THE STUDY
KARMANYEVADHIKARASTE
MAA PHALESHU KADACHAN
An Institute for IAS

THESTUDYIAS
by MANIKANT SINGH

JULY 2024
MONTHLY MAGAZINE

HOW GS TRAVELLED THIS MONTH

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UPSC JOURNEY OF AN ASPIRANT

THESTUDYIAS

HINDI | ENGLISH
ONLINE & OFFLINE

SUPER ADVANCE STAGE

- Intensive Mains Oriented Answer Writing
- Value Addition with Interlinkages (Integration of Interlinkages Approach)
- Essay Writing (Targeted Practice)

ADVANCE FOUNDATION

- Comprehensive UPSC Coverage (Pre + Mains)
- Practice & Application through Tests
- Unique Pedagogy (Interlinkages between Topics and Subjects)
- GS MANTHAN : How GS Travelled this Week ?

BASIC FOUNDATION

- Broad Understanding (NCERT+ Basics of core Subjects)
- Inter & Intra Subject Interlinking
- How to Read ?
- How to Write Precisely ?

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NOTE FOR ASPIRANTS

Dear Aspirants,

The last to last week has been quite upsetting for all of us. The unfortunate events that resulted in the loss of our friends' lives were very painful. We saw a worrying mix of environmental harmony and a lack of accountability from those in control, which caused enormous disturbance to the overall system. This was followed by a movement highlighting the significance of accountability and openness in civil society and institutions, which obviously confronted you with countless obstacles on a daily basis.

First and foremost, we would want to recognise the expensive rent you pay as renters in this neighbourhood. The print and electronic media have emphasized the challenges you encounter in completing your studies in such tough home circumstances. Any promise of major improvement in facilities is generally accompanied by a large rent hike. We realize how frustrated many of you are when dealing with excessive power costs.

Second, keeping a high level of food intake is critical. Many of you still enjoy the hostel lifestyle from your college days, and some of you continue to do so professionally. However, it seems that you are more concerned with preparation and procedure than with the details of your diet, eating habits, and time.

Third, there is an obvious lack of support from numerous educational institutions. Foundation courses encompassing General Studies and Optional Subjects are only accessible during classes and not beyond that. Many of you confront the difficulty of not being able to get mentoring and other help from coaching institutions, which extends beyond operating costs.

Fourth, herd culture gives you access to study materials that others have utilised, yet it is apparent that many people are now struggling owing to a lack of help from numerous organisations. You must be cautious of who you select to follow, confirming that they have truly taken the Mains Exam.

Finally, the failure of people in authority to respond to your concerns generates a trust gap, making many of you concerned that your issues will not be remedied.

So, what should you do now? The wise have taught us to seize opportunities when they arise. We notice that your protest on the streets was not just about seeking justice for the victim candidates, but also about demanding competent governance from all main players. Your acts show a strong feeling of unity and concern about these critical concerns. This movement is a good case study that may assist you make the shift from an aspirant to an officer.

Regardless of prospective changes, one thing is certain: you have a strong sense of resolve. Your nuanced and effective approach demonstrates a strong feeling of support and concern. In our democratic society, streets have always served as more than simply modes of transit; they are also platforms for change. Individuals like you play an important role in promoting good change. How can you not continue to make an impact? By demonstrating unity and calling for accountability, you can pave the road for a brighter tomorrow.

Remain strong and together!

Warm regards,

The Study IAS

Subject - Indian History, Heritage and Culture

The Santhal Rebellion: A Historic Uprising

Sub Topic- *Modern Indian History, Indian National Movement,Important Personalities*

Context:

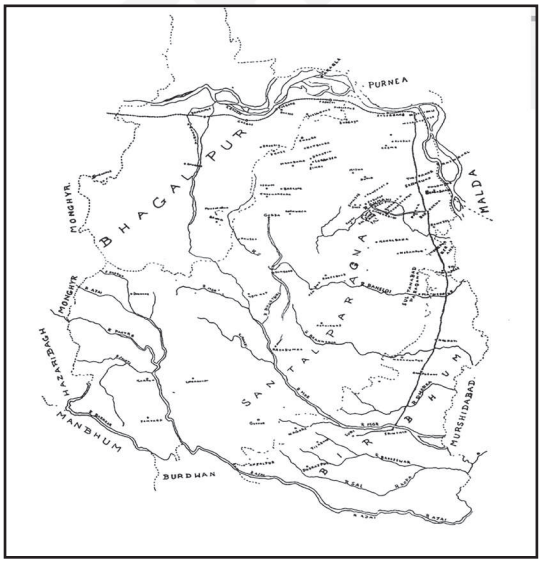
The Santhal Hul of 1855 was a revolt against British imperialism led by four brothers, Sidho, Kanho, Chand, and Bhairav Murmu, along with their sisters Phulo and Jhano. June 30 marks the 169th anniversary of this significant peasant uprising, one of the first against British colonial oppression.

Background:

- **Permanent Settlement System (1793):** Introduced by Lord Cornwallis, this system granted landlords perpetual rights over land, leading to the exploitation of peasants.
- **Demarcation of Damin-i-Koh (1832):** The East India Company promised non-interference in this region, encouraging Santhals to settle there.
- **Economic Hardship:** Santhals faced high-interest loans and oppressive land taxes, losing control over their land and traditional lifestyle.

Causes of the Revolt:

- **Exploitation by Zamindars:** Santhals were oppressed by landlords who imposed heavy rents and taxes.
- **Abolition of Traditional Panchayat System:** The end of the Santhals' traditional political institution, "Purha Panchayat."
- **Entry of Christian Missionaries:** Under the Charter Act of 1813, the British government granted permission for religious propagation and conversion in the Santhal region.
- **Debt Trap:** Unfamiliar with money, Santhals borrowed from moneylenders at exorbitant rates, trapping them in debt.



- **Loss of Land:** Traditional Santhal lands were auctioned off by the British, leading to widespread resentment.
- **Other reasons:** The British government forcibly took labour from the Santhals without pay during the development of the Bhagalpur-Bardhaman rail project.

The Rebellion:

- **Initial Revolt (June 30, 1855):** Sidhu and Kanhu organised 10,000 Santhals in Bhognadih village and declared a revolt against the British.
- **Guerrilla Tactics:** Santhals used guerrilla warfare, targeting zamindars, moneylenders, and British properties.
  - Around 60,000 Santhals participated, employing guerrilla tactics against the British and local exploiters.
- **Divine Inspiration:** The Murmu brothers claimed divine direction from their God, Thakur Bonga, to resist oppression.
- **Major Conflicts:** They captured large areas including Rajmahal Hills, Bhagalpur district, and Birbhum.
- **Duration:** The rebellion lasted nearly six months, ending on January 3, 1856.
- **Casualties:** Over 15,000 Santhals were killed, and 10,000 villages were destroyed.
- **Leaders' Fate:** Sidhu was hanged on August 9, 1855, and Kanhu in February 1856.

British Response:

- **Military Action:** British troops, initially unsuccessful, imposed martial law on November 10, 1855.
- **Suppression:** By January 3, 1856, British forces had killed around 15,000 Santhals, including Sidhu and Kanhu, and destroyed their villages.

Aftermath and Legacy:

- **Santhal Parganas Tenancy Act (1876):** Enacted by the British to offer some protection to Santhals against exploitation.
- **Impact on Tribal Identity:** The rebellion fostered a sense of unity and identity among Santhals, playing a significant role in the creation of Jharkhand in 2000.
- **Lasting Influence:** The rebellion inspired further movements for land rights and social justice, such as the Birsa Munda movement.

Significance:

- **Agrarian Uprising:** Unlike other revolts, the Santhal Rebellion focused on reclaiming traditional lands and economic freedom.
- **Nationalism:** It fostered a sense of nationalism among Santhals, contributing to future resistance against colonial rule.
- **Cultural Identity:** The rebellion reinforced the importance of preserving Santhal culture and traditions.

Swami Vivekananda

Sub Topic- *Important personalities*

Context:

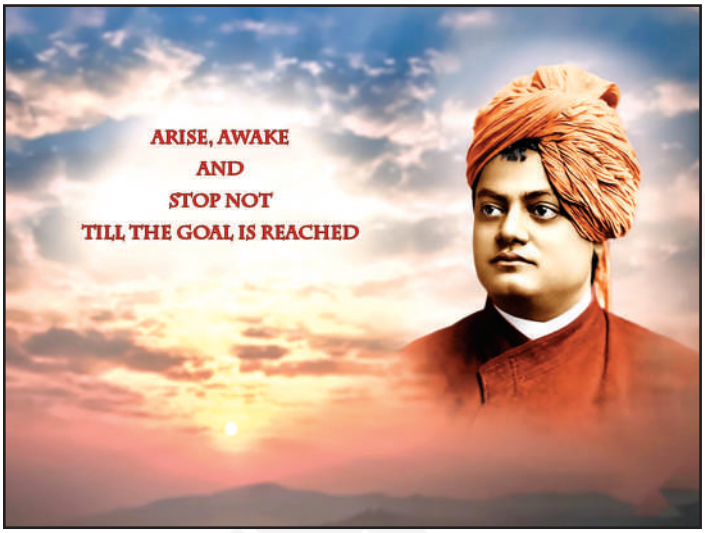
Prime Minister Narendra Modi paid tribute to Swami Vivekananda on his Punya Tithi (death anniversary).

About Swami Vivekananda: Swami Vivekananda, **born Narendra Nath Datta on January 12, 1863**, in Kolkata, was educated in a Western-style university and became a devout **follower of Sri Ramakrishna Paramhansa**.

Spiritual Journey:

- **Sannyasa: In 1887, he and fellow disciples of Ramakrishna took vows of sannyasa**, renouncing worldly pleasures.
- **Foundations:** He **founded the Ramakrishna Math and the Ramakrishna Mission (1897)** to continue his guru's work.

Contributions and Achievements:



- **Parliament of Religions:** Attended the **World's Parliament of Religions in Chicago in 1893**, earning acclaim with his speech beginning with, "**Sisters and brothers of America...**"
- **Vedanta Philosophy: Promoted Vedanta philosophy** in the West, **emphasising religious unity** and **service to humanity**, and delivered lectures across the US, England, and Europe to spread Hindu philosophy and interfaith awareness.
- **Publications:** Authored four classics on Hindu philosophy—**Jnana-Yoga**, **Bhakti-Yoga**, **Karma-Yoga**, and **Raja-Yoga**.

Legacy:

- **Influence:** Considered one of modern India's most influential figures; **his birthday is celebrated as National Youth Day**.
- **Reform: Advocated for social reforms**, including **education for women and lower castes**, and the **elimination of child marriage and illiteracy**.
- **International Impact:** Became **India's spiritual ambassador**, **fostering understanding between East and West**.
- **Recognition:** Known for his spiritual genius, deep insight, and charismatic personality. **His words continue to inspire globally**.

Final Years: Passed away on July 4, 1902, leaving a lasting legacy in both East and West.

Palitana: A Revered Jain Pilgrimage Destination

Sub Topic- *Historical Places and sites*

Context:

The decision to **ban non-veg foods** in **Palitana** was made after nearly **200 Jain monks protested** and succeeded in having around **250** butcher shops shut down, making **meat sale and consumption illegal in the city.**

Overview of the City:

- **Location**: Palitana, in the **Bhavnagar** district of **Gujarat**, India, is a highly revered town for Jainism followers.
- The city, formerly known as **Padliptapur**, is nicknamed the **"City of Temples,"** or **Jain Temple Town.**
- The place is located around **Shatrunjaya Hills.**
- **Significance:** Palitana features **more than 800 temples** in the city.

  - The main temple, is dedicated to **Rishabha (the first Tirthankara).**
  - **Sanctity**: The hill is sanctified by the visits of 23 Tirthankaras, except for **Neminatha**, who has already been **liberated from karma.**
- **Accessibility:** Reaching the temples requires climbing approximately **3950 stairs.** Constructed over **900 years,** the oldest temples date back to the **11th or 12th century.**
  - **Historical Context:** Much of Palitana's **11th-century**

architecture, originally built by the **Solanki dynasty**, was destroyed by **Muslim invaders** and later reconstructed in the 16th century by wealthy merchants.

- **Prominent Temple:** The **Adishwar Temple**, also known as the **Chaumukha Temple,** is the most lavishly decorated. Built in the **early 17th century,** it features a **marble pedestal with a four-faced deity of Adinath.**
- **Angar Pir Shrine:** Nearby, this **Muslim shrine** is dedicated to a saint believed to help childless couples, with miniature cradles offered in hopes of blessings.
- **Other Important Temples:** Notable temples include **Rampal, Kumarpal, and Sampriti Raja.**
- **Cultural Context**: The town is a hub for pilgrimage, especially during the **Kartik Purnima festival.**
  - It is believed that visiting these temples is crucial for achieving **nirvana or salvation.**
- **Religious Practices**: The temple town is considered a **divine abode,** and therefore, no one is allowed to stay overnight, including priests.
  - Some temples remain **closed during the monsoon season.**
- **Cultural and Tourist Attractions**:
  - **Shopping**: Palitana's bustling bazaars offer handcrafted **woven bamboo products as souvenirs.**
  - **Festivals**: Local festivals such as **Makar Sankranti and the Kite Festival** are celebrated with great enthusiasm.

Architectural Features of the Town:

- The design includes a **large square subdivided into smaller squares with domes,** representing the five sacred hills.
- **Decorations:** The temple's pillars and roof are intricately carved marble shaped like dragons.
- **Temple Complex:** The site features **both large and small shrines.** Larger temples have marble halls with columns and towers, while smaller ones are compact, displaying **Tirthankara emblems.**
- **Marble Use:** Temples are richly adorned with marble that reflects sunlight, creating an ivory shield effect.

The Solanki Clan: A Historical Overview

- The Solanki dynasty, also known as the **Chalukyas of Gujarat,** played a significant role in shaping the history of Gujarat from the **10th to 13th centuries CE.**
- They were more prominent in **southern regions than in Rajputana.**
- **Mularaja,** the founder of the Solanki dynasty, established an independent kingdom with **Anahilapataka (modern Patan)** as its capital in **940 CE.**
- **Siddharaja Jayasimha and Kumarapala** are the best known Solanki kings.

Subject Geography

Causes of Widespread Rainfall Across India

Sub Topic- *Climatology- Indian Climate*

Context:

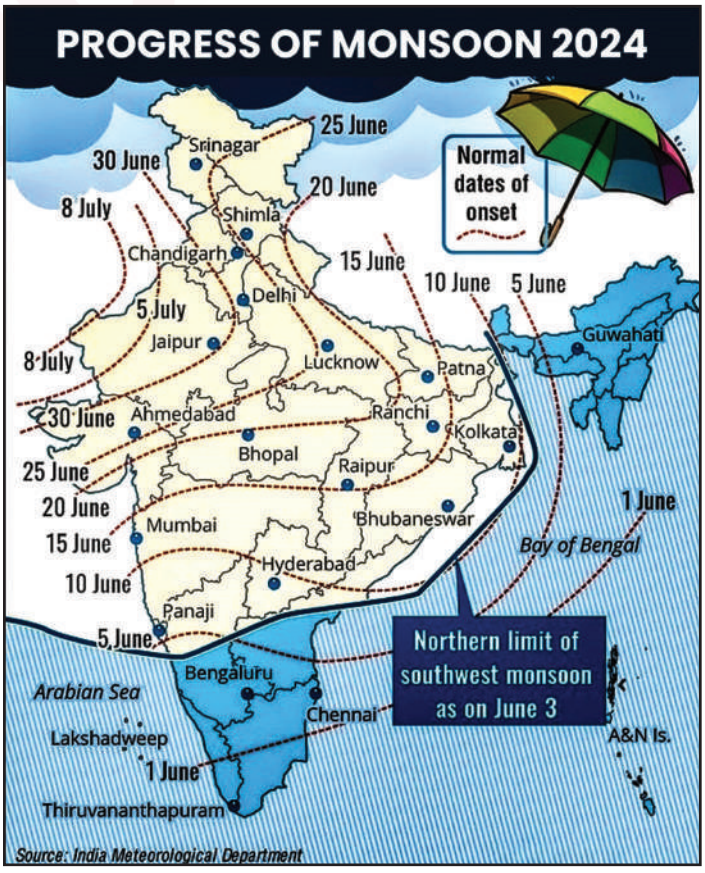
The southwest monsoon covered the entire country by **July 2, six days ahead** of its **normal schedule.**

More on news:

- At least **80%** of the country reported widespread rainfall last week, with **heavy to very heavy** spells in regions including **Assam, West Bengal, Uttar Pradesh, Uttarakhand, Gujarat, coastal Maharashtra and Karnataka, Kerala, and Lakshadweep.**

Favourable Weather Systems:

- **Moisture-Laden Westerly Winds**: Continuous influx of **moisture-laden** strong westerly winds from the **Arabian Sea.**



- **Current Position**: Shifted towards the south, resulting in more rainfall in central, eastern, and peninsular India.
- **Additional Contributing Weather Systems:**

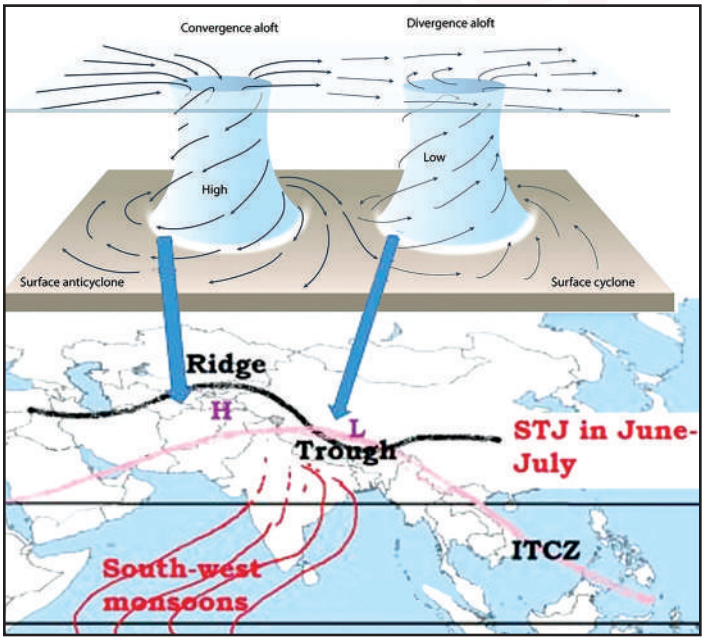
- **Off-Shore Trough**: A shallow trough of low pressure along India's coast between south Gujarat and north Kerala has persisted for more than a week.
- **Wind Shear Zone**: Development of a wind shear zone along latitudes **20°N** between central and peninsular India.
- **Low Pressure System**:
  - **Development**: A low pressure system developed over the **west-central Bay of Bengal, off the Odisha coast** on Monday.
  - **Movement**: Moved over Chhattisgarh and adjoining Vidarbha on Tuesday, and over southeast Madhya Pradesh on Wednesday.

Monsoon:

- A monsoon is a **seasonal change** in the direction of the **prevailing, or strongest, winds of a region.**
- Monsoons cause **wet and dry seasons** throughout much of the tropics. Monsoons are most often associated with the **Indian Ocean.**
- Monsoons always blow from **cold to warm regions.** The summer monsoon and the winter monsoon determine the climate for most of **India and Southeast Asia.**

Mechanism of South-West Monsoon:

- **Differential Heating and Cooling of Land and Water:** During the summer months, the landmass of India heats up more quickly than the surrounding seas.
  - This creates a **low-pressure area** over the **land**, while the **seas** around India experience comparatively **high pressure.**



- **Shift of ITCZ:** In June, the sun shines vertically over the **Tropic of Cancer.**
  - **The Inter-Tropical Convergence Zone (ITCZ)** shifts northwards to the Indo-Gangetic Plain, causing the south-west monsoon **winds to blow from the Arabian Sea and the Bay of Bengal** towards the Indian subcontinent.
- **Coriolis Force:** The southeast trade winds from the southern hemisphere cross the equator.
  - Due to the **Coriolis force,** these winds are deflected and start blowing from the southwest to the northeast, forming the **southwest monsoon winds.**
- **Withdrawal of Westerly Jet Stream:** The **shift in the position of the ITCZ** is associated with the withdrawal of the westerly jet stream from its position over the north Indian plain, south of the Himalayas.
- **Onset of Easterly Jet Stream:** The easterly jet stream, also known as the Somali Jet, sets in along the **15°N latitude** after the **westerly jet stream** has withdrawn.
  - This **easterly** jet stream is responsible for the onset of the monsoon in India.
- **Bifurcation of Monsoon Winds:** As the monsoon winds approach the Indian subcontinent, the relief and thermal **low-pressure areas** cause them to **split into two branches:**
  - **Arabian Sea Branch**: Monsoon winds originating over the Arabian Sea.
  - **Bay of Bengal Branch**: The **Arakan Hills** along the coast of Myanmar deflect a significant portion of this branch towards the Indian subcontinent, entering **West Bengal and Bangladesh** from the south and southeast.

El Niño, La Niña and Indian Monsoon Relationship :

- El Niño **weakens trade winds** across the Pacific, reducing moisture-laden monsoon winds over India, leading to **reduced monsoon rainfall.** Historically, at least half of the El Niño years were monsoon droughts (below -10% departure from the **long-term average).**
- **La Niña, the cool phase** of ENSO, generally **enhances the strength** of the trade winds, potentially increasing the moisture-laden monsoon winds over India, often **leading to increased rainfall.**

Glacial Lake Outburst Floods (GLOFs)

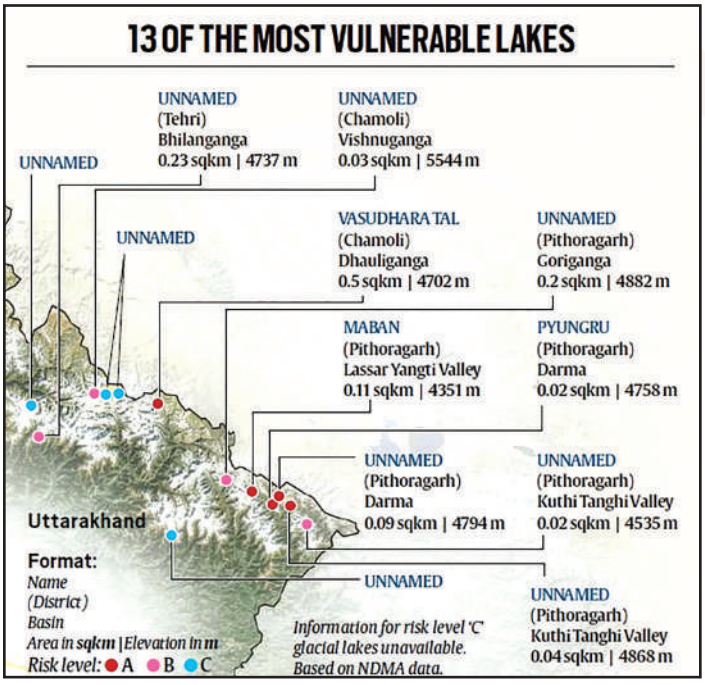
Sub Topic- *Important Geophysical Phenomena*
GS Paper III - *Disaster management*

Context:

Ahead of the monsoon season, Uttarakhand's State Disaster Management Department **(USDMA) plans to conduct a vulnerability study on 13 glacial lakes**, **five of which are in high-risk zones**, to prevent potential calamities like lake outbursts.

More on News:

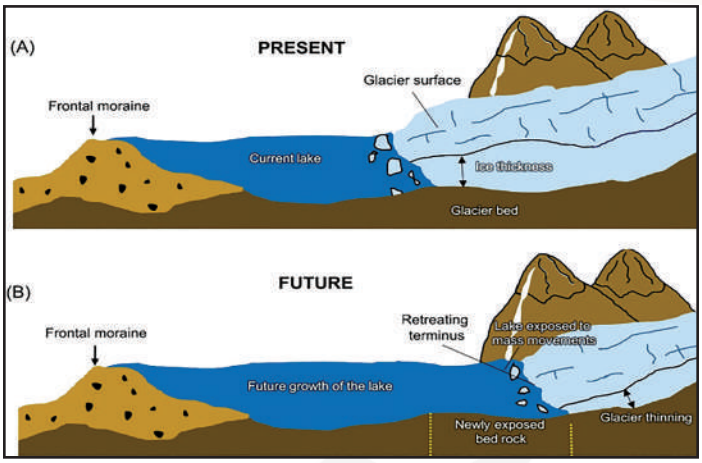
- Lakes in **Darma**, **Lasaryanghati**, and **Kutiyangti valleys** of **Pithoragarh district**, and **Vasudhara Tal in Chamoli district**, among the 13 studied, **are categorised as high-risk** due to their locations at elevations exceeding 4,000 metres above sea level.
- These lakes, ranging from 0.02 to 0.50 square kilometres in size, are under scrutiny by Uttarakhand's State Disaster Management Department (USDMA) to assess vulnerability and mitigate potential risks during the upcoming monsoon season.



What is a GLOF?

- A Glacial Lake Outburst Flood (GLOF) is a **sudden release of water** from a glacial lake **due to the breach of a natural dam** formed by ice or sediment.
- This can **lead to catastrophic flooding downstream**, **causing extensive damage to infrastructure**, property, and loss of life.

Causes of GLOFs:



- **Climate Change and Glacier Melting:** The warming of the troposphere accelerates glacier melting, forming unstable glacial lakes.
- **Glacier Retreat and Surging:** Melting glaciers leave depressions that fill with water, increasing the risk of GLOFs.
- **Avalanches and Earthquakes:** Avalanches, landslides, or seismic activity can disrupt natural dams, triggering floods.
- **Extreme Weather: Heavy rainfall** and **sudden temperature changes** can destabilise glacial lakes.
- **Human Activities: Construction**, **mining**, and **deforestation** near glacial lakes can increase the risk of GLOFs.

Examples of GLOFs:

- **Bhutan (1994): Lugge Tsho's outburst** highlighted the region's vulnerability to glacial melting.
- **Nepal (1985):** Dig Tsho's floodwaters caused significant downstream damage.
- **India (2013):** The Kedarnath flash flood in Uttarakhand caused by Chorabari Tal's outburst killed over 5,000 people.

Impacts of GLOFs:

- **Loss of Life and Property:** Sudden floods can kill people and destroy infrastructure, including houses, roads, and power plants.
- **Disruption of Livelihoods:** GLOFs can reduce access to resources and markets, affecting local communities' income and tourism.
- **Environmental Damage:** Floods alter landscapes, erode soil, and impact water quality.
- **Transboundary Impact:** GLOFs can affect areas far from their origin, crossing national boundaries.

India's Vulnerability to GLOFs:

- **ISRO's Glacial Lake Atlas:** Identified over 28,000 glacial lakes in the Himalayan region, with many classified as high-risk.

- **State Assessments:** Sikkim, Uttarakhand, and Jammu & Kashmir have numerous vulnerable lakes.
- **Geological Instability:** The Himalayan region is geologically active, making it prone to earthquakes and landslides, increasing GLOF risks.

Mitigation Measures:

- **Identification of Dangerous Lakes:** Use field observations and historical data to identify high-risk lakes.
- **Use of Technology:** Employ Synthetic-Aperture Radar imagery and drones for monitoring lake conditions.
- **Structural Management:** Techniques like controlled breaching, pumping, or tunnelling to lower water volume.
- **Early Warning Systems:** Enhance sensor-based systems for timely alerts to at-risk communities.
- **Construction Codes:** Develop uniform construction standards for infrastructure in vulnerable zones.
- **Training Local Manpower:** Train local communities for rapid disaster response and search-and-rescue operations.

Way Forward:

- **Monitoring and Data Collection:** Continuous monitoring of glacial lakes and downstream water levels.
- **Enhanced Safety Standards:** Revise safety standards for infrastructure projects in mountainous areas.
- **Scientific Research:** Scale up studies on glaciers to understand their response to climate change.
- **Balancing Development:** Ensure hydropower and other projects include robust safety mechanisms to mitigate GLOF risks.
- Implementing these measures can help mitigate the impacts of GLOFs, protecting lives, property, and the environment in vulnerable regions.

Subject - Indian History, Heritage and Culture

Khandagiri & Udayagiri Caves

Sub Topic- *Indian Art Forms, Indian Heritage Sites, Sculpture, Temple Architecture, Indian Architecture, Rock Cut Architecture*

Context:

On the third day of her Odisha tour, President Droupadi Murmu visited the Khandagiri and Udayagiri caves in Bhubaneswar.

Historical Background:

- Constructed during the reign of **Kalinga King Kharavela** in the **1st and 2nd centuries BC**.
- **Located near Bhubaneswar**, Odisha.
- Served as **residences for Jain monks**.
- Originally known as Kattaka or Cuttack Caves.
- Hills referred to as **Kumara Parvatha in Hathigumpha inscription**.
- **Rock-cutting continued till the Somavamsis** period (10th-11th century AD).

Udayagiri Caves Contains 18 caves

- **Famous caves:** Hathi Gumpha, Ananta Gumpha, Ganesha Gumpha, Jaya Vijaya Gumpha, Mancapuri Gumpha, Bagha/ Vyaghra Gumpha, Sarpa Gumpha.
- **Significant caves:**
  - **Rani Gumpha (Queen's Cave)**: Double-storeyed monastery, known for its acoustic qualities and central wing relief images.
  - **Ganesh Gumpha**: Notable for carvings of Jain Tirthankara and sculpture carvings.
  - **Hathi Gumpha**: Features inscriptions of King Kharavela detailing his conquests and leadership.

Significance:

- Located roughly 200 metres apart, facing each other.
- Showcases advanced rock-cut architecture and carvings.
- Depicts **mythological and historical themes, including the Kalinga War**.
- Jain monks used the caves for residence and meditation.
- **Equipped with water sources**, **communication systems**, **lamp places**, and **tilted flooring for headrests**.
- **Most caves are double-story**, with upper chambers for deep meditation.

Modern Importance:

- Listed as **Adarsh Smarak Monument** by the Archaeological Survey of India (ASI).
- Udayagiri and Khandagiri Caves reflect the religious, cultural, and artistic heritage of ancient India.
- Served as important centres for Jain ascetics and later became a significant site for Buddhist activities.

Qutub Minar

Sub Topic- *Indian Heritage Sites*

Context:

In 2023-24, Qutub Minar, a 13th-century marvel built by the Delhi Sultanate, surpassed Agra Fort of the Mughal Empire as the second most visited monument by foreigners, according to Archaeological Survey of India (ASI) visitor statistics.

Qutb Minar Overview:

- **Built in early 13th century by Delhi Sultanate**, India's tallest masonry tower at 72.5 metres.
- Construction spanned 75 years, **started by Qutb-ud-Din Aibak in AD 1199, expanded by Shamsuddin Iltutmish**.
- Features intricate honeycomb design and inscriptions **repaired by Firuz Shah Tughlaq, Sikandar Lodi, and Major R. Smith**.

Key Points:

- Qutub Minar commemorates Muslim conquests over Delhi's Rajput rulers, doubling as a minaret for mosque calls.
- Includes a 7-metre iron pillar in mosque courtyard.
- **Engraved with Quranic verses and fine arabesque decorations**.

- **UNESCO World Heritage Site since 1993**.

Quwwat-ul-Islam Mosque:

- **Established by Qutb-ud-Din Aibak in AD 1198**, incorporating pillars from 27 Hindu and Jain temples.
- Expanded by Shamsuddin Iltutmish and Alauddin Khalji, includes a unique five-arched screen and ancient Iron Pillar.

Tomb of Iltutmish: Constructed in AD 1235, a red sandstone chamber adorned with Saracenic motifs and inscriptions.

Alai Darwaza and Alai Minar:

- **Alai Darwaza Gate**, masterpiece of **Indo-Muslim art built in AD 1311 by Alauddin Khalji**.
- Alai Minar, intended to surpass Qutb Minar, stands incomplete at 25 metres.

Architectural Significance:

- Represents early **Islamic architecture in India, blending Persian and Indian styles**.
- Complex includes **funerary buildings showcasing technological and artistic advancements**.

Indian Independence Act, 1947

Sub Topic- *Constitutional Development during British Period, Post-Independence*

Context:

Indian Independence Act, 1947 Passed by British Parliament on July 5, 1947, received royal assent on July 18, 1947.

Overview:

- Ended British rule in India, partitioned into India and Pakistan.
- Based on the **Mountbatten Plan (3 june plan)** for transferring power to Indian hands.

Key Provisions:

- **Independence Declaration**: India and became independent on August 15, 1947, while Pakistan on 14th August.
- **Partition**: India and Pakistan created as separate dominions.
- **Governance Changes**: Abolished the viceroyalty, established separate Governor-Generals for India and Pakistan.
- **Constituent Assemblies**: Empowered to draft and implement their own constitutions, annul British laws.
- **Legislative Autonomy**: Post-independence, no British Parliament acts extended to the dominions without their consent.
- **Princely States**: Given the option to join India, Pakistan, or remain independent.
- **Government of India Act, 1935**: Basis for governance until new constitutions were drafted.

Historical Background:

- British control over India since the Revolt of 1857.
- Mountbatten Plan aimed to transfer power and address Indian self-rule demands.

Impact and Legacy:

- **Constitutional Development**: India became a republic on January 26, 1950; Pakistan on March 23, 1956.
- **Integration of Princely States**: Most acceded to either India or Pakistan, notable issue of Kashmir remains unresolved.
- **Communal Tensions**: Partition led to significant violence and migration.
- **End of British Suzerainty**: Abolished titles and roles associated with British rule, marked a new era of sovereignty for both nations.

Cultural Mapping of Villages

Sub Topic- *Architecture*

Context:

Under the **National Mission on Cultural Mapping** (NMCM), the government has taken an initiative to provide a comprehensive overview of the cultural heritage of 6.5 lakh villages across India.

National Mission on Cultural Mapping (NMCM).

- It is a scheme **launched in 2017 by the Ministry of Culture** (MoC)

Cultural mapping :

- It **records a region's cultural uniqueness**—local stories, rituals, arts, languages, built heritage, cuisines, and history—to define local culture.
- It documents both **tangible and intangible assets** to develop cultural resource mapping, starting with a **culturally sensitive approach** to capture the '**sense of place**' and **distinctive elements**.

- The **aims and objectives** of the project include:
  - Raising **awareness about cultural heritage** and its **role in development and cultural identity.**
  - **Mapping 6.5 lakh villages**, including their geographical, demographic profiles, and creative capitals.
  - Creating **National Registers of Artists and Art practices.**
  - Developing a **web portal and mobile app** to serve as a **National Cultural WorkPlace (NCWP).**
- The project targets **all inhabited villages in India listed in the 2011 Census**, including those in Bihar.
- **Vision & Mission**

- To **preserve India's rich art and cultural heritage** and convert its vast cultural landscape into objective cultural mapping.
- To Design a mechanism to fulfil the aspirations of the whole artist community of the nation
- To Preserve the rich cultural heritage of this country for future generations
- To create a strong "**Cultural Vibrancy**" throughout the nation

- It will identify, **collect and record cultural assets and resources.**
- **CSC** (Common Service Centres) **e-Governance Services India Limited**, a special purpose vehicle (SPV) under **Ministry of Electronics & IT** (Meity), will carryout National Mission on Cultural Mapping.
- It is executed under the guidance of **Indira Gandhi National Centre for the Arts (IGNCA).**

Other Schemes/Programs Related to Art and Culture

- Ek Bharat Shreshtha Bharat
- Kala Sanskriti Vikas Yojana
- Scheme for Safeguarding Intangible Cultural Heritage
- National Mission on Libraries
- Museum Grant Scheme
- Indian Conservation Fellowship Program (ICFP)

Subject Geography

Heat Domes

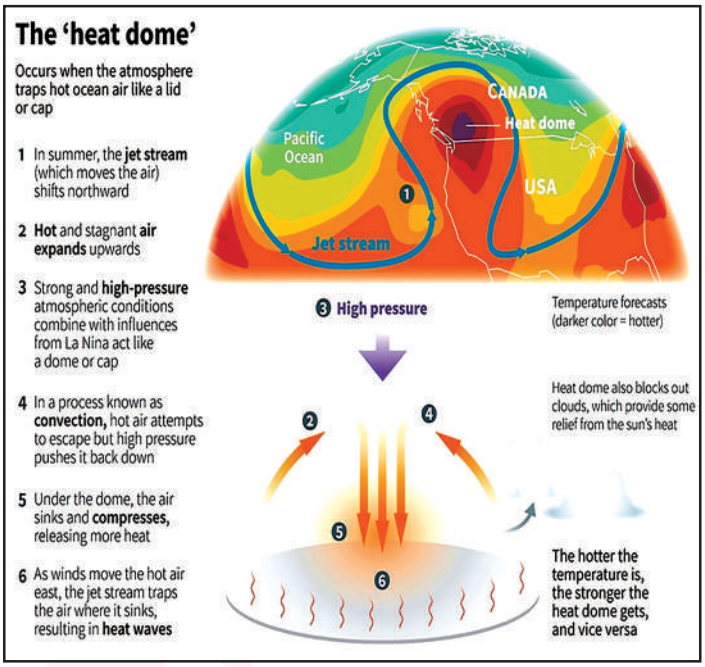
Sub Topic- *Physical Geography, Important Geophysical Phenomena*
GS Paper III - *Environmental Pollution & Degradation*

Context:

A severe heatwave has engulfed the entire western United States since last week, affecting nearly 75 million people with widespread heat alerts and record-breaking temperatures.

Heat Dome Phenomenon:

- **Definition:** A heat dome occurs when a high-pressure system in the atmosphere traps warm air, acting like a lid on a pot, for an extended period.
- **Effect on Weather:** Prevents warm air from rising, keeping skies clear and reducing cloud formation, which limits rain.
- **Impact on Temperature:** Allows more sunlight to reach the earth, intensifying warming and drying of soil, leading to hotter conditions.
- **Duration and Intensity:** The longer a heat dome persists in one place, the more intense and prolonged the heatwave becomes.



Role of Jet Stream:

- **Function:** Normally moves weather systems across the Earth's surface due to its fast-moving air patterns.
- **Formation of Heat Domes:** When the jet stream's wave-like pattern becomes elongated and slows down, it can cause a high-pressure system to stagnate, resulting in a heat dome.

Climate Change Impact:

- **Increased Size and Intensity:** Climate change has amplified heat dome events, making them larger and more severe.
- **Scientific Findings:** Studies indicate that human-caused climate change has made extreme temperatures during heat dome events more likely and intense.
- **Research Insights:** Recent studies suggest that the intensity of heat domes is increasing faster than the overall rate of global warming, highlighting climate change's role in exacerbating these events.

Subject - Indian Society

KIRTI Programme

Sub Topic- *Government Schemes*

Context:

As the **Paris Olympics draws near**, the Government's ambitious KIRTI programme is set to receive a fresh boost under the leadership of the **Union Minister for Youth Affairs & Sports and Labour & Employment**.

- The Hon. Minister will inaugurate **Phase 2** of the initiative in **New Delhi** on **July 19, 2024.**

About KIRTI:

- **Khelo India Rising Talent Identification (KIRTI)** aims **to develop** an **integrated talent identification** architecture based on modern ICT tools and global best practices.

- It **streamlines the process** of **grassroots talent identification** by providing a single platform.
- The **project adopts an athlete-centric approach**, ensuring that every step of the talent identification process is **broad-based** and **accessible**.
- **Objectives:**
  - **Identifying sports talent** from **across the nation**.
  - Using **sports to combat drug addiction** and excessive gadget use **among school children aged 9 to 18**.

Nationwide Launch and Goals:

- **To achieve 20 lakh assessments** in the **FY 2024-25** by **on-boarding all states** and **treating districts as units of assessment**.
- **To create** a pool of **talent capable** of winning **medals** at **global competitions** like the **Olympics** and **Asian Games**.

KIRTI Phase I

- Initiated in **Chandigarh** on **March 12, 2024**
- **Assessments Conducted:** Nearly 51,000 in 28 states and Union Territories.
- **Top States:** Maharashtra (9168 assessments) and Haryana (4820 assessments), followed by Assam (4703 assessments).
- **Disciplines Evaluated:** 11 including Archery, Athletics, Badminton, Boxing, Football, Hockey, Kabaddi, Kho-Kho, Volleyball, Weightlifting, and Wrestling.
- **Highest Assessments:** Athletics (13,804) and Football (13,483).

Ambition and Accessibility:

- Align to become a **top 10 sports nation** by **2036** and among the **top five** by **2047**.
- Target **to reach every block in** the **country**, connecting with **children who aspire** to **play sports** but **lack guidance**.
- **Registration:** Candidates are encouraged **through the My-Bharat portal.**
- **Transparent selection methodology** leveraging **Information Technology, data analytics,** and **Artificial Intelligence** predicts the sporting potential of aspiring athletes.

Subject - Polity, Governance, Constitution

Constitutional Morality

Sub Topic- *Indian Constitution, Constitutional Amendments, Judgements & Cases*

Context:

The CJI DY Chandrachud at the inauguration of the East Zone-II Regional Conference of National Judicial Academy in Kolkata, **emphasised the importance of constitutional morality** in the context of Judiciary .

More in News:

- At the same meeting West Bengal Chief Minister called for an **"absolutely pure and honest"** judiciary, which is **"free of political biases"**.
- She was highlighting this based on the Calcutta High Court order cancelling all appointments made through a 2016 teacher recruitment test.
  - With Justice Abhijit Gangopadhyay(had ordered the investigation on the recruitment test) quitting Judiciary and joining politics to become an MP it raises questions on the biases of the judgement.

Constitutional Morality

The concept was elaborated by Dr. BR Ambedkar in Constituent Assembly debates

It means:

- Abiding by the rules that **limit the power of the government** to infringe on citizens' liberties.
- It also includes respecting the **supremacy of the Constitution and the rule of law**.
- Citizens have the right to **freely criticise the holders of power** as long as they observe restraint.
- However he said that Indian society is not fit to understand the **Constitutional morality, hence it has to be cultured in a nation** like India where everything is newborn via the constitution.

Judicial Independence

The SC in following cases has emphasised Judicial Independence:

- ***Kesavananda Bharati vs. State of Kerala case(1973):*** the Supreme Court established the basic structure doctrine highlighting that an **independent judiciary is essential to serve as the final authority in constitutional matters.**
- ***Minerva Mills case (1980)***, Supreme Court adjudged the limited power of Parliament to amend the constitution saying **Judicial independence acts as a safeguard against the concentration of power**, preventing the executive from dominating all branches of government.

CJI Chandrachud views on constitutional morality: Unlike morality, which is a restraint on the rights of citizens, **constitutional morality is a restraining factor on the state**.

- Constitutional morality addresses itself to every component of society and allows for conditions which **respect diversity, promote inclusion and pursue tolerance**.
- **Judicial independence can only be there when**
  - **All organs of state adhere to constitutional morality** by not breaching their constitutional limits .
  - **Personal perceptions of a judge** as to what is right or wrong **must not override constitutional morality** .
    - He highlights this in the context that it is being increasingly found that **judges write about their own ideologies in judgments**.

Constitutional morality in Indian Constitution

Though the term constitutional morality is not explicitly used in the Indian Constitution, it is deeply embedded in several of its sections:

- **Preamble:** It outlines the principles that underpin our democracy, including justice, liberty, equality, and fraternity.
- **Fundamental Rights:** It safeguards individuals' rights against the arbitrary use of state power.Supreme Court allows for the enforcement of these rights under **Article 32.**
- **Directive Principles:** They provide guidelines for the state to pursue the goals set by the constitution's framers, drawing from Gandhian, socialist, and liberal intellectual philosophies.
- **Checks and Balances:** It includes judicial review of legislative and executive actions, legislative oversight of the executive, etc.

Supreme Court's viewpoint

- **Krishnamoorthy case**: The court emphasised that constitutional morality is essential for good governance.
- ***Union of India vs. Government of the NCT of Delhi:***
  - The Court, likened constitutional morality to a **"second basic structure doctrine"**, emphasising its role in curbing arbitrary authority.
- ***Justice K S Puttaswamy and Anr. vs. Union of India and Ors.:*** While upholding the **constitutional validity of Aadhaar** with certain restrictions, the Court reiterated its duty to **uphold constitutional morality by nullifying any law or executive action that contravenes the constitution**.

SC on Constitutional morality vs Social morality

- ***Navtej Singh Johar & Ors. vs Union of India* (2018):** the Supreme Court held that Section 377 infringed upon the rights of the LGBTQI community and violated the fundamental values of individual dignity as enshrined in **Articles 14**, **19**, and **21** of the Constitution.
  - The Supreme Court ruled that **Constitutional Morality takes precedence over social morality.**
- **Sabarimala case**: The Supreme Court bypassed the **"doctrine of essentiality"** by allowing women entry into the temple to uphold Constitutional morality over social morality.

Concerns:

- **Ambiguity:** The concept of constitutional morality is not clearly defined and it can be misused to justify a wide range of actions and decisions, which undermines the principle of predictability and the rule of law.
- **Lack of popular legitimacy:** constitutional morality is sometimes not based on popular consent and is imposed on society in opposition to public/social morality.
- **Can lead to judicial overreach:** This can lead to a **violation of the separation of powers.**

Sessions of Parliament

Sub Topic- *Indian Constitution, Parliament*

Context:

After the general elections for the 18th Lok Sabha, the First Session of the Lok Sabha and the 264th Session of the Rajya Sabha were conducted, and both houses were adjourned sine die.

More in News:

- The session began with the **oath/affirmation of newly elected Members** of the 18th Lok Sabha in front of the pro-term speaker.
- Following the oaths, the **Speaker was elected** by the members of the Lok Sabha. Subsequently, the **Prime Minister introduced his Council of Ministers** to both the Lok Sabha and the Rajya Sabha.
- The **President addressed both Houses of Parliament assembled together** under **Article 87** of the Constitution. This was **followed by a discussion on the Motion of Thanks on the President's address**, which included a response from the Prime Minister.

Other Ways of Terminating a sitting/session.

Adjournment

- An adjournment results in the **suspension of work** in a **sitting** for a **specified time**, which may be hours, days or weeks **by the presiding officer .**
- In this case, the time of reassembly is specified as an adjournment **only terminates a sitting and not a session of the House.**

Prorogation

- The term prorogation means the **termination of a session** of the House by an order made by the **President** under **Article 85(2)(a)** of the Constitution.
- The prorogation **terminates both the sitting and session** of the House and is usually done within a few days after the House is adjourned sine die.

Dissolution

- Whenever a dissolution happens, it **ends the very life of the existing House** and a new House is constituted after the General Elections.
- However, only the Lok Sabha is subject to dissolution as the **Rajya Sabha, being a permanent House, is not subject to dissolution.**

Adjournment sine die

- Means **terminating** a **sitting** of Parliament for an **indefinite period**, i.e, when the House is adjourned without naming a day for reassembly, it is called adjournment sine die.
- The **power of adjournment sine die lies with the presiding officer** of the House.
- However, the presiding officer of a House **can call a sitting of the House before the date or time** to which it has been adjourned **or at any time after** the House has been adjourned sine die.

Motion of Thanks

- The **Motion of Thanks** is a **formal motion** moved in the Parliament **to express gratitude to the President for their address** to both Houses of Parliament at the beginning of the first session after each general election and at the first session of each year. The **President's address outlines the government's policies and programs for the upcoming year.**
- The **Motion of Thanks is debated in both Houses of Parliament.** Members discuss the content of the President's address and may raise issues or express their support or criticism of the government's policies.

Constitutional Provision

- **Article 87 (1)** provides for the **special address by the President** stating that at the commencement of the **first session after each general election** to the House of the People and at the commencement of the **first session of each year**, the President **shall address both Houses** of Parliament assembled together.

Discussion on the Address by Motion of Thanks

- **Article 87(2) of the Constitution:** discussion on the matters referred to in the President's Address takes place on a **Motion of Thanks moved by a member and seconded by another member.** Members who are to move and second the Motion are **selected by the Prime Minister.**
- **Scope of discussion**
  - The scope of the discussion on the Address is **very wide** and members are at liberty to **speak on every matter** of national or international importance and other issues.
  - At the end of the discussion, the **Prime Minister replies to the debate**. Thereafter, the amendments are disposed of, and then **the Motion of Thanks is put to vote.**

- If any of the amendments is accepted then the **Motion of Thanks is adopted in the amended form.**The Amendment to the Motion of Thanks include
  - **Specific Issues or Omissions:**They can highlight areas where the government has failed to act or where its policies are considered inadequate.
  - **Criticism of Government Policies**
  - **Suggestions for Improvement**
  - There have been only **three instances so far, when the Motion of Thanks was adopted by Rajya Sabha with amendments**.
    - The Motion of Thanks with an amendment was adopted in 1980,1989 and 2001.

President's Address under Article 86(1) of the Constitution

- Provides that the President **may address** either House of Parliament or both Houses assembled together, and for that purpose require the attendance of members.
- However, since the commencement of the Constitution, **there has not been any occasion when the President has addressed either House or both Houses assembled together,** under the provision of this article.

Parliamentary Privileges

Sub Topic- *Indian Constitution, Parliament*

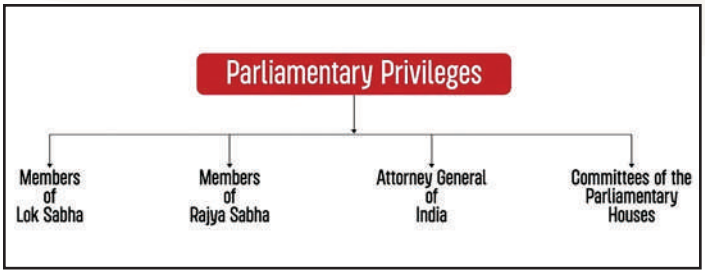
Context:

In the 18th Lok Sabha, both the opposition and the ruling party have been accusing each other of violating parliamentary privileges by **expunging proceedings(cease to exist in the records of Parliament and cannot be reported by media houses) and making inflammatory statements**.

Parliamentary Privileges: Parliamentary privileges refer to the **special rights, immunities, and exemptions** enjoyed by the MPs alone and parliament as a whole .

Origin

- Originally, the original Constitution, under **Article 105,** explicitly mentioned two Parliamentary Privileges:
  - **Freedom of speech in Parliament**, and
  - **Right of publication of its proceedings.**
- With regard to other privileges, Article 105 provided that they were to be the **same as those of the British House of Commons**, its committees, and its members on the date of its commencement i.e. 26th January 1950, **until defined by Parliament.**



Categories of Privileges

Individual Privileges- Article 122	Collective Privileges -Article 105
Those that are individually enjoyed by the members. **MP's Have Freedom of Speech**:within the House and cannot be sued or prosecuted for anything said or any vote given by him in the course of parliamentary proceedings. **Freedom from Arrest:**In civil cases during the session of Parliament and 40 days before and after the session. However, this does not extend to criminal cases. **Exemption from Jury Service:** during the session of Parliament and while attending to their duties.	**Those that are collectively enjoyed by each House of Parliament.** ❖ **Right to publish** its reports, debates, and proceedings. ❖ **Right to exclude strangers** from its proceedings ❖ **Right to make rules** to regulate its own procedure ❖ **Right to punish members** as well as outsiders for breach of its privileges ❖ **The courts prohibited inquiring i**nto the proceedings of a House. ❖ **Publication of expunged proceedings.**

Purpose:

- **MPs/MLAs can freely express their opinions and participate in debates** without fear of legal repercussions.
- **The Houses can maintain their authority, dignity, and honour.** This foster's public trust and respect for the legislative process..

Breach of privilege: A breach of privilege is a violation of any of the privileges of MPs/Parliament. This may include publishing of news items, editorials or statements made in newspaper/ magazine/TV interviews or in public speeches.

- **Punishment in case of breach of privilege or contempt of the House:**The house **can ensure attendance of the offending person**. The offending individuals were **sentenced to simple imprisonment.**

Concerns:

Codification of parliamentary privileges:

It **refers to the process of formally defining and documenting the special rights, immunities,** and powers of Members of Parliament (MPs) and the legislative bodies in written law.

Argument For Codification:

- **Clarity and Transparency**
- **Judicial Interpretation**:would help in resolving conflicts between parliamentary privileges and fundamental rights.
- **Accountability and Oversight** – A codified framework would introduce a structured approach to parliamentary privileges, promoting responsible exercise by parliamentarians

Arguments Against Codification

- **Flexibility**
- **Complexity of Definition**
- **Constitutional Constraints –** The proposal to codify parliamentary privileges **violates Article 122,** which limits judicial scrutiny over parliamentary procedures.

- **Political misuse:** It can be used to evade accusations or inquiries unrelated to legislative duties thus reducing accountability.
- **Delays in legal proceedings:** Legal proceedings involving legislators may be delayed compared to those involving regular individuals.
- **Conflict with constitutional principles:** Parliamentary privileges may sometimes conflict with other constitutional principles, **such as equality before the law.**
  - For example, the privilege of immunity from arrest and legal process may be seen as giving members of parliament special privileges that are not available to other citizens.
- **Lacks codification** – Most of the privileges being based on conventions and precedents lack codification.

SC judgements

- ***State of Kerala Vs. K. Ajith and Others 2021* –** The Supreme Court has observed that parliamentary privileges and immunities **are not gateways to claim exemptions from the general law of the land** which governs the action of every citizen.
- ***Sita Soren Vs Union of India Case, 2024*** – In this case, the Supreme Court **overturned its judgement in the *P.V. Narasimha Rao vs State (CBI/SPE) Case,* 1998**. The court said that the **parliamentarians do not enjoy Parliamentary Immunity for acts of bribery.**

Way Forward

- **Use privileges responsibly:** Members of parliament should not abuse them for personal or political gain. This means **avoiding using privileges to make inflammatory or baseless allegations.**
- **Codification of Parliamentary Privileges :42nd Report of the Law Commission of India (1971)** and the **National Commission to Review the Working of the Constitution (2002)** have discussed the need for codification.

International Practices

- **Australia:** In Australia, the privileges of members of parliament are codified by Parliamentary Privileges Act 1987, and are subject to review by the courts.
- **United Kingdom:** Parliament possesses privileges such as the freedom of speech within the house, exemption from arrest, and the autonomy to govern its internal affairs.
- **Canada:** Members are granted privileges that include the right to speak freely, immunity from arrest in civil cases.

Police Reforms

Sub Topic- *Governance*

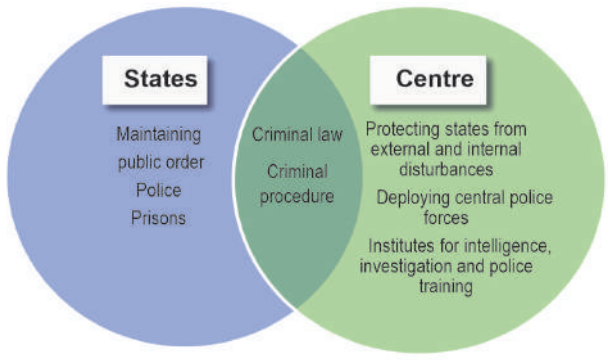
Context:

With the new criminal laws coming into effect from 1st July 2024, there have been changes in the basic duties of the police, including the procedures for registering FIRs, videography, and provisions for arrests.

Important Provisions under new criminal laws

- **Rules for registering FIRs:** The officer in charge of a police station must register a **zero FIR** regardless of jurisdiction and transfer it to the appropriate station.
  - The Bharatiya Nagarik Suraksha Sanhita (BNSS) mandates this under **Section 173,** with penalties for noncompliance.
- **Rules for videography:** The BNSS requires police to videograph searches (Section 185), crime scenes (Section 176), and property possession (Section 105). Negligence may benefit the accused, so officers need electronic devices and training.
  - The **eSakshya app by NIC** (National Informatics Centre) captures geo-tagged, time-stamped photos and videos, ensuring data integrity, and is accessible to the judiciary, prosecution, and cyber forensics under the ICJS.
- **Provision of arrest:**The BNSS mandates displaying information about arrested persons at police stations(Section 37) and **restricts arresting frail, sick, or elderly individuals(Section 35(7)) without DySP permission for minor offences**.

Figure : Responsibilities of centre and states with regard tpolice



Sources: Schedule 7 and Article 355, Constitution of India, 1950; PRS.

- **Handcuffs are permitted but must be used cautiously**, only if there's a risk of escape or harm.

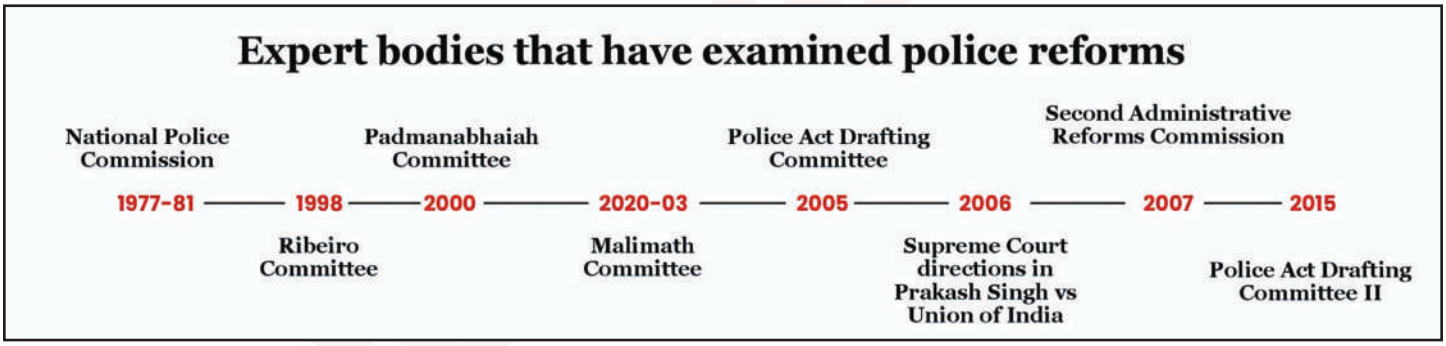
Constitutional provision of police system

- Police is an **exclusive subject under the State List** (List II, Schedule 7 of the Constitution).
  - However, the centre is also allowed to maintain its own police forces to assist the states with ensuring law and order. For ex- CRPF, CISF.

Need for Police Reforms in India

- **Government spending on police modernization is low due to inadequate allocation and underutilization of funds.**
- **An overburdened police force:**As of January 1, 2022, India's police-public ratio is 152.80 per lakh persons, below the sanctioned ratio of 196.23 per lakh persons and well below the UN-recommended standard of 222 police per lakh persons.
  - **86% of state police are constables** who typically receive one promotion and usually retire as head constables, which may reduce their incentive to perform well.
- **Centre- state tussle :**Despite policing being a state subject, the public often favours **CBI investigations over state police interventions** due to lack of trust in local forces, resulting in tensions between the Centre and states.
  - Examples include conflicts like those between West Bengal Police and the CBI, and states like **Tamil Nadu withdrawing general consent for CBI investigations.**

Recommendation regarding police reforms



- **The Padmanabhaiah Committee (2000) proposed standardising police recruitment and training.**
- **The Second Administrative Reforms Commission (2007)** proposed **separating crime investigation from law and order maintenance** within the police.
- **Malimath Committee 2003**:A complete revamp of the entire criminal procedure system like **Creation of fund to compensate victims** turning hostile under pressure of culprits and **Separate national level authority** to deal with crimes threatening the country's security.
- In the case of **Prakash Singh v. Union of India (2006),** the Supreme Court **addressed police abuse of power** and political interference by issuing guidelines:
  - **Fixed tenure and selection process for Directors General of Police (DGPs)** to prevent last-minute appointments.
  - **Police Establishment Boards (PEB)** to handle officer postings.
  - **State Police Complaints Authority (SPCA)** for public grievances against police actions.

Way Forward

- State Governments are tasked with adopting the **Model Police Act 2006** drafted by the Central Government to modernise and reform their police forces into a **SMART entity:** Strict and Sensitive, Modern and Mobile, Alert and Accountable, Reliable and Responsive, Techno-savvy and Trained.
- **Police-public relations:**The **2ndARC highlighted poor police-public relations** due to perceptions of corruption, inefficiency, political bias, and unresponsiveness.
  - Addressing this can be achieved through **community policing models like Kerala's 'Janamaithri Suraksha Project', Rajasthan's 'Joint Patrolling Committees', and Assam's 'Meira Paibi'.**
- **Revamp the 'Thana' system,** which serves as the fundamental unit of police operations and connects directly with the public.

- Priority should be given to **enhancing the working conditions of constables** at the thana level.

❖ **NITI Aayog Suggestions on Police Modernisation**

- **Greater representation of women**- The states should be encouraged to ensure that the representation of women in the police force is increased.
  - For ex- **Bihar's 33% women in police force rule.**
- **Place police and public order in Concurrent List.**

Caste Census

Sub Topic- *Government Policies & Interventions*

Context:

With the **census delayed until the end of 2024**, there is a demand to **amend the Census Act of 1948 to make caste enumeration mandatory**, rather than leaving it to the discretion of the Union executive.

❖ **Census:** A comprehensive 10-year process in India collecting demographic, economic, and social data. Before 1931, all castes were included hence there are calls for a 2021 socio-economic caste census.

- **Legally backed by census act 1948**, and only cover **data of SC/ST.**
- The subject of census is covered in the **Union List under Entry 69 in the Seventh Schedule of the Constitution.**
- Conducted by **Office of the Registrar General and Census Commissioner of India, Ministry of Home Affairs.**

❖ **Caste Census:** The **first socio-economic caste census** in independent India was in **2011,** but its findings were not published. The **last comprehensive caste data was in the 1931 census.**

- **No legal backing**

❖ **Caste Survey:** Since only the Union government can conduct a census, states like **Bihar and Odisha** have conducted their own socio-economic caste surveys to assess the social and economic status of different castes.

- **No legal backing**

Need for caste census to include OBC's

❖ **Social imperative:** Caste continues to be a foundational social construct in India. Only about 5% of Indian marriages were inter-caste as of 2011-12.

- Choices of candidates for elections and ministers for Cabinets continue to be dictated by caste considerations.

❖ **Constitutional imperative:**For providing reservation, education and public employment e.g. **Article 15(4),Article 16(4) and Article 340.**

Caste-based census

YEAR	OUTCOME
1872	Classified population into Brahmins, Kshatriyas, Rajpoots, other castes based on profession, native Christians, Aboriginal tribes, semi-Hindooised tribes
1901	1,642 castes
1931	4,147 castes
1941	Census curtailed due to World War II
2011*	Over 46 lakh caste names, sub-castes, surnames and gotras. Caste numbers withheld citing inaccuracies.

*socio-economic and caste census

Commissions dealing with issues related to OBCs

Kaka Kalelkar Commission (1953)	Identified 2,399 backward castes, including 837 most backward castes. Recommended caste-based census in 1961. Report rejected. Government says no objective tests for identifying backward class.
Mandal Commission (1979)	Identified OBCs comprise 52% of India's population, granted 27% reservation in government jobs.
Rohini Commission (2017)	Recommends 27% reservation for OBCs be divided into four sub-categories. Finds 97% of jobs and educational seats went to 25% sub-castes. 10% of the 2,633 OBC communities cornered 25% of these jobs, while 983 communities had zero representation.

The OBC vote in Lok Sabha elections

	1996	1998	1999	2004	2009	2014	2019
Congress	25.00%	21.00%	25.00%	24.00%	24.00%	15.00%	15.00%
BJP	19.00%	26.00%	23.00%	23.00%	22.00%	34.00%	44.00%
Regional Parties	49.00%	44.00%	41.00%	43.00%	42.00%	43.00%	27.00%

- **Administrative imperative:**To include beneficiaries and eliminate ghost beneficiaries, needed for sub-categorising castes within a reserved category and to determine the income/wealth criterion for the creamy layer.
- **Moral imperative:**Absence of data leads to dominant groups among OBC getting disproportionately high benefits .
- **Reservation in Local bodies:** Unlike SCs and STs, OBCs lack reservations in MP and MLA constituencies but have them in panchayats and municipalities (Articles 243D(6) and 243T(6)) since the 73rd and 74th amendments (1993).
  - States like MH,UP, KN implementing OBC reservations in local elections faced judicial stays due to the absence of this data.
- **Better targeting of Government welfare schemes:**
  - Under the National Food Security Act, 83.92% of Bihar's population is entitled to subsidised food grain. However post Bihar caste survey it was found out that 90% population needed subsidised food grain.

Argument against Caste Census

- **Socially divisive as it strengthens caste identities.**
- **Administrative nightmare of conducting caste census of 4000 castes**

Failed caste census of 2011

- In **2010, Parliament resolved to include caste in the 2011 Census.**
- The **1931 Census listed 4,147 castes.**
- However, the **Socio Economic and Caste Census (SECC) of 2011 was flawed, reporting an implausible 46 lakh castes,** and its results were never released.
- The **SECC failed because it wasn't conducted under the Census Act, 1948**, and used **poorly designed questionnaires** by inexperienced Union Ministries.
- In contrast, **Bihar's 2023 Caste Survey, using a list of 214 specific castes, yielded better results.**
- Despite the 2010 resolution, the **Central government decided against including caste in the next Census in 2021** and upheld this before the Supreme Court in a case filed by Maharashtra.

- **Fuel demands for increased reservations:e.g.** demands by Marathas, Patidars, Jats, for reservations. And thus may lead to **breaching the 50% reservation cap** as guided by SC in ***Indra Sawhney & Others vs Union of India.***
  - Increased reservation may **hamper efficiency of administration (Article 335)**
- Instead of focusing on a caste-based census, the **government can subclassify Backward Classes,** as done in Tamil Nadu, Andhra Pradesh, and West Bengal, to better target benefits.
  - **Justice G. Rohini Panel on Sub-categorisation of OBCs** has already been appointed for this purpose.

Way Forward

- To avoid SECC-2011 failures, the **Census Act, 1948 should be amended to mandate caste enumeration** by the Census Commissioner.
- Caste should be **included in the regular Census with a well-designed questionnaire**
  - Sociological/anthropological experts should **create a draft list of castes for each state.**
- States should urge the **Supreme Court to review its 2021 judgement as relying on outdated 1931 data for OBC reservations** is inadequate.

Right to Repair

Sub Topic- *Government Policies & Interventions*

Context:

Centre asked the **automobile companies to join the unified Right to Repair Portal** India which has been launched by the Department of Consumer Affairs.

About Right to Repair(RtR)

It would be **mandatory for manufacturers to share their product details** with **customers so that they can either repair them by self or by third parties,** rather than only depending on original manufacturers.

- **Obligation to repair** :The new rules ensure that manufacturers provide timely and cost-effective repair services and inform consumers about their rights to repair.
- **Information on repair conditions and services:**To help them assess and compare repair services (detailing the nature of the defect, price and duration of the repair).

Right to Repair Portal of Ministry of Consumer Affair

- This portal has a **consolidated list of consumer care contact details of all major consumer products** manufacturers for your quick viewing.
  - The portal **offers a centralised consumer grievance redressal mechanism,** listing contact details from the Ministry of Consumer Affairs to local district-level commissions, serving as a one-stop shop for customers seeking repairs and information.
- **Find warranty and post-sales service information**.
- **Links to the service network of the brands.**
- **Sectors Covered:**
  - **Farming Equipment** e.g. Tractor parts, Harvesters.
  - **Consumer electronics** eg Mobiles, Tablets.
  - **Consumer Durables** eg Water Purifiers, Washing machines, Refrigerators.
  - **Automobile equipment** e.g. Passenger vehicles,2 wheelers, cars.

Significance of Right to Repair

- The framework also aims to help harmonise the trade between the Original Equipment Manufacturers (OEMs), third-party buyers and sellers - thus **revitalising the repair market and also creating new jobs.**
- It will help **reduce electrical waste (e-waste)** and boost business for small repair shops, which are an important part of local economies.
  - **India generated around 16 lakh tonnes of e-waste in FY'22,** of which less than one-third was recycled, the rest ending up in landfills.
- It **will save consumers money and contribute to circular economy** objectives by improving the life span, maintenance, re-use, upgrade, recyclability, and waste handling of appliances.
- It will give a **boost to LiFE (Lifestyle for the Environment)** movement through sustainable consumption : RtR policy can **help achieve India's commitment to reach carbon neutrality by 2070** during its transition to a green economy.

International Practices

- **The UK passed a law** that includes all the electronic appliance manufacturers to provide consumers with spare parts for getting repair done either by themselves or by the local repair shops.
- **Australia** has repair cafes that are basically free meeting places where volunteer repairmen gather to share their repairing skills.
- **The European Union** passed legislation that requires manufacturers to supply parts of products to professional repairmen for a period of 10 years.
- **USA** has directed manufacturers to remedy unfair anti-competitive practices and asked them to make sure that consumers can make repairs, either themselves or by a third-party agency.

Challenges

- **Manufacturer Resistance:**Many manufacturers oppose right-to-repair laws, citing **intellectual property** and safety concerns often restricting access to spare parts, repair manuals, and diagnostic tools.
- **Consumer Awareness:**Low awareness among consumers about their rights and available repair options.
  - Currently, it primarily serves as a collection of verified links and blogs for customers, offering no distinctive features that aren't already accessible to tech-savvy users through basic online searches.
- **Voluntary registration** system limits the scope and depth of information available on the portal. GoI should collaborate with manufacturers to make it mandatory for them to register on the portal and provide repair-related information
- **Technological Complexity:**Modern devices are increasingly complex, making repairs difficult without specialised knowledge and tools.
- **Environmental Concerns:**Improper repairs can lead to increased e-waste and environmental harm.

Way Forward

- **Manufacturer Collaboration:**Encourage manufacturers to collaborate with independent repair shops and develop industry standards for repairs to ensure safety and quality.
- Inspired by **global best practices**, the RtR portal should implement a **product repairability index.** This index would inform customers about the **ease of repairing a product,** aiding in informed purchasing decisions and allowing for product comparisons across companies.
- As India aims to become a global manufacturing hub, **balancing Right to Repair (RtR) legislation is crucial.** Strengthening RtR laws must address consumer grievances without deterring foreign manufacturers concerned about intellectual property rights (IPR).

Money Bill Route for Contentious Amendments

Sub Topic- *Parliament, Constitutional Amendments and Significant Provisions*

Context:

Chief Justice of India D.Y. Chandrachud agreed to **list petitions challenging the Centre's Money Bill route t**o passing contentious amendments in the Parliament.

More in News:

- The Money Bill question was referred to a seven-judge Bench in November 2019 by a five-judge Bench headed by Chief Justice Ranjan Gogoi in the case of ***Rojer Mathew vs South Indian Bank Ltd*** **(2019).**

- The cardinal issue is whether such amendments could be passed as a **Money Bill, circumventing the Rajya Sabha, in violation of Article 110** of the Constitution.

About money Bill:

- **Article 110 of the Constitution** deals with the definition of money bills:It states that a bill is deemed to be a money bill if it contains **'only'** provisions dealing with all or any of the following matters:
  - The **imposition, abolition, remission, alteration or regulation of any tax**;
  - The **regulation of the borrowing of money by the Union government**;
  - The **custody of the Consolidated Fund of India** or the contingency fund of India, the payment of monies into or the withdrawal of money from any such fund;
  - The **appropriation of money out of the Consolidated Fund of India**;
  - Declaration of **any expenditure charged on the Consolidated Fund of India** or increasing the amount of any such expenditure;
  - The **receipt of money on account of the Consolidated Fund of India** or the public account of India or the custody or issue of such money, or the audit of the accounts of the Union or of a state; or
  - Any matter incidental to any of the matters specified above.
- However, a bill is **not to be deemed to be a money bill** by reason only that it provides for:
  - The imposition of **fines or other pecuniary penalties**, or
  - The demand for payment of **fees for licences or fees for services rendered**; or
  - The **imposition, abolition, remission, alteration or regulation of any tax** by any local authority or body for local purposes.

Financial bills:

- Are those bills that **deal with fiscal matters, that is, revenue or expenditure.** However, the Constitution uses the term financial bill' in a technical sense.
- **Financial bills are of three kinds:**
  - Money bills–Article 110
  - Financial bills (I)–Article 117 (1)
  - Financial bills (II)–Article 117 (3)
- This classification implies that **money bills are simply a species of financial bills.**
- Hence, **all money bills are financial bills but all financial bills are not money bills.**
  - Only those financial bills are money bills which contain exclusively those matters which are mentioned in Article 110 of the Constitution.
  - These are also certified by the Speaker of Lok Sabha as money bills.

- **Passage of the Bill (Article 109):**
  - **Lok Sabha :** Money bill can **only be introduced in the Lok Sabha** and that too **on the recommendation of the president.** Every such bill is **considered to be a government bill and can be introduced only by a minister.**
    - **Role of Lok Sabha Speaker:** The Speaker of the Lok Sabha **has to certify that a bill being introduced in the house is a Money Bill.**
      - **Judicial Review: The** Supreme Court in 2018 while delivering the judgement upholding the Aadhaar Act stated that the **Speaker's decision will be subject to judicial scrutiny.**
  - **Rajya Sabha:** After a money bill is passed by the Lok Sabha, it is transmitted to the Rajya Sabha for its consideration.
    - The Rajya Sabha has **restricted powers** with regard to a money bill.
    - It **cannot reject or amend a money bill.** It can **only make the recommendations.** It must return the bill to the Lok Sabha within **14 days,** whether with or without recommendations.
    - The **Lok Sabha can either accept or reject** all or any of the recommendations of the Rajya Sabha.
  - **Joint Sitting: No provision** of joint sitting of both the Houses.
  - **President:** It **can be rejected or approved but cannot be returned** for reconsideration by him.

Challenges with respect to passage as a Money bill:

- **Circumvention of the Rajya Sabha:** The government is accused of misusing the Money Bill provision to **evade scrutiny of the Bill by the Rajya Sabha** where it was numerically weaker as compared to the Lok Sabha where it enjoyed pre-eminence.
- **Ambiguity in Article 110:** The **definition** of what constitutes a Money Bill under Article 110 of the Constitution is **somewhat** ambiguous, leading to differing interpretations and potential misuse.
  - **Broad Classification:** Bills that **include non-financial provisions are sometimes classified as Money Bills,** which can lead to disputes over their validity e.g. **Appellate Tribunal Rules of 2017 passed with Finance Act 2017.**
- **The scope of Judicial Review on Speakers' power to declare money bills** is still not clear. There are **allegations of partisan role by the speaker** through the sole discretion given to the speaker for certifying the bill as a money bill.

Cases Challenged Concerning the Passage Of Bills As Money Bills

- **Aadhaar Act, 2016:** Legality of Aadhar Act as a Money Bill
  - **Judgement:** The Supreme Court in ***Justice K.S.Puttaswamy Vs Union Of India(*** **2018) upheld the constitutionality of the Aadhaar Act, 2016 on the ground that**
    - The main aim of the Act was to provide subsidies and benefits, which **involved expenditure from the Consolidated Fund, and qualified the Act to be passed as a Money Bill under Article 110.**
- **Prevention of Money Laundering Act (PMLA) Amendments:**
  - **The Finance Acts passed in 2015 brought in crucial amendments to the PMLA.**
  - Though the court had **upheld the legality of the PMLA amendments, it left the question whether the amendments could have been passed as Money Bills to the seven-judge Bench.**
- **Tribunal Reform: In *Roger Matthew Vs Union of India* (2019),**five-judge Bench struck down the Tribunal Rules as unconstitutional for interfering with judicial independence, but **referred the Money Bill aspect to a larger seven-judge Bench.**

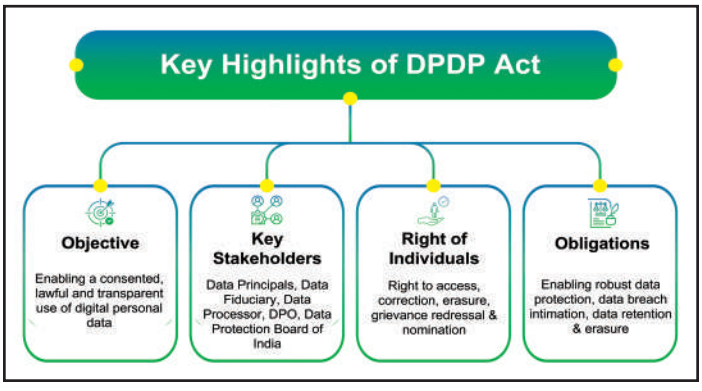
Parental Consent in Digital Personal Data Protection Act, 2023

Sub Topic- *E-Governance, Government Policies & Interventions*

Context:

The industry has welcomed the DPDP Act for its easy compliance structure, but the provision for gathering verifiable parental consent has created a divide between the industry and the government.

Digital Personal Data Protection Act, 2023 (DPDP Act):



- It is India's legal framework to **protect individuals' personal data and ensure data sharing only with consent.**
- It **regulates digital data processing and outlines provisions to safeguard privacy** in the digital age.
- **It is based on seven principles:**
  - **Consented**, lawful, and transparent use of personal data.
  - Purpose limitation (using data only for the specified purpose).
  - Data minimization (collecting only necessary data).
  - Data accuracy (ensuring data is correct and updated).
  - Storage limitation (storing data only as long as needed).
  - Reasonable security safeguards.
  - Accountability (adjudicating breaches and imposing penalties).
- It applies to **processing of digital personal data within India**, whether collected **online or offline and digitised** later.
  - It also covers **data processing outside India** if it involves **offering goods or services within India.**
- The act provides that a **data fiduciary** (determining purpose and means of processing personal data) **may process a child's (under 18) data** only with **prior verifiable consent from the parent or guardian.**
- **Exemptions:**
  - Certain entities like healthcare and educational institutions may be exempt from obtaining verifiable parental consent.
  - Other entities might be exempt on a restricted basis, depending on the specific purpose of processing a child's data.

Challenges in Implementing Verifiable Parental Consent:

- The Act requires tech companies to **verify a child's age** (people below the age of 18) **and obtain parental consent** before processing their personal data.
- However, the Act **does not suggest ways for platforms to perform age-gating** and reliably establish the relationship between a child and their parents.
- This became a challenge for the **Ministry of Electronics and Information Technology**, as it has been unable to narrow down on a **conclusive technological intervention** to implement this requirement.
- The ministry considered using parents' **DigiLocker app** (based on Aadhaar details) or an **industry-created electronic token system** for this purpose.
- However, the ministry no longer believes these solutions can be implemented at scale and has dropped the ideas.

Way Forward:

- **Justice B.N. Srikrishna Committee** on a Data Protection Framework for India stated that **consent is a pre-condition for processing personal data**.
- For vulnerable groups like **children** and for **sensitive personal data**, **law should provide adequate protection**, requiring explicit consent for sensitive information.
- **Economic Survey 2018-19** emphasised the importance of data as a critical resource in the modern economy, **comparing it to oil in the digital age**.
  - It recommends **utilising technological advances to eliminate all privacy concerns.**

Global Approaches to Verifiable Parental Consent

- The **U.S. Children's Online Privacy Protection Act** (COPPA) provides a list of acceptable methods, such as **signed consent forms, online payment systems, and facial recognition.**
- The **EU's General Data Protection Regulation** (GDPR) requires data collectors to make "**reasonable efforts**" using available technology to verify parental consent, considering the risks and available technology.

State's Right to Levy Tax on Mineral Rights

Sub Topic- *Governance, Government Policies & Interventions*

Context:

The Supreme Court, in a decision by a 9-judge constitution bench with an 8:1 majority, ruled that **states have the authority to levy taxes on mineral rights**.

Constitutional Provision under Schedule VII

- **Entry 54 List I(Union List):** Power of the **Parliament to regulate** mines and mineral development to the extent to which such regulation and development is deemed as per a Parliamentary Law to be necessary in the public interest.
- **Entry 49 List II(State List): States' powers to levy taxes on lands** and buildings.
- **Entry 50 List II: States' powers on taxing mineral rights.** The State Governments have the authority to impose taxes on the extraction and subsequent use of minerals within their territories.
  - However, such a power is **subject to 'any limitations imposed by Parliament** by law relating to mineral development'.(e.g. MMDR ACT 1957).
- **Article 297: All lands, minerals** and other things of value underlying the ocean within the territorial waters, or the continental shelf, or the exclusive economic zone, **of India shall vest in the Union and be held for the purposes of the Union.**

The judgement clarified that the Union law, the **Mines and Minerals (Development and Regulation) Act of 1957(MMDR Act 1957), does not limit this power of the states.**

More in News:

- The majority verdict given in ***Mineral Area Development Authority Etc vs M/S Steel Authority Of India & Ors (2011)***, **overruled** the 1989 decision of a 7-judge Bench in ***India Cement Ltd vs State of Tamil Nadu(*1989*)***
  - It said **royalty is tax** and **state legislatures lack competence to levy taxes on mineral rights** because the subject matter is covered by the MMDR Act, 1957, enacted by Parliament in exercise of powers under Entry 54 of List I (Union List) of the Constitution.
  - The majority ruling said **royalty, as envisaged under Section 9 of the 1957 Act, "is not in the nature of tax"**.

Royalty vs Tax

- Royalties are **based on specific contracts or agreements** between the mining leaseholder and the lessor (the person who leases the property**)** who **can even be a private party.**
- Also, **taxes are meant for public purposes such as welfare schemes** and creating public infrastructure, whereas the payment of **royalties is to a lessor in exchange "for parting with their exclusive privileges in the minerals.**

Definition of minerals

As per MMDR Act

- **"minerals" includes all minerals except mineral oils.**
  - **"mineral oils" includes natural gas and petroleum.**

Major and Minor minerals

- **Major Minerals under the MMDR Act**
  - Major minerals are **specified in the first schedule of the MMDR Act 1957.**
  - **Common major minerals include lignite, coal, uranium, iron ore, gold, etc.**
  - There is **no official definition for "major minerals"** in the MMDR Act.
  - Minerals **not declared as "minor minerals" are treated as major minerals.**
- **Minor minerals**
  - **Means building stones, gravel, ordinary clay, ordinary sand other than sand used for prescribed purposes, and any other mineral which the Central Government may declare to be a minor mineral.**
  - **The Indian Bureau of Mines added 31 minor minerals to the list of minor minerals in 2015 , e.g. Barytes, Calcite , Feldspar, Dolomite, Granite** etc.

Majority verdict:

- **Royalty is not within the nature of a tax Entry 54 of List 1(Union list) is a regulatory entry** dealing with the regulation and development of mines and minerals.
  - Regulatory entries are **distinct from taxing entries.**
  - **Entry 54 of List 1, being a general entry, does not include the power of taxation of the Union.**
- Under **Entry 50 List II** the **legislative power to tax mineral rights vests with the state legislatures**.
  - State legislatures have **legislative competence under Article 246 read with Entry 49 of List 2** to tax land which comprises mines and quarries. containing minerals.
  - Mineral-bearing lands fall within the description of 'lands' in Entry 49.
  - Since the power to tax mineral rights is enumerated in Entry 50 of List 2, **Parliament cannot use its residuary power with respect to that subject matter.**
  - Entry 50 of List 2 envisages that the **Parliament can impose any limitations** on the legislative field of the States through a law relating to mineral development.
    - The **MMDR Act, as it stands, does not impose any such limitations**.
- Any dilution in the taxing powers of the State legislatures will **necessarily impact their ability to raise revenues,** which in turn will impede their ability to **deliver welfare schemes and services to the people.**
  - The ability of the State governments to invest in physical infrastructure, health, education, human capacity, and research and development is directly correlated to the raising of government revenue.
- The taxing power to the state will **benefit mineral-rich States such as Chhattisgarh, Jharkhand and Odisha** who continue to have per capita income below the national average.

Dissent view:

- Justice B.V. Nagarathna said the States' power to tax under **Entry 49 of List II did not include "mineral-bearing lands"** and **royalty is in the nature of a 'tax' .**
  - Taxing **powers of a State legislature were subjected to limitations imposed by Parliament by law relating to mineral development.**
- Allowing states to impose taxes on minerals would **lead to unhealthy competition among states to derive additional revenue and consequently,** the steep uncoordinated and uneven increase in cost of minerals **which can possibly result in the erosion of the federal system.**
  - **Parliament would have to again step in to bring about a uniformity in the prices of minerals** and in the interest of mineral development so as to curb the states from imposing levies, taxes, etc. on mineral rights.

Steps taken by the government to promote mines & mineral development:

- **The MMDR Act 2015 was amended to create District Mineral Foundation (DMF)**
  - The **District Mineral Foundation (DMF) is a Trust and non-profit body** established in districts affected by mining, as mandated by the MMRDA, 2015.
  - Operated by the state government, it is **funded through contributions from miners.**
  - It **implements the PM Khanij Kshetriya Kalyan Yojana, 2015** for the welfare of areas and people affected by mining.
- **Budget 2024-25** has the following provisions for the development of critical minerals.
  - **Critical Mineral Mission** to be set up for domestic production, recycling of critical minerals, and overseas acquisition of critical mineral assets.
  - **Fully exempt 25 critical minerals from custom duties** and reduce basic custom duties (BCD) on two of them eg. **Antimony, Beryllium, Bismuth, Cobalt, Copper, Gallium, Germanium.**

Disqualification of Two Jharkhand MLA Under Anti- Defection Laws

Sub Topic- *Salient features of the Representation of People's Act*

Context:

The **Jharkhand Assembly Speaker's Tribunal** disqualified **JMM MLA Lobin Hembrom** and **BJP MLA J.P. Patel** under the anti-defection law in the ongoing monsoon session of the Jharkhand Assembly.

More in News:

- Both MLAs were found guilty of defection under the 10th Schedule of the Constitution as they had **contested the Lok Sabha elections against their party's wishes.**
- Hembrom contested against his party's candidate, and contested as an independent candidate, leading to his suspension by JMM president Shibu Soren.
  - The tribunal **considered Hembrom's past contest as an independent in 1995 but found the current defection valid**.
- **Patel joined Congress and contested against BJP's candidate**, leading to a complaint from BJP's Amar Kumar Bauri.

About Anti- Defection Laws:

- Introduced through the **52nd Amendment Act of 1985** and encapsulated in the **Tenth Schedule of the Constitution**, seeks to curb the **issue of political defection** by imposing sanctions on lawmakers who switch parties or breach party discipline.

Exceptions:

Party Mergers: Legislators can change parties without disqualification **if at least two-thirds of the legislators support the merger with another party.**

- This Provision was added to the **91st Amendment Act of 2003.**
- **Split :**Provision in the Tenth Schedule allowing exemption from disqualification for splits involving **one-third of a legislature party was removed by the 91st Amendment Act of 2003.**

Provisions of Anti-Defection Laws:

Members of Political Parties:

- Disqualified if they voluntarily give up party membership.
- Disqualified if they vote or abstain from voting against party directions without prior permission and without party condoning the act within 15 days.

Independent Members:

- Disqualified if they join any political party after being elected.

Nominated Members:

- Disqualified if they join any political party after six months from the date they take their seat in the House.
- Allowed to join any political party within the first six months without disqualification.

Deciding Authority

- The Speaker of the House or the Chairman of the Legislative Council is the final authority on matters related to defection. Their decision on such issues is conclusive and cannot be contested in any court.
  - However in the ***Kihoto Hollohan v. Zachillhu and Others (1992):,*** the Supreme Court ruled this **provision unconstitutional,** arguing it improperly removed the jurisdiction of the Supreme Court and high courts.

Need for Anti-Defection Laws:

- **Greater Stability:** It enhances stability in the political system by discouraging legislators from frequently switching parties.
  - **Prevention of 'Aya Ram - Gaya Ram' Politics** which originated from **Haryana MLA Gaya Lal's** actions in 1967, where he switched parties three times in two weeks, highlighting frequent party-switching by legislators.
- **Facilitates Democratic Realignment:** It allows for the democratic realignment of parties in the legislature through mergers.
- **Reduces Corruption and Expenditure:** It minimises political corruption and non-developmental expenses associated with frequent elections.
- **Constitutional Recognition of Political Parties:** It provides clear constitutional recognition to the existence and role of political parties for the first time.

Criticism:

- **No Differentiation Between Dissent and Defection** thereby curbing legislators' rights to dissent and freedom of conscience, promoting party tyranny.
- **Irrational Distinction Between Individual and Group Defection ,**effectively banning only "retail defections" while legalising "wholesale defections.

Recent anti-defection cases

- **Political Crisis in Karnataka (2019):** Several MLAs resigned, causing a political crisis.
  - The Speaker disqualified them under the anti-defection law, and while the Supreme Court upheld their disqualification, it overturned the ban on holding office until the end of their term.
- **Meghalaya Speaker's Decision (2019):** The Speaker disqualified five MLAs under the anti-defection law. The High Court affirmed the disqualification despite challenges, and the Supreme Court declined to overturn the Speaker's ruling.

- **No Provision for Expulsion for Activities Outside Legislature:** It does not allow for the expulsion of a legislator for their activities outside the legislature.
- **Criticism of Vesting Authority in the Presiding Officer:** The presiding officer may not be impartial due to political pressures and lacks the legal expertise to adjudicate defection cases.
  - Notably, former Lok Sabha Speakers Rabi Ray (1991) and Shivraj Patil (1993) expressed doubts about their suitability for this role.
- **Lack of Intra-Party Democracy:** By penalising defectors, the law encourages parties to tightly control their members and discipline those who deviate. This can **deter legislators from voicing concerns against party leaders or addressing issues that might be unpopular within the party.**

Landmark Judgments related to the anti defection law:

- ***Ravi S. Naik v. Union of India (1994):*** In such cases, the Speaker or Chairman of the relevant legislative body has the authority to disqualify an elected representative for defection.
- **In *Keisham Meghachandra Singh v the Hon'ble speaker (2020)*: The Supreme Court upheld the Speaker's decision to disqualify nine MLAs in Manipur.**
  - The Supreme Court ruled that **speakers should decide on disqualification pleas within three months.**

Way Forward for strengthening anti-defection legislation:

- **Strengthening Disqualification Provisions:** Implementing clear and specific criteria for disqualification—such as voting against party policies, voluntarily leaving the party, and defying the party whip in a confidence vote—can help reduce arbitrary disqualifications.
  - **Dinesh Goswami Committee (1990):** Disqualification under the Tenth Schedule should occur if a member voluntarily leaves their party or votes against the party whip in confidence or no-confidence motions.
- **Promoting Intra-Party Democracy and Transparency,** such as electing party leaders and candidates.
- **2nd ARC Recommendations: The president or governor should decide whether to disqualify members on grounds of defection, based on the advice of the Election Commission.**
- **Constitution Review Commission (2002):** Defectors should be **barred from holding public office for the remainder of their term,** and their **votes to remove a government should be deemed invalid.**
- **Law Commission (170th Report, 1999):** Pre-poll electoral alliances should be recognised as political parties under the law.

Subject - Social Justice

Global Education Monitoring Report of UNESCO

Sub Topic- *Issues related to Education, Health, Government Policies & Interventions, Growth & Development*

Context:

A recent report by the Global Education Monitoring Report of the United Nations Educational, Scientific and Cultural Organization **(UNESCO)** has emphasised the enduring impact of climate shocks experienced during early childhood.

More on news:

- The paper, part of a series aimed at fostering **dialogue on education** and the UN-mandated **Sustainable Development Goals (SDGs).**
  - highlights the long-term damage extreme weather events can inflict on a **child's development.**
- Climate change has a **direct effect on education.**

SDG4: Ensure inclusive and quality education for all and promote lifelong learning.

  - Climate-related stressors, such as heat, wildfires, storms, floods, droughts, diseases, and rising sea levels, negatively affect education outcomes.**Vulnerability of Young Children & Climate-Related School Closures:**
- Young children are particularly vulnerable **due to their reliance on adults and developing bodies.**
- Immediate physical hazards from floods, droughts, and heatwaves can have long-term negative impacts on cognitive abilities, emotional well-being, and educational opportunities.
- Most **low and middle-income countries** experience climate-related **school closures** annually, leading to increased learning loss and dropout rates.
- **Over the last 20 years**, at least **75 %** of extreme weather events have resulted in school closures.

Specific Case Studies:

- Children exposed to severe **El Niño floods in Ecuador** while in **utero** were shorter and performed worse on **cognitive tests later.**
- **Rainfall shocks** during early life in **India** negatively impacted vocabulary at age **5 and academic skills at age 15.**
- A study of over **140,000 children** in seven Asian countries found reduced school enrollment for boys and **lower maths performance for girls** due to **early-life disasters.**
- Many **low and middle-income countries** face annual climate-related school closures, increasing the risk of learning **loss and dropout.**
- Extreme weather events have caused at least **75% of school closures** in the **last 20 years.**

Impact of Natural Disasters:

- Natural disasters such as **floods and cyclones** are becoming more frequent, causing **deaths of students and teachers,** and significant **damage** to **schools**.
- The **2013 Jakarta floods** disrupted access to schools, which were converted into emergency shelters or closed due to damage.
- Flood exposure **reduced the number of completed grades** among 12- to 15-year-olds in **Ethiopia (3.4%), India (3.8%), and Vietnam (1.8%)** due to household income loss.
- **Cyclone Idai** destroyed **3,400 classrooms** in **Mozambique** in 2019.
- **Tropical Cyclone Gita** damaged **72%** of Tonga's schools in 2018.

Impact of Heat and Rain Variability:

- **Higher-than-average temperatures** during prenatal and early life in **Southeast Asia** are linked to **fewer years of schooling.**
- **High temperatures in China** lead to **reduced** high-stakes **test performance,** lowering high school graduation and college entrance rates.
- **In Pakistan,** children and adolescents in flooded districts were **4% less** likely to attend school than those in non-flooded districts.
- **Low precipitation and drought-like conditions** in ten **African countries** decreased primary school completion rates by **6.4%.**
- **Drought in rural Maharashtra, India,** reduced **children's mathematics and reading scores by 4.1% and 2.7%, respectively.**

Role of Education in Climate Action:

- Education is **vital** for building a **green economy** and driving **climate action.**
- It is often **deprioritized** in climate agendas due to its perceived link to **unsustainable consumption** and unclear research on its direct impact.
- Climate change education **should expand beyond knowledge** transfer to include **social, emotional, and action-oriented learning.**
- A new global indicator for **greening education is proposed.**

Proactive Measures Needed:

- **Strengthening school buildings** to withstand climate impacts.
- **Training** educators to support students **psychologically and academically** during these challenges.
- Fostering **community resilience** through awareness and adaptation initiatives.
- The report advocates for **greater investment in educational systems** to enhance their resilience to climate-related disruptions.
- Need to include **climate change education** in school curricula, providing not only climate science knowledge but also skills in resilience, adaptation, and **sustainable development.**

Impact of War and Conflict on Children's Education

- **Over 240 million children globally** have had their education disrupted due to **war and violent conflict.** Children exposed to violence are **more at risk** of under-achieving and dropping out of school.
- Schools are often **destroyed, looted, or occupied** during conflicts, leaving children without access to education, affecting o**ver 400 million children** in conflict zones.
- In conflict and crisis, **girls are 2.5 times** more likely to be out of school than boys and are less likely to return post-ceasefire.
- Refugee girls are half as likely to be in school as refugee boys, **according to a 2019 UNHCR report.**
- **In Syria**, millions of children lack formal education due to school **destruction and inadequate facilities.**
- **Ethiopia's Tigray conflict (2020-2022)** damaged approximately 7,000 schools, reversing over a decade of progress.
- **Till January 2023** over 2,600 schools have been damaged and over 400 destroyed across Ukraine, in the Russia-Ukraine **war.**

Rising Mental Health Issues Among Indians

Sub Topic- *Issues related to Health*

Context:

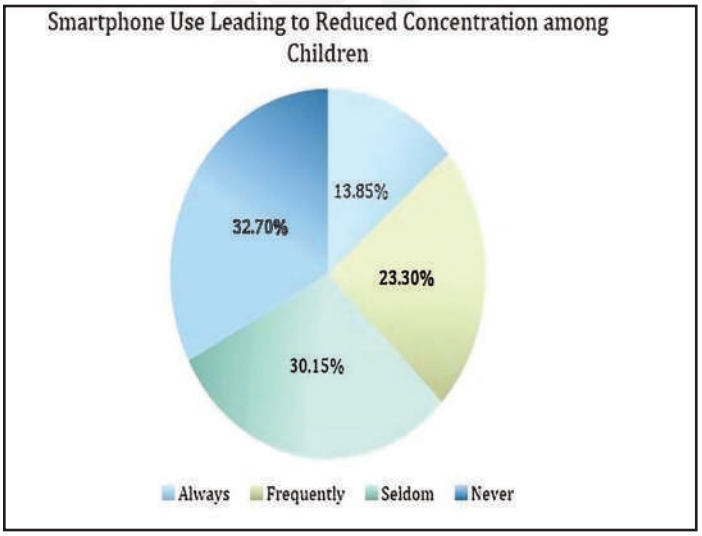
The **Economic Survey 2023-24** highlights that mental health issues have a broader impact on productivity than physical health issues. Addressing mental health is essential for both economic and health reasons.

Key Insights from the Survey:

- **Prevalence of Mental Health Disorders**: The **National Mental Health Survey (NMHS) 2015-16**, reveals that 10.6% of adults in India suffer from mental disorders, with treatment gaps ranging from 70% to 92% for various conditions.
  - Mental health issues are more prevalent in urban metro regions (13.5%) compared to rural (6.9%) and urban non-metro areas (4.3%).
- **Impact on Youth**: NCERT's **Mental Health & Wellbeing of School Students Survey** indicated worrying trends among adolescents, exacerbated by COVID-19.
  - **Key statistics include:**
    - **11%** of students reported feeling **anxious**, while **14%** experienced **extreme emotions** and **43%** faced **mood swings, with academic pressures cited as a primary source of anxiety.**
- **Economic Implications**: The survey highlights that mental health issues lead to significant **productivity losses due to absenteeism, decreased productivity**, and **increased healthcare costs**.
  - It asserts that **mental health impacts the economy more broadly than physical health issues,** necessitating urgent attention from policymakers.

Policy Recommendations and Implementation Gaps:

- **Current Policy Landscape**: India recognizes mental health as a crucial component of overall well-being, with several policies in place.
  - **For example**, **National Mental Health Policy, National Tele Mental Health Programme**, etc.
  - However, the survey emphasises the **need for better implementation** and addressing existing **program gaps.**
- **Increase in Mental Health Professionals:** The report stresses the need to double the number of psychiatrists from **0.75 per lakh population to the WHO norm of 3 per lakh**.
  - This is crucial for addressing the existing treatment gap.
- **Integrating Mental Health in Education**: The survey suggests developing an **age-appropriate mental health curriculum for schools**, encouraging early intervention, and promoting positive language around mental health.
  - **Community interactions and balanced use of technology** are also recommended.
- **Stigma and Awareness**: Survey highlights the importance of overcoming stigma associated with mental health, which often prevents individuals from seeking help.
  - A **community-based approach** is advocated to break this stigma.
  - **For example, Atmiyata**, a community volunteer service in Gujarat, identifies and supports people experiencing mental health issues.
- **Impact of Internet Usage**: **Overuse of internet and social media** particularly among children and adolescents is **linked to rising mental health issues**.
  - **National Commission for Protection of Child Rights 2021** study highlighted that **23.8% of children use smartphones in bed, and 37.2% experience decreased concentration** due to smartphone use.



- **Tripartite Compact(Economic Survey 2023-24)**: A significant component of the tripartite compact is the emphasis on the mental and physical health of citizens.
  - The compact recognises that a healthy population is crucial for sustainable economic growth. It advocates for initiatives that promote health and well-being and ensure that citizens have access to necessary healthcare services.

Initiatives and Policies Taken by Government:

- **National Tele Mental Health Programme (NTMHP) :**
  - It was launched in **October 2022** to improve access to **mental health counselling and care services.**
  - **36 Tele Mental Health and Normalcy Augmentation Systems (MANAS)** Cells have been established by 25 States/UTs to provide mental health services.
  - **The National Institute of Mental Health and Neuro Sciences (NIMHANS), Bengaluru,** serves as the National Apex Centre, overseeing Tele MANAS activities across India.
- National Mental Health Programme
- National Mental Health Policy
- Rashtriya Kishor Swasthya Karyakram's adolescent-friendly health clinics (AFHCs) and peer education programmes.

Subject - International Relations

Petrodollar

Sub Topic- *Effect of policies and politics of developed and developing countries on India's interests*

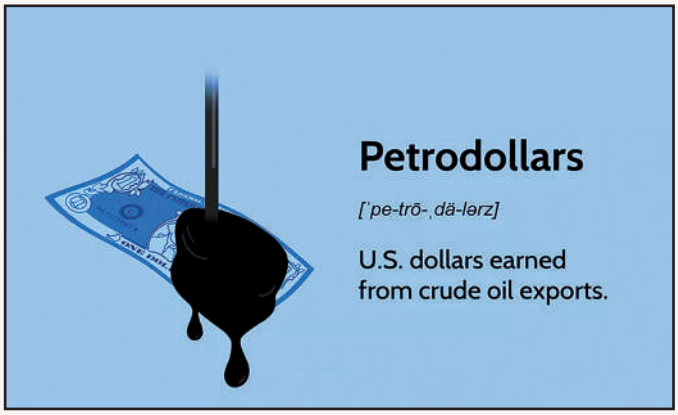
Context:

With the The **50-year-old petrodollar agreement between the US and Saudi Arabia expired** commentators predicted the end of the US dollar as the world's reserve currency, suggesting the Chinese yuan could take its place.

Historical Context

- In **1973**, amid significant economic and political uncertainty like the oil crisis, the **US forged the petrodollar agreement with Saudi Arabia.**
- This pact involved **Saudi Arabia selling oil exclusively for dollars** and reinvesting those dollars into US Treasury bonds to support American fiscal deficits.
- In exchange, Washington committed to supplying military equipment to Saudi Arabia and ensuring its national security, creating a notable **"oil-for-security" relationship**.

What is petrodollar and what does its withdrawal mean

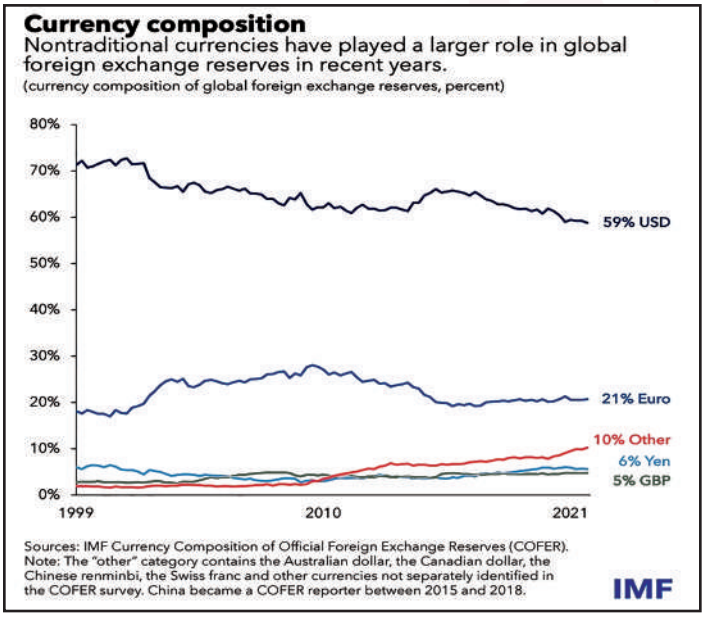


- Petrodollars are **oil export revenues denominated in U.S. dollars**. Petrodollars are **not a distinct currency**; they are simply U.S. dollars accepted as payment by an oil exporter.

Impact of withdrawal of petrodollar:

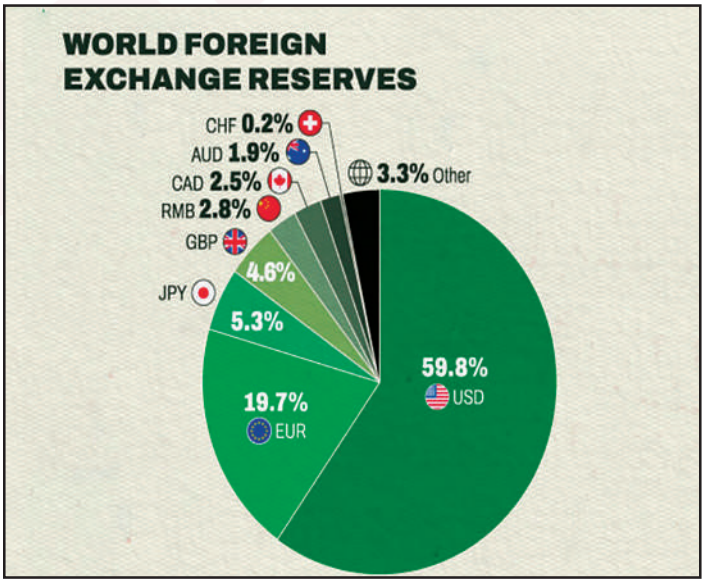
- In the foreseeable future, the dollar's dominance will remain.
- But a **gradual democratisation of the global reserve currency** may be underway, giving way to a world in which more local currencies like Chinese renminbi, the euro, and the Japanese yen can be used for international transactions.

The argument in support of the end of the petrodollar



- **Waning influence of the U.S.** on the world stage, both economically and politically.The **US debt has reached $31 trillion**, with a budget deficit exceeding 16%, which many experts deem unsustainable.
- Since the **American shale oil revolution and the pursuit of energy independence,** traditional oil-producing allies like Saudi Arabia have sought alliances with countries such as China. **This shift aims to lessen their reliance on US demand for their oil.**
  - **Saudi Arabia's Yuan Oil Sales:** Saudi Arabia's decision to sell oil to China in yuan represents a significant blow to the petrodollar system.
- **China has sought to increase its geopolitical influence** by forging economic and political alliances with numerous allies and investing in developing countries through the Belt and Road initiative. Eg **400 billion USD deal with IRAN.**
- **Russia's Ruble Mandate:** Russia has mandated the use of rubles for selling oil and gas to Europe, reducing the demand for dollars.
  - Even **India and Russia have entered into an oil deal where transactions are conducted in Indian rupees**.
  - Over 90% of trade between China and Russia is now conducted outside the US dollar.

Argument against end of petrodollar



- The **U.S. dollar continues to enjoy greater preference for investment** than any other country.
  - The year **2022-23 is an example of how investment funds rushed to U.S. shores** after the Federal Reserve raised rates at short intervals, signalling high investor confidence in U.S. treasuries and the U.S. dollar.
  - The **Saudi Arabian government and wealth funds favour investments in the U.S.** Treasury bills and imports of advanced American technologies, including Artificial Intelligence.
- **China's Yuan hype :**
  - The **Belt and Road Initiative (BRI)** has plagued partner countries like Sri Lanka, which have struggled to repay

loans to China. This practice, known as **"Debt-trap diplomacy,"** has caused many countries to feel pressured.

- **Chinese demand suffered due to the implementation of the zero-COVID policy**, which imposed significant strain on the economy alongside a collapse in the real estate sector.
- China, with its **heavily restricted markets and low-quality exports**, does not possess a better investment prospect and trade partner than the U.S.

Way forward

- The discussion surrounding the decline of the petrodollar and the emergence of the petroyuan is complex and multifaceted.
- Although China has made notable progress in expanding its global influence, the **U.S. dollar remains dominant** due to the strong economic and political foundations of the United States. If a transition to a new global reserve currency occurs, it will be a **gradual process fraught with challenges**.
- **For now, the U.S. dollar continues to be the leading force in global finance**.
- In order that a currency could replace dollar, it **must be freely tradable with a stable economy backing it**, ensuring users can **rely on its value and stability** without concern about the issuing country.

China plans to run trains from Kunming to Singapore

Sub Topic- *Effect of policies and politics of developed and developing countries on India's interests, Indian diaspora.*

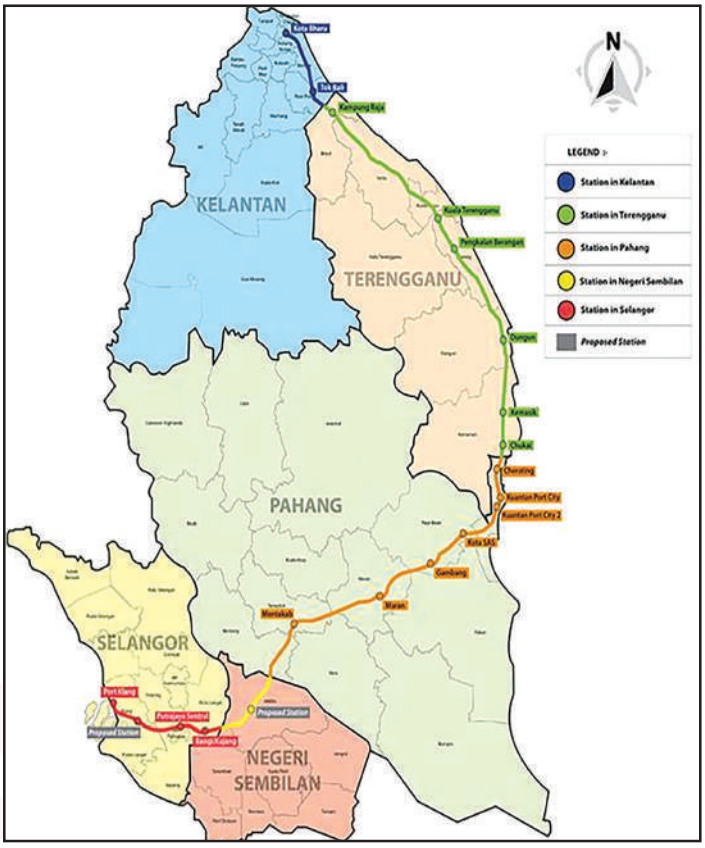
Context:

During his visit to Malaysia last week, Chinese Premier Li Qiang expressed China's willingness to explore connecting its railway projects in Malaysia, Laos, and Thailand to enhance regional connectivity.

Overview: Chinese Premier Li Qiang and Malaysian Prime Minister Anwar Ibrahim attended the groundbreaking for Malaysia's East Coast Rail Link (ECRL) Gombak Integrated Terminal Station.

East Coast Rail Link (ECRL)

- **Project**: The ECRL is a 665-km-long railway connecting Kota Bharu on the northeastern coast of Malaysia with Port Klang on the west coast.
- **Economic Benefits**: Expected to bring significant economic benefits through improved connectivity, including freight movement and tourism.
- **Significance**: Described by Chinese state media as the largest economic and trade cooperation project between China and Malaysia.
- **Project Timeline**: Started in 2017, stalled due to funding issues, and resumed in 2020 with completion expected by 2027.



Historical Challenges:

- **Funding and Political Issues**:
  - **2018:** Malaysian PM Mahathir Mohamad froze the project due to high costs.
  - **Domestic Politics:** The project was affected by the embezzlement scandal involving former PM Najib Razak.
  - **New Agreement:** A revised deal was negotiated in 2020 to lower costs and resume the project.

Pan-Asian Rail Network:

- **Concept**: The pan-Asian rail network includes three main links:
  - **Western Line:** From Kunming via Myanmar and Thailand.
  - **Central Line:** Via Laos and Thailand.
  - **Eastern Line:** Via Vietnam, Cambodia, and Thailand.
- **Additional Line**: Connecting Bangkok with Malaysia and Singapore.

Current Status of Pan-Asian Railway:

- **Operational Sections**: Only the Laos-China section has been operational since 2021.

- **Challenges in Thailand**: Thailand faces high costs and hesitancy to accept Chinese assistance.
- **Completion Delays**: Expected completion by 2028, with potential delays.

Economic and Logistical Concerns:

- **Economic Projections**: Vary railway track widths hinder seamless cargo transportation.
  - **Demand Concerns:** Travellers and cargo transport may prefer cheaper and faster air and maritime options.

Larger Geopolitical Context:

- **Historical Context**: The rail link plans predate President Xi Jinping's BRI, with initial mentions at the 2007 ASEAN summit.
- **China-ASEAN Trade**: In 2023, trade volume between China and ASEAN reached USD 911.7 billion, making them each other's largest trading partners for four consecutive years.
- **BRI and Regional Influence**: The Belt and Road Initiative aims to strengthen China's economic and cultural ties with Southeast Asia through infrastructure investments.

Strategic Considerations:

- **Debt Trap Diplomacy**: China faces accusations of "debt trap diplomacy," which it denies, aiming instead to leverage economic ties to build goodwill and trust in the region.
- **South China Sea Tensions**: China's territorial claims have created regional nervousness, making economic investments a tool to gain strategic influence.

India's Customs Act Amendments Make Way for UK and EU Free Trade Agreements

Sub Topic- *Effect of policies and politics of developed and developing countries on India's interests*

Context:

To facilitate signing free trade agreements (FTAs) with developed nations like the UK and the European Union, the Union Budget 2024 has introduced amendments to the Customs Act.

About the Amendment:

- **Liberalising compliance with rules of origin norms** that typically guard against misuse of concessions agreed in a trade pact.
  - The government on Tuesday amended the Customs Act, 1962 **substituting 'certificate' of origin with 'proof' of origin.**
  - The fine prints of the Budget defined "Proof of origin" as a "certificate" or "declaration" in accordance with a trade pact.
- The amendments **give Indian trade negotiators a choice as to which geography they wish to allow self-certification** by foreign exporters.

About Rules of origin vs Proof of Origin:

- Rules of origin are the **criteria needed to determine the national source of a product.**
  - While trade agreements help boost trade volumes with partner countries, it **often risks a third country benefiting from the concessions resulting in a loss of revenue if rules of origin are breached**.
- **"Proof" of origin (if India decided so in an agreement) which is a wider term** that
  - includes a **certificate of origin** as well as a
  - **self-declaration** in line with global Customs norms.

Need for Proof of Origin:

- **Instances of Rule Breaches:** India has experienced m**ultiple breaches of rules of origin**.

- **Unusual Import Surge:** The **Global Trade Research Initiative (GTRI) reported a 60-fold increase in silver imports from the UAE**, suggesting a possible violation of the India-UAE FTA's rules of origin.
- **Insistence on Certificate Authority:** India continues to demand authority for issuing certificates of origin **due to past issues with goods being diverted from countries like China through Indonesia and Vietnam.**

- **Eases Trade Agreements:** The amendments simplify compliance, making it easier to negotiate and implement FTAs with developed countries like the UK and EU.
- **Broadens Trade Opportunities:** Allowing self-certification of origin can lead to better trade terms and expanded market access for India.
- **Streamlines Processes:** Replacing formal certificates with a broader "proof" of origin **reduces bureaucratic barriers and speeds up trade procedures**.
- **Aligns with International Standards**: The changes bring India's customs practices in line with global norms, improving integration with international supply chains.
  - The **developed countries have good tracking systems,** and the self-certification mode has already come into play in those countries for the FTAs they sign.

Concerns:

- **Implementation Challenges**: Ensuring effective oversight and enforcement of self-certification practices can be complex and resource-intensive.
- **Potential for Trade Manipulation**: There is a risk that goods could be rerouted through countries with lax regulations to exploit FTAs, undermining their benefits.
- **Enforcement Issues**: Past challenges with rule-of-origin enforcement, such as those faced with **CAROTAR,** could be exacerbated by the new amendments.

CAROTAR

- CAROTAR, introduced in 2020, is a set of regulations aimed at strengthening the enforcement of rules of origin under trade agreements, including the **India-ASEAN FTA.**
- These rules are known as **Customs (Administration of Rules of Origin under Trade Agreements) Rules** require importers claiming FTA duty benefits to **obtain various documents from their vendors and submit at the time of importation.**
- Several Southeast Asian countries such as Thailand subsequently raised concerns against CAROTAR norms in the India-ASEAN FTA review.
- **Despite stringent rule of origin norms, the India-ASEAN trade gap in FY23 surged to $43.57 billion** in favour of ASEAN countries, growing sharply by over 40 per cent compared to $25.75 billion in FY22.

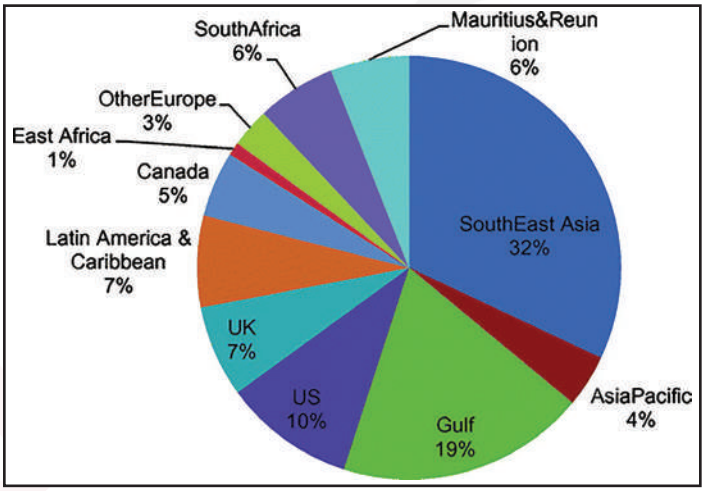
Indian Diaspora

Sub Topic- *Indian Diaspora*

Context:

India has opened a **new resident mission in Riga, Latvia,** effective July 25, 2024 which will enhance India's diplomatic presence, strengthen political and economic ties, support bilateral trade, foster investments, and improve assistance for the Indian community in Latvia.

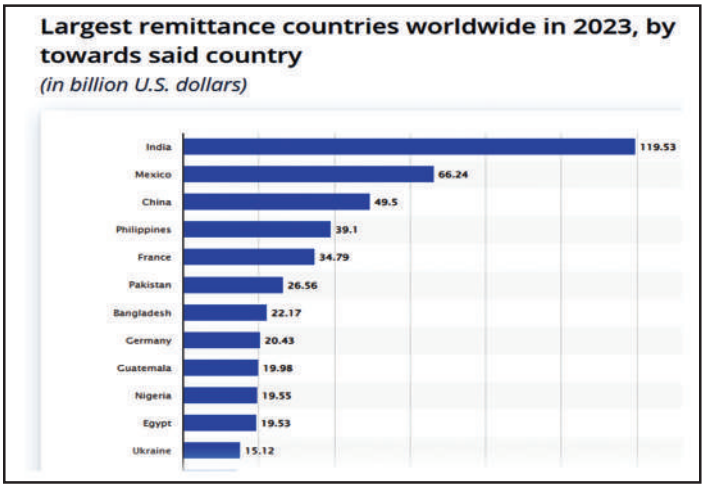
About Indian Diaspora:



- Indian Diaspora is a generic term used for addressing people who have **migrated from the territories** that are currently within the borders of the Republic of India.
- It **constitutes NRIs (Non-resident Indians) and PIOs (Persons of Indian origins)**.
  - The Indian Diaspora is **estimated to be over 30** million.

Contribution of Indian diaspora:

- **Economic contribution:**India is one of the highest remittance acceptor by virtue of its large diaspora population.



- **Cultural Impact:**The Indian Diaspora has notably shaped the cultural landscapes of their host countries. Indian cuisine, music, dance, and attire have gained global popularity.
  - **Spread of Buddhism** in Asian countries e.g. Japan,A-SEAN etc have added to our **soft power.**
- **Diplomatic & Security contribution :**Indian expatriates often serve as unofficial ambassadors, advancing India's interests worldwide e.g., they played a key role in advocating for the **India-US Civil Nuclear Agreement in 2008.**
- **Political Impact:**Members of the Indian Diaspora have been elected to public office in several countries, using their positions to **champion issues significant to the Indian community.** For example, the **ex UK Prime Minister of Indian descent has been influential in addressing these concerns.**

Challenges:

- **Diplomatic Strain:** Managing relations with host countries can be complex, especially when diaspora issues or conflicts arise, impacting bilateral ties. **Eg Issue of H-IB visa during US president Trump regime.**
- **Security Concerns:** Monitoring and addressing potential **security threats posed by extremist elements within the diaspora** or in their host countries can be challenging.eg **Khalistani elements in Canadian diaspora**.
- **Evacuation Challenges:**Ensuring the **safety of evacuees** amidst conflict zones, natural disasters, or unstable regions is a major concern, requiring effective security measures and risk assessments.

Indian Government schemes:

- **Pravasi Bharatiya Divas (PBD):** Since 2003, this annual event celebrates the Indian Diaspora's contributions and provides a platform for them to connect with each other and with India.
  - **Pravasi Bharatiya Divas, also known as Overseas Indian Day,** is celebrated **on January 9 by the Republic of India.**
  - This day **honours the contributions of the Overseas Indian community** toward India's development. It **commemorates Mahatma Gandhi's return from South Africa to Mumbai on January 9, 1915.**
- **Know India Programme**: This **Ministry of External Affairs initiative** engages Indian-origin youth (ages 18-30) **to increase their awareness of India,** its cultural heritage, and contemporary aspects of the country.
- **Online Services for Voters:**This is a dedicated platform for **Non-Resident Indians (NRIs) to register and manage their voting rights.** It facilitates the registration of overseas electors and helps in applying for postal ballots.

Subject - Polity, Governance, Constitution

Jurisdiction Powers of CBI

Sub Topic- *Constitutional and Non-constitutional bodies, Government Policies & Interventions*

Context:

The Supreme Court **upheld the maintainability of the West Bengal government's suit** accusing the Union government of "constitutional overreach" accusing the CBI of investigating cases in the state despite the **withdrawal of general consent** in November, 2018.

General consent and Specific Consent

- CBI is governed by The Delhi Special Police Establishment **(DSPE) Act, 1946.**

About CBI

- The Central Bureau of Investigation (CBI) was **set up in 1963 by a resolution of the Ministry of Home Affairs.**
- Later, it was **transferred to the Ministry of Personnel** and now it **enjoys the status of an attached office.**
- The CBI is **not a statutory body**. It **derives its powers from the Delhi Special Police Establishment Act, 1946.**

- **Section 5 of the DSPE Act empowers special police establishments (SPEs), including CBI, to investigate cases in the states.However under Section 6 of the DSPE Act**, the CBI is required to **obtain consent from the concerned State government** before initiating an investigation within its jurisdiction.
  - When a state gives a general consent (**Section 6 of the Delhi Special Police Establishment Act**) to the CBI for probing a case, the agency is **not required to seek fresh permission** every time it enters that state in connection with investigation or for every case.
  - This permission is **crucial since "police" and "public order" are subjects that fall within the State List** under the Seventh Schedule of the Constitution.
  - **No such prior consent** is necessary in **Union territories** or railway areas.
  - The CBI's position is, in this respect, different from that of the National Investigation Agency **(NIA)**, which is governed by the **NIA Act, 2008, and has jurisdiction all over the country.**
  - **Since 2015 several opposition-ruled states have revoked general consent** on grounds of misuse of power.
- **Specific Consent: When general consent is withdrawn,** the CBI needs to seek **case-wise consent for investigation** from the concerned state government.

Implication of withdrawal of general consent

- **Corruption may rise** as the conviction rate of CBI is high vis-a-vis state police.
- Impact on **federalism.**

Court's view

- ***Vinay Mishra vs the CBI(2021): The*** **Calcutta High Court** ruled that the central agency **cannot be stopped from probing an employee of the central government** in another state.
  - The order **has been challenged in the Supreme Court** which is being heard now.
- The HC also said that **withdrawal of consent would apply in cases where only employees of the state government were involved.**
- Withdrawal of consent did not make the CBI defunct in a state — it **retained the power to investigate cases that had been registered before consent** was withdrawn.
- A case registered anywhere else in the country, which involved **individuals stationed in these states,** allowed the CBI's jurisdiction to extend to these states.

About the case

- The constitution conferred **original and exclusive jurisdiction** upon the Supreme Court to **address centre -state disputes**, under **Article 131**.
- August 2021, the **West Bengal government filed an original suit under Article 131** of the Constitution arguing that the actions of the Union government and the involvement of the CBI in the State infringed upon its sovereignty.
- **For a suit to be maintainable under this provision, two conditions** have to be satisfied —
  - It should relate to a **dispute between the Government of India and one or more State Governments** (or) between one or more State Governments,
  - It **must involve a question of law or fact** crucial to the determination of legal rights.

Centres Argument against admitting the case

- Asked the Court **to dismiss West Bengal's suit under Article 131** by raising preliminary objections to its maintainability.
- The centre pointed out that original suits under **Article 131 of the Constitution exclusively involve the Union and States as parties**.
- Since this case was filed by **CBI which is an "independent agency"**thus the central government cannot be made part of the case.

Courts Judgement about admitting the case

- Rejected the Centre's preliminary objections that it was wrongly made a defendant in the suit as it did not control the CBI, which was an "independent agency".
- Right from the **constitution of the CBI, the classes of offences** which are to be investigated by it, **to its administration and powers**, it is the Central government that holds the power.
- The **central agency cannot initiate any investigation without the express authorisation of the Union government** under Section 5 of the DSPE Act.

Central Information Commission

Sub Topic- *Constitutional and Non-constitutional bodies*

Context:

The Supreme Court has affirmed that the Central Information Commission (CIC) has the authority to constitute benches and establish regulations, emphasising the importance of the CIC's autonomy for its effective functioning.

More in the news:

- The ruling was given in the ***Central Information Commission vs Delhi Development Authority*** **case (2024).**
- The Chief Information Commissioner's powers to frame regulations about the constitution of benches of the commission are **upheld as such powers are within the ambit of Section 12(4) of the RTI Act.**
  - While the RTI Act does not explicitly grant CIC the authority to frame regulations, the overarching powers granted under Section 12(4) of the RTI Act inherently include the ability to manage the commission's affairs effectively.
- The observations of the top court came in a judgement in which it **set aside a 2010 verdict of the Delhi High Court** where it held that the **CIC has no power to constitute benches of the commission.**

About CIC:

- The Central Information Commission (CIC) is a **statutory body** in India, established **under the provisions of the Right to Information Act (2005).**
- **Composition:** Consists of a Chief Information Commissioner and not more than ten Information Commissioners.
  - They are **appointed by the President** on the **recommendation of a Committee** consisting of:
    - The **Prime Minister** as the Chairperson,
    - The **Leader of Opposition** in the Lok Sabha, and
    - A **Union Cabinet Minister** nominated by the Prime Minister.
- **Qualifications:** They should be **persons of eminence in public life** with wide knowledge and experience in **law, science and technology, social service, management, journalism, mass media or administration and governance**.
- **Tenure:** The Chief Information Commissioner and an Information Commissioners shall hold office for **such term as prescribed by the Central Government or until they attain the age of 65 years**,whichever is earlier.
  - They are **not eligible for reappointment.**
- **Removal: if he/she:**
  - **Is adjudged insolvent.**
  - **Has been convicted of an offence which, in the opinion of the President, involves moral turpitude.**
  - **Unfit to continue in office due to infirmity of mind or body.**
  - **Grounds of proved misbehaviour or incapacity.**
    - However, in such cases, the **President has to refer the matter to the Supreme Court for an enquiry**.
    - If the Supreme Court, after the inquiry, **upholds the cause of removal** and advises so, then the President can remove him.

Function: The Commission is required to receive and inquire into a complaint from any person **who has not been able to submit an information request because of the non-appointment of a Public Information Officer**

Supreme Court Balancing Liberty and Security on ED's Action

Sub Topic- *Judiciary, Constitutional and Non-constitutional bodies*

Context:

Two recent observations by the Supreme Court of India have **highlighted significant issues concerning personal liberty** in the context of actions taken by the Enforcement Directorate (ED).

About the two observations of SC

- One concerned the question whether an officer arresting a person on money-laundering charges should demonstrate the **necessity for arrest** for the action to be deemed valid;
  - The verdict granting bail to Delhi Chief Minister Arvind Kejriwal, ended with a **reference to a larger Bench** the question **whether the ED would have to prove the need or "necessity to arrest" a person,** before effecting an arrest.

Section 19 of PMLA

- It speaks of the arresting officer being required to have **"reason to believe"** that the person is guilty of money-laundering before effecting arrest.
- The PMLA casts a **statutory obligation** on an officer to both **record reasons for arrest** and **convey grounds for arrest** to the accused.
- Whether these obligations **include a duty to demonstrate the necessity to arrest the person will have to be decided by a larger bench** .
  - Court's order is that the authorised officer's decision on arrest ought to **be one that a magistrate or judge can examine**.
  - The Court reiterated that **arrests under the PMLA cannot be on a mere whim**; and that decisions during investigation should **consider favourable material too, and not merely material against the accused**.
- The other issue touches upon a key aspect of **contemporary judicial functioning**.
  - The court voiced shock at the **ease and quickness with which courts were staying reasoned orders granting bail.**
  - A stay on **reasoned orders ought to be rare exceptions** based on grounds such as unreasonable by the lower court, and **not done as a matter of routine.**

Constitutional Provision balancing liberty and security

Liberty

- **Preamble :** LIBERTY of thought, expression, belief, faith and worship;
- **Article 19:Protection of Certain Rights Regarding Freedom of Speech**
- **Article 21 :** Right to Life and Personal Liberty
- **Articles 32 and 226** (Right to Constitutional Remedies)

However, **this is subject to the security of the nation as mentioned in :**

- **Article 19(2):** Amongst other things, it provides **reasonable restriction in the interest of security of the state.**
- **Preventive detention laws under Article 22, subject to preventing abuse**
- **Article 352: Emergency Provisions**

Subject - Social Justice

Lenacapavir Shows Promising Results in Preventing HIV Among Young Women

Sub Topic- *Issues related to health*

Context:

The recent large clinical trial in **South Africa and Uganda** for **lenacapavir,** a new **pre-exposure prophylaxis (PrEP) drug, shows injection twice a year is 100% effective against HIV infection.**

More on news:

- The trial focussed on women aged **16 to 25**, a group particularly vulnerable to HIV infection.
- The trial tested whether a **six-month injection** of lenacapavir would provide better protection against HIV infection than two other drugs, **PrEP drugs, Truvada (F/TDF) and Descovy (F/TAF).**
  - **Lenacapavir (Len LA):** A fusion capsid inhibitor administered subcutaneously every **six months**, which disrupts the **HIV capsid,** a protein shell essential for viral replication.
  - **Truvada (F/TDF):** A daily PrEP pill widely used for over a decade.
  - **Descovy (F/TAF):** A newer daily pill with superior pharmacokinetic properties compared to **Truvada.**
- All three medications are **pre-exposure prophylaxis (PrEP) drugs.**

Lenacapavir:

- It is a **drug** for the **treatment of HIV.**
- It is also being studied as an **investigational drug** to prevent HIV infection.
- It belongs to a **group** of HIV drugs called **capsid inhibitors.**

Significance:

UNAIDS Target:

- It is leading the global effort to **end AIDS** as a public health threat by **2030** as part of the **Sustainable Development Goals.**

- Offering a new, highly **effective tool** that could simplify **PrEP regimens** for young women who find daily medication challenging due to social and structural **barriers**. The trial will continue in an **"open label"** phase where participants are informed of their assigned **PrEP** and **can choose** their preferred option.

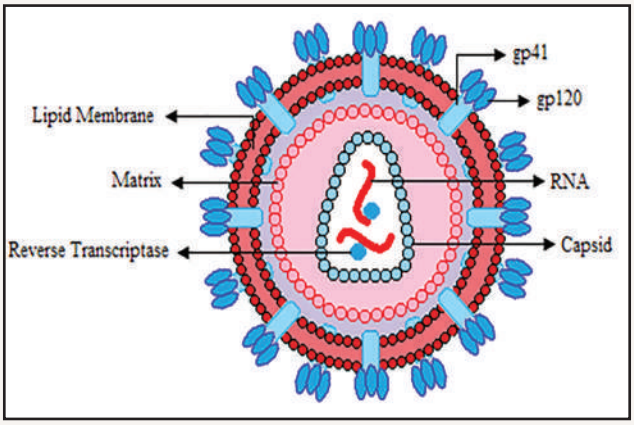
- The success of lenacapavir could significantly impact global HIV prevention efforts and help meet **UNAIDS targets.**

National AIDS and STD Control Programme Phase-V (2021-2026):

- **NACP Phase-V**: Central Sector Scheme fully funded by the Government of India with an outlay of **Rs 15,471.94 crore.**
- **Goal**: Attain **UN Sustainable Development Goals 3.3,** aiming to **end the HIV/AIDS** epidemic as a public health threat by **2030.**
- **Services**: Prevention, detection, and treatment of HIV/AIDS and STIs.
- **Building on Previous Initiatives**: HIV/AIDS Prevention and Control Act (2017), Test and Treat Policy, Universal Viral Load Testing, Mission Sampark, Community-Based Screening, Transition to Dolutegravir-based Treatment Regimen.
- Setting up **Sampoorna Suraksha Kendras (SSK)** for providing services for those **"at risk" for HIV and STIs**, covering the prevention-test-treat-care continuum.

HIV (Human Immunodeficiency Virus):

- It is an **infection** that attacks **white blood cells, weakening the immune system** and increasing susceptibility to infections like **tuberculosis and certain cancers.**



- **Transmission**: Spread through body fluids **(blood, breast milk, semen, vaginal fluids)** from an infected person. Can also be transmitted from mother to child during pregnancy, delivery, or breastfeeding.
  - Not spread through casual contact like **kissing or sharing food.**
- **AIDS (Acquired Immunodeficiency Syndrome)**: The most severe phase of HIV infection, characterised by a very weakened immune system and severe illnesses.
- **Prevention:**
  - **Condom Use**, **Testing**: Regular HIV and STI testing, **Medical Male Circumcision**
  - **Harm Reduction**: Services for people who inject/use drugs.
- **Medications**:
  - **PrEP (Pre-exposure Prophylaxis)**: Antiretroviral drugs taken before potential exposure.
  - **PEP (Post-exposure Prophylaxis)**: Antiretroviral drugs taken after potential exposure.
  - **Dapivirine Vaginal Rings** and **Injectable Cabotegravir**: Long-acting prevention methods.

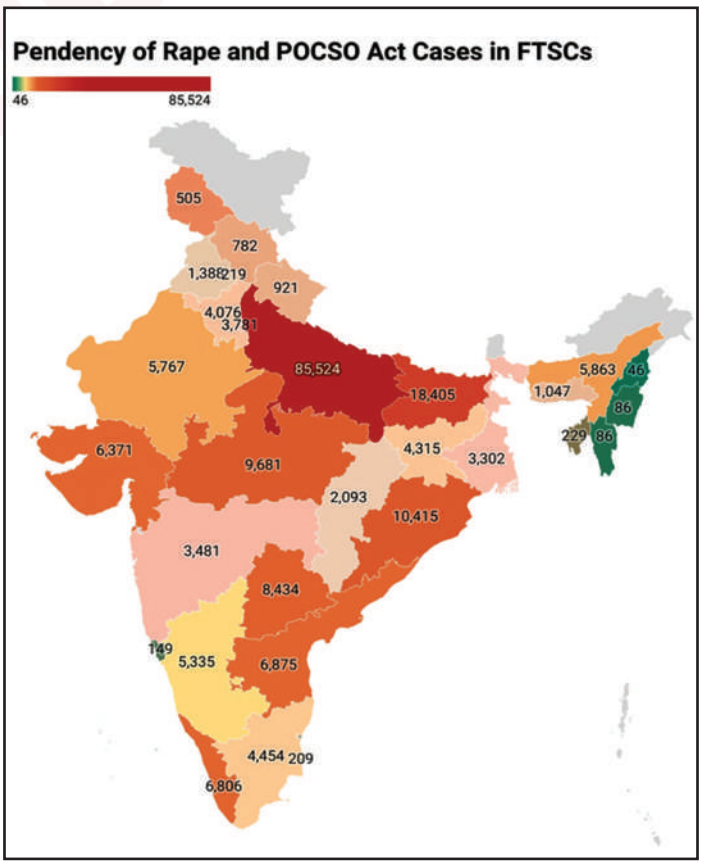
Fast Track Special Courts and POCSO Courts

Sub Topic- *Issues Related to Children, Government Policies & Interventions*

Context:

According to the latest press release by the **Ministry of Law and Justice,** as part of the **Centrally Sponsored Scheme for setting up Fast Track Special Courts (FTSCs)** from October 2019, there are currently **755 FTSCs, including 410 exclusive POCSO Courts**, operating in 30 States/UTs across the country.

About the Scheme:



- The central share of the scheme, (extended until March 31, 2026), will be **funded on CSS pattern (60:40, 90:10) by the Nirbhaya Fund.**

- The scheme **mandated the establishment of exclusive POCSO Courts** for districts with over 100 POCSO Act cases.

About fast track court and POSCO Court:

- Fast track courts (FTCs) are specialised courts designed to **expedite the legal process** and resolve cases more quickly than traditional courts.
  - It aims to **improve the overall efficiency of the judicial system.**
- Fast-track courts were **first introduced in 2000 on the recommendation of the 11th Finance Commission.**
- **The Central Government enacted the "The Criminal Law (Amendment) Act. 2018,"** which included stringent punishment, including the death penalty for rape offenders, leading to the creation of the Fast Track Special Courts (FTSCs).

About POCSO Act:

- The Protection of Children from Sexual Offences (POCSO) **Act, 2012, enacted in consequence of India's ratification of the UN Convention on the Rights of the Child in 1992,** came into effect on November 14, 2012.
- **Definition of a child:**The Act defines a child as any person **below 18 years of age.**

An **NGO named RAHI** (Recovery and Healing from Incest) conducted India's first study on child sexual abuse.

- The study found that **76% had been abused during childhood or adolescence**, with **40% of the perpetrators being family members**, mainly uncles or cousins.
- Alarmingly, **72% of victims did not report the abuse, and only 3% of families complained to the police or made the abuse public.**

- It is a **gender-neutral act.**It is an **offence to not report an abuse.**
- **POCSO (Amendment) Act, 2019:**
  - **Section 2** (Definitions) was amended to **incorporate the definition of child pornography.**
  - **Section 4** (Punishment for penetrative sexual assault) was amended to increase the quantum of **punishment to a minimum of 10 years, and a minimum of 20 years in case of a child below 16 years.**

Subject - International Relations

Resolve Tibet Act

Sub Topic- *India and its Neighbourhood, Effect of Policies & Politics of Countries on India's Interests*

Context:

President Joe Biden has **signed the Act which was passed by both houses** of the US which **enhances U.S. support for Tibet** and **promotes dialogue between China and the Dalai Lama.**

About the Act:

- Towards a **peaceful resolution of the dispute** over the status and governance of the remote Himalayan region.
- Bipartisan commitment to **advancing the human rights of Tibetans** and supporting efforts to preserve their distinct linguistic, cultural, and religious heritage.

Universal Declaration of Human Rights(UDHR)

- Approved by the **UN General Assembly in 1948**.
- It was a **response to the atrocities of World War II.**
- The declaration was proclaimed as "a **common standard** of achievement **for all peoples and all nations**."(not a treaty and is not legally binding).
- The UDHR **consists of 30 articles** that articulate a broad range of civil, political, economic, social, and cultural rights.
- **Achievement:**It **inspired the decolonization movement**, the anti-apartheid movement,It also **inspired freedom fighters** all around the world, be it on gender issues, be it on **LGBTIQ+ issues**, be it against racism.
- The **75th anniversary comes as human rights are challenged** in the war between Israel and Hamas, Russia's war in Ukraine, internal conflicts in Myanmar and Sudan and in a host of other places and situations.

- The Act does **not change longstanding bipartisan US policy to recognise the Tibet Autonomous Region** and other Tibetan areas of China **as part of the People's Republic of China (PRC).**The **Act enhances US support for Tibet**, empowering officials **to actively and directly counter disinformation about Tibet** from the Chinese government.
- It **rejects claims that Tibet has been part of China since"ancient times"**, calls for **unconditional negotiations between the Chinese government** and Tibetan leaders, and affirms the USA's role in **coordinating multilateral efforts** for a **negotiated agreement on Tibet**.
- US wants China to abide by the **Universal Declaration of Human Rights(UDHR)**
- **China had opposed the Resolve Tibet Act,** describing it as a destabilising Act.

About the China - Tibet dispute:

- **Post Chinese annexation of Tibet, the 14th Dalai Lama fled Tibet in 1959** and came to India, where he set up the government-in-exile at Dharamshala in the state of Himachal Pradesh.
- From **2002 to 2010, the Dalai Lama's representatives and the Chinese government held nine rounds of dialogue** that did not produce any concrete outcome.
- China **views the 89-year-old Tibetan spiritual leader, who is based in India, as a "separatist"** who is working to split Tibet from the rest of the country.

About India's Tibet Policy:

- **Diplomatic and Humanitarian Commitment-**India **recognised Tibet Autonomous Region as part of China in 1954.**
  - Since 1959, it has provided asylum to the **Dalai Lama** and **Tibetan refugees**, showing its strong commitment to humanitarian principles.
- **Position on the Dalai Lama** -India highlights the Dalai Lama's status as a **respected spiritual leader** instead of categorising him as a **"separatist,"** despite China's objections.
- India does not officially recognise the Tibetan Government in Exile or
- Parliament in Exile as independent entities.

Hannibal Directive

Sub Topic- *Effect of policies and politics of developed and developing countries on India's interests*

About:

Post Hamas attacks on October 7, the Israel Defence Forces **(IDF) activated a deadly military policy "Hannibal Directive"** also known as the **Hannibal Procedure or Hannibal Protocol.**

About the Doctrine

- The expression refers to a purported IDF operational policy that **aims to pre-empt politically painful prisoner swaps** by **immediately eliminating everyone** in the vicinity of a captive Israeli soldier by using maximum force, even if it **poses a risk to the soldier himself and civilians.**
- It is believed to be **inspired by** the Carthaginian general Hannibal, who chose to consume poison rather than be captured by the **Romans in 181 BCE.**

- The Hannibal Doctrine was formulated as a **response to the Jibril Agreement of 1985 in which 1,150 Palestinian prisoners were exchanged for three Israelis** who had been seized in Lebanon by the Syria-based militant group Popular Front for the Liberation of Palestine-General Command (PFLP-GC).
- In its **original form, the Hannibal Doctrine endorsed the use of light arms** fire to stop the abductors or their vehicles, to prevent them from escaping.
  - Over the years, this meaning has been **interpreted loosely** by the IDF, which **has even employed attack helicopters in its pursuance of the doctrine.**
- The directive **was first implemented by Yossi Peled, then head of the IDF's Northern Command, in mid-1986** after an abduction attempt by Hezbollah.
- Did not attract criticism from Israelis, primarily because of the **perception that any soldiers captured by militants would not be extended the dignity** of being treated as prisoners of war.

Criticism

- Legal experts have criticised the Hannibal Doctrine for its **disregard for human life.**
- Shows **lack of faith in the Geneva Convention relative to the Treatment of Prisoners of War.**

Subject - Indian Economy & Agriculture and Banking

Government to Amend MSME Development Act, 2006

Sub Topic- *Mobilisation of Resources, Growth, Development and Employment*

Context:

Ministry of Micro, Small, and Medium Enterprises (MSME) to amend MSME Development Act, 2006.

More on News:

- The aim is to improve mechanisms for managing disputes related to delayed payments and address evolving needs of the MSME sector.
- The ministry is **collaborating with the Ministry of Law and Justice**, experts at **National Law Universities** (NLUs), and other relevant stakeholders.
- The Ministry announced the **Trade Enablement & Marketing (TEAM) initiative, Yashasvini Campaign.**
- It is also looking to transform **Samadhan portal** into an online dispute resolution platform.

Definition of MSME:

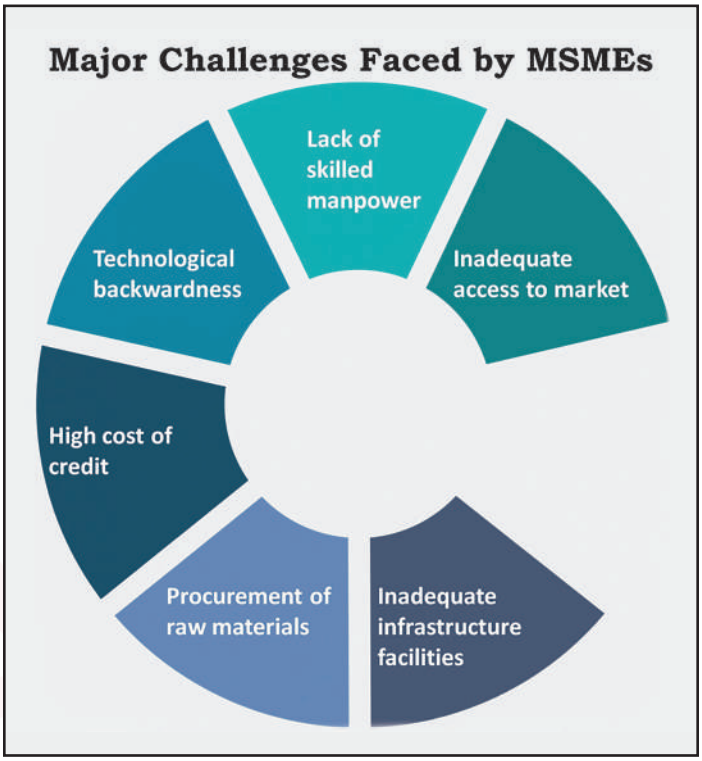
- The Ministry of MSMEs revised the definition and criteria for MSMEs, effective from July 1, 2020, as part of the Atmanirbhar Bharat package announced on May 13, 2020.
- **New Definitions:** The MSME is based on the **Investment in Plant, Machinery or Equipment values** (excluding land and building) and **Annual Turnover**.

Enterprise Type	Investment Limit	Turnover Limit
Micro Enterprises	Up to Rs. 1 Crore	Up to Rs. 5 Crore
Small Enterprises	Up to Rs. 10 Crore	Up to Rs. 50 Crore
Medium Enterprises	Up to Rs. 50 Crore	Up to Rs. 250 Crore

  - **Unified Criteria:** No difference between manufacturing and service sectors.
  - **Turnover Exclusion:** Exports are excluded from turnover calculations to encourage more exports without losing MSME benefits.

MSMEs Role in Inclusive Growth in India

- At present, there are **more than 6 crore MSMEs functional** in the country.
- It provides more than **11 crore jobs to the people,** as the second-largest employer in India after agriculture.
- The sector contributes approximately **30% to India's GDP** and has a share of approximately **50% of India's exports.**
- MSMEs contribute significantly to India's inclusive growth by:
  - **Creating jobs and distributing industries** across urban, rural, and state regions.



  - **Encouraging entrepreneurship** among Women and diverse socio-economic groups like Other Backward Class (OBC), Schedule Caste (SC), Schedule Tribe (ST), etc.

Government to Amend MSME Development Act, 2006

- **Challenges with the Current Act:** Delayed payments, outdated support mechanisms, lack of state government representation in the **National Board for MSME.**
- **Need to Focus on Micro Enterprises:** The importance of micro-enterprises in rural areas to improve quality of life and reduce unemployment can not be neglected.

Other Key Government Initiatives for MSMEs:

- Pradhan Mantri MUDRA Yojana
- Credit Guarantee Schemes
- Credit Guarantee Fund Trust for Micro and Small Enterprises
- Government e-Marketplace (GeM)
- Udyam Assist Platform
- ASSEM Portal
- The **Champions portal:** Created as a hub and spoke model, it serves as a unified platform for addressing grievances of MSMEs.

- 70% of the population falls below the poverty line, with 90-95% managing their lives with difficulty.

- **Six Pillars of Focus:** The ministry will focus on six pillars going forward:
  - Formalisation and access to **credit**
  - Increased access to **market and e-commerce** adoption
  - Increased **productivity** through **modern technology**
  - Enhancing **skill** levels and **digitalisation** in the service sector
  - Support to **khadi, rural, and coir** industries **Empowerment** of **women** and **artisans** through enterprise creation.

Initiatives Announced by the Ministry:

- **Trade Enablement & Marketing (TEAM) Initiative:** It aims to onboard 5 lakh MSEs onto the **Open Network for Digital Commerce** (ONDC).
- **Yashasvini Campaign:** It aims to spread awareness for formalising women-owned, informal micro enterprises.
  - **Target Areas:** Focus on **tier-2 and tier-3** cities.
- **Upgrading the Samadhan Portal:** Launched in **2017** to track outstanding dues to MSEs from buyers of goods and services.
  - It will be enhanced into a comprehensive online resolution platform with dispute resolution mechanisms to address high litigation costs and delays.

International MSME Day

- Celebrated on **June 27th.**
- **Theme for 2024**: Leveraging the Power and Resilience MSMEs to Accelerate Sustainable Development and Eradicate Poverty in Times of Multiple Crises.
- MSMEs are vital in achieving the Sustainable Development Goals (SDG).
- They are an important element in the implementation of **SDG 8 (decent work and economic growth) and SDG 9 (industry, innovation and infrastructure.)**
- **MSE Cluster Development Programme** of **Ministry of MSME** aims to establish Common Facility Centres and enhance infrastructure, aligning with SDG 8 and 9.

Advisory Committee on National Account Statistics

Sub Topic- *Fiscal Policy, Monetary Policy*

Context:

The Union government recently reconstituted the **Advisory Committee on National Accounts Statistics chaired by Bishwabnath Goldar.**

About the National Account Statistics:

- National Account Statistics (NAS) of India is a **comprehensive statistical record** that provides detailed information on the economic activities of the country like GDP, GVA etc. These statistics are **compiled and published by the Ministry of Statistics and Programme Implementation (MoSPI) through the National Statistical Office (NSO).**

Terms of Reference of the Advisory Committee:

- Tasked to **review the existing databases and advise on the inclusion of new data sources** for improving the estimates of national accounts.
- The panel will also **advise on the base year for the national account** and its alignment with other related products like WPI,CPI And IIP.

Evolution of National Income Accounting:

- Modern national accounts emerged only after the Great Depression Era in 1930s by Josiah Stamp in UK, Simon Kuznets & John Maynard Keynes in the USA :
- **Kuznets: Developed systematic methods for measuring GDP** and national income in the U.S. His work laid the foundation for modern national income accounting.
- **John Maynard Keynes:** Keynes emphasised the **importance of aggregate demand in determining economic output and employment,** influencing the development of national income accounts.
- **Post-World War II Era**: The United Nations introduced the **System of National Accounts (SNA) in 1953,** providing a standardised framework for national income accounting where GDP became the primary measure on national income.
  - **India adopted the SNA in 1993 and shifted from GNP(gross national product) to GDP** as the main measure of evaluating economic performance.

Changes made by India to its GDP calculation methodology in 2014-15 vis a vis 2004-05 in line with SNA:

- **Base Year Change:**
  - **Pre-2015:** The base year was 2004-05.
  - **Post-2015:** Updated to 2011-12 to better align with global practices and capture more accurate economic data.
- **Manufacturing Sector Data:**
  - **Pre-2015:** Relied on the Index of Industrial Production (IIP) and Annual Survey of Industries (ASI) covering over **two lakh factories**.

Impact of change in calculation methodology (Revised data of GDP at current market price)

Year	2004-05 Series	2011-12 Series	% Difference
2011-12	9009722	8832012	-2.0
2012-13	10113281	9988540	-1.2
2013-14	11355073	11345056	-0.1

- **Post-2015:** Used annual accounts from firms filed with the **Ministry of Corporate Affairs (MCA 21),** covering around **five lakh companies** for a more detailed representation.

- **GDP Calculation Method:**
  - **Pre-2015:** Calculated GDP at factor cost.
  - **Post-2015:** Adopted **GDP at market price and Gross Value Added (GVA)** at basic price, including production costs, subsidies, and taxes.
- **Labour Income Calculation:**
  - **Pre-2015:** Treated all labour inputs equally.
  - **Post-2015:** Introduced **"effective labour input"** with different weights for owners, hired professionals, and helpers for a nuanced assessment.
- **Agricultural Value Addition:**
  - **Pre-2015:** Limited to farm produce.
  - **Post-2015:** Expanded to **include livestock data**.
- **Financial Sector Income:**
  - **Pre-2015:** Included few mutual funds and RBI estimates for Non-Government Non-Banking Finance Companies.
  - **Post-2015:** Broadened to include stockbrokers, stock exchanges, asset management companies, mutual funds, pension funds, and **regulatory bodies like SEBI, PFRDA, and IRDA.**

Challenges for the Committee:

- In the federal political framework, the Indian Statistical System is decentralised in character so that NAS necessarily have to **depend on a large number of autonomous source agencies**.
- The **Census, originally scheduled for 2021, has been postponed**. Without the latest Census data, the accuracy and reliability of survey results may be compromised.
- Adopting and implementing **United Nations standards** present significant challenges.
- The **increasing digitisation and globalisation** of the economy would necessitate developing new methodologies to accurately capture economic activities.
- **Informal sector :** As the present system does not accurately reflect the position of the informal sector and tends to overstate economic growth thus incorporating the informal sector data is a complex challenge for accurate measurement and analysis.

Digital Bharat Nidhi (DNB)

Sub Topic- *Growth & Development, Indigenization of Technology*

Context:

The Department of Telecommunications (DoT) released draft rules to operationalise the Digital Bharat Nidhi, it would replace the erstwhile Universal Service Obligation Fund (USOF).

Digital Bharat Nidhi

- It was established through the **Telecommunications Act, 2023**, passed by Parliament.
- **Goal**: **Improve and expand efforts to connect people to the Internet,** especially in **rural, remote, and poor urban areas.**
- **Objectives:**
  - Enhance rural telecom services.
  - Support research and development in telecommunication technologies.
  - Finance pilot projects and consultancy services.
  - Provide targeted access to telecommunication services for underserved groups.
  - Promote innovation, research, and development of indigenous technologies.
- **Focus Areas:**
  - **Target Groups**: Women, persons with disabilities, economically and socially weaker sections.
  - **Technological Goals**: Introduce next-gen telecom technologies, improve affordability, promote innovation, R&D, and indigenous technology.

Consolidated Fund of India (CFI): Article 266 provides for the provisions for the consolidated fund of India.

- It is an account in which **all revenues that the government receives**, including loans raised and all money received in repayment of loans, are **credited**.
- The **government also incurs its expenditures from this fund.**

  - **Standards and Startups**: Develop national and international standards, encourage telecom sector startups and manufacturing.
  - **Funding**: Contributions from telecom companies will be credited to the **Consolidated Fund of India** (CFI) and then deposited to the DBN.
- Funds will be utilised to **support universal telecommunication services, research and development**, pilot projects, consultancy, and advisory support.

- Funding will be determined **case-by-case**, including **full, partial, co-funding, market risk mitigation, and risk capital.**
- The government will appoint an **administrator** to manage it who will select **DBN implementers** through bidding or invitations for applications from eligible persons.

Impact of Digital Bharat Nidhi:

- **Improving Rural Connectivity**: Focus on expanding telecom networks in remote and rural areas where private companies may not find it profitable.
- **Enhancing Competition**: Encourages innovation and new businesses in the telecom sector, making it more competitive globally.
- **Addressing Underutilization**: Replaces the USOF, which had been criticised for not utilising funds effectively, aiming to improve the efficiency of the new fund.

USOF

- Established in **2003** through an amendment to **Indian Telegraph Act of 1885**.
- **Funding Source**: It was funded by a **5% Universal Service Levy** on the **Adjusted Gross Revenue (AGR) of telecom operators.**
- **Purpose**: Intended to fund telecom network expansion in rural and remote areas.
- **Underutilisation of USOF**
  - **Collection vs. Utilisation**: Between 2017 and 2022, **Rs 41,740 crore** was collected, but only **Rs 30,213** crore utilised (72%).
  - **Specific Fiscal Data**: In 2019-20, out of **Rs 7,962 crore** collected, only **Rs 2,926 crore** utilised.
  - **BharatNet Project**: **Underspending** on the BharatNet project contributed to overall underutilization.

Dynamics of the Gig Economy

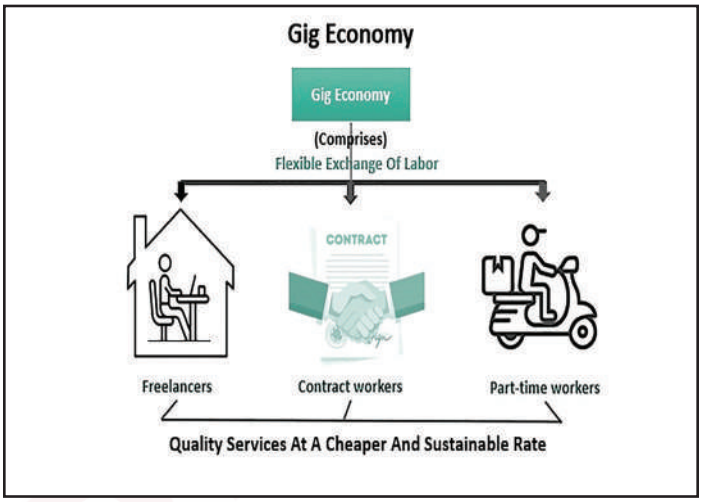
Sub Topic- *Industrial Policy, Issues Relating to Development, Government Policies & Interventions*

Context:

Karnataka Platform-based **Gig Workers (Social Security and Welfare) Bill, 2024** does not adequately address employment relationships in gig work, which is crucial for applying crucial labour protections.

Issues With the Bill:

- The **Rajasthan Platform Based Gig Workers (Registration and Welfare) Act, 2023,** and the Karnataka bill both follow a welfare board model.
- **The Welfare Board model provides some social security schemes but does not replace institutional benefits** (provident fund/gratuity).
- It uses the term "**aggregator**" instead of "**employer**", skirting the issue of defining employment relations in gig work.
- The bill does **not guarantee minimum wages or regulate working hours** for gig workers.



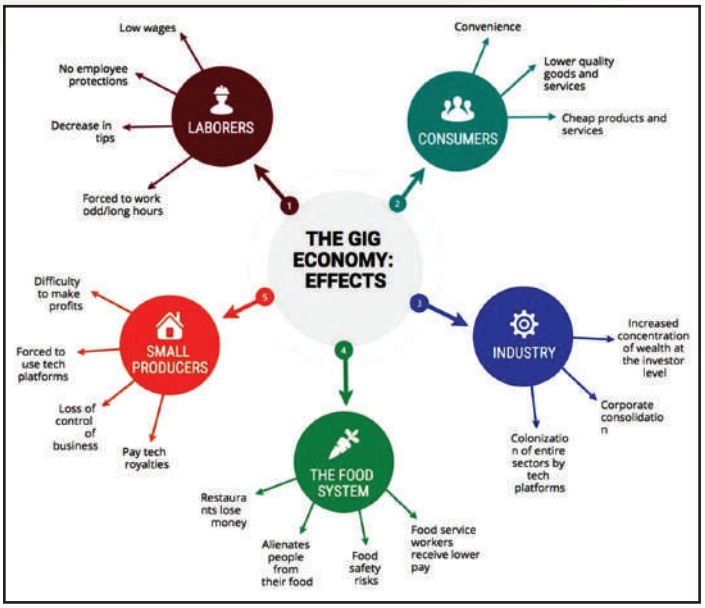
- It **only requires weekly payments** without specifying a minimum amount.

Gig Economy and Workers:

- Gig economy **uses digital platforms to connect freelancers with customers** for **short-term services or asset-sharing**, such as ride-hailing, food delivery.
- It involves income-generating activities **outside traditional, long-term employer-employee arrangements.**
- A Gig Worker is a person who performs short-term jobs, often in the service industry, as an independent contractor or freelancer.

Rise of Gig Work and Associated Issues:

- Gig and platform work has seen significant growth, especially in the app-cab and retail delivery sectors.
- Projections by **NITI Aayog** indicate the **gig workforce will expand to 23.5 million by 2030.**
- This means that **by 2029-30**, gig workers will make up **4.1% of India's total workforce**, compared to 1.5% in the 2021-22 fiscal year.
- Projections suggest the gig economy could **contribute 1.25% to India's GDP** and create **90 million non-farm jobs in the long run.**
- **Gig workers** have been **protesting over revenue sharing, working hours,** and other employment terms.
- Gig economy is largely **unregulated, offering workers little job security and few benefits,** similar to India's long standing informal labour sector.



- Formal sector workers are highly skilled as companies invest in their training, while **gig workers need to upgrade their skills independently** at their own expense.
- There are **more potential gig workers than available jobs**, leading to a **demand-supply mismatch** that depresses wages over time.

Way Forward:

- The **United Kingdom Supreme Court ruled that Uber is an employer, and the existing labour laws of the UK apply to Uber** drivers.
- In India, gig and platform workers are included in **the Code on Social Security 2020** as informal self-employed workers.
- However, no mention of such workers has been made in the other three new labour codes, namely:
  - Code on Wages, Industrial Relations Code and Occupational Safety, Health and Working Conditions Code
- Provide **accident, health and death insurance** for gig workers, similar to models in the **UK and Indonesia.**
- NITI Aayog's report "***India's Booming Gig and Platform Economy***" recommended **providing social security measures for gig workers** and their families.

India's Informal Economy

Sub Topic- *Employment, Government Policies & Interventions, Inclusive Growth, Management of Social Sector/ Services, Growth & Development*

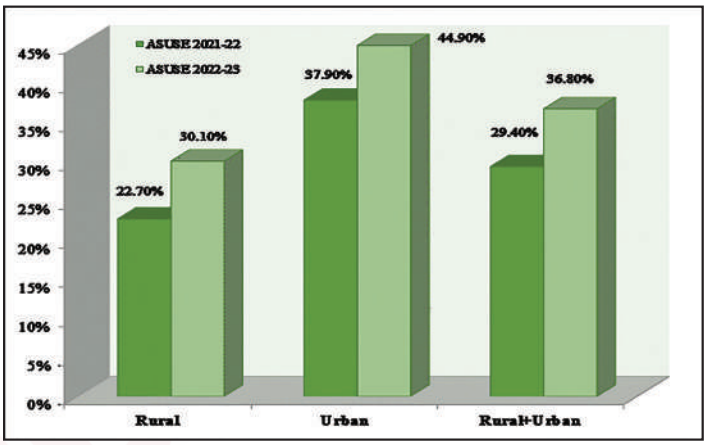
Context:

Data from the **Annual Survey of Unincorporated Enterprises (ASUS)** shows Informal Economy which is crucial for job creation and employing semi-skilled workers **has lost 1.645 million jobs over the past 7 years** (non-farm informal economy).

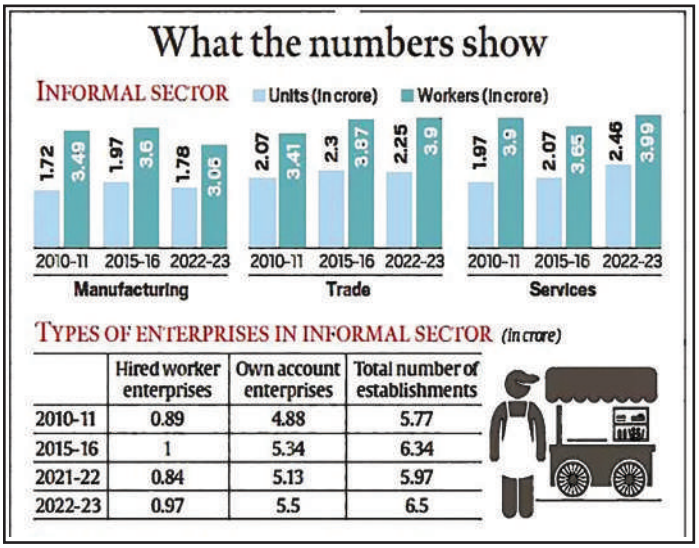
Unincorporated enterprises (USE)

- These are **enterprises in the unorganised or informal sector**, comprising Micro, Small and Medium Enterprises **(MSMEs)**, household units including those with **hired workers**, and **own-account enterprises**.
  - The surveys were **carried out for unincorporated non-agricultural establishments** in three sectors: manufacturing, trade, and "other services".

Results of Survey



- The **informal sector registered a decrease in employment, though the number of enterprises increased over the previous round** in 2015-16.
  - The **number of unincorporated enterprises increased by 16.56 lakh** to 6.50 crore in 2022-23 from 6.33 crore in 2015-16.
  - The **number of workers employed in the informal sector in 2022-23 dropped by 16.45 lakh** (1.5%) to 10.96 crore from 11.13 crore in 2015-16.
- **Own-account enterprises increased nearly 4% during the seven-year period, even as hired-worker enterprises contracted by 3.2%.**



TYPES OF ENTERPRISES IN INFORMAL SECTOR *(in crore)*

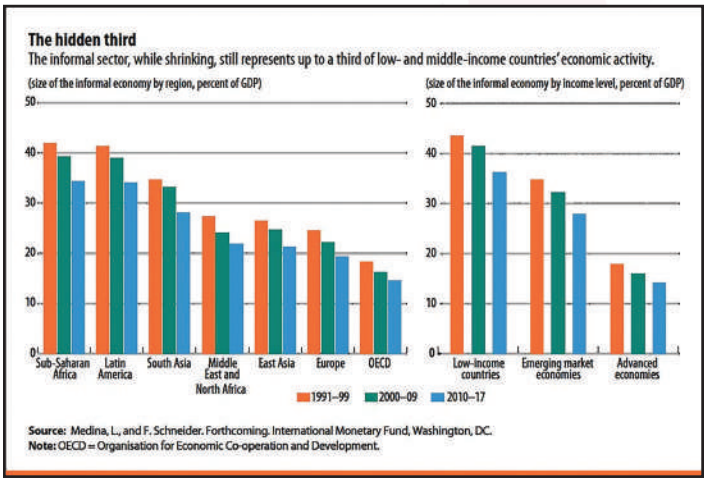
	Hired worker enterprises	Own account enterprises	Total number of establishments
2010-11	0.89	4.88	5.77
2015-16	1	5.34	6.34
2021-22	0.84	5.13	5.97
2022-23	0.97	5.5	6.5

- This **indicates a deterioration in the quality of employment as units shifted to self-owned units,** that is, households or one-person units rather than hired-worker units, which are typically a source of labour-intensive enterprises, especially in manufacturing.

- **Manufacturing units** were the worst hit, **contracting 9.3%** between 2022-23 and 2015-16 to 1.78 crore. The **number of workers in manufacturing fell 15% to 3.06 crore** during this period.
- **Units in the trade sector contracted** to a lesser extent — to 2.26 core, a 2% decline in 2022-23 from 2015-16. The number of workers increased marginally by 0.8% to 3.90 crore in this period.
- **Services sector establishments,** on the other hand**, recorded increases in numbers of both units and workers** — by 19.1% to 2.46 crore and by 9.5% to almost 4 crore respectively.

Inference from the survey

- While the **real GVA of USE** had grown at a **CAGR (compounded annual growth rate) of 7.4% between 2010-11 and 2015-16, its CAGR contracted by 0.2% between 2015-16 and 2022-23.**
- **Sixteen out of the 34 states/ Union Territories recorded a decline in informal sector workers in 2022-23** compared with the data from 2015-16.
- Data from the surveys help to understand the impact of the sudden **withdrawal of cash from the system (2016),GST (2017)**, and of the **national lockdown (2020-21)**, the brunt of which was borne by the informal sector.



- Around **63 lakh informal enterprises shut down due to GST** between 2015-16 and 2022-23, resulting in a loss of about 1.6 crore jobs.
- The **number of informal enterprises increased** from 50.32 lakh with 85.6 lakh workers in April-June 2021 at the peak of the COVID-19 second wave, to 1.91 crore firms with 3.12 crore employees in January-March 2022.

About informal Economy

- The informal sector — small and medium enterprises and household proprietary and partnership establishments — accounts for **almost 50%India's economic output** and **more than 85% of employment.**
- The informal economy consists of activities that **have market value but are not formally registered.**
  - The International Labor Organization estimates that **about 2 billion workers, or over 60 percent of the world's adult labour force, operate in the informal sector**--at least part time.
  - The informal economy is **difficult to measure.**

Indian Government scheme to boost informal economy

- **Pradhan Mantri Rojgar Protsahan Yojana (PMRPY)-**
- **Aatmanirbhar Bharat Rozgar Yojana (ABRY)-**
- **PM Street Vendor's AtmaNirbhar Nidhi (PM SANNidhi)**-provide affordable Working Capital loan to street vendors
- **e-Shram Portal:**The portal aims to create a National database of unorganised workers
  - According to recent data from the e-Shram portal, **around 28 crore unorganised workers were registered in 2021-22.**
- **MGNREGA And MUDRA Yojana**

Navigating Economic Indicators and Policy Implications

Sub Topic- *Industrial Policy, Infrastructure, Growth & Development, Planning, Fiscal Policy, Inclusive Growth, Government Budgeting*

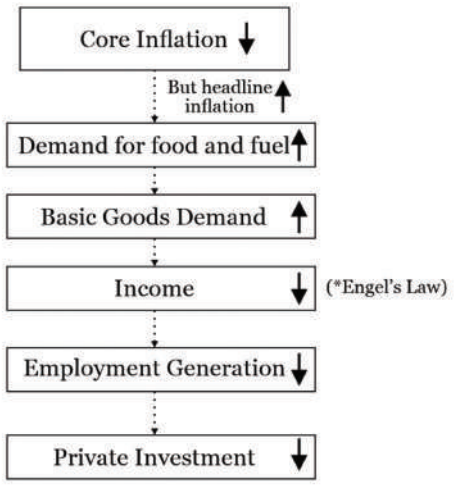
Context:

The economy shows a paradox of weak consumption growth, sluggish employment, and low core inflation despite strong overall growth, highlighting the need for a deeper analysis of these trends.

Economic Indicators and Their Implications:

- **Consumption: Consumption growth is weak**, growing at just 4%, half the rate of the overall GDP growth.
  - **Household savings are declining** and **borrowing is rising**, indicating that households are not saving more but borrowing to sustain consumption.

Economic Trilemma: Soft Consumption, Weak Employment Generation, and Low Core Inflation



* Engel's law states that with the rise in income, individual consumption move towards luxury items rather than basic products like food.

- **Household net financial savings was only 5.7% of GDP** in 2023-24, below the 7.6% of GDP average in the years before Covid.
- Weak consumption is a signal of weak growth rather than high growth with low consumption.

❖ **Employment: Employment growth is weak** despite strong GDP figures.

- The official employment statistics might present an overly optimistic view, as the actual employment conditions could be more problematic than reported.Weak employment growth **reflects broader economic weakness**, not strong growth.

Headline and Core inflation:

❖ **Headline inflation:** It Denotes the overall change in the value of all goods within the basket of goods.

❖ **Core inflation:** It is calculated by excluding food and fuel items from the headline inflation figure.

❖ Since the **prices of fuel and food items tend to fluctuate** and create 'noise' in inflation computation, **core inflation is less volatile than headline** inflation.

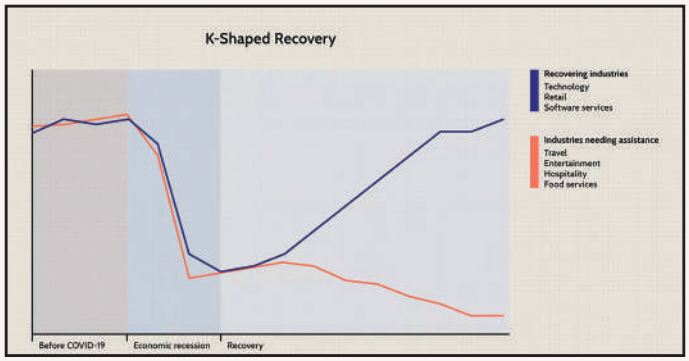
❖ **Core Inflation: Core inflation** (excluding food and fuel prices) **has fallen at a low level of 3%**, despite strong GDP growth.

- Low core inflation suggests that **aggregate demand is weak**, indicating that growth may not be as strong as reported.
- Low core inflation **supports the view that growth is modest** rather than robust.

Policy Recommendations:

K-shaped recovery:

A K-shaped recovery describes a scenario where, after a recession, various sectors of the economy rebound at disparate rates, times, or levels.



❖ **Avoid Tax Cuts:** Tax cuts would **impact only a small portion of the population** i.e top 10-20% tax paying population, and could exacerbate inequality.Moreover, such measures would be **inequitable given the K-shaped recovery** and the adverse impact on the informal sector.

- Focus is needed on structural reforms instead of cyclical adjustments.

❖ **Prioritise Privatisation:** Implementing a privatisation strategy could **spur investment and modernization** in state-owned enterprises.

❖ It is unwise for the government to invest more public funds into inefficient public sector undertakings like Mahanagar Telephone Nigam Limited (MTNL).

❖ **Adjust Monetary Policy:** With weak growth and low core inflation, reducing interest rates could stimulate demand.

❖ Lower rates might lead to a weaker rupee, enhancing export competitiveness.

Financing Challenges for Food Security

Sub Topic- *Food Security*

Context:

UN report "**The State of Food Security and Nutrition in the World 2024**" reveals that approximately **63% of low & middle income countries** (out of 119 analysed) have **limited or moderate access to financing for food security** and nutrition.

Key Findings:

❖ Progress in fighting global hunger has set back 15 years, **around 733 mn people going hungry in 2023**, equivalent to **1 in 11 people globally**.

- This indicates that the global community is significantly falling short of achieving **Sustainable Development Goal 2**.
- Despite progress in combating stunting and in promoting breastfeeding, global **hunger levels remained static for three consecutive years**.
- Regional trends show a stark contrast with **hunger continuing to rise in Africa,** affecting 20.4% of the population, while **remaining stable in Asia** at 8.1 per cent.
- In 2023, about **2.33 billion people were moderately or severely food insecure**, nearly the **same number as during the COVID** pandemic.

Structural Limitations and Inadequate Funding for Food Security:

- **74% of these countries** were impacted by major factors contributing to food insecurity and malnutrition.
- **Undernourishment prevalence** is significantly higher in countries with limited access to financing (23.1%) compared to moderate (10.4%) and high (6.9%) access.
- A **similar trend is observed in child stunting rates**, indicating a direct correlation between financing access and nutritional outcomes.
  - Higher rates observed in countries with limited (23.9%) and moderate (20.9%) access to financing.
- The report notes that countries most in need of financial support for food security face **structural limitations** that hinder their ability to secure necessary funding.
- Despite critical need, **less than 25% of total official development assistance is allocated to food security** and nutrition.
  - In the period between 2017 to 2021, these flows amounted to **$76 billion per year, of which only 34% helped address the major drivers** of food insecurity and malnutrition.

New Definition and Standardised Approach:

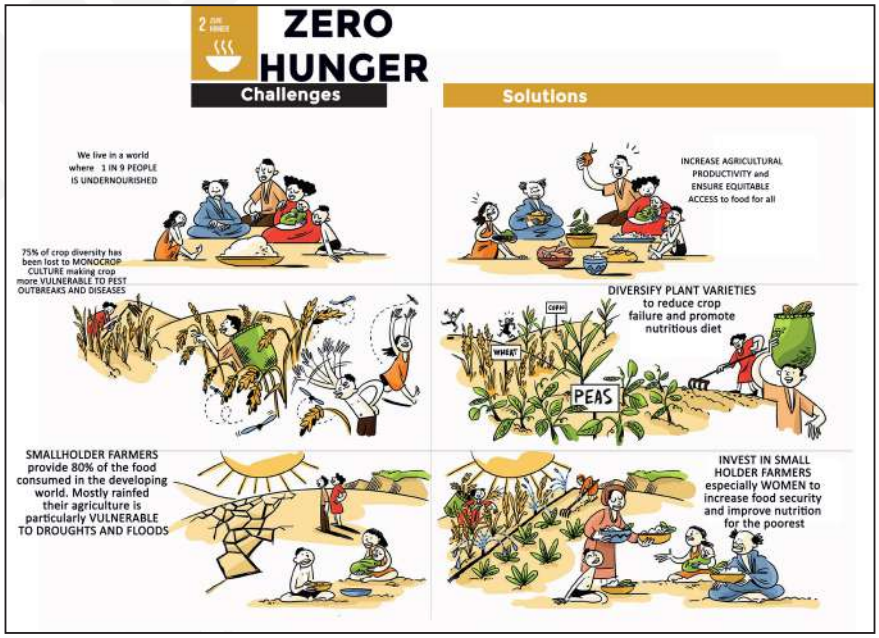
- The report calls for a **universal adoption** of a new definition and standardised approach to mapping financing flows for food security and nutrition.
  - Currently, there is **no agreed-upon definition** of measuring financing flows.
  - **Multiple definitions lead to differences** in estimates, undermining efforts to identify underfinanced areas and track intervention effectiveness.
- **Proposed Definition: Financing for food security and nutrition** refers to **public and private financial resources**, both **domestic and foreign,** directed **towards eradicating hunger, food insecurity, and all forms of malnutrition.**

Investment in Agriculture is Essential:

- There is a need to make **investments in agriculture in rural areas** crucial for overcoming hunger and poverty.
- It indicates that without **increased and smarter investments**, the global goal of ending hunger by 2030 is unlikely to be met.

Way Forward:

- **Financing to End Hunger, Food Insecurity, and All Forms of Malnutrition Report** recommends transforming agrifood systems, addressing inequalities, and making healthy diets affordable and accessible.
- The report calls for **increased, cost-effective financing** and a **standardised approach to food security and nutrition.**
- **Establish a common definition** of financing, clarifying what is being funded and its key elements, enhancing donor accountability and providing a clearer picture of financial flows.



Why are there so many hungry people?

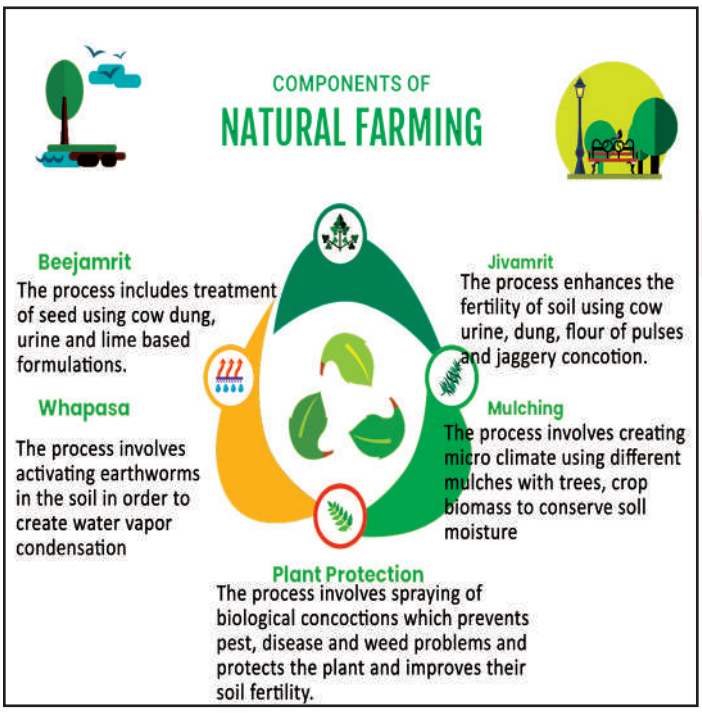
- The world faces hunger levels not seen since 2005, with high food prices persisting in many countries.
- Factors such as **conflict, climate shocks, rising living costs, civil insecurity, and reduced food production** contribute to this crisis.
- **Investing in agriculture** is crucial to tackling hunger and poverty, enhancing **food security, creating jobs, and building resilience to disasters.**

Natural Farming

Sub Topic- *Major crops Patterns, Irrigations*

Context:

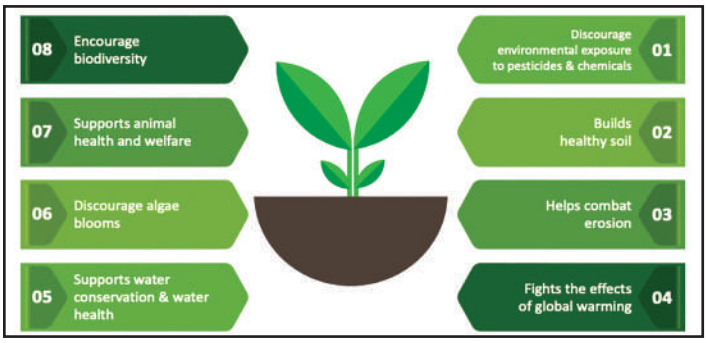
In the 2024-25 Budget, the Finance Minister announced a plan to introduce **one crore farmers to natural farming over the next two years,** supported by certification and branding.



Natural Framing:

- It **excludes all synthetic chemical fertilisers and pesticides**.
- It **promotes traditional practices** such as:
  - On-farm biomass recycling, cow dung-urine formulations, botanical concoctions, and pest management through biodiversity.
- **Agro-Ecological Integration:** This diversified farming system **integrates crops, trees, and livestock,** aiming to improve natural nutrient cycling and increase soil organic matter.

Benefits of Natural Farming:



- **Enhanced Yields**: Farmers using Natural Farming often report yields comparable to or sometimes higher than those from conventional methods.
- **Improved Health**: Natural farming eliminates health risks by avoiding synthetic chemicals, resulting in food with greater nutritional value and health benefits.
- **Environmental Conservation**: It promotes better soil health, increased agro-biodiversity, and more efficient water use, while minimising carbon and nitrogen footprints.
- **Increased Farmer Income**: It boosts farmers' incomes by providing additional revenue from intercropping, reducing costs, lowering risks, and maintaining yields.
- **Employment Generation**: It generates employment on account of natural farming input enterprises, value addition, marketing in local areas, etc.
  - The surplus from natural farming is invested back in the village itself.

Challenges and Concerns:

- The potential **reduction in crop yields**, making it difficult for natural farming to meet the food demands of India's large population.
- **National Bank for Agriculture and Rural Development** (NABARD) and **Indian Council for Research on International Economic Relations** (ICRIE) published **'Zero Budget Natural Farming (ZBNF): Implications for Sustainability, Profitability, and Food Security**.
  - It highlighted the huge **disparity in outcomes of two different ZBNF experiments** (now renamed **Bhartiya Prakritik Krishi Paddhati**).
- A study by **Centre for Economic and Social Studies** (CESS) **and Institute for Development Studies, Andhra Pradesh,** found that using lower-cost biological inputs under ZBNF **improved crop yields and increased farmers' incomes.**
  - The study suggested that natural farming could **enhance food and nutritional security** for farmers.
- However, the study by the **Indian Council of Agricultural Research** (ICAR) and the **Indian Institute of Farming Systems Research** (IIFSR) reported **significant yield reductions**.

- A 59% decline in wheat yields and a 32% decline in basmati rice yields compared to integrated crop management.
- These findings indicated potential **adverse impacts on food supply** if natural farming were adopted on a large scale.

- **Rigorous scientific studies are needed to assess the yield potential and sustainability** of natural farming before nationwide implementation.
- **Local vs Large-Scale Application:** While natural farming may be beneficial locally, it may not be viable on a large scale without risking national food security.
- **Limited market**: Farmers practising natural farming struggle to get premium prices due to a **lack of differentiated markets**, **standards**, and **protocols**.
- The **absence of certification and standardisation** makes it **difficult to differentiate** natural farming from organic or conventional methods.
  - Initiatives like the **Participatory Guarantee System** (PGS) are there, they often involve lengthy processes deterring farmers from obtaining certification.

Government Initiatives for Promoting Natural Farming:

- **Paramparagat Krishi Vikas Yojana** (PKVY), **Mission Organic Value Chain Development for North Eastern Region** (MOVCDNER), **Bhartiya Prakritik Krishi Paddhati** (BPKP), **National Mission on Natural Farming** (NMNF), **National Project on Organic farming** (NPOF), etc.

Way Forward:

- **NABARD and ICRIE** suggest that **extensive scientific studies** are crucial to assess the yield potential and sustainability of natural farming.
  - These studies should address the varying outcomes from different experiments to provide a clearer picture of natural farming's viability.
- **Niti Aayog's Task Force Report 2023** recommends that innovative mechanisms should be implemented to require fertiliser sellers and manufacturers to **offer both inorganic and organic fertilisers in a specified ratio.**

National Mission on Natural Farming (NMNF)

- The government has launched the NMNF as an independent scheme from 2023-24 by scaling up the **Bhartiya Prakritik Krishi Paddhati** (BPKP).
- The scheme is for the **duration of 2023 to 2026**.
- **Vision:** To **implement self-sustaining natural farming systems** to reduce cultivation costs, increase farmers' income, and ensure resource conservation, healthy soils, environment, and food.
- **Objective**: To **motivate farmers to adopt chemical-free farming** through the system's merits, requiring behavioural changes towards using cow-based, locally-produced inputs.
- The NMNF has a **total budget outlay of ₹4,645.69 crore for six years**.
- It will **initiate 1 crore farmers into natural farming**, supported by certification & branding, implemented by scientific institutions & gram panchayats
- Establishing 10,000 bio-input resource centres is also part of the mission.

Bharatiya Prakritik Krishi Paddhati Scheme:

- It is a sub scheme of **Paramparagat Krishi Vikas Yojana** (PKVY) from 2020-21 for the promotion of traditional indigenous practices, falling within the umbrella of **National Mission on Sustainable Agriculture** (NMSA).
- Under the scheme the **financial assistance of Rs. 12,200/ ha. were provided for 3 years.**
- Given the government's vision to promote natural farming as a mass movement, the BPKP is being **up-scaled and renamed the "National Mission for Natural Farming."**

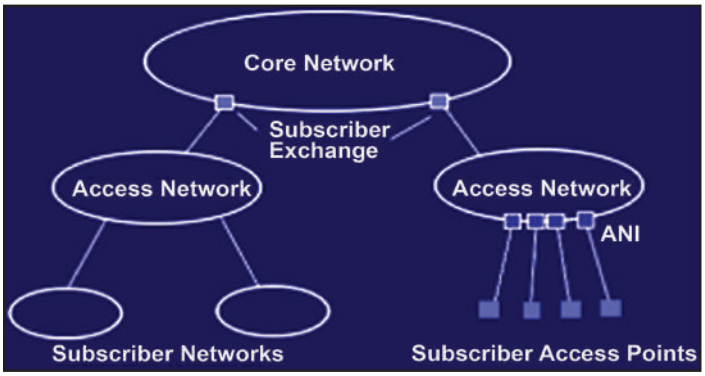
Subject - Science & Technology

IEEE Approves IIT Bombay's Network Standard

Sub Topic- *Achievements of Indians in the Science & Technology*

Context:

Institute of Electrical and Electronics Engineers (IEEE) approves **wireless network architecture for affordable broadband access in rural areas** developed at IIT Bombay.



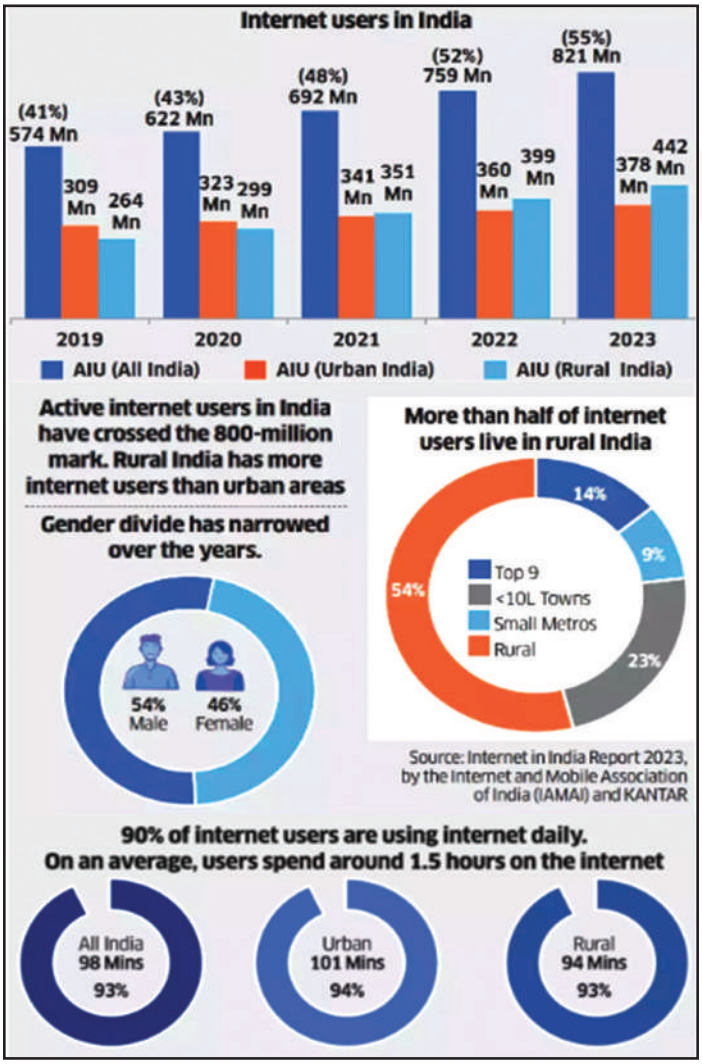
More on News:

- Mobile devices are integral for communication, financial transactions, and Internet access. Their connectivity relies on **cellular (mobile) wireless networks.**

- IIT Bombay has been developing **affordable rural connectivity solutions** that form the basis of the **2061-2024 standard**.
- The standard defines a wireless network architecture for **affordable broadband access in rural areas.**

Cellular network

- A **cellular network**, such as a 5G network, includes a **set of network equipment connected by communication links**.
- They work together to move data between different devices and to other networks, e.g., the Internet.
- It can be divided into two sub-networks: **Access network** (AN) and **Core network** (CN).
- **Access Network (AN)**: Includes **base stations** providing **wireless connectivity** to mobile devices in specific coverage areas.
  - These **towers**, equipped with **antennae**, are strategically placed across regions by network operators.
- **Core Network (CN)**: **Centralised equipment connecting to external networks** such as the Internet.



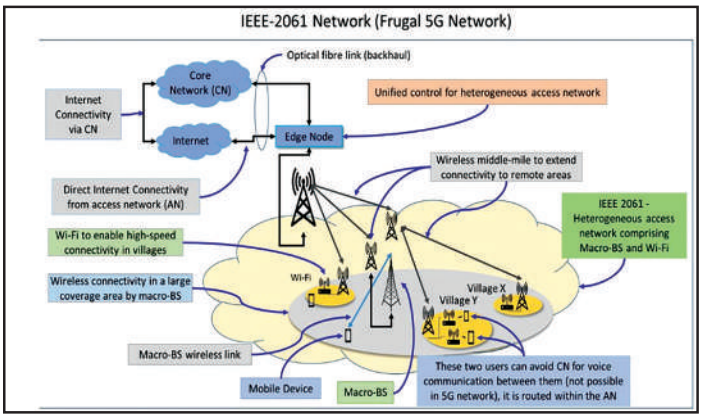
- Linked to **base stations via optical fibre** (backhaul), it facilitates crucial **data transmission** and supports user mobility.
- All data, even from nearby users, must pass through both the base station and CN to reach its destination.

Impediments to Rural Connectivity:

- **Income Disparity**: Lower rural incomes hinder affordability of mobile services.
- **Population Density**: Sparse rural populations are clustered in villages spread across wide areas.
- **Infrastructure Challenges**: Cost & feasibility hinder fibre optic deployment in remote regions.
- **Urban-Rural Digital Divide**: India has a tele-density gap between urban (127%) and rural (58%) areas.

IEEE 2061-2024 Standard (Frugal 5G network)

- This standard outlines an architecture for a **low mobility, energy-efficient network** designed for **affordable broadband access.**
- It includes a **wireless middle-mile network**, an **access network**, and the necessary control and management functions.
- **Key Features of IEEE 2061-2024 Standard**
  - **Heterogeneous AN**: Comprises different types of base stations, including **macro base stations** (macro-BS) for large coverage areas and Wi-Fi for high-speed connectivity within villages.
  - **Seamless Connectivity**: Allows devices to switch from Wi-Fi to macro-BS without service disruption, due to integrated AN control functionality.



  - **Direct and Alternate Internet Paths**: Provides a direct connection to the Internet from AN, bypassing the CN for stationary users, and enabling direct communication between nearby users within the AN.
- **Multi-hop Wireless Middle-Mile Network**: IEEE-2061 standard proposes a cost-effective middle-mile network using technologies like satellites or long-range Wi-Fi, eliminating need for optical fibre in remote areas.
- **Benefits of IEEE 2061-2024 Standard**
  - Provide **cost-effective connectivity** solutions for rural populations.

- Offers a **flexible and scalable mobile network**, accommodating legacy and new technologies (4G, 5G, 6G, Wi-Fi).
- Integrated AN control functionality helps **avoid issues like call drops** in a heterogeneous network.
- Direct routing within the AN for nearby users **enhances network efficiency,** similar to direct regional travel.

Photoelectron Spectroscopy Analysis Reveals Insights into Solid-State Battery Degradation

Sub Topic- *Achievements in the Science & Technology*

Context:

Researchers from **HZB and Justus-Liebig-Universität, Giessen**, have developed a **new method using photoelectron spectroscopy at BESSY II** to monitor electrochemical reactions in solid-state batteries, as reported in ACS Energy Letters.

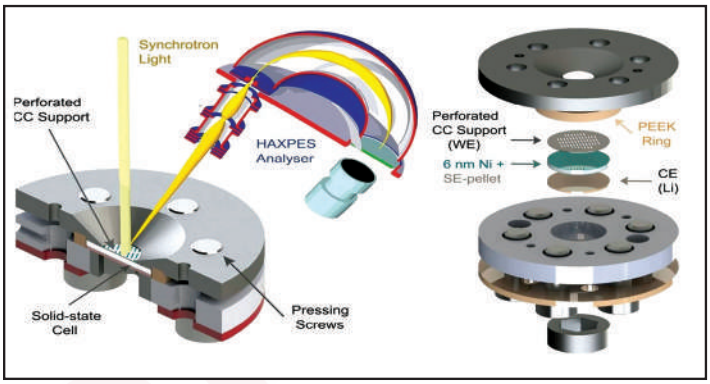
- This approach **aims to enhance battery materials and design** by providing detailed insights into operational processes.

Photoelectron Spectroscopy

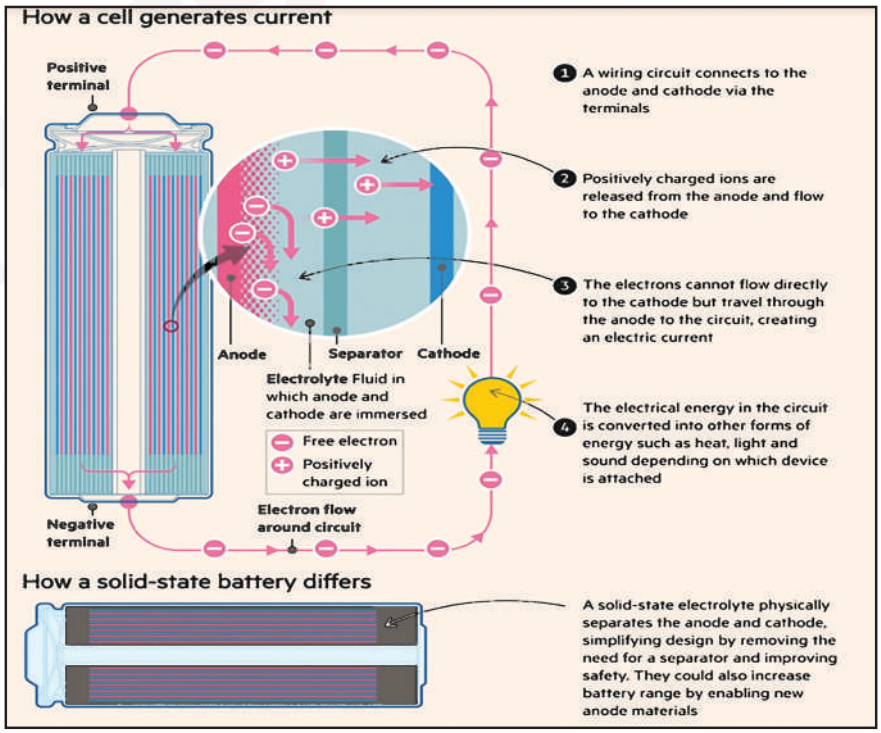
- PES is an analytical technique that **uses ultraviolet light (UV) or X-rays to ionise electrons in a sample**.
- The energy and number of the emitted photoelectrons are measured **to determine** the **electronic structure** and **chemical composition** of the material.
- **There are two main types of PES:** X-ray photoelectron spectroscopy (XPS) and Ultraviolet photoelectron spectroscopy (UPS).

Key Highlights

- A team has **devised a novel method** to examine electrochemical reactions occurring at the interface between a solid electrolyte and electrode with exceptional temporal resolution.
- They investigated **samples of the solid electrolyte Li6PS5Cl**, recognised as a **leading candidate** for solid-state batteries due to **its high ionic conductivity**.
  - They utilised an **ultra-thin layer of nickel**, approximately **30 atomic layers thick or 6 nanometers**, as the working electrode.



  - On the opposite side of the Li6PS5Cl pellet, **a film of lithium** was applied to function as the **counter electrode**.
- **Hard X-ray photoelectron spectroscopy (HAXPES)** was employed to monitor reactions at the interface in real-time to **observe the formation of an interlayer (SEI)** and analyse the **chemical evolution during battery operation**.
- The study revealed that **decomposition reactions at the interface** were only **partially reversible**, contributing to **reduced battery longevity**.

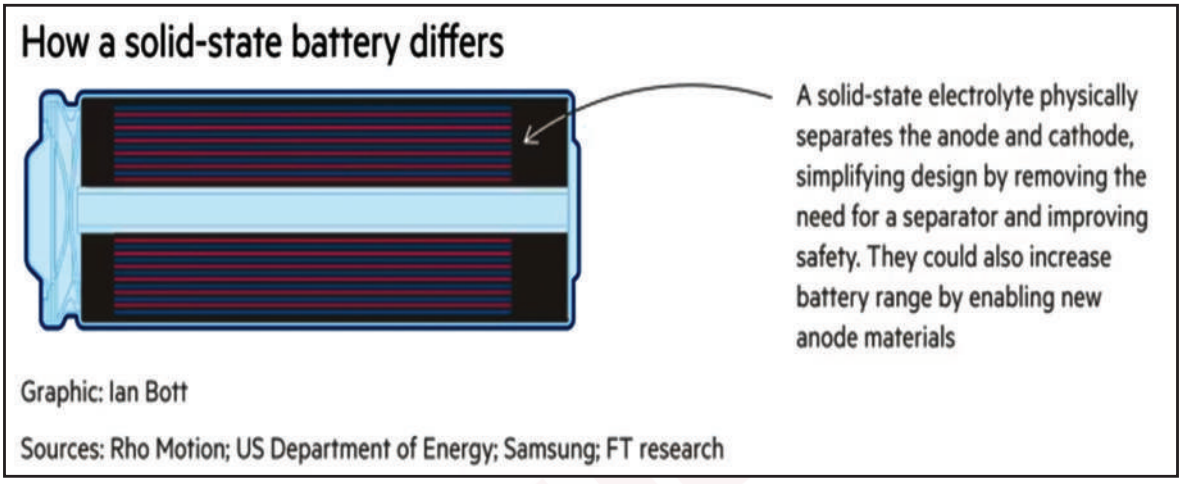


Challenge: Solid-state batteries use a solid ion conductor between the battery electrodes, allowing lithium ions to move during charging and discharging.

- Unfortunately, decomposition products and interphases form at the interfaces between the electrolyte and the electrode.
- These hinder lithium ion transport and lead to active lithium consumption, resulting in decreased battery capacity over charge cycles.

About Solid-state batteries

- A solid-state battery is essentially battery technology that **uses a solid electrolyte** instead of liquid electrolytes which are instead behind lithium-ion technology.
- They are safer because they are **less susceptible to fires**.
- They can be **charged more quickly**.
- They are more energy dense which means they can **store more energy** in a smaller and lighter package.
- Their **limited lifespan** remains a **challenge**.



Implications and Future Directions: By understanding these processes, researchers can improve battery materials and design. The findings pave the way for longer-lasting, more efficient solid-state batteries.

The lithium-ion batteries that we rely on in **our phones, laptops and electric cars** have a **liquid electrolyte**, through which ions flow in one direction to charge the battery and the other direction when it is being drained.

Understanding the Power of Auroras and Geomagnetic Storms: Safeguarding Critical Infrastructure

Sub Topic- *Achievement in the field of Space Technology*

Context:

Researchers in **Frontiers in Astronomy** and **Space Sciences** have shown that the **angle at which interplanetary shocks hit Earth's magnetic field** determines the **strength of geomagnetically induced currents**.

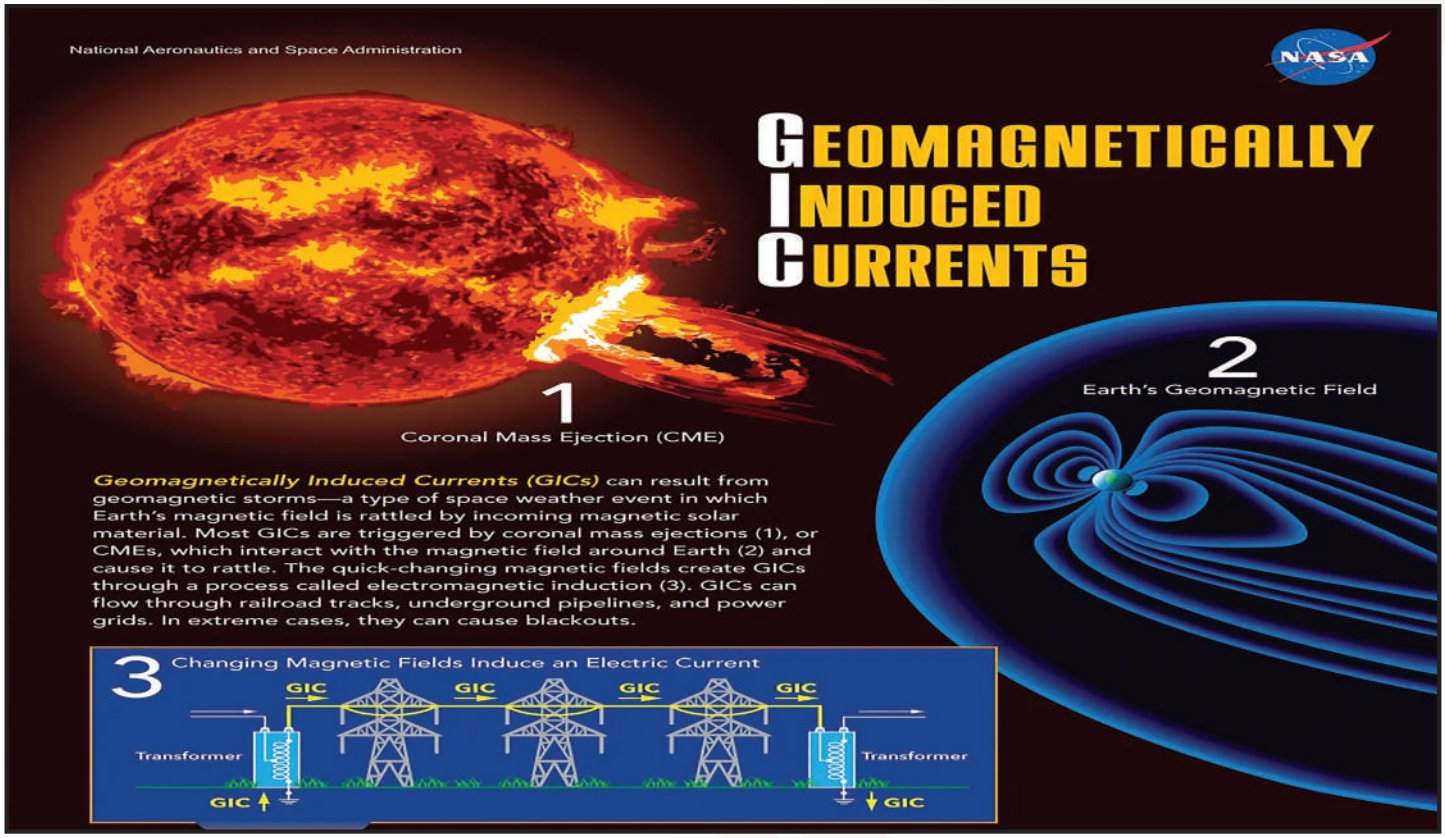
- This discovery opens doors **to predicting** and **protecting** against potentially **damaging shocks to essential infrastructure**.
- **Auroras** long revered in myth, now exert their **influence on modern technology** that relies on electricity. These celestial displays are generated by forces that **also generate currents capable of damaging** electrically conductive **infrastructure**.
- Auroras and GIC **share common space weather drivers**.

Critical Infrastructure

- It refers to the **systems, facilities and assets that are vital for the functioning of society and the economy**. Their disruption would **impact public safety, security and health or economic stability.**
- It includes both physical and virtual components that are interconnected and interdependent.

The Science Behind Auroras and Infrastructure Damage

- **Auroras and Geomagnetically Induced Currents (GICs):** Auroras result from two processes:

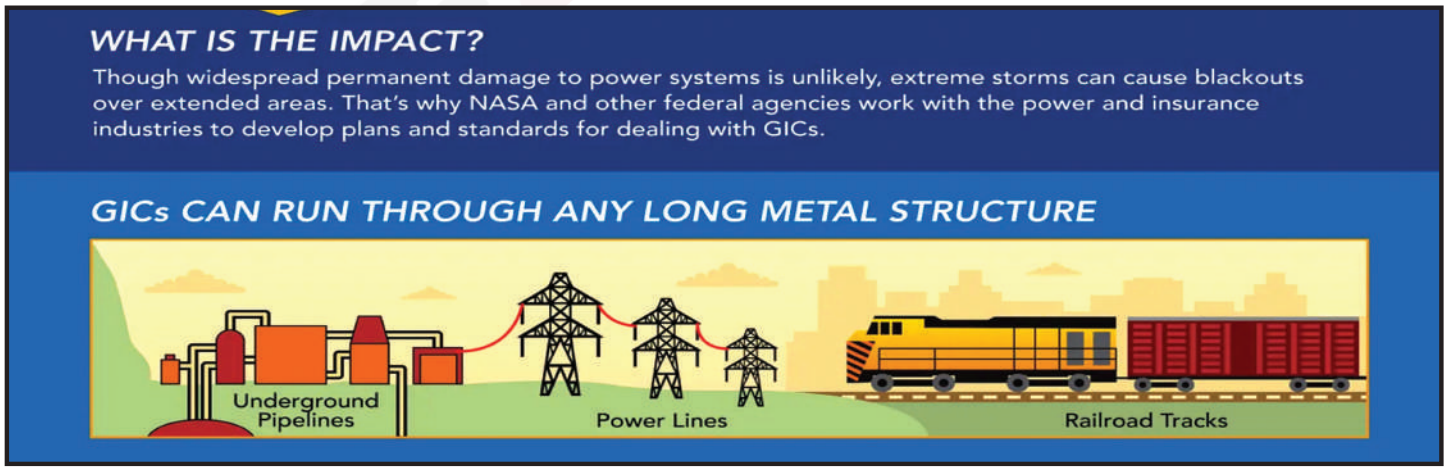


- Particles ejected from the sun interact with Earth's magnetic field, **causing geomagnetic storms**.
- Interplanetary shocks compress Earth's magnetic field, generating **geomagnetically induced currents (GICs)**.

❖ **Infrastructure Vulnerability:** GICs can harm infrastructure that conducts electricity, such as power grids, pipelines, and communication networks.

❖ **Impact Angle Matters:** Discovered the angle at which interplanetary shocks hit Earth is crucial. **Head-on impacts induce stronger GICs** because they compress the magnetic field more effectively.

❖ **Forecasting and Protection:** Understanding shock impact angles allows us to forecast dangerous events and shield critical infrastructure.



Historical Examples and Future Considerations

❖ **1989 Geomagnetic Storm:** The Hydro-Quebec power system in **Canada** was shut down for nearly nine hours due to a severe geomagnetic storm. Millions of people were left without electricity.

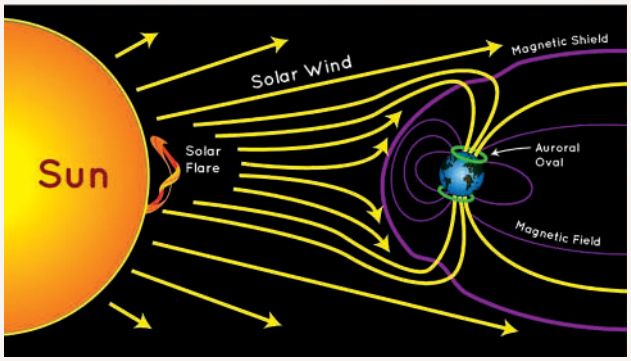
❖ **May 2024 Storm:** The most severe storm in the past two decades expanded the **auroral region (Florida in the U.S. to Ladakh in northern India**) significantly, emphasising the need for vigilance.

❖ While extreme events grab headlines, weaker but more frequent interplanetary shocks can also pose threats over time.

About Auroras

- An aurora is a natural light display that **shimmers in the sky**.

- **Blue, red, yellow, green, and orange lights shift** gently, changing shape like softly blowing curtains.
- They are only visible at night, and usually only **appear** in **lower polar regions**.
- They are known as **Aurora Borealis, or Northern Lights at the Arctic Circle** and **Aurora Australis, or Southern Lights at the Antarctic Circle**.
- **Most active auroras** happen during **periods of strong solar wind**, which is associated with **sunspots** and **solar flares**.



- The **colours of auroras depend** on the **altitude** and the **type of atoms** involved:
  - **Green-yellow:** oxygen atoms at lower altitudes.
  - **Red:** oxygen atoms at high altitudes.
  - **Blue/purple:** hydrogen and helium atoms (rarely seen).
  - **Reddish/bluish:** nitrogen atoms.
- **Magnetic storms** and **active auroras** can sometimes **interfere with communications**. They can **disrupt radio and radar signals**. Intense magnetic storms **can even disable communication satellites**.

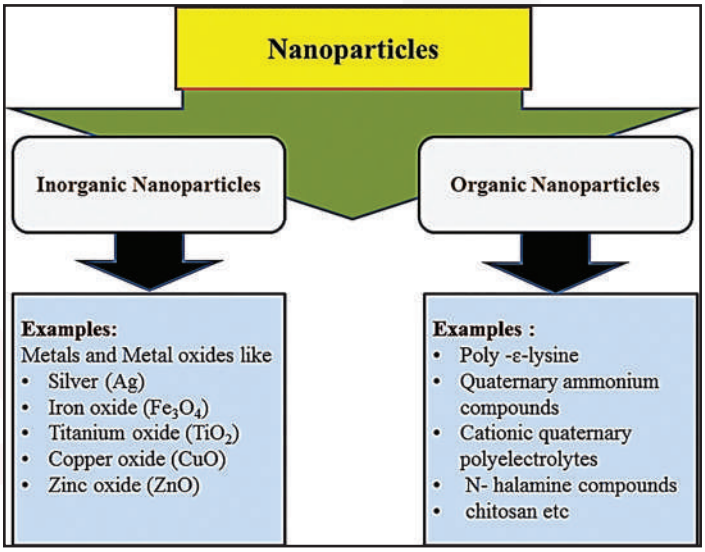
Advancements in Organic Nanoparticles

Sub Topic- *Achievement in the field of Nanotechnology*

Context:

A recent **PNAS study** explores the **effects of hyper branching and chemical cross-linking** on Organic Nanoparticles (oNPs), **creating a dense bonding network**.

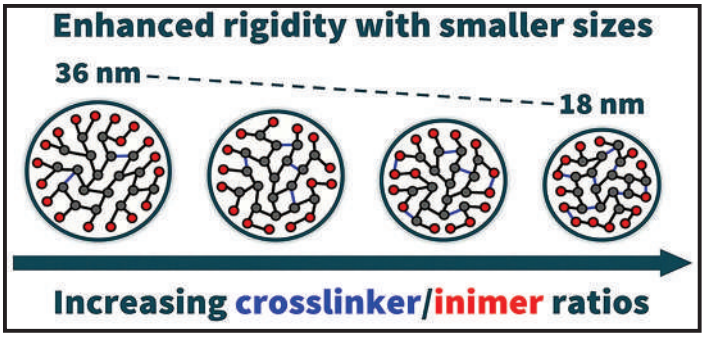
- This combined approach enhances the functionality and mechanical properties of oNPs and **organic nanoparticles can achieve inorganic-type stiffness**.



Organic nanoparticles (oNPs)are **more chemically versatile** than inorganic ones, enabling functionalisation and customisation for specific biomedical and technological applications. However, **traditional materials have faced limitations** in mechanical properties and chemical tunability.

Key Findings:

- The research outcomes demonstrate the **ability to control both the functional attributes** and **elastic properties** of organic nanoparticles.
- This **innovative "bottom-up" approach** is ideal for developing versatile functional materials for various applications.
- This **advanced level of control** by using a precise method for the synthesis of functional nanoparticles called **atom transfer radical polymerisation (ATRP)**.
  - These functionalised organic nanoparticles are essentially **new gigantic single macromolecules** with **molar masses** of **100 million Daltons**.



- An important **feature of the new oNP system** is its **macro-initiator** characteristics, **enabling** versatile **graft modification**.
  - The resulting **brush-tethered oNPs** unlock innovative applications across various nanomaterial technologies through direct assembly or integration.

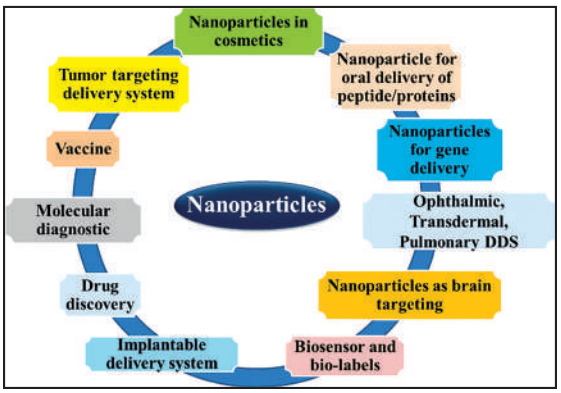
Atom Transfer Radical Polymerisation (ATRP)

- It is a **controlled living polymerisation method** that yields well-defined polymers or copolymers with predetermined molecular weights and low polydispersities.
- It is mechanistically **related to transition metal-mediated atom transfer** radical addition (ATRA) reactions.

Implications: It holds potential for **improving optical properties in materials**, with **future research focusing** on areas like **fluorescence** and **real-world performance evaluation.**

About Nanoparticles:

- It is a tiny particle that **ranges between 1 to 100 nanometres in size**.
- Undetectable by the human eye, nanoparticles can **exhibit** significantly **different physical** and **chemical properties** to their larger material counterparts.
- They are small enough to confine their electrons and **produce quantum effects**.
- **Nanoparticles** are **used** in diverse fields, including **drug delivery, electronics,** and **air purification**.
  - **Grafting polymers** made from nanoparticles together can further **enhance material functionality.**



Applications:

- **Healthcare:** Drug delivery, cancer treatment, antibacterial applications, biosensors.
- **Environment:** Water purification, air filtration, solar cells.
- **Cosmetics:** Sunscreen, antimicrobial products.
- **Sports:** Lightweight and durable sports equipment.
- **Military:** Camouflage, sensors.
- **Other Industries:** Coatings, electronics, energy, food packaging.

Teleoperation System for Robotic Manipulation

Sub Topic- *Achievement in the field of Artificial Intelligence & Robotic*

Context:

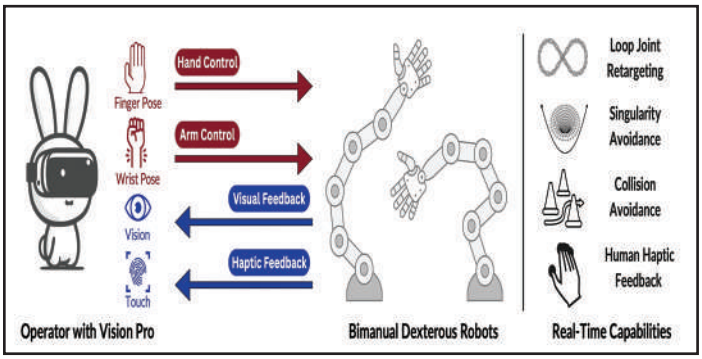
Researchers at UC San Diego have **created Bunny-VisionPro**, a teleoperation system for **robots that handles complex bimanual tasks**. Featured on arXiv, it aims to streamline human demonstration **collection for imitation learning**.

Key Highlights

- **Imitation learning** holds immense promise for training robots **to perform complex everyday tasks** like dishwashing or cooking.
  - This method heavily **relies on detailed human demonstrations**, which have been **challenging to capture effectively**.
- **Existing teleoperation systems** often struggle to accurately reproduce humans' intricate and coordinated movements. To address this, researchers developed Bunny-VisionPro.

Bunny-VisionPro:

- Its cutting-edge teleoperation system controls **dual robot arms** and **multi-fingered hands in real time**.

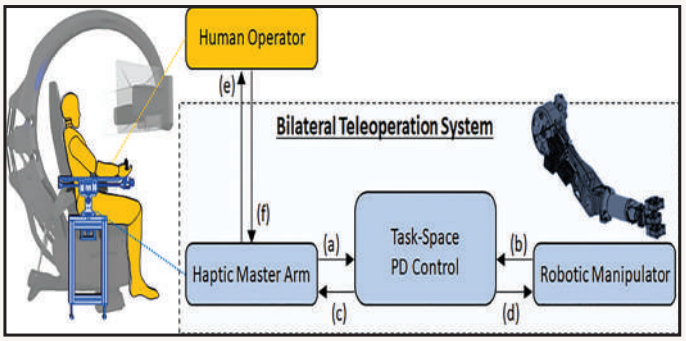


- By making the **experience** as immersive **as playing a virtual reality game**, the system facilitates the collection of high-quality human demonstrations for imitation learning.

- **Features:**
  - **Real-time control:** It enables safe and efficient control of robotic manipulators with minimal delay.
  - **Immersive experience:** The device is portable and lightweight, offering visual and haptic feedback for enhanced user interaction.
  - **Collision prevention:** Incorporates safeguards to avoid accidents during teleoperation.
  - **Modular design:** Easy to install and adapt to different robotic platforms.

How Bunny-VisionPro Works?

- The system comprises three main components:
- **Arm motion control module:** Translates human wrist movements to robot end-effector positions while addressing potential issues like singularities and collisions.
- **Hand and motion retargeting module:** Maps human hand poses to robot hand poses, accommodating complex hand structures.



- **Haptic feedback module:** Transmits tactile information from the robot to the human operator, enhancing the sense of control.

About Robotics:

- Robotics, the **intersection of engineering, computer science,** and **artificial intelligence**, rapidly transforms industries and our daily lives.
- At its core, robotics **involves the design, construction, operation**, and use of robots, which are **machines capable of performing a variety of tasks** with varying degrees of autonomy.
- **Applications:** Industrial Automation, Healthcare, Agriculture, Exploration, Domestic Use, Education.

The draft **"National Strategy for Robotics" (NSR)** proposed by the **Ministry of Electronics and Information Technology (MeitY)** aims to **position India as a global leader in robotics by 2030**.

- **Objectives**
  - Enhance R&D capabilities and funding.
  - Create a conducive ecosystem for innovation and entrepreneurship.
  - Promote large-scale adoption of robotics in priority sectors.
- The draft identifies manufacturing, agriculture, healthcare, and national security as the **four core sectors** to prioritise **for robotics automation**.
- **Policy Framework:** It builds upon the **Make in India 2.0 initiative**, which identifies **robotics as one of the 27 sub-sectors** to enhance India's integration in the global value chain.
- **Institutional Framework: MeitY** will serve as the **nodal agency** overseeing the "National Robotics Mission" (NRM) to implement the NSR.
  - Establishment of a Robotics Innovation Unit (RIU) to develop a regulatory framework for robotics.
- **Interventions:** The draft NSR proposes **fiscal** and **non-fiscal support** for robotics startups and export promotion, as well as the **creation of Centres of Excellence (CoEs).**
  - The NFR recommends involving the private sector in priority areas for application-based research to assist with **experimental prototyping** and **small-volume production** during initial commercialisation phases.
- **Capacity Building:** Developing a skilled workforce in robotics and related fields to support the growth of the ecosystem.

The Road Ahead: The future of robotics holds immense promise.

- As **technology continues to advance**, we can expect to see even more sophisticated and capable robots.
- **Challenges** such as ethical considerations, job displacement, and data privacy must **be addressed.**
- The potential **benefits of robotics** in **economic growth, improved quality of life**, and addressing global challenges **are undeniable**.

Origin of Superconductivity in High-Temperature Copper Oxide Superconductors

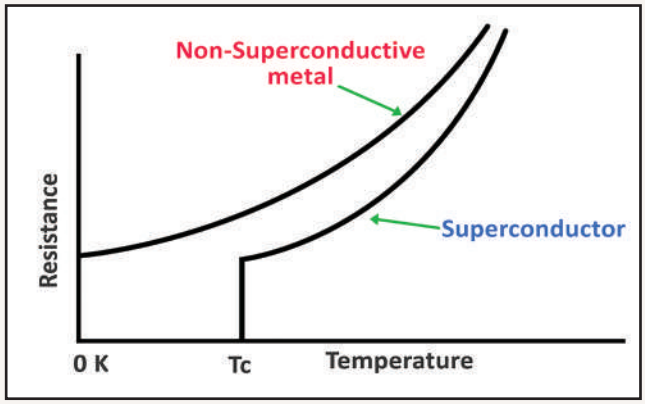
Sub Topic- *Achievements of Indians in Science & Technology*

Context:

In **a recent study** associate Professor and his team **from Okayama University, Japan**, explored the source of high-temperature **superconductivity in cuprates' pseudogap state** using an innovative method.

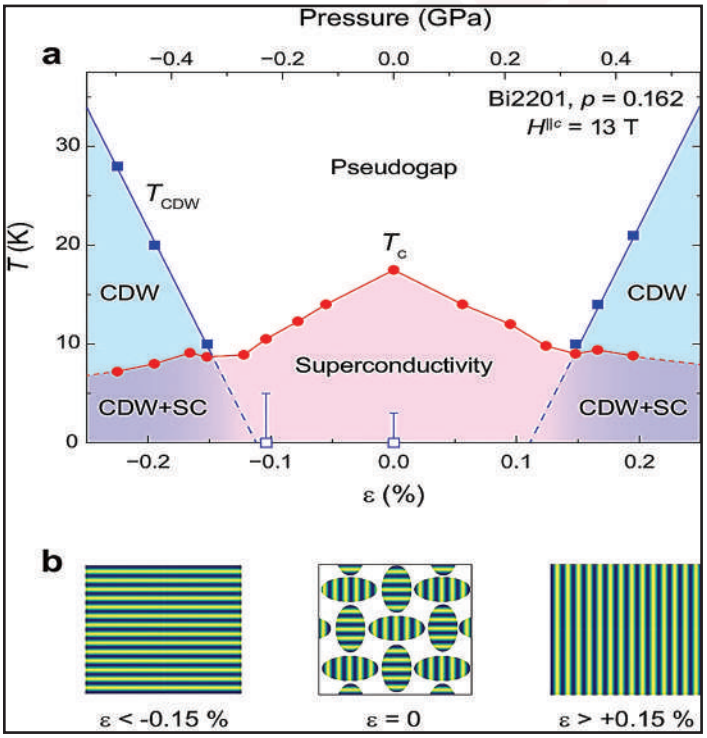
Superconductors are materials that conduct electricity with zero resistance when cooled to a specific temperature, known as the critical temperature.

- They have numerous **applications**, including power grids, maglev trains, and medical imaging.



- **High-temperature superconductors** (critical temperatures higher than conventional superconductors) hold significant potential for advancing various technologies.
  - **A class of HTS, copper oxides** or **cuprates**, exhibits superconductivity through **doping**.
  - In the **low-doped state, a pseudogap opens**. This pseudogap is considered a potential factor in the origin of superconductivity in these materials.

Key Highlights:



- They **found a long-range charge density wave (CDW)** order in **optimally doped Bi2201** induced by a unique **piezo-driven uniaxial strain cell,** intentionally **disrupting** the crystal **symmetry of the CuO2 plane**.
- They **employed nuclear magnetic resonance (NMR)** to observe how the electronic structure of optimally doped **Bi2201 superconductor responded to** applied **uniaxial compressive** and **tensile strains**.
- The study found that **when the strain reached 0.15%**, there **was a notable transformation in the material**: the short-range CDW order transitioned into a long-range CDW order.

Implications:

- **Increasing strain** not only suppressed superconductivity but also **enhanced the long-range charge density wave (CDW) order**, indicating the coexistence of both phenomena.
- These findings suggest that **a hidden long-range CDW order exists in the pseudogap state of cuprates**, extending beyond the low-doped regime, and **becomes visible under strain**.

Challenging Conventional Theories: The findings challenge the traditional belief that magnetism is the primary driver of superconductivity in cuprates. This opens doors for new theoretical models.

Previous studies have revealed a long-range charge density wave (CDW) order in the low-doped regime of cuprates, which breaks the crystal symmetry of the copper oxide (CuO2) plane.

- **CDW** is **a repeating wave-like pattern of electrons** that affects the material's conductivity.
- This symmetry breaking is significant, as **superconductivity** is known to **arise inside** or **near symmetry-broken states**.
- In the **bismuth-based cuprate superconductor**, **Bi2Sr2-xLaxCuO6+δ (Bi2201)**, strong magnetic fields have been shown to induce a long-range symmetry-breaking CDW order. The **exact role of these phenomena** in the occurrence **of superconductivity in cuprates remains unknown**.

Pathways to Practical Applications: Unveiling the way for the development of more practical superconducting materials.

- **High-temperature superconductors** hold significant potential for **lossless power transmission and storage**, making substantial contributions **to energy conservation** and the **pursuit of carbon neutrality**.
- The **application of superconductors in MRI technology** has the potential to **reduce costs** and **enhance accessibility** to **advanced medical imaging**.
- **Uniaxial Strain for Future Studies:** The importance of uniaxial strain as a valuable **tool for exploring superconductivity in cuprates** and **similar materials.**

Key Terms

- **Cuprates:** A class of high-temperature superconductors made of copper oxide.
- **Doping:** Introducing electrons or holes into the crystal structure is required for superconductivity in cuprates.
- **Pseudogap:** A partial gap in the electronic structure observed in low-doped cuprates, potentially linked to superconductivity.

Spatial Computing

Sub Topic- *Achievements of Indians in Science & Technology*

Context:

Spatial computing is the **future of human-technology interaction**, blending virtual content into the physical world using **AI, computer vision, and extended reality (XR)**.

- It's more than just the metaverse, representing **a 3D-centric approach to integrating digital experiences** with our **everyday environment**.

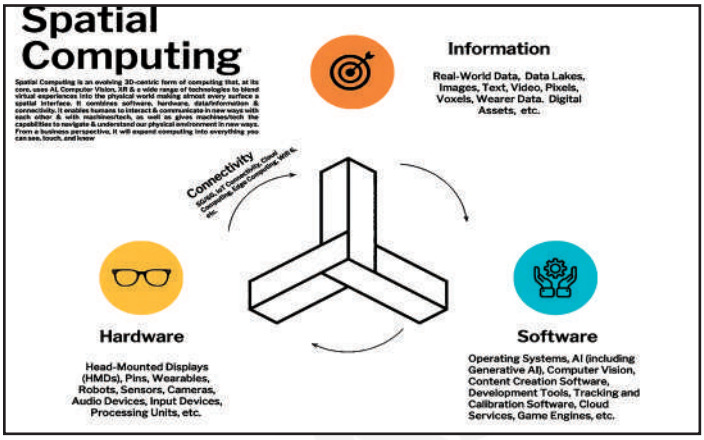
The first generation of spatial computing

- **Wearable devices:** It relies on wearable tech, like **headsets** or **glasses**, to **deliver** the **augmented reality experience.**

  - **Augmented reality (AR):** The ability to **overlay digital 3D objects onto the physical world**, making it **seem like they are part of the environment**.
- **Spatial computing is in its early stages**, but it has the potential to significantly change how we interact with technology, **similar to the shift brought** about **by mobile computing**.
- The **World Economic Forum recognises** it as a key emerging technology with the potential to significantly impact people and the planet in the coming years.

What is Spatial Computing?

- The term "spatial computing" was coined back in **2003** by **researcher Simon Greenwold**.



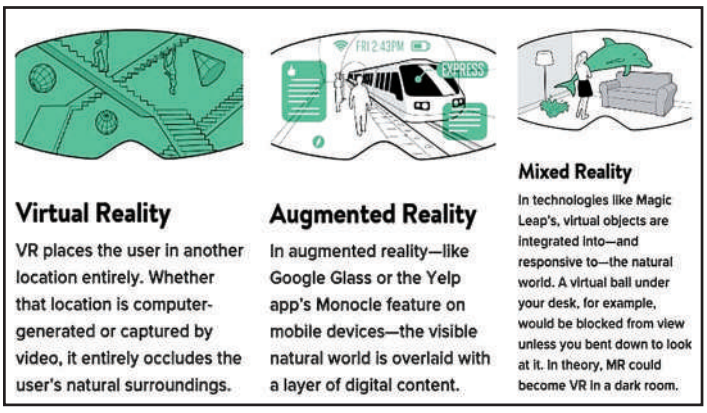
- A "**human interaction with a machine** in which the **machine retains** and **manipulates referents** to real objects and spaces."
- Simply put, spatial computing technology blends the digital and physical by **overlaying computer interfaces onto the real world**.
- Rather than staring at a screen, **users interact with digital objects** and information **using natural movements in 3D space**.

Examples:

- Leading **tech companies are developing** advanced **AR glasses**, while **healthcare providers** are **using VR** for patient treatment and medical training.
- Visual driving directions on car windshields.
- **Virtual office metaverses** for collaboration.
- **Pokémon Go**, which overlays digital characters onto the real world for interaction.

Components and Techniques:

- **Spatial computers incorporate sensors** (such as **RGB cameras, depth cameras, and 3D trackers**) to sense and track human bodies during interactions in a 3D space.



- **Computer vision** is used to **understand real-world scenes**, recognise objects, create 3D maps, and more.
- **Extended reality (XR)** and **mixed reality (MR)** superimpose virtual 3D graphics and audio onto our visual and auditory systems, providing contextual information naturally.

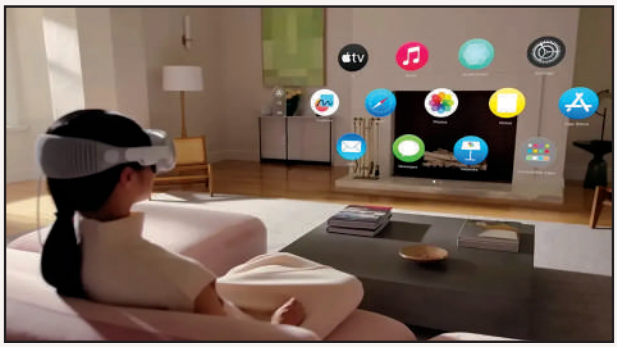
Applications:

- **Gaming and entertainment:** XR experiences are transforming gaming, movies, and live events, offering new levels of immersion.
- **Education and work:** Virtual surgery practice for medical students, virtual experiments for science students, and design modifications for architects and designers.
- **Healthcare:** Access to vital information and 3D scans for doctors, personalised virtual assistants and exercises for patients.
- **Industry and Manufacturing:** Augmented reality is being used for training, maintenance, and quality control, improving efficiency and safety.

Challenges and Future Prospects:

- **High device costs** limit accessibility for average consumers.
- **User experience issues:** Devices are often heavy, and bulky, have low battery life, and poor resolution, leading to potential tiredness and nausea.
- **Privacy concerns** arise as more personal data is collected and processed.
- **Apple's entry** could drive innovation and accessibility, setting trends for other companies to follow.

Apple's Vision



- **Vision Pro headset** and **visionOS software** allow navigation of apps and media through looking, gesturing, and voice commands.
- **It enhances multitasking** by allowing multiple apps and windows to be opened simultaneously.
- **Aims to reduce device size** and **cost over time**, making spatial computing mainstream and potentially **replacing smartphones** with **wearable devices** resembling regular glasses.

GM Mustard

Sub Topic- *Achievements in the field of Biotechnology*

Context:

The Supreme Court pronounced a **split verdict** on the validity of the **Centre's 2022 decision granting conditional approval for environmental release of genetically modified (GM) mustard crops.**

More in News:

- The court in ***Gene Campaign vs Union of India and Others (2024)*** was dealing with a Public Interest Litigations (PILs) challenging the Union Government's decision to commercially cultivate and release genetically modified mustard into the environment.
- The Bench asked the Centre to **formulate a national policy** with regard to GM crops in consultation with all stakeholders.
- The case **would now be referred to a three-judge Bench** to be constituted by the Chief Justice of India.

About Other GM crops

- **Bt Cotton** is the **only GM crop approved for commercial cultivation in India.**
- **Bt Brinjal -** In Spite of **GEAC approval in 2009** for the commercial release , due to widespread public opposition an **indefinite moratorium is in place** and thus its commercial cultivation is not permitted in India.
- **The Cartagena Protocol on Biosafety to the Convention on Biological Diversity is** an international agreement which aims to ensure the **safe handling, transport and use of living modified organisms** (LMOs).

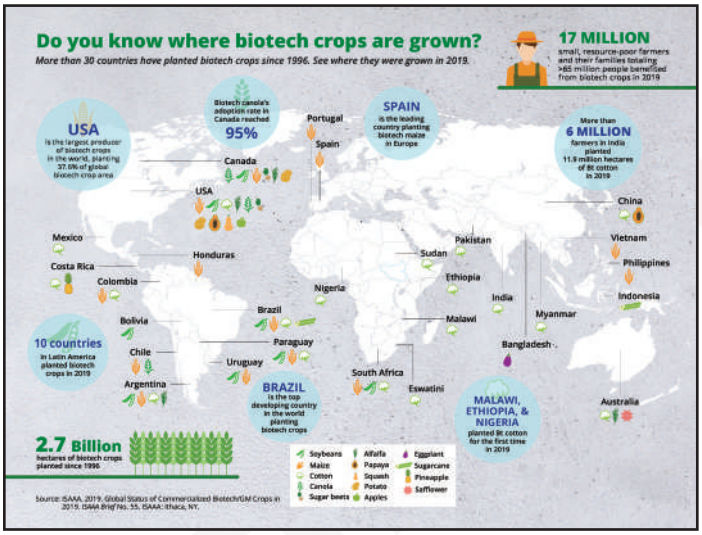
About GM mustard (DMH-11):

- DMH-11 was created by a team of scientists from **Delhi University's Centre for Genetic Manipulation of Crop Plants (CGMCP)** with assistance from the National Dairy Development Board (NDDB) and the Department of Biotechnology.
- The transgenic hybrid is developed by **hybridising an Indian mustard variety called Varuna with the east European 'EH-2'.**
- The DMH-11 has been developed using the genetic male sterility (GMS) technique, especially the **'barstar-barnase' system**, to make herbicide resistant.
- On the **recommendation of the Genetic Engineering Appraisal Committee (GEAC)**— the environmental release of transgenic mustard hybrid DMH-11, a variety of GM mustard was undertaken. This is the **first time a transgenic food crop** is planned to be cultivated in India.

About GEAC

- A **statutory body under the Ministry of Environment, Forest and Climate Change** and regulator of genetically modified organisms in the country
- As per Rules, 1989, it is **responsible for appraisal of activities involving large scale use of hazardous micro-organisms and recombinants** in research and industrial production from the environmental angle.
  - The committee is also responsible for **appraisal of proposals relating to release of genetically engineered (GE) organisms and products** into the environment including experimental field trials.
- Presently, it has **24 members** and **meets every month** to review the applications in the areas indicated above.
- **Chairman- Special Secretary/Additional Secretary,** Ministry of Environment, Forest and Climate Change (MoEF&CC); **Co-Chairman - Representative of Department of Biotechnology.**

Advantages of GM mustard:



- DMH-11 is vital to **making India self-sufficient in edible oils.**
  - During 2021-22, domestic edible oil production stood at 116.5 lakh tonnes and **imports at 141.93 lakh tonnes** which puts **significant pressure on the country's foreign exchange reserves.**
- **Mustard** has the potential to turn around the situation, as it **contributes 40 percent of total edible oil production in India.**
- **Boost to Production:** DMH-11 can **increase yield by 25 to 30 percent** despite using less water, chemical fertilisers, and pesticides.
- **Opens the Pathway for More Genetic Research:** DMH-11 opens up the possibility of further research , recently the **GEAC has recommended field trials for GM hybrids of Banana, Potato, and Rubber.**
- **Pest Management:** GM mustard has been modified to be resistant to the broad-spectrum plant-killer or **herbicide glufosinate**.
- **Environmental Benefits:** Reduced need for chemical inputs can lower the environmental impact of agriculture.

Concerns of GM mustard:

- **Honey Production:** GM mustard has mutated flowering and pollen production and, as a result, can affect honeybees directly or indirectly.
- **Health Concerns:** GM mustard seed has never been a part of the human diet, so introducing the genes **can create novel proteins with unknown impacts**.
- **Emergence of Superweed:** The DMH-11 mustard variety is herbicide-tolerant, allowing farmers to use weed killer on crops. However, **excessive herbicide use could result in resistant weeds and the emergence of superweeds.**
- **Economic Issues:** GM seeds are often patented, leading to concerns about **corporate control** (eg.US seed manufacturer **Monsanto**)**over the food supply** and the economic impact on small-scale farmers.
- **Lack of Food Testing Laboratory:** The **2019 report by Yes Bank's Food and Agribusiness Strategic Advisory and Research group**, titled "**Meta Study on Food Testing Laboratories in India**," revealed that **only 2 percent of food-testing laboratories in India are equipped to detect the presence of GM products,** highlighting a significant gap in monitoring and surveillance for genetically modified crops.
- **Ethical and Labelling Issues:** There are ethical debates surrounding the **manipulation of genetic material**, and many advocate for clear labelling of GM products to inform consumer choice.

Way forward

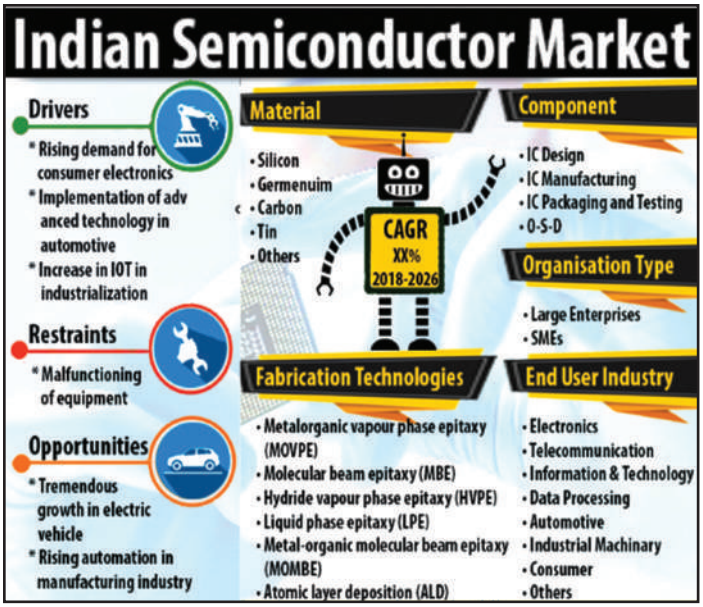
- **The Standing Committee on Agriculture:** The report found that the GM crop regulatory framework has significant shortcomings, including a **lack of mandatory state government consultations for open field trials**.
  - It **recommended conducting all research and development of transgenic crops in labs and discontinuing ongoing field trials.**
  - **Standing Committee on Science and Technology, Environment and Forests (2017):** Recommended **closed field trials in consultation with agricultural universities to ensure bio and health safety.**

MeitY to Seek More Funds for Semiconductor Mission

Sub Topic- *Growth & Development, Indigenization of Technology*

Context:

Ministry of Electronics and Information Technology (MeitY) is seeking additional funding from the Finance Ministry to further support semiconductor mission.



More on News

- **Scheme for Promotion of Manufacturing of Electronic Components and Semiconductors** (SPECS) ended on March 31, 2024.
- Nearly **₹70,000 crore out of ₹76,000 crore** for the mission has already been committed.

Strengthening India's Semiconductor Ecosystem

- Additional funds are required to **support new and existing manufacturers, suppliers, and equipment manufacturers** within the semiconductor industry.
- Approximately 300 vendors will require support and need to be located in close proximity to fabrication facilities (fabs).

The India Advantage

- With **20% of the world's semiconductor design workforce**, rapidly evolving tech landscape, and thriving domestic market, India is poised to build a semiconductor ecosystem.
- Initiatives like **National Electronics Policy** and **$10 billion PLI scheme** bolster chipmaking aspirations.
- **Budget 2024** increased funding for the semiconductor ecosystem and established **$12 billion R&D innovation corpus**.
- India's strategic positioning to attract global semiconductor companies is clear.

- **Supporting the ecosystem** involves **establishing facilities** such as laundries for cleaning the bunny suits worn inside semiconductor units.
- While India's design workforce is strong, there is a crucial **need to enhance manufacturing precision**.
- **Diversification of the semiconductor supply chain** is essential for strategic and geopolitical reasons.
  - The **pandemic** emphasised the need for supply chain diversification.
- India sourced nearly **70% of its semiconductor devices and diodes** from China.
- Electronics manufacturing operates within a **global value chain**, with components often crossing borders multiple times.
- **India's total electronics export** stands at approximately **$110 billion**, with significant activity concentrated near Chennai.
  - However, **value addition in these exports is around 18-20%,** primarily due to **assembly and labour**.
- To **retain and expand its electronics manufacturing sector**, India must **deepen** its **value chain.**
- The **next critical stage** for India in this process is **component manufacturing.**

Challenges

- The **US and EU offer more lucrative semiconductor incentives**, pushing India to focus on mature nodes (28 nm and older) instead of cutting-edge ones.
- Advanced manufacturers like **Taiwan Semiconductor Manufacturing Company** (TSMC), which produces 3 nm chips, are currently out of reach, and attracting them may take time.
- India has many design engineers but **lacks skilled workers** for fabrication plants.
- India **lacks original research in semiconductor design**.
  - Government is setting up an **R&D lab at Semiconductor Laboratory (SCL) in Mohali** and a **Rs 10,000 crore modernisation plan**, including Bharat Semiconductor Research Centre, to develop chips for India's needs.

Government Support and Subsidies

- New semiconductor units have **75% of their costs covered by government subsidies,** paid progressively as projects advance to align government and investor interests.
- **Semicon India Programme** for development of semiconductors.
- Government approved **three semiconductor plants** (two in Gujarat and one in Assam).
  - It includes **India's first semiconductor fabrication plant**, a collaboration between **Tata Electronics and Taiwan's Powerchip Semiconductor Manufacturing Corporation** (PSMC), to be established in **Dholera, Gujarat.**

India Semiconductor Mission (ISM)

- Launched in **2021** with a financial outlay of **Rs76,000 crore under MeitY**
- **Objective:**
  - **Development of a sustainable semiconductor and display ecosystem** and a robust **semiconductor design ecosystem** in collaboration with government, industry, and academia.
  - Promote secure **microelectronics adoption and establish a trusted semiconductor supply**.
  - Support growth of Indian semiconductor design industry by providing **Electronic Design Automation (EDA)** tools, foundry services, and other resources for early-stage startups.
  - Promotes **indigenous Intellectual Property** (IP) generation and incentivizes **Technology Transfer** (ToT).
- Following **four schemes have been introduced under the aforesaid programme**:
  - Modified Scheme for setting up of **Semiconductor Fabs** in India.
  - Modified Scheme for setting up of **Display Fabs** in India.
  - Modified Scheme for setting up of **Compound Semiconductors / Silicon Photonics / Sensors Fab / Discrete Semiconductors Fab and Semiconductor Assembly,** Testing, Marking and Packaging (ATMP) / OSAT facilities in India.
  - **Semicon India Future Design: Design Linked Incentive (DLI) Scheme.**

Subject - Environment, Bio-diversity and Disaster management

Lakshadweep Bleaching Crisis

Sub Topic- *Ecology & Ecosystem and Its Dynamics*

Context:

Scientists have confirmed that Lakshadweep, **an archipelago of 36 islands** and **a Union Territory of India**, has been the most affected by coral bleaching.

More on News:

- The world is experiencing its **fourth global coral bleaching event** (GCBE4), the most severe on record, according to NOAA.
- Since early 2023, **at least 67 countries and territories across the Atlantic, Pacific, and Indian Oceans** have reported coral bleaching due to severe heat stress.
- As of May 23, 2024, GCBE4 has impacted more than 70.7% of the world's coral reefs, surpassing the previous record of GCBE3 (2014-17), which affected 65.7%.

Coral Bleaching:

- Corals, belonging to the **Cnidaria group**, host algae called **zooxanthellae** for mutual benefit.
- Zooxanthellae **provide corals with oxygen and nutrients through photosynthesis**, while corals offer shelter. Stressors like **light and temperature changes can lead to coral bleaching**, where corals expel zooxanthellae, causing them to turn white and become vulnerable.

Types of coral reefs:

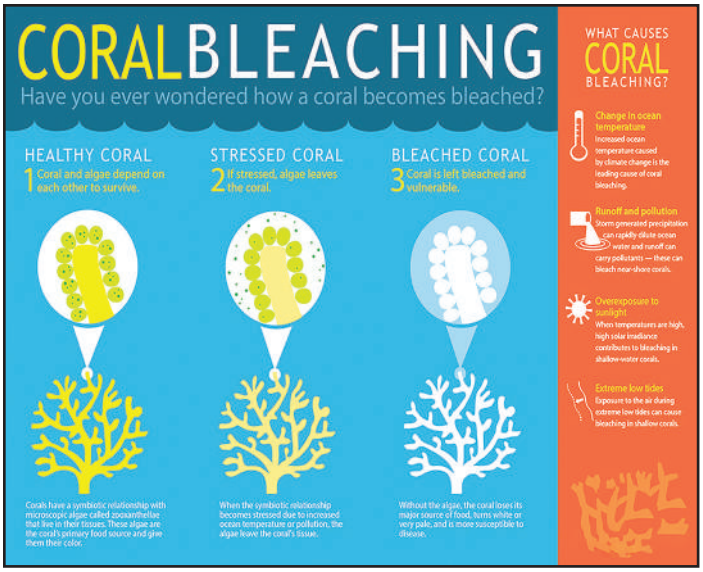
- **Fringing Reefs:** Common coral reefs that **grow directly along coastlines** and border islands.
- **Barrier Reefs:** Massive underwater structures **parallel to coastlines, with a deep lagoon** separating them. The **Great Barrier Reef** is a famous example.
- **Atolls: Ring-shaped** coral reefs **with a central lagoon** and a shallow rim above the water's surface.

Causes of Coral Bleaching:

- **Rising Ocean Temperatures: Climate change is the primary driver**. High water temperatures cause corals to expel algae (zooxanthellae), leading to bleaching.
  - Without algae, corals lose their main food source and become vulnerable to diseases.
- **Other Stressors:**
  - **Pollution:**
    - Runoff introduces pollutants (fertilisers, sewage, sediments).
    - Harmful to corals, increases susceptibility to bleaching.
  - **Overfishing:**
    - Depleted fish populations disrupt the reef ecosystem's balance.
    - Increases algae growth that can suffocate corals.
  - **Ocean Acidification:**
    - Increased CO_2 absorption raises acidity levels in oceans.
    - Hinders coral skeleton formation and weakens their immune systems.

Impacts of Coral Bleaching:

- **For Coral Reefs:**
  - **Death:** Unaddressed stress leads to coral polyp death, leaving behind skeletal remains.
  - **Reduced Growth and Reproduction:** Even surviving bleaching weakens coral, impeding growth and reproduction.
  - **Increased Susceptibility to Disease:** Vulnerable corals are prone to diseases, further harming and killing them.



- **For Marine Ecosystems**
  - **Loss of Habitat:** Dead reefs mean lost habitats for fish, invertebrates, and plants, reducing biodiversity.
  - **Disruption of Food Chains:** Coral loss disrupts food sources for many marine animals, impacting ecosystem balance.
  - **Reduced Coastal Protection:** Degraded reefs diminish natural barriers against coastal erosion and storms, increasing vulnerability of coastal communities.
- **Socio-economic Implications:**
  - **Fisheries:** Declining fish populations affect livelihoods and food security.
  - **Tourism:** Bleached reefs deter tourists, impacting local economies reliant on tourism.
  - **Coastal Protection Costs:** Loss of reefs raises costs for coastal protection measures, straining finances of governments and communities.
- **Global Implications:**
  - **Reduced Carbon Sequestration:** Healthy reefs absorb CO_2, aiding in climate change mitigation.
  - **Loss of Biodiversity:** Coral reefs, vital for marine biodiversity, suffer losses impacting aquatic diversity.

Initiatives:

- **Global Initiatives:**
  - **International Coral Reef Initiative (ICRI):** Facilitates collaboration among governments and organisations to address coral reef issues globally.
  - **Global Coral R&D Accelerator Platform:** Focuses on accelerating research and development efforts aimed at coral reef conservation.
- **India:**
  - **Conservation and Management of Mangroves and Coral Reefs: Central sector scheme** under the **National Coastal Mission Program**, aimed at conserving coastal environments while promoting sustainable development, revenue generation, and employment.
  - **Technological Innovations:**
    - **Cyromesh:** Technology for coral larvae preservation, potentially creating a bank of genetically diverse coral larvae.
    - **Biorock:** Utilises low-voltage electrical currents to enhance coral reef growth by accelerating mineral accretion, mimicking natural limestone reefs.

Coral reefs in India:

- **Gulf of Mannar:** Fringing reefs in the Gulf of Mannar Marine Biosphere Reserve.
- **Gulf of Kutch:** Northernmost coral reefs in Gujarat, characterised by patch reefs.
- **Andaman and Nicobar Islands:** Host diverse reefs including fringing reefs, barrier reefs, and atolls.
- **Lakshadweep Islands:** Composed of coral atolls and submerged reefs.

Significance of corals:

- **Biodiversity:** Support thousands of marine species.
- **Economic Value:** Provide goods and services worth $375 billion annually.
- **Human Dependence:** Vital for food, income, and coastal protection for over 500 million people globally.
- **Environmental Benefits:** Absorb up to 97% of wave energy, mitigating storm damage and erosion.

Urban Floods in India

Sub Topic- *Environmental Pollution & Degradation, Disaster Management*

Context:

Delhi is experiencing rapid urban expansion, often disregarding the natural topography and drainage capacity, making the city vulnerable to flooding during intense rainfall.

Background:

- India faces frequent hydrometeorological disasters, with floods impacting **urban areas covering about 12% of the country's land**.
- Major cities like **Delhi**, **Mumbai**, and **Ahmedabad** have suffered significant economic and infrastructure damage due to floods.

Urbanisation and Flood Risk in Delhi:

- Delhi's **rapid, unplanned urban growth** has doubled its population since independence, leading to **encroachment on natural drainage channels** and **urban lakes**.

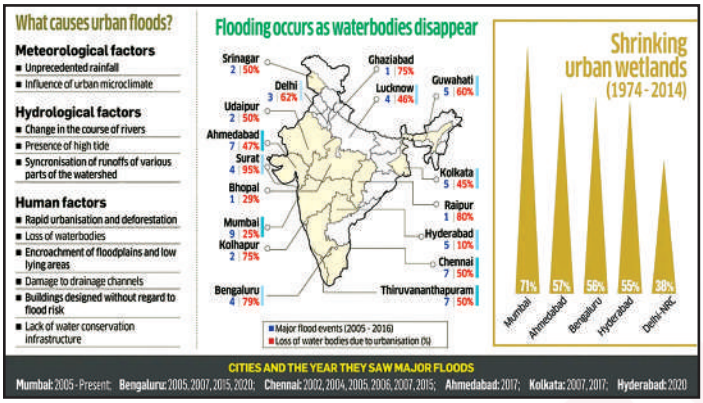
- **Illegal construction** and filling of water bodies have exacerbated flood vulnerabilities.

Introduction to Urban Floods

- Urban floods occur when cities are submerged by heavy rainfall, snowmelt, or storm surges, aggravated by inadequate drainage systems.
- **Climate change intensifies these events globally** and in Indian cities like Mumbai, Hyderabad, Chennai, and Bengaluru.

Causes of Urban Flooding:

- **Encroachments on Drainage Channels: Development in low-lying areas without expanding natural drains** reduces their capacity, increasing flood risks.

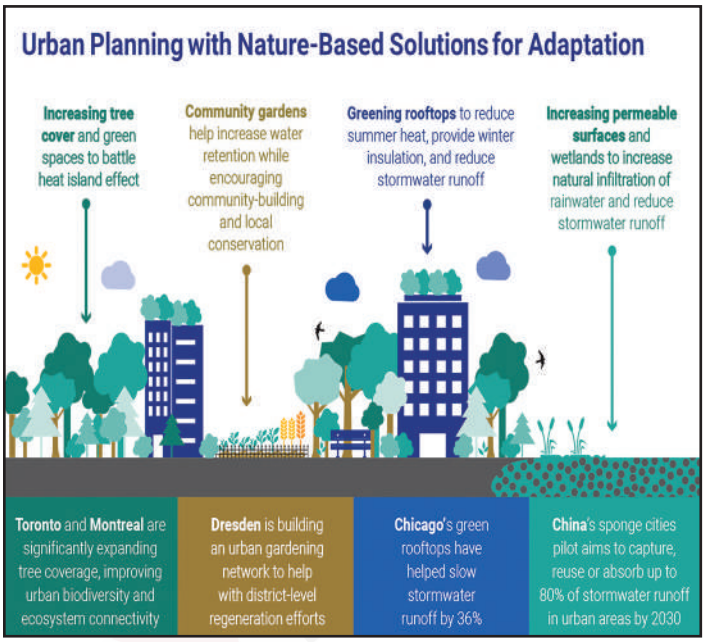


- **Rainfall and Drainage:** Varying **rainfall intensities** overwhelm **outdated drainage systems**, exacerbated by poor maintenance.
- **Waste Management: Illegal construction on natural drains** and **improper waste disposal** reduce drainage efficiency.
- **Climate Change:** More frequent and intense rainfall events overwhelm drainage systems. **Urban heat islands** intensify localised rainfall.
- **Uninformed Dam Releases: Sudden releases from dams** like Chembarambakkam Lake contributed to the 2015 Chennai floods.
- **Illegal Mining:** Depletes river and lake beds, **reducing water retention capacity** and increasing flood risks.

Implications of Urban Flooding:

- **Loss of Life and Property:** Fatalities, injuries, and infrastructure damage lead to significant economic losses.
- **Environmental Impact:** Erosion, loss of vegetation, and ecosystem degradation.
- **Health Risks:** Waterborne diseases spread through stagnant floodwaters.
- **Psychological Impact:** Emotional distress and long-term mental health effects due to displacement and loss.

Solutions for Urban Flooding:



- **Sustainable Urban Planning: Prioritise green spaces**, **retention ponds**, and permeable surfaces to manage stormwater effectively.
- **Infrastructure Upgrade:** Expand and maintain drainage systems, including natural drains and stormwater channels.
- **Floodplain Management: Identify and map flood-prone areas**, restrict construction, and enhance flood risk management strategies.
- **Early Warning Systems: Improve alert systems** to facilitate timely evacuation and precautionary measures.

Government Initiatives

- **Jal Shakti Abhiyan (JSA), Amrit Sarovar Mission, Atal Bhujal Yojana:** Aim to improve water management and urban infrastructure resilience.
- **Atal Mission for Rejuvenation and Urban Transformation (AMRUT) 2.0:** Focuses on urban infrastructure upgrades.
- **Model Building Bye Laws (MBBL), Standard Operating Procedures (SoPs):** Provide guidelines for flood management by the Ministry of Housing and Urban Affairs.

Conclusion:

- In conclusion, addressing urban flooding in India **requires comprehensive strategies integrating sustainable urban planning**, upgraded infrastructure, and effective disaster management.
- Government initiatives and **global best practices like sponge cities** are crucial in mitigating urban flood impacts and enhancing urban resilience.

UN Proposes Multilateral Fund to Share Benefits of Genetic Resources

Sub Topic- *Conservation, Environmental Pollution & Degradation*

Context:

In **August 2024**, international delegates will gather to discuss a milestone proposal relating to a **multilateral fund for sharing the benefits derived from digital sequence information (DSI)**.

- The proposal emerges ahead of the final talks in the **(Convention on Biological Diversity) CBD's DSI negotiating group** in **Montreal**, aiming to set the stage for **discussions at the COP16 UN biodiversity summit in Cali, Colombia**.

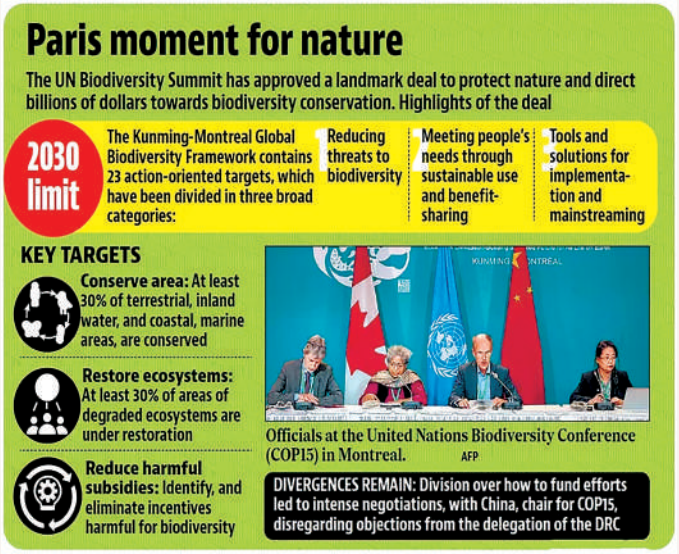
Key Highlights:

- The outcome of the negotiations will influence discussions on comparable multilateral funds within the **Food and Agriculture Organization's International Treaty on Plant Genetic Resources for Food and Agriculture, and the World Health Organisation's Pandemic Treaty**.
- While all **companies using DSI would contribute to the fund**, the **main focus** would be on **large and transnational producers or companies**.
- **UN documents released on July 1, 2024**, indicate that the **revenue from** products such as **medicines, cosmetics, and agricultural biotechnology** could **amount to billions of dollars**.
  - **For instance**, a mere 0.1% of $1 trillion would yield $1 billion for the global fund, while 1% would amount to $10 billion.

Background:

- Traditionally, **companies obtained genetic material directly from the environment**. This **system required them to share benefits** with the **communities that protected those resources**.
- Companies are turning to DSI from **open-source databases** instead.
  - This allows them **to avoid sharing benefits**, which is a **violation of the Convention on Biological Diversity (CBD)**.
- **Sharing benefits is a core principle of the CBD**, but it **lacks guidance in situations** where only genetic material DSI is used.

What is DSI?



- It refers to **genetic information obtained from plants, animals, and microbes**.
- It can include things like **nucleic acid sequences** and **protein sequence data**. There is currently no agreed-upon definition for the scope of DSI.

A Multilateral Fund for Benefit Sharing: At the **15th Conference of the Parties (COP15)** held in **December 2022**, CBD parties pledged to **establish a new multilateral mechanism.**

- **A global fund** supporting **nature conservation, sustainable use**, and related **activities of Indigenous Peoples** and **Local Communities**.

Challenges and opportunities:

- There are concerns that **this contribution could hurt business activity and consumer spending**.
- The documents emphasise that the **contribution should be reasonable and manageable** for businesses to ensure they do not face unaffordable costs.
  - **Any additional expenditure** should **not burden consumers or create inflationary pressures**.

Way Forward: While all companies using DSI are expected to contribute, the primary focus will be on large and transnational producers.

- The proposals will be discussed in Montreal in August, with the final decision likely to be taken at the **UN Biodiversity Conference (COP 16) between October 21 and November 11**.

Transition from Dirty Fuels to Clean Energy: Challenges and Unexpected Diversions

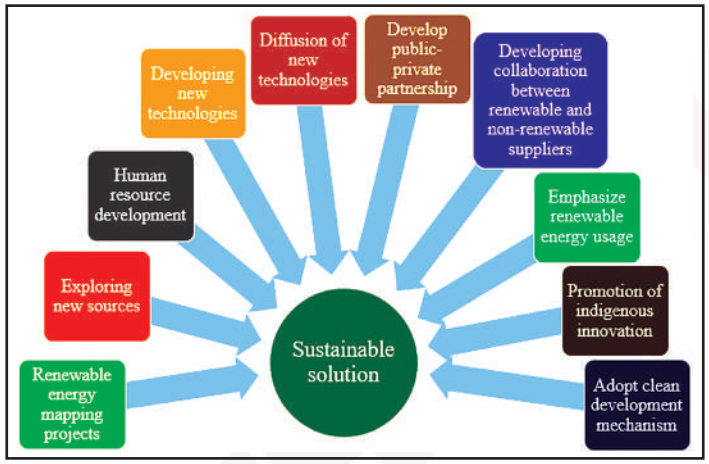
Sub Topic- *Renewable Energy and Resources*

About India's Energy Landscape:

- **Heavy investments** in clean energy do not eliminate reliance on older fuels immediately.
- **India** is the **fastest-growing large economy,** but far from being a high-income country. The country's **energy needs are growing** rapidly.
- India is **expanding its solar and wind capacities** and developing a clean energy storage ecosystem.
- Despite this, demand for **dirty fuels** like coal and hydrocarbons will continue to rise.

Oil and Gas Dependency:

- India is the **third-largest importer and consumer of oil globally.**



- The **IEA** projects India's **demand** for **hydrocarbons will rise** until **2050,** though **coal** demand may **decrease** by then.
- India **imports** over **80% of its oil and 50% of its natural gas,** making it vulnerable to **market disruptions.**
- **Domestic oil production is declining** due to ageing wells and may fall further unless new fields are discovered.
- Plans to **reduce vulnerability** to shocks are often shelved once crises abate.
- The **United Progressive Alliance-I government initiated** underground strategic oil reserves, but development stalled after initial facilities were built.

Policy Awareness and Vulnerability:

- Policymakers are aware of vulnerabilities to **external shocks affecting oil and gas prices.**
- India has suffered from global oil shocks, such as the **Russia-Ukraine war.**
  - **Recent Efforts:** Policymakers have reiterated the need to reduce hydrocarbon imports and taken some steps towards this goal.
- **The Indian Strategic Petroleum Reserves Ltd (ISPRL)** is **expanding** facilities to meet current and future needs.
  - ISPRL has invited bids for constructing **2.5 million tonnes** of underground storage in **Padur, Karnataka.**
- **Exploration and Licensing Policies:**
  - In 2015 and 2016, the **Hydrocarbon Exploration Licensing Policy (HELP)** and the **Open Acreage Licensing Policy (OALP)** were **introduced** to attract **private players.**
  - Major global oil companies showed limited interest in unproven Indian fields, preferring lower-risk proven reserves elsewhere.

Hydrocarbon Exploration and Licensing Policy (HELP):

- **Introduction:** Adopted in 2016 to replace the New Exploration Licensing Policy (NELP).
  - **Aims** to enhance domestic oil and gas production by intensifying exploration activity and investment.
- **Components:** Uniform Licence, Open Acreage Policy, Revenue Sharing Model, Marketing and Pricing Freedom.

The Open Acreage Licensing Policy (OALP):

- **Under HELP,** the OALP mechanism was launched **to facilitate investors** in **selecting blocks** of their choice through an **Expression of Interest (EoI) submission process.**

Key details include:

- It aims to **enhance exploration and production activities in India's hydrocarbon sector** through streamlined processes and increased investor participation.

Challenges and Need for Increased Private Investment:

- Global oil companies often partner with Indian **public** or **private sector companies.**
- **Independent bidders** frequently **exit due to high risks, bureaucratic red tape,** and **uncertain tax measures like the "windfall tax."**
- **Indian public sector undertakings** plan significant investments in oil and gas exploration, but this may not be enough.
- India needs **more private investment,** both domestic and global.

Zinc's Groundbreaking Impact on Nitrogen Fixation and Climate-Friendly Farming

Sub Topic- *Climate Change, Pollution and Degradations*

Context:

Researchers in France have discovered the crucial **role of zinc in promoting the health and productivity of legume crops**.

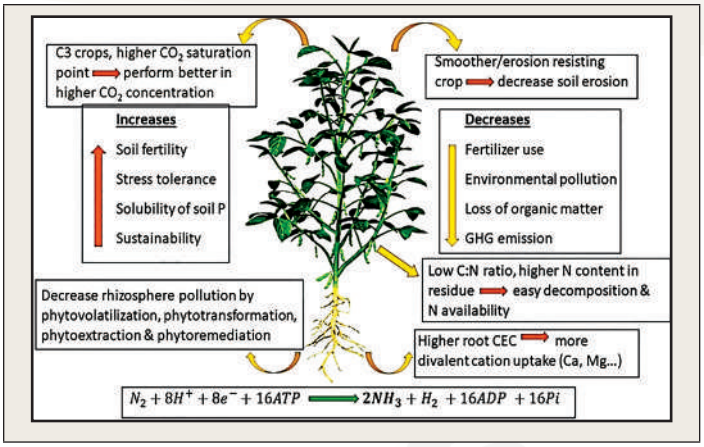
- The study published in the Nature Journal conducted by **Denmark's Aarhus University** in collaboration with the **Polytechnic University of Madrid** shows how zinc significantly impacts nitrogen fixation.

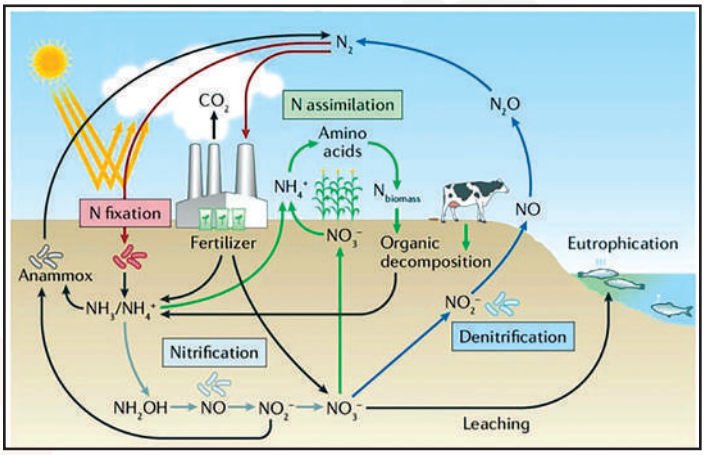
Key Highlights

- Researchers discovered that legumes utilise zinc as a **secondary signal to integrate environmental factors** and **regulate the efficiency of nitrogen fixation**.
- They identified a **genetic regulator called "Fixation Under Nitrate" (FUN)** that **acts as an "off switch" for nitrogen fixation in legumes**.
  - By **studying 150,000** individual legume plants where specific genes were disabled to investigate how plants regulate the transition from nitrogen fixation to the uptake of soil nitrogen.
- The study identified an essential **transcription factor that controls** the **breakdown of nodules** when **soil nitrogen levels are elevated**.

What are legume plants?

- Legume is the fruit of plants in the **pea family (Fabaceae).**
- It includes **beans, chickpeas, cowpeas, lentils, peas, peanuts, soybeans, and tamarind.**
- Most legumes **split open along two seams** to release seeds. Some legumes, like peanuts and carobs, don't naturally open.
- It **provides food for humans and animals**, edible oils, fibres, and even raw materials for plastics.
- **Legume plants** possess an exceptional **ability to convert atmospheric nitrogen into usable nutrients** through **nitrogen fixation**.
- However, this energy-intensive **process is slowed when soil nitrate levels are already high** due to **natural processes or synthetic fertiliser applications**.





Understanding Zinc's Impact

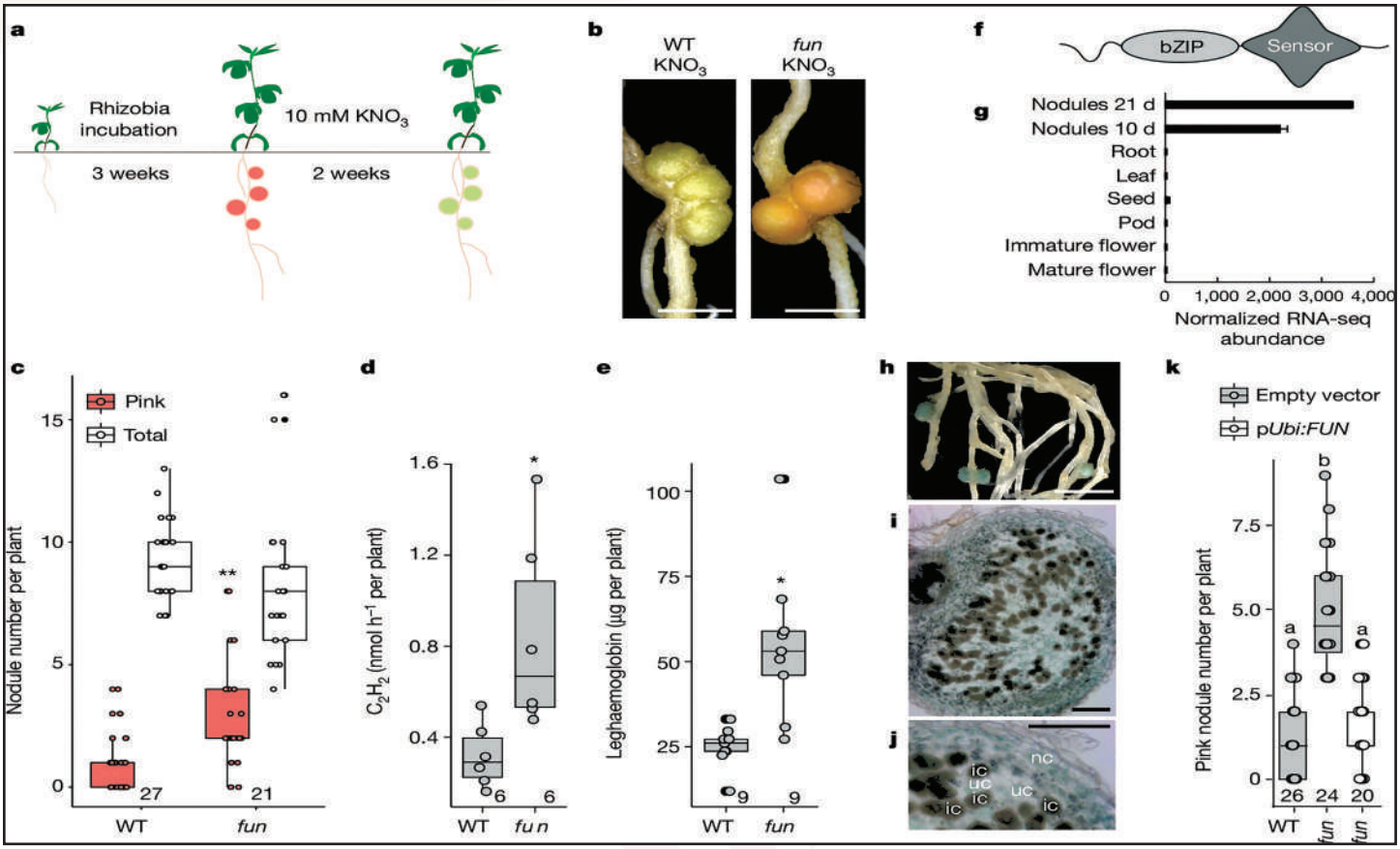
- Zinc in plants plays a crucial **role in nitrogen fixation**, a process essential for **converting atmospheric nitrogen into ammonia**, a vital nutrient for plant growth.
- **Legume crops form a symbiotic relationship** with **rhizobia**, bacteria that fix atmospheric nitrogen within root nodules.
  - These **nodules are sensitive** to various **environmental factors** including temperature, drought, flooding, soil salinity, and high levels of soil nitrogen.

The Zinc Sensor: Fixation Under Nitrate (FUN)

- FUN is a novel type of zinc sensor in legumes. It **decodes zinc signals in nodules** and **regulates nitrogen fixation efficiency**. When soil nitrogen concentrations are high, It controls nodule breakdown.
- **It is activated or deactivated based on cellular zinc levels**, forming large filament structures that release active FUN when zinc is inadequate.

Implications for Agriculture

- By understanding zinc's role in regulating nitrogen fixation, researchers aim to **optimise crop productivity and resilience**.



- Enhanced nitrogen fixation not only boosts crop yields but also **reduces the dependency on synthetic fertilisers**, thus mitigating environmental impact and production costs.

Future Directions: Researchers are delving deeper into the **mechanisms** through which **zinc signals** are generated and **interpreted by FUN**.

- This could **lead to higher nitrogen delivery, increased crop yields,** and a **decreased reliance on synthetic fertilisers**.
- They are currently studying the performance of common **legume crops like soybean and cowpea** under conditions where FUN activity has been disrupted or lost.

Megafauna Extinctions

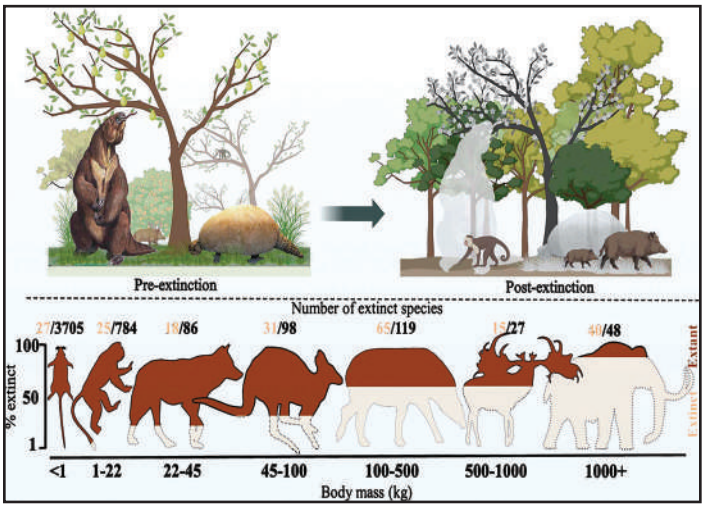
Sub Topic- *Biodiversity and Its Conservations*

Context:

Over the past **50,000 years,** land **vertebrate faunas** have undergone **significant losses, particularly of large species known as megafauna.**

Megafauna Extinctions: A Unique Phenomenon:

- **The selective loss** of megafauna is unprecedented in the **past 66 million years.**
- **Climate Change Role:** Previous climate change periods did not lead to such large, selective extinctions, suggesting climate played a minor role.



- **Impact Across Stable and Unstable Areas:** Recent extinctions affected climatically stable and unstable areas equally, further diminishing climate as a primary cause.
- **Global Extinction Patterns**
  - **Widespread Extinction Events:** Extinctions occurred globally but varied widely in **timing and rate,** correlated with **human arrival** or cultural advancements.

- **Varied Timelines:** Extinctions occurred rapidly in some areas and over **millennia** in others, but all followed the presence of modern humans or **cultural changes in Africa.**

❖ **Human Hunting and Vulnerability of Megafauna:**

- **Archaeological Evidence:** Traps designed for large animals and **isotope analyses** of ancient human bones indicate **widespread hunting** of megafauna. Led to **decrease in population.**
- **Vulnerability Factors:** Megafauna's **susceptibility** to **overexploitation** was exacerbated by **long gestation periods, low offspring production, and slow maturity.**

Megafauna Overview:

❖ Megafauna refers to **large animals** found in **all terrestrial regions** worldwide. Generally, they are defined as animals weighing over **40 kg or over** a **tonne.**

❖ Term is used to denote the **largest living** and extinct terrestrial wild animals, such as **giraffes, elephants, rhinoceroses, and hippopotamuses.**

❖ **Importance:**

❖ Megafauna are crucial **ecosystem engineers,** shaping habitats through **grazing and browsing**, and regulating the abundance of **smaller animals.**

❖ Studying megafauna offers valuable insights into **ecological systems, evolution, and conservation.**

Ecological Impacts of Megafauna Loss:

❖ **Global Extinction Impact:** Species went extinct on all continents and in diverse ecosystems, from tropical forests to arctic regions.

❖ **Adaptability of Extinct Species:** Many extinct species thrived in various environments, suggesting climate change alone couldn't explain their disappearance.

❖ **Ecological Consequences:** Loss of megafauna significantly altered ecosystem structures and functions, affecting vegetation, seed dispersal, and nutrient cycling.

The Cheetah Reintroduction Program:

❖ It is an initiative by the **Government of India** aimed at **reintroducing cheetahs** to the country, following their local **extinction in 1952.**

Conservation and Restoration Efforts: Need for Conservation: The profound **ecological consequences** highlight the urgency for active **conservation and restoration efforts.**

❖ **Restoration Benefits:** Reintroducing large mammals can help **restore ecological balances and support biodiversity**, crucial for ecosystems that evolved with **megafauna richness.**

The Rising Demand for Air Conditioning: Environmental Costs, and Global Transformations

Sub Topic- *Climate Change, Pollution and Degradations*

Context:

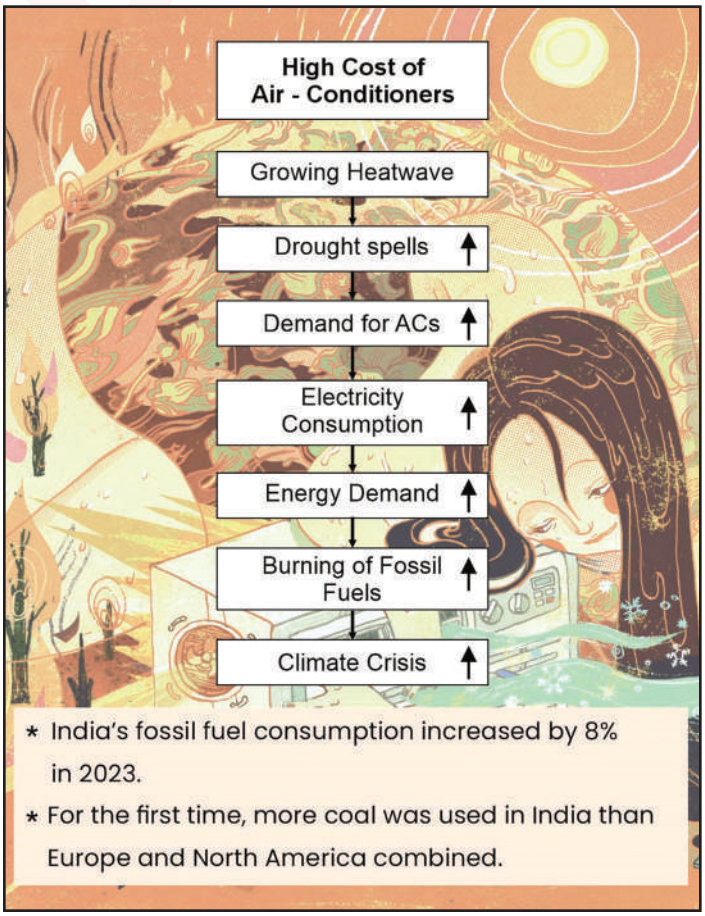
A **severe heatwave** combined with **high humidity** is significantly **boosting** air conditioner sales nationwide. India's **rapidly growing AC market** is expanding into new areas and driving an unprecedented **surge in demand** for cooling solutions.

More on news:

❖ Air conditioner ownership in India has increased **threefold since 2010.**

❖ **By 2023**, there will be **24** air conditioners **per 100 households** in India, according to the **World Energy Outlook 2023 report** by **the International Energy Agency (IEA).**

❖ The **2011-12 National Sample Survey Office (NSSO)** report indicated that **12%** of households had either **air coolers or air conditioners.**

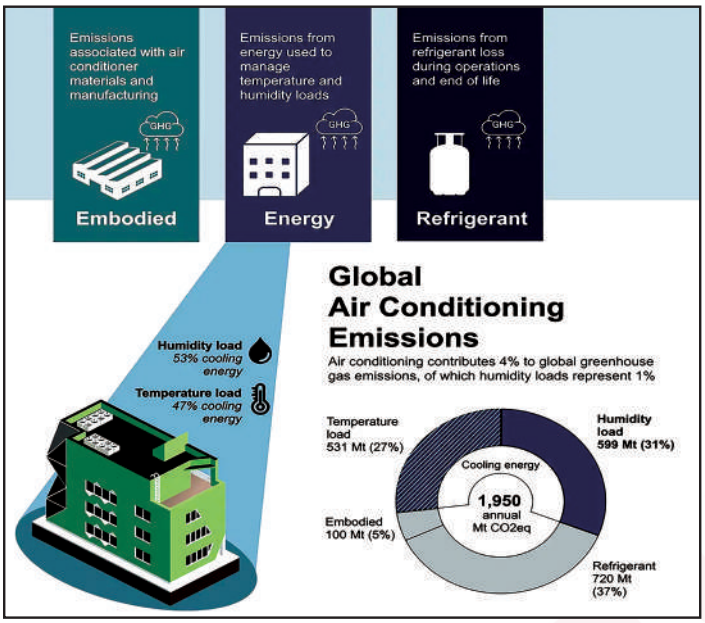


❖ The **2022-23 NSSO report** shows that the combined ownership of these appliances has nearly **doubled to 24%.**

- The **IEA estimates** that household air conditioner ownership in India will grow **ninefold by 2050, reaching over 1 billion units.**

The Cost of Cool Air:

- **Impact on Power Generation:** Large-scale use of air conditioners **increases electricity demand** significantly.
  - Electricity consumption for space cooling rose by 21% between 2019 and 2022. Nearly **10%** of current electricity demand is due to space cooling needs.



- **Reliance on Fossil Fuels:** A significant portion of electricity is generated from **fossil fuels, primarily coal.**
  - In FY24, coal-fired power generation accounted for 75% of total electricity generation. India's coal-fired thermal capacity increased to 218 GW in FY24 from 205 GW in FY20, reflecting a 6% growth.
- **Greenhouse Gas Emissions:** Increased use of ACs leads to **higher electricity demand,** which, in turn, **raises greenhouse gas (GHG) emissions.**
- **Refrigerants and Global Warming:** Air conditioners use refrigerants like **hydrofluorocarbons (HFCs) or hydrochlorofluorocarbons (HCFCs),** which contribute to global warming if leaked.
- **Urban Heat Island Effect:** ACs contribute to the **'urban island effect,'** where cities experience higher temperatures compared to surrounding rural areas.
  - ACs release heat outside, warming the external environment.

The Production Linked Incentive Scheme for White Goods (PLIWG)Objective:

- Scheme creates a comprehensive component ecosystem for Air Conditioners and LED Lights in India, integrating the country into **global supply chains.**
- **Notified By**: Department for Promotion of Industry and Internal Trade (DPIIT).

White Goods:

- White goods are large **consumer durables or home appliances** that were traditionally only available in **white.**
- These include items like **washing machines, air conditioners, stoves, and refrigerators.**

- **Implementation Period**: FY 2021-22 to FY 2028-29.
- **Objectives**: Scheme proposes **financial incentive** to **boost domestic manufacturing** and **attract large investments** in the **White Goods manufacturing value chain**.
- **Incentives**: **Financial Incentive**: **4-6%** on incremental turnover over the base year **(2019-20).**
  - **Duration**: Incentives provided for a **period of 5 years.**
  - **Scope**: Applies to goods sold in India and exported globally.

The Transformative Effect of Air Conditioning on Global Migration and Urban Growth:

- The **uptake of new technologies** created **unexpected effects. In 1955,** one in fifty US homes had an air conditioner. **By 1980,** a majority did.
- Air conditioning spread rapidly around the world (there are now **more than two billion** air conditioners globally).
- The technology enabled a **mass migration** towards the equator in many **advanced countries.**
- Americans moved to Florida. Australians moved to Queensland. Equatorial and desert cities such as Singapore, Dubai and Doha boomed.
- Air conditioning literally **rearranged the world.**

UNEP Report: Disruptions from Space Activity

Sub Topic- *Climate Change, Pollution and Degradations*

Context:

The UNEP report "Navigating New Horizons — A Global Foresight Report on Planetary Health and Human Wellbeing," highlights **major disruptions** due to accelerated **space activity,** with **ozone depletion** identified as a **primary concern.**

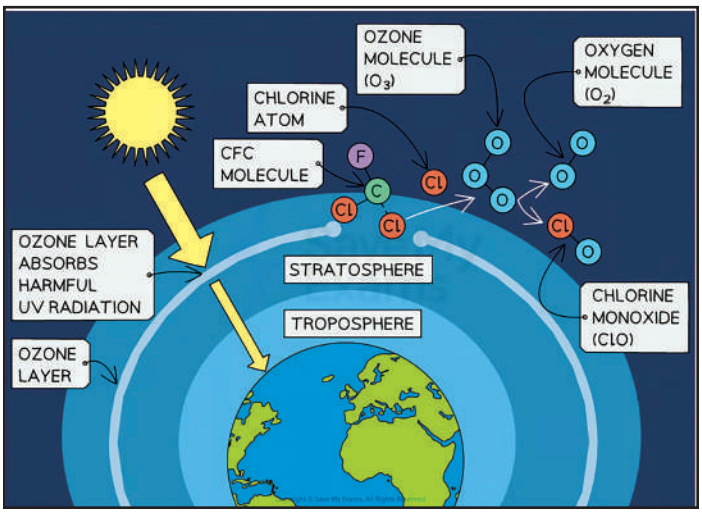
More on news:

- The potential impact of **disruptions** is **rated '2'** on a scale of 1-3, where **1 is low and 3 is high.**
- Based on responses from nearly **1,200** submissions by **790** respondents to a **2023 survey.**

- Identified **280** specific signals of change, shortlisted by the Foresight Expert Panel consisting of **22** members from both developing and industrialised countries.

Space Activity Impact on Ozone Layer:

- Increasing satellite launches emit gases **damaging the ozone layer.**



- Rocket launches and re-entry **emit carbon dioxide, water vapour, nitrogen oxide, black carbon, alumina particles, and gaseous chlorine.**
  - Black carbon absorbs **solar radiation, warms** the **stratosphere**, and reduces the total **ozone** column.
- **Debris and Atmospheric Impact:** Re-entering debris generates shock waves causing atmospheric chemical reactions.

- The atmosphere contains **metals** from vaporised satellites and rocket boosters, **potentially depleting ozone.**
- Space junk and re-entering **alumina** impact the upper atmosphere and Earth's climate.
- Space debris may become a significant problem, akin to **microplastics.**
- **Sustainable Development Goals (SDGs) Impact**
  - **SDG 3:** Good Health and Well-being.
  - **SDG 13:** Urgent action to combat climate change and its impacts.
  - **SDG 16:** Promotes peaceful and inclusive societies.

Global Space Industry:

- Projected growth to $**3.7 trillion** by **2040**, from **$630 billion** in **2023.**
- Annual satellite launches have increased by **50%**, with launch costs falling 10-fold over two decades **(World Economic Forum, 2024).**

The Vienna Convention:

- **The Vienna Convention for** the **Protection of the Ozone Layer** was the first convention of any kind to be **signed by every country involved**,
- taking **effect in 1988** and reaching **universal ratification in 2009.**
- India became a party in **1999.**
- **The Montreal Protocol**
  - It is an international treaty **Established in 1987,** aimed at safeguarding the **stratospheric ozone layer** by gradually eliminating the production and use of substances such as **chlorofluorocarbons (CFCs) and halons** that deplete ozone.
    - **India** became a **signatory** in **1992.**

The Kigali Agreement:

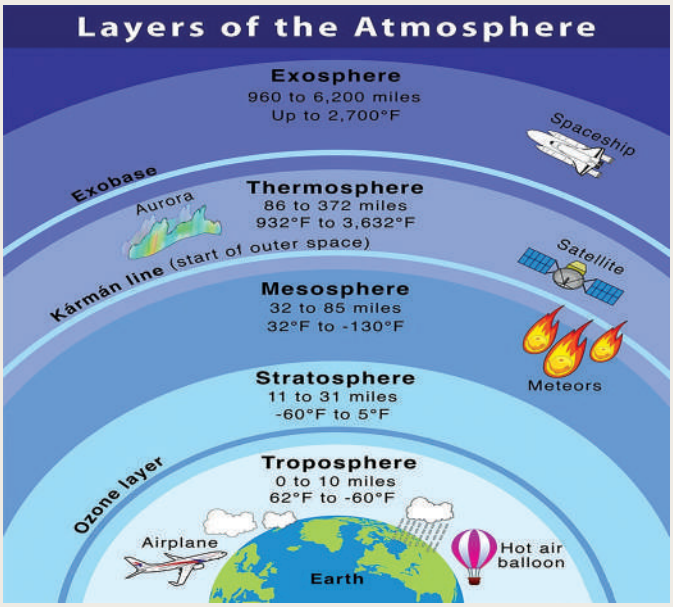
- The Kigali Amendment to the Montreal Protocol was signed in **October 2016** in Kigali, Rwanda **by 197 countries.**
- It aims to **phase down the production and use of hydrofluorocarbons (HFCs),** which are powerful greenhouse gases.

Monitoring and Future Solution:

- UNEP emphasises the importance of **monitoring and foresight** to avoid repeating past mistakes and ensuring **solutions** withstand **future disruptions.**
- **Call to Action:**
  - Ensuring solid progress made under the **Montreal Protocol** is not reversed.
  - Addressing the challenges posed by space activity expansion and **orbital debris.**

Ozone Layer Overview:

- The ozone layer is **part of the stratosphere,** the **second layer** of Earth's **atmosphere**, which consists of protective gases, **(15-30 km above the surface).**
- The stratosphere is **stratified**, meaning **it gets warmer with increasing elevation** due to ozone gases absorbing **ultraviolet radiation** from the sun.
- **Role of Ozone:**
  - It is a trace gas in the atmosphere, with about **three molecules** for every **10 million molecules of air.**



- It is crucial for **absorbing radiation** from the sun, acting **like a sponge.**
- It serves as a **shield**, protecting life on Earth from excessive **UV radiation.**

❖ **Depletion impacts human health and the environment;**

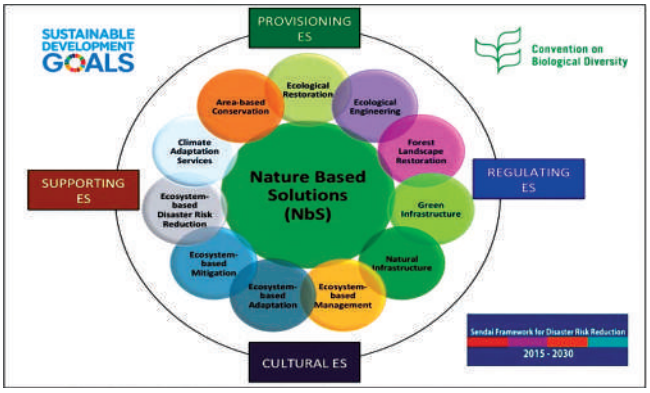
- **1985:** First recorded springtime ozone losses **over Antarctica.**
- Ozone depletion caused by **human-made substances (refrigeration and air conditioning).**

Nature-Based Solutions to Mitigate Disasters

Sub Topic- *Disaster and Disaster Management*

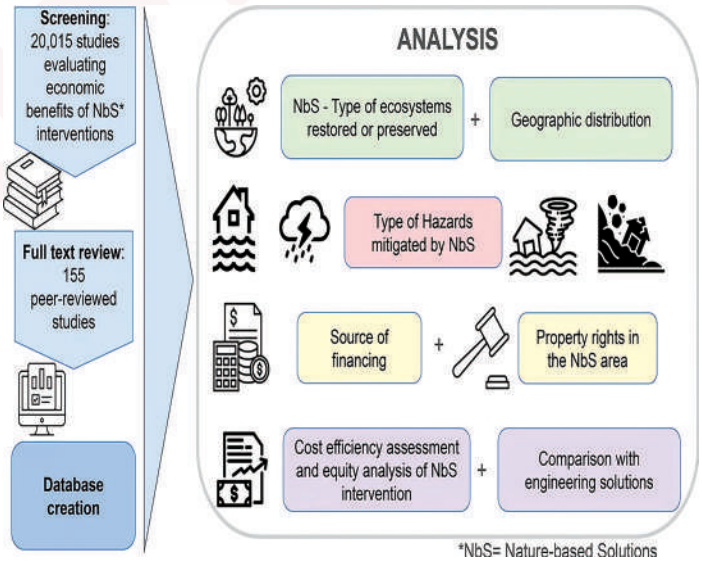
Context:

A new global **assessment** of scientific literature led by the **University of Massachusetts Amherst** finds that **nature-based solutions** (NbS) are an economically **effective method** to **mitigate risks** from a range of **disasters.**



Nature-Based Solutions (NbS):

- ❖ NbS are interventions where an ecosystem is either **preserved, sustainably managed or restored** to provide benefits to society and to nature.
- ❖ NbS **mitigates disasters** from **floods and hurricanes to heat waves and landslides**, which are only **expected to intensify** as Earth **continues to warm.**
- ❖ According to the **World Bank Group:** NBS that strategically **conserve or restore nature** to support **conventionally** built **infrastructure systems** (also referred to as **grey infrastructure**) **can reduce disaster risk** and **produce** more **resilient and lower-cost services** in **developing countries.**
  - In the **disaster risk management (DRM)** and **water security sectors,** NBS can be applied as **green infrastructure** strategies that work in harmony with grey infrastructure systems.
  - The **World Bank's Nature-Based Solutions Program** aims to facilitate the uptake of NbS in water management and **DRM projects.**
- ❖ **Cost-Effectiveness:** NbS were proven to be a consistently cost-effective approach to mitigating hazards.



- Ecosystem-based interventions most frequently found effective include **mangroves (80%), forests (77%), and coastal ecosystems (73%).**

- ❖ **Effectiveness:** 65% of studies found NbS always **more effective** at mitigating hazards compared to **engineering-based solutions.**
- ❖ NbS have emerged in combination with or as an **alternative** to **engineering-based solutions.**
  - **Examples:** Restoring wetlands to address coastal flooding as an alternative to constructing seawalls.
- ❖ **Policy Recognition:** NbS are acknowledged by major national policies and international agreements, including those by the **U.N. and the White House.**

- **Nature-based Solutions for Disaster Risk Reduction guide of UNDRR,** provides expert-informed, practical **guidance** on setting up and implementing Nature-based Solutions (NbS) for disaster risk reduction (DRR) and **climate change adaptation.**
- It is designed to **support the implementation of the Sendai Framework for Disaster Risk Reduction 2015-2030.**

Underestimated Benefits:

- **Environmental and socioeconomic benefits,** such as maintaining biodiversity, climate mitigation, and **supporting underserved communities.**
- **Difficulties in quantifying improvements** in air and soil quality, protection of endangered species, and cultural or spiritual values contribute to underestimation.
- Complex and potentially expensive valuation techniques are **needed** to assess these benefits.

Financing and Future Needs:

- **Funding Sources:** NbS have been mainly financed by the public sector, even when involving private property.
- **Future Requirements:** To achieve a global impact, additional funding is required, with a significant share needing to come from the private sector.
  - A transformative upscaling of NbS requires both **public and private financing.**
  - **Developing innovative** nature-based insurance and investment **solutions** is the next step.

Recently, **Coalition for Disaster Resilient Infrastructure (CDRI)** announced an **$8 Million funding** initiative to support **Disaster Resilient Infrastructure in Small Island Developing States (SIDS).**

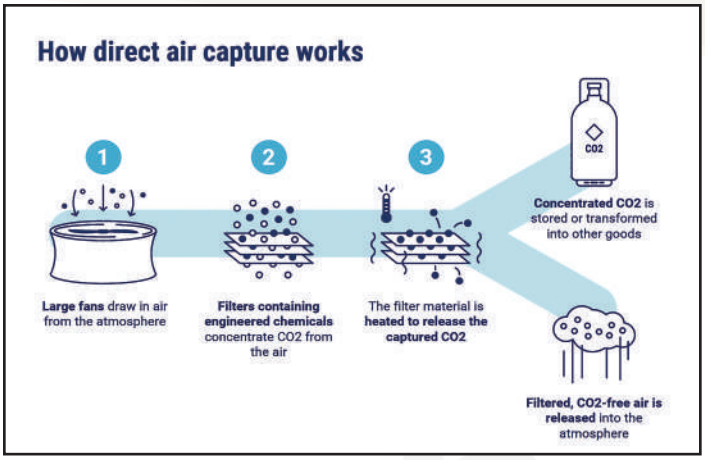
- The **Prime Minister of India launched** CDRI at the **UN Climate Action Summit in 2019.**
- It is a **global partnership** that aims to promote the resilience of infrastructure systems to climate and disaster risks, thereby ensuring sustainable development.
- Secretariat: **New Delhi, India.**

Direct Air Capture Technology (DAC)

Sub Topic- *Disaster and Disaster Management*

Context:

Last year, global carbon dioxide (CO2) emissions hit a record 37 billion metric tons. Consequently, **direct air capture technology** is gaining traction as governments use it to meet climate goals and combat climate change.



Direct Air Capture Technology (DAC)

- DAC technologies **remove CO2 from the atmosphere for storage or utilisation**.
- This captured CO2 can be **permanently stored in geological formations or used to produce fuels, chemicals, and building materials**.
- These methods can **contribute to achieving net-zero or net-negative emissions.**
- DAC is being recognised as a **crucial technology in the fight against climate change**, with over 20 operational plants and 130 more under construction globally.

Challenges and Solutions:

- **Capturing CO2 from the air is costly** because atmospheric CO2 is much more dilute than CO2 in flue gas from power stations or cement plants.
- This **contributes to DAC's higher energy needs and costs** relative to these applications.

Electrodialysis: It is a membrane-based process involving transport of ions through semipermeable membranes using an applied electric field.

- The process **splits additional water into acidic and basic ions**, helping to maintain the basic liquid's ability to absorb more CO2.
- Electrodialysis can run on renewable electricity, making it a potentially sustainable way to turn captured CO2 into useful products.

- A study from University of Colorado Boulder highlighted that common methods to reduce energy costs in DAC may not be practical.
- The study **proposed an alternative method called reactive capture,** which involves using electricity to regenerate solutions used for capturing CO2.
- However, research found that this method would not effectively regenerate capturing solution in industrial conditions, leading to minimal CO2 capture after multiple cycles.

- Researchers suggested **incorporating electrodialysis into the reactive capture process.**
- This addition could **help maintain the solution's ability to absorb CO2 and utilise renewable energy sources**.
- Furthermore, the process could potentially **convert captured CO2 into useful products,** such as strengthening concrete, thus addressing multiple environmental challenges simultaneously.

Steps Taken by Government:

- India has developed a roadmap and a strategy for a **Bio-based economy** which is inching towards **150 billion USD by the year 2025**.
  - This will **facilitate infrastructure for Bio-manufacturing of low-carbon bio-based products**.
- **National Action Plan on Climate Change** (NAPCC)
- **Commitment to Net Zero**: India is committed to **achieve the Net Zero emissions target by 2070.**
- **Energy Conservation (Amendment) Act**,2022, aims to accelerate the decarbonisation of the economy.

Way Forward:

- **Innovation in CO2 use opportunities**, including **synthetic fuels,** could drive **down costs and provide a market for DAC.**
- **Early commercial efforts to develop synthetic aviation fuels using air-captured CO2** and hydrogen have started, reflecting the important role that these fuels could play in the sector.
- A **start-up based in Mumbai** has created an **aqueous-based CO2 capture technology** featuring a novel catalyst that is **durable, cost-efficient, and scalable.** This innovation enables the capture of **CO2 from industrial wastewater, representing a noteworthy advancement in India's adoption of eco-friendly technologies.**

India's Installed Nuclear Power Capacity

Sub Topic- *Nuclear Energy & Technology*
GS PAPER I - *Mineral & Energy Resources*

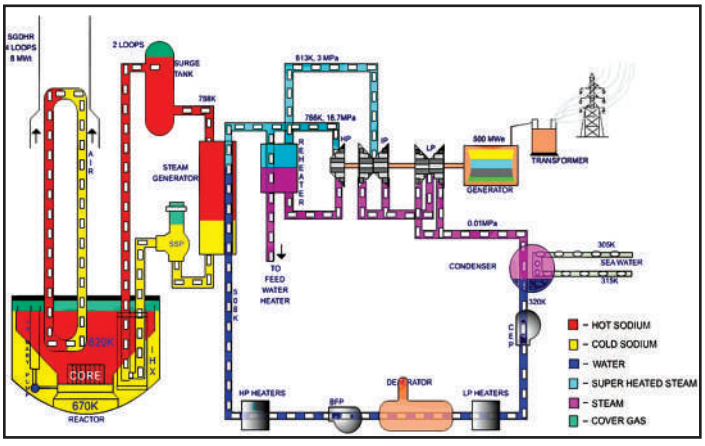
Context:

India's **installed Nuclear Power Capacity to Triple by 2031-32.** "The present installed nuclear power capacity is set to **increase from 8180 MW to 22480 MW** by 2031-32, according to the Union Minister of State for the Department of Atomic Energy.

India's Nuclear Power Expansion:

- **Aim**: To **increase nuclear power capacity to 100 GW by 2047** as a key component of its comprehensive infrastructure development program.
- **Current Capacity**: India's nuclear power capacity **increased by 70% over the past decade**, rising from 4,780 MW in 2013-14 to **8,180 MW** distributed **across 24 reactors** in 2024.
- Additionally, **21 reactors** with a combined capacity of 15,300 MW are **at various stages of implementation by the Nuclear Power Corporation of India Limited** (NPCIL).
  - **This includes:**
    - 9 reactors with a total capacity of 7,300 MW (including **Prototype Fast Breeder Reactor**) under construction
    - And 12 reactors with a capacity of 8,000 MW in pre-project activities.
  - This expansion is part of **India's commitment to achieving net-zero emissions by 2070.**
  - Various studies have projected that India needs a national nuclear capacity of approximately 1,00,000 MW by 2047.
- **Electricity from Nuclear Power**: **Niti Aayog reports a 115.12% increase in electricity consumption** by commercial & industrial sectors from 2006 to 2022.
  - To counter rising fossil fuel costs and diversify energy sources, India **aims for nuclear power to provide 25% of its electricity by 2050**, necessitating a base-load capacity of 1,094 GWe.
  - **Annual nuclear electricity generation increased** from 34,228 million units in 2013-14 to **47,971 million units in 2023-24.**
- In November 2022, the Ministry of Environment, Forest, and Climate Change (MoEFCC) published an updated **long-term low-carbon development strategy**.
  - It includes objectives to increase the nation's **nuclear power capacity threefold by 2032.**

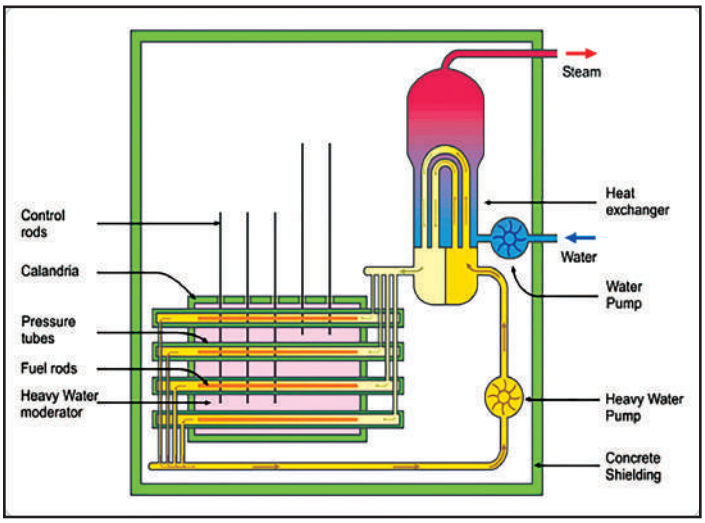
Types of nuclear reactor:



- **Prototype Fast Breeder Reactor (PFBR)**
  - **Fuel**: Utilises **Uranium-Plutonium Mixed Oxide**

(MOX) fuel.

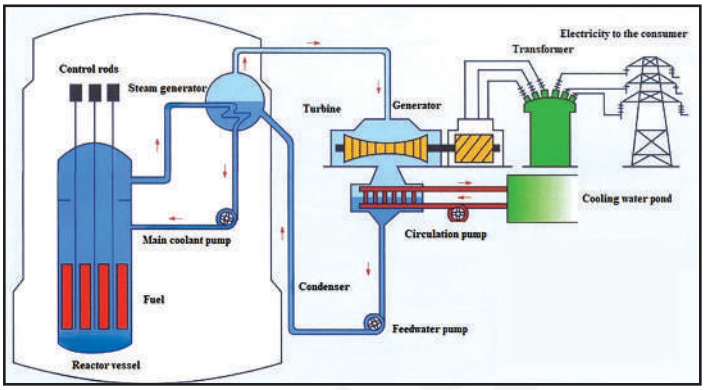
- It is a reactor that **generates more nuclear fuel than it uses.**



- **Coolant**: It uses **liquid sodium** in two circuits.
  - Sodium in the first circuit absorbs heat and radioactivity from the reactor, then transfers the heat to a secondary circuit via heat exchangers.
  - This secondary coolant carries the heat to generators for electricity production.
- It is **indigenously designed and built by** Bharatiya Nabhikiya Vidyut Nigam Ltd (**BHAVINI**) with substantial input from over 200 Indian industries, including MSMEs.
- **Current Status**: A 500 MWe fast breeder reactor is **under construction** at the **Madras Atomic Power Station in Kalpakkam, Tamil Nadu**.

❖ **Pressurised Heavy Water Reactor (PHWR)**

- **Fuel:** Uses **natural uranium** (no enrichment needed), simplifying the fuel cycle and reducing costs.
- **Coolant and Moderator:** Employs **heavy water** (deuterium oxide D2O) to slow down neutrons and cool the reactor, enhancing efficiency with natural uranium.



- **Pressurisation**: Heavy water is pressurised to prevent boiling, allowing operation at higher temperatures and improving thermal efficiency.

❖ **Light Water Reactor (LWR)**

- **Type**: A thermal-neutron reactor using normal water as both coolant and neutron moderator.
- **Fuel**: Utilises **Low Enriched Uranium.**
- **Operation**: Produces heat through controlled nuclear fission.
- **Prevalence**: LWRs are the most common type of thermal-neutron reactors and among the most widely used nuclear reactors overall.

Do You Know?

❖ **India's FDI policy** currently **prohibits foreign investment in the atomic energy sector but allows 100% FDI in nuclear parts and equipment production.**

❖ A 2023 **NITI Aayog** panel **recommended allowing FDI in the atomic sector**, but this policy change has not yet been approved.

Subject - Indian Economy & Agriculture and Banking

Indian Government Bonds in JP Morgan Index

Sub Topic- *Inclusive Growth, Banking Sector & NBFCs*

Context:

Indian Government Bonds (IGBs) will be included in **JP Morgan's Government Bond Index-Emerging Markets (GBI-EM)** for a period of **10 months**, likely to bring nearly **$20-25 billion** into the country boosting foreign exchange reserves and the rupee.

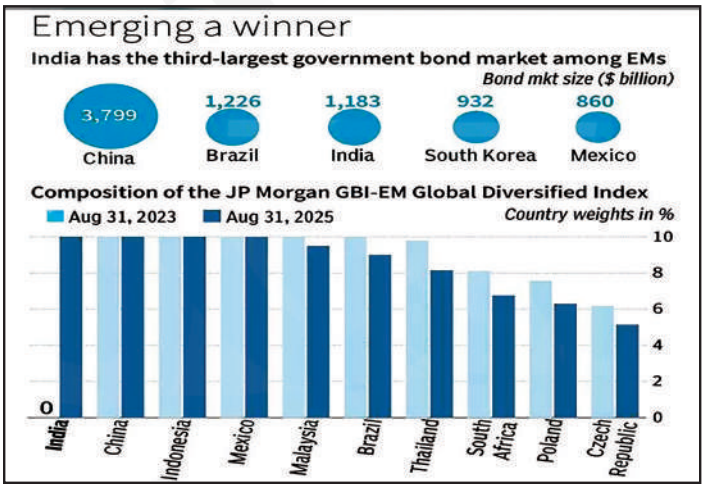
JP Morgan Emerging Market Bond Index (EMBI)

Eligibility for Inclusion:

Only IGBs designated under the **Fully Accessible Route (FAR) are eligible**.

- FAR was introduced by **RBI in March 2020** for **non-residents** to invest in specified Government of India dated securities.
- **Eligible instruments must have:**
  - Notional outstanding above $1 billion (equivalent).
  - At least 2.5 years remaining maturity.

- Created in the early **1990s**, it is the **most widely referenced index for emerging market bonds.**
- It began with the issuance of the **first Brady bond** and has since expanded to include:
  - **Government Bond Index-Emerging Markets** (GBI-EM) and **Corporate Emerging Markets Bond Index** (CEMBI).
- **Significance**:
  - It oversees approximately **$213 billion in assets worldwide**, and holds significant sway as a benchmark for emerging market bonds.



- **India's anticipated 10% weight** in this index could **draw around $21 billion** (Rs 1.7 trillion) **in investments**, assuming initial zero exposure.
- This could **prompt other major EM index providers** like Bloomberg and Financial Times Stock Exchange (FTSE) **to consider including India**, leading to additional economic inflows.

Impact of Bond Inclusion

- It will lead to **new active investments in the debt market**, which is currently underutilised in terms of external financing.

- This will not only lead to **reduced risk premiums** but will also assist India in **financing its fiscal and current account deficit** (CAD).
- It will **increase the liquidity and ownership base of government securities** (G-secs and debt instruments).
- It may help **lower funding costs and support domestic capital market development.**
- Higher inflows can **raise inflation** as the Reserve Bank of India (RBI) absorbs the dollars and releases an equivalent amount in rupees.

Challenges in India's bond markets:

- Narrow Investment Base
- Virtually absent secondary market
- Insufficient Participation by foreign Investors

Micro ATMs

Sub Topic- *Inclusive Growth, Banking Sector & NBFCs*

Context:

The micro-ATM sector has remained resilient despite the rise in digital payments and stagnant pricing.

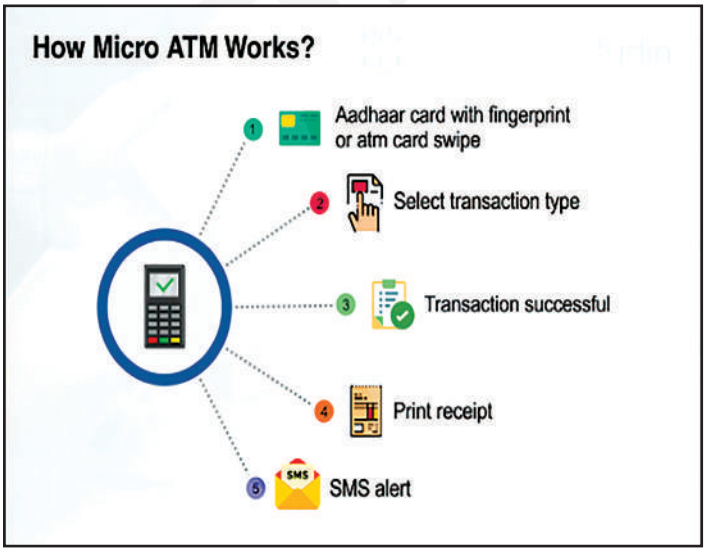
More on News:

- A largely overlooked directive issued by the **National Payments Corporation of India** on March, 2020, permits cash withdrawals over UPI at merchant locations.
- Increasing the speed and local availability of **cash in circulation** (CiC) can be achieved by reducing logistics costs.
- This can be done by eliminating the need to send cash to banks for sorting and bundling, as is required for ATMs, and calls attention to micro-ATM.

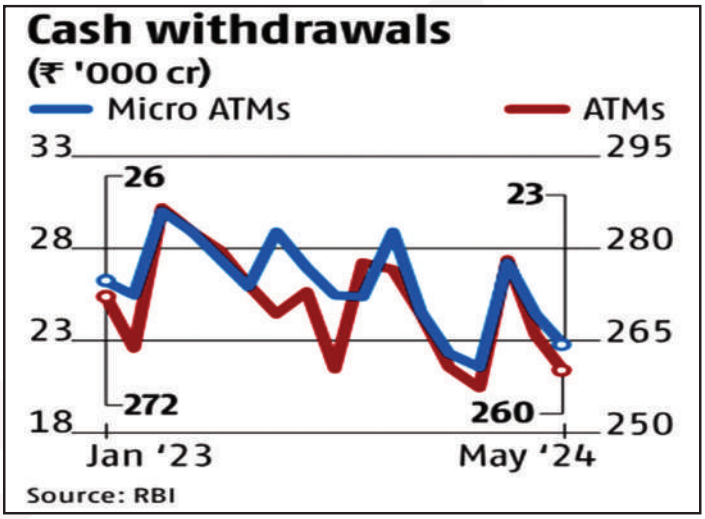
Micro-ATM

- They are similar to **point-of-sale** (PoS) terminals operated by **bank business correspondents** (BCs), and function as **mini handheld ATMs**.

- It is a compact version of an ATM, connected to the banking network via GPRS and includes a card swipe facility.
- It includes a **card reader** for **cash withdrawals and balance inquiries** using any domestic bank debit card.
- This initiative **aims** to **bridge the cash availability gap in the ecosystem.**
- Their primary **advantage** is **addressing low ATM penetration** while also **speeding up the recycling of cash in circulation** (CiC).



- They enable account holders to **withdraw and deposit cash using Aadhaar and biometric authentication** without visiting bank branches or ATMs.
- **Authorization in four ways:**
  - **PoS Terminals**: Different transaction identifiers on PoS terminals.
  - **Aadhar Enabled Payment Systme (AePS)-Enabled PoS**: Aadhaar-enabled payment system terminals with biometric authentication.
  - **Micro-ATMs**: Direct micro-ATM transactions.
  - **UPI QR**: Transactions via UPI QR codes.



- **Transaction Volumes:**
  - **RBI Data (May 2024)**: Approximately **₹22,804 crore withdrawn** via 1.562 million micro-ATMs across 87.979 million transactions.
  - **Traditional ATMs** saw withdrawals of approximately **₹2,60,240 crore** across 516.641 million transactions. Nearly eleven times higher than micro-ATM withdrawals.
  - **Only off-us cash withdrawals** are **captured** in RBI data.
    - For example, a Direct Benefit Transfer (DBT) beneficiary with an SBI account withdrawing from a BC of another bank.

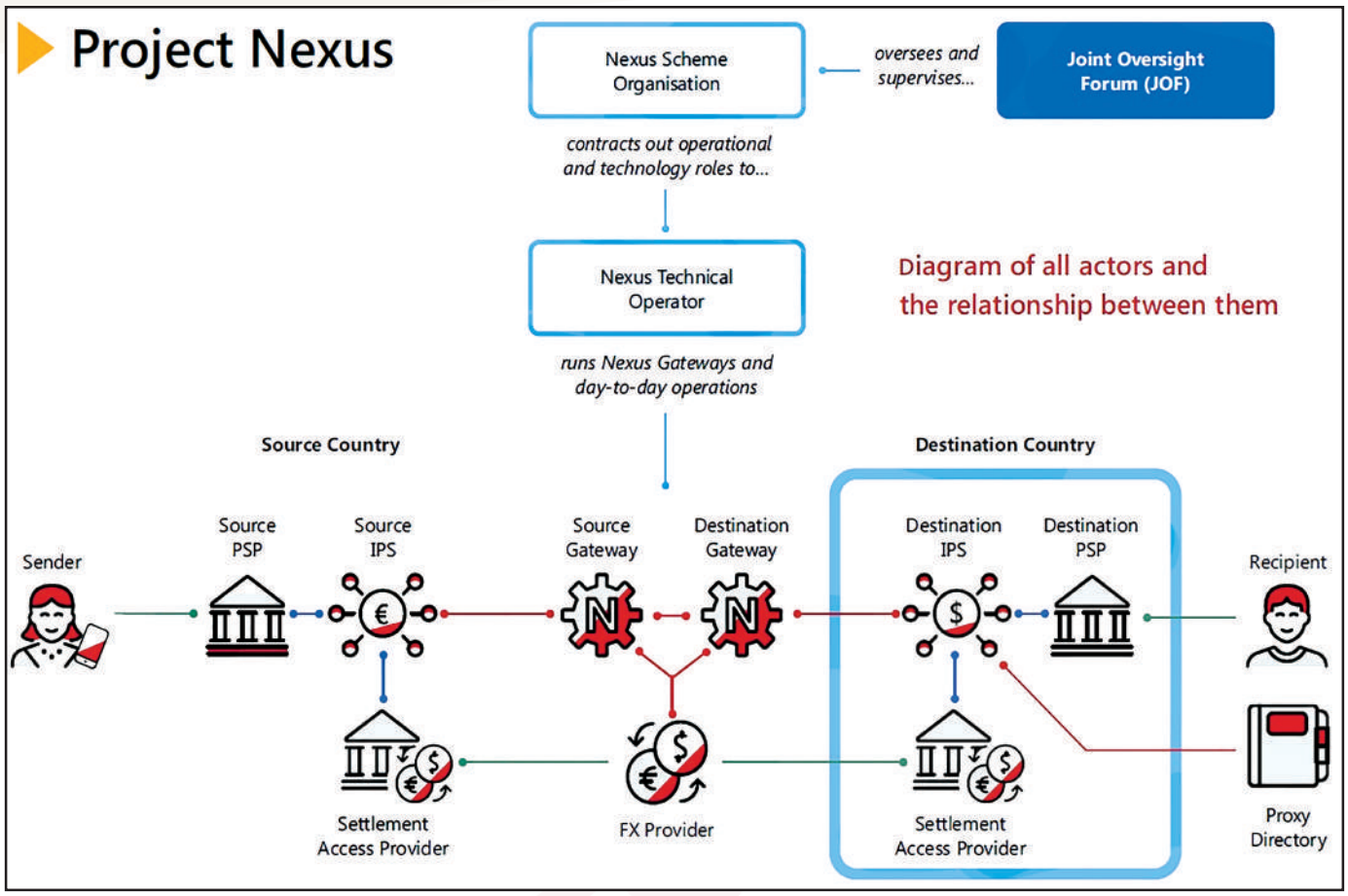
On-us transactions, where the withdrawal is made from the same bank's BC, are **not captured.**

Project Nexus

Sub Topic- *Banking Sector & NBFCs*

Context:

India's Unified Payments Interface (UPI) and Fast Payments Systems (FPSs) of Malaysia, the Philippines, Singapore and Thailand will be interlinked through Nexus.



Project Nexus:

- It is an initiative conceptualised by the **Innovation Hub of the Bank for International Settlements** (BIS).
- It aims to enhance **cross-border payments** by interlinking multiple domestic **instant payment systems** (IPS) globally.
- It is also looking to standardise the way IPS connects to each other, allowing for a single connection to the Nexus platform to reach all other countries on the network.
- This initiative is the first of its kind from the **BIS Innovation Hub** to move towards live implementation in the payments area.
- Founding members include the **FPSs of India, Malaysia, the Philippines, Singapore, and Thailand.**
  - Indonesia is expected to join in the future.
- To facilitate live **implementation**, the partner central banks and IPS operators have agreed to work towards establishing a new entity, the **Nexus Scheme Organisation** (NSO).
  - It will be **responsible for managing** the Nexus scheme, and continuing the mission to achieve instant cross-border payments at scale.
- **Benefits**:
  - **Facilitates cross-border payments within 60 seconds i**n most cases.
  - Accelerates the growth of instant cross-border payments.
  - **Reduces the need for custom connections** for every new country, streamlining the process.
- **Advantages for India:**
  - **Reserve Bank of India** (RBI) has been actively collaborating bilaterally to link India's UPI with other countries' FPSs for cross-border Person to Person (P2P) and Person to Merchant (P2M) payments.
  - Project Nexus provides a multilateral approach, **enhancing international reach of Indian payment systems and benefiting from faster, standardised, and more extensive cross-border payment infrastructure**.

SEHER Program For Supporting Women Entrepreneurs

Sub Topic- *Mobilization of Resources*

Context:

The SEHAR program, launched through a partnership between the **WEP and TransUnion CIBIL, significantly empowers women entrepreneurs in India.**

About SEHAR Programme:

- launched to address the lack of financial awareness among **micro, small, and medium enterprises (MSMEs)**, particularly those **owned by women.**
- **Aim** to empower women entrepreneurs in India with **financial literacy and business skills.**
- **SEHER focuses** on providing comprehensive support across various aspects:
  - **Financial Literacy:** Educating women on financial management, including understanding **CIBIL Rank and credit reports.**
  - **Access to Finance:** Facilitating easier finance access through enhanced credit **awareness and education.**
  - **Business Growth:** Supporting sustainable growth by equipping entrepreneurs with essential skills and knowledge.
- India has **63 million micro, small, and medium enterprises** of which around **20%** are women-owned, employing as many as **27 million people**
- Estimates suggest that by accelerating women's entrepreneurship, India could create more than **30 million new women-owned enterprises,** potentially creating **150 to 170 million more jobs.**
  - It supports the goal of bolstering India's economy by fostering **inclusive growth** through women's entrepreneurship.
- **Overall,It is** a crucial step towards fostering a conducive environment for women entrepreneurs in India, **promoting economic empowerment through enhanced financial education and access to credit.**

Women Entrepreneurship Platform:

- WEP was established in 2018 within NITI Aayog and later transitioned into a public-private partnership in 2022.
- It **aims** to **support women entrepreneurs across India** by addressing information gaps and providing comprehensive support.

TransUnion CIBIL:

- It is a pioneering information and insights company in India.
- It plays a crucial role in enabling trust within the modern economy by offering actionable insights that ensure reliable marketplace representation.

Some of The Initiatives For Women Entrepreneurs Empornment:

- **Bhartiya Mahila Bank (BMB):** business loan scheme **offers loans up to ₹20 crores** for women-owned manufacturing companies at **10.15% interest rate.**
- **Pradhan Mantri Mudra Yojana** provides **funding to micro and small entrepreneurs, focusing on the unfunded.**
- **Mahila Shakti Kendra:** supports women with skill development, digital literacy, and employment opportunities.
- **Stree Shakti:** provides personal loans up to **₹ 50 lakhs** for women entrepreneurs.
- **Mudra Yojana:** supports micro enterprises with loans up to ₹10 lakhs **without collateral for women.**
- **Stand-Up India Scheme:** provides loans from ₹10 lakhs to **₹ 1 crore for SC/ST and women entrepreneurs.**
- **Women's Savings Bank Accounts** cater to financial needs with exclusive benefits like discounts and rewards.
- **Annapurna Scheme:** provides loans up to **₹ 50,000 for women** in food catering businesses.

Telecom Equipment sales cross ₹ 50,000 crore under PLI scheme

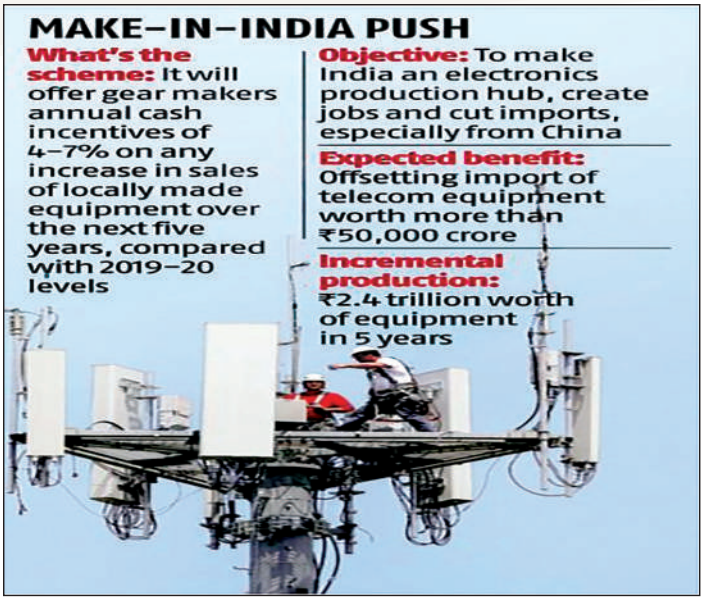
Sub Topic- *Growth & Development, Liberalisation*

Context:

Government push via Production linked Incentive (PLI) schemes boosts production, resulting in balanced telecom equipment exports (₹1.49 lakh crore) and imports (₹1.53 lakh crore) for FY 2023-24.

Key Achievements of the PLI Scheme in India's Telecom Sector

- **Industry Growth**: Telecom manufacturing **sales exceeded ₹50,000 crore** under PLI scheme, with a **370% increase** in FY 2023-24 compared to FY 2019-20.
- **Job Creation**: It created **over 17,800 direct jobs** and many more indirect jobs.
- **Reduced Import Dependency**: It reduced reliance on imported telecom equipment by 60%, making India **self-reliant** and enhancing **national security.**
- **Global Competitiveness**: Indian manufacturers are increasingly competing on a global scale, offering high-quality products at competitive prices.
- **Telecom Equipment Exports**: **Exports totaled approximately ₹10,500 crore**, with significant shipments to North America and Europe.
- **Mobile Phone Production**: In 2023-24, 33 crore units were produced in India, with only 0.3 crore units imported and nearly 5 crore units exported.



- **Export value increased** from ₹ 1,556 crore in 2014-15 to ₹ 1,28,982 crore in 2023-24.

❖ **Trade Balance**: The **trade deficit in telecom reduced** from ₹ 68,000 crore to ₹ 4,000 crore over five years.

Government Initiatives for Telecom Sector:

❖ **PLI Scheme for Large Scale Electronic Manufacturing**: Attracted **₹3,400 crore** investment **in three years**.
- **Supports Atma Nirbhar Bharat** by promoting local production and reducing import dependency.

❖ **6G innovation group**

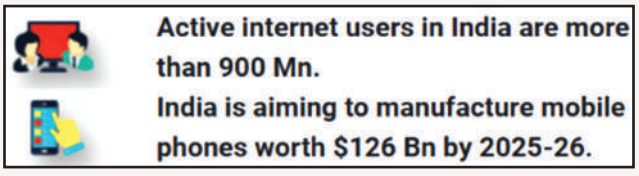
❖ **Bharatnet project**

❖ Prime Minister Wi-Fi Access Network Interface **(PM-WANI)**

❖ **Telecom Technology Development Fund** (TTDF).

❖ **FDI** cap in the telecom sector increased to 100% from 74%.

India's Telecom Industry:



❖ **Second largest globally** with **1.091 billion subscribers** (wireless + wireline).

❖ **Overall tele-density**: 85.76%.
- With **Rural tele-density** of 59.44% and **Urban tele-density** of 133.42%.

❖ India poised to be the world's **second-largest smartphone market by 2025.**

❖ India is placed at **60th rank** as per **Network Readiness Index 2023.**

Oil Exploration and Production in India

Sub Topic- *Industrial Growth, Growth & Development*

Context:

A joint working group (JWG) has been constituted to improve the ease of doing business in the exploration and production (E&P) sector.

Oil Industry:

❖ India is the **third-largest energy and oil consumer** in the world.

❖ The country's **oil demand is expected to increase by 40%** to 6.7 mb/day by **2030** and further to 8.3 mb/day by 2050.

❖ India **aims to commercialise 50% of its SPR** (strategic petroleum reserves) to raise funds and build additional storage tanks to offset high oil prices.

❖ **Indian refiners would add 56 million metric tonnes per annum (mmtpa) by 2028** to increase domestic capacity to 310 mmtpa.

❖ India's **refining capacity stands at 256.8 MMTPA as of Apr 2024**, comprising 23 refineries.

❖ Refinery capacity utilisation is about 96% for the year 2021-22.

❖ **Indian Oil Corporation (IOC) is the largest domestic refiner** with a capacity of 70.1 MMTPA.

❖ India **aims to increase its refining capacity to 450 MMTPA by 2030**.

❖ In July 2021, the **Department for Promotion of Industry and Internal Trade** (DPIIT) approved **100% foreign direct investments** (FDIs) under automatic route for oil and gas PSUs.

❖ India imported 43.1 MMT of crude oil for $26.1 Bn in Apr-May 2024 as compared to an import of 40.6 MMT for $21.5 Bn in Apr-May 2023.

❖ Import dependency in the case of crude oil in May 2024 was 88.2% as compared to 88.6% during the corresponding period of last year.

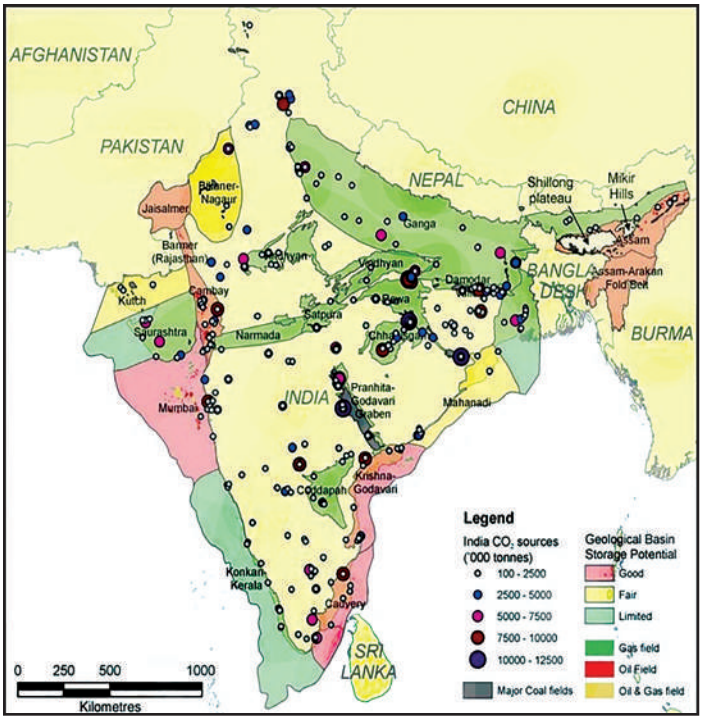
❖ Export of petroleum products was $7.5 Bn in Apr-May 2024.

❖ The Government has allowed **100% Foreign Direct Investment (FDI) in upstream and private sector refining projects.**

Potential sites for oil exploration in India:

❖ India's key oil extraction sites include the **Mumbai High Oil Fields**, which are the largest in the country, contributing 65% of India's crude oil production.

❖ The **Gujarat coast** represents the second-largest oil extraction area.



- The **Digboi Oil Fields** hold historical significance as the oldest in the nation.
- The **Brahmaputra Valley**, particularly in the Dibrugarh and Sibsagar districts of upper Assam, is another notable oil extraction region.
- Additionally, the **Cambay-Luni region** is an important area for oil production in India.

Government e-Marketplace (GeM)

Sub Topic- *Growth & Development, Government Policies & Interventions*

Context:

The GeM portal achieved a milestone, with procurement of goods and services crossing Rs 1.24 lakh crore in the first quarter of the 2024-25 fiscal year.

Government e-Marketplace (GeM):

- **Establishment**: The **Ministry of Commerce and Industry** launched the GeM portal in **2016**.
- **Aim:** To create a **dedicated e-market for goods and services** procured by Government Organizations, Departments, and PSUs.
- **Purpose and Goals:**
  - Facilitates **online procurement of commonly used goods and services** by various Government Departments, Organizations, and PSUs.
  - **Enhance transparency, efficiency, and speed** in public procurement.
  - Provides **tools like e-bidding, reverse e-auction, and demand aggregation** to help users achieve the best value for their money.
- It is a **contactless, paperless, and cashless platform.**
- Authentication of users is done via Application Programming Interface (API) integration with respective domain databases, i.e., Aadhaar, PAN, etc.
- **The Ministry of Finance authorised and made purchases through GeM mandatory** by adding Rule No. 149 in the General Financial Rules, 2017.
- It transitioned from the Directorate General of Supplies and Disposals (DGS&D) to a digital e-commerce portal in a record time of five months.
- It is effectively contributing to the government's commitment of "**Minimum Government, Maximum Governance**".
- **GeM-Special Purpose Vehicle** (SPV), a Section 8 (Non-Profit) Private Limited Company under the Ministry of Commerce was incorporated under the Companies Act, 2013 to **develop, manage, and maintain the GeM platform.**

GeM's Achievement:

- GeM closed the financial year 2023-24 with a Gross Merchandise Value **(GMV) of ₹4 lakh crore.**
- States like **Gujarat, Uttar Pradesh, and Delhi** surpassed their designated public procurement targets, contributing significantly to the GMV growth
- Initiatives like **'Vocal for Local', 'One District, One Product', and 'Womaniya'** provided a level-playing field for domestic businesses.
- Nearly 50% of the GMV was awarded to marginalised seller segments.

Deregulating Non-Subsidised Fertilisers

Sub Topic- *Issues related to subsidies, MSP, PDS*

Context:

With price decontrol of urea, di-ammonium phosphate (DAP), and other politically sensitive nutrients unfeasible, the focus may shift to expanding the market for non-subsidised fertilisers by easing registration requirements.

More on News:

- Centre to allow companies to freely set prices of DAP, muriate of potash (MOP), and other non-urea fertilisers.
- This includes complexes containing varying proportions of nitrogen (N), phosphorus (P), potassium (K), and sulphur (S) that are covered under the **Nutrient-Based Subsidy** (NBS).
- NBS fertilisers are technically decontrolled, manufacturers or importers only receive a per-tonne subsidy linked to their individual N, P, K, and S content.

- The **Department of fertilisers** prescribed **maximum profit margins** over cost to determine the "**reasonableness**" of their MRPs.
- **Prices of imported urea, DAP, and MOP dropped** to around $350, $560, and $319 per tonne, respectively, from recent highs of $900-1,000, $950-960, and $590.

Non-subsidized fertilisers:

- They are **sold at market prices without government financial assistance**.
- Farmers pay the full market rate, which varies based on market conditions, including supply, demand, and international pricing trends.
- **Deregulating non-subsidized fertilisers** means eliminating government controls or regulations on pricing, distribution, or sale of fertilisers that do not receive subsidies.

Benefits of Deregulation:

- Deregulating non-subsidised fertilisers can **allow for faster introduction of new and innovative nutrient products** into the Indian market.
- In India, **registering new fertiliser products takes an average of 804 days**, compared to 90 days in the US and 270 days in China, as per **World Bank's 'Enabling the Business of Agriculture 2019' report**
  - **Deregulation can significantly reduce this time.**
- Deregulation can **follow the framework of water-soluble fertilisers** (WSFs) only requiring basic quality & labelling standards bypassing lengthy agronomic trials.
  - WSFs have **higher nutrient use efficiency** of 60-70% compared to 30-35% for regular fertilisers, leading to better crop yields.
  - **Absorption of nutrients by plants is higher when delivered through WSFs** than the normal bulk field-applied fertilisers
- Deregulation of non-subsidized fertilisers can be a first **step before potentially deregulating subsidised fertilisers** like urea in future.

Drawbacks of Deregulation

- There is **no fiscal pressure on the government to raise prices** of subsidised fertilisers like urea, DAP and MOP.
  - The Government of India budgeted **₹163,999.80 crore for fertiliser subsidies in 2024-25.**
  - This burden is **decreasing due to falling global fertiliser prices.**
- The government has informally fixed **"reasonable" MRPs** for decontrolled NBS fertilisers, **limiting the pricing freedom of companies**.

World Bank's 'Enabling the Business of Agriculture (EBA) 2019' report

- It is the **World Bank's** publication highlights the challenges encountered by farmers.
- Out of 101 countries assessed, **India ranked 49th** on the EBA aggregate score.
- As per the report, India trails behind its main agricultural competitors, China, Brazil, and Russia.

Government to Launch AgriSURE

Sub Topic- *Agriculture and Allied Activities, E- technology in the aid of farmers*

Context:

The Government is set to launch a Rs 750 crore Category-II Alternative Investment Fund (AIF) called AgriSURE.

Agri Fund for Start-Ups & Rural Enterprises (AgriSURE):

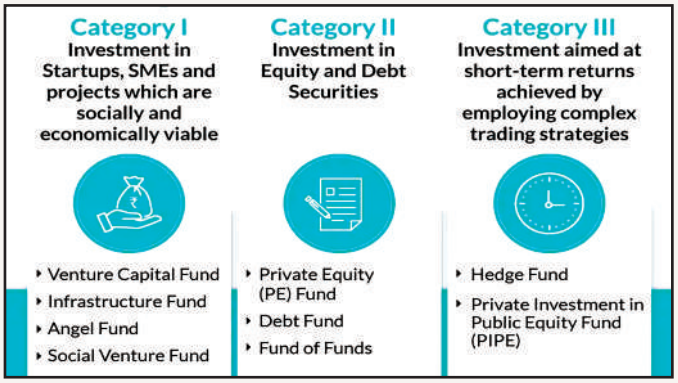
- The fund will **provide equity and debt support to start-ups and agripreneurs** working in agriculture and allied sectors.
- **Aim**: To foster innovation and sustainability in India's agricultural sector

AgriSURE Greenathon 2024:

- **NABARD** launched the AgriSURE Greenathon 2024, a hackathon to **address key challenges in agriculture.**
- The hackathon focuses on smart agriculture, turning agri-waste into profitable opportunities, and making regenerative agriculture remunerative.

- **Funding**: The fund will be funded equally by:
  - **National Bank For Agriculture And Rural Development** (NABARD)
  - **Department of Agriculture and Farmers Welfare,** Ministry of Agriculture
  - An additional Rs 250 crores from other institutions.
- The fund is designed to **operate for 10 years**, extendable by two or more years.
- **Managed by**: **NAB VENTURES**, a wholly-owned subsidiary of **NABARD**.
- **Focus**: Innovation in agriculture, enhancing farm produce value chain, creating rural infrastructure, generating employment, and supporting Farmers'Farmers Producer Organizations (FPOs).
- It will encourage **IT-based solutions and machinery rental services** for farmers.

Alternative Investment Fund (AIF):



- It is a **privately pooled investment vehicle** that collects funds from sophisticated Indian or foreign investors to invest according to a defined investment policy for their benefit.

NABARD:

- It is **India's apex development bank**, established in **1982** under **National Bank for Agriculture and Rural Development Act, 1981**.
- **Aim**: To promote sustainable and equitable agriculture and rural development through participative financial and non-financial interventions, innovations, technology and institutional development for securing prosperity.
- Based on **B. Sivaraman Committee's recommendations**, it replaced :
  - Agricultural Credit Department (ACD) and Rural Planning and Credit Cell (RPCC) of the RBI
  - As well as the Agricultural Refinance and Development Corporation (ARDC).
- **Headquarter: Mumbai**

NITI Aayog Unveils GearShift Challenge to Accelerate Zero-Emission Truck Adoption in India

Sub Topic- *Infrastructure*

Context:

NITI Aayog, in collaboration with IIM Bangalore, Smart Freight Centre India, CALSTART/Drive to Zero, and WRI India, launched the **NITI GearShift Challenge** as part of the **e-FAST India initiative.**

More on news:

- The hackathon aims to **foster innovative business models** for the adoption of **zero-emission trucks (ZETs) in India.**
- Students, transport service practitioners, academics, and researchers are invited to participate.
- **Focus:** Develop business models addressing financial, technical, and operational challenges in the adoption of electric trucks.
- **Hackathon Structure:** Divided into **two rounds:**
  - **Round 1:** Teams submit initial business models addressing specific barriers (technical, operational, or financial).
  - **Round 2:** Shortlisted teams present detailed business models with implementation roadmaps and comprehensive research.
- Industry leaders will **mentor** teams to ensure practical and impactful solutions.
- **Significance of Transition:** India's freight sector is crucial, accounting for **55%** of annual diesel consumption and nearly **40%** of CO2 emissions from road transport.
- **Environmental Impact: Electric trucks** offer a transformative opportunity to reduce emissions, improve air quality, and enhance energy security.
- **Purpose:** Accelerate the adoption of **zero-emission trucks** to benefit both the economy and the environment in India.

e-FAST India Overview:

- Electric Freight Accelerator for Sustainable Transport – India **(e-FAST India).**
- **Purpose:** Facilitates **collaboration** between government stakeholders and private sector partners.
- **Stakeholders Involved:**
  - Original Equipment Manufacturers (OEMs)
  - Logistic Service Providers (LSPs)
  - Financers
  - Producers
  - Charge Point Operators (CPOs)
- **Objective:** Shape strategies and actions to support **freight electrification** at scale in India.
- **First of Its Kind:** Country's inaugural platform dedicated to accelerating the adoption of electric freight transport solutions.

One Scientist-One Product Programme

Sub Topic- *Agriculture and Allied Activities, E- technology in the aid of farmers*

Context:

The Indian Council of Agricultural Research **(ICAR)** is set to introduce its **'One Scientist-One Product' programme**, coinciding with its **96th Foundation Day celebrations.**

About One Scientist-One Product Programme:

- This initiative **aims** to enhance specialisation, improve research efficiency, and accelerate the development of **new agricultural technologies** and products,
  - By assigning specific products or research areas to individual scientists.
- Under this initiative, each of the **5,521 ICAR scientists** is tasked with developing a product, technology, model, concept, or publication.
- The progress will be monitored every **three months** at the institute level and every **six months at headquarters.**
- This programme is planned for a duration of **five years,** with a current **focus on seed hubs** for high-yielding **oilseeds and pulses** varieties.
- ICAR will also announce the release of **323 new varieties of crops,** including **cereals, oilseeds, forage crops, and sugarcane,** as part of its 9**6th foundation day celebrations.**
  - This includes **289 climate-resilient varieties and 27 bio-fortified varieties.**
- **100-Day Action Plan:**
  - ICAR aims to develop **100 new seed varieties** and 100 farm technologies as part of its **100-day action plan.**
- **Production Boost:**
- With the help of breeder seeds, approximately **16 million hectares (Mha)** are under bio-fortified varieties of different crops during **2023-24.**
- The deployment of **climate-resilient technologies** has led to enhanced production even **during abnormal years.**

Decade of Agricultural Innovation (2014-15 to 2023-24):

- Over the past decade, ICAR has made remarkable strides in crop variety development:
  - Total high-yielding varieties released: 2,593
  - Climate-resilient varieties: 2,177 (83% of total)
  - Biofortified crop varieties: 150
- These varieties offer resistance to both **biotic and abiotic stresses.**

Biofortification:

- It is the **process** of **enhancing the nutrient density** of food crops through conventional plant breeding, improved agronomic practices, and **modern biotechnology** without compromising **consumer or farmer preferences.**
- **Purpose:** It is a nutrition-sensitive agriculture intervention aimed at **reducing vitamin and mineral deficiencies. Examples:**
  - **Iron-biofortification:** Beans, cowpea, and pearl millet.
  - **Zinc-biofortification:** Maize, rice, and wheat.
  - **Pro-vitamin A carotenoid-biofortification:** Cassava, maize, rice, and sweet potato.

About Indian Council of Agricultural Research (ICAR):

- It is an **autonomous organisation under the Department of Agricultural Research and Education (DARE), Ministry of Agriculture and Farmers Welfare ,** Government of India.
- Formerly known as **Imperial Council of Agricultural Research,**
- It was **established on 16 July 1929** as a registered society under the Societies Registration Act, 1860 in pursuance of the report of the Royal Commission on Agriculture.
- The ICAR has its **headquarters at New Delhi.**
- **Vision 2020:** The first comprehensive effort to address challenges and opportunities, prepared at the end of the 20th century.
- **Perspective Plan & Vision 2030:** Developed after five years, coinciding with the XI plan.
- **Vision 2050:** Provides a strategic framework for innovation-led, inclusive, and sustainable agricultural growth.

SEBI Proposes to Bring 'New Asset Class'

Sub Topic- *Statutory Bodies, Quasi-Judicial Bodies, Capital Market*

Context:

SEBI proposes to bring a 'new asset class' with a minimum investment limit of **Rs 10 lakh per investor.**

About the new asset class: A **hybrid investment vehicle** for **high-net-worth individuals (HNIs)** that combines elements of **mutual fund plans and portfolio management programs**.

- The proposed new asset class offers a **regulated product** featuring **greater flexibility, higher risk-taking capability** and a **higher ticket size**, to meet the needs of the emerging category of investors.
  - Aimed at **curbing the proliferation of unregistered and unauthorised investment products.**

Infrastructure Investment Trusts

- **InvITs** is a trust (they are called Business Trusts) registered under the Indian Trusts Act, 1882 which manages a fund/ corpus where the **funds are invested in infrastructure projects**.
- InvITs are **mutual fund like institutions** that enable investment into the infrastructure sector by pooling small sums of money from multitude of individual/institutional investors. InvITs are **regulated by Securities and Exchange Board of India (SEBI).**

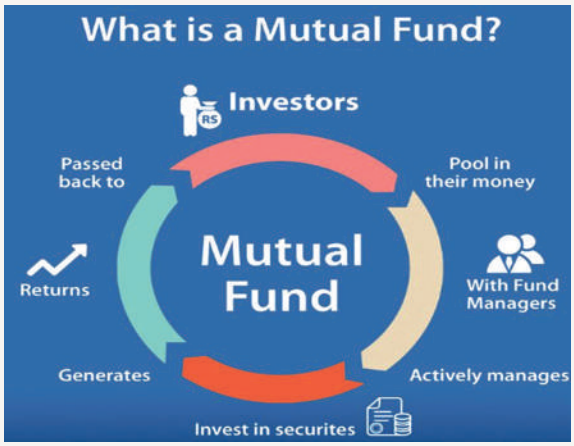
REITs are the same as InvITs but they invest in commercial real estate projects.

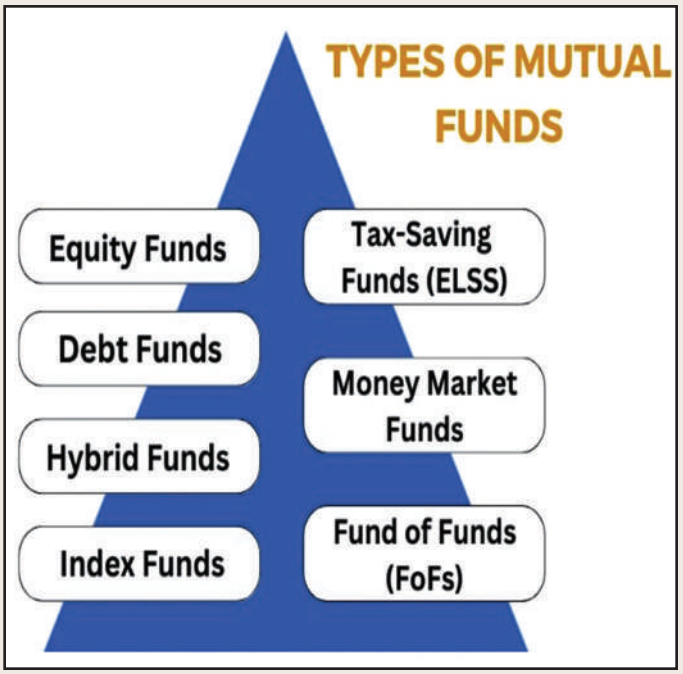
- **Current PMS ticket size:**Currently, the **PMS minimum investment threshold is Rs 50 lakh**, while the **MF minimum investment threshold is Rs 500 per investor.**By setting a minimum investment threshold of Rs 10 lakh, **SEBI aims to deter retail investors** while attracting those currently drawn to unauthorised PMS providers.
- The regulator has **recommended a distinct nomenclature** for the new asset class to distinguish it from traditional MFs and other investment products already available in the securities market such as **PMS, AIF (alternative investment funds), REITs (real estate investment trust) and INVITs (Infrastructure Investment Trust).**
- Sebi has proposed that Asset Management Companies (AMC) can offer investment strategies under **pooled fund structure**, **akin to MF schemes**.
- **Proposed investment strategies**
  - **Long-short equity fund** — a fund that seeks to deliver returns by taking long and short positions in stock and equity-related instruments .
- **Inverse ETF** (exchange traded fund)/ — a fund that seeks to generate returns that are negatively correlated to the returns of the underlying index.
- SEBI has set **two routes of eligibility criteria** for the existing as well as newly registered MFs/ AMCs to be able to offer products under the new asset class.

Exchange traded fund(ETF)

- Exchange Traded Funds (ETF) are **index funds** that are **listed and traded** on stock exchanges **just like regular shares**.
- They are a **basket of stocks** with **assigned weights** that reflect the composition of an index.
- The ETFs trading value is **based on the net asset value of the underlying stocks** that it represents.
- **eg.Bharat-22 ETF** that will **track the performance of 22 stocks** of Central Public Sector Enterprises (CPSE), Public Sector Banks(PSB's).

Mutual Fund





- A mutual fund is a form of **financial vehicle** which collects **money from people** who **pool their money** to invest in stocks, bonds, and other short-term investments.
- **Individuals and institutions** both invest in mutual funds.
- This fund is typically **administered by a fund manager** who collects fees from investors in exchange for looking after their investments.

Benefits of Mutual Fund

- Professional Management
- Diversification
- Accessibility and Affordability
- Liquidity
- Regulator Oversight and Investor Protection
- Economies of scale

PMS (portfolio management programs)	Mutual Fund
Minimum Investment is 50 Lakh	No minimum Investment
High Risk (Invest in concentrated portfolio of 15-25 stocks)	Medium Risk compared to PMS (Diversified invest in 70-80 stocks)
High expected return of 18-20%	Medium expected returns of 12-13%
Cater to a niche segment of clients , generally HNI's	Structured for a wide range of retail investors
Investors can directly own the stocks	Trustees own the stock, investors are allotted units

Payment Aggregator-Cross Border (PA-CB)

Sub Topic- *Banking in India, Monetary System and RBI, Financial Market, NBFCs*

Context:

Cashfree Payments, a (Non-Bank) company specialising in banking solutions and payments, received the Reserve Bank of India's (RBI) approval to operate as a **payment aggregator-cross border** (PA-CB).

More on News:

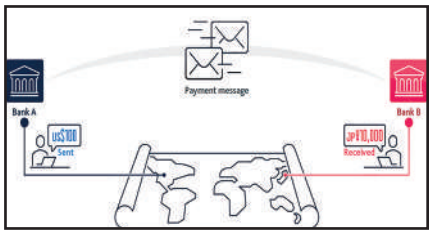
- The PA-CB licence positions Cashfree Payments to support global businesses and regulated entities in collecting payments in India.
- It also enables them to provide cross-border payment solutions for Indian exporters and freelancers.
- This comes in line with **RBI Payments Vision 2025**, focusing on **bringing nonbank entities within the RBI's regulatory ambit.**

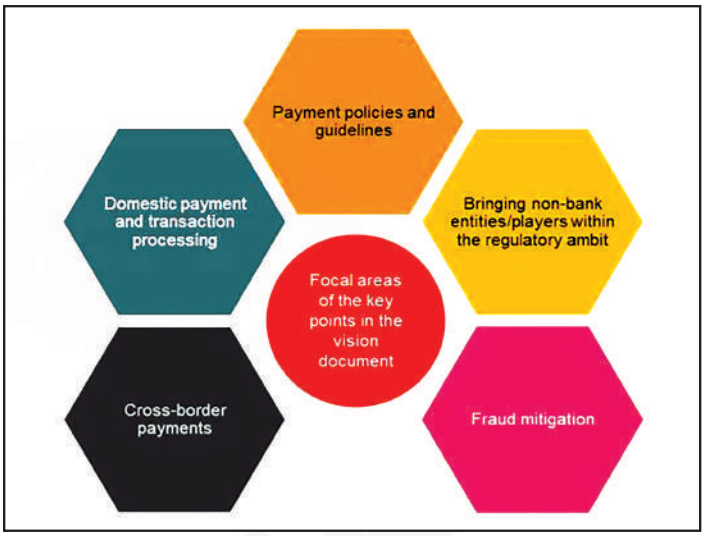
Cross-Border Payments:

- **Financial transactions sent from one country and received in another** (payer and the recipient are based in separate countries).
  - They cover both the **wholesale and retail** payments, including **remittances**.
- Cross-border payments are **projected to grow from nearly $150 trillion in 2017 to over $250 trillion by 2027,** a rise of over $100 trillion in 10 years.

Payment Aggregator-Cross Border (PA-CB):

- These are entities **facilitating online cross-border payment transactions for importing and exporting** permissible goods and services, according to the RBI.
- **RBI categorises PA-CBs into three categories:**
  - Export only (PA-CB-E)
  - Import only (PA-CB-I)
  - Both Export and Import (PA-CB-E&I).
- These PA-CBs can process import or export **transactions where the value of each unit** of goods/services sold/purchased **doesn't exceed INR 25,00,000**.
  - This limit is **'per unit'** of goods/services and **not 'per transaction'.**
- Non-bank entities seeking to work as PA-CB must obtain **approval from the Department of Payment and Settlement Systems (DPSS), RBI,** Central Office (CO).





- **Regulatory Requirements:** In the year 2023, the RBI established minimum net worth requirements for non-banks operating as PA-CBs.
  - These include a **minimum net worth of Rs 15 crore at the time of application**.
  - And a **Rs 25 crore net worth by March 31, 2026**.
  - **New non-banks** must achieve a **minimum net worth of Rs 25 crore by the end of the third financial year post-authorisation**.

RBI Payments Vision 2025:

- Payments Vision 2025 builds on the foundations laid by Payments Vision 2019-21.
- **Theme**: E-Payments for Everyone, Everywhere, Everytime (**4Es**).
- **Objective**: To offer **safe, secure, fast, convenient, accessible, and affordable e-payment** options for all users.
- **Goals**: It is framed around **five key goals:**
  - **Integrity, Inclusion, Innovation, Institutionalisation, and Internationalisation**.

Indian efforts to push Cross-Border Payments:

- **NIPL** (NPCI International Payments Limited) a subsidiary of **NPCI** (National Payments Corporation of India), is **expanding the global acceptance of BHIM UPI QR** at international merchant locations.
  - Indian travellers can now use BHIM UPI QR for retail payments in Singapore, UAE, Mauritius, Nepal, and Bhutan.

International Efforts Towards Cross-Border Payments:

- **Roadmap for Enhancing Cross-Border Payments**, launched in 2020 by **Financial Stability Board** (FSB), is the first attempt by the international community towards cross-border payments.

- **International Monetary Fund** (IMF) and **World Bank's Financial Sector Assessment Programs** (FSAPs), are important tools that can be used to support cross-border payments.

Subject - Science & Technology

ISRO Plans for Planetary Defence: Targeting Apophis in 2029

Sub Topic- *Space Technology- Indigenization of technology and developing new technologies*

Context:

The Indian Space Research Organization (ISRO) aims **to be involved in planetary defence missions** focusing on the closest approach of the **Apophis asteroid to Earth** on **April 13, 2029.**

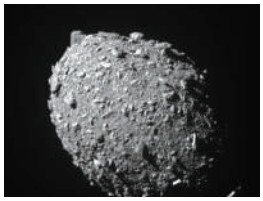
- The initiative was highlighted during an **international workshop held in Bengaluru** on **Asteroid Day 2024**.
- **India** is proposing to **contribute instruments or other support** to collaborative **missions led by** agencies such as **NASA, ESA, and JAXA**.

Asteroid Day

- It is observed **annually on June 30** by the space community to remember the **Tunguska event**, where an **asteroid explosion flattened 2,200 sq km of Siberian forest in 1908**.
- It marks the importance of studying asteroids, which are **also linked to the extinction of dinosaurs**.

ISRO's Role and Challenges

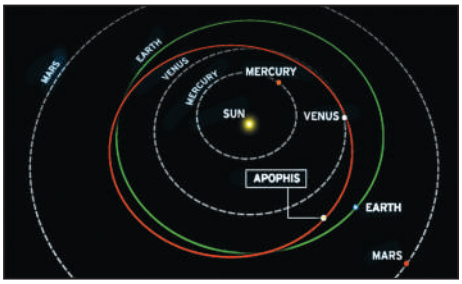
- Scientists plan to **study asteroid Apophis** when it comes within **32,000 km of Earth,** to enhance the planet's safeguards against possible impacts.
  - The asteroid, deemed one of the **most hazardous near-Earth objects**, is **set to pass close to Earth in 2029** and **again in 2036**.
- ISRO's eagerness to contribute stems from the **success of NASA's DART mission** in **2022**, which **altered an asteroid's trajectory** in deep space.



  - The **Double Asteroid Redirection Test (DART) mission** shifted an **asteroid's orbit through kinetic impact** – specifically, by successfully smashing a spacecraft into the smaller member of the binary asteroid system Didymos.
- Currently prioritising its **Gaganyaan human space mission**, which could **constrain funding for new projects** such as **asteroid deflection**.

About Apophis

- **Asteroid 99942 Apophis** was discovered in **2004**
- **Size:** 340-metre.
- It is **classified as an S-type asteroid**, composed of rocky materials and metals.



- It is believed to be elongated and possibly **has two lobes**.
- It is **named after the ancient Egyptian** demon serpent of evil and chaos.
- It has an **orbital period of 360 days**, nearly matching Earth's year, making it frequently observable near Earth.
- **Initial observations** indicated a potential **impact on Earth**. After further tracking and analysis, the risk of impact has been ruled out for at least 100 years.
- The **OSIRIS-APEX spacecraft** will study Apophis during the flyby.

India's Aditya-L1 Completes First Halo Orbit Around Sun-Earth L1 Point

Sub Topic- *Achievements of Indian in the field of Space Technology*

Context:

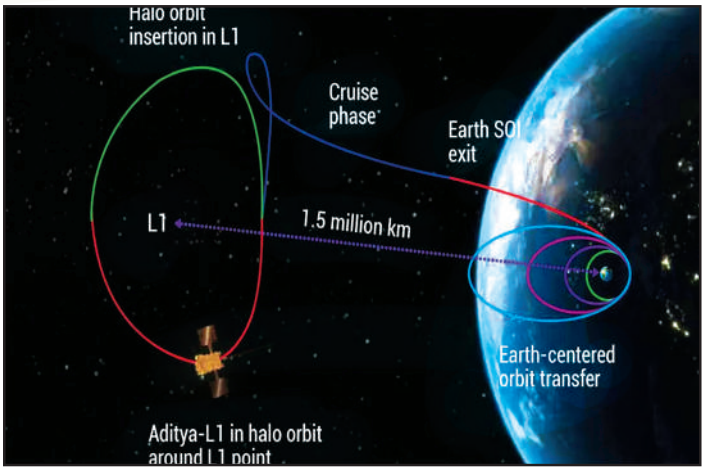
ISRO announced a significant milestone for **India's first solar mission, Aditya-L1**, as it **completed its first halo orbit around the Sun-Earth L1 point**.

- The **spacecraft, launched on September 2, 2023**, achieved **insertion into its initial halo orbit** on **January 6, 2024**.

Aditya-L1 Mission

- India's **first solar mission.**
- **Launched** via **PSLV-C57** from the **Satish Dhawan Space Centre** at **Sriharikota.**
- **Objective:** It intends to **investigate the Sun's corona and atmosphere** from the **L1 (Lagrange point)**.
  - L1, which lies between the Sun and Earth. This unique location allows it to observe the Sun continuously without Earth's interference.

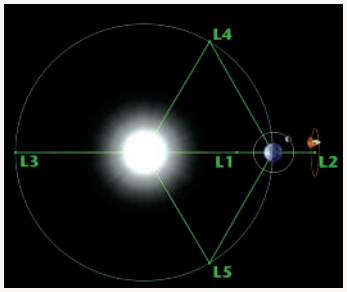
About Halo Orbit:



- It is a **three-dimensional, periodic orbit** around Lagrange points in a two-body system like Earth-Sun or Earth-Moon.
- It is commonly **linked with L1, L2, and L3 Lagrange points**, where the **gravitational forces** of two large bodies and **centrifugal force** balance each other.
- The **spacecraft's halo orbit takes 178 days** to **complete one revolution** around the L1 point.
- During this journey, perturbing forces (such as gravitational interactions) can cause the spacecraft to deviate from its intended path.

Lagrange Points

- Positions in space where the **gravitational pull of two large masses balances with the centripetal force** required for a small object to move with them.



- **There are five Lagrange points in a two-body system:**
  - **Three unstable points: L1, L2, L3** (lie along the line connecting the two large masses).
  - **Two stable points: L4 and L5** (form the apex of two equilateral triangles with the large masses at their vertices).

Benefits of placing Aditya-L1 in a halo orbit around the L1 point are:

- **Ensuring a mission lifetime of 5 years:** It is selected to minimise station-keeping manoeuvres and fuel consumption, thus extending the mission life.
- A satellite in a halo orbit around L1 **has the major advantage of continuously viewing the Sun** without any occultation or eclipses.
- It provides an **unobstructed view of the Sun** crucial for studying the solar atmosphere, including the photosphere, chromosphere, and corona.
- The **orbit provides a stable line of sight to Earth and the Sun**, which is beneficial for continuous communication and solar power.

Anti-Radiation missile Rudram-1

Sub Topic- *Indigenization of technology and developing new technologies*

Context:

India has **successfully test-fired its first indigenous anti-radiation missile**, the Rudram-1, developed by the DRDO for the Indian Air Force (IAF).

About Rudram- 1

- The missile is **integrated on SU-30 MKI fighter aircraft** as the launch platform, having capability of varying ranges based on launch conditions.
- It has **INS-GPS navigation with Passive Homing Head** for accurately hitting radiation emitting targets.
- It is an **Air – to surface missile.**
- The missile can be launched from varying altitudes, ranging from **500 metres to 15 kilometres, and has a range of up to 250 kilometres.**
- Speed **0.6 to 2 Mach** and uses **Solid fuel.**
- The country has established indigenous capability to develop long range air launched anti-radiation missiles **for neutralising enemy Radars, communication sites and other RF emitting targets.**
  - However, they **can also be directed at jammers and communication radios.**

Technology

- An **Inertial Navigation System (INS)** is a **navigation aid that uses accelerometers and gyroscopes** to calculate the position, orientation, and velocity of a moving object.
  - It **does this autonomously, without relying on external signals like GPS,** making it essential for applications in aerospace, marine, military, and autonomous vehicles.
- **The Passive Homing Head** can detect, classify and engage targets over a wide band of frequencies as programmed.
  - This precision is crucial for **Suppression of Enemy Air Defence (SEAD)** operations.

Significance

- **Modern warfare is increasingly network-centric,** involving advanced detection, surveillance, and communication systems integrated with weapons systems.

Global India AI Summit 2024

Sub Topic- *Artificial Intelligence & Robotic*

Context:

The Global IndiaAI Summit 2024, **organised by the Ministry of Electronics and Information Technology** in New Delhi, **aims** to advance the responsible development, deployment, and **adoption of artificial intelligence (AI) in India.**

Global IndiaAI Summit 2024:

- **Objective:** Foster collaboration and knowledge exchange among international AI experts from **science, industry, civil society, governments, international organisations, and academia.**
- **Focus:** Ethical and inclusive growth of AI technologies, positioning **India as a global leader in AI** innovation for socio-economic development.

About GPAI:

- It is an **international body** of experts from science, industry, civil society, international organisations, and national governments committed to **bridging the gap between AI theory and practice.**
- Formed in **June 2020**
- **India is a member** of GPAI.

IndiaAI Mission:

- **Purpose:** Build a comprehensive AI ecosystem fostering innovation through **democratising computing access,** enhancing data quality, and developing indigenous AI capabilities.
- The Centre plans to allocate approximately **₹5,000 crore** out of a total fund of **₹10,372 crore** under the **Mission** for procuring **Graphics Processing Units (GPUs).**
  - Government plans to **subsidise compute capacity** for Indian startups
  - Compute capacity will be obtained through tenders from **private players, not direct chip purchases.**
  - Users, **including startups and enterprises, can choose GPUs or CPUs** tailored to their AI solutions.
- **Seven Pillars:IndiaAI Compute Capacity:** Establishing a scalable AI computing ecosystem with over **10,000 GPUs**, offering AI as a service and pre-trained models.
  - **IndiaAI Innovation Centre:** Developing indigenous large multimodal models (LMMs) and domain-specific foundational models.
  - **IndiaAI Datasets Platform:** Streamlining access to high-quality non-personal datasets to support AI innovation.
  - **IndiaAI Application Development Initiative:** Promoting AI applications in critical sectors for socio-economic transformation.
  - **IndiaAI FutureSkills:** Increasing AI education accessibility and establishing Data and AI Labs in Tier 2 and 3 cities.
  - **IndiaAI Startup Financing:** Supporting deep-tech AI startups with funding and risk capital.
  - **Safe & Trusted AI:** Ensuring responsible AI development through Responsible AI projects, indigenous tools, and ethical guidelines.

About GPU:

- It is a **specialised computer chip** designed to **render graphics** and **images** by performing **rapid mathematical calculations.**

- Initially employed mainly for rendering **2D and 3D visuals, animations, and videos,** GPUs have **evolved** to serve a **broader array of functions.**
- **Key GPU Producers:** Major producers of GPUs include **Nvidia, Intel, and AMD,** known globally for their advanced **GPU technologies.**

Significance of India AI Mission:

- Mission **aims to bolster global AI leadership,** foster **technological self-reliance,** and ensure **ethical AI deployment.**
- Plans include establishing an **AI innovation centre**, providing **high-quality datasets,** and developing apps for **socio-economic challenges.**
- Mission targets i**nvestments in the AI sector with private companies** setting up data centres for AI model development.
- AI is crucial for transformative growth in **businesses and societies.**

Regenerative Braking

Sub Topic- *Achievement in the field of Science & technology*

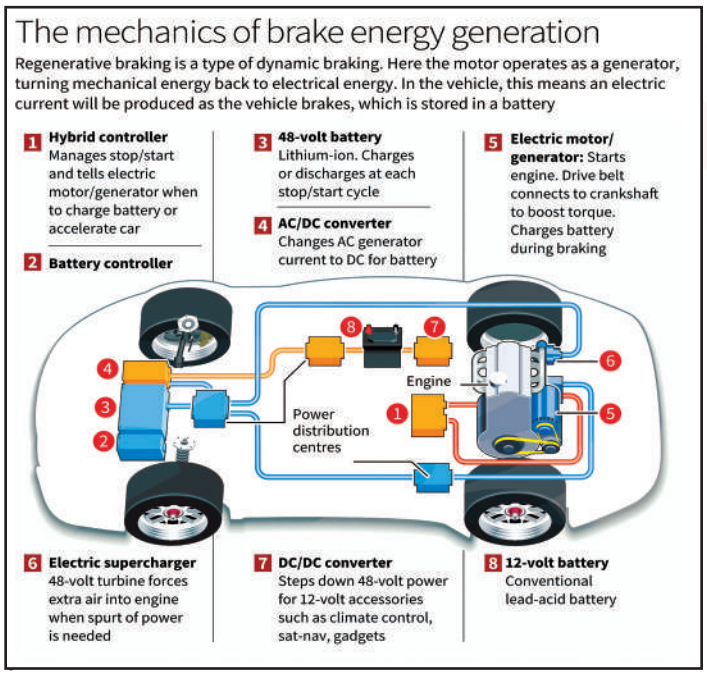
Context:

Driven by the desire for sustainability, regenerative braking is the latest addition to EV technology in the automotive sector.

Normal Braking: In a traditional vehicle, when you brake, the car's **kinetic energy (the energy it has while moving) is turned into heat and wasted**.

Regenerative Braking

- Regenerative braking is a brake system **designed to convert the kinetic energy of the wheels** typically lost as heat during braking, to a form that can be stored and used for other purposes.
- During regenerative braking, the motor operates as a generator, **turning mechanical energy back to electrical energy which is stored separately in a battery and used for other purposes**



- **Regenerative braking works on the principle of law of conservation of energy.**
- Regenerative Braking claim to **recapture as much as 70% of the kinetic energy typically lost from braking.**

Significance of Regenerative Banking

- **Energy Efficiency:** Reuses energy, reducing the need for frequent battery recharges.
- **Extended Range:** Allows electric and hybrid vehicles **to travel further on a single charge.**
- **Less Wear and Tear:** Decreases wear on traditional brake components, **lowering maintenance costs.**
- **Regenerative brakes are beneficial in stop-start traffic.**
- **Aids in reducing carbon emissions**

Challenges

- Regenerative braking alone often **cannot bring a vehicle to a complete stop** and needs to be **supplemented by conventional braking systems.**
- Regenerative brakes may not prevent vehicles from sliding backward on a downhill slope.
- The **efficiency of energy recovery decreases as the vehicle's speed slows down.**

Other way to recover energy

- **Flywheels** can store mechanical energy by increasing angular momentum, useful in applications like **Formula One** racing and satellite navigation.
- **Kinetic energy can also be used to compress air**, which can be useful for starting internal combustion engines.

Zorawar Light Battle Tank

Sub Topic- *Achievement in the field of Defence Technology, Indigenization of Technology*

Context:

Defense Research and Development Organization (DRDO) introduced the **Zorawar light battle tank** as a strategic measure to counter Chinese military presence in high-altitude regions.

Zorawar Light Battle Tank

- **Weight:** 25 tonnes
- **Development:** Indigenously developed by **DRDO** and **Larsen and Toubro** (L&T)
- **Deployment Area:** India-China border
- **Design and Capabilities**
  - **Terrain Navigation:** Capable of navigating steep mountains. Can handle a **20-degree incline** with ease, **engineered for inclines exceeding 30 degrees.**
  - **Amphibious Capabilities:** Efficient at crossing rivers and water bodies
  - **Transportability:** Air-transportable
- **Key Features:**
  - **105-mm rifled gun**
  - **Multi-Ranging Sensor** (MRS)
  - **BEL Remote Weapon Station** (RWS)
  - **Safran Paseo optics**
  - **Two Anti-Tank Guided Missiles** (ATGMs)
  - **LightWeight Rifle** (LWR)
  - **Active Protection System** (APS)
  - **Add-on modular armour blocks**
  - **Composite Rubber Tracks** (CRT)
- It is anticipated that the Indian Army will induct the Zorawar tank by **2027** following the completion of all trials.

Adaptive Optics (AO) system of the upcoming Thirty Meter Telescope (TMT)

Sub Topic- *Achievement in the field of Space Technology*

Context:

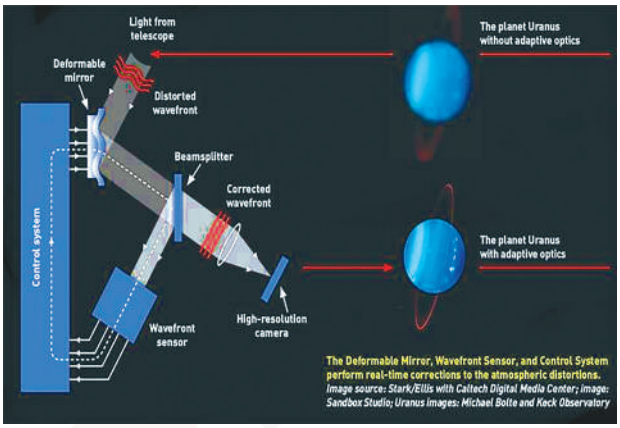
A new online tool to create a **comprehensive star catalogue for the Adaptive Optics (AO) system of the upcoming Thirty Meter Telescope (TMT) has been created** to enable this ground-based telescope-one of the largest to be operational in the next decade, generate sharper astronomical images.

Comprehensive star catalogue

- The TMT's Narrow Field Infrared Adaptive Optics System **(NFIRAOS), enhanced by a Laser Guide Star (LGS) facility will project up to nine lasers into the sky to create artificial guide stars.**
  - However, atmospheric turbulence affects these laser beams, hence it **requires feedback from three Natural Guide Stars (NGS) within its field of view.**
- Currently, no comprehensive catalogue for such NGS exists. Researchers have developed an **automated code for creating an all-sky NIR star catalogue essential for TMT's optimal performance** in the next decade.

About Thirty metre telescope:

- It is being installed at **Mauna Kea in Hawaii** by a non-profit international partnership involving the **USA, Japan, India (Department of Science and Technology), and Canada.**
- It is a **ground based telescope :**It involves large telescopes located on Earth's surface employing sophisticated optics to capture and analyse celestial objects.



  - Unlike space based telescopes, they are **cost effective and easier to maintain.**

About Adaptive Optics

- Adaptive optics (AO), broadly speaking, is a kind of technology that **corrects for imperfections in a wave of light.**
- It detects distortions in the incoming wavefront with some kind of wavefront sensor, computes the needed correction with a control system, and then **corrects for those distortions, usually with a deformable mirror (like being used in TMT).**
- The deformable mirror is an integration of greater than 500 smaller mirrors and is controlled by computers to correct the distortion caused by turbulence of Earth's atmosphere in real-time.
- Telescopes on Earth, such as the **TMT, face atmospheric distortion, impacting image quality.** To mitigate this, the **TMT uses an Adaptive Optics System (AOS) that continuously adjusts for atmospheric changes.**
- A comprehensive **all-sky catalogue of NIR stars is essential** for this system.

Revisiting Tachyons: New Theoretical Insights and Potential Observability

Sub Topic- *Achievement in the field of Science & Technology*

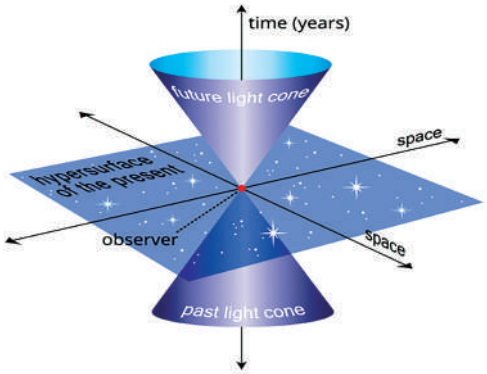
Context:

A recent paper published in **Physical Review D** by physicists from the University of Warsaw and the University of Oxford **challenges previous assumptions,** arguing tha**t tachyons can**

be integrated into quantum theory and help us understand its causal structure better.

Overview of Tachyons:

- **Definition:** Tachyons are **hypothetical subatomic particles** that **exceed the speed of light,** arising from **Einstein's theory of special relativity.**
  - Considered the **"enfant terrible"** of modern physics.



- **Historically**, tachyons were **thought to be incompatible with the special theory of relativity.**
- **Origin of the Term:** The term "tachyon" was first used in **1967 by Gerald Feinberg,** who suggested they arise from a quantum field with **"imaginary mass."**
- **Speed of Light Constraint:** According to Einstein, as objects approach the speed of light, their **mass and energy requirements become infinite,** making faster-than-light travel **impossible for normal particles.**
  - An **ordinary particle** such as an **electron** can exist only at **speeds less than** that of **light**
- **Anti-Mass Concept**: Tachyons are theorised to have **"anti-mass,"** allowing them to travel faster than light even at their **lowest energy state.**
- **Spacetime Diagram:** In spacetime diagrams, tachyons could link events outside each other's light cones, suggesting **possible backward time travel** and causality violations.
- **Detection Challenges:** Tachyons travel faster than light, making direct detection challenging.

New Insights and Solutions:

- **Boundary Conditions:** Previous difficulties were due to misunderstood boundary conditions; incorporating both initial and final states resolves these issues.
- **Implications for Causal Structure:** Aligns with unconventional quantum mechanics interpretations, suggesting the future can influence the present.

Potential Observability & Future Research:

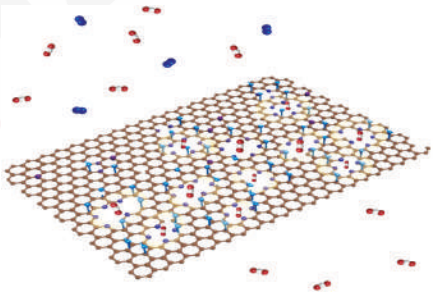
- The authors propose that tachyons are **not just a theoretical possibility but could be crucial** for understanding the spontaneous breaking process in the **formation of matter.**
- They suggest that **excitations in the Higgs field,** before spontaneous symmetry breaking, could have travelled at **superluminal speeds.**
- The research opens up questions about the potential observation of tachyons and their **role in fundamental physics.**

Graphene membranes with High Selectivity improve the efficiency of CO_2 capture

Sub Topic- *Achievement in the field of Science & Technology*

Context:

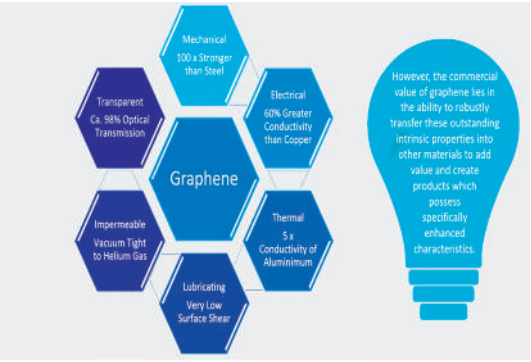
Researchers at **École Polytechnique Fédérale de Lausanne (EPFL)** have recently unveiled innovative **graphene membranes** that could significantly enhance carbon capture efficiency.



These membranes feature **pyridinic nitrogen** at their pore edges, aiding in the binding of **CO_2 to the pores.**

Advancing Graphene Membrane Performance for Carbon Capture:

- **Objective**: Enhance the separation performance of graphene membranes.
  - Increase porosity in graphene, improve pore size distribution, and add polymer groups to the pores to improve CO_2/N_2 selectivity and achieve high CO_2 permeance.
- **Simple Incorporation Process**:
  - Pyridinic nitrogen can be incorporated by soaking porous graphene in ammonia.



  - This method significantly improves CO_2/N_2 selectivity while maintaining high permeance.

- Achieves extremely high CO_2/N_2 selectivity for dilute CO_2 feed, with factors above 1,000.

❖ **Advantages of the Method**:
- Atomic nitrogen introduced as pyridinic nitrogen has a high affinity for CO_2.
- The graphene lattice remains atom-thin, enabling both high selectivity and permeance.

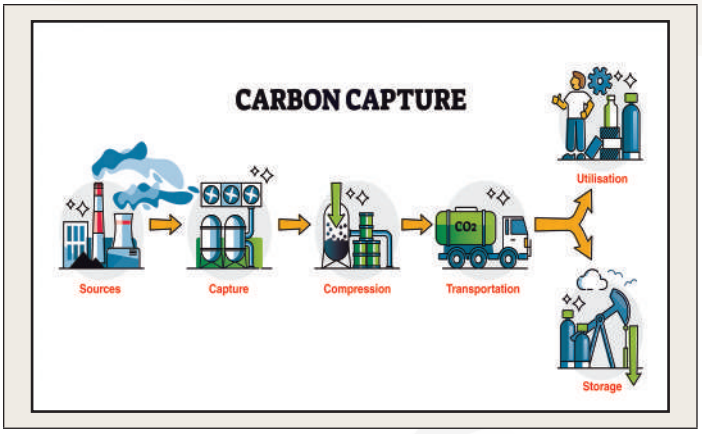
❖ **Challenges**: Achieving both high permeance and high selectivity in graphene membranes was difficult.
- Developing high-performance and low-cost membranes for CO_2 capture.
- These challenges have limited the real-world application of carbon capture solutions.

❖ **Future Implications**:
- The developed graphene membranes and fabrication approach could enable large-scale carbon capture.
- Researchers are working on scaling up the membranes and simplifying fabrication with roll-to-roll synthesis for future commercialization.

Carbon Capture and Storage (CCS)

❖ CCS involves capturing CO2 emissions produced by industrial activities like power generation, hydrogen production, steel, or cement manufacturing. The captured CO2 is then transported and stored deep underground.

❖ **It is a critical technology aimed at reducing carbon dioxide (CO2) emissions to combat global warming. It involves:**
- **Capture**: CO2 is separated from other gases emitted during industrial processes such as coal or natural gas power plants, and steel or cement factories.
  - Involves the separation of CO_2 from mixed gas emissions.
  - Captures CO_2 to prevent its release into the atmosphere.
  - Utilises special membranes as selective barriers:
    - Allows CO_2 to pass through and absorb it.
    - Blocks the passage of other gases.
- **Transport**: The captured CO2 is compressed and transported via pipelines, road transport, or ships to a suitable storage site.
- **Storage**: CO2 is injected deep into geological formations underground, ensuring it remains permanently stored and does not re-enter the atmosphere.
- **Role in Climate Action:** CCS is crucial for achieving the goals of the Paris Agreement by helping to limit global temperature rise to 1.5°C. It is recognised as a technology that can complement efforts to reduce emissions by removing CO2 directly from the atmosphere.



Jumping Genes: From Discovery to Potential Cure

Sub Topic- *Achievement in the field of Biotechnology*

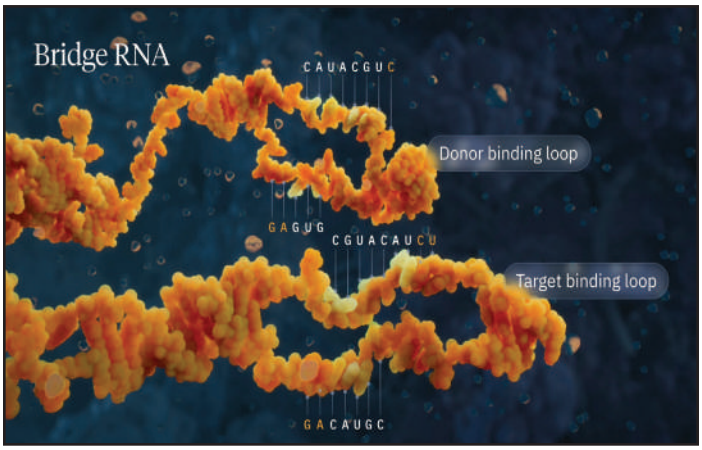
Context:

On June 26, **researchers from UC Berkeley** and the **Arc Institute** revealed a **new RNA-guided gene editing system** in Nature.

❖ It **utilises a gene from the IS110 bacterial transposon family**, enabling cells **to produce an RNA molecule** with dual loops for precise genome editing.

RNA-guided transposons

❖ Researchers discovered **RNA capable of binding to two DNA** pieces simultaneously, **forming a bridge** for precise DNA editing in a new study.



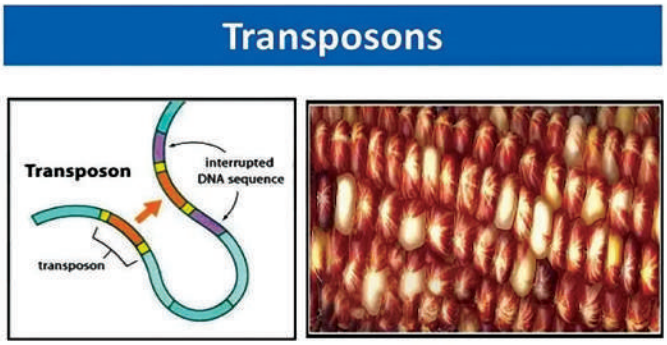
❖ The **two loops of the RNA** can independently **bind to two separate pieces of DNA**.
- **One of the loops** identifies the **target site in the genome** that needs **to be altered** while the **other loop specifies the DNA to be inserted**.
- Each loop is **independently programmable**, which means **researchers can mix and match** any target and **donor DNA sequences of interest**.

- In **Escherichia coli bacteria**, the **bridge RNA** demonstrated over **60% insertion efficiency** and **94% specificity** for targeting specific genomic locations.

In a **separate study from the University of Tokyo**, researchers detailed how bridge RNA guided genome modification.

- They **employed cryo-electron microscopy** to examine **IS110 transposons**, revealing their **functioning as dimers**—complex structures **formed by linking two copies of a simpler compound**.
- **One copy of the dimer** binds **to target DNA** while the **other binds to donor DNA**, facilitated **by the bridge RNA**.

From Static to Dynamic Genes: Understanding Discovery of Transposon



- **In 1948, Barbara McClintock** challenged the notion of **genes as stable** and **orderly arranged on chromosomes.**
- **Studying maize kernels**, she discovered **mobile elements** known as transposons, or "jumping genes," that could **move around within the genome.**
- McClintock's findings **earned** her the **Nobel Prize** in **Physiology or Medicine in 1983**.

Sleeping Beauty Transposon

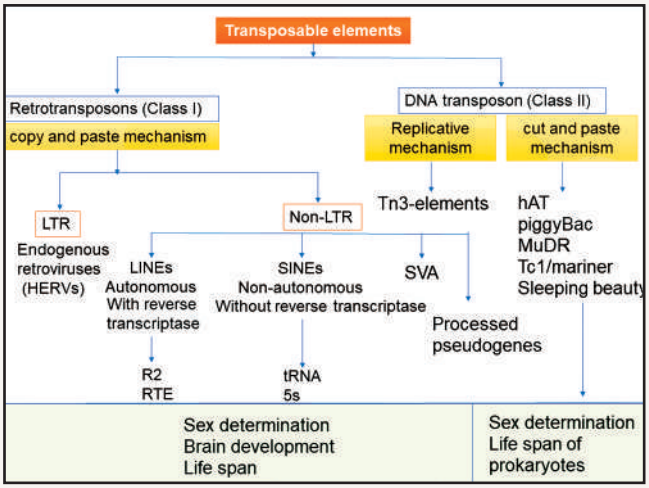
- **In 1997**, researchers studied **fish genomes and reconstructed** a dormant transposon called 'sleeping beauty' at the molecular level. This **transposon had become inactive** in vertebrates millions of years ago.
- They influence the **effects of genes by tur**ning '**on' or 'off' their expression** using a variety of epigenetic mechanisms.
- **More than 45% of the human genome** comprises transposable elements, which contribute to genetic diversity but can also **cause gene mutations and diseases**. However, many transposons have accumulated mutations over time, rendering them inactive and unable to move within the genome.
- Researchers have endeavoured to **revive inactive transposons from animal genomes for biomedical applications**.
  - To utilise them for genetic corrections **to treat diseases or for advanced gene therapy techniques.**

Significance of RNA Bridge

- This technology can add, remove, recombine, and reverse DNA sequences, **overcoming the limitations** of existing gene-editing tools such **as CRISPR23**.
- This technique enables researchers **to insert desired genetic material** into specific genomic locations, treating genetic diseases by replacing faulty genes.
- It holds promise for **synthetic biology applications**, facilitating the **insertion or removal of entire gene sets in organisms.**
- It may **address challenges** like **chromosomal inversions** or **deletions** that current editing tools struggle to manage effectively.

What is Transposon?

- **Transposable elements (TEs)**, also known as **"jumping genes,"** are **DNA sequences** that **move from one location on the genome to another**.



- TEs are universal in both **prokaryotic** and **eukaryotic organisms**, existing in significant numbers.
- They **constitute approximately 50%** of the **human genome** and can reach **up to 90%** of the **maize genome** (San Miguel, 1996).
- Their mobility and abundance **contribute to genetic diversity and evolutionary dynamics** across species.

Galaxies' "Heart and Lungs" Prevent Premature Ageing

Sub Topic- *Achievement in the field of Biotechnology*

Context:

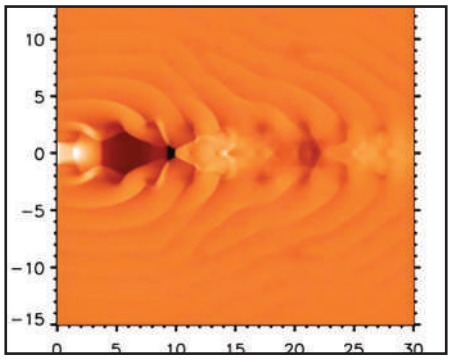
Astrophysicists at the University of Kent, in a study published in **Monthly Notices of the Royal Astronomical Society**, suggest that **galaxies use an internal "heart and lungs" system** to avoid premature ageing.

- The **study uses a biological analogy**, comparing a **galaxy's central supermassive black hole to a "heart"** and the **bi-polar supersonic jets** it emits **to "lungs."**

The Mystery of Galaxy Size and Analogy:

Astronomers have long wondered **why galaxies aren't as massive as they theoretically could be**. Something seems to limit their growth, preventing them from becoming colossal behemoths.

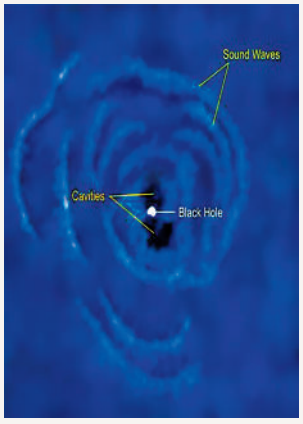
- **The Supermassive Black Hole (Galactic Heart):** At the centre of most galaxies is a supermassive black hole, which can be thought of as the galaxy's "heart."



  - This **black hole emits powerful jets of gas and radiation**, akin to our lungs' airways.
- **The Supersonic Jets (Galactic Lungs):** These **jets oscillate back and forth** along both axes, much **like our diaphragm** moves to **inflate and deflate our lungs**.
  - As the **jets expand and contract**, they transmit energy into the surrounding medium.
- **Breathing Out Warm Air:** Just **as we exhale warm air**, the **jets release energy into space**. This **process slows down** the **accretion of gas** by the galaxy, **limiting its growth**.

Simulation Details:

- Novel simulations show that **high-pressure jets behave like "bellows,"** generating **pressure ripples** in the **galaxy's ambient medium**.



- **Pressure Ripples: Similar to sound waves** from a bottle of champagne or rocket exhaust, they spread through the galaxy, inhibiting the **rate of gas accretion and star formation.**
- **Observations** of pressure ripples in the **Perseus cluster** suggest that sound waves produced by jets from a supermassive black hole **affect the surrounding gas**.

Implications:

- Without this **internal regulation**, the **universe would have aged faster**, and we would only see massive "zombie" galaxies filled with dead and dying stars.
- The **rate of pulsation, size of the black hole**, and **effectiveness of the jets** are critical to the balance of this "breathing" process.
- It **provides a mechanism** to explain the previously unexplained **regulation of gas flow into galaxies**, which influences their **growth and longevity**.

OpenAI's secret project Strawberry

Sub Topic- *Artificial Intelligence & Robotic*

Context:

US-based OpenAI is reportedly building a **new AI model, called the strawberry model, which** may dramatically improve AI reasoning capabilities and allow them **to undertake 'autonomous' internet research** — something existing models cannot do.

About Project Strawberry:

- OpenAI is now working on a new reasoning technology under the **code name "Strawberry" believed to be the new name for Project Q***.
- Strawberry aims to enable AI models to **plan ahead, autonomously search the internet, and conduct deep research.**

Comparison with exciting AI model:

What are Large Language Models (LLMs)

- LLMs are advanced artificial intelligence (AI) systems **designed to understand, generate, and process human language.**
- They are **built using deep learning techniques, particularly neural networks,** and are trained on vast amounts of text data.

- As of now, **Large Language Models (LLMs), which form the basis of AI chatbots**,e.g. Chat Gpt can summarise dense texts and compose prose instantly. However, they **struggle with common sense problems and multi-step logic tasks**.
  - Strawberry models, with their enhanced reasoning, would be seen as a catalyst for AI to make some landmark scientific discoveries and undertake complex problem-solving.
- Reasoning involves teaching AI to plan, understand the physical world, and solve complex problems step by step.
  - Right now, **large language models (LLMs) need extra tools to plan ahead effectively.** With **Strawberry, AI will be able to plan and carry out tasks that require multiple steps** and take place over a longer period.

Potential Applications of Enhanced AI Models:

- **Advanced Research:**Conduct experiments,Analyse data,-Suggest new hypotheses & Potential breakthroughs in various scientific fields.
- **Medical Research:**Assist in drug discovery,Support research in genetics and Analyse large data sets for personalised medicine.
- **Problem-Solving:**Solve complex mathematical problems,Aid in engineering calculations,Participate in theoretical research,Handle logical deductions and contribute to legal analysis.
- **Education:**Offer personalised tutoring,Create educational content and Develop interactive lessons.
- **Business:**Analyse market trends,Predict economic changes,Assess risks and Assist with investment decisions.
- **Creative Fields:**Aid in writing, art, and music creation and Generate videos and design video games.

Ethical Considerations :

- **Impact on Jobs:** Improved AI capabilities may intensify concerns about **job displacement and the ethical implications** of AI reproducing human work.
- **Power Consumption and Ethics:** The vast amounts of power required to run advanced AI models **raise environmental and ethical questions.**

Subject - Environment, Bio-diversity and Disaster management

Permaculture: A Sustainable Alternative to Conventional Agriculture

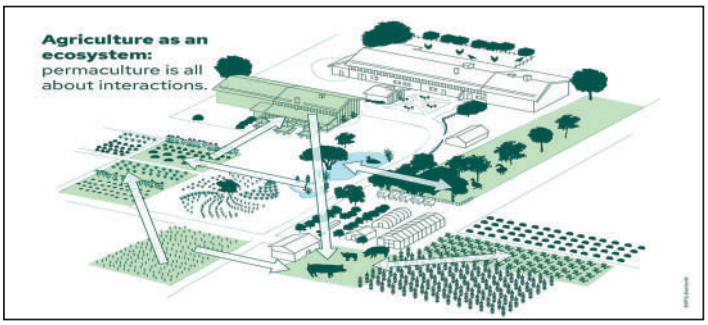
Sub Topic- *Ecology & Environment*

Context:

A recent **study by researchers** from **RPTU University of Kaiserslautern-Landau** and **BOKU University** has shown that permaculture can significantly improve biodiversity, soil quality, and carbon storage.

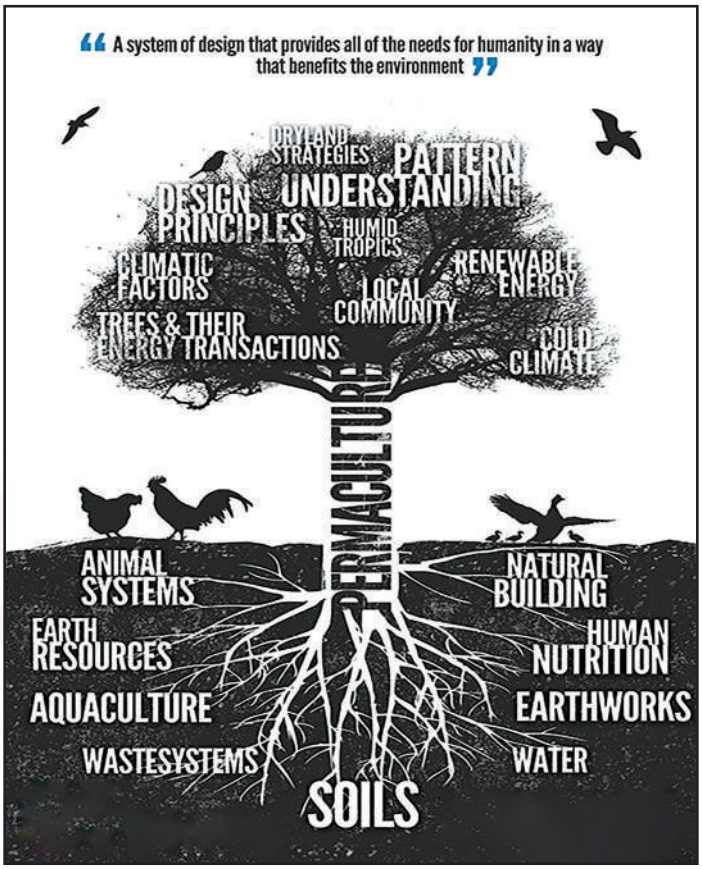
More on News

- This finding, especially **considering the challenges of climate change** and **species extinction**.
- It offers a **real alternative to conventional agriculture** and could even **help reconcile environmental protection** with high yields.



Research Findings

- **Research focus:** Investigated the **effects of permaculture on soil quality** and **biodiversity in Central Europe**.
- **Methodology:** Compared **nine farms in Germany and Luxembourg** to control fields using conventional agriculture.
- **Soil quality:** Sites had **27% higher soil carbon stocks**, **20% lower bulk density**, and **higher macro and micronutrient concentrations**, indicating better conditions for crops.



  - Soil's higher organic carbon, humus, and nutrient levels, enhance their **ability to store water and nutrients**, similar to **natural grasslands during drought periods**.
- **Biodiversity:** Showed significantly higher species richness: 457% increase in vascular plants, 201% increase in earthworms, 197% increase in birds.

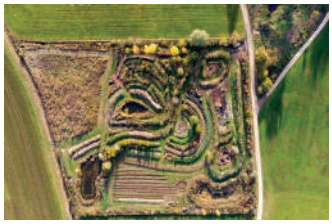
About Permaculture

- Permaculture **integrates land, resources, people and the environmen**t through mutually beneficial synergies – imitating the no-waste, closed-loop systems seen in diverse natural systems.
- Sustainable design **using natural ecosystems** (introduced 1970s).
- It creates self-regulating, natural, diverse food production systems.
- It **combines livestock farming**, beneficial organisms, and soil health techniques.

- Enhances carbon storage through organic matter, reduced tillage, and mulching.
- Permaculture soils show high phosphorus levels, vital for plant growth (contrasts intensive agriculture).

Permaculture for the future

To encourage **wider adoption of permaculture**, the researchers suggest:



- Restructuring financial incentives to favour sustainable farming methods.
- Revising agricultural education to include permaculture and other sustainable approaches.
- Developing flagship projects to showcase the effectiveness of permaculture.

Rogue Waves: Unpredictable Giants of the Sea

Sub Topic- *Ecology & Environment*

Context:

A pioneering **study led by mathematicians** from the **University of Maryland** has made substantial **progress in forecasting rogue waves**.

More on News:

- The **study, titled "Prediction of freak waves from buoy measurements,"** offers hope for significantly **reducing** the **risks associated** with **rogue waves** and **improving maritime safety**.
- By utilising **data from 172 ocean buoys**, the **researchers developed an AI program** capable of **detecting wave patterns** that **precede rogue waves** with up to **five minutes of advance notice**.

Rogue Waves

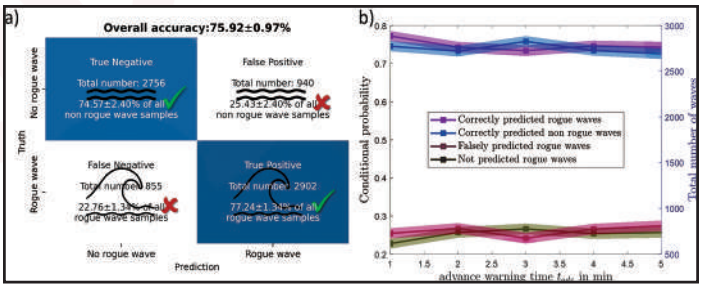
- Once considered folklore, rogue waves are now accepted as real by scientists.
- Often described as **"walls of water"** with **steep sides and deep troughs**.
- **Huge, unpredictable,** and **poses danger** to **ships, infrastructure,** and **lives**.
- These waves, which can be **twice the height of surrounding waves**, have historically **eluded accurate forecasting methods**.
- **Previously unpredictable:** No real-time forecasting method existed.

- **Between 2011 and 2018,** rogue waves resulted in at least **386 fatalities and sank 24 ships**.

- **In 2022**, for example, one cruise ship passenger died and others were injured **when a freak wave hit the Viking Polaris**.

Key Highlights:

- The **AI model** was trained using billions of data points from ocean buoys, **analysing 20-minute samples** of **wave activity**.
- **For** samples **containing rogue waves** (as defined by NOAA), the **recording ends at the point** when the **rogue waves occur**.
  - The rogue wave samples were then compared to all **other samples (in which rogue waves did not occur)** to train the AI programme.
- The AI was then able to distinguish between these patterns.



  - Leading to a **predictive capability** of approximately **75%** for **rogue waves one minute** in **advance** and **about 73% for five minutes ahead**.
- **The World Meteorological Organization (WMO)** sea state code characterises sea state based on **wave height on a scale** of **0 (no waves) to 9 (waves over 14 m).**
- **According to the U.S. National Oceanic and Atmospheric Administration (NOAA)**, rogue waves often emerge from the **convergence of distant weather systems** or from the compression of ocean currents, resulting in a single, amplified wave that can be extraordinarily dangerous.

AI's Potential and Future Directions:

- Researchers demonstrated its potential by **accurately predicting rogue waves near two additional buoys** that were not part of the initial training data.
- The **AI's predictive capabilities** might be **broadly applicable** across various **oceanic conditions** and **depths**. More **advanced AI architectures** and **larger datasets** could lead to near-perfect prediction models.

- **Future improvements** could **enhance the AI's accuracy** by incorporating additional physical parameters such as **water depth, wind speeds,** and **buoy locations**.

In oceanography, sea state refers to the condition of the **surface of a large body of water at a certain location, at a certain point of time.**

Glacial Geoengineering: A Potential Solution to Sea-Level Rise

Sub Topic- *Climate Change*

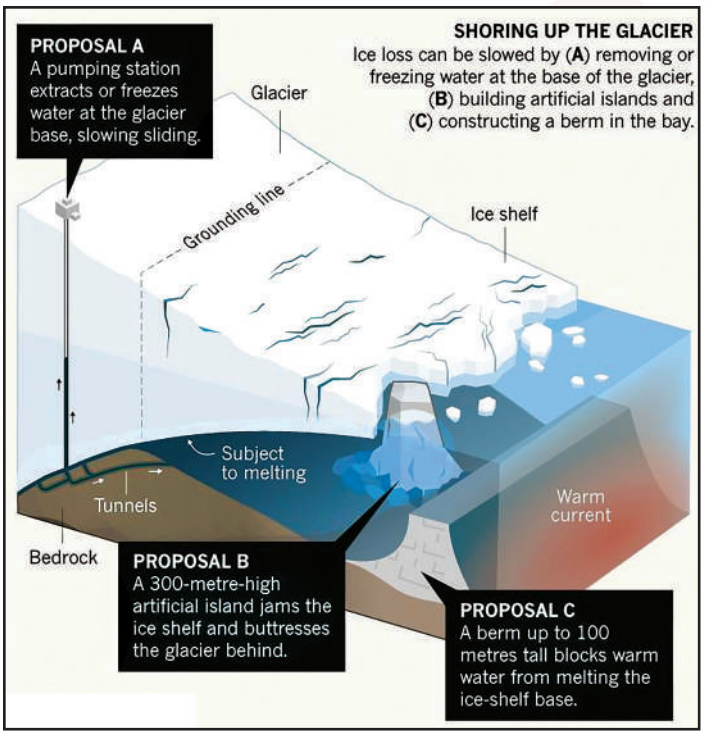
Context:

Recent scientific conferences have highlighted **two** main **technological interventions** to **slow sea-level rise** caused **by climate change: fibre-based curtains around ice shelves** and **drilling holes through glacier beds**.

- These interventions **aim to mitigate the human-induced breakdown of ice sheets**, a significant factor in rising sea levels.

Key Highlights:

- The **Intergovernmental Panel on Climate Change (IPCC)** Sixth Assessment Report **(AR6) estimated** a **global sea level rise** of between **0.43 metres** and **0.84 metres by 2100** relative to 1986-2005 levels.



- In response, scientists and engineers convened at **workshops** at the **University of Chicago (October 2-3, 2023)** and **Stanford University (December 9-10, 2023).**
  - Their discussions **resulted** in a **white paper** assessing the current knowledge and potential of these engineering methods **in Antarctica** and **Greenland.**
- It would take **15-30 years** to gather sufficient knowledge to recommend or rule out these interventions. The primary importance of **reducing carbon emissions** and the **need for funding** to avoid panicked decisions in the future.
- They discussed **other proposed interventions**, such as using windbreaks to increase snow mass deposition, employing cables and anchors to delay ice shelf breakup, and adding reflective materials to ice surfaces to reduce ablation.

About Glacial Geoengineering

- A **field** that **involves large-scale interventions** aimed at slowing down the melting of ice sheets and glaciers **to curb sea-level rise**.
- **In 2021, over 60 senior climate scientists** and governance scholars advocated for an **International Non-Use Agreement on Solar Geoengineering**, citing governance challenges and potential risks.
  - **Solar geoengineering includes** methods like **spraying aerosols** in the **stratosphere to reflect sunlight back into space**.

Fibre Curtains and Glacier Bed Drilling:

- **Fibre curtains** to **prevent the collapse of Antarctica's Thwaites** and **Pine Island glaciers** by **reducing their exposure to warm ocean water**.
  - These curtains would be **attached to the seabed in front of the ice shelves.**
  - **Modelling studies** suggest that **even modest curtains** could **slow sea level rise** from **glacier melting by a factor of 10**.
  - It involves as little as **50 miles of seabed nets** and **curtains** for the **Thwaites Glacier.**
- **Drilling holes** through the glacier bed **to slow the flow of streams** that **carry meltwater into the sea.**
  - These holes **could drain water** from **below** the **ice** or **artificially freeze** the **glacier bed to stabilise it.** However, the effectiveness and ecological impact of these methods remain uncertain.

Risks and Local Impact:

- Potential risks, such as fibre curtains **deflecting warm water** to **nearby ice shelves**, potentially **reducing their stability** and **altering local ecology.**
- These **interventions could impact** the **lives of thousands of people in the Arctic**, including many Indigenous communities, whose voices need to be included in the decision-making process.
- The **drilling approach might pose fewer risks to ecosystems** but **could be less effective** and would **require extensive engineering** under **harsh conditions**.

Potential of Atmospheric Water Harvesting

Sub Topic- *Pollution and Degradations, Conservations*

Context:

Recently, **University of Utah researchers** have developed a pioneering compact, rapid-cycling, fuel-fired **atmospheric water harvesting (AWH)** device that extracts water from dry air using **adsorbent materials and heat.**

More on News:

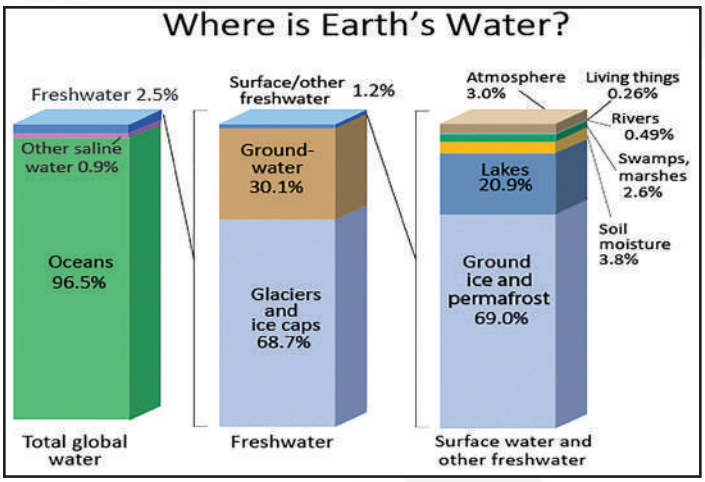
- Earth's atmosphere contains enough water to fill **Utah's Great Salt Lake 800 times,** presenting a vast potential resource for **clean drinking water.**
- Researchers have developed a **compact, rapid-cycling, fuel-fired AWH device** designed to improve **efficiency and practicality.**
  - The device uses adsorbent materials, specifically **metal-organic frameworks (MOFs),** to extract water from **non-humid air.**
  - MOFs, likened to Lego blocks, can be customised to adsorb **water vapour selectively.**
- Current **atmospheric water harvesting (AWH)** technologies face limitations in **size, cost, and efficiency,** making them less practical for widespread use.

Mechanism of the Device:

- The prototype uses **aluminium fumarate** arranged in panels to capture water as air is drawn through.
- Water molecules **adhere to the material's surface,** which is reversible and allows for efficient **water collection.** The material's surface area is **extremely high,** equivalent to two football fields, enabling **significant water capture.**
- The prototype achieves **5 litres** of water per day per kilogram of adsorbent material.
- The **second step** of the process involves precipitating water into **liquid form by applying heat** from a standard Army camping stove.
- The device is efficient because the water collection process is **exothermic,** meaning **it releases heat** as it collects water, simplifying the condensation process.

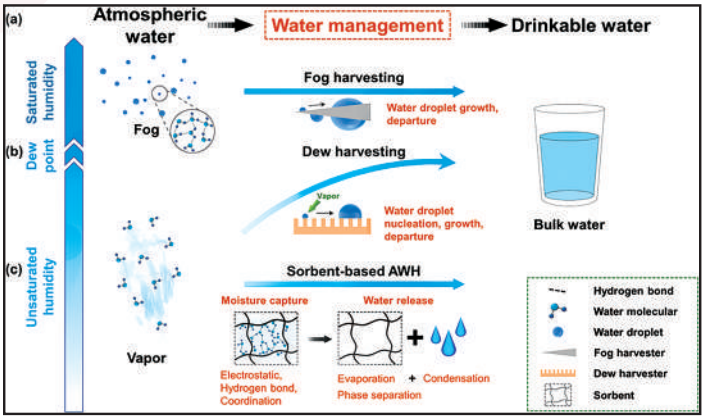
Advantages over Existing Solutions:

- Uses **energy-dense fuels**, suitable for arid conditions, **not** limited to **daytime** or **reliant on batteries.**
- Effective for **water harvesting** in conditions where **conventional methods,** like refrigeration, fall short.
- Addresses **water scarcity issues** impacting **4 billion people,** worsened by **climate change, population growth, and pollution.**
- Conventional sources are limited to **rainfall, rivers, and lakes,** with access issues in undeveloped and landlocked areas.



Atmospheric Water Harvesting (AWH)

- AWH is the process of capturing and collecting water present in the air as **vapour or tiny droplets.**
- There are about **13 trillion litres** of water in the **atmosphere** at any time.
- Recognised for providing potable water, particularly in areas with **scarce liquid water or unreliable infrastructure.**
- **How AWH Works?**:
  - **Dew Harvesting**: **Condensation** relies on the process where **water vapour** turns into **liquid** droplets when exposed to a **cooler surface.**



  - It replicates natural dew formation by **cooling** warm, humid air to **below the dew point**, causing water vapour to condense into droplets for collection.
  - **Sorbent Systems**: **Adsorption** refers to the **adhesion of molecules** to a **solid surface,** while **absorption** involves the **penetration of molecules** into a substance.
    - In sorbent systems, materials such as **silica gel, hydrogels, and Metal Organic Framework (MOFs)** capture water vapour from humid air through **adsorption.**
    - **Saturated** sorbent materials undergo regeneration through **heating or pressure reduction** to release the captured water vapour.

- The **condensed** water vapour is then **collected**, **treated**, and made suitable for various uses.

- **Types of AWH Systems:**
  - **Active Systems**: It requires **electricity** or other **high-grade power.**
    - **Examples**: Air-conditioning systems and thermo-electric coolers.
  - **Passive Systems**: It uses natural or sustainable power with no energy demand. **Examples**: Fog and dew collection on large-area panels.

There are four main methods for extracting water from the atmosphere:

- **Fog nets:** Physical nets are set up in humid environments to collect water in the air.
- **Dew plates:** Using temperature differences to encourage water to condense on metal plates.
- **Sorbents:** Chemicals are used to absorb water from the air, and then the material is heated to extract the water.
- **Membranes:** Using vapour-selective membranes that extract water as air passes over them.

Clarion-Clipperton Zone

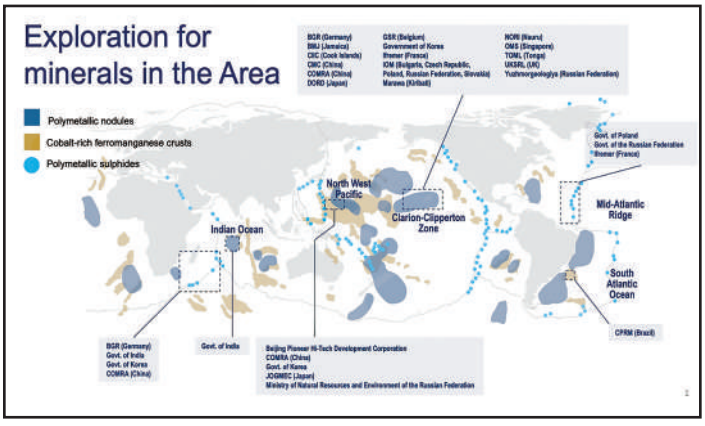
Sub Topic- *Pollution and Degradations, Conservations*

Context:

India will apply for licences to explore **deep-sea minerals in the Clarion - Clipperton Zone** of the Pacific Ocean to secure supplies essential for energy transition technologies.

More on News:

- The **International Seabed Authority** (ISA) has issued **31 deep-sea exploration licences globally**, including **two for India in the Indian Ocean -** one for polymetallic nodules, and other for polymetallic sulphides.
- **Mining has not yet been permitted** as the ISA council is finalising regulations.



Deep Sea Mining:

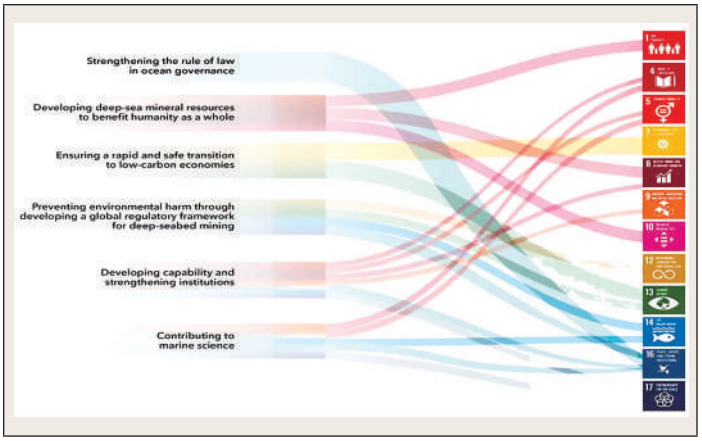
- It refers to the **extraction of mineral resources from the ocean floor below 200 metres,** according to the International **Union for Conservation of Nature** (IUCN).
- With seabed ecosystems largely unexplored and terrestrial deposits depleting, there is growing interest in deep sea mining to meet the rising demand for metals like lithium, cobalt, copper, nickel, and manganese.

Clarion-Clipperton Zone (CCZ)

- It spans 4.5 million square kilometres (1.7 million square miles), in the **northeastern equatorial Pacific Ocean**.
- It is an **abyssal plain of continental proportions** (4.5m km^2) **between Hawaii and Mexico.**
- As its name suggests, the zone is **bound by the Clarion and Clipperton Fracture Zones.**
- It is a region **rich in polymetallic nodules** containing minerals vital for electric vehicles and solar panels (manganese, nickel, copper, cobalt).
- CCZ falls outside national jurisdictions, and hence is regulated by the ISA. So far, the authority has granted 16 exploration contracts in the CCZ.
- It is **home to cetaceans**, including blue whales (endangered), baleen whales, and toothed whales.

International Seabed Authority (ISA)

- **Establishment**: In **1994**, as an **autonomous international organisation.**
- It was established with the **implementation of the 1982 United Nations Convention on the Law of the Sea** (UNCLOS).
  - **UNCLOS** is a 1982 agreement that established rules governing the use of the oceans and their resources.
- ISA can **grant exploration contracts only in international waters**.
  - It is the area defined as the **seabed and subsoil beyond the limits of national jurisdiction** by the UNCLOS.
  - Thus, the **region beyond the outer limits of the continental shelf.**
  - This comprises just over **50% of the entire seabed.**
- **Headquarters: Kingston, Jamaica**
- ISA is dedicated to achieving the **2030 Agenda for Sustainable Development goals and targets** through the economic, social, and environmental mandates assigned by UNCLOS and the 1994 Agreement.



State of the World's Forests Report 2024

Sub Topic- *Pollution and Degradations, Conservations*

Context:

State of the World's Forests 2024 Report released by the **Food and Agriculture Organization** (FAO) reveals that while global deforestation rates have slowed, climate change remains a major threat to the world's forests.

Global Forest Area and Trends:

TOP TEN COUNTRIES FOR AVERAGE ANNUAL NET GAIN IN FOREST AREA, 2010–2020

Ranking	Country	Annual net change (1 000 ha/yr)
1	China	1 937
2	Australia	446
3	India	266
4	Chile	149
5	Vietnam	126
6	Turkey	114
7	United States of America	108
8	France	83
9	Italy	54
10	Romania	41

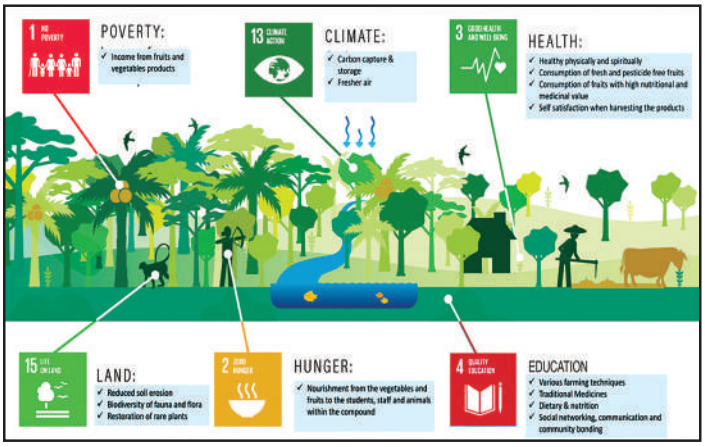
- **Forest Coverage**: As of 2020, the global forest area was approximately 4.1 billion hectares (ha), covering **31% of the land area.**
- **Major Forest Holders**: The **Russian Federation, Brazil, Canada, the USA, and China** together hold **54% of the global forest area.**
- **Forest Conversion**: Between 1990 and 2020, about 420 million ha of forest were converted to other land uses.
- **Deforestation Rates**: Deforestation decreased from 15.8 million ha/year (1990-2002) to 10.2 million ha/year (2015-2020).
- **Annual Forest Change**: The net rate of forest area change was -4.7 million ha/year (2010-2020), a reduction from previous decades.

Positive Developments:

- **Countries with Forest Gains**: In 2020, annual forest area **increased in countries such as China, Australia, India, and the USA.**
- **Mangrove Areas**: Global mangrove area stands **at 14.8 million ha, with South and Southeast Asia contributing 44% of this.**

Challenges and Threats:

- **Wildfires:** Approximately **383 million ha of land** were affected by fires in 2023.
  - **Fire Emissions**: In 2023, fires emitted **6,687 megatons of CO2 globally,** more than double the EU's emissions from fossil fuels.
  - **Boreal fires**, **2021**, contributed about **10% of global carbon dioxide emissions**, exacerbated by extended droughts that increased fuel consumption and fire severity.
  - The number of **wildfires in the Amazon forests** in the first half of 2023 was 10 per cent higher than in 2022.
- **Mangrove Loss:** The **rate of mangrove loss decreased by 23%** between 2000-2010 & 2010-2020, but extreme weather and sea-level rise pose threats.
- **Pests and Diseases: Pine Wood Nematodes** significantly damaged pine forests in China, Japan, and Korea, with 12 million pine trees lost between 1988 and 2022.



- **Economic Impact**: The economic cost of timber loss, tree replacement, and the loss of ecosystem services offered by trees is difficult to quantify.
- **Climate change**: It continues to pose a severe threat to forests through extreme weather events and sea-level rise, particularly endangering mangrove ecosystems.

Innovation in Forestry:

- The report emphasises that innovation is **crucial for achieving the Sustainable Development Goals** in the forestry sector.

- Innovation in the forest sector is **essential to address climate change-related stressor**s like wildfires and pests, requiring resilient management strategies.
- The shift towards a **zero-carbon bioeconomy demands innovations for efficient and diverse wood-based products**.
- **5 Types of innovations identified**:
  - **Technological**: AI and data analysis from drones, satellites, and space stations. **For example: NASA's Fire Information for Resource Management System** (FIRMS) uses satellite data to monitor and analyse wildfires globally.
  - **Social**: Engaging women, youth, and Indigenous Peoples in locally led solutions. **For example: Joint Forest Management** (JFM) programs involve local communities in the management and protection of forests.
  - **Policy**: Policies to foster inclusive and equitable innovation. **For example: The National Forest Policy** (2018).
  - **Institutional**: Institutional reforms to support forest sector innovations. **For example: The Global Forest Observations Initiative** (GFOI)
  - **Financial**: Innovations in public and private finance to enhance forest value. **For example**: The Compensatory Afforestation Fund Management and Planning Authority (**CAMPA**)

Case Study: Developing a New National Policy and Strengthening the Enabling Environment to Scale Up Agroforestry:

- India developed the intersectoral **National Agroforestry Policy in 2014**.
- The policy was the **first in the world to promote agroforestry at a national level**.
- It provided multiple monetary and non-monetary incentives to promote agroforestry in the country.
  - In 2016, for example, the Government approved its first agroforestry budget, worth **USD 150 million**.
- The policy has led to a significant increase in trees outside forests.
- One year after implementation, the **Forest Survey of India reported an 88.7 million m^3 increase in the total volume of these trees.**
- Currently, agroforestry is **practised on over 28.4 million ha in India, providing 65% of the country's timber and almost half of its woodfuel**, with even greater potential.

Subject - Internal Security

Emerging Threat: Snowblind Banking Malware

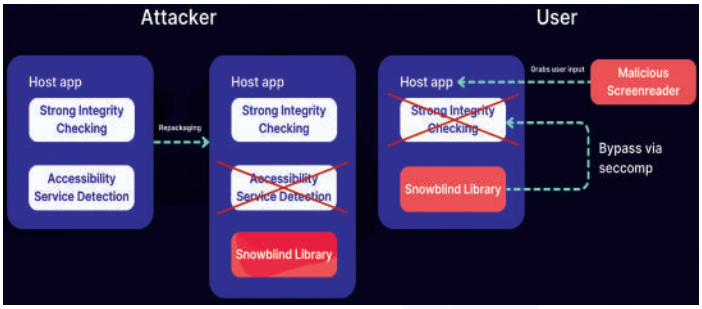
Sub Topic- *Basics of cyber security*

Context:

A new banking malware called **'Snowblind'** is targeting Android users to **steal banking credentials.**

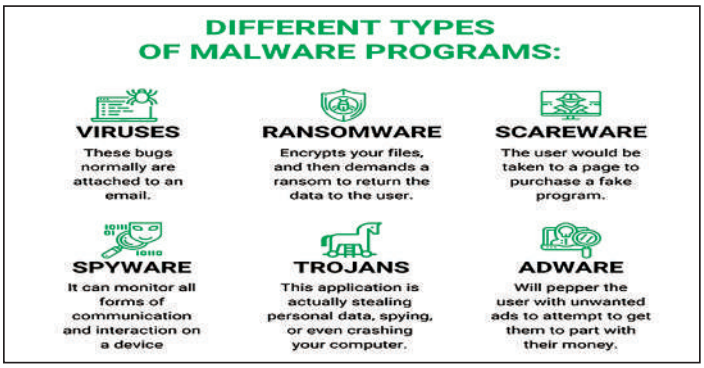
About Snowblind Malware:

- Snowblind exploits a **built-in security feature** called **'seccomp'** to **bypass anti-tamper protection** in apps handling **sensitive information.**



- It **repackages apps** to avoid detection of accessibility features, allowing it to extract login credentials and gain remote access.
- Snowblind **injects code to evade Secure Computing Mode (seccomp's) security measures,** enabling it to use accessibility services to **monitor victims' screens** remotely.
- The malware **can disable biometric and two-factor authentication,** typically used by banking apps for enhanced security.
- Snowblind **infects users** who download apps from **untrusted sources.**
- It is predominantly active in **Southeast Asia, according to security firm Promon.**

What is Malware:



- Malware, short for **malicious software,** is created by **cybercriminals (often referred to as hackers)** to **infiltrate computer systems, steal data, and potentially cause damage.**
- It includes various types such as **viruses, worms, Trojan horses, spyware, adware, and ransomware.**
- India has been hit by **several recent cyber attacks,** causing disruptions across critical services and sparking widespread concern:
  - **AIIMS Attack In 2023, Telangana and Andhra Pradesh Power Utilities, UHBVN Ransomware Attack, WannaCry, Mirai Botnet Malware Attack,- Petya, BSNL Malware Attack**

Places in News

Places in News: Bahrain

Context:

India Initiates Anti-Dumping Probe into Import Of Glass Fibre From China, Thailand And Bahrain.

About Bahrain

- **Location**: Small Arab state in a bay on **southwestern coast of Persian Gulf.**
- **Capital**: **Manama**, is also the largest city and the cultural and financial centre of the country.
- **Official and national language**: Arabic
- **Neighbouring Countries**: **Saudi Arabia** lies to the west across the Gulf of Bahrain, and the **Qatar** peninsula lies to the east.

- **Connectivity**: Linked to Saudi Arabia by the **King Fahd Causeway**, a 15-mile (24 km) long bridge.
- **Archipelago**: Consists of **Bahrain Island** and approximately **30 smaller islands**.
- **The Persian Gulf** is the lowest point of the country and extensive coral reefs cover the northern part of the island.
- Nearly **92% of Bahrain is a desert** with low-lying rocky and sandy plains.
- **Coastal salt marshes are common** in the central and southern reaches, and there are **no significant rivers or lakes**.
- **Land Area**: Slightly larger than Singapore.
- **Currency Exchange Rate**: 1 USD equals 0.376 Bahraini dinar
- It is located in a **major oil-producing region but has limited petroleum reserves.**
- It is a member of several international organisations including the **United Nations, Arab League, and Gulf Cooperation Council (GCC).**

Places in News: Vanuatu

Context:

China has constructed a new presidential palace in **Vanuatu**, a country in the Pacific.

About Vanuatu

- **Location**: Southwestern Pacific Ocean
- **Capital**: Port-Vila, located on Efate.
- **Neighbouring Countries**: Lies to the east of Australia, northeast of New Caledonia, west of Fiji, and southeast of the Solomon Islands.
- **Geography**: A **chain of 13 principal and many smaller islands**
  - The islands form an irregular **Y shape,** extending north-south for approximately 400 miles (650 km).
  - **Seismic Activity**: Frequent earthquakes indicating structural instability.

- The terrain of Vanuatu is diverse and is famed for its gorgeous islands and active volcanoes.
- **Active Volcanoes**: Sere'ama (Vanua Lava), Monaro (Aoba), Garet (Santa Maria), Benbow and Marum (Ambrym), Yasur (Tanna)

- **Wildlife**: Approximately 10 types of bats are found here (with three species unique to Vanuatu) and home to the estuarine crocodile

Places in News: Belarus

Context:

Belarus has formally become a member of the Shanghai Cooperation Organization (SCO).

About Belarus:

- **Location**: It is a **landlocked** country of Eastern Europe.
- **Borders**: **Russia** to the northeast, **Ukraine** to the south, **Poland** to the west, and **Lithuania** and **Latvia** to the northwest.
- **Capital**: Minsk
- **Official Language**: Belarusian and Russian
- **Major Rivers**: Dnieper River (flowing south towards the Black Sea), Pripyat River (main tributary of the Dnieper), Neman River.
- **Bodies of Water**: Many streams and over 10,000 small lakes are scattered across the country.
- **Landscape**: Predominantly flat with large tracts of marshy land.
- The **highest peak, Dzyarzhynskaya** Hara at 345 metres, to the **lowest point at Neman River**, 90 metres above sea level.

- **Climate**: Cool continental climate moderated by maritime influences from the Atlantic Ocean.
- **Natural vegetation**: Mixed deciduous and coniferous forest.
- **Currency**: Belarusian Ruble (BYN)
- **Key Alliances**: Member of the United Nations, Commonwealth of Independent States (CIS), Collective Security Treaty Organisation (CSTO), and recently the Shanghai Cooperation Organization (SCO).

Places in News: France

Context:

Given that no party secured a majority in the French elections, coalition negotiations and alliances are expected to shape the formation of the next government.

About France:

- **Official Name**: French Republic (République française)

- **Capital**: Paris
- **Motto**: "**Liberty, Equality, Fraternity**" (Liberté, égalité, fraternité).
- **Currency**: Euro (€)
- **Official Language**: French
- **Location**: Western Europe
- **Borders**: Belgium, Luxembourg, Germany, Switzerland, Italy, Monaco, Spain, Andorra.
- **Geographic Boundaries**: Atlantic Ocean, Mediterranean Sea, English Channel, North Sea, Alps, Pyrenees

- **Key French geographical features that form borders with other countries:**
  - The **Alps** form the border between **France and Italy** in the southeastern part of the country.
  - The **Pyrenees Mountains** form the border between **France and Spain** in the southwestern part of the country.
    - This natural barrier **separates the Iberian Peninsula from the rest of continental Europe**.
  - The **Rhine River** forms part of the border between **France and Germany**.
  - France's northern maritime border with the United Kingdom (specifically England) crosses the **Strait of Dover** (known as Pas de Calais in French)
    - It is a narrow channel separating the two countries.
- **Highest Point**: Mont Blanc (4,808 metres) in the Alps
- **Major Rivers**: Seine, Garonne, Rhône, Saône
- **International Relations**
  - **European Union** (EU) **Membership**: Founding member.
  - **NATO Membership**: Founding member.
  - **UN Membership**: Permanent member of the **United Nations Security Council.**
  - **G7/G20**: Member of both groups.

Places in News: Mongolia

Context:

India likely to get **coking coal from Mongolia** on **Trial basis** in July.

Overview of The Country:

- Mongolia, located in n**orth-central Asia,** is a **landlocked** country (**Russia to the north and China to the south**).
- **Capital: Ulaanbaatar (Ulan Bator)**.
- **Form of Government:** Parliamentary.
- **Languages:** Khalkha Mongol (official), Turkic, Russian.
- **Climate:**
  - **Type:** Marked continental climate.
  - **Seasons**: Long, cold winters and short, cool-to-hot summers.
  - **Mountain Chains:** Mongolian Altai, Khangai, Khentii, and Gobi Altai.
  - **Plateau:** Extensive upland plateau across southern and eastern Mongolia.
- **Historical and Cultural Significance:**
  - **History:** Long prehistory and a significant historical legacy, including the Mongol Empire led by **Genghis Khan.**
  - **Independence:** Achieved from Qing (Manchu) China in 1911/12, leading to the establishment of the Mongolian **People's Republic in 1924.**

- **Natural Resources and Land Use:**
  - **Pasturelands:** Covering three-fourths of Mongolia's area, supporting large herds of grazing livestock.
  - **Forests and Deserts:** Remaining land divided equally between forests and barren deserts, with **minimal agricultural land.**
- **Hydrology:**
  - **Rivers:** Include the **Orkhon, Selenge, and Kherlen,** with northern rivers flowing to the Arctic Ocean and eastern rivers to the Pacific.
  - **Lakes:** Various lakes, including such as Lake **Khövsgöl and Lake Uvs.**
- **Seismic Activity: prone to earthquakes**, though their impact is limited due to **low population density.**

Facts about Mongolia:

- Mongolia is known as the "Land of Blue Sky" due to its vast, clear skies.
- Gobi Desert: It is the second largest desert in Asia and the sixth largest in the world.
- Family Size: The average Mongolian woman has four children. Women with five or more children are honoured with the title of "honoured mothers."
- Approximately 30% of Mongolians are classified as nomads.

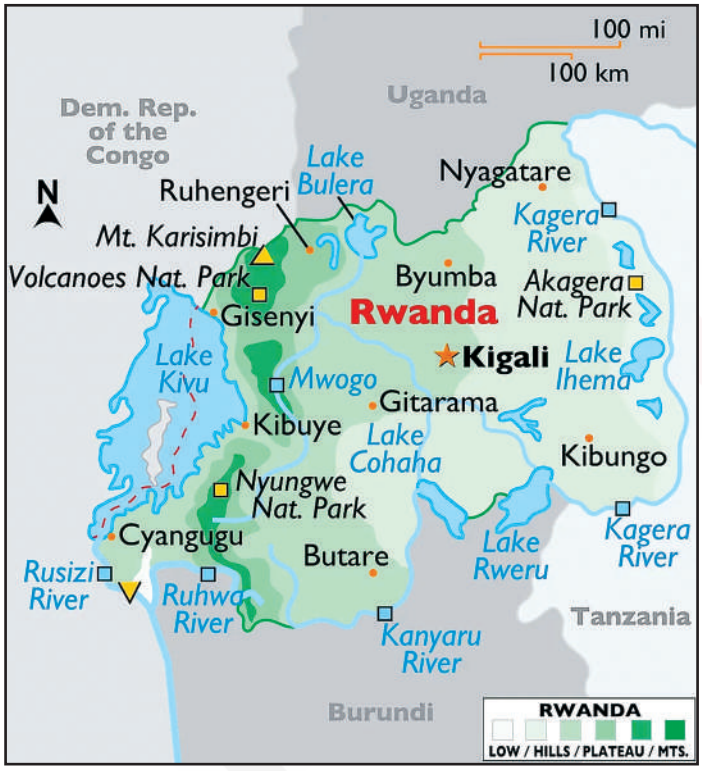
Places in News: Rwanda

Context:

Rwandan President Paul Kagame was gearing up on July 16 for a **fourth term** after winning a thundering **99.15% of votes** according to **partial results** from an election where only **two challengers** were allowed to run against him.

Overview of Rwanda:

- Rwanda is a **landlocked country** situated in **Central Africa,** bordered to the **North by Uganda**, to the **East by Tanzania,** to the **South by Burundi a**nd to the **West by the Democratic Republic of Congo.**
- Total area is **26,338 Km², w**ith a population density estimated to be **445 people per km².**



- Name: **Republic of Rwanda**
- Capital City: **Kigali**
- Currency: **Rwandan Franc (FRW)**
- Official Languages: **Kinyarwanda, French, English**
- Known as the **"land of a thousand hills,"** the landscape is predominantly hilly and mountainous.
  - The **Virunga Mountains** in the northwest include **Karisimbi, the highest peak at nearly 15,000 feet.**
- Major rivers include the **Nile and the Congo.**
- **Lake Kivu** is the **largest** lake in Rwanda and **Africa's sixth largest**, separating Rwanda from the Democratic Republic of the Congo.
- Rwanda is **densely populated**, with around **85% Hutu and 15% Tutsi ethnic** groups.
- Most Rwandans **practise Christianity.**
- **Music and dance** are significant in Rwandan culture, with traditional dances such as **intore, umushagiriro, and drumming.**
- **Common foods** include bananas, plantains, sweet potatoes, beans, and fish; **meat is consumed less frequently.**
- Rwanda features **tropical rainforests, mountain ranges, and volcanoes, with high biodiversity.**
- The **Albertine Rift** region in western Rwanda hosts a significant portion of Africa's birds, mammals, amphibians, and plants.
- **Volcanoes National Park** hosts about **one third of the world's mountain gorillas**.

Government and Economy:

- Rwanda adopted a **presidential system of government in 2003,** with the president elected **every seven years.**
- The country is divided into **four provinces plus Kigali**, each led by a **governor**.
- The economy is primarily **agricultural, w**ith major crops including **bananas, coffee, tea, and tobacco.**
- **Tourism**, particularly for **mountain gorilla** viewing, is a rapidly growing sector.

Sutlej River

Context:

Recently, a Supreme Court Judge has expressed concern over the deteriorating condition of Sutlej river, highlighting the impact of climate change and human activities on North India's rivers recognising climate change as a distinct legal field.

About Sutlej River

- The Sutlej River was known as **Zaradros in Ancient Greek** and as **Shutudri or Shatadru in Sanskrit.**
- The Satluj originates in the **Rakas lake near Mansarovar**.
- It is known as **Langqen Zagbo in Tibet/China**.
- It is the **longest of the five tributaries of the Indus River**, giving the Punjab region its name ("Five Rivers").
  - **Jhelum, Chenab, Ravi, Beas and Satluj** are main **tributaries of Indus**.
- **Course**: Flows northwestward and then west-southwestward through Himalayan gorges, crosses **Himachal Pradesh**, and enters Punjab plain near Nangal, **Punjab**.

- **Journey through Punjab**: Continues southwestward and **receives the Beas River, and forms India-Pakistan border** before entering Pakistan.
- **Confluence**: Flows in Pakistan to **join the Chenab River** west of Bahawalpur.
  - The combined rivers form **Panjnad, linking Five Rivers to Indus**.
- **Tributaries**: The main tributaries **Ravi, Beas, Baspa, Spiti, Nogli Khad, and Soan River.**
- **Major Irrigation Projects**: Includes the **Bhakra-Nangal Project**, the **Sirhind Canal**, and the **Sutlej Valley Project**, the latter spanning both India and Pakistan.
- **Indus Waters Treaty**: Sutlej's water was a source of dispute between India and Pakistan until 1960.
  - The Indus Waters Treaty allocated the Sutlej's water to India and granted Pakistan exclusive rights to the Indus and its western tributaries.

A Critical Budget for Critical Minerals

What are Critical Minerals?

Critical minerals are defined as mineral resources that are essential for the economy and national security but are susceptible to supply disruptions. They include elements like **lithium**, **cobalt**, **nickel**, rare earth elements (REEs), and others that are crucial for manufacturing electric vehicles (EVs), renewable energy technologies, and advanced electronics. The demand for these minerals is expected to surge, with estimates suggesting a four-fold increase by 2040 due to the global shift towards greener technologies.

With growing geopolitical tensions and risks associated with it, as cited by "***Indian Economy: A Review***", there are several global challenges that are hindering growth and development. One of these is related to minerals security. Amidst the **climate change concerns** and demand for its mitigation, **critical minerals** like Lithium are of profound value. Due to the paucity of these minerals and their presence in limited regions like the **ABC** (Argentina, Bolivia, and Chile) **triangle** in **South America**, **China**, and **Central Africa,** access to these minerals is limited.

Therefore, the demand and supply for critical minerals depend greatly on the global supply chains, given their scarcity and regional variations in their availability. Also, since they are being considered the minerals for the future, there is competition among nations to acquire them, which can also lead to geopolitical tensions. Considering the goals laid under the "**Panchamrita**" **model** by India in COP-26 that raised our commitments to climate change mitigation and adaptation, critical minerals are necessary. Hence, it was necessary to make strides in this domain.

A report titled **"Critical Minerals: Global Supply Chains and Indo-Pacific Geopolitics"** by the **National Bureau of Asian Research** (NBR) examines the risks of critical mineral scarcity and their geopolitical implications, focusing on the **Indo-Pacific region**. It highlights the concentration of production in a few countries, **particularly China**, posing significant risks for dependent nations. The report discusses **Australia's** proactive approach to transitioning from fossil fuels to clean energy, **Japan and South Korea's** strategies to diversify supply sources and secure investments, and the **potential for the U.S.** to adopt similar policies. Overall, it underscores the need for diversification, international cooperation, and strategic investments to build resilient critical mineral supply chains globally.

Union Budget and its plan for critical minerals

Considering critical minerals' immense importance, the **Union Budget 2024-25** presents noteworthy developments for the sector. The government has taken steps to **reduce tariffs** on imports of select critical minerals, which is expected to **ease supply constraints** and **support various industries** reliant on these materials. In addition, a flagship **Critical Minerals Mission** has been announced, signalling a strategic and focused effort to enhance the availability and efficient utilisation of these essential resources.

It is also noteworthy that the government has reduced tariffs on critical minerals and certain precious metals, such as **platinum and iridium**. These metals are essential at various stages of production within the **Electronics System Design and Manufacturing (ESDM) sector**. This move underscores the government's commitment to transforming India into a hub for ESDM products.

The **Electronics System Design and Manufacturing** (ESDM) sector encompasses the entire value chain involved in creating electronic products and systems. This includes the design, development, manufacturing, testing, and maintenance of electronic components, devices, and systems. The sector covers a wide range of products, from consumer electronics like smartphones and laptops to industrial electronics, medical devices, automotive electronics, and telecommunications equipment.

Critical Minerals Mission

The Critical Minerals Mission, introduced in the Union Budget, sets forth a comprehensive strategy to enhance India's position in the global critical minerals market and ensure a stable supply of these essential resources. Its primary goals include **boosting domestic production** by encouraging **local extraction and processing** to reduce dependency on imports, which can be vulnerable to geopolitical risks and supply chain disruptions. Currently, we have found minerals like **Vanadium** from **Arunachal Pradesh** and **Lithium** reserves in the **UT** of **Jammu and Kashmir**.

The mission also focuses on **technology development**, investing in and acquiring advanced technologies to make mining and processing more efficient and sustainable. In parallel, it emphasizes skilling the workforce by establishing training programs to equip workers with the necessary expertise for the sector. Another key objective is implementing an **Extended Producer Responsibility (EPR) framework** to promote recycling and sustainable practices within the supply chain, fostering a circular economy and minimizing environmental impact. Additionally, the mission aims to create robust financing mechanisms to support investments in exploration, extraction, processing, and technological advancements, attracting both domestic and international investors.

Extended Producer Responsibility (EPR) is a policy approach in which producers are given significant responsibility for the treatment or disposal of post-consumer products. It extends the producer's responsibility for their products beyond the point of sale and includes the end-of-life management of the products. This framework aims to reduce waste and promote recycling by making producers accountable for the entire lifecycle of their products.

Overall, the Critical Minerals Mission seeks to build a resilient, self-sufficient, and technologically advanced critical minerals sector in India, ensuring long-term economic stability and growth.

How can these objectives be fully realised?

This heightened attention to critical minerals reflects a practical and forward-thinking approach to fostering productivity and economic growth in India. The availability and efficient use of critical minerals are crucial for the country's digital and green transitions, impacting everything from advanced manufacturing to renewable energy technologies. However, the objectives of the **Critical Minerals Mission** can be fully realized only if specific key steps are implemented in the short term. A report by the think tank ORF advocated for an **ecosystem approach** to the ESDM sector, emphasizing the importance of securing access to critical minerals. When established, India's **Critical Minerals Mission** could also gain significantly from adopting this ecosystem perspective.

Firstly, **increasing the production capacity and technology of domestic companies should be matched with enhancing human resources quality along with sustainable mining regulations**. This would involve budgeting funds to acquire effective technologies from other nations and facilitating access to these technologies. These resources are both geographically and finite in nature, with risks arising from production and extraction technologies. India on a path to promote mining itself is far from important—what is paramount for India once it mines in its backyard, however, will be to sustainably practice the extraction.

Secondly, we must build the **storage and processing infrastructure that will be required as imports rise with reduced tariffs on key minerals**. Although the demand for these minerals is substantial, companies in India that require them are unlikely to fully benefit from the reduced tariffs without adequate infrastructure for safe long-term storage. Establishing refineries and processing units should be a central focus of this initiative.

The **third dimension** is the implementation of an **Extended Producer Responsibility Framework** for critical minerals that meets global standards, creating a platform to soar towards sustainable and responsible mining and actorship in contributing to circularity efficiency. Product recovery and reuse are some of the most powerful immediate solutions to shortages.

Fourthly, overseas acquisition of critical mineral assets should create mutually beneficial scenarios for both new suppliers and India. This balance can be achieved by exploring **Free Trade Agreements (FTAs)** with new partners and Early Harvest agreements with some African and Latin American countries.

Additionally, investing in **Research and Development (R&D)** for processing products like **Gallium** and **Germanium**, along with other **Rare Earth Elements (REEs),** should be a clear focus of the mission. Reviving projects such as the **HINDALCO project** in **Renukoot for Gallium**, as mentioned in the ***2023 Ministry of Mines report***, and addressing gaps in Intellectual Property (IP) acquisition for technologies, as well as creating sandboxes for new refining technologies, are crucial steps.

Global Supply Chains and Geopolitical Context

Global supply chains for critical minerals are frequently susceptible to disruptions due to geopolitical risks and the concentration of production in a few key countries, particularly China. For India, developing a robust strategy to secure these essential resources is vital to maintaining economic stability and driving technological progress.

India is taking proactive steps to negotiate **Free Trade Agreements (FTAs)** that encompass provisions for critical minerals. These agreements aim to diversify and stabilise India's supply chain by reducing dependency on any single country. Current negotiations with the **European Union** are part of this broader strategy to ensure reliable access to these essential materials.

Furthermore, India is exploring potential partnerships with countries rich in critical mineral reserves, particularly in **Africa and Latin America**. Early Harvest agreements are being considered as a **strategic approach** to swiftly secure access to critical minerals from these regions. These agreements allow for the rapid implementation of trade provisions, facilitating quicker access to necessary resources while the broader FTAs are being finalised.

By pursuing these international collaborations and FTAs, India aims to create a more resilient and diversified supply chain for critical minerals. This strategy is essential not only for sustaining economic growth but also for supporting the country's ambitions in advanced manufacturing, renewable energy, and digital technologies. **Establishing stable and secure sources of critical minerals** will help India mitigate geopolitical risks, enhance its industrial capabilities, and ensure long-term technological and economic advancement.

Self Reliance in Defence Sector

Defence is the backbone of any country. According to the **Global Firepower Military Strength Ranking**, **India** is listed as the **4th most powerful military** in the world. But, India is heavily dependent on imports in the defence sector, accounting for approximately **9.8 percent of global imports from 2019 to 2023**. To counter this, the Government of India is making extensive efforts to make India self-reliant in the defence sector. This has several benefits, including a reduction in import bills, reduced dependency on supply chain mechanisms, immunity from disruptions caused by international events, protection of sensitive information, and maintenance of strategic autonomy. Achieving self-reliance in defence and consequent reduction in import dependency for military hardware is vital for India to maintain its strategic autonomy.

Current Scenario:

Indian soldiers stationed at high altitudes, such as at **Siachen**, wear a special dress called the **Extended Cold Weather Clothing System** (ECWCS). The clothing system consists of three layers and is intended to help the wearer survive and function in temperatures reaching as low as -50 degrees Celsius. India has been purchasing this clothing system for more than 25 years, mainly from the US and Europe. Recently, the Indian private company "**Aroo**" received orders for domestic manufacturing of the dress. This example highlights India's dependence on imports for even basic defence needs. The Russia-Ukraine war, which saw Western countries scramble to produce weapons for Ukraine and Russia struggling to procure military supplies, underlines the need for self-reliance in defence systems.

Policy Initiatives:

One of the initial steps in revamping our country's defence sector was the **Integrated Guided Missile Programme**. Today, our arsenal includes **hypersonic** and **cruise missiles**, as well as a wide range of ballistic missiles. In addition to this, our defence sector also started **Kevlar clothes**, which are also used to export to other countries. However, several programmes were launched in recent times that display our defence stature to the world.

Various policy initiatives have been undertaken that act as a guiding light to make the defence sector self-reliant. The first one is the **Defence Production and Export Promotion Policy 2020.** It is a strategic framework adopted by the Government of India to boost the domestic manufacturing of defence equipment and promote the export of defence goods and services. It sets a target of exporting $5 billion worth of defence exports. It mandates **DPSUs (Defense Public Sector Undertakings)** and **OFB (Ordnance Factory Board)** to achieve at least 25% revenue from exports by 2025. It prioritises procurement from domestic sources, especially under the **BUY INDIAN** (IDDM) category, which mandates significant indigenous content in defence contracts.

The next one is the **Defence Acquisition Procedure (DAP) 2020**. It is a set of guidelines and regulations established by the Government of India to streamline the process of acquiring defence equipment and systems for the Indian Armed Forces. It prescribes 50% Indigenous Content (IC) in procurement contracts. Under it, a new procurement category—Buy (Global-Manufacture in India)—has been introduced to encourage foreign original equipment manufacturers (OEMs) to set up maintenance and manufacturing facilities in India. This will enable ab initio indigenisation of spare parts.

The third one is **Positive and Negative Indigenisation Lists.** The Positive Indigenisation Lists outline items that must be procured from domestic sources. Presently, five positive indigenisation lists encompass 509 items. The Negative Indigenisation Lists mention those items whose import is prohibited, promoting domestic production.

The fourth one is the **liberalised Foreign Direct Investment Policy**. FDI norms have been relaxed in the defence sector, allowing up to **74% FDI** under the **automatic route**, and encouraging foreign companies to invest in Indian defence manufacturing.

The fifth one is , the government **restructuring the Ordnance Factory Board** into seven separate Defence Public Sector Undertakings (DPSUs) in 2021. This move is intended to **enhance efficiency** and **innovation in defence production** by reducing bureaucratic hurdles.

The last one is the **Make in India initiative**, which has identified defence manufacturing as a key sector for boosting indigenous production.

Promoting Innovation:

Indigenous development of technologies allows India to create military hardware and systems **tailored to its specific needs and threats.** By developing in-house technology, India can ensure

that its defence systems are optimised for its **unique operational requirements, environmental conditions** and specific strategic and tactical needs. This will help India enhance its overall military effectiveness. Continuous innovation in defence technology is also crucial for the development of more sophisticated and precise weaponry, improving the effectiveness of military operations and reducing collateral damages in its operations. Domestic innovation and production would also ensure the **secrecy of** the **technological edg**e available to Indian defence forces.

iDEX (Innovation for Defence Excellence) **and TDF** (Technology Development Fund) **are the two primary arms of the Government of India** to promote indigenous innovation in defence technology, harnessing domestic capabilities, particularly from Micro, Small, and Medium Enterprises (MSMEs) and startups. iDEX targets projects from startups and MSMEs with high innovation potential despite low capital investment. The TDF enables DRDO to harness domestic capabilities, particularly from MSMEs and startups.

iDEX aims to encourage self-reliance and indigenisation in the aerospace and defence sectors, in conformity with the government's **Atmanirbhar Bharat Abhiyan**. iDEX engages startups to address defence production challenges, research on essential new technologies for the defence forces, and reduce reliance on imported technology. The objectives of the iDEX initiative are multifaceted. The primary objectives of iDEX are to advance innovative home-grown defence technologies, foster collaboration with startups, and promote joint creation and technological innovation within the Indian defence and aerospace sectors.

The DDP (Department of Defence Production) channels funding to the Defence Innovation Organisation (DIO) for implementing the iDEX scheme, focusing on three key functions: **co-innovation, piloting technologies, and indigenising defence and aerospace platforms through Transfer of Technologies (ToTs)**. iDEX provides grants up to Rs 1.50 Cr (up to Rs 10 Cr for iDEX Prime) to startups and MSMEs for projects in various technological areas under the Defence India Start-up Challenges (DISC) , and Open Challenge through the Support for Prototype and Research Kickstart **(SPARK) Framework.** The SPARK framework is aimed at supporting Startups/MSMEs/Innovators to create prototypes and/or commercialise products/solutions in National Defence and Security.

The intellectual property rights (IPR) developed within the company, institution, or by individual innovators will belong to the startup or MSME entity with the government retaining the right to impose **Government Purpose Rights (GPRs)** for internal use or manufacturing. Government can also exercise March-In Rights to take over patents in the interest of national security in certain cases where the rights holder does not meet some conditions. Additionally, Ministry of Defence (MoD) export control regulations apply to technology or product exports resulting from the project.

The iDEX initiative has been successful in the sense that it managed to engage over 300 startups and MSMEs, encouraging them to develop cutting-edge technologies for defence applications. The Indian Army has also made a huge advancement in promoting innovation and technological development in defence and aerospace by issuing its first-ever procurement order under the initiative. A contract was awarded to the Indian startup **Hyper Stealth Technologies Private Limited** for the procurement of an indigenously developed Integrated Mobile Camouflage System (IMCS) for Mechanised Forces. **Big Bang Boom Solutions Pvt Ltd (BBBS)**, a startup in the defence sector, has been given a substantial contract exceeding Rs 200 crores from the Indian Air Force and Indian Army for its advanced anti-drone technology.

The **Technology Development Fund (TDF)** scheme is a flagship programme of the Ministry of Defence executed by DRDO under the Make in India initiative. The main objectives of the scheme are enumerated below: To provide Grant in Aid to Indian industries, including MSMEs and startups, as well as academic and scientific institutions for the development of defence and dual-use technologies that are currently unavailable with the Indian defence Industry; To engage with the private industries, especially MSMEs and startups, to bring in the culture of Design & Development of Military Technology and support them with Grant in Aid; To focus on Research, Design & Development of Niche technologies which are being developed for the first time in the country ; To create a bridge amongst the Armed Forces, research organisations, academia, and qualifying/certifying agencies with private sector entities ; To support the futuristic technologies having a Proof of Concept and converting them into prototypes.

Promoting Indigenous Manufacturing:

The establishment of two **Defence Industrial Corridors (DICs)** in Uttar Pradesh and Tamil Nadu is a significant step towards enhancing domestic manufacturing capabilities. These corridors have attracted investments worth approximately ₹24,000 crore, with significant contributions from both state and private sectors.

In addition to this, the **SRIJAN Indigenisation Portal** is a one-stop-shop online portal that provides access to the vendors to take up items that can be taken up for indigenisation. On this portal, DPSUs/OFB can display the items which they have been importing or are going to import, so that the Indian industry can come forward and take up the indigenisation challenge.

Armed Forces Initiatives:

Each of the armed forces has undertaken specific initiatives to promote self-reliance. For example, the **Indian Army** is identifying **'National Champions'**—companies capable of producing advanced weaponry. The Army is organising competitions like **'Inno Yodha 2023'** for AI, software applications, unmanned aerial platforms, and counter-drone systems. The **Indian Navy** has initiated **Project 17A,** focusing on the construction of advanced stealth frigates with indigenous design and construction. The **Indian Air Force** has achieved 95-97% self-reliance in its daily requirements, with only a few critical technologies still being imported. **Upgrades of MIG-29** aircraft have been completed without support from Russia, showcasing indigenous capabilities.

Progress:

The impact of these initiatives is evident. According to the **SIPRI report**, **India's arms imports declined** by 11% between 2013-2017 and 2018-2022. Additionally, **defence exports** reached a record Rs 21,083 cr in FY 24, a **30-fold increase over five years.** This has been achieved through defence **diplomacy**, marketing of Indian defence products, and the defence offset policy. India exports arms to over **85 countries**, including notable nations such as **Italy**, the **Maldives**, **Russia**, **Sri Lanka**, the **UAE**, the **Philippines**, **Saudi Arabia**, **Poland**, **Egypt**, **Israel**, **Spain**, and **Chile**. This expansion in arms exports highlights India's growing role in the global defence market. India has collaborated with **Russia** on the front of **BrahMos missile development** and **Israel** on the front of **Carbine rifle weapons**. Such efforts are necessary considering the twin folded challenges lying on the east and west borders, i.e., China and Pakistan.

India's defence R&D landscape is **hindered by low GDP allocation (0.64%)**, lagging behind nations like China and the US. This necessitates better fund distribution, interdisciplinary collaboration, and adherence to international standards for sustainable growth and innovation.

However, even after such initiatives, it was found that the target of exporting **defence items** worth **35000 Crore** by **2024-25** cannot be achieved. As of now, we have attained defence exports of **16000 Crore** by **2022-23** and **21083 Crore** by **2023-24** (*as mentioned earlier*). Therefore, to give a better nudge, the target was revamped and set to **50000 Crore** by 2028. For this, we can also look for the option of "**Assemble in India**", as recommended by the **Economic Survey 2019-20**, so that like-minded partners can come together to develop defence weapons. In addition to this, there is a need to develop "***defence electronics***" as a subject for graduation programmes to create interest among the youth.

In conclusion, achieving self-reliance in defence is vital for India's strategic autonomy. The government's initiatives, policies, and innovations are paving the way for a robust and self-sufficient defence sector.

Divided: 8 Partitions That Changed the World

Agastya Mittal's book "***Divided: 8 Partitions That Changed the World***" offers a profound examination of eight significant partitions throughout history that have reshaped nations and cultures. This review will delve into the dimensions of each partition discussed in the book, exploring how they occurred and the underlying Western interests that often influenced these divisions.

Overview of the Book:

In "Divided", Mittal presents a detailed narrative of partitions that have not only altered geographical boundaries but also had lasting impacts on the social, political, and economic landscapes of the affected regions. The author meticulously outlines the historical contexts of these partitions, providing readers with a comprehensive understanding of the events leading to these divisions. The book is structured to highlight each partition individually, allowing for an in-depth exploration of their causes and consequences. For convenience, it is set in chronological order here.

The Partition of Africa (1884-1914):

What is Igbo Nationalism?

Igbo nationalism is an **ethnic nationalist ideology** among the Igbo people of southeastern Nigeria that encompasses preserving Igbo culture, developing Igboland, asserting Igbo political interests, and advocating for an independent Igbo state. It emerged during the colonial era as Igbo intellectuals and elites sought to achieve their interests within the struggle for **Nigerian independence**. After Nigeria's independence in 1960, Igbo nationalism intensified due to the perceived exclusion and marginalisation of Igbo politicians from high political offices.

The most significant manifestation of Igbo nationalism was the attempted secession of the eastern region to form the independent **Republic of Biafra** in 1967, leading to the **Nigerian Civil War (1967-1970)**. The war highlighted challenges within **pan-Africanism** during the early stages of African independence from colonial rule, suggesting that the diverse nature of African peoples may present obstacles to achieving common unity. It also sheds light on initial shortcomings within the **Organisation of African Unity**.

The war resulted in the destruction of the eastern region, the death of millions of Biafrans, and the political marginalisation of the Igbo people, as Nigeria has not had another Igbo president since the end of the war. This has led some Igbo people to believe they are being ***unfairly punished for the war***.

The partition of Africa during the late **19th** and early **20th centuries**, often referred to as the "***Scramble for Africa***," involved European powers dividing the continent among themselves without regard for existing ethnic and cultural boundaries. To avoid clashes, the **Berlin Conference** was organised to curb the import of weapons onto African soil and keep the continent away from any kind of European conflict. This partitioning led to the establishing of **arbitrary borders** that have had lasting effects on African nations. For this, the author discusses **Igbo nationalism** and how it affected peace and stability in the entire continent.

Mittal explores how Western powers' interests in **resources** and **strategic territories** drove this partition, resulting in **colonial exploitation** and the **suppression of local cultures.** The author emphasises the long-term consequences of these divisions, including ongoing conflicts and struggles for identity in post-colonial Africa.

To read about the oppression of local culture in detail, you can refer to "***The Cobalt Red: How the Blood of the Congo Powers Our Lives***" by **Siddharth Kara**.

The Partition of Ireland (1921):

From the Irish Home Rule Movement to Destabilisation of the United Kingdom:

The partition of Ireland in 1921 was directly related to the **Irish Home Rule movement**, which had long campaigned for Ireland to have **self-government** while remaining part of the United Kingdom. However, Protestant unionists in **Ulster** opposed **Home Rule**, fearing religious persecution and economic decline under a **Catholic-dominated Irish government**. The partition was designed to create two separate Home Rule territories, with **Northern Ireland** remaining in the UK and the remaining twenty-six counties becoming the **Irish Free State**.

The partition exacerbated tensions between **Irish nationalists** and **unionists**, leading to the **Irish War of Independence** and the **Anglo-Irish Treaty** of **1921**. It also raised questions about the status of **Wales** and **Scotland** within the **UK**, as they, too, had **distinct national identities** and **aspirations**. In **Northern Ireland**, partition entrenched divisions between the Protestant Unionist majority and the Catholic nationalist minority, fueling resentment and leading to the outbreak of the Troubles in the late 1960s.

The legacy of partition continues to shape the political landscape of the United Kingdom. The **Good Friday Agreement** of 1998 sought to address the issues underlying the **Troubles**, but tensions between unionists and nationalists in Northern Ireland remain. The possibility of a united Ireland has been raised again in recent years, particularly in the context of Brexit and its impact on the Irish border.

The partition of Ireland created two distinct entities: Northern Ireland, which remained part of the **United Kingdom**, and the **Irish Free** State. This division was rooted in historical grievances, religious differences, and national identity. The British government's policies and actions played a significant role in shaping the partition, as they sought to maintain control over the predominantly Protestant Northern Ireland while allowing the Catholic-majority south to gain independence.

Mittal explores the long-term effects of this partition, including sectarian violence and political strife, culminating in the **Troubles** of the late 20th century. The author highlights how Western interests in maintaining stability and control in the region influenced the partition process.

The Partition of India (1947):

The partition of India was one of the most significant events in the 20th century, leading to the creation of two independent nations: India and Pakistan. This division was largely driven by religious differences, with Hindus and Muslims being the primary communities involved. The British colonial rule played a pivotal role in exacerbating these divisions, as they employed a strategy of "***divide and rule***" to maintain control over the subcontinent.

The aftermath of the partition was **catastrophic**, resulting in widespread violence, the displacement of millions, and a deep-rooted animosity between the two nations that persists to this day. The author emphasises that the partition was not merely a product of local tensions but was significantly influenced by Western powers, particularly Britain, which had vested interests in maintaining control over the region.

To read about the impact of partition in India in detail, you can refer to "***Freedom at Midnight***" by **Dominique Lapierre** and **Larry Collins**.

The Partition of Palestine (1948):

The establishment of Israel in 1948 marked another critical partition that has had enduring ramifications. The conflict arose from competing national aspirations between Jewish and Arab populations in the region. The Western powers, particularly the United States and Britain, played crucial roles in supporting the establishment of Israel, often sidelining the rights and claims of the Palestinian people.

This partition has led to **ongoing conflicts** and **humanitarian crises** to date (**Israel-Hamas War**), illustrating the complexities of national identity and territorial claims. The author argues that the Western powers' regional interests, including geopolitical strategy and resource access, significantly influenced the partition's outcome.

To read about the **Israel - Palestine conflict**, you can follow our **GS Manthan Session**. YouTube Link: GS Manthan | How GS Travelled This Week | 21st -26th April 2024 Edition (https://www.youtube.com/watch?v=oPLIjoX1Ta8&list=PL76W-gKLBbpJQaYD7GfMEksqHshPZds55s&index=8)

The Partition of Yugoslavia (1990s):

How did the disintegration of Yugoslavia lead to the Bosnian Civil War and further demand for Kosovo?

The dissolution of **Yugoslavia** in the early 1990s, particularly the breakup of **Bosnia** and **Herzegovina**, was a major catalyst for the **Bosnian Civil War** and the subsequent demand for Kosovo's independence. As Yugoslavia disintegrated, nationalist sentiments among the various ethnic groups within Bosnia, including **Bosniaks**, **Croats**, and **Serbs**, intensified. These groups vied for control over territory and political power, leading to a brutal conflict that lasted from 1992 to 1995.

The **Bosnian Serb faction**, led by **Radovan Karadžić**, sought to link the disjointed parts of territories populated by Serbs and areas claimed by Serbs. To achieve this goal, they pursued an agenda of systematic ethnic cleansing, primarily against Bosniaks through massacre and forced removal of populations.

The conflict was characterised by the years-long **Siege of Sarajevo** and the **Srebrenica genocide**, in which over 8,000 Bosniaks were killed by Serb forces in 1995. The Bosnian War resulted in the deaths of over 100,000 people and the displacement of millions, leaving a legacy of ethnic tensions and mistrust.

The aftermath of the Bosnian War set the stage for further demands for independence, particularly in Kosovo, where ethnic Albanians sought to break away from Serbian control. The lessons learned from the violent dissolution of Yugoslavia influenced the Kosovo Liberation Army's push for independence, culminating in the 1999 NATO intervention and Kosovo's eventual declaration of independence from **Serbia** in 2008.

The breakup of Yugoslavia in the 1990s resulted in a series of violent conflicts and the emergence of several independent nations. **Ethnic tensions**, fueled by **historical animosities** and nationalist sentiments, led to brutal wars and atrocities, particularly in **Bosnia** and **Kosovo**.

Mittal examines how the role of Western powers, including **NATO intervention**, shaped the outcomes of these conflicts. The author argues that the partition was not merely a local phenomenon but was significantly influenced by international politics and the interests of Western nations in the **Balkans**.

The Partition of Czechoslovakia (1993):

The peaceful split of Czechoslovakia into the **Czech Republic** and **Slovakia** is often called the "***Velvet Divorce***". This partition was largely driven by national identity and cultural differences between the Czech and Slovak populations. Unlike other partitions marked by violence, this division was negotiated and executed with relative calm.

Mittal discusses how the **dissolution** was influenced by broader **European dynamics** and the **fall of communism**, highlighting the role of Western ideas of **self-determination** and **nationalism**. The author notes that while the split was peaceful, it still reflects the complexities of national identity and the impact of historical grievances.

The Partition of Iraq (2003):

The **Baghdad Pact**, signed in **1955**, was a mutual security agreement among **Iraq**, **Turkey**, **Iran**, **Pakistan**, and **Great Britain**, aimed primarily at **countering Soviet influence** in the Middle East. However, this pact sowed the seeds for the eventual partition of Iraq and contributed to regional instability. The pact was met with resistance from other Arab nations, which viewed it as a threat to Arab unity and a violation of the Arab League's principles. This division created a rift within the region, undermining cooperation among Arab states and fostering an environment of distrust.

Iraq's 1959 withdrawal from the **Baghdad Pact** led the **Baath Party** to establish a dictatorship in Iraq by removing **King Faisal II** in 1958, which marked a significant shift in the country's political landscape. The coup d'état, led by military officers who were members of the Baath Party, was motivated by a desire to **eliminate the monarchy** and introduce a republican regime based on **Arab nationalism** and **socialism**. Following the coup, the Baathists consolidated power by systematically eliminating **political rivals** and **dissenters**, which laid the groundwork for a **totalitarian state under Saddam Hussein**. The party's ideology emphasised Arab unity and anti-imperialism, but in practice, it resulted in a regime characterised by repression, extrajudicial killings, and widespread human rights abuses.

The new Republican regime rejected the pact, leading to a shift in alliances and further destabilising the region. The fallout from the Baghdad Pact and Iraq's subsequent withdrawal contributed to a series of conflicts and power struggles in the Middle East, which had lasting effects on the entire region.

Mittal discusses how Western interests in **controlling oil resources** and establishing a **foothold** in the **Middle East** influenced the partitioning of Iraq. The author highlights the chaos that ensued post-invasion, leading to the rise of extremist groups and ongoing conflict.

The Partition of Sudan (2011):

Sudan's partition into two independent states, Sudan and South Sudan, was the result of decades of civil war and conflict driven by ethnic, religious, and economic disparities. The North, predominantly **Arab** and **Muslim**, and the South, primarily **African** and **Christian**, faced deep-rooted tensions exacerbated by historical injustices and exploitation. This division was further deepened by policies that favoured the North in terms of development and governance, leading to significant disparities in resources and political power.

Self-Interest Governance and Oil is the Product of Partition:

In her analysis of Sudan's partition, **Iris Seri-Hersch** argues that the British approach to governance perpetuated divisions that would later fuel conflict between the two regions.

The subsequent independence of Sudan in 1956 failed to address these underlying tensions. The central government, dominated by northern elites, marginalised the southern population, leading to the **First Sudanese Civil War (1955-1972)** and the **Second Sudanese Civil War (1983-2005)**. These conflicts were characterised by violent repression of southern dissent and a struggle for autonomy, as highlighted by **Alex Cooke**, who notes that the southern Sudanese felt increasingly isolated and oppressed under northern rule. The discovery of oil in southern Sudan further exacerbated tensions as both regions vied for control over these valuable resources.

The author explains how Western powers' involvement, particularly in the context of **oil interests**, contributed to the **eventual partition**. The book details the struggles faced by South Sudan

following its independence, including ongoing conflict and humanitarian crises, underscoring the complexities of partitioning based on ethnic and cultural lines.

Conclusion:

In "***Divided: 8 Partitions That Changed the World***", Agastya Mittal provides a compelling analysis of how partitions have shaped the modern world. Each partition discussed in the book reveals the complex interplay of local dynamics and Western interests, highlighting the often painful legacies of these divisions. Mittal's work serves as a reminder of the importance of understanding history to comprehend the present and future challenges nations worldwide face. Thus, it displays how the "***White Man's Burden***" converted into "***White Man is a Burden***" that affected almost every region globally. Through clear and engaging prose, the author invites readers to reflect on the consequences of these partitions, urging a deeper understanding of the forces that have shaped our world.

THE STUDY *by* MANIKANT SINGH

UPSC CSE EXAM PATTERN

STAGE 1 :

Preliminary Exam

- **Paper I :** General Studies
  - 2 hours
  - 100 Questions
  - 200 Marks
  - 2 Marks each question
  - Minimum marks required - 75.41 (2023)
- **Paper II :** CSAT
  - 2 hours
  - 80 Questions
  - 200 Marks
  - 2.5 Marks each question
  - Minimum marks required - 66.66

STAGE 2 :

Mains Exam | Total 1750 Marks | Cutoff - 741 (2023)

- **Paper A :** Any Indian Language Paper (Qualifying in nature)
  - 3 hours
  - 300 Marks
  - Minimum marks required - 75
- **Paper B :** English Language Paper (Qualifying in nature)
  - 3 hours
  - 300 Marks
  - Minimum marks required - 75
- **Paper I :** Essay Paper
  - 3 hours
  - 250 Marks
  - Minimum marks required-10%
  - Considered for Merit
- **Paper II :** General Studies I
  - History, Geography and Indian Society
  - 3 hours
  - 250 Marks
  - Minimum marks required-10%
  - Considered for Merit
- **Paper III :** General Studies II
  - Governance, Polity, Social Justice and International Relations
  - 3 hours
  - 250 Marks
  - Minimum marks required-10%
  - Considered for Merit
- **Paper IV :** General Studies III
  - Science & Technology, Economic, Development, Environment , Disaster Management and Internal Security
  - 3 hours
  - 250 Marks
  - Minimum marks required-10%
  - Considered for Merit
- **Paper V :** General Studies IV
  - Ethics, Integrity and Aptitude
  - 3 hours
  - 250 Marks
  - Minimum marks required-10%
  - Considered for Merit
- **Paper VI and VII :** Optional Subject
  - Select one optional subject out of 48
  - 3 hours each 250 Marks each
  - Minimum marks required- 10%
  - Considered for Merit

STAGE 3 :

Personal Interview

- **Maximum Marks :** 275 Marks
  - No minimum score is needed

Paradigm Shift In

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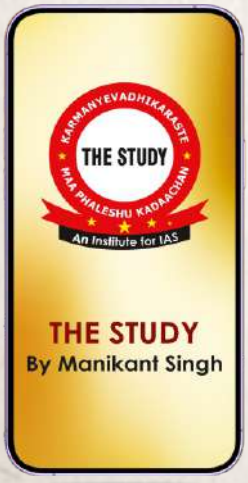

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