of various organizations of the Union and States.

➢ **DigiLocker:** **DigiLocker** is a digitization service provided by the Indian Ministry of Electronics and Information Technology under its **Digital India initiative**.

- It allows access to digital versions of various documents including driver's licenses, vehicle registration certificates and academic mark sheets.

**Read More: UMANG App**

■■■

Note: