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# CURRENT AFFAIRS MAGAZINE

**JUNE 2024**

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Prelim Bits Compilation



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## PRELIM BITS - JUNE 2024

### G.S PAPER I

#### 1. GEOGRAPHY

##### 1.1 Impact of Tonga's Volcanic Eruption

Tonga's volcanic eruption could cause unusual weather for the rest of the decade, new study shows.

- **Tonga's volcanic eruption** – Being an underwater volcano, Hunga Tonga produced little smoke, but a lot of water vapour due to enormous heat converts sea water into steam.
  - About 100–150 million tonnes, or the equivalent of 60,000 Olympic swimming pools.
- **Stratospheric accumulation** – All that water in the form of steam ended up in the stratosphere which produces neither clouds nor rain because it is too dry.
- **Depletes ozone layer** – Water vapour in stratosphere helps in the chemical reactions which destroy the ozone layer.
  - The large ozone hole from August to December 2023 was at least in part due to Hunga Tonga.
- **Positive phase of Southern Annular Mode** – It came during the summer of 2024 which means there is a higher chance of a wet summer in Australia.
- **Lesser contribution to global Warming** – Though it is a very potent greenhouse gas, its impact is only about 0.015 degrees Celsius in the high temperatures that existed in last year.
- **Lasting impacts in weather** – The climate model predicts that
  - **In the northern half of Australia** – Colder and wetter than usual winters up to about 2029.
  - **In North America** – It predicts warmer than usual winters.
  - **In Scandinavia** – It predicts colder than usual winters.

##### Cooling smoke cloud

- Generally, volcanic eruption emit many gases including sulphur dioxide that forms atmospheric clouds.
- The sulphur dioxide transforms into sulphur aerosols which send sunlight back into space before it reaches the surface.
- This shading effect means the surface cools down for a while, until the sulphate falls back down to the surface or gets rained out.

**Stratosphere** is a layer of the atmosphere between about 15 and 40 kilometres above the surface of Earth.

##### 1.2 Tonga Island

- It is also known as "The Friendly Islands".
- **Location** – It is located in the heart of the South Pacific lying east of Fiji, south of Samoa and north of New Zealand.



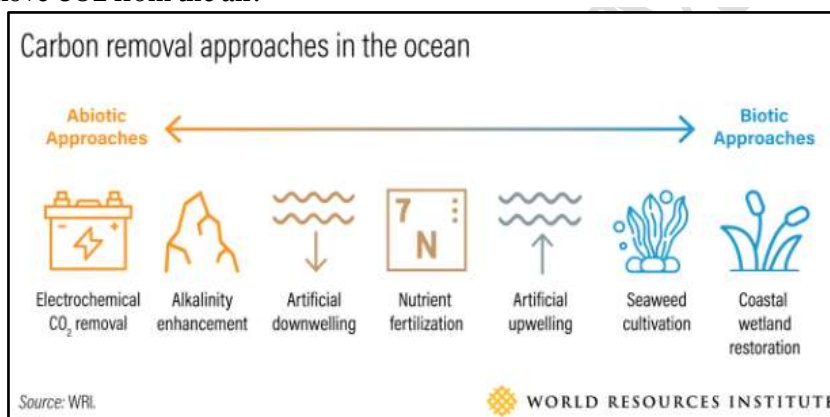
- **Relief** – It consists of 171 coral and volcanic islands spread over 747 sq km with 48 of those inhabited.
- **4 distinctive island groups** – They are Tongatapu, Ha’apai group, Vava’u and Niuatoputapu, all lies directly to the West of the international dateline

### 1.3 Ocean Based Carbon Removal

A new study throws light on the limitations of the current approaches of removing carbon dioxide from the ocean.

- **Carbon sequestration by Ocean** – It has already absorbed 30% of the CO<sub>2</sub> and 90% of excess heat caused by human activities.
- **Approaches** – By enhancing or accelerating natural biological or chemical processes that sequester carbon in the ocean.
- **Abiotic approaches** – They harness the physical or chemical properties of the ocean to remove CO<sub>2</sub> from the air.
  - Alkalinity enhancement, electrochemical CO<sub>2</sub> removal and artificial downwelling
- **Biotic approaches** – They leverage photosynthesizing organisms in seawater to take up CO<sub>2</sub> and store as biomass.
  - Seaweed cultivation, Ocean fertilization, artificial upwelling and coastal wetland restoration.

In total, the ocean holds around 42 times more carbon than the atmosphere.



#### Abiotic Approaches in Marine CO<sub>2</sub> Removal

- **Alkalinity enhancement** – Adding certain minerals to seawater enable more atmospheric CO<sub>2</sub> to dissolve into the ocean.
- **Electrochemical CO<sub>2</sub> removal** – It use electricity to mimic alkalinity enhancement, or directly extract CO<sub>2</sub> from seawater for storage on land.
- **Artificial downwelling** – It accelerates natural currents that carry carbon-rich surface water into the deep ocean in the Arctic and Antarctic.

#### Biotic Approaches in Marine CO<sub>2</sub> Removal

- **Seaweed cultivation** – They are cultivated and then sunk to the deep ocean storing a portion of the carbon-rich biomass.
- **Ocean Fertilization** – Nutrients like iron can be added to the ocean to spur phytoplankton growth.
- **Artificial upwelling** – It is same as ocean fertilization, but does so by moving deeper, nutrient-rich water to the surface.

- **Challenges** – The limited understanding of basic ocean processes is hindering progress in marine CO<sub>2</sub> removal.
- Absorbing excess CO<sub>2</sub> and heat is causing ocean warming, acidification, oxygen loss; changing currents and nutrient cycling; and imperilling plants and animals essential to marine ecosystems.
- They compromise the ocean’s ability to provide food, support livelihoods and insulate us from the worst effects of climate change.

### 1.4 COSIS

Recently, the ITLOS issued an advisory opinion on international climate change litigation requested by the COSIS.

- **COSIS** – Commission of Small Island States on Climate Change and International Law, an international commission that have an international legal personality.
- **Formed by** – The Island nations of Antigua & Barbuda and Tuvalu on the eve of COP26 at Glasgow **in 2021**.

- It entered into force upon signature by two or more states.
- **Aim** – To address the unique challenges faced by small island nations regarding climate change within the framework of international law.
- **Recognition** – It was registered with the United Nations (UN) in accordance with Article 102 of the Charter of the UN.
- **Members** – It is open to any member of the Alliance of Small Island States (AOSIS).
  - Antigua & Barbuda, Tuvalu, Palau, Niue, Vanuatu, St. Lucia, St. Vincent & the Grenadines, and St. Kitts & Nevis.
- **Mandate** – To promote and contribute rules and principles of international law concerning climate change, protection and preservation of the marine environment and their responsibility for injuries arising from internationally wrongful acts in respect of the breach of such obligations.
- **Activities** – It assists Small Island States in promoting its mandate.
- It shall be authorised to request advisory opinions from the ITLOS on any legal question within the scope of 1982 UN Convention on the Law of the Sea (UNCLOS).
- It may appoint experts and advisors as necessary.
- **Recent advisory by ITLOS** – The Parties to UNCLOS have specific obligations to take all necessary measures to prevent, reduce and control marine pollution from anthropogenic greenhouse gas emissions (GHG).

**International Tribunal for the Law of the Sea (ITLOS)** is an independent judicial body established by the 1982 United Nations Convention on the Law of the Sea (UNCLOS).

## 1.5 Ghataprabha River

Recently 9 people who fell into the Ghataprabha River were rescued.

- **About-** It is an important right-bank tributary of the Krishna River that flows in Karnataka.
- **Origin-** It originates in the Western Ghats and flows eastward before its confluence with the Krishna River.
- **River basin-** It is wide and stretches across Maharashtra and Karnataka states.
- **Tributaries-** The Markandeya and Hiranyakeshi rivers are tributaries of the Ghataprabha.
- **Bridges-** The river is crossed by a **suspension bridge** near the Gokak Falls.
- **Dams-** Hidkal Dam also known as Raja Lakhmagouda Dam, is an earthen gravity dam built across the river in Belagavi district.



**Krishna River** is the 2<sup>nd</sup>-largest river in peninsular India which rises in the Western Ghats near Mahabaleshwar in Maharashtra.

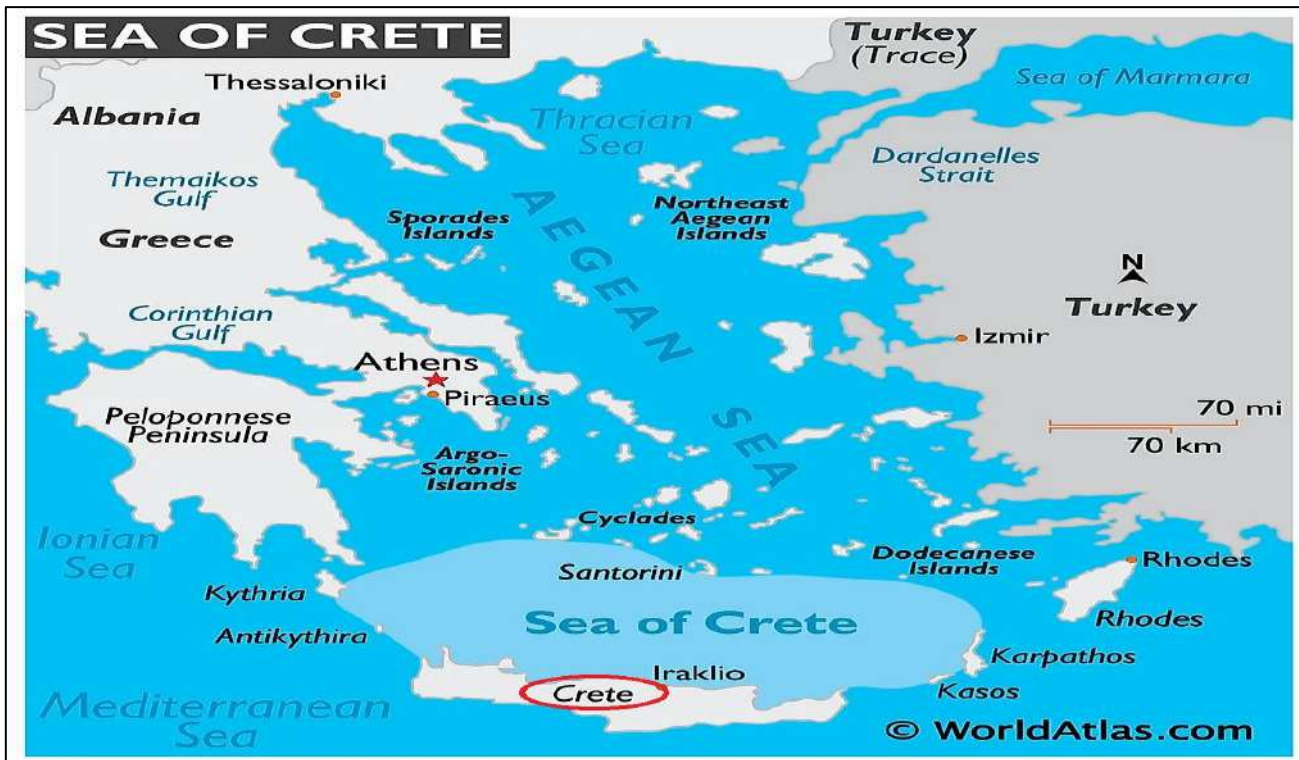
## 1.6 Island of Crete

A 4000-year-old circular monument was discovered during airport excavations on Crete, island.

- **Location-** Crete is the largest and most populous of the Greek islands and 5<sup>th</sup> largest island in Mediterranean Sea, located in the eastern Mediterranean Sea.
- **Bordered by** - It is located in the southern part of the Aegean Sea. It is bordered by the Sea of Crete in the north, the Libyan Sea in the south, the Myrtoan Sea in the west and the Carpathian Sea in the east.
- **Rivers** - Anapodiariis, Almiros, Giofyros, Koiliaris, Ieropotamos, and the Megas Potamos rivers.

**Mediterranean Sea** is an intercontinental sea that stretches from the Atlantic Ocean on the west to Asia on the east and separates Europe from Africa.

- **Lakes** - Lake Agia and Lake Kournas are the two freshwater lakes on the island.
- **Terrain**- The island is characterized by diverse terrain including mountains, gorges, plateaus, and coastline.



### 1.7 Jiribam

*Jiribam has emerged as the newest hotspot of ethnic violence in Manipur.*

To know the history of Insurgency in Manipur [Click Here](#).

- Jiribam district is situated on the **westernmost side of Manipur**.
- It is surrounded on the east and south by the Tamenglong and Churachandpur districts, respectively, and on the west and north by the Cachar district of Assam.
- NH-37 passes through Jiribam, connects Silchar in Assam and Imphal in Manipur, and is important for transporting essentials to the valley areas of the State.
- **Population**—The district has a population of 13 communities, including a large number of Hindu and Muslim Bengalis and Nagas.
- **Ethnic communities** - The Kuki-Zo-Hmar and Meitei are 2 ethnic communities primarily in the state of Manipur.
- **Soil**- It varies from sandy to loam and clay to loam having variety of colours from yellowish to bluish grey.
- **Drainage- Jiri River** flows from the north to the south. Jiri river forms the boundary between **Assam and Manipur** from its source to its termination in the Barak.
- The confluence point of Jiri and Barak Rivers is known as Jirimukh.
- **Flora**- It is covered by green vegetation, include bamboo, cane, teak, orchids, rubber, tea, agar, cashew nut, litchi, jack fruit, betel nut, pineapple, Eiranthus procerus etc.
- **Fauna**- There are various wild lives found in the area including *wild dog, wild pig, barking deer, sabu, moirang sathibi, samarak ngamarak*, etc.



*The Kuki Inpi Manipur is the apex body of the Kuki tribes.*

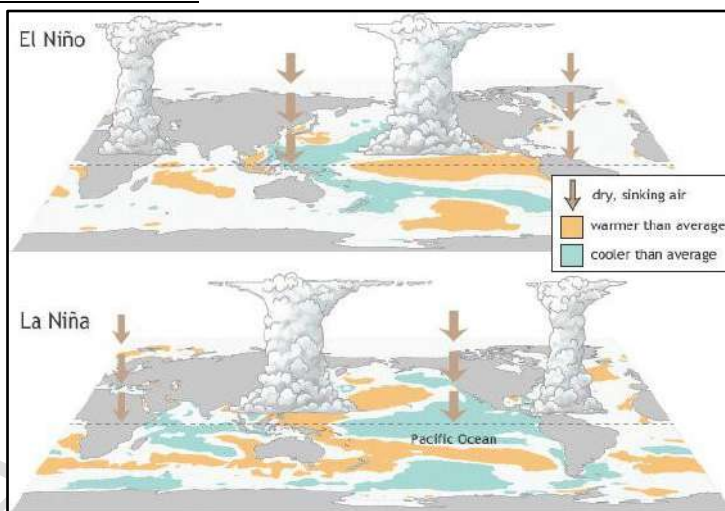
## 1.8 Bayesian Convolutional Neural Network (BCNN)

Recently, Indian National Centre for Ocean Information Services (INCOIS) has created a Bayesian Convolutional Neural Network (BCNN).

- **About-** The BCNN is new product integrates cutting-edge technology to enhance forecasts associated with ENSO phases.
- It is to forecast ***El Nino and La Nina conditions*** up to 15 months ahead.
- The model is particularly adept at predicting El Nino or La Nina events due to its ability to account for the slow oceanic variations and their atmospheric coupling.
- It computes the ***Nino 3.4 Index*** by averaging sea surface temperature anomalies across the central equatorial Pacific, enhancing ENSO phase prediction accuracy.

### ENSO, El Nino and La Nina

- **ENSO-** ENSO, short for El Niño-Southern Oscillation, affects global weather by changing sea temperatures in the ***tropical Pacific Ocean and altering atmospheric circulation.***
- It can alter the global atmospheric circulation, which, in turn, influences weather across the world.
- ENSO occurs in irregular cycles of ***2-7 years and has three different phases – warm (El Niño), cool (La Niña), and neutral.***
- **El Nino-** Warmer than average sea surface temperatures in the central and eastern Pacific.
- **La Nina-** Cooler than average sea surface temperatures in the central and eastern Pacific.
- **Neutral-** Conditions when sea surface temperatures are close to average.



### Indian National Centre for Ocean Information Services (INCOIS)

- It is an autonomous organization established in 1999.
- **Location** – Hyderabad.
- **Nodal agency-** Ministry of Earth Sciences.
- It is a unit of the Earth System Science Organization, New Delhi.
- **Objective-** Its primary mandate is to provide ocean information and advisory services to various stakeholders including government agencies, research institutions, industry, and the public.
- It is being the central repository for marine data in the country, receives large oceanographic data in real time, from a variety of in-situ and remote sensing observing systems.

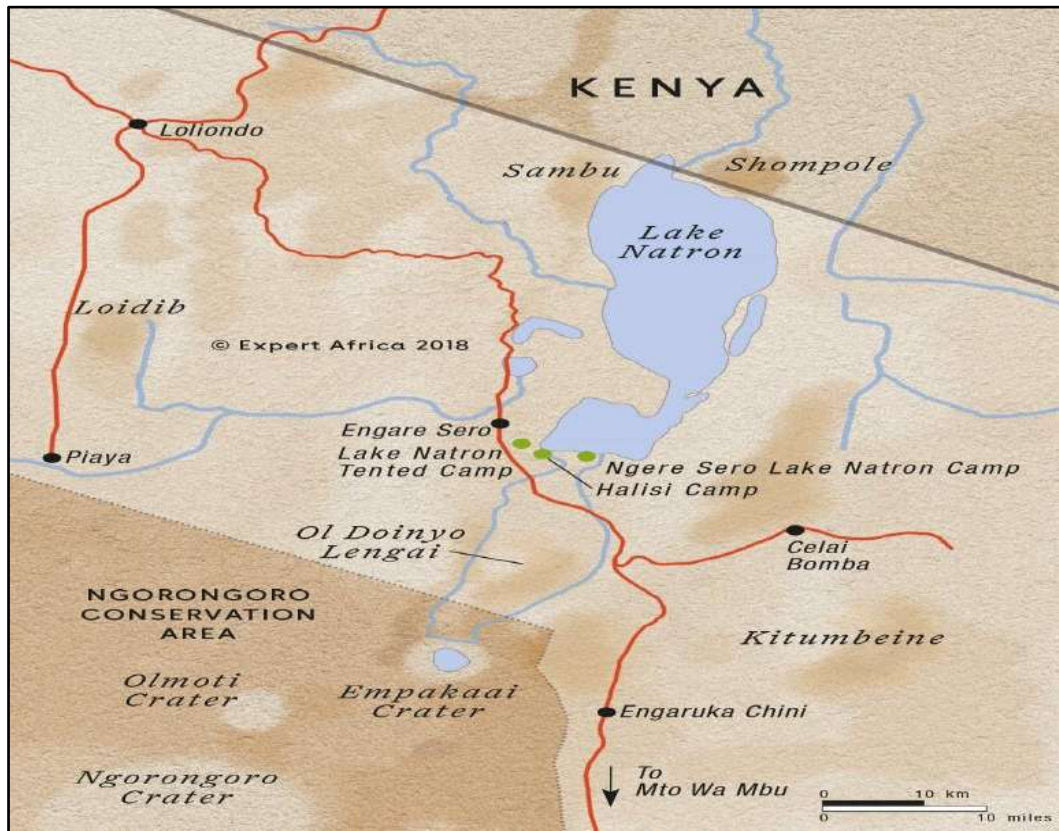
## 1.9 Lake Natron & Flamingos

- Lake Natron is an alkaline or saline lake in ***Arusha Region of Tanzania.***
- It is located in the ***Gregory Rift***, which is part of the East African Rift Valley.
- It is situated on the border of Kenya and Tanzania.
- It is a part of ***Lake Natron Basin***, a Ramsar Site wetland of international significance.
- The Southern Ewaso Ngiro River, which originates from central Kenya is the main source of water supply for the Lake.
- The ***Gelai volcano*** is at the lake's southeastern edge.
- It is one of the most outstanding soda lakes in Africa because of the high PH of water which is always about 12.

A Ramsar site is a wetland site designated to be of international importance under the Ramsar Convention on Wetlands.



- The lake is a regular feeding ground for the majority of the East Africa's lesser flamingos.



### 1.10 Flamingos

- **Common Name** - Greater Flamingo
- **Scientific Name** - *Phoenicopterus roseus*
- **Appearance** - Flamingos are famous for their bright pink feathers, stilt-like legs, and S-shaped neck.
- Their pink color comes from a carotenoid pigment present in the algae and crustaceans they eat.
- **Diet** - shrimp, snails, and plantlike water organisms called algae
- Flamingos build nests that look like mounds of mud along waterways.
- **Habitat** - It is usually found in shallow, saline, alkaline wetlands, such as salt lakes, coastal lagoons, intertidal mudflats, and saltworks during the breeding season.
- **Distribution** – It inhabits Africa, the Middle East, southern Europe, and the Indian subcontinent.
- Greater flamingos produce a loud goose-like honking call, 'ka-haunk'.
- Greater flamingo is the **state bird of the Gujarat.**



### 1.11 Great Nicobar Island

Recently, the Congress party demanded an immediate suspension of all clearances granted to NITI Aayog's mega project on Great Nicobar Island.

- Great Nicobar Island is the largest and southernmost island in the **Nicobar Islands archipelago**, located in the Bay of Bengal.
- **Headquarters** – Campbell bay.
- **Vegetation** - It is a hilly island mostly covered in tropical rainforest, with mangroves and Pandan forests along the coast.
- The island's main hill range runs from north to south, and its highest peak is Mount Thullier.
- **Rainfall** - Great Nicobar also receives an annual rainfall of around 3,500 mm.

- **Rivers** - Galathea, Alexandra and Dagmar are the major rivers.
- **Species** - It is known for its diverse wildlife, including many endangered and endemic species, such as the
  - Giant leatherback turtle,
  - Nicobar megapode, and
  - Nicobar crab-eating macaque.
- **UNESCO Listing** - Great Nicobar Biosphere Reserve is designated as part of the **UNESCO World Network of Biosphere Reserves (WNBR)** in 2013.
- **Indigenous communities** - The Shompen and the Nicobarese.



## G.S PAPER II

### 2. POLITY

#### 2.1 National Testing Agency

The Supreme Court is scheduled to address three petitions regarding the controversy surrounding the NEET-UG 2024 medical entrance test.

- **About**- It is a premier, specialist, autonomous and self-sustained testing organization.
- **Aim** - To conduct entrance examinations for admission/fellowship in **higher educational institutions**.
- **Established in** – 2017, as a Society registered under the **Indian Societies Registration Act, of 1860**.
- **Core values** - NTA will create a system which will promote teaching (by teachers), learning (by students) and assessment (by parents and institutions).
- **Objectives** - To conduct efficient, transparent and international standards tests in order to assess the competency of candidates for admission, and recruitment purposes.
- To undertake research on educational, professional and testing systems to identify gaps in the knowledge systems and take steps for bridging them.
- To identify experts and institutions in setting examination questions.
- To produce and disseminate information and research on education and professional development standards.
- **Functions** - To create a question bank for all subjects using the modern techniques.
- To establish a strong R&D culture as well as a pool of experts in different aspects of testing.
- To help individual colleges and universities in the field of testing and to provide training and advisory services to the institutions in India.
- To undertake any other examination that is entrusted to it by the Ministries/Departments of Government of India/State Governments.

**NEET-UG- Examination conducted for admissions to MBBS, BDS, and AYUSH.**

#### 2.2 Renaming of sites in Uttarakhand

The Centre approved the Uttarakhand government's proposal for renaming the Joshimath and Kosiyakutoli.

- **New name-**
  - Joshimath tehsil to Jyotirmath in Chamoli district
  - Kosiyakutoli tehsil to Pargana Shri Kainchi Dham in Nainital district

- **Objective-** To enhance the ***religious and cultural significance*** of these areas, in a state that is already a major destination for religious tourism.
- **Approved by-** The Union Ministry of Science and Technology with No Objection Certificate.
- **Constitutional provision- Article 3** of the Indian Constitution deals with the formation of new States and alteration of areas, boundaries or names of existing States.
- **Joshimath tehsil-** The name “Jyotirmath” comes from the divine light of knowledge he is said to have attained, with ‘jyoti’ meaning divine light.
- Jyotirmath is one of the 4 cardinal mathas (monasteries) that 8<sup>th</sup>-century philosopher **Adi Shankaracharya** is believed to have established across India to promote the Advaita Vedanta philosophy.
- The Jyotirmath was established for the preservation and dissemination of spiritual knowledge and practices.
- **Kosiyakutoli tehsil-** Kosiyakutoli came to be known for its association with Neem Karoli Baba and the Kainchi Dham Ashram he founded in 1962.
- In the name “Kosiyakutoli”, **“Kosi” refers to the river** of the same name which flows through the Nainital district and is important for the Kumaon region of Uttarakhand.

### 2.3 Pro-tem Speaker of Lok Sabha

A senior Congress member is expected to be appointed as the pro-tem Speaker for the first session of the 18<sup>th</sup> Lok Sabha.

- **About** - A pro-tem Speaker is ordinarily elected for the ***first sitting of a new legislative assembly*** where the Speaker is yet to be elected.
- **Origin of the term-** Pro-tem is a Latin phrase which means “for the time being”.
- **Enshrined in** - The Constitution does not mention the post, but the official '*Handbook on the Working of Ministry of Parliamentary Affairs*' details the 'Appointment and Swearing in of Speaker pro tem'.
- **Tenure-** The Pro tem Speaker is a ***temporary speaker*** appointed for a limited period of time.
- **Oath-**The ***president administers*** the oath of the office for the pro-tem speaker.
- Normally, 3 other elected members of the Lok Sabha are also appointed by the President for the MPs to take oath before them.
- They are administered the oath by the Speaker pro-tem in the Lok Sabha.
- **Duties-** Under **Article 188(1)**, it appears that a pro-tem Speaker only has the power to administer the oath to Assembly Members
  - The Pro-tem Speaker presides over the first sitting of the Lok Sabha, administers the oath of office to the newly elected MPs.
  - To conduct the vote for the speaker and deputy speaker.
  - On the election of new Speaker, the office of the pro tem speaker ceases to exist.
  - He also administers the floor test.
- **Article 93** - Lok Sabha shall choose 2 members of the House to be the **Speaker** and Deputy Speaker. The Speaker is the Presiding Officer of Lok Sabha.
- The Speaker and deputy speaker of the Lok Sabha is decided by a ***simple majority*** (more than 50% of members present and voting).
- **Article 94** - Speaker of the House of the People remain in office until just before the first meeting of the newly elected House following a dissolution.
- **Article 99** - Every member of either House of Parliament shall, before taking his seat, make and subscribe before the President according to the form set out for the purpose in the 3<sup>rd</sup> Schedule.

### 2.4 Dodol

The Goa government has formally applied for a Geographical Indication (GI) tag for Dodol.

- **About-** It is a pudding-like, classic Goan sweet that is often called a cousin of Bebinca, the ***Queen of Goan desserts.***

- **History-** The scholars believe a traditional version of the sweet is served at royal banquets in the Medang Kingdom of Indonesia between the 8<sup>th</sup> and 11<sup>th</sup> centuries.
- In Goa, it is believed that the sweet was introduced during Portuguese rule in the coastal state during the 17<sup>th</sup> century.
- The dish is dark brownish in colour often served during Christmas celebrations.
- **Ingredients-** Rice flour, coconut milk, and black palm jaggery.
- **Distribution-** Dodol and its variations are also popular in southern India, Sri Lanka, Indonesia, Thailand, Malaysia, and parts of Southeast Asia.



### Geographical Indication (GI) Tag

- GI tag is a form of certification that recognizes unique products based on their origin.
- It is defined under Article-23 and 24 of the Trade-Related Aspects of Intellectual Property Rights (TRIPS) Agreement of the World Trade Organization (WTO).
- GI tagged products can be natural or man-made.
- The raw materials for such products do not necessarily have to come from that region, unless it is an agricultural tag.
- The essential difference between GI and other intellectual properties (IP) is that, GI is a collective Intellectual Property Right.
- India is a member of WTO and enacted the Geographical Indications of Goods (Registration & Protection) Act, 1999 that came into force from 2003.

## 2.5 Leader of Opposition

Rae Bareli MP Rahul Gandhi is appointed as the Leader of Opposition in Lok Sabha recently.

- **Statutory post** - It is a statutory post officially described in the Salary and Allowances of Leaders of Opposition in Parliament Act, 1977. It is not mentioned in the constitution.
- **Qualification**
  - The leader of the numerically biggest party in opposition to the government and recognized as such by the speaker/chairman.
  - To be qualified as a Leader of Opposition, a party must have at least 10% of MPs in the House.
- The option of not recognizing him/ her by speaker is just not available.
- **Functions** - The main duty of the Leader of Opposition is to serve as the voice of the opposition in the House.
- **Power of Appointment** - Leader of Opposition is the opposition's representative in the high-powered committees headed by the Prime Minister for appointment to key posts like
  - Director of CBI,
  - The Central Vigilance Commissioner and Chief Information Commissioner,
  - The Chairperson and Members of the National Human Rights Commission, and
  - The Lokpal.
- **Order of precedence** - Leaders of Opposition in Lok Sabha and Rajya Sabha is in order of precedence along with
  - Union cabinet ministers,
  - The national security advisor,
  - The principal secretary to the PM,
  - The vice-chairperson of the NITI aayog,
  - Former PMs, and
  - Chief Ministers.

- He will be a member of several Joint Parliamentary Committees, the committees of Public Accounts, Public Undertakings, Estimates, and many more.
- He will also have a say in the appointment of bureaucrats to key posts.

## 2.6 National Investigation Agency (NIA)

Recently, the National Investigation Agency announced reward for information on Canada-based terrorist Goldy Brar.

- It is the Central counter terrorism **law enforcement agency** in India.
- **Established on** – 2008.
- **Head Quarters** – New Delhi.
- **Branch offices**- Hyderabad, Guwahati, Mumbai, Lucknow, Kochi, Kolkata, Jammu and Raipur.
- It is constituted under the **National Investigation Agency Act** in response to the 2008 Mumbai terror attacks.
- It is empowered to deal with the investigation of terror related crimes across states without special permission from the states under written proclamation from the **Ministry of Home Affairs**.
- **Functions**
  - Setting national standards for counter-terrorism and other national security investigations
  - Developing a highly trained workforce that works in partnerships
  - Deterring existing and potential terrorist groups and individuals
- It deals with offenses under acts that implement international treaties, agreements, conventions, and resolutions of the United Nations (UN), its agencies, and other international organizations.
- The NIA also works with state governments to designate Special Courts, which have precedence over other courts when trying NIA cases.

## 2.7 Sangyaan App

Director General of RPF launches Sangyaan App recently.

- It is a Comprehensive application for anyone seeking to stay informed about the latest legal developments in India.
- **Developed by** - The Tech Team of Railway Protection Force.
- **Aim** - It aims to educate and empower RPF Personnel by providing comprehensive information to understand the provisions of both new and old criminal laws.
- It also aims to provide in-depth information on 3 new Criminal Acts
  - The Bharatiya Nyaya Sanhita (BNS) 2023,
  - The Bharatiya Nagarik Suraksha Sanhita (BNSS) 2023, and
  - The Bharatiya Sakshya Adhinyam (BSA) 2023.
- **Key Features**
  - Comprehensive Legal Access
  - Comparison of Laws
  - Section wise analysis
  - Advanced Search Tools
  - Inclusive Legal Database
  - User-Friendly Design

## 2.8 ULLAS Understanding of Lifelong Learning for All in Society (Nav Bharat Saaksharta Karyakram)

The Lieutenant Governor of Ladakh recently declared that Ladakh has achieved Full Functional Literacy under the ULLAS—Nav Bharat Saaksharta Karyakram.

- It is also known as New India Literacy Programme (NILP).
- **Agency** - It is a **centrally sponsored scheme** implemented from 2022-2027.
- **Umbrella policy** - The scheme aligns with the recommendations of the **National Education Policy (NEP) 2020**.
- **Aim** – The initiative fosters a learning ecosystem that reaches every individual, bridging the gaps in basic literacy and critical life skills.
- **Targeted Group** - The scheme will cover non-literates of the age group of **15 years** and above in **all state/UTs** in the country.
- **Components of the scheme**
  - Foundational Literacy and Numeracy,
  - Critical Life Skills,
  - Basic Education,
  - Vocational Skills, and
  - Continuing Education.
- **Implemented by** - The scheme is implemented through volunteerism through online mode.
- All material and resources shall be provided digitally for easy access to registered volunteers through easily accessible digital modes through ULLAS Mobile App.

### 3. GOVERNMENT INTERVENTIONS & SCHEMES

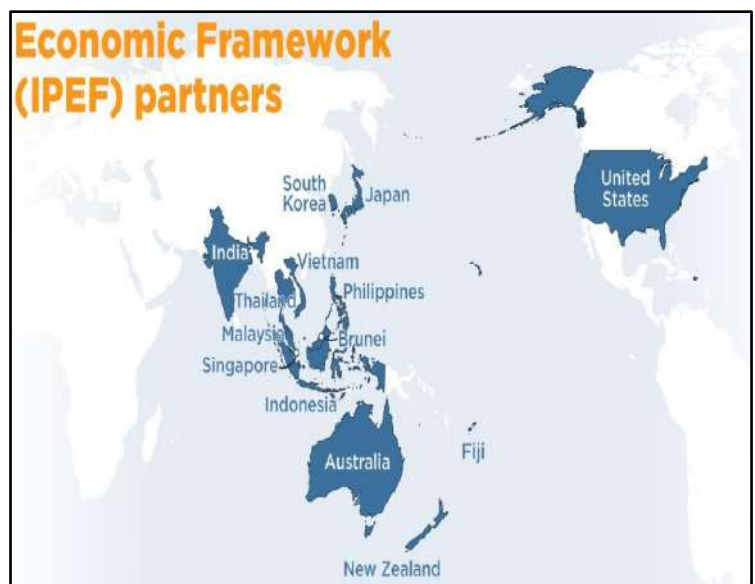
#### 3.1 National Health Claim Exchange

The Health Ministry and the Insurance Regulatory and Development Authority of India (IRDAI) are jointly launching the National Health Claim Exchange (NHCE).

- **Objective-** NHCE will be a digital platform bringing together *insurance companies, healthcare providers, and government insurance* scheme administrators.
- It will facilitate the exchange of *claims-related information* among healthcare and insurance stakeholders.
- **Aim-** The exchange will serve as a *gateway for exchanging claims-related information* among various stakeholders in the healthcare and health insurance ecosystem.
  - It also aimed at allowing patients *to access quality healthcare swiftly and with reduced out-of-pocket expenditure*.

Health insurance contributes to around 29% of total general insurance premium income in India.

- **Implementation-** The insurance industry will support this system by streamlining interactions between hospitals and insurers, creating a *seamless, paperless, and secure contractual framework*.
- **Agency involved-** **Life insurance corporation (LIC)** to play a key role in achieving 'Insurance for All by 2047'
- **Claims processing-** It aims to improve efficiency and transparency in *health claims processing, benefiting policyholders and patients*.
- Insurance authorities have mandated that all *cashless claims must be processed within three hours* of receiving discharge authorization from the hospital.
- **In-patient cases-** In India, hospitalization cases are highest among individuals insured through private purchase (54.4 per 1,00,000 persons).



- **Urban area**-The government-funded scheme beneficiaries have the highest inpatient care cases (60.4 cases per 1,00,000 persons).
- **Rural areas**-The private insurance show substantially higher in-patient cases (73.5 cases per 1,00,000 persons).
- **Challenges**- Improving *hospital-insurance company relationships*.
  - Addressing the issue of *discharge delays, miscommunication between hospitals and insurers*.
  - Trust among policyholders relies on efficient service delivery.
- **Digital Health Incentive Scheme**- To *promote digital health transactions and patient record digitization*, the National Health Authority launched the Digital Health Incentive Scheme (DHIS) in January 2023.

## 4. INTERNATIONAL RELATIONS

### 4.1 Colombo Process

Recently, India has assumed the chair of the regional grouping Colombo Process for **2024-26**.

- **About** – It is a Regional Consultative Process of migrant worker origin countries from South and South East Asia.
- **Objectives** – To provide a forum for Asian countries of origin of temporary contractual workers
  - To share experiences, lessons learned and best practices on overseas contractual employment.
  - To discuss and propose practical solutions for overseas workers particularly the most vulnerable ones.
  - To optimize benefits from organized overseas employment, and enhance dialogue with countries of destination.
  - To review and monitor the implementation of ministerial recommendations and identify further steps for action.
- **12 Members** – China, Cambodia, India, Indonesia, Afghanistan, Bangladesh, Nepal, Pakistan, the Philippines, Sri Lanka, Thailand, and Vietnam.
- **Technical support and secretariat by** – The International Organization for Migration (IOM).
- **Administration** – They are coordinated through the permanent Missions of Member States at the UN in Geneva.
- Governed by – Ministerial Consultations (representation from member states).
- The decision-making is by consensus but it is not binding on the members.
- **3 themes** – Protection of and provision of services to temporary overseas contractual workers.
- Optimizing benefits of organized labour mobility.
- Capacity building, data collection and inter-state cooperation.

India has become chair of regional grouping Colombo Process for the first time since its inception in 2003.

The **International Organization for Migration (IOM)**, established in 1951 is a United Nations organization working in the field of migration.

### 4.2 Indo-Pacific Economic Framework for Prosperity (IPEF)

India participates in the IPEF Ministerial meeting in Singapore in 2024.

- **Launched in** – **2022** at Tokyo, Japan,
- **Aim** – To advance resilience, sustainability, inclusiveness, economic growth, fairness, and competitiveness for the member economies.
- It will provide tangible benefits that fuel economic activity and investment, promote sustainable and inclusive economic growth, and benefit workers and consumers across the region.

- **Member – 14 countries** including Australia, Brunei, Fiji, *India*, Indonesia, Japan, Republic of Korea, Malaysia, New Zealand, Philippines, Singapore, Thailand, USA and Vietnam (Taiwan is not part of it).
- **4 Pillars**
  - **Pillar I** - Trade
  - **Pillar II** - Supply Chain Resilience
  - **Pillar III** - Clean Economy
  - **Pillar IV** - Fair Economy
- **India** – It had *joined Pillars II to IV*, while it has maintained an *observer status in Pillar-I*.
- **IPEF Catalytic Capital Fund** – The founding supporters were Australia, Japan, Korea, and the United States.
- **2024 Ministerial Statement** – It declared substantial conclusion of *negotiations for Clean Economy, Fair Economy*, and the overarching Agreement on the IPEF for Prosperity.
- Pursuant to this, the IPEF partners completed legal review of the text for these agreements and domestic approval processes.
- These agreements will enter into force after *at least 5 IPEF partners* complete their internal legal procedures for ratification, acceptance or approval.
- *India did not formally sign* these agreements as domestic approval processes are still underway.
- **Significance** – The bloc represents *40% of global GDP* and 28% of global goods and services trade.
- The agreements planned under IPEF are 1st-of-their-kind approaches **to address 21st century challenges**.

#### 4.3 Bangladesh-India Friendship Bridge

The long-awaited Bangladesh-India friendship bridge, Maitri Setu to get operational by September.

- **About** - The Maitri Setu is inaugurated between **India and Bangladesh** in March 2021.
- **River-** The bridge 'Maitri Setu' has been built over the **Feni River**, flows between the Indian boundary in **Tripura State and Bangladesh**.
- **Length-** The bridge spans over 1.9 kilometres joining Sabroom (in Tripura) with Ramgarh in Bangladesh.
- **Type-** It is a road bridge, allowing both passenger and cargo vehicles to cross.
- **Construction-** The bridge was constructed by the **National Highways and Infrastructure Development Corporation Ltd (NHIDCL)**.
- **Significance-** It is a significant infrastructure project, particularly in the context of India's diplomatic and strategic relations.
- The bridge serves as a crucial link between India and Bangladesh, *enhancing connectivity and trade relations* between the two countries.

#### 4.4 Five Principles of Peaceful Coexistence

China is celebrating the 70<sup>th</sup> anniversary of the Five Principles of Peaceful Coexistence, first propounded in the Sino-Indian Agreement of 1954.

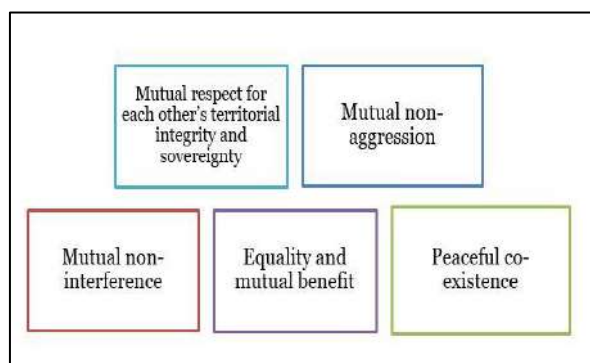
- China calls the Five Principles is known in India as **Panchsheel agreement**.
- The word Panchsheel traces its origin to the Buddhist concept of Pancasila.
  - **5 moral vows of Buddhism** - Abstinence from murder, theft, sexual misconduct, lying, and intoxicants.

#### Panchsheel - The Five Principles

- The Panchsheel Agreement, formally known as The Agreement on Trade and Intercourse with Tibet Region is signed between **India and China**.
- **Signed on** - April 29, 1954.



- The agreement aimed to enhance trade and cooperation between the 2 countries, establishing each country's trade centres in major cities of the other, and laid out a framework for trade.
- The agreement also listed important religious pilgrimages, provisions for pilgrims, and acceptable routes and passes available to them.
- Importantly, India for the **1<sup>st</sup> time recognized Tibet** as the Tibet Region of China.
- **Badung Conference** - In 1955, the Five Principles would feature prominently at the first African-Asian Conference in Bandung, Indonesia.
- 29 countries of Asia and Africa took part in the Bandung Conference and signed a 10-point declaration that co-opted the Five Principles or Panchsheel.
- The Bandung Conference is the precursor to the **Non-Aligned Movement**.



*The Non-Aligned Movement is a forum of 120 countries that are not formally aligned with or against any major power bloc.*

## 5. INTERNATIONAL ORGANISATIONS

### 5.1 OPEC+

The Organization of the Petroleum Exporting Countries (OPEC) and its allies have decided to extend its current oil output cuts.

#### OPEC

- It is the 'Organisation of the Petroleum Exporting Countries'
- **Established in** – 1960
- **Headquarters** – Vienna
- **Membership** – 12 members, as of January, 2024
  - 5 founding members – Iran, Iraq, Kuwait, Saudi Arabia and Venezuela
  - 7 others – Libya, UAE, Algeria, Nigeria, Gabon, Equatorial Guinea, and Congo.
- Indonesia, Angola and Qatar were former members.
- Thus, it have members from Middle East, Latin America and Africa.

- **OPEC+** – It was based on the agreement between OPEC nations and non-OPEC major oil producing nations in **2016**.
- **Membership** – OPEC members + 11 allied major oil-producing countries.
- **11 allied nations** – Russia, Mexico, Kazakhstan, Oman, Azerbaijan, Malaysia, Bahrain, South Sudan, Brunei and Sudan.
- **Objectives** – To coordinate and unify the petroleum policies of its Member Countries and ensure the stabilisation of oil markets.
- To secure an efficient, economic and regular supply of petroleum to consumers, a steady income to producers and a fair return on capital for those investing in the petroleum industry.
- **Rationale for cutting down production** – A faltering global economy would reduce the oil demand, and the cuts are seen as a way to protect profits.

*Seven Sisters' refers to a group of integrated international oil companies that dominated the global oil markets from the mid-1940s to the mid-1970s.*

## 5.2 UNESCO State of Ocean Report 2024

UNESCO's State of Ocean report released recently on World Oceans Day highlights key knowledge gaps in research & data on spiking oceanic warming.

- **Initiated by** - The report is initiated by the Intergovernmental Oceanographic Commission (IOC-UNESCO).
- It supports for UN Decade of Ocean Science for Sustainable Development Outcomes.

United States, Saudi Arabia and Russia are the top 3 major oil producing countries in the world. While Saudi Arabia is an OPEC member, Russia has OPEC+ membership.

### Recent findings of the report

- Critical issues in **ocean climate regulation**, emphasizing the need for better understanding and data to address ocean crises and validate new carbon dioxide removal technologies.
- **Greenhouse gas emissions**- The increased greenhouse gas emissions from human activities have increased the uptake of the Earth's energy imbalance (EEI) by oceans.
- **Energy and Heat Imbalance**- Oceans absorb about **90% of the Earth's energy imbalance**, leading to increased heat content in the upper 2,000 meters.
- This inhibits ocean mixing, causing deoxygenation, which harms marine ecosystems and coastal communities relying on oceans.
- **Coastal Blue Carbon Habitats**- There's growing interest in restoring coastal blue carbon habitats like mangroves, seagrasses, and tidal marshes to enhance carbon sequestration.
- **Marine Carbon Dioxide Removal (mCDR)**- A rising interest in marine Carbon Dioxide Removal (mCDR) technologies since 2020, supported by scientific research, start-up initiatives, and substantial funding from the U.S. and EU.
- **Ocean Warming trend**- From 1960 to 2023, the upper 2,000 meters of oceans warmed at a rate of  $32 \pm 0.03 \text{ W/m}^2$ , accelerating to  $0.66 \pm 0.10 \text{ W/m}^2$  in the past two decades.
- This trend is expected to persist, leading to irreversible changes over centennial to millennial timescales.
- **Ocean Acidification**- Coastal waters can turn acidic due to natural processes, such as freshwater influx, biological activity, temperature change and climate patterns like El Nino/Southern Oscillation (ENSO).
- Human activities like nutrient input from agricultural and industrial activities also influence the chemistry of coastal areas.
- **Sea Level Rise** - From 1993 to 2023, the global mean sea level rose at a rate of  $4 \pm 0.3 \text{ mm/year}$ .
- **Data and Research**- The report highlights a pressing need for comprehensive and regular data to monitor ocean warming and its impacts, essential for maintaining healthy and resilient oceans.

EEI is the balance between incoming energy from the Sun and outgoing energy from the Earth.

## 5.3 International Hydrographic Organisation (IHO)

The International Hydrographic Organisation (IHO) celebrates the World Hydrography Day recently.

- **It is an Intergovernmental technical consultative organisation established under the Convention on the IHO.**
- **Aim** - It ensures that all the world's seas, oceans and navigable waters are surveyed and charted.
- **Headquarters** – Monaco, Europe.
- **Established in**- 1921.
- **Objective**
  - To ensure the accuracy and uniformity of hydrographic charts and publications worldwide.
  - It coordinates the activities of national hydrographic offices and promotes uniformity in nautical charts and documents.

Hydrography is the science that measures and describes the physical features of the navigable portion of the Earth's surface and adjoining coastal areas.

- It adopts the reliable and efficient methods of carrying out and exploiting hydrographic surveys
- The development of the sciences in the field of hydrography and the techniques employed in descriptive oceanography.
- **Members-** It has **100 member states** as of 2024, including both coastal and landlocked nations.
- **India** is a member of the International Hydrographic Organization (IHO) since 1955.
- The member states collaborate to standardize nautical charts, publications, and hydrographic surveys.

### World Hydrography Day

- It is celebrated every year on **21<sup>st</sup> of June** every year.
- **Aim-** To raise awareness about hydrography and how it plays a vital role in improved knowledge of the seas and oceans.
- **Theme, 2024-** Hydrographic Information - Enhancing Safety, Efficiency and Sustainability in Marine Activities.

## 5.4 UN Global Principles for Information Integrity

The United Nations Secretary-General Antonio Guterres recently unveiled the Global Principles for Information Integrity.

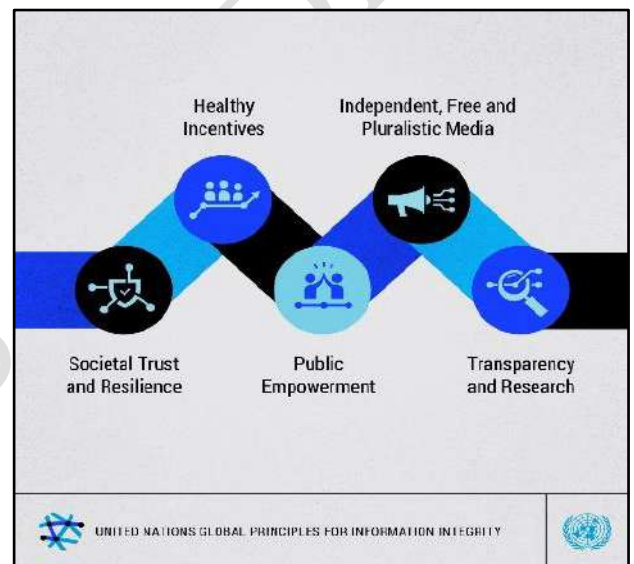
- It is a comprehensive framework aimed at addressing the escalating threats posed by misinformation, disinformation, and hate speech in the digital realm.
- It is developed through extensive consultations with Member States, the private sector, youth leaders, media, academia, and civil society.
- The principles aim to create healthier and safer information environments that uphold human rights and promote peaceful societies and a sustainable future.

### 5 Principles

- Societal trust and resilience,
- Healthy incentives,
- Public empowerment,
- Independent, free and pluralistic media,
- Transparency and research.

### Key recommendations

- **Combating disinformation and hate speech** - All stakeholders, including governments, tech companies, advertisers, and media, should avoid using, supporting, or amplifying disinformation and hate speech for any purpose.
- **Promoting media freedom** - Governments should ensure timely access to information, maintain a free, viable, independent, and plural media landscape.
- It should provide strong protections for journalists, researchers, and civil society.
- **Enhancing Tech Company responsibilities** - Technology companies should incorporate safety and privacy by design in all products, apply policies consistently across countries and languages.
- Additionally, they should prioritise crisis response and support information integrity during elections.
- **Ethical AI development** - AI developers must take immediate measures to ensure AI applications are designed, and used ethically and safely, upholding human rights.
- **Reforming business models** - Tech companies should explore business models that do not rely on programmatic advertising and prioritise human rights, privacy, and safety.
- Users should have greater control over their online experiences and personal data.
- **Transparency in advertising** - Advertisers should demand transparency in digital advertising processes.



- **Data transparency and accountability** - Tech companies and AI developers should ensure meaningful transparency, allow researchers and academics access to data while respecting user privacy.
- **Protecting children** - Special measures should be taken to protect and empower children, with governments providing resources for parents, guardians, and educators.

## G.S PAPER III

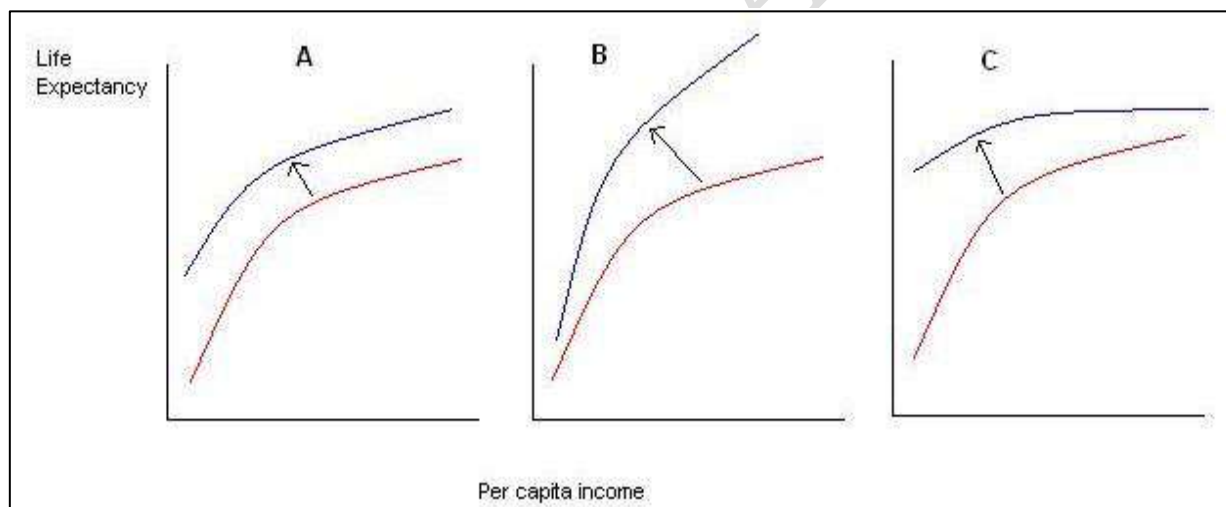
### 6. ECONOMY

#### 6.1 Preston curve

Research experts observe that people in richer countries generally live longer than those in poorer countries.

- **Preston curve** – It refers to a certain empirical ***relationship between life expectancy and per capita income*** in a country.
- **Proposed by** – ***Samuel H. Preston*** in 1975.
- **Demonstrations** – Higher life expectancy in wealthier countries is due to better access to education, healthcare, cleaner surroundings, better nutrition etc.
- When a poor country begins to grow, its ***per capita income rises*** and causes a significant ***increase in life expectancy*** initially as people are able to consume sufficient nutrients, enjoy better healthcare etc.

In India, the average per capita income rose from around Rs.9,000 per year in 1947 to around Rs.55,000 per year in 2011. Meanwhile, the average life expectancy also rose from a mere 32 years to over 66 years.



- **Shift in Preston curve** – An increase in the per capita income of a country does ***not cause much of a rise*** in the life expectancy of its population ***beyond a point***, perhaps because human life span cannot be increased indefinitely.
- **Problems in the Curve** – Higher life expectancy has been achieved by countries even at low per capita income levels due to ***improvements in medical technology***, such as the development of life-saving vaccines.
- Thus, improvement in life expectancy can hold true as a result of ***public investment in human development*** like better education & healthcare.
- **Significance** – Other development indicators such as infant and maternal mortality, education, healthcare, etc. also improve when the per capita income of a country rises.

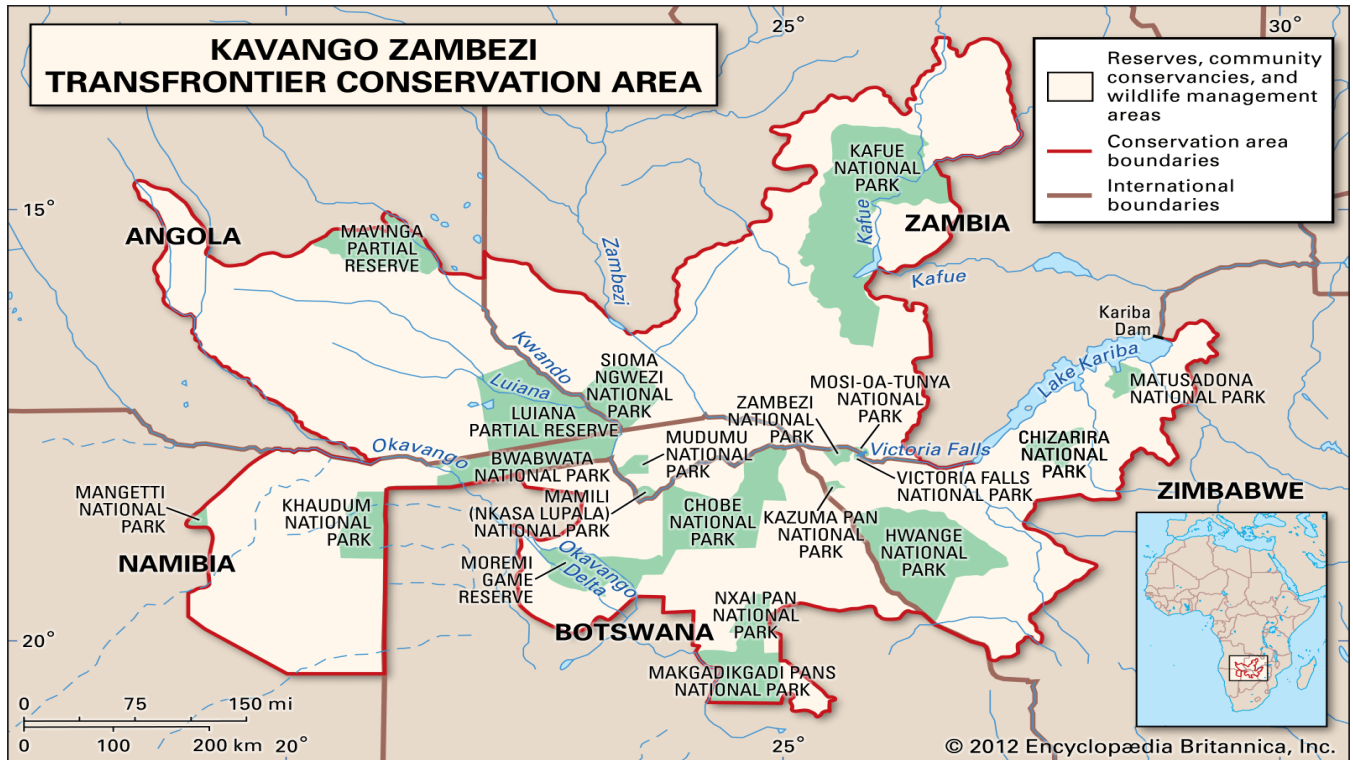
The rapid economic growth of India and China over the last few decades, which has helped improve life expectancy and other development indicators, has been cited as an example of faster economic growth leading to better development outcomes.

### 7. ENVIRONMENT

## 7.1 Kavango-Zambezi Trans-Frontier Conservation Area (KAZA-TFCA)

Delegates to the ongoing KAZA 2024 Heads of State Summit in Livingstone, Zambia renew calls to leave Convention on International Trade in Endangered Species of Wild Fauna and Flora (or CITES).

- **KAZA-TFCA** – It is a 520,000-square kilometre wildlife sanctuary straddling 5 southern African nations that share common borders along the Okavango and Zambezi river basins.
- **5 Countries** – Angola, Botswana, Namibia, Zambia and Zimbabwe.



- **Inaugurated in** – 2012.
- **Aim** – To facilitate cooperation between countries and remove physical impediments to wildlife that traverses their boundaries.
- **Conservation areas** – It includes 36 proclaimed protected areas such as national parks, game reserves, forest reserves, community conservancies and game/wildlife management areas.
- **Ecological diversity** – Salt pans and arid grassland, woodland and scrubland, seasonal wetlands and permanent marshes, among other biomes, are all found within its borders.
- **Biodiversity** – Those areas support some 3,000 species of plants and are home to more than two-thirds of the African elephant population of about 450,000.
- **Important sites**
  - Victoria Falls, a World Heritage site.
  - The Okavango delta, the largest site covered by the 1971 Ramsar Convention on Wetlands.
- **Issue with CITES** – CITES has repeatedly denied them permission to sell off their abundant ivory and other wildlife products.

Transfrontier conservation areas (TFCAs) are called as **peace parks**.

**CITES**, an international agreement between government's aims to ensure that international trade in specimens of wild animals and plants does not threaten the survival of the species. In 2022, the European Parliament called for a total ban on the import of trophies derived from species listed as endangered under CITES.

## 7.2 Hoollongapar Gibbon Sanctuary

Railways to build canopy bridges across track in Assam gibbon habitat.

- It is an isolated protected area of **evergreen forest**.

- **Located in** – Jorhat district of **Assam, India**.
- **Development** – It was officially established & renamed in 1997.
- It was renamed in 2004, formerly known as the Gibbon Wildlife Sanctuary or Hollongapar Reserve Forest.
- In the early 1900s, artificial regeneration was used to develop well-stocked forest, resulting in the site's rich biodiversity.
- **Canopy**
  - **Upper canopy** – It is dominated by the Hollong tree
  - **Middle canopy** – Nahar or Indian Rose Chestnut (State Tree of Mizoram)
  - **Lower canopy** – It consists of evergreen shrubs and herbs.
- **Important species**
  - **The hoolock gibbons** – It is India's only gibbons.
  - **The Bengal slow loris** – It is Northeastern India's only nocturnal primate.
- **Threat** – A 1.65-km-long Mariani-Dibrugarh railway track divides sanctuary into 2 halves which has disturbed the arboreal nature of the ape, putting it at risk while crossing the track.
- **Conservation measures** – The Northeast Frontier Railway (NFR) has plans to construct **canopy bridges** for gibbons to move across a railway track.
- **Canopy bridges** – They are designed by the WII in consultation with NFR, to facilitate easy movement of the arboreal species.
- **Safety nets** will be installed below the main twin-rope bridge to save the species accidentally falling off the bridges.

Hoolock gibbon
<ul style="list-style-type: none"> <li>• It is one of the <u>20 species of apes</u> on earth.</li> <li>• It is known for its vocalisation, spends much of its time on the upper canopy of tall trees called as Hoolongapar.</li> </ul>
Hoollongapar
<ul style="list-style-type: none"> <li>• <b>Scientific Name</b> - <u>Dipterocarpus macrocarpus</u></li> <li>• It rises about 12 to 30 m and having straight trunks.</li> <li>• Other species found in the top canopy include Sam, Amari, Sopas, Bhelu, Udal and Hingori.</li> </ul>

*Indian gibbon is only apes found in India. Hoollongapar Gibbon Sanctuary is the only sanctuary in India named after a gibbon due to its distinction for containing the densest gibbon populations in Assam.*

### 7.3 World Environment Day

The 2024 World Environment Day was hosted in the West Asia region, marking the 2<sup>nd</sup> time in more than 50 years.

- It is the largest global platform for environmental public outreach and is celebrated by millions of people across the world.
- **Celebrated on** – June 5<sup>th</sup>, annually.
- **Started in** – 1973.
- **Led by** – The United Nations Environment Programme (UNEP).
- **World Environment Day 2024** – It is hosted by Saudi Arabia.
- **Focus on** – Land restoration, desertification, and drought resilience.
- Land restoration is a key pillar of the UN Decade on Ecosystem Restoration (2021-2030).
- **Aim** – To support accelerated progress on global commitments, which include protecting 30% of

**Generation Restoration project (2023-25)** of UNEP, aims to address selected political, technical, financial challenges to promote restoration at scale, particularly in urban areas.

**UNEP** is the leading global voice on the environment. It inspires, informs and enable nations and peoples to improve their quality of life without compromising that of future generations.

While countries have promised to restore 1 billion hectares of land by 2030, current trends suggest 1.5 billion hectares would need to be restored to meet the 2030 land degradation neutrality goals

land and sea for nature and restoring 30% of the planet's degraded ecosystems.

- **Activities** – 6 new cities stretching from Africa to Latin America joined UNEP's Generation Restoration Cities, an initiative for catalysing a nature-based transformation in finance, jobs and cities.

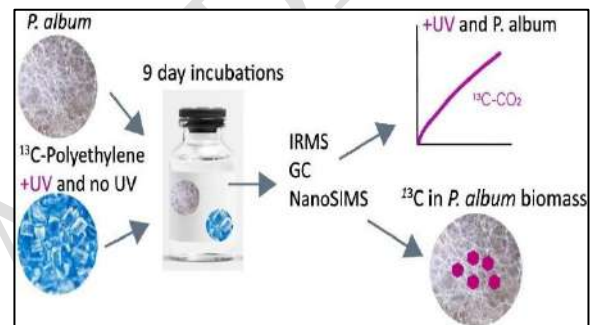
### Environmental concerns

- **Current concerns** – Up to 40% of the world's land is already degraded, directly affecting 50% of humanity.
- An estimated 3.2 billion people worldwide are negatively impacted by desertification.
- By 2050, more than three-quarters of the world's population is expected to be affected by droughts.
- **Future challenges** – Exposure to air pollution is projected to increase by 50% within the next decade.
- Plastic waste entering aquatic ecosystems will nearly triple by 2040.

### 7.4 Parengyodontium Album

A study identifies fungus that breaks down ocean plastic.

- **Taxonomy** – It is a marine fungus.
- **Growing Conditions** – It lives together with other marine microbes in thin layers on plastic litter in the ocean.
- **Degrade plastics** - It is capable of mineralizing UV-treated polyethylene (PE) into CO<sub>2</sub> and this PE-derived carbon is converted into fungal biomass that serves as its energy.
- It uses UV radiations from the sunlight to initiate the photo degradation of PE.
- **Significance** – It will join the list of plastic-degrading marine fungi, which hitherto were only 4 species.
- Both bacteria and fungi are known to degrade plastic.



*Polyethylene is the most abundant of all plastics that have ended up in the ocean.*

### 7.5 Fungus

- **Taxonomy** – They are under the Kingdom Fungi.
- **Species** – It includes the yeasts, rusts, smuts, mildews, molds, and mushrooms.
  - Slime molds and oomycetes (water molds), that do not belong to kingdom Fungi but are often called fungi.
- **Habitat** – Many are free-living in soil or water while others form parasitic or symbiotic relationships with plants or animals.
- **Features** – They are eukaryotic organisms, whose cells contain membrane-bound organelles with a clearly defined nuclei.
- **Decomposers** – They decompose the living matter around them and then feed on it.
- The canopy rope bridges will be installed in such a way that lianas and creepers can be guided along them to make it look as natural as possible.

### 7.6 Conservation Breeding Programme (CBP)

Recently, the Indira Gandhi Zoological Park (IGZP) has emerged at the forefront of wildlife conservation efforts in India.

- **CBP** – A science of conserving a species by preventing imminent population collapse in the wild due to a large number of eliminative pressures.
  - **For instance:** Habitat loss, habitat fragmentation, industrialization, poaching, illegal trade, climate change etc.

- **Aim** – To conserve the genetic diversity of the species and restock or reintroduce the species to re-establish self-sustaining population in its natural wild habitat.
- **Joint initiative of** – In-situ and ex-situ wildlife managers.
- The Chief Wild Life Wardens and protected area managers were asked to identify the species which need immediate intervention.
- **Role of Zoo** – To conserving a species through ex-situ CBP.
- **Zoo species** – They should be used for display, used as insurance for the use in future to complement and supplement the in-situ population when the species got extinct from wild.
- They can be used as education tools for the public to spread the awareness for the conservation of these endangered species.
- **Facilities** – It can be either an off displays Conservation Breeding centre (if appropriate land is available in the Zoo compound) or in the form of satellite facility will be created only in one (coordinating Zoo) to two Zoos of the region.

**Ex-situ' conservation** is that the individuals of species are maintained in off exhibit under different selection pressure that those in natural conditions in a natural habitat till they are release in wild.



## 7.7 Conservation Breeding Programme in IGZP

- **IGZP** – Indira Gandhi Zoological Park
- **Located in** – Visakhapatnam.
- It is recognized by the Central Zoo Authority (CZA) for CBP.
- **Conservation of Striped hyenas** – It is one of the 3 hyena species in the world which are threatened by habitat loss, human-wildlife conflict, poaching, and illegal wildlife trade.
  - **IUCN Red list** – Near threatened
  - **Wildlife Protection Act, 1972:** Schedule I
- It involves protection, education and awareness programmes.
- They also established a protocol of hand rearing of hyena cubs before being released back into the enclosure.
- **Conservation of Asiatic wild dogs** – Once widespread across southern & eastern Asia, now scattered in localised areas of India and Thailand.
  - **Threats** – Habitat loss, declining prey base and disease.
  - **IUCN status** – Endangered
  - **Wildlife Protection Act, 1972** - Schedule II
  - **CITES** - Appendix II
- **Soft release** – A pack will be released in an invisible cage spread over a large area and after a behavioural study of the pack, it will be slowly released in the wild.
- **Significance** – It has given fillip to IGZP's animal-exchange programme with other zoos in India.
- **Other conserved species in IGZP** – Indian grey wolf, ring-tailed lemur, Indian bison, blue and gold macaw, jungle cat and eclectus parrot.

IGZP is also the only zoo in India that is responsible for creating off-display conservation breeding centres (CBCs).

## 7.8 Impacts of Herbicide-Tolerant Rice



The Indian Council of Agricultural Research (ICAR's) herbicide-tolerant rice is not farmer-friendly and is a threat to national food security.

- **Herbicide-tolerant crops** – They are the crops which have the inherent ability to survive and reproduce after herbicide application that would kill a normal population of the same species.
- **Need** – Weeds are a major biological constraint in rice production, causing losses ranging from 30-100 per cent.
  - **Herbicides** – They are chemicals substances used to control undesired plants, also known as weeds.
- **Issue** – ICAR has commercialised herbicide-tolerant (Ht) basmati rice varieties and also promoted direct application of herbicide 'Imazethapyr' in direct seeded rice (DSR).
- **Impacts** – Ht rice will not favour the genetic diversity of Indian rice as it will monopolise in favour of specific varieties of seed.
- It will raise the cultivation costs.
- It may also lead to more herbicide-resistant weeds in the future, endangering rice production.
- **Eco-friendly weeding method** – Advancing the date of sowing to May 15-June 10 and hand weeding at 20 and 40 days after DSR sowing is more effective for weed control and higher seed yield.

**Imazethapyr** only kills certain types of broadleaf weeds (BLW). Globally, the herbicides is recommended for soybean and pulse crops, but not for rice crops due to the different weed flora.

**Direct Seeded Rice (DSR)**

- It is a modern agricultural technique where rice seeds are sown directly into the field without the need for transplanting seedlings.
- **Advantages** – It saves about 40% of groundwater irrigation and cultivation costs, with savings in energy consumption (electricity, diesel, manpower, etc) without any loss of seed yield compared to water-guzzling transplanted rice.

**7.9 4-Horned Antelope**

A rare four-horned antelope has been sighted for the 1<sup>st</sup> time in Veerangana Durgavati Tiger Reserve.

- **Scientific name-** Tetracerus quadricornis.
- **Family-** Bovidae.
- It is also called as also called chousingha, one of the **smallest Asian bovids**.
- It is diurnal (active mainly during the day) and typically solitary by nature.
- **Distribution** - It is endemic to India and Nepal, only bovid with four horns (only males have horns).
- It ranges from the foothills of the Himalayas in the north to the Deccan Plateau in the south.
- **Habitat-** It is found primarily in open, dry, deciduous forests of hilly areas in India.
- **Apperance-** They are yellowish-tan, reddish or goldenrod coat in colour with thin legs and a short tail.
- **Diet-** Feeds on grasses, herbs, shrubs, foliage, flowers and fruits.
- It is also found in the Nilgiri Biosphere Reserve and are confined to the Indian subcontinent.
- **Conservation status**
- **IUCN Red List-** Vulnerable
- **Wildlife Protection Act of 1972-** Schedule I
- **CITES-** Appendix III



**Veerangana Durgavati Tiger Reserve**

- It is the **7<sup>th</sup> tiger reserve** in **Madhya Pradesh** which was earlier known as Nauradehi Sanctuary.
- A green corridor linking Panna Tiger Reserve (PTR) with Durgavati will be developed for the natural movement of the tiger to the new reserve.
- **Vegetation-** Dry deciduous type.
- **Rivers-** Parts of the reserve fall under the Narmada and Yamuna River basins.
- **Flora-** Teak, Saja, Ber, Amla, Dhaora, etc.
- **Fauna-** Nilgai, Chinkara, Chital, Sambhar, Black Buck, Barking deer, Tiger, leopard, wolf, jackal, Indian fox, striped hyena, etc.

### 7.10 Greater Adjutant Stork

The Greater Adjutant Stork, locally known as 'Garuda', is now limited to Assam, India.

- **Scientific Name-** Leptoptilos dubius
- **Family-** Ciconiidae.
- It is locally called '**Hargila**' in the **Brahmaputra Valley** in Assam, which harbours more than 80% of the global population of the species.
- **Habitat-** It is now restricted to a much smaller range with only 3 breeding populations, 1 in Cambodia and 2 in India (Assam and Bihar).
- **Appearance** – This large stork has a massive wedge-shaped bill, a bare head and a distinctive neck pouch.
- **Diet-** Carnivorous, mostly feeding on fish, frogs, snakes and other reptiles.
- **Scavenging hunter-** A Greater Adjutant Stork arrives to feed on a garbage dumping site near Deepor Beel wildlife sanctuary in Guwahati.
- **Protection Status**
  - **IUCN Red List-**Endangered
  - **Wildlife (Protection) Act 1972-** Schedule IV
- **Green Oscars-** Assam's renowned environmentalist Purnima Devi Barman has won the prestigious Whitley Awards, also known as the Green Oscars, for her efforts in conserving greater adjutant storks in association with Aaranyak.



### Deepor Beel Wildlife Sanctuary

- The Deepor Beel Wildlife Sanctuary is a perennial freshwater lake on the outskirts of Guwahati, Assam.
- The state's only Ramsar site (declared in 2002), also the only central storm-water storage basin for Guwahati.

### 7.11 Nagarhole Tiger Reserve

Recently, Ashwatthama, a Dasara elephant, died due to alleged electrocution in Karnataka.

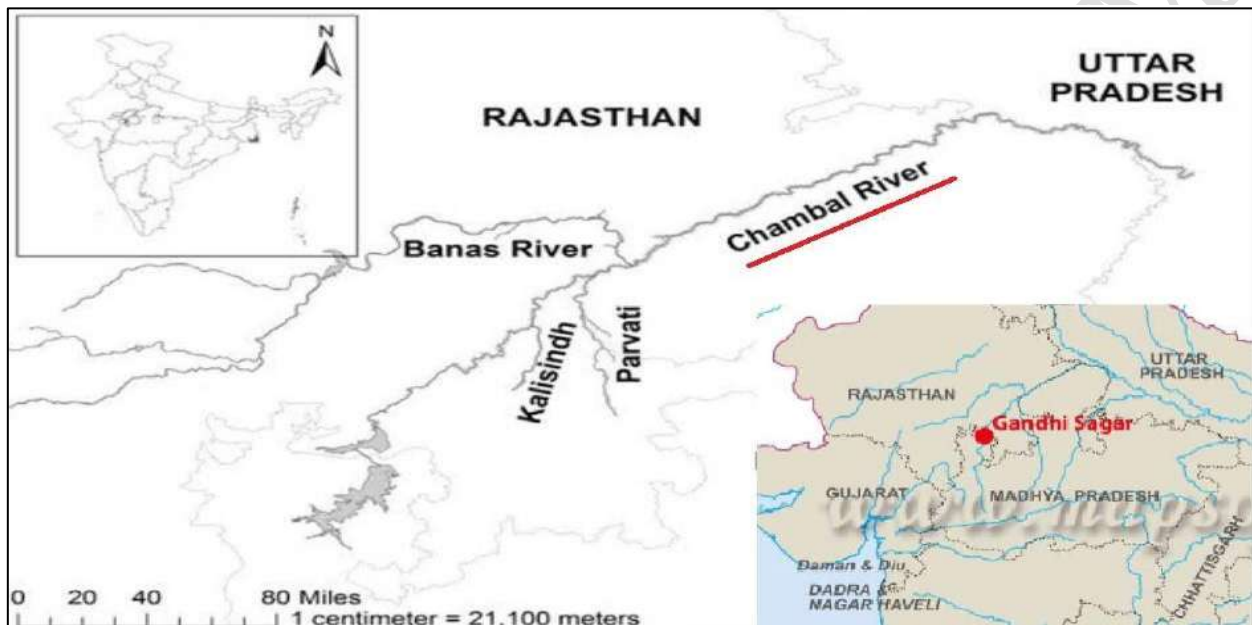
- **Location** - Nagarhole is an important Tiger Reserve in **Karnataka**, supporting the highest number of wild tigers in India and single largest Asiatic elephant population in the world.
- It is previously known as **Rajiv Gandhi National Park**.
- Nagarhole is contiguous with Wayanad wildlife sanctuary (Kerala) to the south and Bandipur Tiger Reserve to its south eastern parts.
- **Established in** – It is established as a wildlife sanctuary in 1955 and was upgraded into a national park in 1988.
- **Reservoirs** - The Kabini and Taraka reservoirs are large waterbodies in the park.
- **River Kabini** separates the Nagarhole & Bandipur tiger reserve.
- **Tiger population-** Nagarhole is acclaimed as one of the high-density tiger populations in the country after Corbett & Kaziranga tiger reserves respectively.
- It is part of **Nilgiri Biosphere Reserve**, one of the oldest and largest conservation areas in the world.
- It was declared as the **37th Tiger reserve** under Project Tiger in 1999.
- **Flora** - The forests are interspersed with Marshy Swamps called 'Hadlu', characterised by open grassy lands with scattered presence of stunted specimens.
- **Fauna** – Leopard, Asiatic Wild Dog, Sloth Bear, Asiatic Elephant Gaur, Sambar, Chital, Muntjac, Four Horned Antelope, Wild Pig Mouse Deer and South-western langur.

### 7.12 Gandhi Sagar Wildlife Sanctuary

The Gandhi Sagar Wildlife Sanctuary is set to become the 2<sup>nd</sup> home for cheetahs in India, after the Kuno National Park.

- Gandhi Sagar wildlife sanctuary is a sanctuary spread over the Gandhi Sagar dam backwater.
- It was notified in 1974 and added to the list of sanctuary in 1984.
- **Location** - The sanctuary is spread across the districts of Mandsaur and Neemuch in **Western Madhya Pradesh**.
- This region is known a Nimar region which touches its border with **Rajasthan**.
- **Physiography**- It sits atop a **flat rocky plateau**, with the **Chambal River** cutting the sanctuary into two almost equal halves.

The Chambal River is a tributary of the Yamuna River, Chambal rises in the Vindhya Range, Madhya Pradesh and thus forms part of the greater Gangetic drainage system.



- **Forest type**- It has **Savanna ecosystem** (dry deciduous trees and shrubs) due to shallow topsoil.
- **Flora**- It has trees like Salai, Kardhai, Dhawda, Tendu, Palash etc.
- **Fauna**- It is known for some rare wildlife species like **Wild Dogs (Dholes), Chinkara, Leopard, Otter, Mugger crocodile**.
- **Project Cheetah** - To establish a viable cheetah (flagship species) metapopulation in India and provides space for the expansion of the cheetah within its historical range.

Chaturbhuj Nala rock shelters is situated within this sanctuary.

### 7.13 Burp Tax

Recently, New Zealand government announced scrapping the 'burp tax'.

- **Aim**- It aims to **curtail methane emissions from ruminant species** they are hooved grazing or browsing herbivores that chew cud.
- **Introduced**- October 2022.
- **Reason for introduction of Burp Tax**- Ruminant animals release **methane** mainly through burping.
- Animals like **cows, sheep, goats, and buffaloes** produce methane during food digestion in their rumen.
- **Protest of farmers** - Farmers protested against the tax, claiming it would greatly affect their livelihoods.

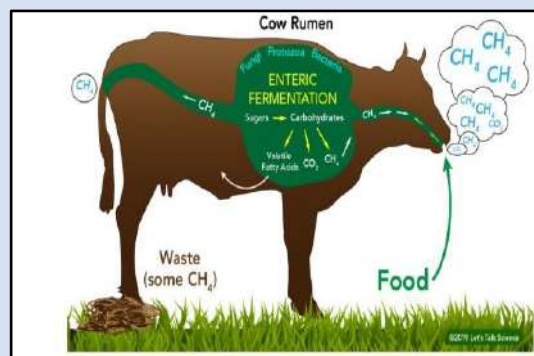
Burp tax is a scheme to tax greenhouse gas emissions from livestock. Livestock is the source of nearly half of New Zealand's greenhouse gas emissions. New Zealand has around 10 million cattle and 25 million sheep.

Methane is a potent greenhouse gas responsible for 30% of warming since preindustrial times, second only to carbon dioxide.

- The farmers argued that the scheme coupled with other agriculture emission regulations would severely impact their livelihood.

### Digestive System of Ruminants

- Ruminants such as cows, sheep, goats, and buffaloes have a special type of digestive system that allows them to break down and digest food that non-ruminant species would be unable to digest.
- Stomachs of ruminant animals have four compartments, one of which, the rumen, helps them to store partially digested food and let it ferment.
- This partially digested and fermented food is regurgitated by the animals who chew through it again and finish the digestive process.



### 7.14 Strategic Interventions for Green Hydrogen Transition (SIGHT) Programme

The Union government has increased the Fertilizer Sector's allocation under the SIGHT Programme.

- **Aim** - To support the domestic manufacturing of electrolyzers and the production of Green Hydrogen.
- **Umbrella Mission** - It is a sub component under the **National Green Hydrogen Mission**.
- It caters the need of the fertilizer sector.
- **Nodal Ministry**- Ministry of New & Renewable Energy (MNRE).
- **Implementing agency**- The Solar Energy Corporation of India (SECI)
- **Financial incentive**- SIGHT Programme consists of 2 distinct financial incentive mechanisms.
  - Incentive for manufacturing of electrolyzers
  - Incentive for production of green hydrogen.

### National Green Hydrogen Mission

- **About**- It aims to accelerate the deployment of Green Hydrogen as a clean energy source, will support the development of supply chains that can efficiently transport and distribute hydrogen.
- **Launched in** - January 2023.
- **Target**- To achieve production capacity of **5 million tonnes per annum of Green Hydrogen** in the country by the year 2030.
- **Significance**- The Mission will drive major decarbonization of the economy, decrease reliance on fossil fuel imports, and position India as a leader in Green Hydrogen technology and markets.

### 7.15 Bio-bitumen

India plans to start large-scale production of bio-bitumen production from biomass or agricultural waste to reduce imports of the material used for asphaltting of roads.

- Bio-bitumen is known as biologically sourced bitumen that is derived from **renewable biological sources** rather than from fossil fuels.
- It is made using non-petroleum-based renewable resources and can be made from vegetable oils, synthetic polymers, or both, making it a more sustainable model long term.
- **Properties**- It typically retains the desirable characteristics of conventional bitumen, such as durability, waterproofing ability, and adhesion.

Bitumen is produced through the distillation of crude oil and also occurs naturally.

- **Advantages** - Bio-bitumen has a potential to reduce greenhouse gas emissions and dependency on fossil fuels, offering a more sustainable alternative in construction and infrastructure projects.
- It doesn't contain any toxic chemicals, so it is safer for workers and the environment.
- **Applications**- It can be used in similar applications as traditional bitumen, including asphalt paving for roads and as a binding agent in roofing materials and waterproof coatings.

### 7.16 Rhisotope Project

South African scientists injected radioactive material into live rhinoceros horns to curb poaching

- **Aim** - This project aims to insert measured quantities of radioisotopes into the horns of live rhinos.
- It is to reduce the demand and save rhinos from the very real threat of extinction in South Africa.
- It is founded in 2021 by **Prof. James Larkin and Suzanne Boswell**.
- Radioactively treated horns are more likely to be detected at international borders, making it more likely that smuggling syndicates are exposed, prosecuted and convicted.



South Africa is home to the largest population of rhinos in the world, including the world's largest population of white rhinos and about half of the African continent's black rhinos.

#### African Rhinos

Species	White Rhino	Black Rhino
<b>Scientific Name</b>	Ceratotherium simum	Diceros bicornis
<b>Habitat</b>	Long and short grass savanna areas in grasslands	Semi-Desert Savannah, Woodlands, Forests, Wetlands
<b>Size</b>	2 <sup>nd</sup> -largest land mammal	It is smaller compared to white ones.
<b>IUCN Status</b>	Near Threatened	Critically Endangered
<b>Distribution</b>	South Africa, Zimbabwe, Namibia and Kenya	South Africa, Zimbabwe, Namibia and Kenya

## SPECIES IN NEWS

### 7.17 Spot-bellied Eagle Owl

Pench Tiger Reserve reports first photographic record of forest eagle owl.

- **Scientific Name** - Bubo Nipalensis.
- **About** - It is a large, bold, nocturnal species of owl known for their distinctive spots on their belly. It is also known as **forest eagle owl**.
- **Habitat** – It is found in dense evergreen and moist deciduous forest usually near water, mostly observed in Arjun and Banyan trees.
- **Distribution**
  - **In world** – Bhutan, Cambodia, China, India, Laos, Myanmar, Nepal, Sri Lanka, Thailand, and Vietnam.
  - **In India** – Foothills of Uttarakhand to North-eastern India, Gujarat, Western and Eastern Ghats.

**Calls** – Their call is a low, deep **double hoot** lasting 2 seconds. They make calls to communicate across long distances, territorial defence, and attracting mates.

These birds have also been reported from Madhya Pradesh and Kanha Tiger Reserve.

- **Prey** - It is an **apex predator**, feeding on a variety of prey including large birds, rodents, small mammals, reptiles, and insects. It occasionally hunt on day.
- **Conservation Status**
  - IUCN – Least concern
  - CITES – Appendix II
  - WPA – Schedule IV

### Pench Tiger Reserve

- Pench Tiger Reserve is located in satpura hills of **Madhya Pradesh**.
- It is the **19<sup>th</sup> Tiger Reserve** of the country, comprises of the Indira Priyadarshini Pench National Park, the Pench Mowgli Sanctuary.
- It derives its name from the River Pench which splitting the Park into two, while forming the boundary of Seoni and Chhindwara districts.
- The **Meghdoot dam** built across **Pench River**.

### 7.18 *Thismia malayana*

Researchers recently discovered that a new plant species, *Thismia malayana* steals nutrients from underground fungi.

- **About** – It is a new plant species steals nutrients from underground fungi, typically found hidden in leaf litter and growing near tree roots or old rotten logs.
- **Group** – Mycoheterotrophs.
- **Habitat** - Discovered in the tropical rainforests of Peninsular Malaysia.
- **Nutrition**- Carbon resources from the fungi on their roots.
- **Interconnectedness**- Malayana underscores the complex interconnectedness within ecosystems.
- **Adaptation- Symbiotic relationship** between colonizing fungi and a plant's roots, typically benefiting both parties. Symbiotic relationship is an ongoing interaction between organisms of different species. The interaction usually benefits at least one of the organisms and can benefit both.
- **Proliferation**- It thrives in the **low-light conditions** of dense forest understories, with its specialized flowers *pollinated by fungus gnats and other small insects*.
- **Conservation status**
  - IUCN Red List- Vulnerable

*Mycoheterotrophs do not perform photosynthesis, instead they act as a parasite, stealing carbon resources from the fungi on their roots.*

### 7.19 *Musankwa sanyatiensis*

Recently, Scientists have discovered a new dinosaur species, named *Musankwa sanyatiensis* from fossils.

- **About** - It is a newly discovered dinosaur species found from fossils on the shoreline of **Lake Kariba in Zimbabwe**.
- **Genus**- Musankwa.
- **Group** – Sauropodomorpha, a group of bipedal, long-necked dinosaurs that were widespread during the Late Triassic.
- **Dietary habits**- Herbivores.



### Recent Findings

- **Triassic period**- The rocks yielding this new specimen date back to the Late Triassic period, approximately **210 million years ago**.
- **Finding significance** - It is the **1<sup>st</sup> dinosaur** to be named from the Mid-Zambezi Basin of northern Zimbabwe in over 50 years and the **4<sup>th</sup> dinosaur species** named from Zimbabwe.

*Sauropodomorpha is a group of bipedal, long-necked dinosaurs that were widespread during the Late Triassic.*

- **Evolution representation-** Remains of a single hind leg, including its thigh, shin, and ankle bones.

### Lake Kariba

- Lake Kariba is located on the Zambezi River in southern Africa, on the border of Zambia and Zimbabwe.
- It is the world's largest artificial lake and reservoir by volume.
- It witnessed the establishment of hydroelectric facilities through the Kariba Dam after 1960.



### 7.20 Antlions

Recently, researchers have discovered two species of antlions namely *Pseudofornicaleo nubecula*, *Creoleon cinnamomeus*, for the first time.

#### Antlions

- **Family-** Myrmeleontidae
- **Order-** Neuroptera
- **Antlions** are commonly known for their pit-building (funnel-shaped) habit to trap their prey.
- **Distribution-** Antlions are found throughout the world, primarily in dry, sandy regions.
- **Distinction** - Antlions can be easily distinguished by their long distinct antennae.
- **Unique Larvae Behavior** - The larvae of *Pseudofornicaleo* and *Creoleon* species don't construct pits.
- Instead, they inhabit loose soils underground, sheltered from direct sunlight, wind, and rain.

#### Pseudofornicaleo nubecula

- It is recently found in Kerala, India and in Chiang Dao, Thailand.
- It has been reported in other countries such as Australia, China, Indonesia, Japan, Malaysia, Palau, Papua New Guinea, Sri Lanka and Vietnam.

#### Creoleon cinnamomeus

- It is recently found in *Kerala, India and in Phu Quoc island, Vietnam.*
- Creoleon cinnamomeus has been reported **only** from China, Sri Lanka, and Vietnam.

### 7.21 Malabar Pit Vipers

Researchers have taken up a detailed radio telemetry study of the Malabar Pit Vipers to understand their habitat and activity patterns and to find their antidote.

- It is one of the type of 9 Pit Vipers.
- **Scientific Name** – Craspedocephalus malabaricus, (formerly Trimeresurus malabaricus).
- **Family** – Viperidae
- **Nativity** – Endemic to Western Ghats.
- **Habitat** – Tropical Evergreen Forests.
- **Features** – They are Nocturnal, arboreal and Ovoviviparous (give birth to live young).
- Triangular head much broader than the neck, heat sensing pits between eyes and nostrils.
- They have spots in various zigzag patterns across the body.
- They have variable colour, often green, brown, or yellow with patterns.
- They have heat-sensing pits to detect warm-blooded prey.
- **Dimorphism** – Males are generally smaller than females.
- **Venom** – Hemotoxic, causing pain and swelling, but rarely fatal to humans
- **Conservation status**
  - **Wildlife Protection Act, 1972** – Schedule-2

**An antidote** is a chemical substance that controls the effect of a poison.



Malabar Pit Viper (MPV) is one among the 15 snakes for which medical supplies should be available as per the guidelines of the World Health Organization (WHO).

### 7.22 Indian House Crows

The Kenyan government has launched a campaign against Indian House Crows, aiming to eliminate one million of them by the end of 2024.

- **Taxonomy** – It belongs to the family ‘Corvidae’.
  - **Scientific Name** – Corvus splendens
- **Nativity** – Indian subcontinent.
- **Distribution** – Colonized urban and suburban areas in many parts of Asia, Africa, and the Middle East.
- **Features** – They are medium-sized birds known for their adaptability and intelligence.
- They have a slightly glossy appearance.
- **Challenges in Kenya** – Their exponential rise due to their remarkable adaptability and association with human settlements.
- Being invasive they cause problems for tourists, farmers, and local avian species for decades.
- It led to significant decrease in the population of small indigenous birds on the Kenyan coast by destroying their nests and preying on their eggs and chicks.

The house crow, also known by various names such as the Indian crow, grey-necked crow, Ceylon crow and Colombo crow originated from India and other parts of Asia but has since spread to many parts of the world, aided by shipping activities.

### 7.23 Pathogens in Space



Researchers are studying multi-drug resistant pathogens on the International Space Station (ISS), which could have key applications for astronaut's health as well on Earth.

- **Organisation involved-** Indian Institute of Technology Madras (IIT Madras) and NASA's Jet Propulsion Laboratory (JPL).
- **The Jet Propulsion Laboratory (JPL)** is a unique collaboration between NASA and Caltech.
- **Aim-** To study the behaviour, adaptation, and evolution of multi-drug resistant pathogens about 400-km above the earth's surface at the International Space Station (ISS).
- **The International Space Station (ISS)** is a large space station assembled and maintained in low Earth orbit by a collaboration of five space agencies and their contractors: NASA (United States), Roscosmos (Russia), JAXA (Japan), ESA (Europe), and CSA (Canada).
- **Key features of the research** – Studying genomic adaptations of drug-resistant pathogens can improve targeted treatments.
- Insights into pathogen persistence in spaces like spacecraft and hospitals can help manage contamination.
- Integrating genomics, metagenomics, and metabolic modeling can study microbial dynamics in various extreme environments.
- **Comprehensive study-** To understand the genomic, functional, and metabolic enhancements observed in multidrug-resistant pathogens with a particular focus on Enterobacter bugandensis, a prevalent nosocomial pathogen found on surfaces within the ISS.
- **Enterobacter bugandensis** is a species of bacteria that belongs to the Enterobacter genus, which is commonly found in various environments including soil, water, and the gastrointestinal tracts of humans and animals.

## 7.24 Striped Caecilian

For the first time herpetologists have discovered a new species of striped caecilian in Kaziranga National Park and Tiger Reserve.

- **About** - It is a new **limbless amphibian** discovered recently in Kaziranga National Park and Tiger Reserve in Assam.
- **Scientific Name** – Ichthyophis spp.
- **Appearance** - Striped caecilians have **long, cylindrical bodies** with annular grooves that give a segmented appearance.
- **Motion** - They lack limbs and have a smooth, slimy skin that aids in movement through soil and water.
- **Habitat**- Striped caecilians are primarily fossorial, meaning they live underground.
- They inhabit moist soil in tropical rainforests, plantations, and occasionally in agricultural areas.
- Striped caecilians are mostly **nocturnal**, coming to the surface or near-surface only during the night or in heavy rains.
- **Diet**- Their diet consists mainly of small invertebrates such as earthworms, termites, and other soil-dwelling organisms.



## Kaziranga National Park

- It is located in Golaghat and Nagaon districts of Assam.
- Formed- 1904.
- It was declared as a National Park in 1974 and a tiger reserve in 2007.
- It is also a **UNESCO World Heritage Site** and houses 2/3rds of the total world population of greater one-horned rhinoceros.
- **Vegetation-** It is a mix of eastern wet alluvial grasslands, semi evergreen forests and tropical moist deciduous forests.

- Flora- Indian gooseberry, cotton tree, and elephant apple are amongst the famous trees that can be seen in the park.
- Fauna- Along with the iconic Greater one-horned rhinoceros, the park is the breeding ground of elephants, wild water buffalo, and swamp deer.

### 7.25 *Didymocarpus janakiae*

Recently a new plant species, *Didymocarpus janakiae* discovered in Arunachal Pradesh.

- **Genus-** *Didymocarpus*.
  - The genus consists of 111 species out of which 27 species are present in India.
- The species has been named in honour of ***Dr. E. K. Janaki Ammal***, Indian botanist renowned for her contributions to botany, particularly in plant breeding, genetics, and cytology.
  - In 1931, she became the 1<sup>st</sup> Indian woman to be awarded a doctorate in botany in the US (University of Michigan).
- **Location-** It is confined to the sub-tropical forests of ***West Kameng district, Arunachal Pradesh***.
- **Habitat-** They thrive in undisturbed habitats such as ***moss-covered rocks***, highlighting the ecosystem's pristine quality.
- **Other nomenclature-** It is commonly known as ***stone flower*** which is part of the African violet family (Gesneriaceae).
- **Threat-** It is under threat of habitat degradation caused by rapid development activities like road construction.
- **Conservation status** – It is proposed for listing as Critically Endangered under IUCN guidelines



### 7.26 *Dendrophthoe longensis* & *Petrocosmea arunachalense*

Researchers have discovered 2 new species of plants, *Dendrophthoe longensis* & *Petrocosmea arunachalense* recently.

#### ***Dendrophthoe longensis***

- It is an ***aerial stem-parasitic flowering plant*** discovered in long islands of Andaman and Nicobar islands.
- **Family** - Mistletoe (group of hemi-parasitic flowering plants).
- **Habitat** - It is found on the specific host plant, Mango (*Mangifera indica*) in the edge of evergreen forests, low land areas of tropical forests.
- **Distribution** - The species is sparsely scattered and confined to a few localities of Long Island.
- **Conservation status** – It is assessed as ***Endangered*** based on the IUCN categories and criteria.

*Indian Dendrophthoe are represented by 9 species - 4 are from Andaman and Nicobar Islands and 2 species are endemic to the region.*

#### ***Petrocosmea arunachalense***

- *Petrocosmea arunachalense* is ***only the second known species*** from the genus *Petrocosmea* in India.
- **Family** – Gesneriaceae.
- It is a new herbaceous plant species discovered from West Kameng district in ***Arunachal Pradesh***.
- It is a very very small herb, requires less sunlight.
- **Appearance** - It is completely white with purple blotch and the plant has a hairy texture.



## 7.27 Steriphopus wangala

A newly discovered Spider named after Wangala festival of Meghalaya recently.

- The new spider species discovered recently in West Garo Hills district of **Meghalaya**.
- **Family** - Palp-Footed Spider.
  - Palp-footed spiders, also known as Palpimanidae, are a family of ground-dwelling spiders with large front legs and distinctive features useful for field identification.
- **Genus** – Steriphopus
  - This discovery added the total number of species in this genus to 5 globally, with 2 found in India.



## Wangala Festival

- Wangala, also known as the "Festival of the Hundred Drums", is a harvest festival celebrated in **India and Bangladesh**.
- The Wangala Festival marks the end of the agricultural season.
- It is celebrated by the **Garo tribe** that honors Saljong, the Sun-God of fertility.
- The highlight of Wangala is the rhythmic beat of a hundred drums. The main soundtrack is provided by the **Nagra drum**.
- These drums are a big part of Garo culture, and they are traditionally made out of tree trunks.
- The **Wangala dance** is the centrepiece of the festival. The dance is characterised by dancers moving to the rhythmic drumming.



## 8. SCIENCE AND TECHNOLOGY

### 8.1 LignoSat wooden satellite

Recently scientists have developed the satellite named LignoSat.

- It is **world's 1st wooden satellite**.
- **Developed by** – **Japan**, a collaboration between Kyoto University and the logging company Sumitomo Forestry.
- **Aim** – To test the idea of using wood as an **eco-friendly alternative to metal based satellites** as wood would burn completely upon re-entry into Earth's atmosphere.
- To measure the deformation of the wooden structure in space.
- **Size** – It is a cube that measures **10 centimetres** on each side.
- **Material** – A timber from **magnolia wood**.
- **Significance** – It was founded to be **particularly stable and resistant to cracking** in laboratory tests.
- There is no oxygen in space which could cause wood to burn, and no living creatures to cause it to rot.
- **Future prospects** – If the LignoSat succeeds in orbit, wood could become a material for future satellites.
  - Over **2,000 spacecraft** expected to launch annually.

**Magnolia wood** is a highly sought-after timber, known for its striking colouration and fine grain.

## Issues with Satellites made of Metals

- **Creates space debris** – All the metal based satellites which re-enter the Earth’s atmosphere burn and create tiny alumina particles, which will float in the upper atmosphere.
- **Threat to satellites and spacecraft** – Metals particles can damage the space observatory instruments.
- **Depletes the ozone layer** – Ozone layer protects us from harmful UV radiations from the Sun.
- **Alters the amount of sunlight** – It travels through the atmosphere and reaches the ground.

## 8.2 SafeEXO-Cas

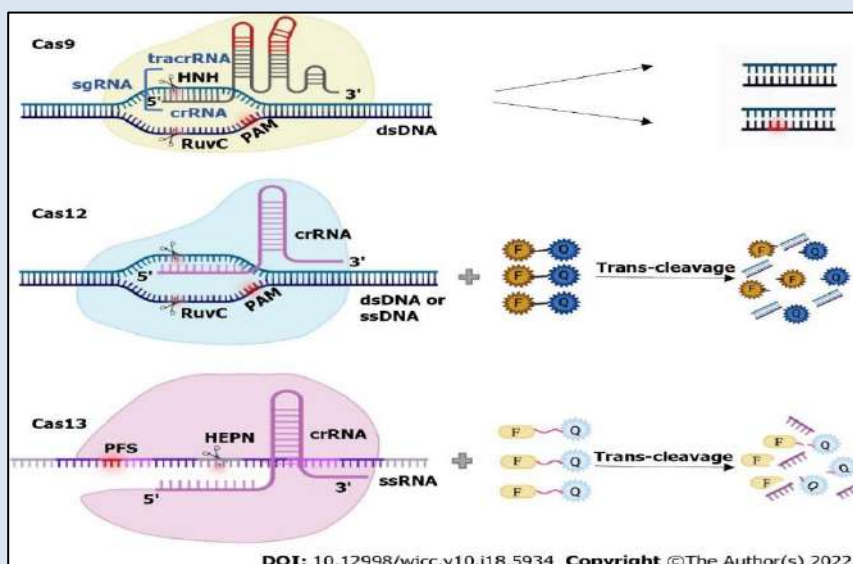
Recently, Columbia University Dental researchers unveiled "safeEXO-Cas," an exosome-based platform.

- **Objective-** The platform will boost **CRISPR/Cas9** delivery for *precise genome editing*.
- Researchers demonstrated that safeEXO-Cas effectively delivers CRISPR/Cas9 components, including *single guide RNA and single-stranded DNA templates*.
- This platform holds promise for on-demand in *vitro and in vivo gene editing*.

Currently, more than 27,000 tracked pieces of space debris orbit Earth at speeds of approximately 15,700 mph in low Earth orbit.

## CRISPR (Clustered Regularly Interspaced Short Palindromic Repeats)

- **About-** CRISPR/Cas9 (Clustered Regularly Interspaced Short Palindromic Repeats) is a unique technology to edit parts of the genome by removing, adding or altering sections of the DNA sequence.
- It is currently the simplest, most versatile and precise method of genetic manipulation.
- **Discovery-** CRISPRs were first discovered in archaea (and later in bacteria) by Francisco Mojica.
- **Working-** The CRISPR-Cas9 system includes:
  - Cas9- An enzyme acting as molecular scissors, precisely cutting DNA strands at a specific location.
  - Guide RNA (gRNA)- Comprising a short pre-designed RNA sequence within a longer RNA scaffold.
- **Applications-** It holds great potential for treating genetic medical conditions like cancer, hepatitis B, or high cholesterol.



## 8.3 Naming of Craters on Mars

Recently, scientists at the Physical Research Laboratory (PRL) discovered three craters on Mars.

- The 3 craters situated in the ***Tharsis volcanic region*** have been named for

- Renowned cosmic ray physicist late Devendra Lal
- The towns of Mursan, Uttar Pradesh and
- Hilsa, Bihar.

*Tharsis is a vast volcanic plateau centered near the equator in the western hemisphere of Mars. The region is home to the largest volcanoes in the Solar System.*

- The naming is approved by ***International Astronomical Union (IAU)***.
- The discovery was made within the Mangala crater of Mars using ***SHARAD (Mars SHallow RADar sounder)***.
- The discovery of the craters provided compelling evidence that water moved large volumes of sediment into the newly discovered Lal crater.
- It also confirmed that Mars was once wet and water has flown on its surface.
- **Lal crater** – It is the biggest among the 3 craters, entire area is covered with lava.
- **Mursan crater**- It is superimposed on the ***eastern side*** of the rim of the Lal crater.
- **Hilsa crater**- It is superimposed on the ***western side*** of the rim of the Lal crater.

*SHARAD is a subsurface sounding radar mounted on the Mars Reconnaissance Orbiter (MRO) probe.*

### International Astronomical Union (IAU)

- The IAU is an apex governing international professional astronomical activities worldwide.
- **Established**- 1919.
- **Headquarters**- Paris, France.
- **Objective**- To promote and safeguard astronomy in all its aspects (including research, communication, education and development) through international cooperation.
- **Member**- IAU membership spans 92 countries, ***India is a member*** of the International Astronomical Union.

## 8.4 Microalgae

Scientists at the CSIR-Indian Institute of Chemical Technology (IICT) have identified microalgae as a potential protein supplement.

- **About**- Microalgae are ***microscopic, single-celled*** organisms that belong to a diverse group of microorganisms called algae.
- **Size** - It can range from a few micrometers ( $\mu\text{m}$ ) to a few hundreds of micrometers, they don't have roots or stems.
- **Diversity and Types**-
  - **Green Algae**- Such as Chlorella and Spirulina.
  - **Diatoms**- Have intricate silica shells.
  - **Blue-Green Algae (Cyanobacteria)** - Like Spirulina.
  - **Red Algae**- Used in agar production.
  - **Golden Algae**- Such as Chrysophytes.
- **Photosynthetic Nature** - Algae are mostly photosynthetic in nature. They are also important for carbon sequestration, as they can absorb carbon dioxide from the atmosphere through photosynthesis.

### Chlorella Growth Factor (CGF)

- Scientists at CSIR-IICT have identified Chlorella Growth Factor (CGF), extracted from ***Chlorella sorokiniana microalgae***, as a valuable ingredient for food and feed.
- Chlorella's nucleus contains a unique substance produced during photosynthesis, packed with peptides, amino acids, nucleotides, polysaccharides, vitamins, and minerals.
- CGF, rich in ***amino acids and high-quality protein***, shows great potential as an alternative protein source for both humans and animals.

- **Habitat**- Microalgae are found in diverse habitats including freshwater, marine environments, soil, and even ***extreme environments like hot springs and polar regions.***
- **Significance** - Microalgae play a crucial role in the ecosystem as they form the base of the food chain, providing nutrients for various organisms.
- **Nutrition**- Rich source of proteins, vitamins, minerals, and omega-3 fatty acids.
- **Nutritional Supplements**- ***Spirulina and Chlorella*** are consumed as dietary supplements due to their high nutritional value.

## 8.5 Electromagnet

An electromagnet is a type of magnet in which the magnetic field is produced by an electric current.

- **Invented by**- ***William Sturgeon in 1824.***
- **Principle**- Electromagnets are temporary magnets that form a magnetic field when an electric current is passed through them.
- **Working** - An electromagnet consists of a wire coil through which an electric current passes. This current generates a magnetic field around the wire.
- **Influencing Factors** - The strength of its magnetic field depends upon various factors like
  - Number of times the wire is wound.
  - The electricity flowing through it, and
  - The material of the core.
- **Magnetic Core**- A ***ferromagnetic core*** is often placed inside the coil to amplify the magnetic field produced by the current.
- **Applications** - Electromagnets are widely used in numerous applications due to their ability to provide ***strong magnetic fields*** that can be turned on and off as needed.
- In electric motors and generators, they convert electrical energy to mechanical energy and vice versa.
- **Example** - Motors, electric bells, solenoids, MRI Machine, Card Reader, Electric Generators.

### Ampere's Circuital Law

- It states that the line integral of a magnetic field around a closed loop is equal to  $\mu^0$  times the algebraic sum of the current passing through it.

## 8.6 Super-Absorbent Polymer

Super-absorbent polymers (SAPs) play a crucial role in modern diapers, enhancing their absorbency and effectiveness.

- A superabsorbent polymer (SAP) is a water-absorbing hydrophilic homopolymers or copolymers that can absorb and retain extremely large amounts of a liquid relative to its own mass
- **Microscopic Forces behind Water Absorption**- Water's ability to be absorbed or repelled by materials is influenced by ***microscopic forces*** and the material's nature.
- A water molecule, composed of ***two hydrogen atoms and one oxygen atom***, exhibits unique properties.
- Although each atom is charge neutral, the hydrogen electrons shift slightly toward the larger oxygen atom due to its pull.
- **Cotton vs Super-Absorbent Polymers (SAPs)** - ***Cotton*** is effective for absorbing small amounts of water.
- However, for absorbing large volumes of fluids, such as those produced by a baby overnight, a more advanced material is needed ***super-absorbent polymer (SAP).***

Feature	Polymer	Super-absorbent polymer
Definition	Large molecules composed of repeating units	Polymers that can absorb and retain large amounts of liquid
Water Absorption Capacity	Low to moderate	Extremely high

Chemical Structure	Linear, branched, or cross-linked chains	Cross-linked network structure
Physical State	Solid at room temperature	Gel-like when swollen with water
Degradability	Varies, many are non-biodegradable	Often non-biodegradable, but some are designed to be environmentally friendly

- **Sodium and Water Interact in Super-Absorbent Polymers (SAPs)** - Sodium and water have a strong affinity for each other, much like how salt (sodium chloride) dissolves in water as **sodium ions separate from chlorine ions and bond** with water molecules.
- In super-absorbent polymers (SAPs), water molecules attach to sodium ions within the polymer structure.
- These water molecules then link together, forming a rigid network that traps the water and swells, creating a gel.
- This gel formation is what allows SAPs to absorb and retain large amounts of liquid.

### 8.7 Claude 3.5 Sonnet

*Anthropic, U.S.-based artificial intelligence start-up has recently launched its latest AI model, Claude 3.5 Sonnet.*

Feature	Claude 3.5 Sonnet	GPT-4	Gemini-1.5 Pro
<b>About</b>	Claude 3.5 Sonnet can independently write, edit, and execute code with sophisticated reasoning and troubleshooting capabilities.	GPT-4 is a type of deep learning model used for natural language processing and text generation.	Gemini 1.5 Pro can process text, images, audio and video.
<b>Developer</b>	Anthropic AI	OpenAI	Google
<b>Core Model</b>	Claude	GPT-4	Gemini-1.5
<b>Text Generation Quality</b>	High	High	High
<b>Unique Strengths</b>	Leading in creative content, superior performance in benchmarks, advanced conversational skills	Renowned for accuracy, reliability, and technical capabilities	Strong in integration, context understanding, and balanced performance across tasks.

### 8.8 Pushpak

*Recently, the 3<sup>rd</sup> and final test success of the Reusable Launch Vehicle (RLV) Landing Experiment (LEX) or Pushpak is conducted.*

- **About-** Pushpak designed to carry payloads into **low earth orbits** and return to earth for reuse.
- **Agency-** Indian Space Research Organisation (ISRO).
- It is to undertake more difficult manoeuvres with dispersions, correct both cross-range and downrange.
- It demonstrated the **autonomous landing capability** of reusable launch vehicle (RLV) from off-nominal initial conditions at release from helicopter.
- Pushpak landed at a velocity exceeding **320 kmph**, due to its low lift-to-drag ratio aerodynamic configuration.
- Pushpak autonomously maintained a stable and precise ground roll along the runway using its rudder and nose wheel steering system during the ground roll phase.

### 8.9 Space Variable Objects Monitor (SVOM)

*Recently, the Space Variable Objects Monitor spacecraft is launched from the Xichang Satellite Launch Center.*

- The Space Variable Objects Monitor spacecraft is a combination of small telescopes.

- The primary objective of satellite is to look for ***gamma-ray bursts across the universe.***
- It is a ***1<sup>st</sup> astronomical satellite*** jointly developed by ***China and France.***
- **Weight** - 930-kilogram.
- **Carrier rocket**- It was placed in a ***low-Earth orbit*** by a Chinese Long ***March 2C carrier rocket.***
- **Payload of SVOM**- It consists of ***4 payloads***, two developed by the France and two by the China.
  - **France**- ECLAIRS and MXT telescopes, which will detect and capture the GRBs.
  - **China**- The Gamma Ray Burst Monitor (GRB), measure the spectrum of GRBs and Visible Telescope (VT), will detect and observe visible emissions produced immediately after a GRB.
- The satellite will measure and study their electromagnetic radiation properties.

### Gamma-ray bursts

- GRBs are bursts of highly energetic gamma rays, which last from less than a second to several minutes.
- They are known to occur in distant realms of the universe, and can erupt with a quintillion (a 10 followed by 18 zeros) times the luminosity of the Sun.
- There are two types of GRBs, short GRBs and long GRBs.
  - **Short GRBs**- Gamma-ray bursts (GRBs) with durations typically less than 2 seconds.
  - **Long GRBs**- Gamma-ray bursts (GRBs) with durations typically greater than 2 seconds, often lasting up to several minutes.

### 8.10 Gigantic jets

*Gigantic jets were recently witnessed over the Himalayan Mountains by National Aeronautics and Space Administration (NASA).*

- Gigantic jets are a ***rare and powerful type of lightning*** that can extend from the top of a cloud to the edge of space.
- They are relatively a recent discovery in the field of atmospheric phenomena, having been documented only in the 21<sup>st</sup> century.
- It is different from regular cloud-to-cloud and cloud-to-ground lightning.
- The bottoms of Gigantic Jets look similar to blue jets, while the tops look similar to red sprites.
- It occurs between some thunderstorms and the Earth's ionosphere high above them.
- It pack ***50 times*** the power of a regular lightning strike and can travel as high as 80 kilometres above the Earth's surface.
- Unlike familiar cloud-to-cloud and cloud-to-ground lightning, gigantic jets bridge the gap between thunderstorms and the Earth's ionosphere, soaring high above the storm clouds.



### 8.11 Motor Neuron Diseases (MNDs)

*The 3<sup>rd</sup> annual conference on MND 'Awareness, Care and Management' at Nimhans held recently in Bengaluru, stated that symptomatic and supportive treatments help manage the condition better.*

- MNDs are a group of progressive neurological diseases that destroy ***motor neurons***, cells controlling skeletal muscular activities like walking, breathing, speaking and swallowing.
- In MND, these neurons degenerate and die. This causes the muscles to become weaker and weaker. This eventually leads to ***paralysis.***
- The MND disease group includes:



- Lou Gehrig's disease, also known as amyotrophic lateral sclerosis (ALS)
- Progressive muscular atrophy (PMA)
- Progressive bulbar palsy (PBP)
- Primary lateral sclerosis (PLS)
- Kennedy's disease, also known as spinal and bulbar muscular atrophy (SBMA)
- **Affecting age** - MND is an **uncommon** disease. The average age that people are diagnosed with MND is **58 years**.
- **Symptoms** - Usually start on one side of the body before spreading that include
  - Weakness in their hands and grip,
  - Slurred speech
  - Weakness in their legs, and a tendency to trip
  - Weakness of their shoulder, making lifting difficult
  - Cramps and muscles twitching
- **Treatment** - There's **no cure** for motor neurone disease, but treatment can help reduce the impact the symptoms have on your life.

## SPACE

### 8.12 JADES-GS-z14-0 & JADES Program

*A new study has detected the 2 earliest and most distant galaxies.*

- **JADES-GS-z14-0** – It is estimated to have formed *about 290 million years after the Big Bang*, making it the earliest-known galaxy.
- **Observed by** – NASA's James Webb Space Telescope (JWST)
- **Umbrella programme** – **JADES program** (JWST Advanced Deep Extragalactic Survey).
- **Location** – It measures about 1,700-light years across.
- **Mass** – It is equivalent to 500 million stars the size of our Sun and is rapidly forming new stars, about 20 every year.
- **Size** – It is significantly larger than other galaxies that the JADES team has measured at these distances.
- **Luminous** – It is brighter.
- **JADES-GS-z14-1** – It is smaller with a mass equal to about 100 million sun-sized stars, measures roughly 1,000 light years across and forms about 2 new stars per year.

*The Big Bang theory proposes that the universe began from an infinitely hot and dense single point, known as a singularity, around 13.7 billion years ago.*

### JADES Program

- **JADES** – JWST Advanced Deep Extragalactic Survey.
- **Partnership** – An international collaboration of more than 80 astronomers from 10 countries.
- It is conducting an ambitious program of *deep infrared imaging and multi-object spectroscopy*.
- **Technique** – It uses 3 JWST instruments, in the 2 most famous deep fields on the sky
  - The Hubble Deep Field (GOODS-N)
  - The Hubble Ultra Deep Field (GOODS-S)
- **3 scientific instruments**
  - **NIRCam** – Near-Infrared Camera
  - **NIRSpec** – Near-Infrared Spectrograph
- **MIRI** – Mid-Infrared Instrument.

*A light year is the distance light travels in a year, which is 9.5 trillion km.*

*Galaxies tend to grow larger as the universe evolves, thus it would potentially get significantly brighter in the next many 100 million years.*

### 8.13 Recombinant Proteins

Researchers have developed an innovative method for the mass production of recombinant proteins.

- **Recombinant proteins** – They are **foreign proteins** produced in expression hosts by introducing specific genes into host organisms.

**Proteins** are large, complex molecules made up of long chains of amino acids that perform many critical functions in organisms.

- **Examples** – Enzymes, hormones, cytokines, growth factors, blood clotting factors, monoclonal antibodies (mAbs), vaccines and antibody-related products.

- **Usage** – In *therapeutics, diagnostics, drug discovery* as well as vaccine development and production.
- **Production** – It is done by cultivating genetically modified *bacterial, viral, or mammalian cells* in large bioreactors.

- **Example:** Yeast *Pichia pastoris* (*Komagataella phaffii*)

- **Methanol-induced process** – The gene coding for that recombinant protein is spliced into the yeast genome and the yeast cells are then *fed glycerol or glucose* as the carbon source.

- Once enough cells have formed, *methanol is added*, which *activates the AOX promoter*, and the cells start *producing the recombinant protein*.

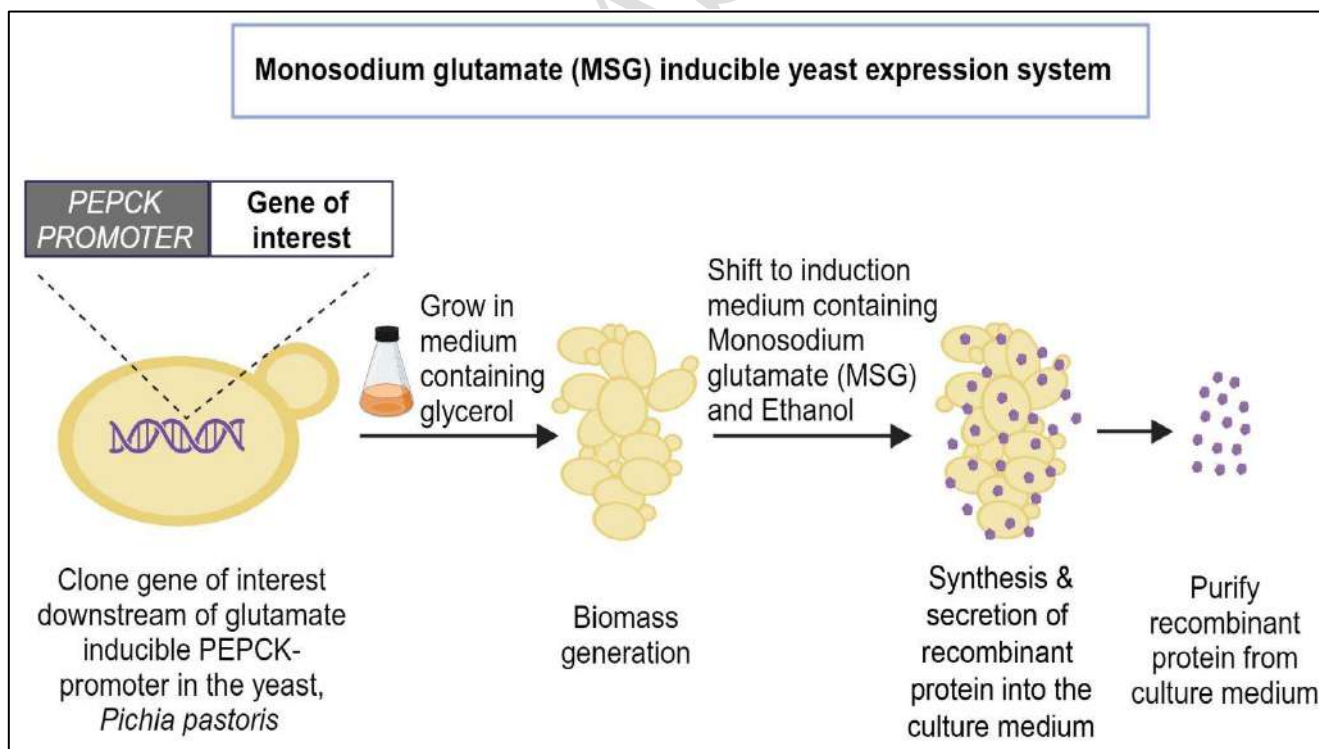
- **Challenges in using methanol** – It is highly flammable and hazardous, requiring stringent safety precautions.

*Alcohol oxidase (AOX) is an enzyme that metabolises methanol.*

- It is also metabolized to form hydrogen peroxide which can induce oxidative stress in the yeast cells or damage the recombinant proteins.

- **New process** – A safer process that instead relies on a common *food additive called monosodium glutamate* (MSG).

- MSG can activate a different promoter in the yeast genome which led to protein production similar to methanol induced process.



- **Significance** – MSG induced process offers a novel expression system for mass-producing valuable proteins, including those found in milk, eggs, baby food supplements, nutraceuticals, and therapeutics.

### 8.14 Boeing starliner

A Boeing Starliner capsule carrying its first-ever astronauts docked with the International Space Station.

- **Aim** – It is a spacecraft that carried astronauts to International Space Station (ISS).
- It is a partially reusable crew capsule, officially known as **CST-100 (crew space transportation)**.
- **Launched by**- The National Aeronautics and Space Administration (NASA).
- **Rocket**- A United Launch Alliance Atlas V rocket.
- **Modules** – It consists of crew module and the service module.
- **Scope for taxi flights**- If the mission goes well, NASA will alternate between SpaceX and Boeing for taxi flights, beginning next year.

**Starliner** is the 6<sup>th</sup> US-built spaceship to carry NASA astronauts, following Mercury, Gemini, Apollo, the Space Shuttle, and SpaceX's Crew Dragon.

SpaceX launched astronauts into orbit in 2020, becoming the first private business to achieve only in 3 countries – **Russia, the U.S. and China.**

### 8.15 PraVaHa Software

The Indian Space Research Organisation (ISRO) has developed Computational Fluid Dynamics (CFD) software named PraVaHa.

- **PraVaHa Software** - Parallel RANS Solver for Aerospace Vehicle Aero-thermo-dynamic Analysis.
- **About PraVaHa**- It is a software tool designed to **analyze the aerodynamics and thermodynamics of aerospace vehicles**.
- **Developed by**- Indian Space Research Organisation (ISRO).
- The software simulates external and internal flows on launch vehicles, winged & nonwinged re-entry vehicles.
- **Usage**- It has been used extensively in the Gaganyaan program for aerodynamic analysis of human-rated launch vehicles, viz, HLVM3, Crew Escape System (CES), and CM.
- The software is designed to make use of CPU as well as GPU architecture of available and upcoming supercomputing facilities.
- Currently, the PraVaHa code is operational to simulate airflow for Perfect Gas & Real Gas conditions.
- PraVaHa soon will replace most of the CFD simulations for aero characterization, which is currently being carried out using commercial software.

### Computational Fluid Dynamics (CFD)

- Computational Fluid Dynamics (CFD) is the process of mathematically predicting physical fluid flow by solving the governing equations using computational power.
- In a CFD software analysis, fluid flow and its associated physical properties, such as velocity, pressure, viscosity, density, and temperature, are calculated based on defined operating conditions.
- In order to arrive at an accurate, physical solution, these quantities are calculated simultaneously.
- The most common CFD tools are based on the **Navier-Stokes (N-S) equations**.

### 8.16 Blaze Star

NASA predicts that the Blaze Star will become visible to the naked eye by September 2024.

- It is officially named as **T Coronae Borealis (T CrB)**, is actually **2 stars binary system**.
- **Binary system**
  - **A white dwarf** – An Earth-sized remnant of a dead star with a mass comparable to that of our Sun.
  - **An ancient red giant** – It is being stripped of hydrogen by the relentless gravitational pull of its hungry neighbour.

- **Located in** – The Constellation *Corona Borealis, the "Northern Crown,"* between the constellations of Boötes and Hercules.
- It is 3,000 light-years away from our solar system.
- **Magnitude** - +10 (beyond naked-eye visibility) to magnitude +2 (visible).
- **Reason for eruption** - The hydrogen from the red giant accretes on the surface of the white dwarf, building up of pressure and heat.
- Eventually, it triggers a *thermonuclear explosion* big enough to blast away that accreted material.
- This event appears to reoccur, on average, **every 80 years**
- **Significance** – The Blaze Star is a rare example of a recurrent nova, which means "new star" in Latin.

*T Coronae Borealis (T CrB) will be visible for the 1<sup>st</sup> time in 2024 since 1946 due to possible eruptions. It will be as bright as Polaris, the North Star, the 48<sup>th</sup>-brightest star in the night sky.*

*T Coronae Borealis (T CrB) have erupted previously in the years 1946 and 1866, with earlier documented observations dating back to 1787 and 1217.*

### 8.17 Lunar Gateway Programme

India and the US have finalized the Strategic Framework for exploring the opportunities to participate in the Lunar Gateway Programme.

- The Lunar Gateway Programme is an international collaborative project aimed at establishing a space station in orbit around the Moon.

The Lunar Gateway Programme is part of **NASA's Artemis program**, designed to support long-term human exploration of the Moon and beyond.

- **Launch** - No earlier than 2025.
- **Polar orbit** - Near-rectilinear halo orbit.
- **Objectives**- To facilitate regular missions to the lunar surface and serve as a base for astronauts.
- **Agencies** - The Lunar Gateway is a collaborative effort spearheaded by NASA, includes several international partners:
  - European Space Agency (ESA)
  - Canadian Space Agency (CSA)
  - Japan Aerospace Exploration Agency (JAXA)
  - Mohammed Bin Rashid Space Centre (MBRSC), UAE
- The Gateway Station is similar to the International Space Station currently in low Earth orbit, but the Gateway will orbit the Moon.
- Incidentally, the Gateway will be the **1<sup>st</sup> space station ever to exist outside of low Earth orbit** or LEO.



*Artemis programme is to return humans to the moon by 2025, with the ultimate goal of expanding space exploration to Mars and beyond.*

### 8.18 Asteroid 2011 UL21

Mountain-sized asteroid, 2011 UL21 made a close approach to Earth recently.

- It is a **giant space rock** first discovered in 2011 and orbits the sun every **3 years**.
- It is larger than 99% of known near-Earth asteroids.
- It is dubbed as the **Planet Killer** and one of the closest asteroids to approach the Earth.
- The asteroid is estimated to have a diameter of 2.5 kilometres.
- The asteroid is also one of the brightest, as it has an absolute magnitude of 15.8.
- Despite its size, it poses no threat and not projected to collide with Earth.

### Near Earth Objects (NEO)

- A near-Earth object (NEO) is an asteroid or comet that ***orbits the sun and passes close to Earth's orbit.***
- NEOs are nudged into their orbits by the gravitational pull of nearby planets.
- Technically, a NEO is defined as having a trajectory that brings it within 1.3 astronomical units of the sun, and therefore within 0.3 astronomical units, or about 45 million kilometers, of Earth's orbit.
- NEOs that cross Earth's path are categorized as either Atens or Apollos:
  - **Atens** - Have a semimajor axis smaller than Earth's orbit around the sun.
  - **Apollos** - Have a semimajor axis larger than Earth's orbit.
- Asteroids as small as 20 meters in diameter can cause significant damage to the local environment and human populations.
- Larger asteroids can penetrate Earth's atmosphere and surface, creating craters or tsunamis depending on where they land.
- NEOs that are larger than 140 meters across and cross Earth's orbit are considered potentially hazardous objects (PHOs).

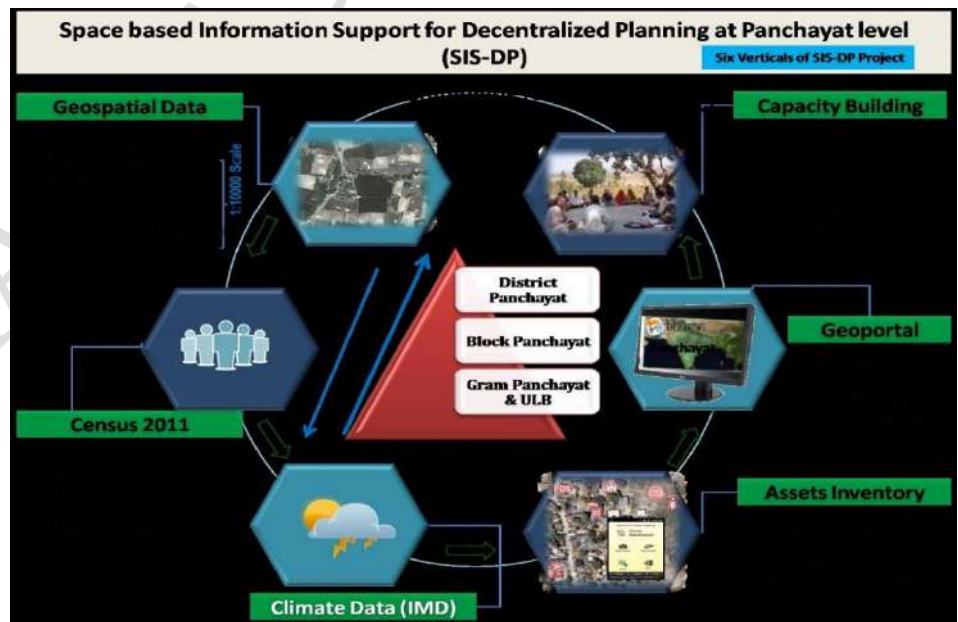
NASA's Near-Earth Object Program coordinates efforts to detect, track, and characterize these potentially hazardous objects (PHOs).

### 8.19 Bhuvan Panchayat portal & National Database for Emergency Management

Union Minister launches 2 Geoportals, "Bhuvan Panchayat (4.0)" portal and "National Database for Emergency Management (NDEM 5.0)" recently.

#### Bhuvan Panchayat Portal (Space based Information Support for Decentralised Planning at Panchayat level (SIS-DP))

- It is a national initiative of preparing basic spatial layers useful in planning process at grass root levels.
- **Formulated by** – National Remote Sensing Centre, ISRO.
- **Implemented by** - In partnership with State Remote Sensing Application Centers in the country.
- **Aim** - Empowering Panchayati Raj Institutions (PRIs) and the Stakeholders with Space-based Information Support for Decentralized Planning and Governance.



- The project's main deliverables include
  - **Satellite images** - 2.5 m resolution satellite images of the entire country.
  - **Thematic maps** - 1:10K scale thematic maps on natural resources and infrastructure, such as land cover and settlements.
  - **Resource inventories** - Inventories of resources like water sources, road networks, drainage, and rail networks.
- These deliverables are useful for planning, development, implementation, and monitoring activities at the Panchayat or Village level.
- The project also integrates data from stakeholder departments into the spatial layer in a GIS environment.

## National Database for Emergency Management

- It is to provide space-based inputs on natural disasters and aid in disaster risk reduction In India as well as neighboring countries.
- **Developed by** - National Remote Sensing Centre (NRSC), ISRO.
- **Ministry** - Ministry of Home Affairs (MHA).
- NDEM acts as a geo-portal with the amalgamation of DSS tools and services of disaster forecasting organisations with value addition.
- NDEM will also act as a ***Disaster Recovery and Data Provider node*** for the Integrated Control Room for Emergency Response (ICR-ER) being established by MHA, New Delhi.

## DEFENCE

### 8.20 RudraM-II Missile

India successfully test-fires RudraM-II missile from a Su-30 fighter jet of the Indian Air Force (IAF) off the coast of Odisha.

- It is India's 1<sup>st</sup> indigenously developed **air-launched ballistic missile** (ALBM).
- **Developed by** – Defence Research and Development Organisation (DRDO).
- **Aim** – To neutralise several types of enemy assets.
- **Mode** – It is a **solid-propelled, air-to-surface missile**.
- **Significance** – They are *ideal weapons to target Chinese static infrastructure*, which have mushroomed in Tibet largely since the standoff at the Line of Actual Control (LAC) began in 2020.

Common features:	
▷ Propulsion	: Solid Rocket Motor
▷ Navigation	: INS + SATNAV
▷ Actuation	: EMA
▷ Range	: 50 - 300 Km
▷ Launch Platform	: SU-30 Mki & Mirage-2000
▷ Launch Mach	: 0.5 to 1.5
▷ Launch Alt	: 3 to 15 Km
▷ Apogee	: 40 Km
▷ Time of Flight	: 400 s
▷ Mach number	: Peak (5.5) Touch Down (>1.0)
▷ WH Weight	: 200 Kg Class
▷ Control	: Aerodynamic

### RudraM

- **Role** – It is a series of *anti-radiation & land-attack missiles* developed by DRDO.
- **Anti-radiation missiles** – They target enemy equipment that emits electromagnetic radiation, ie, radars and active jammers.
- **RudraM-I** – It will only be used in anti-radiation roles and has a range of 180 kilometres.
- **RudraM-II and RudraM-III** – They both will be ALBMs, with ranges of 300 kms & more than 600 kms, respectively.
- **2 different variants**
  - An *anti-radiation seeker* to destroy air defence radars.
  - An IIR seeker to destroy heavily fortified bunkers.
- **Terminal velocity** – More than a Mach, making them very hard to defend against.

### 8.21 North Korea's Spy Satellite

Malligyong-1-1 satellite launch failed as the rocket exploded and fell into the Yellow Sea shortly after lift-off.

- It is a **military reconnaissance satellite**.
- **Launched by** – North Korea.
- **Russia's assistance** – Russian experts have visited North Korea to help with the satellite and space rocket program.

**Air-launched ballistic missile (ALBMs)** are cheaper than cruise missiles and easier to manufacture. Their high speeds, terminal velocity, high manoeuvrability, and quasi-ballistic trajectory make them extremely difficult to intercept by air defence systems.

- **Reason for failure** – One of the main issue is due to the failure of newly developed liquid-fuel rocket motor, which is the 1<sup>st</sup> stage.

It uses a combination of liquid oxygen and petroleum engine.

**Challenges** – Liquid oxygen engines require specialised storage and handling due to extremely low boiling points (-183 degree Celsius).

**Malligyong-1 satellite** which was launched successfully in 2023 is North Korea's 1<sup>st</sup> spy satellite.

- It is quite difficult to solve combustion instability problems of this fuel system and apply materials and parts that can withstand extremely low temperatures.
- **Significance** – Using different engines might allow North Korea to differentiate its civilian space program from its missile program, which is banned by the UN Security Council.

North Korea's **Chollima-1 satellite** uses hypergolic fuels, substances that can be stored at room temperature but ignite on contact each other, thus require careful handling. It is used in nuclear ballistic missiles.

**Hypergolic fuels** include hydrazine ( $N_2H_4$ ) and its derivatives including: monomethylhydrazine (MMH), unsymmetrical dimethylhydrazine (UDMH), and Aerozine 50 (A-50).

### Yellow Sea

- It is a large inlet of the western Pacific Ocean.
- **Yellow colour** – It was named so as the yellowish sand particles originating from the Gobi Desert that descend on the surface of the sea, thereby giving it a golden yellow colour.
- Also known as Huang Hai or Hwanghae.
- **Location** – It is lying between mainland China on the west and north, the Korean peninsula on the east and the Shandong Peninsula & Liaodong Peninsula to the south.
- **Boundaries** – It is to the north of the East China Sea while the Bo Hai Sea is the north-western extension of the Yellow Sea.
- It is dotted with numerous islands, some of which are
  - Jeju Island (South Korea), Shandong Peninsula islands (China), and Ganghwa Island (South Korea).



### 8.22 Standard Missile 6 (SM-6)

The US Navy's F/A-18 Super Hornet was recently spotted carrying an air-launched version of the SM-6 (RIM-174) missile.

- The Standard Missile-6 (SM-6) is also known as **RIM-174**.
- **Capability** - The SM-6 is the first missile of its kind, with anti-air, anti-surface and sea-based terminal defence capabilities, which enable it to intercept ballistic and cruise missiles.

- **Technology** - It is an extended range active missile (ERAM) that uses the sophisticated signal processing and guidance technologies of the **AMRAAM (Advanced Medium-Range Air-to-Air Missile)**.
- **Guidance** - The interceptor uses semi-active homing and active homing guidance to achieve accurate engagement of the assigned targets.

Features	
<b>Developed by</b>	Raytheon, a United States company.
<b>Basing</b>	Ship-launched
<b>Class</b>	Surface-to-air and surface-to-surface missile
<b>Range</b>	370 km
<b>In service</b>	2013-Present

### 8.23 Javelin anti-tank missiles

Recently, India and the US discussed co-producing Javelin missiles in India.

- **About-** It is a **3<sup>rd</sup> generation** man-portable fire **anti-tank guided missile (ATGMs)**.
- It is developed and produced jointly by U.S. defence majors, **Raytheon and Lockheed Martin**.
- It employs a **top-down attack mode**, striking tanks from above where the armour is the thinnest.
- It is a highly lethal **medium-range missile** has been in full-rate production since 1994.
- It is capable of defeating all known and projected armour, as well as soft and irregular targets.

#### Features

- **Weight-** 22.1 kg.
- **Range-** 2,500 metres to 4,750 meters.
- **Technology-** It uses **"fire-and-forget" technology** with automatic infrared guidance, allowing it to self-guide to the target without external commands or target designation.

*Fire-and-forget missiles require no further guidance after launch, allowing them to hit their target without needing the launcher to maintain line-of-sight or provide ongoing direction.*

- It is designed to defeat heavily armoured vehicles like main battle tanks, lighter military vehicles, fortifications, bunkers, and helicopters.
- It's reload and reacquire time is about one minute.
- **Significance for India** - The anti-tank missiles will enable the Indian Army to meet its requirements to boost the weapon system.

### Anti-Tank Guided Missile (ATGM)

- An Anti-Tank Guided Missile (ATGM) is a precision weapon designed to destroy armoured vehicles such as tanks.
- It is primarily designed to hit and destroy heavily armoured military vehicles.
- These are "fire-and-forget" missiles.
- The missiles rely on an electro-optical imager (IIR) seeker, a laser, or a W-band radar seeker in the nose of the missile.

### 8.24 ABHYAS

DRDO has successfully completed developmental trials of High Speed Expendable Aerial Target (HEAT) 'ABHYAS'.



- The High-speed Expendable Aerial Target (HEAT) ABHYAS is a high-speed **indigenously-designed target** developed for the Indian Armed Forces.
- It is designed for autonomous flying with the help of an auto pilot made by the Aeronautical Development Establishment (ADE) of the Defence Research and Development Organisation (DRDO).
- It is equipped with **MEMS (Micro-Electro-Mechanical Systems)** based Inertial Navigation System (INS) for navigation.
- It has a Flight Control Computer (FCC) for guidance and control.
- It has a radar cross section, visual and infrared augmentation system required for weapon practice.
- It has pre-flight checks, data recording during the flight, replay after the flight and post-flight analysis can be carried out.

### Defence Research and Development Organisation (DRDO)

- It is an agency under the Department of Defence Research and Development in Ministry of Defence.
- It is India's largest research organisation.
- **Role-** Military's research and development
- **Headquarters-** New Delhi.
- **Formed in** – 1958.
- It is formed by the merger of the
  - Technical Development Establishment.
  - Directorate of Technical Development and Production of the Indian Ordnance Factories
  - Defence Science Organisation
- Defence Research & Development Service (DRDS) is constituted in 1979.
- **Motto-** “Balasya Mulam Vigyanam” – “The source of strength is science”.
- The **Integrated Guided Missile Development Programme (IGMDP)** under A P J Abdul Kalam is the most prominent success of DRDO.

## HEALTH

### 8.25 Visceral Leishmaniasis (VL)

The World Health Organization (WHO) recently launched a framework to eradicate visceral leishmaniasis (VL) in eastern Africa.

- **About** - Visceral leishmaniasis (VL) is a severe and potentially fatal disease caused by the **Leishmania parasite**.
- It is also known as kala-azar or black fever.
- **Transmitted by** - Infected female phlebotomine sandflies.
- **Vulnerables** - It primarily affects infants and children, though adults can also be infected.
- **Symptoms** - Fever, weight loss, and enlargement of the spleen and liver.
- **Fatality rate** - If the disease is not treated, the fatality rate can be as high as 100% within 2 years. It is the **2<sup>nd</sup> deadliest parasitic disease** in the world, only after malaria.
- **Endemic to** - It is endemic in 80 countries. In India **Leishmania donovani** is the only parasite causing this disease.
- **Post Kala-azar Dermal Leishmaniasis (PKDL)** – It is a condition when Leishmania donovani invades skin cells, resides and develops there and manifests as dermal lesions.
- **WHO framework on VL Elimination** - The framework outlines 5 main strategies
  - Early diagnosis and treatment

*In 2022, eastern Africa accounted for 73% of global VL caseload, 50% of which occurred in children aged under 15 years.*

*Bangladesh is the first country to eradicate VL in 2023.*

- Integrated vector management
- Effective surveillance
- Advocacy, social mobilisation and partnership-building and
- Implementation and operational research.

WHO has set the target date for the elimination of this disease in South-East Asia Region by 2026.

## 8.26 Hydroxyurea

The Indian Council of Medical Research (ICMR) has invited an Expression of Interest (EoI) for joint development and commercialization of paediatric oral formulation of hydroxyurea.

- **Hydroxyurea** – It is in a class of medications called *antimetabolites* and is also a *myelosuppressive agent*.
- **Application** – As an antimetabolites, they *treats cancer* by slowing or stopping the growth of cancer cells in your body.
- As a myelosuppressive agent, it is used for treating patients of *sickle cell disease, and thalassemia*.
- **Concerns** – *Lack of availability of paediatric doses* as well as the *fear of toxicity*.
  - Only high dosage hydroxyurea tablets are available, as 500 mg capsules or 200 mg tablets.
- **Paediatric formulation** – In children, the prescribed dose is 10-15 mg per kilogram of body weight after 2 years of age.
- **Usage in India** – As per National Health Mission's guidelines, healthcare providers initiate hydroxyurea therapy to only symptomatic sickle cell disease patients among children.
- Currently, the tablet has to be broken down appropriately to be administered in accordance with body weight, thereby risking the efficacy available with measured doses.

Opportunity Youth are youth who are active and inactive, unemployed, underemployed, and out of school/education / skilling.

India has the highest prevalence of sickle cell disease in South Asia, and over 20 million sickle cell affected individuals reside in the country.

## 8.27 Virus-like Particles (VLPs)

Scientists had recently developed a novel method to generate non-infectious virus-like particles (VLPs) that mimic the Nipah virus (NiV).

- **Nipah Virus** - Nipah virus (NiV) is a zoonotic disease that spreads primarily between animals and humans.
- Nipah is a highly pathogenic paramyxovirus, with a fatality rate of up to 80% in affected humans.
- The genome of the NiV encodes 6 major proteins:
  - Glycoprotein (G)
  - Fusion protein (F)
  - Matrix (M)
  - Nucleocapsid (N)
  - Long polymerase (L)
  - Phosphoprotein (P)
- **Virus-like Particles (VLPs)** – VLPs are molecules that closely resemble viruses, but are non-infectious because they contain ***no viral genetic material***.
- **Characteristics** - VLPs carry most of the characteristics of the virus, except their ability to replicate (because it lacks the viral genome).
- The advent of NanoBiT technology and “HiBiT-tagged” VLP (HiBiT is an 11 amino acid peptide) makes it far more sophisticated.
- Scientists at the Institute of Advanced Virology (IAV) have generated “HiBiT-tagged” Nipah virus-like particles (NiV-VLPs).

- Highly sensitive and quantitative HiBiT-tagged Nipah virus-like particles is a platform for rapid antibody neutralisation studies.
- It was generated using plasmid-based expression systems, encoding the NiV structural proteins G, F, and M.
- The VLPs produced are morphologically and functionally identical to the native virus.
- The inclusion of a highly sensitive HiBiT tag on these VLPs accelerates their potential in antiviral drug screening and vaccine development.
- **Virus neutralisation assays** – These are critical for the development and evaluation of vaccines and immune-therapeutics,
- They are also used for conducting basic research into the immune response and pathogenesis of NiV.
- These tests, which traditionally require to be done in high security labs (BSL-4) with the infectious organism, can now be done safely in BSL-2 labs in the country using the NiV-VLPs.
- Biosafety level 4 (BSL-4) laboratories are designed to handle pathogens that are highly contagious and can cause fatal diseases.
- These pathogens are known as Risk Group 4 pathogens and include viruses like Ebola, Lassa, Nipah, Marburg and Crimean-Congo hemorrhagic fever.

## 9. INDICES AND REPORT

### 9.1 World Wealth Report, 2024

According to the latest report reveals that in 2023, the number of high-net-worth individuals (HNWIs) and their wealth hit record levels.

- **Published by-** Capgemini Research Institute.

#### Report Highlights

- **Wealth expansion** - The report noted that global HNWI wealth expanded by 4.7% in 2023 reaching \$86.8 trillion.
- **HNWI population-** Increased by 5.1% to 22.8 million.
- The HNWI continues to grow globally despite market unpredictability.

#### Global Findings

- **Wealth recovery** - North America posted the most robust recovery, expanding by 7.2% in HNWI wealth and 7.1% in HNWI population.
- **Asia-Pacific** – It experienced 4.2% HNWI growth and 4.8% rise in HNWI population.
- Among the Asia–Pacific (APAC) region **India and Australia, recorded HNWI wealth growth of 12.4% and 7.9%.**

#### Findings in India

- **HNWI in India-** The number of high net-worth individuals (HNWI) in **India increased by 12.2% in 2023 vs 2022.**
- **Market capitalisation-** India's country's market capitalisation increased by 29.0% in 2023, after an increase of 6% in 2022.
- **National savings-** National savings as a percentage of GDP increased to 33.4% in 2023, up from 29.9% in 2022.

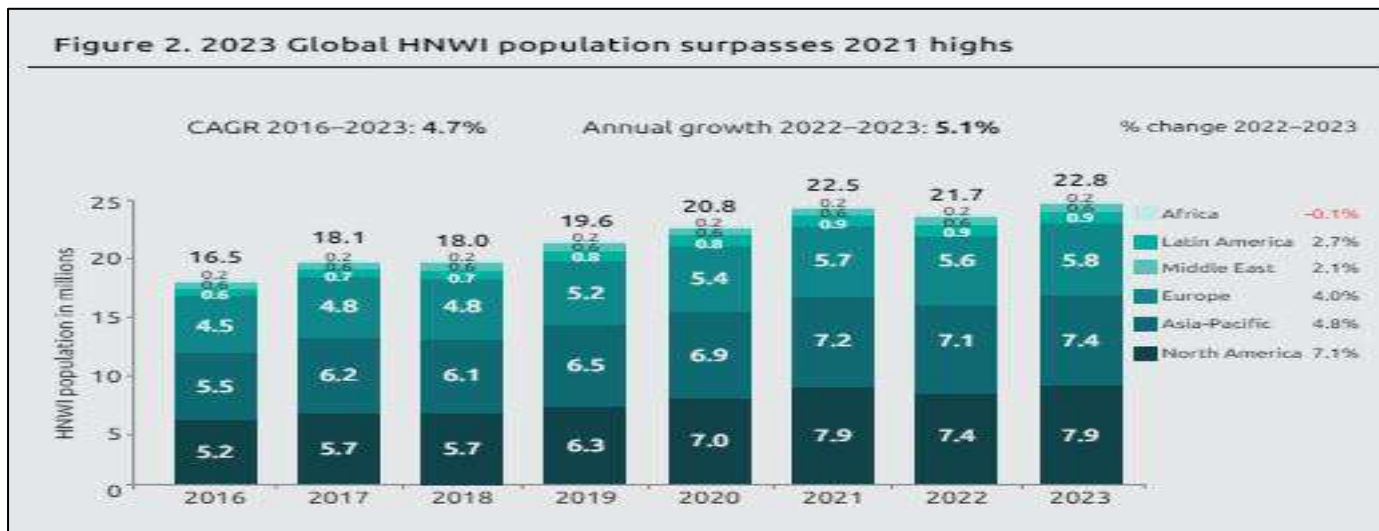
**HNWIs** are high-net-worth individuals with investable assets of USD1 million or more, excluding their primary residence, collectables, consumables, and consumer durables.

Figure 1. HNWI wealth recovers from 2022 losses



The total number of HNWI population in India is **3,589 million.**

- **Unemployment rate-** India's unemployment rate decreased to 3.1% in 2023, down from 7% in 2022, despite the economy growing 7.3% in 2023, higher than the increase of 7% in 2022.



## 9.2 Global Gender Gap Report 2024

Recently, the Global Gender Gap Report 2024 was released by the World Economic Forum (WEF).

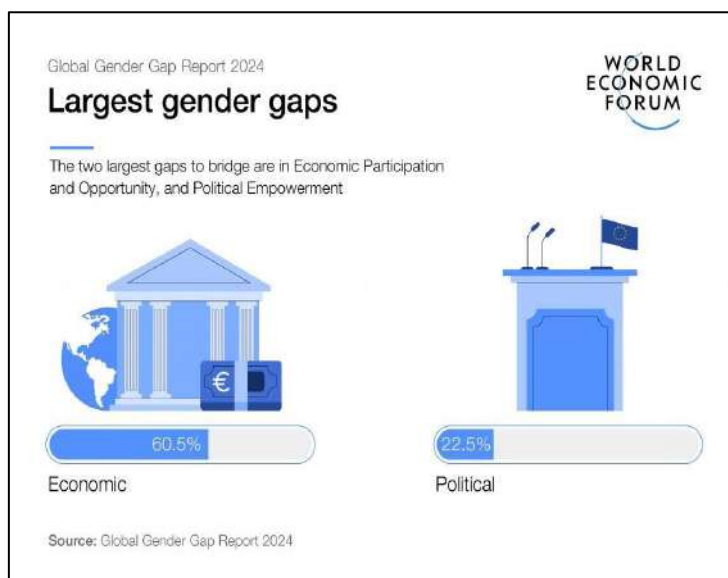
- **About-** The Global Gender Gap Index annually benchmarks the current state and evolution of gender parity.
- **Released by** - World Economic Forum (WEF).
- **Adoption** - Adopted in 2006.
- It benchmarks gender parity across 146 countries.
- **Four Parameters**
- It measures scores on a 0 to 100 scale and scores can be interpreted as the distance covered towards parity (i.e. the percentage of the gender gap that has been closed).



### Highlights of the report, 2024

#### Global

- The 2024 Global Gender Gap Index highlights that while no country has achieved full gender parity.
- Iceland is ranked 1st, most gender equal country and has been leading the index for a decade and a half.
- European economies occupy 7 spots out of the global top 10.
- **Bangladesh** is the 1st country in the Southern Asia to get a double-digit rank of 99.
- The world has closed 68.5% of the gender gap, indicating progress toward gender equality, but underlining the need for ongoing efforts.
- **Political disparity** – It is high in entire South Asia although the region has moved 4% points towards political parity since 2006.
- **Health and Survival gap-** It has closed by 96%.



#### India's status in 2024

- **Rank-** India has been ranked **129<sup>th</sup>** out of 146 countries, a decline from its previous position of 127<sup>th</sup> in 2023.
- India ranked is the **3<sup>rd</sup>-lowest** among the **South Asian** economies, lower than Bangladesh, Nepal, Sri Lanka, and Bhutan.
- **Political Empowerment-** India has better representation of women as heads of state compared to **ministerial positions** and parliament.
- Women hold **40.7% of head-of-state** positions but only 6.9% in ministerial positions and 17.2% in parliament.
- Only 2 out of 30 Union ministers in the newly formed Indian cabinet are women.
- The number of female ministers in the Central Council of Ministers has decreased from 10 to 7.
- **Economic Participation-** India has made progress in economic participation and opportunity but still ranks low at **142<sup>nd</sup> place**.
- **Education-** Although women in India have high enrolment rates in primary, secondary, and tertiary education, there's still a significant gender gap in literacy rate (17.2% points).
- India ranks **124<sup>th</sup> globally in this indicator**.

Global Gender Gap Index rankings by region, 2024

Economy	Rank		Score
	Regional	Global	
Bangladesh	1	99	0.689
Nepal	2	117	0.664
Sri Lanka	3	122	0.653
Bhutan	4	124	0.651
India	5	129	0.641
Maldives	6	132	0.633
Pakistan	7	145	0.570

### 9.3 World Investment Report, 2024

- The Report focuses on trends in foreign direct investment (FDI) worldwide, at the regional and country levels and emerging measures to improve its contribution to development.
- **Released by** – United Nations Trade & Development (UNCTAD).

#### Key findings of the report

- Global Foreign Direct Investment (FDI) fell by 2% in 2023.
- FDI flows to developing countries dropped 7%.
- Overall, FDI to developing countries fell by 7% in 2023 to \$867 billion, but the decrease varied significantly across regions.
  - FDI inflows to Africa declined by 3%.
  - Flows to developing countries in Asia fell by 8%, with China, the world's 2<sup>nd</sup>-largest FDI recipient experiencing a rare decline.
  - FDI flows to Latin America and the Caribbean decreased by 1% to \$193 billion.
- FDI flows to structurally weak and vulnerable economies increased.
- International project finance deals, critical for infrastructure investment led to a 26% fall due to tight financing conditions.
- Investment in sectors linked to the Sustainable Development Goals (SDGs) fell by more than 10%.
- Reforming older IIAs remains slow, with about half of global FDI still governed by non-reformed treaties, increasing the risk of investor-State dispute settlement (ISDS) cases.
- Only 16% of global FDI stock is covered by new-generation IIAs.

#### United Nations Conference on Trade and Development (UNCTAD)

- It is an intergovernmental organization and United Nations' leading institution dealing with trade and development.
- **Aim** - To promote integration of developing countries into the global economy and their inclusive and sustainable development through trade and investments.
- **Headquarters** - Geneva, Switzerland.
- **Established by** - It is a permanent intergovernmental body established by the United Nations General Assembly on December 30, 1964.
- UNCTAD membership consists of **195** states.

## 10. PERSONALITIES

### 10.1 Contributions of Birsa Munda

A tribute was recently paid to revolutionary tribal leader Birsa Munda on his 124<sup>th</sup> death anniversary.

- He belongs to Munda tribe, a tribe of nomadic-hunters-turned-farmers who lived in the Chotanagpur region of Jharkhand.
- He is also known as '***Dharti ka Abba and 'Bhagwaan Birsa'***', as he achieved a God-like status among his followers.
- **Social reformer** – He fought against superstition, animal sacrifice and alcoholism.
- **Unified the tribal community** – He started the faith of "Birsait" to challenge the British conversion activities through missionaries.
- It attracted the members of Munda and Oraon tribal communities and thereby unified the tribal community under a single umbrella.
- **Mobilized the masses** – He had put examples of their ancestors and their burning patriotism to motivate the mass people.
- **Fought for Tribal land rights** – His organisational skill, motivating the masses to regain freedom from the power grabbers like the Thikadars, Zamindars and money-lenders and restoration of full ownership rights as tillers of the soil.
- He demanded tribal farmers to boycott 'beth begari system' (forced labour).
- **Spearheaded tribal movement** – He led the movement called 'Ulgulan', organising the Adivasis against the land settlement system imposed by the British.

#### The Ulgulan Movement or The Great Tumult

- **Background** – Munda tribes follows *Khuntkatti system*, a joint ownership of land by tribal lineage.
- They clear forests to make the land cultivable, and the entire clan, rather than an individual, owns the land.
- **Causes of revolt** – The *Permanent Settlement Act (1793)* introduced the zamindari system and created land-owning zamindars who were seen as *outsiders or dikus* by indigenous residents.
- It allowed the dikus to claim ownership rights of tribal lands which displaced the indigenous dwellers.
- **Aim of the revolt** – To resist British oppression, exploitation by landlords, and the imposition of alien laws and taxes on tribal people.
- **Impact** – Though it was eventually suppressed by the British, it inspired later movements for tribal rights and land reforms.
- The government *repealed of the begar system*, and led to the *Tenancy Act (1903)* which recognised the khuntkhatti system.
- The *Chotanagpur Tenancy Act (1908)* later banned the passage of tribal land to non-tribal folks.

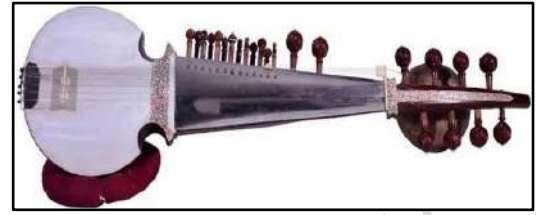
### Sardari Ladai (1858-90)

- An agrarian discontent against the imposition of beggars (forced labor) and illegal enhancement of rent by the intermediaries.
- **Led by** – The "Sardars" of the Munda and Oraon tribes.
- **Approaches** – Peaceful means like petition, prayers and protest to demand justice from the colonial regime.
- **Significance** – It prepared the ground for Birsa Munda's rebellion.

### 10.2 Sarod

Renowned sarod maestro Pt. Rajeev Taranath recently passed away after a brief illness.

- **About** - Sarod is a stringed musical instrument of the lute family that is common to the ***Hindustani music tradition*** of northern India.
- **Origin** - The sarod is an adaptation of the ***Afghan rabab***, which arrived in India during the 16<sup>th</sup> century.
- The modern form of the instrument was designed in the 19<sup>th</sup> century.
- **Making materials** - It is made up of coconut shell, tun wood, drone, shikri, and ivory. Entire body carved out of a single block of 'tun' wood.
- **Strings** - There are 2 sets of strings.
  - Upper set contains 4 main playing strings, 4 drones and 2 chikari strings.
  - Lower set is of 15 sympathetic strings.
- All are attached to a metal string holder underneath the resonator, pass through the bridge and finally fixed to their respective pegs.
- **Resonator** - The resonator has a stretched membrane (usually goatskin) and a bridge made from horn where the strings rest.
- The bridge is very thin, like that of a violin. The melody strings are stretched across the bridge and the sympathetic strings run through holes drilled into the bridge.
- **Player** - One who plays the sarod is called a ***sarodiya*** and the word sarod is Persian for song or melody.
- **Playing Technique**-The player uses the fingernails of the left hand to press the strings against the fingerboard, producing the notes.
- **Indian Schools** - Two prominent Indian schools of sarod playing are Ghulam Ali Khan and Allauddin Khan.



### Rajeev Taranath

- He was born on October 17, 1932, to his father, Pandit Taranath and his mother, Sumathi Bai, Rajeev Taranath.
- He was a distinguished disciple of the great sarod maestro ***Ustad Ali Akbar Khan***.
- He had been honoured nationally by the Government of India with a Padma Shri in 2019 and the Sangeet Natak Akademi award in 2000.
- In Karnataka, he has been bestowed with the Rajyothsava award in 1996, Chowdaiah Memorial award in 1998, Sangeet Vidwan award in 2018 and Nadoja award in 2019.

## 11. IMPORTANT DAYS

### 11.1 International Yoga Day

The 10<sup>th</sup> annual International Yoga Day, 2024 celebrated in Srinagar, Jammu and Kashmir on June 21.

- **Origin** - The International Day of Yoga established by the United Nations on ***21<sup>st</sup> June***, emphasises the importance of Yoga.
- **Aim**- It aims to spread awareness of the many advantages of yoga practice and to inspire people everywhere to include yoga into their daily routines.
- **Observed Since** - 2015.
- **United Nations recognition**- The draft resolution establishing the International Day of Yoga was proposed by India.
- The UN passed a resolution during the ***69<sup>th</sup> session*** of the General Assembly to proclaim June 21 as International Day of Yoga (IDY).
- It is endorsed by ***175 member states***

*June 21<sup>st</sup> (Summer solstice) is chosen as the International Yoga Day as it is the longest day of the year in the Northern Hemisphere.*

*The 9<sup>th</sup> International Yoga Day created a Guinness World Record for participation of people of most nationalities in a yoga event.*

### International Yoga Day, 2024

- **Theme, 2024** - Yoga for Self and Society.

## • Initiatives

- Ministry of AYUSH launched a 'Common Yoga Protocol Book in Braille' script to support visually impaired people to learn and practice yoga with convenience.
- The Indian Space Research Organisation (ISRO) is organising a unique initiative, 'Yoga for Space', all scientists and officials of ISRO will perform Yoga together.

## Yoga

- Yoga is an ancient practice that originated in India, has grown into a global phenomenon.
- Yoga is a holistic practice that combines physical postures (asanas), breathing techniques (pranayama), and meditation to promote overall well-being.
- It helps to heal the mind and body by enhancing flexibility, strength, and balance, while reducing stress and anxiety through mindful breathing and meditation.
- Its philosophical roots lie in the 6 Doctrines of Salvation in Hinduism, in which Yoga forms a related and complementary pair with Sankhya, the other two pairs being Nyaya and Vaishesika, and Mimosa and Vedanta.

## 12. OTHERS

### 12.1 Nelson Mandela Award for Health Promotion

NIMHANS bags the Nelson Mandela Award for Health Promotion for 2024.

- **Instituted by** – World Health Organisation (WHO).
- **Established in** – **2019**, upon the initiative of the Ministers of Health of Member States of the African Region.
- **Aim** – To reward work that has extended far beyond the call of normal duties.
- In recognition of the humility of Nelson Mandela, the Award given to each laureate consists of a plaque.
- **Presented by** – Group of members including
  - The President of the World Health Assembly
  - The Director-General of the WHO
  - A representative of the Nelson Mandela foundation
- **Beneficiary** – Individuals, institutions and/or governmental or nongovernmental organizations
- **Eligibility** – Beneficiary to have made a significant contribution to health promotion, as per the Statutes for the award.
- **Ineligible** – Current and former staff members of the WHO and current members of the Executive Board.
- **Nomination by** – Any national health administration of a Member State of the WHO, or any former recipient of the award.
- The nomination must be accompanied by a written statement of the reasons for proposing the candidate.
- The same candidature may be submitted several times if unsuccessful.
- **Proposals are submitted to** – The Director-General of the WHO, who submits them to the Award Selection Panel.
- **The Award Selection Panel** - They in a private meeting, considers the candidates for the Award and proposes the name(s) of the recipient(s) of the award to the Executive Board.
- The proposal is considered by the Executive Board, which designates the recipient(s) of the Award.

The World Health Assembly is the main decision-making body of WHO and is comprised of 194 Member States.

NIMHANS, established in 1974, celebrates 50 years of its formation and the 70th anniversary of its precursor, the All India Institute of Mental Health (AIIMH) in 2024. It is an Institute of National Importance under the Ministry of Health and Family Welfare, Government of India.

Mental Health Units are supported in almost all districts of India today through the National Health Mission. India's national tele mental health helpline, Tele MANAS, which was launched in 2022 also recently achieved the landmark of having handled 10 lakh calls.



- **2024 award** – National Institute of Mental Health & Neuro Sciences (NIMHANS), Bengaluru has received the award.
- It is a testament to NIMHANS' dedication and outstanding contributions to promoting mental health and well-being.
- NIMHANS has been at the forefront of mental health and neurosciences, championing innovative approaches to research, education, and patient care.

## 12.2 Onge tribes

Andaman's Onge tribe king Totoko and Queen Priya welcomed a baby boy.

- **About-** Onges are one of the oldest tribes in ***Little Andaman Island***.
- **Racial ancestry-** Negrito.
- **Occupation-** The Onge tribe is traditionally *semi-nomadic and reliant on hunting and gathering*.
- **Habitat-** Until 1940s, the Onge were the sole permanent inhabitants of Goubalambabey (the Onge name for Little Andaman).
- At present, they were confined to the **Dugong Creek and South Bay of Little Andaman Island**.
- **Appearance** - Due to their dark appearances, Onge's are regarded as among the darkest people.
- **Religion** - They do not believe in or follow firm worshipping practices or sacrifices.
- **Ornamentation** -On special occasions, they place a greater emphasis on body ornamentation.
- **Belief** – They considered that white teeth is a symbol of death, so they continue to chew the bark to impart a red colour to their teeth.
- **Prolific nature** - The Onge tribe is also *one of the world's least prolific and infertile communities*.
- Infertility affects somewhat more than *40% of married couples*.

*Other tribes in Andaman were Jarawa, Shompen, Great Andamanese, and Sentinelese.*

## 12.3 Quishing

A new report by a cybersecurity firm reveals that hackers are constantly finding new ways to deploy QR codes in phishing campaigns.

- **Quishing** – It is a **QR code phishing**, a cybersecurity threat in which attackers use QR codes to redirect victims to malicious websites or prompt them to download harmful content.

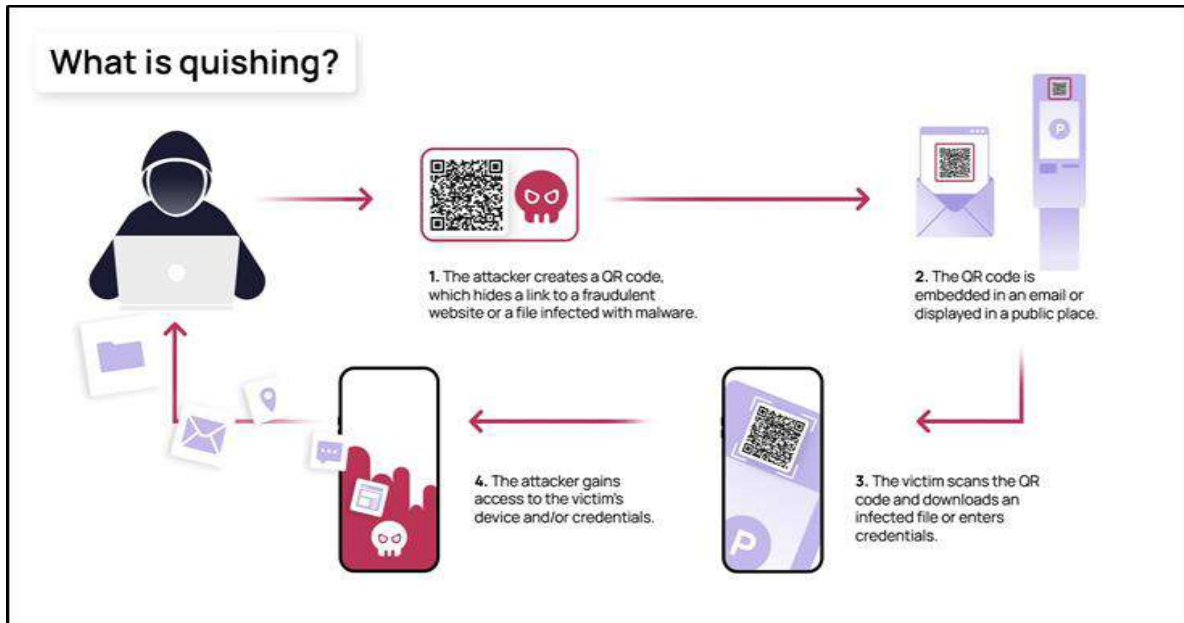
### Quick Response codes (QR codes)

- They are 2-dimensional barcodes that can be scanned easily with a camera or a code reader application.
- It have the capability to store information including URLs, product details, or contact information.
- Scanning technology allows smartphone cameras or code readers to easily and quickly access the website to which the URL points.

- **Technique used** – *Conditional QR Code Routing Attacks*.
- **Working** – The targeted person is tricked into *scanning a QR code* embedded with a uniform resource locator (URL).
- It redirects to the *credential harvesting page*, which results in the *installation of a malware* that steals sensitive information such as bank account details.
- **Threat** – The number of UPI frauds doubled from *15,000 cases in 2022 to 30,000 in 2023*.
- **Causes** – Due to the *widespread use of mobile phones* and *digital payment systems*, coupled with poor cybersecurity practices.

**Phishing** is a common type of cyber-attack that targets individuals through email, text messages, phone calls, and other forms of communication.

- **Challenges** – The attack is incredibly *personalised and targeted*, by providing the legitimate company logo and using the correct name and user name.



- By changing dynamically depending on the target, this *attack is scalable*, as well.
- **Guidance to prevent it** – Implement security that automatically decodes QR codes embedded in emails and *analyse the URLs* for malicious content.
- Utilise security that *rewrites the embedded QR code* in the email body and replace it with a safe, re-written link.
- As always, if it is urgent or feels out of ordinary, *do not scan* the code QR Code.

## 12.4 Smart Meters

India's power distribution system remains inefficient, with state-owned businesses facing persistent struggles despite various financial aid schemes.

- **Smart meter-** Smart meters provide *automated, accurate and real-time data on electricity consumption, reducing human errors associated with manual meter readings.*
- Automation of meter reading and billing processes reduces operational costs.
- **Digitising distribution- Smart meters** are the first block in digitising power distribution.
- **IntelliSmart-** It is a joint venture of state-owned *EESL and NIIF*, and is a participant in smart meter tenders of states.
- **Real-time data-** It helps discoms *collect real-time data on electricity usage and faults.*
- **Advantages-** It helps to prevent *electricity leakages and make billing efficient, reducing the aggregate technical and commercial (AT&C) losses of discoms.*
- **Revamped Distribution Sector Scheme (RDSS)**
- **Launched in-** 2021
- **Aims-** To improve the **discoms' operations and finances.**
- **Objective-** To improve the *quality and reliability of power supply* to consumers through a *financially sustainable and operationally efficient Distribution Sector.*
- **Targets-** The overall target is to install **250 million smart meters by 2025.**
- **Sector players-** Adani Power, L&T, Tata Power and GMR.

## 12.5 Huntington's Disease

Scientists develop new methods to detect Huntington's disease progression.

- **About-** Huntington's disease (HD) is a genetic disorder that causes the progressive breakdown of nerve cells in the brain.

- **Genetic Mutation-** Huntington's disease is caused by a mutation in the ***HTT gene***, which provides instructions for making a protein called huntingtin.
- **Types**
  - **Adult onset** - This is the most common form. Symptoms usually begin after age 30.
  - **Early onset (juvenile Huntington's disease)** - Early onset affects children and teenagers. It's very rare.
- **Symptoms** - Huntington's disease affects you both physically and mentally.

*Huntington's disease affects an estimated 3 to 7 out of every 100,000 people, most often people of European ancestry.*

Physical symptoms	Mental symptoms
<ul style="list-style-type: none"> <li>• Uncontrolled movements like jerking or twitching (chorea).</li> <li>• Loss of coordination (ataxia).</li> <li>• Trouble walking.</li> <li>• Difficulty swallowing (dysphagia).</li> <li>• Slurred speech.</li> </ul>	<ul style="list-style-type: none"> <li>• Emotional changes like mood swings, depression and irritability.</li> <li>• Problems with memory, focus and multitasking.</li> <li>• Trouble learning new information.</li> <li>• Difficulty making decisions and reasoning.</li> </ul>

- **Treatment-**Presently, there is **no cure** for Huntington's disease, but treatments can help manage symptoms.

## 12.6 Juneteenth

Recently, Juneteenth was observed on June 19, in the United States of America.

- **About-** Juneteenth, derived from "June" and "nineteenth," commemorates the **abolition of slavery in the United States.**
- **History** - The day was first commemorated in 1865 after the Confederate state surrendered to end the Civil War.
- The enslaved African Americans informed of their freedom under President Abraham Lincoln's 1863 Emancipation Proclamation.
- The day is celebrated with community events such as parades, cookouts, prayer gatherings, and musical performances.
- **Symbol of Freedom-** It symbolizes freedom and the **end of slavery in the United States.**
- It signifies the triumph of the human spirit over slavery's brutal legacy and the ongoing struggle for civil rights and equality.
- It is also known as Freedom Day or Emancipation Day, is an American holiday celebrated annually.
- However, not all state governments recognise the holiday, which means state employees in those states will report to work.
- The legislature would have to pass bills to make it a permanent holiday.
- **Recognition-** Over the years, Juneteenth celebrations have grown in prominence across the United States.

## 12.7 Human African Trypanosomiasis (HAT)

Recently, Chad became the 51<sup>st</sup> country to eliminate the gambiense form of human African trypanosomiasis (HAT) globally.

- **About-** Human African trypanosomiasis, also known as sleeping sickness, is a **vector-borne parasitic disease.**
- It is also known as sleeping sickness.
- **Caused by** - Protozoans of the genus Trypanosoma, transmitted to humans by bites of tsetse flies (glossina), acquired the parasites from infected humans or animals.
- Only certain species of tsetse flies transmit the disease.
- **Variants of HAT-** There are **2 forms** of HAT, determined by the subspecies of the parasite involved

- Trypanosoma brucei gambiense - It accounts for 92% of reported cases.
- Trypanosoma brucei rhodesiense – It is responsible for the remaining 8%.
- **Endemic to** - It is endemic in sub-Saharan Africa.
- **Symptoms** - A swollen, discolored (red, purple or brown) bump that may be painful, recurrent fever, Chills, Headache, Muscle pain, Joint pain and Skin rash.
- **Treatment**- Treatment depends on what type of protozoa caused the infection and whether the infection has spread to other areas of the body.
- Early diagnosis and treatment can cure this disease.
- **Fatal** - It is potentially a fatal disease if left untreated.

## 12.8 UNESCO City of Literature

Recently, Kozhikode is officially declared as India's first UNESCO 'City of Literature'.

- **Agency**- UNESCO Creative Cities Network (UCCN).
- **Reason for selection**- Kozhikode combines a rich historic past with modern developments and is home to numerous artists and boasts over **500 functioning libraries**.
- Every year, the city of Kozhikode hosts the **Kerala Literature Festival**, one of the largest in Asia.
- The city is home to some of India's renowned writers, including Vaikom Muhammed Bashir, MT Vasudevan Nair, S. K. Pottekkatt, Thikkodiyar and P. Valsala Sanjayan, contributed to the diversity of Malayalam literature and culture.
- **State government's recognition**- The state government of Kerala announced to celebrate **June 23 as 'City of Literature' Day** from next year onwards.

World Cities Day is a United Nations observance day, observed on October 31<sup>st</sup> every year.

### UNESCO Creative Cities Network (UCCN)

- It is to promote cooperation among cities which recognized creativity as a major factor in their urban development.
- **Launch** - Year 2004
- **Eligibility** - UNESCO's member states and associate members
- **Update** - Time Once every 2 years
- **Total Cities (2023)** - 350 in more than 100 countries
- **UCCN creative fields** - Crafts and Folk Art, Design, Film, Gastronomy, Literature, Media Arts and Music.
- Other cities that received UNESCO recognition were: