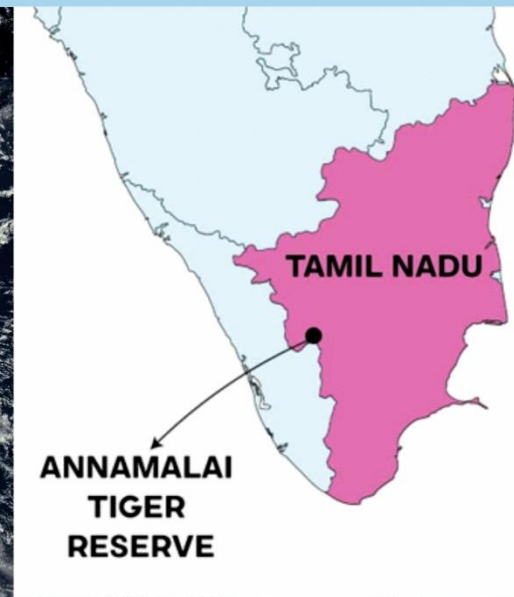


**GEOGRAPHY &
DISASTER
MANAGEMENT,
PLACES IN NEWS
PRELIMS SPECIAL**

KSG

An Institute For **IAS** Exam...

2024



**BOOKLET
8/8**

YEARLY COMPILATION

(MAY 2023 - DECEMBER 2023)

Jan to April 2024 will be released in mid May

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New Enigmatic Layer – E Prime Layer

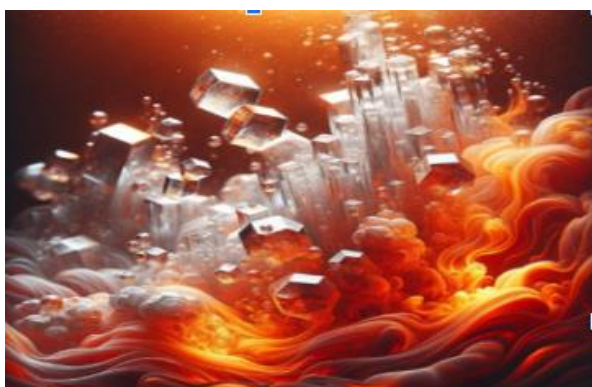
News Excerpt:

Earth's core's mysterious new layer formed due to surface water diving deep.

About Different Layers of Earth:

The Earth can be divided into one of two ways – **mechanically or chemically**.

- Mechanically, the study of liquid states can be divided into the **lithosphere, asthenosphere, mesospheric mantle, outer core, and inner core**.
- But chemically, it can be divided into **the crust, the mantle** (subdivided into the upper and lower mantle), **and the core** (subdivided into the outer and inner core).
- The **inner core is solid, the outer core is liquid, and the mantle is solid/plastic**. This is due to the relative melting points of the different layers (**nickel-iron core, silicate crust and mantle**) and the **increase in temperature and pressure** as depth increases.
- At the surface, the **nickel-iron alloys and silicates** are cool enough to be solid.
- In the **upper mantle**, the **silicates are generally solid** but localised regions of melt exist, leading to limited viscosity.
- In contrast, the lower mantle is under tremendous pressure and therefore **has a lower viscosity than the upper mantle**. The **metallic nickel-iron outer core is liquid** because of the **high temperature**. However, the intense pressure, which increases towards the inner core, dramatically changes the melting point of the **nickel-iron, making it solid**.



Silica crystals in the core

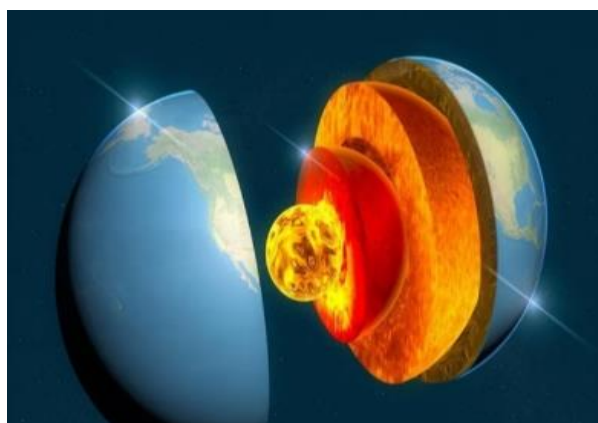
About E Prime Layer:

The E prime layer is located at the **outermost portion of the Earth's core**. It is the **consequence of "surface water penetrating deep into the**

planet," altering the composition of the metallic liquid core's outermost section.

How does this layer develop?

- According to the latest findings, **tectonic plates carrying surface water have moved it deep within the Earth** over billions of years.
- When this water reaches the core-mantle border, some **1,800 miles** below the surface, it causes **substantial chemical changes** that influence the core's structure.
- Scientists have discovered that **subducted water reacts chemically** with core components under extreme pressure.
- This reaction results in the **development of a film-like structure with a hydrogen-rich, silicon-depleted layer** at the outer core.
- This process **generates silica crystals**, which climb and merge into the mantle, influencing the overall composition.
- These changes in the **liquid metallic layer could result in lower density and altered seismic properties**, which would correspond to abnormalities recorded by seismologists.



Significance of the findings:

- Researchers believe that the **E prime Layer** may be **older than the inner core** as it took 1 billion years to reach the current thickness.
- The new finding is another sign that our current understanding of how the **outer core and mantle interact with one another** may be incomplete.
- In **September 2022**, the research team discovered that **leaking water could be reacting with large reservoirs of carbon in the outer core** to create gigantic diamond factories near the core-mantle boundary.
- The discovery expands experts' understanding of Earth's underlying systems, showing a larger and more complex global water cycle than previously thought.

Relative humidity

News Excerpt:

IMD intends to publish a Heat Index, or what the temperature feels like when humidity is factored in, for Delhi this summer.

About:

- There are three techniques to measure humidity, which is the quantity of moisture in the air around us.
- The most prevalent of these is **absolute humidity**, which is measured in kg/m³ and is the mass of water vapour in a certain volume of the air and water vapour mixture.
- The second is **specific humidity**, which is determined by dividing the mass of the moisture by the mass of the air. It is expressed as a dimensionless number, while it can also be stated in other comparable units, such as grams per kilograms.
- The third is "**relative humidity**" (RH) refers to the ratio between the actual amount of atmospheric moisture in the air and the amount that would be present if it were saturated.
- Relative humidity (RH) is a measure of how much water vapour is in a water-air mixture compared to the maximum amount possible.
- A **Psychrometer** is a tool with two thermometers and a chart to determine the final reading. Relative humidity can be calculated directly by modern, electronic psychrometers.

El Nino

News Excerpt:

According to the India Meteorological Department (IMD), there is a nearly 70% chance of an El Nino developing this monsoon, raising concerns that the weather phenomenon could threaten most emerging markets.

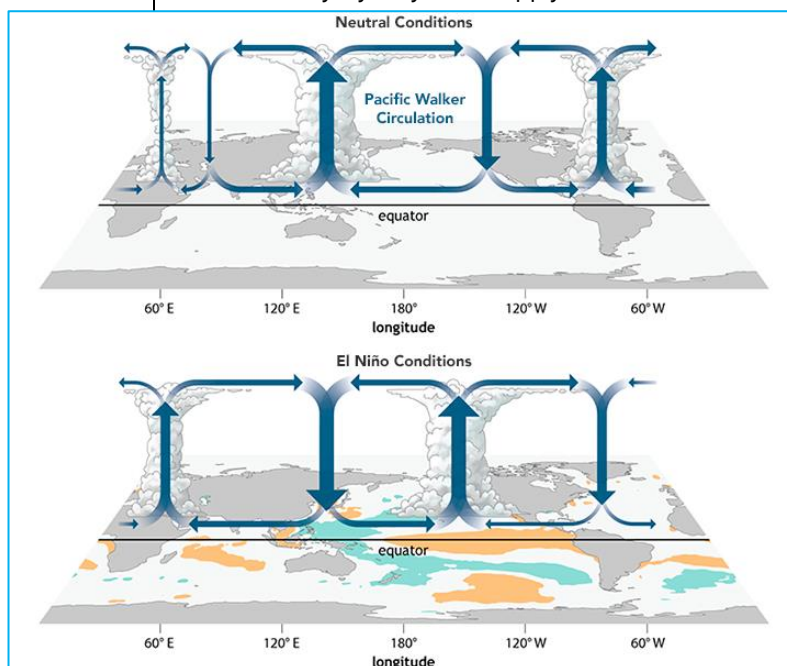
About El Nino:

- Peruvian fishermen discovered El Nino when they noticed unusually warm water off the coast of Peru.
- El Nino, which translates as "the little boy" in Spanish, was given the name by Spanish immigrants.

- El Nino quickly became associated with irregular and dramatic climate changes rather than only warming of coastal surface waters.
- El Nino occurrences do not follow a predictable cycle; they occur at two- to seven-year intervals.
- Scientists discovered that El Nino occurs in conjunction with the Southern Oscillation.
- The Southern Oscillation is a change in atmospheric pressure that occurs across the tropical Pacific Ocean.
- When the coastal waters of the eastern tropical Pacific warm (El Nino), the air pressure over the ocean falls.

India's El Nino:

- In 1997, India saw the largest El Nino on record, but the monsoon season was typical.
- Between 2001 and 2020, India experienced seven El Nino years, four of which resulted in droughts (2003, 2005, 2009-10, and 2015-16).
- Inflation was also caused by a 16%, 8%, 10%, and 3% fall in kharif or summer-sown farm output (which accounts for approximately half of the country's yearly food supply).



Sea Mount

News Excerpt:

Scientists discovered 19,325 additional seamounts after combing over new high-resolution data. A 2011 census identified 24,000 seamounts in the world's oceans.

About Sea Mount:

- A seamount is a mountain that exists underwater. They are generated by volcanic activity and are recognized as hotspots for marine life by experts. Seamount volcanoes, like land volcanoes, can be active, extinct, or dormant.
- Most seamounts occur near mid-ocean ridges, where the earth's tectonic plates move apart and allow molten rock to ascend to the seafloor. The Mid-Atlantic Ridge and the East Pacific Rise are the two most researched mid-ocean ridges on the planet.
- Some seamounts have also been discovered near intraplate hotspots, which are areas of intense volcanic activity inside a plate, and island arcs, which are oceanic island chains with volcanic and seismic activity.
- Seamounts are mapped using one of two methods: echo sounders or multibeam sonar on ships for topographic mapping, or satellite altimetry for gravity-field mapping.

India's First Water Metro

News Excerpt:

Recently, the Prime Minister of India has inaugurated India's first water metro in Kerala's Kochi.

Metro in India

- There are currently 16 operational rapid transit (popularly known as 'metro') systems in fifteen cities across India, with Delhi Metro being the largest.
- As of March 2023, India has 859 kilometers (534 miles) of operational metro lines and 16 systems.
- India's metro network is the fourth longest in the world, behind China, USA and South Korea. A further 568.15 km of lines are under construction.
- The first rapid transit system in India is the Kolkata Metro, which started operations in 1984. The Delhi Metro has the largest network in the entire Country.

First water metro:

- The Kochi Water Metro is a project being implemented by Kochi Metro Rail Corporation Limited (KMRL) with the assistance of a German funding agency, Kreditanstalt für Wiederaufbau.
- It includes boats that are hybrid, battery-powered, air-conditioned and disabled-friendly among other features.

- It will connect 10 islands around the city in Malabar Coast through battery-operated electric hybrid boats.
- The water metro will operate on water bodies like any other ferry or traditional boat service, but with modern facilities, enhanced safety and security measures.
- The project is envisaged with 38 jetties, and 78 boats, covering a distance of 76 km. The non-polluting, battery-powered boats are noise-free and produce low waves, unlike traditional ferries. Boat re-charging facilities have been provided in all terminals.

Summer Solstice

News Excerpt:

The longest day of 2021 for the northern hemisphere is on June 21. This day is referred to as the 'summer solstice', the longest (duration) day in the summer season.

About Summer Solstice:

- It occurs when the sun is directly over the Tropic of Cancer, or more specifically right over 23.5-degree north latitude.
- During the solstice, the Earth's axis around which the planet spins, completes one turn each day. It is tilted in a way that the North Pole is tipped towards the sun and the South Pole is away from it.
- Typically, this imaginary axis passes right through the middle of the Earth from top to bottom and is always tilted at 23.5 degrees with respect to the sun. Therefore, the solstice is that instant in time when the North Pole points more directly toward the sun than at any other time during the year.
- Summer solstice does not mean the earliest sunrise or latest sunset. Solstice means "sun standing still".
- The sun appears to linger at its highest point in the sky for the year at midday on the summer solstice.
- This day is characterised by a greater amount of energy received from the sun.
- According to NASA, the amount of incoming energy the Earth receives from the sun on this day is 30 per cent higher at the North Pole than at the Equator.
- When the Northern Hemisphere is tilted toward the sun, sunlight falls at a steeper angle on it to cause the hot months of summer.

- Summer solstice is very closely linked to the seasons, and seasons are directly linked to human behaviour and activity and resources. In India, intense heating invites monsoon during summer solstice which has direct impact on agriculture and the economy.
- Summer Solstice also changes the duration of Day and Night in the respective hemisphere. The further north one moves from the equator, the more light one receives during the summer solstice. At the Arctic Circle, the sun never sets during the solstice.

Coronal Mass Ejections

News Excerpt:

Recently, a new and large sunspot is emerging on the southeastern part of the star and two solar storms are headed towards the Earth. According to NASA, The Earth is set to get a "double punch" of solar storms soon and this could supercharge auroras in the regions where they are visible.

About Coronal Mass Ejections:

- Coronal Mass Ejections (CMEs) are large-scale eruptions of charged particles (plasma) and magnetic fields from the solar atmosphere into space. They can disrupt a range of ground- and space-based technologies and satellites on Earth.
- When CMEs propagate, several processes can exchange energy (electrical, kinetic, potential, thermal, and so on.), thereby heating or cooling the plasma.
- The corona is structured by strong magnetic fields. Sometimes, these fields are closed, often above sunspots. The confined solar atmosphere can suddenly and violently release bubbles of gas and magnetic fields, or CMEs.
- CMEs can sometimes contain billions of tons of matter that can be accelerated to speeds of millions of miles per hour. These streams of solar material cut through the space in between planets and impact any planet or spacecraft in its path.
- It could cause some weak power grid fluctuations and have a minor impact on satellite operations. Migratory animals could be affected by the storm as well.

Star Rating Registration process for Mines

News Excerpt:

Recently, the Coal Ministry announced the Commencement of the Star Rating Registration process for Coal and Lignite Mines for FY 2022-23.

Star Rating Registration process for Mines:

- The process started in order to foster competitiveness among mines and recognize their outstanding performance based on compliance with statutory provisions, adoption of advanced mining technology and economic achievements.
- **The Star Rating policy aims** to evaluate mines based on various factors across **seven key parameters** namely,
 - **Mining Operations,**
 - **Environment-related parameters,**
 - **Adoption of Technologies,**
 - **Best Mining Practices,**
 - **Economic performance,**
 - **Rehabilitation & Resettlement,**
 - **Worker-related Compliance and Safety & security.**
- The Coal Ministry aims to elevate the overall performance and sustainability of coal and lignite mining in the country by driving competitiveness and promoting responsible mining practices.

Exploration of coal and lignite scheme

News Excerpt:

The Cabinet Committee on Economic Affairs (CCEA) has approved the continuation of Exploration of Coal and Lignite Scheme which entails an estimated expenditure of ₹2,980 crore.

- The time period for the extension is from 2021-22 to 2025-26 co-terminus with the 15th Finance Commission cycle.
- Under the scheme, exploration for coal and lignite is conducted in two broad stages.
 - For promotional exploration the outlay is Rs 1650 crore.
 - For detailed drilling in areas other than that of Coal India Ltd is Rs 1330 crore.

Dynamics of Coal Sector in India:

- As per the draft report of Niti Aayog, the coal demand is expected to remain in the range of 1,192-1,325 million tonnes by 2030.
- A plan to increase all India coal production to the level of 1 BT by 2023-24 and coal production by

Coal India Limited (CIL) to 1 BT by 2024-25 has been prepared.

- CIL has taken steps to upgrade the mechanized coal transportation and loading system under 'First Mile Connectivity' projects.

Shifting in Earth's Axis

News Excerpt:

Excessive Groundwater extraction shifted the Earth's axis.

About:

Humans pumped out around 2,150 gigatons of groundwater between 1993 and 2010, the study says that the planet's axis has drifted at the rate of **4.36 cm per year towards the east**.

Study:

- 'Drift of Earth's Pole Confirms Groundwater Depletion as a Significant Contributor to Global Sea Level Rise 1993–2010'
- The study also noted that the groundwater extraction from North America and northwestern India, both located at the Earth's midlatitudes, had an **outsized impact** on the polar motion in comparison to the extraction taking place in poles or equators.
- Mass change on the equator or pole cannot affect change in the rotational pole. Rotational pole change is actually associated with the moment of inertia of the Earth, which is sensitive to mid-latitude mass change.
- The water sucked out from the ground for irrigation and meeting the world's freshwater demands, eventually, goes into the oceans.
- Groundwater extraction is one of the major contributors to the global sea level rise. Study shows, estimated that groundwater extraction raised global sea levels by 6.24mm between 1993 and 2010.

Static Info - Earth spins around an imaginary axis which passes through the north pole, its center of mass and the south pole.

- Scientists for years have known that the poles and the axis keep shifting naturally as the mass distribution in and on the planet changes. This phenomenon is known as "**polar motion**".
- There are several other reasons responsible for polar motion like ocean currents and even hurricanes.

Phosphine Gas in Venus Atmosphere

News Excerpt:

Indication of presence of Life on Venus.

About:

Phosphine Gas indicates biological activity which was found in Venus's atmosphere using the James Webb Space Telescope (JWST) at Mauna Kea Observatory, Hawaii

- Phosphine on Earth is developed by bacteria that live in very low-oxygen environments.

Other possibilities - Researchers noted that while the presence of phosphine could indicate a possible **biosignature**, it could also be caused by other processes that are not yet fully understood.

Shelf Clouds

News Excerpt:

Clouds that resemble a majestic snow-covered mountain seen at Haridwar.

About:

Shelf clouds are a type of **Arcus cloud**, characterized by their impressive and intimidating appearance.

- These unique cloud formations often resemble a large, horizontal wedge or shelf extending from the base of a thunderstorm or cumulonimbus cloud.
- It is a shelf hanging from the sky, a 'shelf cloud' is a wide, low cloud that appears before a big storm.
- They **don't cause** tornadoes or extreme weather conditions.
- They often appear ahead of powerful thunderstorms with heavy rain, strong winds, and occasionally hail or tornadoes.

Formation:

- When a cold downdraft from a cumulonimbus cloud comes in contact with the ground, the cold air may spread rapidly along the ground, pushing the existing warm moist air upwards.
- As the cold air comes down, it pushes warm air upward, causing condensation and therefore cloud formation. This process creates a horizontal shape and takes the appearance of a shelf cloud.

Arcus Clouds:

An arcus cloud is a low, horizontal cloud formation, usually appearing as an accessory cloud to a cumulonimbus.

- Roll clouds and shelf clouds are the two main types of arcus clouds.

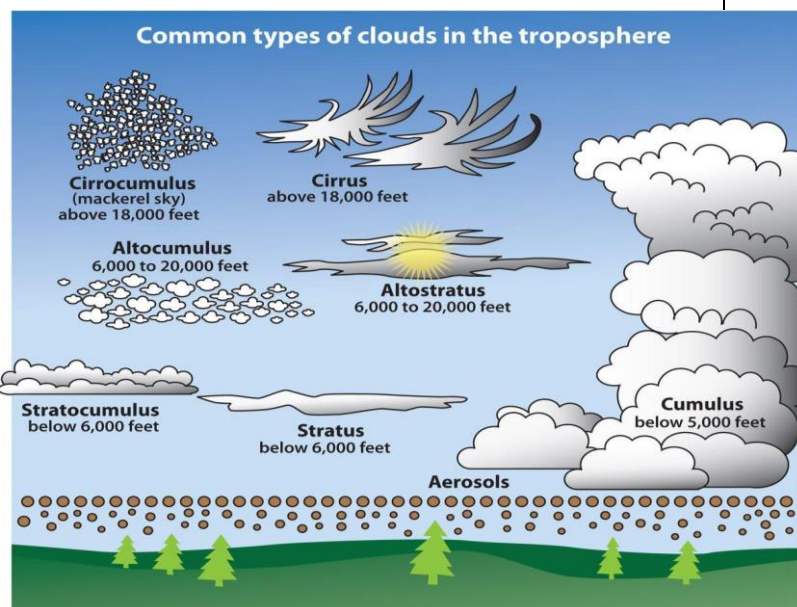
Global Warming and Cirrus Clouds

News Excerpt: According to a study, a significant statistical correlation occurs between thunderstorms

around the world and the formation of wispy cirrus clouds, resulting in increased global warming.

Features of Cirrus Clouds:

- White or light grey **delicate, feathery clouds, made mostly of ice crystals** originating from the freezing of supercooled water droplets.
- **Thin and wispy** in appearance, this **shape comes from wind currents**, twisting and spreading the ice crystals into filaments or strands.
- They are **commonly known as "mare's tails"** because they are **shaped like the tail of a horse**.
- Typically found at heights greater than 20,000 feet (6,000 metres).
- They generally occur in fair weather and point in the direction of air movement at their elevation.



Other Main Cloud Types:

- **Cumulus clouds:**
 - They are **puffy clouds** with a distinct **white or light grey appearance**.
 - They have a **relatively short life** cycle. Their bottom is fairly close to the ground.
 - Cumulus clouds that do not get very tall are indicators of fair weather. If they do grow tall, can turn into thunderstorms.
- **Stratus clouds:**
 - They are **low-level cloud formations** characterised by their uniform and featureless appearance.
 - They look like **flat sheets of clouds** covering the sky like a **continuous, greyish or whitish** blanket and are associated with overcast or cloudy weather conditions.

1st GSI Survey of Siachen

News Excerpt:

In June 1958, V. K. Raina, a top Indian geologist, led the first **Geological Survey of India** expedition to the Siachen glacier.

Objective:

Study of the Himalayan glacier systems which included snout monitoring of the glaciers in the Sikkim Himalayas, Kumaon Himalayas as well as the Kashmir Himalayas.

History- Point NJ 9842 was the last mutually demarcated point between India and Pakistan as per the **Karachi ceasefire agreement** of 1949 and also the point where the Line of Control of the **Shimla Agreement** ends.

- Karachi ceasefire agreement of 1949 under which they had clearly delimited the entire cease fire line right up to the glaciers and agreed to mutually demarcate it.
 - **Operation Meghdoot 1984** - launched by Indian Defence Forces at Siachen Glacier against adversary Pakistan.
- **Relevance in present-** Pakistan's claim of the Siachen region falling on its side of the ceasefire line is rejected as Pakistan never objected to the survey which was widely published and published.

Bhu-Vision

News Excerpt:

Bhu-Vision, an IoT based automated soil testing & advisory platform was officially launched at AICRP (ICAR-IIRR), Hyderabad.

About:

- Bhu-Vision is also known as KRISHI-RASTAA Soil Testing System. It was jointly developed by ICAR-IIRR (Indian Institute of Rice Research) and Krishi Tantra (Agri-tech startup).
- It seamlessly conducts 12 key soil parameter tests in just 30 minutes, providing quick, accurate results directly to farmers on their mobile device.
- It's a portable and automated system. It provides all macro and micronutrients, pH, organic carbon, EC, and microbial count reports within minutes. It requires no expertise to operate. The system generates reports and is a cloud-based interpretation.

Atlantic meridional overturning circulation (AMOC)

News Excerpt:

New findings published in Nature Communications suggest the Atlantic meridional overturning circulation, or Amoc, could collapse within the next few decades — maybe even within the next few years — driving European weather to even greater extremes.

About AMOC:

- The AMOC is a system of ocean currents that circulates water within the Atlantic Ocean, bringing warm water north and cold water south.
- This circulation brings warmth to various parts of the globe and carries nutrients necessary to sustain ocean life.
- The entire circulation cycle of the AMOC, and the global conveyor belt, is quite slow. It takes an estimated 1,000 years for a parcel (any given cubic meter) of water to complete its journey along the belt. Even though the whole process is slow on its own, there is some evidence that the AMOC is slowing down further.

What if AMOC continues to slow:

- **Far-reaching climate impacts:** For example, if the planet continues to warm, freshwater from melting ice at the poles would shift the rain belt in South Africa, causing droughts for millions of people.
- **Rise in sea level:** It would also cause sea level rise across the U.S. East Coast.
- **It might cause circulation collapse** – This would mean even greater climate chaos across Europe.

Benefits of AMOC:

- AMOC helps keep Europe warm and stable.
- It helps to disperse heat and energy throughout the earth (heat budget).
- By absorbing and storing carbon from the atmosphere, it serves as a carbon sink.

Southern Annular Mode (SAM)

News Excerpt:

Indian National Centre for Ocean Information Services (INCOIS) has discovered that the Southern Annular Mode (SAM), a vital climate pattern, is pivotal in shaping the **sea conditions across the Indian Ocean.**

About Southern Annular Mode (SAM):

The SAM refers to the **(non-seasonal) north-south movement of the strong westerly winds** that blow **almost continuously** in the **mid-to-high latitudes** of the southern hemisphere.

- This belt of westerly winds is also associated **with storms and cold fronts moving west to east**, bringing rainfall to southern Australia.
- These are also called **Antarctic Oscillation.**
- The SAM has three **phases: neutral, positive and negative.**
- Each positive or negative SAM event lasts **one to two weeks**, though longer periods may also occur.
- The time frame between positive and negative events is random but typically ranges from **a week to a few months.**
- The SAM's effect on rainfall **varies greatly depending on season and region.**

Phases of SAM:

Positive Phase:

- Band of westerly winds contracts toward Antarctica
- Higher pressures over southern Australia
- Can relate to stable, dry conditions.

Negative Phase:

- Band of westerly winds expands towards the Equator
- More (or stronger) low-pressure systems over southern Australia
- Can mean increased storms and rain.

Impact of SAM across the Indian Ocean:

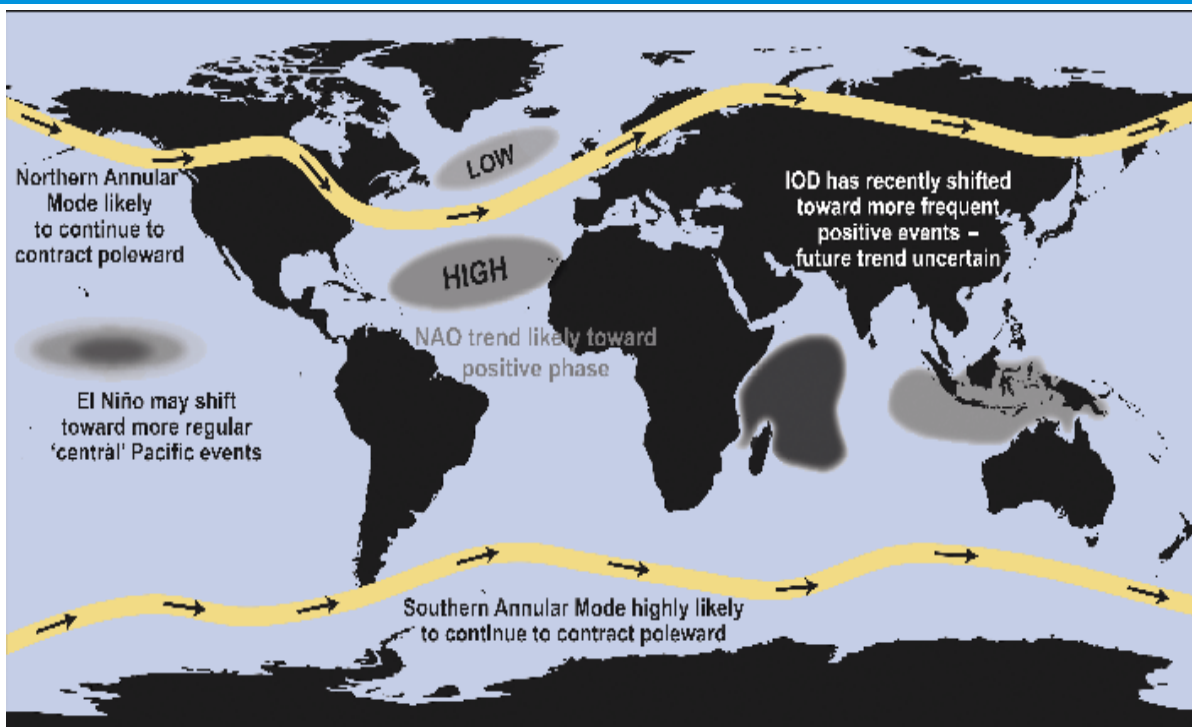
- SAM impact expands beyond swells, influencing the Northern Indian Ocean wave climate by altering wind seas through **Hadley cell (HC) circulation shifts.**

During a Positive SAM phase:

- A cyclic pattern of warm sea surface temperature anomalies can be seen, and strong winds cause increased wave activity in the Indian Ocean.

ESSO-INCOIS:

- It was established as an **autonomous body** in **1999** under the **Ministry of Earth Sciences (MoES)** and is a unit of the **Earth System Science Organization (ESSO).**
- It is to provide **ocean data, information and advisory services to society**, industry, the government and the scientific community through sustained ocean observations and constant improvements through systematic and **focused research in information management and ocean modelling.**



- Since the early 1990s, changes in the atmospheric fields have evoked anomalous **vertical motion over the continent and the Indian Ocean**, enhancing the southerly cross-equatorial flow by **increased land-sea thermal contrast**, thereby increasing **decadal rainfall** in the region.
- A new swell generation region along the East African coast caused an **increase in wave height in the Arabian Sea**.

During a Negative SAM phase:

- The eastern tropical southern Indian Ocean becomes the central region for generating swells, resulting in reduced wave heights in the Arabian Sea.

Significance of the Study for the Indian Ocean:

- It could help the country with better coastal planning, resource management, and **disaster preparedness**.
- It can also contribute to advancing the **accuracy of wave predictions**.
- It can help identify **fair weather windows**, thus benefitting the **fisherfolk community and blue economy stakeholders** such as shipping, maritime boards, and the oil industry for their multi-million dollars' worth of operations at sea.
 - Oil and shipping industries can utilize these fair windows for their operations, **thus significantly impacting the**

blue economy activities on the Indian coast.

- It is important to study ocean surface waves as they are crucial in shaping coastal processes and influencing numerous aspects of society, including **shoreline erosion, sediment transport, coastal engineering, and recreational activities**.

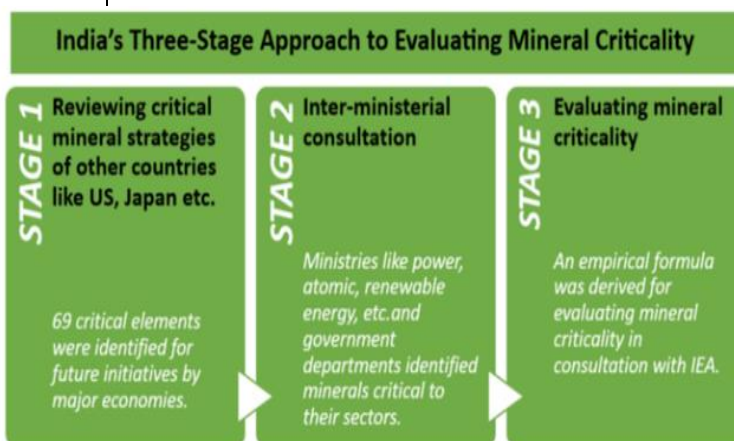
Exploration projects for critical minerals by GSI

News Excerpt:

122 critical minerals exploration projects were taken up by the Geological Survey of India (**GSI**) in FY24.

About:

- India is **import-dependent** for critical minerals needed to power **green technologies, aviation, defence manufacturing**.



- First-ever **critical minerals list**, identifying **30 key critical minerals** crucial to the nation's economic growth and technological development was released by government. The list includes **17** rare earth elements (**REEs**) and **6** platinum-group elements (**PGE**).
- **Examples** - Antimony, Beryllium, Bismuth, Cobalt, Copper, Gallium, Germanium, Graphite, Hafnium, Indium, Lithium, Molybdenum, Niobium, Nickel, PGE, Phosphorous, Potash, REE, Rhenium, Silicon, Strontium, Tantalum, Tellurium, Tin, Titanium, Tungsten, Vanadium, Zirconium, Selenium, and Cadmium.

Measures taken:

- Khanij Bidesh India Ltd (**KABIL**), of three public-sector undertakings — National Aluminium Company, Hindustan Copper, and Mineral Exploration Company was established. Its objective is to **identify and acquire overseas mineral assets** of critical and strategic nature. Projects are being undertaken in Argentina, Australia, etc.
- **Domestic:** Increased public and private investments and adoption of advanced technologies in exploration, mining, and processing facilities.

Exploration projects:

- As per the Geographical Survey of India's (**GSI**) **field season 2023-24 report**.
- **Lithium exploration projects:** Korba (Chhattisgarh); South Garo Hills and East Garo Hills (Meghalaya); and Jammu, Ramban, Resai, Rajoury and Udhampur (Jammu and Kashmir). **India's only Lithium** has been found in **Resai (J&K)** to the tune of **5.9 million tonnes**, recently.
- Over **50 explorations** are on for rare earth elements (**REE**). This, incidentally, is one of GSI's biggest exploration activities in the segment in recent times.
- **Vanadium exploration projects:** Madhya Pradesh, Himachal Pradesh, Arunachal Pradesh and Kerala.
- **Niobium exploration projects:** West Bengal (Purulia) and Rajasthan (Jhunjhunu and Sikar).

National Geoscience Awards

News Excerpt:

President of India presented the National Geoscience Awards-2022.

About:

- It aims to honour **individuals and teams** for extraordinary achievements and outstanding contributions in various fields of geosciences. It is instituted by the **Ministry of Mines**.
- There are **three categories** of awards under National Geoscience Awards: National Geoscience Award for Lifetime Achievement, National Geoscience Award and National Young Geoscientist Award.
- Geoscience, includes the **study of natural disasters** like landslides, earthquakes, floods, and tsunamis.

Morocco Earthquake and High Atlas Mountains

News Excerpt: The epicenter of the recent devastating earthquake in Morocco was in the High Atlas Mountains, about 71 kilometres southwest of Marrakesh.

About the High Atlas Mountains:

- They are a prominent **mountain range in North Africa**, primarily located in Morocco.
- They are part of the Atlas Mountain Range, stretching across Morocco, Algeria, and Tunisia. It extends north eastward for 1000 km from the Atlantic Coast to the Moroccan-Algerian border.
- **Geography:**
 - They are characterised by **rugged and steep terrain** and are known for their **high peaks, deep valleys, and extensive plateaus**.
 - It includes **several peaks over 4,000 metres** (13,000 feet) in elevation, with **Mount Toubkal being the highest at approximately 4,167 metres** (13,671 feet).
- **Cultural Significance:** The region is inhabited by **Berber communities** and traditional Berber villages throughout the mountains.
- **Climate Divide:** Its saw-toothed **Jurassic peaks** act as a weather barrier between the mild Mediterranean climate to the north and the encroaching Sahara to the south.

About Morocco:

- Morocco with its capital Rabat is located in the northwest corner of Africa, bordered by the North Atlantic Ocean and the Mediterranean Sea with a significant part covered by the Sahara Desert.
- It shares land borders with Algeria to the east and southeast and Western Sahara to the south. The High Atlas Mountains

separate the mild coastline from the harsh Sahara.

- Climate: Ranging from Mediterranean along the coast to desert in the interior experiencing hot summers and mild winters.
- Government: A constitutional monarchy with an elected parliament.
 - King Mohammed VI has been the reigning monarch since 1999.
 - It was a French protectorate between 1912 and 1956.

"Below Normal" Indian Monsoon 2023 Impacting India's Economy

News Excerpt:

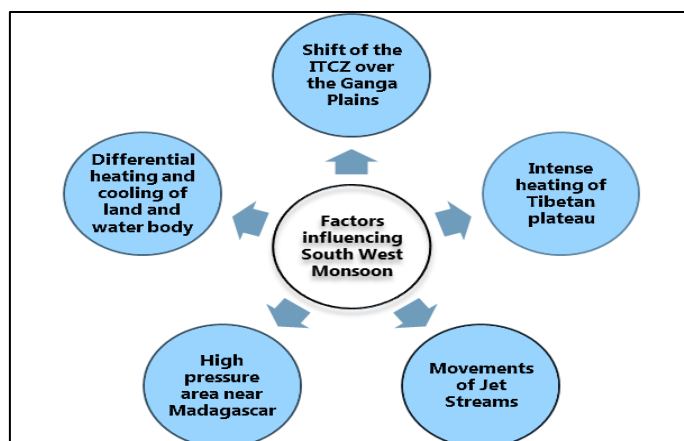
For the first time in four years, **India experienced a 'below normal' Southwest Monsoon**. There was a **rainfall deficit of 6%** compared to the long-term average of 50 years.

- Around 31% of India's landmass received below-normal rainfall. Six states, Assam, Manipur, Mizoram, Jharkhand, Bihar and Kerala, recorded the highest deficit. The rainfall pattern is said to be impacted because **the current year is El-Nino**.

Impact of Monsoon on Indian Economy:

- **Agriculture:** It sustains the livelihood of 61% of Indian farmers dependent on monsoons. 55% of India's net sown area (139.42 million ha) is rain-dependent and supports 34 crops out of 40 major crops.
- **Food Security:** Crops like wheat and rice are water-intensive crops that heavily rely on monsoons for higher agricultural output. Sufficient production will help stabilize prices and prevent the risk of food shortage.
- **Employment Generation:** As per the Periodic Labour Force Survey (PLFS) 2020-21 report, 46.5 % of total persons are engaged in agricultural activity. A successful monsoon season would create more demand for employment in the agriculture sector.
- **Inflation Control:** An adequate food supply will make essential commodities affordable for consumers, which will help to control inflation.
- **Hydroelectric Power Generation:** A good monsoon replenishes water reservoirs and aquifers, which is crucial for hydroelectric power generation.
 - **22%** of electricity consumed in India is through Hydro Power Plants.
- **Economic Growth:** Agriculture contributes about 19% to India's GDP.

- **Export Opportunities:** Agricultural surplus due to good monsoons will boost India's foreign exchange reserves.
 - In 2022, India's agriculture exports touched a historic high of USD 50 billion.
 - Also, India is the world's largest sugar-producing nation and second largest rice and wheat-producing nation.
- **Impact on Balance of Trade:** A favourable monsoon boosts production and results in a positive balance of trade, whereas failure of a monsoon causes a decline in the government's revenue along with increasing expenditure, leading to a negative balance of trade.
- **Impact on the Rural Economy:** About 800 million people live in villages and depend on agriculture and allied activities. Poor monsoon can lead to drought-like situations affecting the livelihood of rural households.
 - Droughts would result in increasing NPA, and the inability to repay the loans would increase farmer suicides.



Government Initiatives to Tackle Failure of Monsoons:

- **Climate Prediction Systems:** Under the **National Monsoon Mission (NMM)**, state-of-the-art weather and climate prediction models are developed to improve precision monsoon prediction over India on all time scales.
- **Improving Irrigation Facilities:** Pradhan Mantri Krishi Sinchayee Yojana (**PMKSY**) enhances physical access to water and expands cultivable areas under assured irrigation to improve on-farm water use efficiency.
- **Energy Subsidies:** Government initiatives like **PM KUSUM** ensures energy security for farmers and reduce the over-dependence of diesel-powered plants.

- **Price Stabilization Schemes to Manage Inflation:** Operation Greens (TOP), PM Kisan Sampada Yojana, Minimum support price, Price stabilization fund provide a strategic buffer for essential Agri-horticulture commodities and moderate the impact of price fluctuations.
- **Creating Artificial Rain:** Recent **Cloud seeding technology** tests conducted by IIT-Kanpur can help to mitigate the rain deficit during the failure of monsoons.
- **Ground Water Replenishing:** Launching of **Atal Bhujal Yojana**, a community-led sustainable groundwater management to improve the groundwater resources in stressed areas.
- **Skill Development for Reducing Over-reliance on Agriculture:** Initiatives like PM Kaushal Vikas Yojana, Capacity building schemes, Rozgar Mela, PM Kaushal Vikas Kendra are a part of ensuring the supply of skilled labour for the manufacturing sector.
- **Research and Development in Agriculture:** Development of GM crops, and a new variety of wheat crops that will withstand harsh climatic conditions.

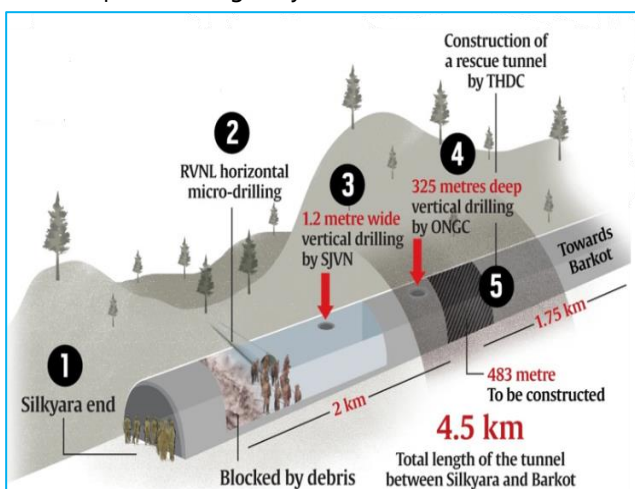
Rat Hole Mining

News Excerpt:

Recently, 41 workers were rescued from the collapsed **Silkyara tunnel** using the technique of **rat hole mining**.

About Rat Hole Mining:

- It is a type of **manual drilling done by professional personnel** that is particularly frequent in Meghalaya.



- The term "**rat hole**" refers to **narrow pits** excavated into the ground that are usually only large enough for one person to descend and get coal from.

- After excavating the pits, the miner descends into them using a rope and bamboo ladders.
- This technology is typically **used to remove coal** and is exceedingly dangerous.
- Many countries have made it illegal due to an increase in the number of miners dying from asphyxiation, a lack of oxygen, and hunger.
- There is **another type of rat mining**:
 - A rectangular hole of 10 to 100 sqm is formed, and a vertical pit of 100 to 400 feet depth is dug through it.
 - Once the coal seam is discovered, horizontal rat-hole-sized tunnels are built through which miners can extract the coal.



Why is rat-mining banned?

- This rat-mining practice has **received harsh condemnation** due to the **hazardous working conditions, environmental degradation, and frequent accidents** resulting in injuries and fatalities.
- According to experts, the mines are often unregulated, without safety precautions such as sufficient ventilation, structural support, or worker safety gear, resulting in a highly hazardous situation for the rat miners.
- Furthermore, mining can lead to soil degradation, deforestation, and water contamination.
- The **National Green Tribunal in 2014 imposed a ban** on coal mining using the **rat-hole mining** technique in Meghalaya.

India gets ready with rare earth R&D push

News Excerpt:

The **Ministry of Mines, Government of India (GoI)** has invited research and development (R&D) proposals for mining technology, including deep-sea and green mining to secure supplies of vital and rare earth minerals.

Objective:

- To focus on critical, rare earth and deep-seated minerals like **lithium, nickel, and tungsten** over the next three years.

- To develop sustainable solutions using technologies like **robotics, the Internet of Things (IoT), artificial intelligence, and machine learning** for the exploration, prospecting, and mining of strategically important minerals found in challenging locations.
- This initiative would be directed toward **five broad heads** as shown in the diagram.



Steps being taken for Mining Technology:

- The government has **revised the mining legislation (Mines and Minerals (Development and Regulation) Amendment Act, 2023)** to remove various atomic and critical minerals, including lithium, from the restricted list.
 - It also allowed the **private sector to participate** in off-shore and deep-seated mining, including for **rare earth minerals** critical for industrial use.
- The **critical mineral project** includes the development and establishment of technologies for the **recovery of nickel and lithium from scrap batteries**.
- Projects have also been invited from institutions for the development of a **low-cost automated system able to separate aluminium alloys** using **laser-induced plasma** to analyze the composition of materials for rapid and accurate sorting and identification of metals in complex mixtures.
- The Mines ministry is also **focusing** on the development of **energy recovery systems** that would help in making mining more sustainable.
 - In this, the projects would focus on the development of **low-cost heat exchangers or regenerative burners**, which can support the metal recycling industry in tackling energy losses by capturing and repurposing waste heat generated during the recycling process.
 - It will also involve process and technology development for the **production of hydrogen from waste**.
- The projects would also design and develop **pit furnaces with energy efficiency of more than 40%**.
- It has been decided that all R&D project proposals should have mandatory **20% participation** from the **Micro, Small and Medium Enterprises (MSME) sector** as a financial contribution or at least 15% cash contribution.

About Rare Earth Elements (REEs):

- The REEs are a group of 17 elements.
- They are **moderately abundant in the earth's crust** but need to be concentrated enough to make them economically exploitable.
- It finds **key applications** in **defence, electronics, energy systems**, etc. such as magnets, battery materials as well as sustainable energy systems.
- REEs are characterized by **high density, high melting point, high conductivity, and high thermal conductance**.
- The rare earths occur in many minerals and are recoverable as by-products from phosphate rock and from spent uranium leaching. **In India, monazite is the principal source of rare earths and thorium.**
- **China dominates the REE market as of now.**

REE in India:

- The Rare Earth (RE) resources in **India** are reported to be the **fifth largest in the world**.
- Indian resource is significantly lean w.r.t. grade and it is tied with radioactivity making the extraction long, complex, and expensive.
- Indian resources contain **Light Rare Earth Elements (LREE)** while **Heavy Rare Earth Elements (HREE)** are not available in extractable quantities.
- **13.07 million tonnes** in-situ monazite (containing ~55-60% total Rare Earth Elements oxide) resource occurs in the coastal beach **placer sands** in parts of **Kerala, Tamil Nadu, Odisha, Andhra Pradesh, Maharashtra, and Gujarat** and the inland placers in parts of **Jharkhand, West Bengal, and Tamil Nadu**.
- More than 80 % of the usage of RE is in permanent magnets which require **Magnetic**

REE i.e., Neodymium, Praseodymium, Dysprosium, and Terbium.

- These are precious REEs since they find use in energy transition initiatives.
- **High-value REEs** are **Dysprosium and Terbium**, which are **not available in extractable quantities in Indian reserves** already under exploitation.
- **The minability of REE** is further **constrained due to CRZ regulations**, Mangroves, Forests, and inhabitation.
- While **India has existing facilities from mining to separation and refining in oxide form** and has also **developed the capability of metal extraction**, further **industrial-scale facilities** (intermediate) from alloy, magnet, etc. still need to be made available.
 - Though after metal extraction, the sector is under the free category, the industry in the intermediate segment is yet to be established due to **the non-availability of technology**.

built immediately upstream to bypass the dam construction site.

- Once the dam is ready, the **diversion tunnels (DTs)** are closed, and water starts to flow through the multiple spillways — gated holes in the dam wall that ensure regulated release.
- **In a hydel project**, tunnels are also built to carry water from the reservoir to the powerhouse. The water turns the turbines and then goes back into the river. Once the powerhouse is operational, this becomes the main path of the water, and the spillways are used occasionally.

Subansiri Running Dry

News Excerpt:

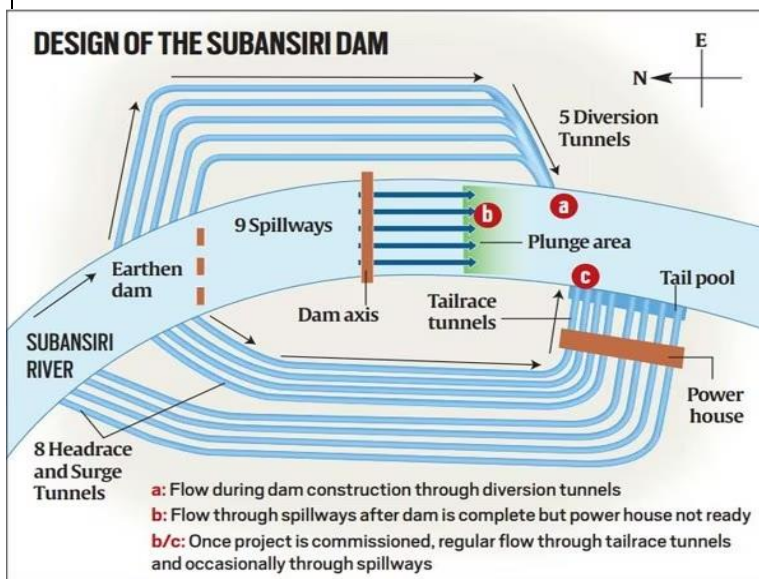
Recently, the flow downstream of Subansiri River was **“highly reduced”** — to an estimated 5-10 cubic metres per second (cumecs) — after a landslide blocked the only Diversion Tunnel in use.

Key points:

- On October 27, 2023, the long-delayed **Subansiri Lower Hydroelectric Project** on the **border of Arunachal Pradesh and Assam** suffered its latest setback after a large part of the hill on the left side of the dam collapsed into its reservoir.
- The deposits blocked the only functional diversion tunnel and stopped the flow of water downstream of the dam into the **Subansiri River, a major tributary of the Brahmaputra**.
- After work resumed, the deadline for commissioning the first two of the project’s eight **250-MW units** has been extended to **March 2024 now**.

How does a dammed river flow?

- Typically, once a location is selected for a dam, a **temporary earthen barrier (coffer dam)** and a few diversion tunnels are



The ‘mistake’ NHPC committed:

- **The Central Electricity Authority (CEA), the statutory body** that advises the government on policy relating to electricity systems, recommended in April 2022 that the impact of the DTs on the slope stability of the project site should be examined.
- NHPC Ltd, implementing the **Subansiri Lower Project**, ignored the recommendation. In April 2023, it said that **“no more assessment of landslide hazards and their impact was needed”** and that **“necessary stabilisation measures have been carried out”**.

NHPC

- NHPC Limited is the largest hydropower development organization in India, with capabilities to undertake all the activities from conceptualization to commissioning of hydro projects.
- NHPC Ltd. (Formerly known as National Hydroelectric Power Corporation Ltd.) was incorporated in 1975 under Companies Act, 1956.
- The company is mandated to plan, promote and organize an integrated and efficient development of power in all its aspects through Conventional and Non-Conventional Sources in India and abroad.
- NHPC has also diversified in the field of Solar & Wind energy development etc.

Reasons for a landslide:

- Three main factors—**geology, morphology, and human activity**—are responsible for landslides.
- **Geology** describes the properties of the substance. It's possible that the rock or earth is brittle or weak or that the stiffness and strengths of the various layers vary.
- **The structure of the land** is referred to as **morphology**. For instance, landslides are more likely to occur on slopes that have lost their flora due to fire or drought.
- **Construction and agriculture are examples of human activity** that raises the possibility of a landslide.
- **Rainfall, snowmelt, variations in water levels, stream erosion, variations in groundwater, earthquakes, volcanic activity, disturbance by human activity, or any combination of these events can cause landslides on slopes that are already about to move.**
 - **Underwater landslides** can also be caused by vibrations from earthquakes and other events.

The Subansiri Lower Hydro Electric Project:

- The construction work of the **Subansiri Lower Hydro Electric Project** commenced in **January 2005**.
- After obtaining forest clearance in October 2004, faced multiple bottlenecks since its inception causing huge delay in commissioning the mega power plant.
- The capacity of lower Subansiri Hydroelectric Project is **2000 MW**.

British project DEFIANT

News Excerpt:

In the project **DEFIANT**, the researchers are studying and measuring the thickness of sea ice at the remote Rothera Research Station of the British Antarctic Survey.

About:

- **Project DEFIANT (Drivers and Effects of Fluctuations in Sea Ice in the Antarctic)**, embarks on one of the most ambitious **observational campaigns** aimed at understanding **Antarctic sea ice variability**.
- The knowledge gained from these observations will help to develop **new ocean and climate models** in order to represent Antarctic sea ice processes more accurately.

- The analysis of these improved models will allow a better understanding of the underlying **drivers of the sudden decrease** in Antarctic sea ice.
- By developing new observations, new satellite records, and new models, DEFIANT will deliver a major advance in understanding the Antarctic sea ice system and its wider impacts on **global climate**.

Two New Coral Reefs in Galapagos Islands

News Excerpt:

Recently, Scientists have discovered **two pristine coral reefs** in the waters surrounding the **Galapagos Islands**.

About the newly discovered Coral Reefs:

In the Galapagos Islands, scientists discovered two new coral reefs and two previously unexplored seamounts.



- The **largest reef is 800 metres** long, approximately around eight football fields and the **second one is 250 metres** long.
- The **SuBastian Remotely Operated Vehicle (ROV)** documented **white polyps** growing from branches of precious coral (Corallium) as it descended at a spot on the northern side of **Isabela Island**.

About Coral Reefs:

- Coral reefs are among the world's most diversified ecosystems.
- **Coral polyps**, the invertebrates largely responsible for reef formation, come in a variety of shapes and sizes, including **huge reef-building colonies, graceful flowing fans, and even small, solitary species**.
- Corals that reside in shallow water have a symbiotic relationship with photosynthetic algae called **zooxanthellae** that live in their tissues.
 - The coral provides a safe environment as well as the substances required by zooxanthellae **for photosynthesis**. In exchange, the algae create carbohydrates and oxygen, which the coral needs for food.

About Sea Mounts:

- Seamounts are underwater mountains that rise hundreds or thousands of feet from the seafloor.
 - They are mainly extinct volcanoes that, while active, produce lava heaps that occasionally break the ocean surface.
 - The highest mountain on Earth is a seamount—**Hawaii's Mauna Kea**, a dormant volcano that **rises more than 30,000 feet from the ocean 18,000 feet** below the surface.

About the Galápagos Islands:



- It is situated in the Pacific Ocean some **1,000 km from the South American continent**, these **19 islands** and the surrounding marine reserve have been called a unique **'living museum and showcase of evolution'**.
- The Galápagos are a **'melting pot'** of marine species due to their location at the confluence of three ocean currents (the **Humboldt Current**, the **Panama Flow** and the **Cromwell Current**).
- Three major tectonic plates—**Nazca**, **Cocos** and **Pacific**—meet at the basis of the ocean, which is of significant geological interest.
- **In 1978 the islands were designated a UNESCO World Heritage site**, and in **1986 the Galapagos Marine Resources Reserve was created** to protect the surrounding waters.
- The **Charles Darwin Research Station on Santa Cruz (Indefatigable) Island** promotes scientific studies and protects the indigenous vegetation and animal life of the Galapagos.

Kra Isthmus

News Excerpt:

The **"land bridge,"** a proposed **infrastructural project**, has put the Kra Isthmus in the limelight recently.

About:

Kra Isthmus:

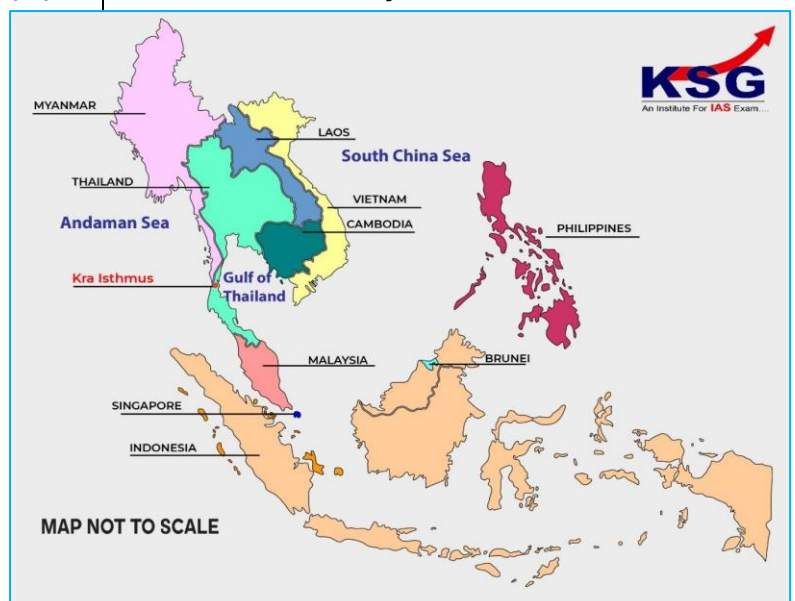
- The Kra Isthmus, located in Thailand, is the narrowest part of the **Malay Peninsula**.
- It is surrounded by the **Andaman Sea** to the west and the **Gulf of Thailand** to the east.
- An **isthmus** is a **narrow land strip** connecting **two larger land masses**. Bodies of water often border it on two sides. **E.g.-** Isthmus of Panama.

Kra Isthmus Canal Project:

- The Kra Canal, also known as the **Thai Canal** or Kra Isthmus Canal, is a **proposed** project to **connect** the **Gulf of Thailand** with the **Andaman Sea** through southern Thailand.
- The original idea was to create a **90-kilometer canal** linking the Andaman Sea and the Gulf of Thailand.
- However, the project has since **evolved** into a **China-backed** economic corridor with ports on both sides.
- In **2021**, Thailand introduced a **new idea** proposing a **land bridge** instead of a canal.

Significance:

- Provide a **new route** for transit, **bypassing** the congested **Straits of Malacca**. It would **shorten** the **travel time** for oil shipments to Japan and China by **1,200 km**.
- Significant impact on **global trade networks** and the **economy** of Thailand.



- The 90-kilometre-long land bridge will connect **deep-sea ports** on both coasts with **road** and **rail** networks.
- Main **objective** is to create **jobs**, generate **economic growth**, and shorten travel time,
- which will improve Thailand's economy and its **position** in Southeast Asia.

Steel Slag Road Technology

News Excerpt:

According to the Union Minister of State for Science and Technology, India has developed the world's latest **Steel Slag Road Technology**.

About:

- The technology to use steel slag for road construction was created by the Council of Scientific and Industrial Research (CSIR)-Central Road Research Institute (CRRRI), which aims to tackle the issue of slag generated by steel plants.
- Border Roads Organisation (BRO) is utilising steel slag, the waste produced during steel production, to construct stronger and more durable roads along the India-China border in Arunachal Pradesh.
- Tata Steel provided the steel slag free of cost, which was then transported from Jamshedpur to Arunachal Pradesh by Indian Railways.

- NITI Aayog stated that the CSIR-CRRRI steel slag road technology will help the BRO develop long-lasting heavy-duty roads in important border areas.
- The National Highways Authority of India (NHAI) has also successfully used this technology in road construction on National Highway-66 (Mumbai-Goa).

About Steel slag Technology:

- It involves the utilization of slag, a **byproduct generated during the steelmaking process**, for various beneficial applications.
- Steel slag is produced when impurities in raw materials such as iron ore and scrap metal are oxidized and removed during the steel production process.
- This results in a molten slag that, upon cooling, solidifies into a material with diverse properties.

Uttarakhand Tunnel Collapse

News Excerpt:

40 workers are trapped due to the collapse of a section of the **Silkyara tunnel** in **Uttarakhand**.

About Silkyara Tunnel:

- It is part of the **Chardham Project** of the **Ministry of Road Transport and Highways (MoRTH)** and is under construction.

- This Yatra or pilgrimage is a tour of four holy sites - **Yamunotri, Gangotri, Kedarnath and Badrinath**.

- The tunnel, once ready, will especially benefit the pilgrims providing an all-weather connectivity, shortening the distance to **Yamunotri** by **26 Km**.

Ways in which tunnels are excavated in rock:

- There are essentially **two ways**: the **Drill and Blast Method (DBM)**, and by using **Tunnel-Boring Machines (TBMs)**.
- DBM involves **drilling holes** into the rock and loading them with explosives. When the explosives are detonated, the rock breaks apart.
- TBMs **bore the rock from the front** (using a rotating head)

Difference between Regular Road and Steel Slag Road	
Regular Road	Steel Slag Road
<ul style="list-style-type: none"> ▪ Constructed using conventional materials such as natural aggregates (crushed stone, gravel, sand), bitumen (asphalt), and cement (for concrete roads). ▪ Consists of layers, including a subgrade (native soil), sub-base (usually aggregates), base course (more aggregates), and surface layer (asphalt or concrete). Each layer serves a specific purpose in terms of stability and load-bearing capacity. ▪ Regular roads provide structural strength, durability, and a smooth driving surface. The materials used are selected based on factors like traffic volume, climate, and expected lifespan. ▪ Environmental impact: resource consumption (such as mining aggregates), energy use in asphalt production, and the potential for heat island effect due to asphalt's heat-absorbing properties. 	<ul style="list-style-type: none"> ▪ Incorporates steel slag as a substitute for some or all of the natural aggregates used in construction. ▪ A steel slag road follows a similar layer structure, but the key difference is the use of steel slag in one or more of these layers. ▪ It can provide improved stability, better drainage, and resistance to rutting and cracking. It also has the potential to contribute to the road's long-term durability. ▪ Environmental benefits: It reduces the demand for virgin aggregates, conserving natural resources and reducing the environmental impact of mining. Additionally, using steel slag in cement production can lower CO2 emissions.

while supporting the excavating tunnel behind the machine by installing concrete segments.

- **Building a tunnel with a TBM is more expensive than DBM, but much safer.**

Impact of terrain on the method of excavation:

- A TBM **cannot** be used to drill through very **tall mountains**. Creating a void through a 1,000-2,000-metre-high mountain by using a TBM leads to a rock burst — when a part of the rock suddenly falls due to high stress.
- TBMs are ideal when the rock cover is up to 400 metres tall.
- Underground tunnels for the **Delhi Metro** were dug using a TBM at shallow depth.
- On the other hand, in places like the Himalayas, including Jammu & Kashmir and Uttarakhand, **DBM is usually used**.

Current Rescue process:

Trenchless technology:

- The rescue operation involves the use of **Trenchless Technology**.
- It will be the **first** time that a “**tunnel inside a tunnel**” will be created as part of a rescue operation in India.
- It involves creating a passage through 900 mm wide mild steel (MS) pipes **for the trapped workers to crawl through**.
- It is a **non-invasive and minimalist approach** to repair the collapsed tunnel without disturbing the loose rock and debris on the surface.
- It will **minimize collateral damage** compared to traditional excavation methods.

How safe are tunnels in the Himalayas? Scientists believe that the tunnel collapse is generally due to **inadequate geological understanding or non-compliance with regulations**.

Geological Understanding:

- The Himalayas are young and are still growing due to the collision between the Indian **tectonic plate** and the **Eurasian tectonic plate**.
- Tunnel construction activities may alter the following:
 - **Stability of Slopes:** It can potentially increase the **risk of landslides and rockfalls**.
 - **Local Hydrology:** Tunnels may intersect with water sources and any alterations to natural drainage patterns can affect water quality as well as availability downstream.
 - **Pollution and relocation:** Noise and Air pollution as well as relocation of communities are major factors in tunnel construction.

Compliance with Regulations:

- **Robust monitoring programs:** Monitoring management during and after construction allows for **adaptive management**, enabling the adjustment of strategies to mitigate unforeseen impacts.
- **Conduct comprehensive EIA:** A comprehensive Environmental Impact Assessment (EIA) before initiating tunnel construction helps identify potential environmental impacts and develop mitigation measures.

Ennore Oil Spill

News Excerpt:

The National Green Tribunal (NGT) questioned the Tamil Nadu government and Chennai Petroleum Corporation Limited (CPCL) on the oil spill in **Pulicat backwaters**.

About Pulicat Lake:

- It is a saltwater lagoon on the Coromandel Coast of the state of Andhra Pradesh. It extends from Andhra Pradesh's extreme southeast into an adjacent portion of Tamil Nadu.
- Scattered settlements surround the lake, which is in the sandy, marshy Andhra lowlands. The lake produces prawns and salt.
- The Indian satellite launch station, Satish Dhawan Space Centre, is located on the long, narrow island of Sriharikota, which divides Pulicat Lake from the Bay of Bengal.



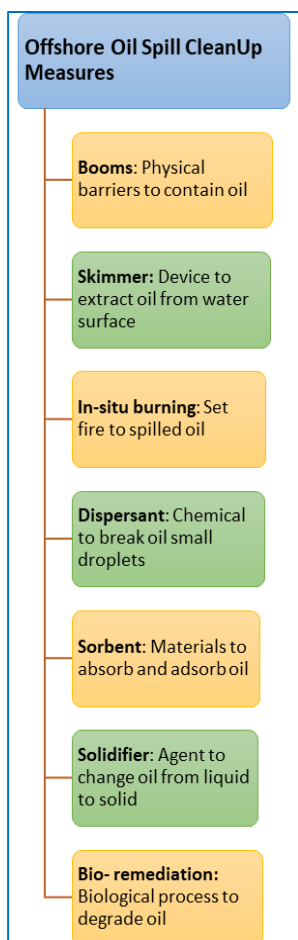
About the Ennore oil spill:

- Dark lumps of oil have washed ashore at **Koraikuppam and Koonankuppam**, near Pulicat Lake, a known **biodiversity hotspot**.
- Due to the incessant rains caused by **cyclone Michaung** there was unprecedented flooding

inside the CPCL refinery in Manali. Presently water levels have receded. There was no pipeline leak from the refinery.

Damage caused After the oil spill:

- **Residential Disruption:** People have been spending days together cleaning the oil stains from their homes besides losing electronic appliances.
- **Health concerns:** The fishing villages complain that they have been encountering several health issues since the oil spill last week, besides feeling suffocated due to the odour of the oil.
- **Effect on Fisheries:** Thousands of fishermen have not been able to venture into fishing even after rains have stopped as fish catch smells of oil, the report stated.
- **Ecological Consequences:** Hundreds of fish, prawns, and crabs have been found dead in the Kosasthalaiyar River due to the impact of oil mixing with flood water when extremely heavy rains drenched Chennai.



Provisions to deal with the oil spill:

- Authorities take stern measures, like hefty penalties, jail terms, etc.
 - In 2020, the National Green Tribunal imposed an interim penalty on PSU major Oil India over its failure to stop the fire in Assam’s Baghjan oil well resulting in damage to the environment.
- International laws and conventions such as the International Convention for the Prevention of Pollution from Ships (MARPOL) for merchant ships that may spill oil due to negligence.
- **Merchant Shipping Act, 1958:**
 - **Section 356J-** Power to give notice to the owner, etc., of the polluting ship when the

Central Government is satisfied the ship is not as per the prescribed rules.

- **Section 356K-** If a person, after being served the notice under section 356J, fails to comply, then the person can be convicted of an offence.
- **National Oil Spill Disaster Contingency Plan (NOS-DCP):**
 - The Indian Coast Guard (ICG) is the Central Coordinating Authority in India for matters related to Oil Spills.
 - NOS-DCP promulgated by ICG is the apex plan for responding to oil spill disasters in Indian waters and applies to shipping, ports, and oil industries.

Global Status of Multi-Hazard Early Warning Systems 2023 Report

News Excerpt:

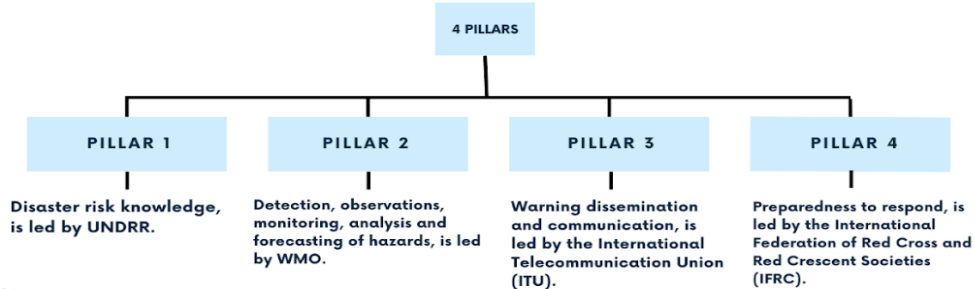
According to a **Global Status of Multi-Hazard Early Warning Systems 2023 report** from the United Nations Office for Disaster Risk Reduction and the World Meteorological Organization, **half of the countries lack appropriate multi-hazard early warning systems.**

Key findings of the report:

- **Good Progress:** The trend of increasing numbers of countries reporting the existence of **Multi-Hazard Early Warning Systems (MHEWS)** has continued – the number has doubled since 2015 and increased to 101 countries as of March 2023.
 - **Dramatic improvement** has been witnessed in **Africa and the Asia and Pacific region.**
 - **Two-thirds of WMO members report having fully operational warning and alerting services** and more than half incorporate hazard, exposure, and vulnerability information in their warning products.
 - **Advances in science and technology,** together with the increase in available observations have led to **improvements in forecasts,** especially lead times.
- With **ninety-five percent of the world’s population** able to access a **mobile broadband network,** there are **significant opportunities to leverage** mobile networks and internet connectivity, especially **in the context of hazards** that can only be forecast on very short timescales (e.g., tsunamis).
- **Significant gaps:**
 - **Issues:**

EARLY WARNINGS FOR ALL INITIATIVE

- It ensures that everyone on Earth is protected from hazardous weather, water, or climate events through life-saving early warning systems by the end of 2027.
- Under this, there are four pillars that make up the early warning chain:



Objective:

- **At the global level:** Mobilizing international support to fund the Executive Action Plan’s estimated budget of USD 3.1 Billion over five years.
- **At the regional level:** Strengthening regional coordination and collaboration around early warning coverage.
- **At the National and Local Levels:** Building political momentum and support to bring together all relevant government agencies and representatives from all of society.

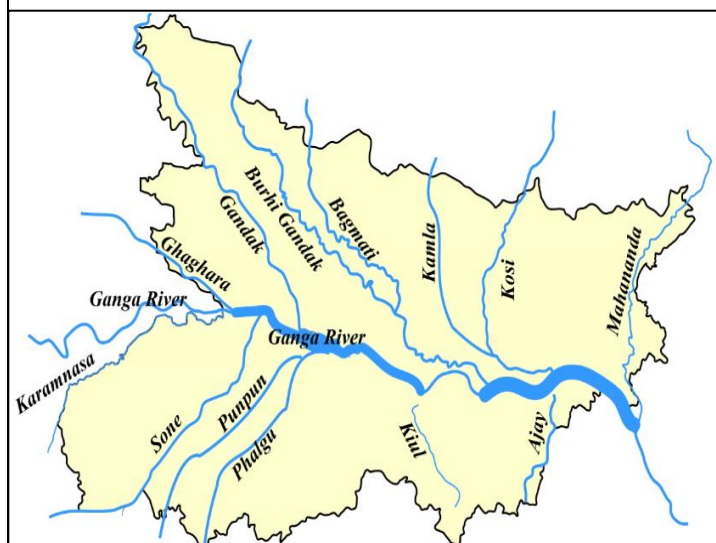
- **Low coverage in the Americas and the Caribbean** and despite progress, persistent **gaps in Africa**. Coverage remains especially low (**less than 50%**) in LDCs.
- **Lack of affordability** continues to be a barrier to **internet access**, particularly in **low-income economies**.
- **Lack of effective Plans and Policies to act on early warnings:**
 - Less than one-third of countries reporting on **Indicator G4** (Percentage of local governments having a plan to act on early warnings) indicated ‘substantial progress’ towards achieving MHEWS.
 - The report also revealed that compared to last year, six more countries have reported having an early warning system, taking the total number of such countries to 101. The number has doubled since 2015.
- **Indian Scenario:**
 - In India, **disaster risk knowledge and management**, warning, dissemination, and communication are **not adequate**. **However, preparedness, response capabilities,** and detection, monitoring, and forecasting capabilities are **available**.
 - The report praised the improved forecasting and activation of the **Early Action Protocol** taken by India during **Cyclone Amphan in West Bengal**.

Bagmati River

A boat carrying 32 school students capsized in the Bagmati River in Bihar's Muzaffarpur.

About Bagmati River:

- It is a **transboundary river** between **Nepal and India**.
- It originates in the **Shivapuri Hills** to the north of Kathmandu and flows southward through the city.
- It passes across the Kathmandu Valley in Nepal.
- It gets divided from Kathmandu through Patan, passing via Province No. 2 of the Southern region of Nepal that eventually seeps into the Bihar state of India.
- This river is assumed to be sacred by a pair of religions, Hindus as well as Buddhists.



- **Major tributaries** – Bishnumati, Hanumante, Dhobikhola and Tukucha.
- The River ultimately joins the Narayani River, located in southern Nepal.
- The merged waters of the **Bagmati and Narayani** eventually make their way southward into the Ganges.

Esequibo River

News Excerpt:

Tensions rise as **Venezuela and Guyana** dispute ownership of the Esequibo region and offshore oil discoveries.

About Esequibo River:

- Esequibo River, in **east central Guyana**, is the largest river between the **Amazon and the Orinoco**.
- It rises in the **Acarai Mountains** on the Brazilian border and flows northward for approximately 630 miles (1,010 km) through Savannas and forests to the Atlantic Ocean.
- Its estuary, 20 miles (32 km) wide, is obstructed by islands and silt.
- With its chief tributaries, the **Rupununi, Mazaruni, and Cuyuni**, its system drains more than half of Guyana.
- The river is **administered by Guyana**. However, Venezuela has, for decades, laid **claim** to Essequibo.
- Venezuela has claimed that the Esequibo River to the **region's east forms a natural border** and has historically been recognised as such.

Why Esequibo is a very important place?

- Venezuelan President **Nicolas Maduro's** move to create a new state and explore the disputed area increases regional tensions.
- Massive **oil and gas** findings near the **Esequibo region**.
- Both countries (**Venezuela and Guyana**) claim the **160,000-square-km** territory surrounding the Esequibo River.
- Guyana seeks support from the United Nations and the International Court of Justice.
- Oil production is currently at **some 400,000 barrels per day (bpd) of oil and gas** and is **expected to rise to more than 1 million bpd by 2027**.
- It will sharply boost Guyana's economy and promise huge income for the country over the coming years.

Athi River

News Excerpt:

Athi River has no piped water or sewage system, and drought is making clean water supplies scarcer and more expensive for locals.

About Athi River Town:

- It is a town outside **Kenya's capital, Nairobi**, in Machakos County.
- The town is named after the Athi River, which passes through it.
- It is also known as **Mavoko**.
- Athi River is a **water-scarce region**. The grasslands have turned brown from the scorching sun and vast tracts of land are left

untilled now as residents couldn't farm the drylands.

- Consecutive seasons of **failed rains and drought, driven by human-caused climate change** and consecutive naturally occurring **La Nina**, have worsened shortages.

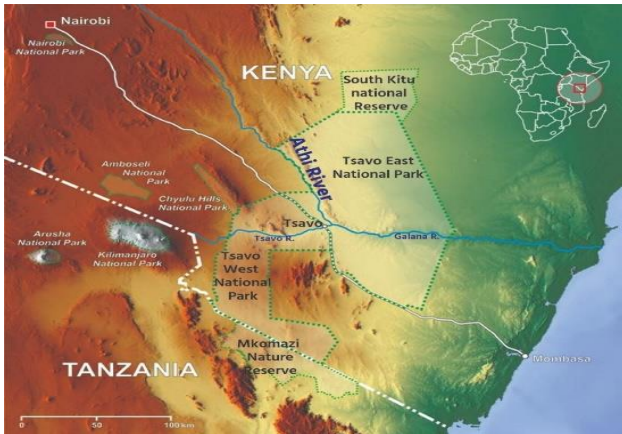
About Athi River:

- The **Athi-Galana-Sabaki River** is **Kenya's second longest river** (after the Tana River).
- This river rises in the **Gatamaiyo Forest as the Athi River** and then **enters the Indian Ocean as the Galana River** or the Sabaki River.
- The Athi River flows across the **Kapote and Athi plains**, through Athi River town, then takes a northeast

turn where the Nairobi River meets it.



- The **Thwake Dam** or Thwake Multi-purpose Water Development Programme is a dam complex built on the **confluence of the Thwake and Athi Rivers in Kenya**.
- Both Athi River and Thwake Dam are Kenya's most polluted water bodies with the highest levels of toxic elements.



Dr APJ Abdul Kalam Island (Wheeler Island)

News Excerpt:

Defence Research Development Organisation (DRDO) will pause missile testing at Dr APJ Abdul Kalam Island (Wheeler Island) off the Odisha coast during the mass nesting season of Olive Ridley Sea turtles from January to March next year to ensure the endangered species wins the race for survival.

- Missile testing, mechanised boats, and the movement of people adversely impact the mass nesting and breeding of sea turtles off the island. Around five lakh Olive Ridleys nested there this year.

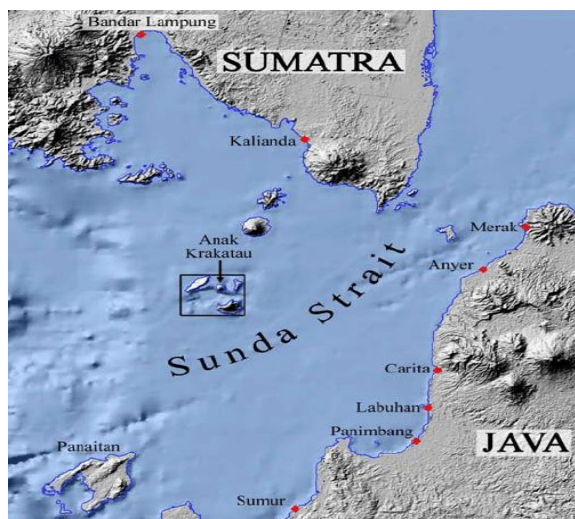
About Dr. APJ Abdul Kalam Island (Wheeler Island):

- Dr APJ Abdul Kalam Island is a continental Island off the coast of Odisha state, located in the Bay of Bengal.
- The island is located offshore of Bhitarkanika National Park.
- It is an **Integrated Test Range Missile Testing Facility in India**.
- The island was formerly known as Wheeler Island, after the English commandant Lieutenant Wheeler.
- On 4 September 2015, the island was renamed to honour the late Indian President, Dr. APJ Abdul Kalam.
- **Biodiversity and Conservation:**
 - Flora - Mangrove with associates, seagrass and other species
 - Fauna - Marine crustaceans, molluscs, fishes and sea bird
 - Type of forest - Mangrove (on the West and Northwest of the island)



DISASTERS IN NEWS

Indonesia's Anak Krakatau volcano



News Excerpt:

The **Anak Krakatau volcano** in Indonesia's **Sunda Strait** erupted, releasing a 1 km-high cloud of volcanic ash into the sky.

About Anak Krakatau volcano island:

- The volcano island is located in Indonesia's **Sunda Strait** between the main **Java and Sumatra islands**.
- Anak Krakatau, which translates as "**Child of Krakatau**," is the spawn of the renowned Krakatau volcano, whose **massive eruption in 1883 precipitated a period of worldwide cooling**.
- It lies in the **Pacific Ring of Fire**.

Sunda Strait:

- The Sunda Strait connects the Indonesian islands of **Java and Sumatra**.
- It is the **link** between the **Java Sea and the Indian Ocean**.
- **The Sunda Kingdom**, which ruled the western half of Java, inspired the name.
- It also derives from the name of the Sundanese, the aboriginal people of West Java, whereas the Javanese are predominantly located in Central and East Java.

Indonesia Marapi Volcano



News Excerpt:

Indonesia's Mount Marapi in West Sumatra province erupted.

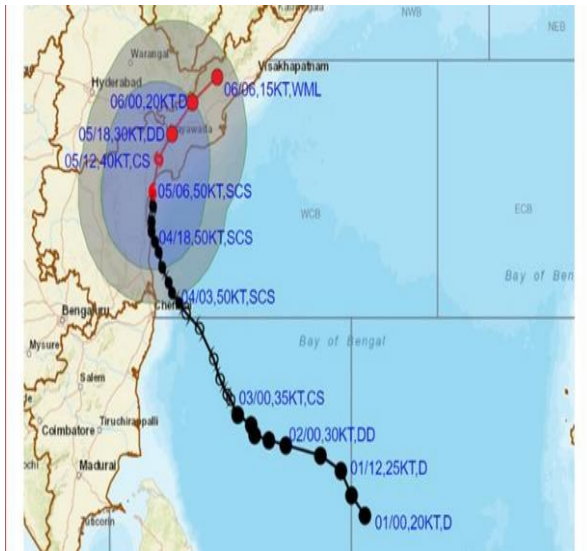
About:

- Mount Marapi, **which means 'Mountain of Fire'**, is the **most active volcano on Sumatra Island** and is nearly 2900 meters high.
- Indonesia is home to about 130 active volcanoes, and Marapi is among these active volcanoes, prone to seismic upheaval due to its location on the **Pacific "Ring of Fire,"**
- Ring of Fire is an **arc of volcanoes and fault lines** encircling the Pacific Basin or a belt of tectonic plate boundaries circling the Pacific Ocean where frequent seismic activity occurs.
- Here, the meeting of continental plates causes **high volcanic and seismic activity**.

About Sumatra:

- It is an Indonesian island, the **second largest** (after Borneo) of the Greater Sunda Islands in the Malay Archipelago.
- It is separated in the northeast from the Malay Peninsula by the **Strait of Malacca** and in the south from Java by the **Sunda Strait**.

Cyclone Michaung



News Excerpt:

Heavy rains and strong winds are battering India's southern Andhra Pradesh state as a severe cyclonic storm Michaung makes landfall.

Cyclone Michaung:

- It is the **fourth** tropical cyclone of the year over the Bay of Bengal. The other previous three were – **Mocha, Hamoon, and Midhili**.
- It developed from a **low-pressure area** in the southwest Bay of Bengal. Gradually intensified into a **deep depression**, a **cyclonic storm**, and finally, a **super-cyclonic storm**.
- It moved northward towards the **Andhra Pradesh coast** while bringing heavy rain and strong winds to **northern Tamil Nadu**.
- It made **landfall** near Bapatla, **Andhra Pradesh**, and **weakened** into a depression over land.
- The name Michaung was suggested by **Myanmar** symbolises **strength** and **resilience**.

Cyclonic disturbance:

- A **non-frontal synoptic scale low-pressure system** originating over tropical waters with organized convection and definite cyclonic wind circulation.

Cyclonic storm:

- A cyclonic disturbance in which the maximum average surface wind speed is in the range of 34 to 47 knots (62 to 88 kmph).

Depression:

- A cyclonic disturbance in which the maximum sustained surface wind speed is between 17 and 33 knots (31 and 61 kmph).

Extremely severe cyclonic storm:

- A cyclonic disturbance in which the maximum average surface wind speed is 90 knots (167 kmph) to 119 knots (221 kmph).

Severe cyclonic storm:

- A cyclonic disturbance in which the maximum average surface wind speed is in the range of 48 to 63 knots (89 to 117 kmph).

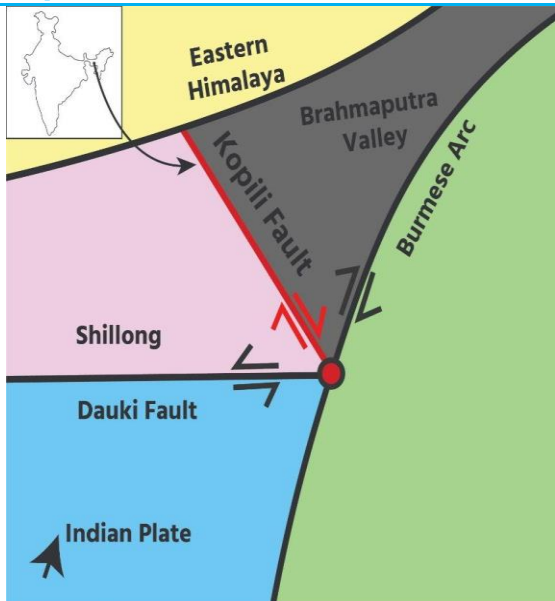
Super cyclonic storm:

- A cyclonic disturbance in which the maximum wind speed is 120 knots and above (222 kmph and above).

News Excerpt:

Recently researchers from the Indian Institute of Geomagnetism (IIG), **identified Seismogenic Liquefaction features** at three trench sites in the floodplain deposits of **Kolong River**, in an active fault in the NorthEastern Region (NER), called the Kopili fault (KF) zone.

Kopili fault (KF) Zone



- It is a fracture or zone of fractures between two blocks of rock.

About Kopili Fault (KF):

- It is **one of the active faults** in the northeastern region (NER) and experienced large earthquakes in **1869 and 1943**.
- The KF, **extends from the western part of Manipur to the tri-junction of Bhutan, Arunachal Pradesh, and Assam**.
- It separates the **Shillong plateau and the Mikir hills**.
- Its paleoseismological investigations in the unexplored abandoned flood plain of Brahmaputra River located in the **Kopili Fault zone (KFZ)**.
- In the region **with thick alluvial cover, the active faults do not produce** significant geomorphic expression when they lie at a deeper source.

Volcano in Grindavik, Iceland



News Excerpt:

A volcano erupted in Reykjanes peninsula (southwest Iceland), spewing lava and smoke across a wide area after weeks of intense earthquake activity.

- Due to the volcano eruption, nearly 4,000 inhabitants of the fishing town of Grindavik have been evacuated.

Reykjanes Peninsula:

- It is a **volcanic and seismic hot spot** southwest of the capital Reykjavik, Iceland.
- It runs along the **Mid-Atlantic Rift**, where the **Eurasian and the North American tectonic plates** are drifting apart.
- Due to this geological setting, the whole peninsula is extremely volcanically active, covered with moss-coated lava fields and cone-shaped mountains.
- Despite its location between two tectonic plates, there were no recorded volcanic eruptions there for **800 years**. However, that all changed in **March of 2021 when Fagradalsfjall volcano erupted**.

Heatwave conditions

News Excerpt:

The upcoming summer is anticipated to be exceptionally hot, with multiple heatwave episodes expected across various regions of the country.

About:

- A Heat Wave is a period of abnormally high temperatures, more than the normal maximum temperature that occurs during the summer season in the North-Western parts of India.
- Heat Waves typically occur between March and June, and in some rare cases even extend till July. The extreme temperatures and resultant atmospheric conditions adversely affect people living in these regions as they cause physiological stress, sometimes resulting in death.
- Heatwaves are prolonged periods of excessively hot weather, typically occurring during the summer months.
- They are characterized by high temperatures and often accompanied by high humidity, making the conditions feel even hotter.
- Heatwaves can vary in intensity and duration, ranging from a few days to several weeks.
- During a heatwave, temperatures rise significantly above the average for a particular region.

Criteria for Heat Waves: The Indian Meteorological Department (IMD) has given the following criteria for Heat Waves-

- Heat Wave need not be considered till maximum temperature of a station reaches atleast 40°C for Plains and atleast 30°C for Hilly regions.
- When normal maximum temperature of a station is less than or equal to 40°C Heat Wave Departure from normal is 5°C to 6°C Severe Heat Wave Departure from normal is 7°C or more.
- When normal maximum temperature of a station is more than 40°C Heat Wave Departure from normal is 4°C to 5°C Severe Heat Wave Departure from normal is 6°C or more.
- When actual maximum temperature remains 45°C or more irrespective of normal maximum temperature, heat waves should be declared. Higher daily peak temperatures and longer, more intense heat waves are becomingly increasingly frequent globally due to climate change.
- India too is feeling the impact of climate change in terms of increased instances of heat waves

which are more intense in nature with each passing year, and have a devastating impact on human health thereby increasing the number of heat wave casualties.

Heatwave in India:

- Heat wave generally occurs over plains of northwest India, Central, East & north Peninsular India during March to June.
- It covers Punjab, Haryana, Delhi, Uttar Pradesh, Bihar, Jharkhand, West Bengal, Odisha, Madhya Pradesh, Rajasthan, Gujarat, parts of Maharashtra & Karnataka, Andhra Pradesh and Telangana. Sometimes it occurs over Tamil Nadu & Kerala also. Heat waves adversely affect human and animal lives.
- However, maximum temperatures more than 45°C observed mainly over Rajasthan and Vidarbha region in month of May.

IMD-Heat Index:

IMD introduced the Heat Index, a valuable tool that considers humidity's influence on temperatures.

About Heat Index:

- The Heat Index serves as a metric that combines temperature and humidity to compute the perceived or "sensational" temperature for individuals.
- It aids in comprehending how humidity amplifies the effects of elevated temperatures and contributes to human unease amid hot conditions.
- The India Meteorological Department (IMD) has introduced the Heat Index as a trial initiative.
- The objective is to offer basic advice for areas encountering escalated apparent temperatures that lead to discomfort among the populace.

Categorization of Heat Levels:

- The Heat Index categorizes the apparent temperature into different levels using colour codes:
- Green: Experimental heat Index less than 35°C.
- Yellow: Experimental heat Index in the range 36-45°C.
- Orange: Experimental heat Index in the range 46-55°C.
- Red: Experimental heat Index greater than 55°C

Factors Causing Heatwaves:

- **Geographical Location:** Odisha is situated on the eastern coast of India and experiences the influence of both the Bay of Bengal and the prevailing monsoon winds.
- **Tropical Climate:** Characterized by high temperatures and humidity throughout the year,

the climatic condition provides a favorable environment for the development of heatwaves.

- **Continental Interior Influence:** The interior parts of Odisha are influenced by the continental interior. This results in hot and dry winds blowing from central India, leading to increased temperatures and heatwave conditions.
- **Monsoon Variability:** Variability in monsoon patterns, such as delayed onset or weak monsoon rainfall, can create conditions conducive to heatwaves.
- **Climate Change:** It is contributing to the increased frequency and intensity of heatwaves globally, including in Odisha. Rising temperatures due to climate change can exacerbate heatwave conditions in the region.
- **Urban Heat Island Effect:** The presence of concrete structures, limited green spaces, and increased anthropogenic activities can lead to higher temperatures in urban areas.
- **Urban areas** compared to surrounding rural regions.

Cyclones And Hurricanes in News

News Excerpt:

The Arabian Sea and the Bay of Bengal - two water bodies are experiencing twin cyclonic storms. Hurricane Otis makes landfall in **Mexico**.

About Cyclone Tej:

- **Cyclone Tej:** Extremely Severe Cyclonic Storm Tej is a **tropical cyclone** that formed over the **central-south Arabian Sea** and made landfall on **Socotra and Yemen**. It was the first cyclone to make landfall in the nation since **Cyclone Luban** in **2018**.
- **Cyclone Hamoon:** Very Severe Cyclonic Storm Hamoon is a **tropical cyclone** that is approaching Bangladesh. The Hamoon formed from a **low-pressure area** over the west-central **Bay of Bengal** on **21 October 2023**.
- The sixth depression and the third named cyclonic storm of the season, Tej formed along with Cyclone Hamoon, a rare phenomenon in the Arabian Sea and the Bay of Bengal in which they both experience cyclonic storms.

About Hurricane Otis:

- Hurricane Otis, currently over the **Mexican state of Guerrero near Acapulco**, is rapidly losing its strength.
- It has earned the distinction of being the most powerful Pacific hurricane to make landfall.

- Otis is the fifteenth storm, tenth hurricane, eighth major hurricane, and the second Category 5 hurricane in the 2023 Pacific hurricane season.
- This formidable storm initially formed from a disturbance located hundreds of miles south of the **Gulf of Tehuantepec**.



Volcanoes

News Excerpt:

Klyuchevskoy (Klyuchevskaya) volcano has erupted on Russia's Kamchatka Peninsula. An undersea volcano off the coast of Japan's Ogasawara Islands.

About Volcano:

- Volcanoes are **openings, or vents where lava, small rocks, and steam erupt** onto the Earth's surface.
- Volcanoes can be **on land and in the ocean**.
- Mountain ranges like the **Andes in South America** and the **Rockies in North America** have been formed through the **movement and collision of tectonic plates**.
- There are **four main types of volcanoes: cinder cones, composite or stratovolcanoes, shield volcanoes, and lava domes**.
 - Their type is determined by **how the lava from an eruption flow and how that flow affects the volcano**, and, as a result, how it affects its surrounding environment.

How do volcanoes erupt?

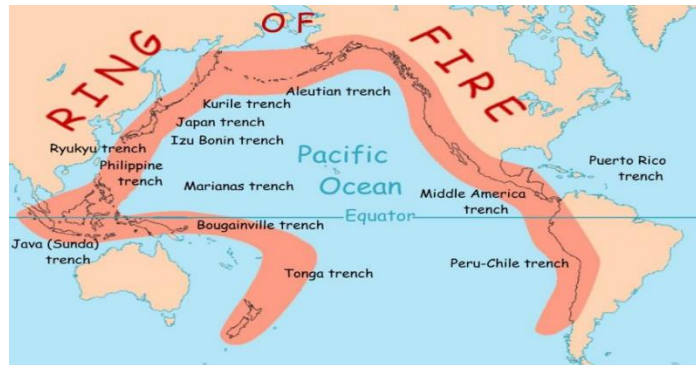
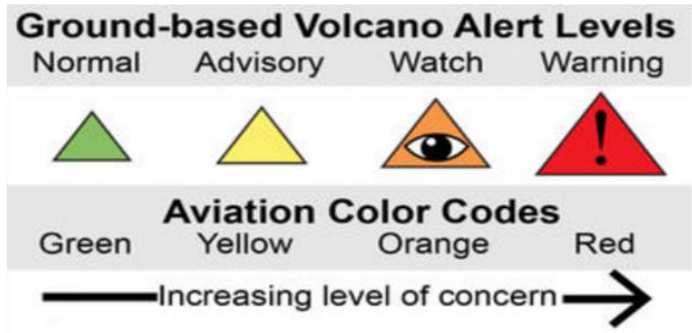
- It is **magma, or the molten rock, below the surface of the Earth** which rises up.
- The **magma finds its way to vents in the volcano** and gets spewed across the land and into the atmosphere. When magma erupts from a volcano, it is called **lava**.

Can scientists predict volcanic eruptions?


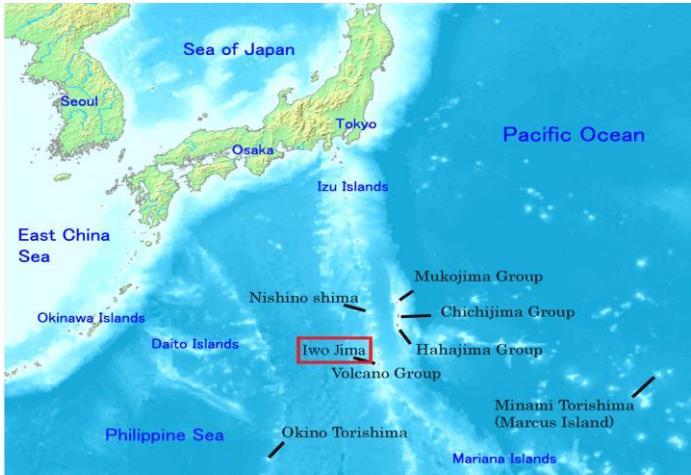
- Volcanic eruptions can be **predicted by scientist's hours, or even days, in advance.**
 - **Earthquakes**, on the other hand, are far more **unpredictable.**
- **Seismographic data** from earthquakes and other tremors is **used by scientists** because it can indicate when a volcanic eruption will occur.
- They **monitor the ground for signs of deformation**, which may be caused by the movement of magma.
- They also **record variations in magnetic and gravitational fields**, as well as releases of volcanic gas.

Aviation Colour Code:

- The **aviation colour code** was elevated to red, the highest warning level, due to the significant emissions of ash into the atmosphere.
- It is a system based on **four colours** and is **only intended for use by the civil aviation community.**



DIFFERENT TYPES OF VOLCANIC ERUPTIONS IN THE NEWS

Name of Volcano	Details
<p>Klyuchevskoy Volcano and Kamchatka Peninsula</p>	<ul style="list-style-type: none"> It is Kamchatka's highest and Eurasia's tallest active volcano. It is a stratovolcano with a large active crater with frequent eruptions. <ul style="list-style-type: none"> Stratovolcanoes have relatively steep sides and are more cone-shaped than shield volcanoes. They are formed from viscous, sticky lava that does not flow easily. The Kamchatka Peninsula is located in far eastern Russia, lying between the Sea of Okhotsk on the west and the Pacific Ocean and Bering Sea on the east. Two mountain ranges, the Sredinny (Central) and Vostochny (Eastern), extend along the peninsula and the trough between them is occupied by the Kamchatka River. Located along the Pacific Ring of Fire, the Kamchatka Peninsula is home to more than 300 volcanoes. <ul style="list-style-type: none"> The Ring of Fire, also referred to as the Circum-Pacific Belt, is a path along the Pacific Ocean characterized by active volcanoes and frequent earthquakes. Of about 1,500 active volcanoes in the world, 111 are in Japan, which sits on the so-called Pacific "Ring of Fire". 
<p>The new unnamed volcano</p>	<ul style="list-style-type: none"> It is located about 1 kilometre off the southern coast of Iwo Jima (Japan). Currently, it is 100 metres in diameter and 20 meters high above the sea. The newly formed island started as a "vertical jet" of solidified magma that shot high above the waves. <ul style="list-style-type: none"> After that, the eruption was sustained by relatively continuous bursts. <p>Earlier emergence of islands due to volcanic eruption:</p> <ul style="list-style-type: none"> In 2013, an eruption at Nishinoshima in the Pacific Ocean south of Tokyo led to the formation of a new island. In 2013, a small island surfaced from the seabed after a massive 7.7-magnitude earthquake in Pakistan. In 2015, a new island was formed as a result of a month-long eruption of a submarine volcano off the coast of Tonga. 

Mount Etna

- **Mount Etna** is **Europe’s most active volcano** and one of the largest in the world.
- Its recorded **volcanic activity dates back to 1500 B.C.** Since then, it has erupted more than 200 times.
- It is the **highest**



Mediterranean island mountain and the most **active stratovolcano** in the world.

Other volcanoes that have erupted for much longer than Etna:

- **Kilauea volcano in Hawaii:** It started to **erupt in 1983** and continued till 2018. In 2021, the eruption started again and is still ongoing.
- **Dukono in Indonesia:** It started erupting in **1933 and is continuing.**
- **Santa Maria in Guatemala:** It began **erupting in 1922** and continues to this day.
- **Yasur in Vanuatu:** It first rumbled to life in about 1270 (± 110 years) and as of June 9, 2023, was still erupting.

Earthquakes In News

News Excerpt:

Recently, A state of emergency has been declared in Iceland after a swarm of **800 earthquakes** rocked the island country's southwestern Reykjanes peninsula.

Key Points:

- Around **1,400 earthquakes** were measured **one day**, and over **24,000** have been recorded in the peninsula **since late October to November 2023**.
- The most powerful of these quakes had a **magnitude of 5.2**, and hit about **40 km from Reykjavík, Iceland's capital** and over **24,000** have been recorded in the peninsula since late October.

What is happening in Iceland?

- Iceland is located on the **Mid-Atlantic Ridge, the longest mountain range in the world, but on the floor of the Atlantic Ocean**.
 - The ridge separates the **Eurasian and North American tectonic plates** — making it a **hotbed of seismic activity**.
- On average, Iceland experiences around 26000 earthquakes a year according to **Perlan, a Reykjavik-based natural history museum**.
 - Most of them are imperceptible and unconcerned.

Altiplano-Puna Magma Body (APMB):

- The Altiplano-Puna Magma Body (APMB) in the Central Andes is the largest **imaged magma reservoir on Earth**, and is located within the **second highest orogenic plateau on Earth, the Altiplano-Puna**.
- Although the APMB is a first-order geologic feature similar to the Sierra Nevada batholith, its role in the surface uplift history of the Central Andes remains uncertain.
- Here we show that a long-wavelength topographic dome overlies the seismically measured extent of the APMB, and gravity data suggest that the uplift is isostatically compensated.

How can earthquake swarms be portents of volcanic activity?

- Deep under the **Earth's surface, intense heat melts rocks to form magma, a thick flowing substance lighter than solid rock**.

- This drives **it upwards and most of it gets trapped in magma chambers deep underground**.
- Over time, this **viscous liquid cool and solidifies** once again. However, a tiny fraction erupts through **vents and fissures** on the surface, causing volcanic eruptions.
- The movement of magma close to the Earth's surface exerts force on the surrounding rock, which often causes earthquake swarms.
- The **underground movement of magma does not necessarily lead to an eruption**. But the closer it gets to the surface, the more likely an **eruption is, and the more frequent symptomatic earthquake swarms** get.

Volcanic eruption in Iceland:

- **Fagradalsfjall** lies about **40 km to the southwest of Reykjavík** and is the **"world's newest baby volcano."**
- It had been dormant for eight centuries before erupting in 2021, 2022 and 2023.
 - Since the 2021 eruption, tourists from across the world have swarmed to Fagradalsfjall to catch a glimpse of molten lava flowing gushing onto the Earth's surface.
- According to IMO, a considerable amount of magma is moving in an area extending from **Sundhnjúkagígum** in the north towards **Grindavík**.
- **Grindavík, a town of 4,000 on Iceland's southern coast** lies about 10 km from the site of the previous Fagradalsfjall eruptions.

Active volcanoes in Iceland:

- Currently, it boasts **33 active volcanoes which have erupted over 180 times in the past 1,000 years**.
- According to the United States Geological Service, active volcanoes are those that have **"erupted within the Holocene (the current geologic epoch, which began at the end of the most recent ice age about 11,650 years ago)," or which have "the potential to erupt again in the future."**
- One of Iceland's most famous volcanoes is **Eyjafjallajökull**. In 2010, this volcano erupted and caused a massive ash cloud to spread across Europe.

Cyclone Biparjoy

News Excerpt:

Recently, A cyclonic storm, named Biparjoy, has developed in the Arabian Sea.

CYCLONE:

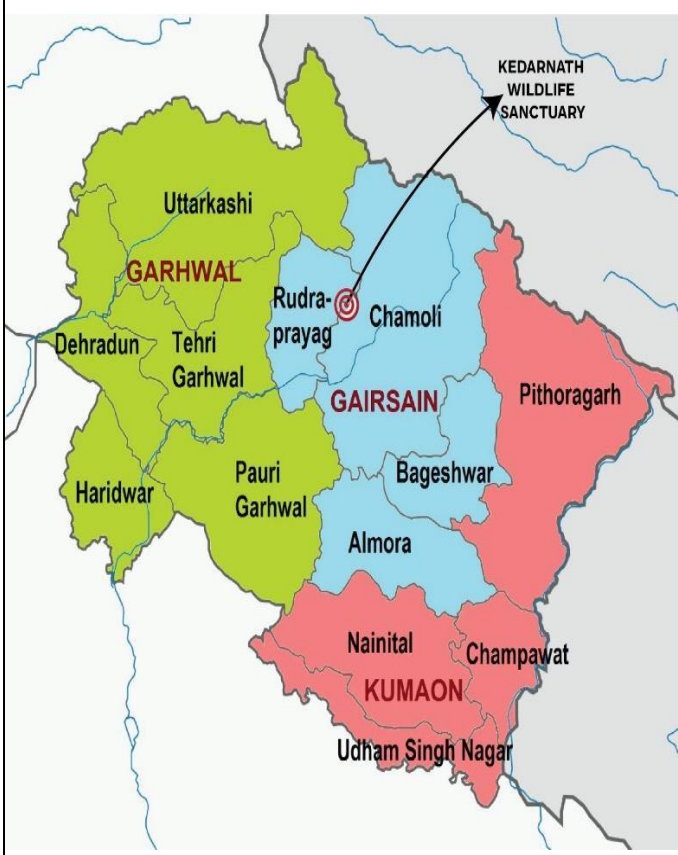
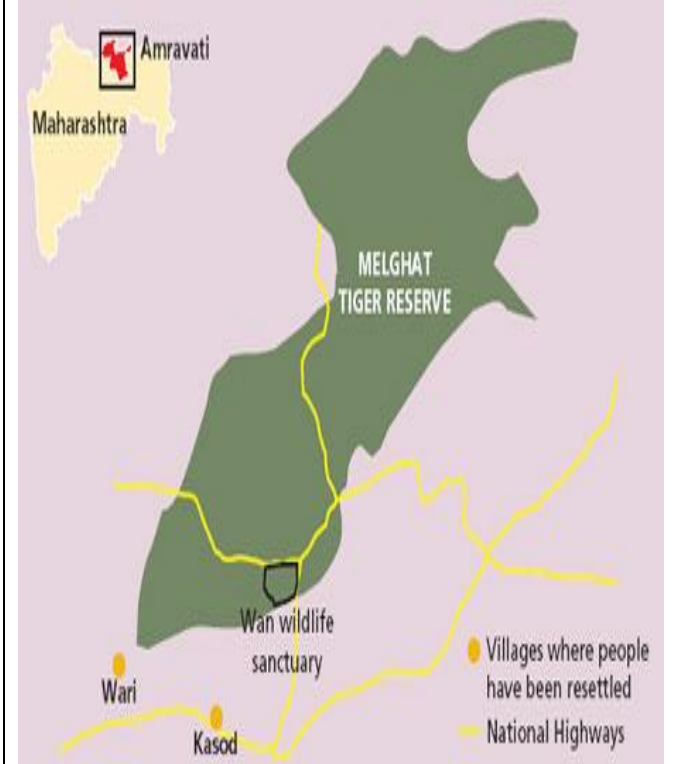
- A cyclone is a low-pressure system that forms over warm waters. Usually, a high temperature anywhere means the existence of low-pressure air, and a low temperature means high-pressure wind.
 - In fact, that is one of the main reasons why we see greater number of cyclones in the Bay of Bengal compared to Arabian Sea.
- Bay of Bengal is slightly warmer. Because of climate change, the Arabian Sea side is also getting warmer, and as a result, the number of cyclones in the Arabian Sea is showing an increasing trend in the recent trend.

Cyclone Biparjoy:

- Name '**Biparjoy**' was suggested by **Bangladesh** and the word means 'disaster' or 'calamity' in Bengali.
- The naming of cyclones is done by countries on a rotational basis, following certain existing guidelines.

- Worldwide, there are **six regional specialised meteorological centres (RSMCs)** and **five regional Tropical Cyclone Warning Centres (TCWCs)** mandated for issuing advisories and naming of tropical cyclones.
- IMD is one of the six RSMCs to provide tropical cyclone and storm surge advisories to 13 member countries under the WMO/Economic and Social Commission for Asia-Pacific (ESCAP) Panel including Bangladesh, India, Iran, Maldives, Myanmar, Oman, Pakistan, Qatar, Saudi Arabia, Sri Lanka, Thailand, United Arab Emirates and Yemen.
- The WMO/ESCAP Panel on Tropical Cyclones in 2000 agreed in principle to assign names to the tropical cyclones in these seas. After deliberations, **the naming began in September 2004.**
- This list contained names proposed by then eight member countries of WMO/ESCAP PTC, viz., Bangladesh, India, Maldives, Myanmar, Oman, Pakistan, Sri Lanka and Thailand. It was expanded to include five more countries in 2018 — Iran, Qatar, Saudi Arabia, United Arab Emirates and Yemen.
- The list of 169 cyclone names released by IMD in 2020 was provided by these countries — 13 suggestions from each of the 13 countries.

PROTECTED AREAS IN NEWS

Protected Area	Location
<p>KEDARNATH WILDLIFE SANCTUARY</p> <ul style="list-style-type: none"> Established in the year 1972. It is the largest protected area of Uttarakhand Location: It Lies between Kedarnath in Rudraprayag and Badrinath in Chamoli. The sanctuary witnesses a large number of Hindu temples like - Kedarnath Mandir, Mandani, Madhyamaheshwar, Tungnath, Ansuya Devi, and Rudranath. It is also known to possess numerous medicinal and aromatic plant species as well as is the migration point for many endangered animals. Flora: Oak, Rhododendrons, Chir, pine etc. Fauna: Musk, deer, Himalayan Thar, Snow Leopard. 	
<p>MELGHAT TIGER RESERVE</p> <ul style="list-style-type: none"> Melghat was among the first nine tiger reserves of India to be notified in 1973 under Project Tiger. It is located in the northern part of the Amravati district of Maharashtra. The Tapti River flows through the northern part of Melghat Tiger Reserve and forms the boundary of the reserve. Vegetation: Tropical dry deciduous dominated by Teak. Flora: Teak, bamboo, Terminalia tomentosa, Emblica Officinalis etc. Fauna: Sloth bear, Indian Gaur, Sambhar deer, Leopard, Nilgais, Dhole etc. 	

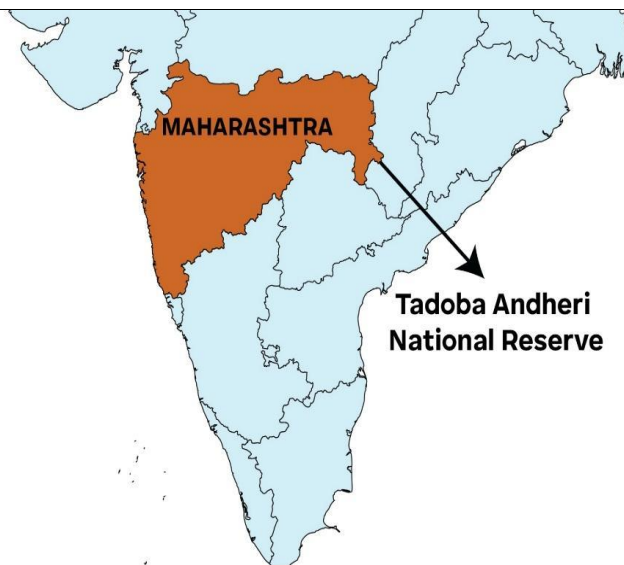
MHADEI WILDLIFE SANCTUARY

- It lies in the **Cotigao-Mhadei forest complex** and is named after the Mhadei River.
- It forms a **contiguous belt** connecting the forests of Karnataka and Maharashtra.
- The formation of this sanctuary made **Goa the only state in the country that protects the entire area of the Western Ghats** that falls within the state.
- Bombay HC directed Goa government to notify Mhadei wildlife sanctuary as Tiger reserve.
- One of the most unusual trees found here is an **evergreen variety of the Ashoka tree** with peculiar saffron-coloured flowers.
- The Goa government will soon notify a tiger reserve in Mhadei Wildlife Sanctuary.
- **Vegetation:** moist deciduous vegetation and some evergreen species.
- **Flora:** Evergreen variety of the Ashoka tree with peculiar saffron-coloured flowers and rare and endemic orchids.
- **Fauna:** Wild boar, Indian hare, Ruddy mongoose, Black-faced langur and Bonnet macaque.



TADOBA ANDHERI NATIONAL RESERVE

- The Tadoba National Park, **was created in the year 1955.**
- It is Maharashtra's oldest and largest National Park.
- It lies in the Chandrapur district of Maharashtra state.
- The word '**Tadoba**' is derived from the name of God "**Tadoba**" or "**Taru**," which is praised by local tribal people of this region and "**Andhari**" is derived from the name of the **Andhari river that flows in this area.**
- Teak is the prominent tree species in the forest.
- **Flora:** Teak, Ain, Bija, Dhauda, Salai, Tendu, Beheda, Hirda, Karaya gum, Mahua Madhuca, Bamboo, Bheria, Black Plum, and many others.
- **Fauna:** Tigers, Indian leopards, Sloth bears, Gaur, Nilgai, Dhole, Striped Hyena, Peacock, Jewel Beetles, Wolf Spiders, etc.



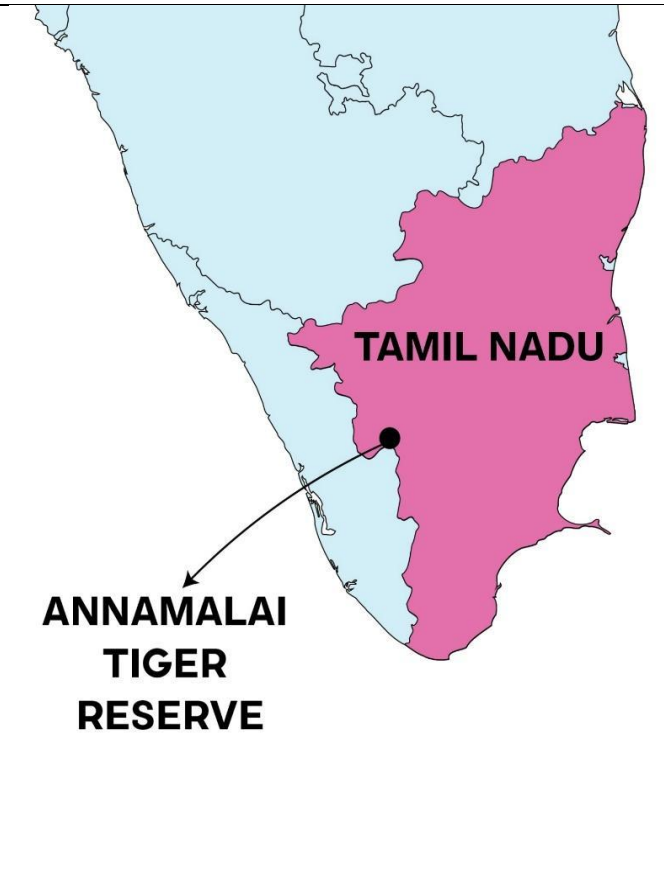
KANYAKUMARI WILDLIFE SANCTUARY

- Nestled in Tamil Nadu's Kanyakumari district, this sanctuary stands at the **convergence of the Arabian Sea, the Bay of Bengal, and the Indian Ocean.**
- The sanctuary serves as the **cradle of seven rivers** (including Pahralli and Thamirabarani).
- **Flora:** Southern thorn forests, deciduous varieties, semi-evergreen groves, and lush evergreen hill sholas adorned with grassy downs.
- **Fauna:** Indian Bison, Elephants, Nilgiri Tahr, Sambar Deer, the charismatic Lion-tailed Macaque, and reptilian wonders like the Indian Rock Python.



ANNAMALAI TIGER RESERVE

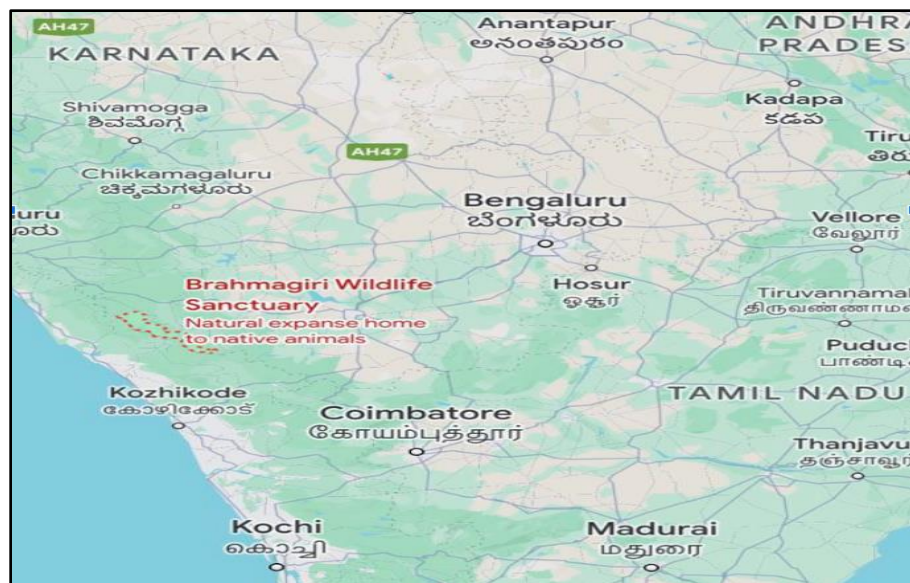
- **Anamalai Tiger Reserve was declared as a Tiger reserve in the year 2007.**
- It was earlier known as Indira Gandhi Wildlife Sanctuary and National Park and as Anaimalai Wildlife Sanctuary.
- It is a protected area in the Anaimalai Hills of Pollachi and Valparai taluks of Coimbatore District and Udumalaipettai taluk in Tiruppur District, **Tamil Nadu, India.**
- Habitat: **Wet evergreen forests, semi-evergreen forests, moist deciduous, dry deciduous, dry thorn and shola forests.**
- Other unique habitats like **montane grasslands, savannah and marshy grasslands** are also present.
- Flora: several species of Balsam, Crotalaria, Orchids and Kurinchi.
- Fauna: Asiatic elephant, Sambar, Spotted deer Barking deer, Mouse deer, Gaur, Nilgiri tahr etc.
- Mudumalai and Anamalai Tiger Reserves have recently received **the global elite tag for best tiger conservation practices.**



Barapole River Makkoottam Brahmagiri Wildlife Sanctuary

News Excerpt:

Residents accuse the Makkoottam Brahmagiri Wildlife Sanctuary authorities of uprooting and destroying cassava crops grown by locals recently.



About Brahmagiri Wildlife Sanctuary (BWS):

- The BWS is located on the Karnataka-Kerala border, in the Kodagu district of Karnataka.
- It adjoins **Aralam Wildlife Sanctuary** in Kerala.
- It is separated from the **Nagarhole National Park** by a narrow strip of coffee estates and from the **Pushpagiri Wildlife Sanctuary** by a thick evergreen forest corridor and coffee estates.
- The region includes the entire forest areas of **Brahmagiri Ghat and Urti Reserve Forests** and was **declared a sanctuary in 1974**.
 - **River Barapole** bifurcates Urti Reserve Forest and Brahmagiri Reserve Forest.
- It was declared an **Eco-Sensitive Zone (ESZ) in 2017**.
 - The Sanctuary also acts as an **important corridor for elephants to move between Rajiv Gandhi National Park and Talacauvery Wildlife Sanctuary in Karnataka and Wayanad and Aralam Sanctuaries in Kerala**.
 - The Sanctuary is a catchment for River Cauvery, an important **River of Karnataka**. **Lakshmanthirtha and Ramathirtha** are the tributaries of River Cauvery that originate from Brahmagiri Wildlife Sanctuary and many perennial streams also originate from the Sanctuary.
 - **Fauna:** Tiger, Leopard, Wild Dog, Asiatic Elephant, Gaur or Indian Bison, Sambar, Lion Tailed Macaque, Nilgiri Langur
 - **Flora:** Consists of evergreen and semi-evergreen forests interspersed with shola grasslands.

About Barapole River:

- It is located in South Kodagu, at a distance of 27 km from Gonikoppal and 78 km from Madikeri.
- It is considered one of the most dangerous spots by rafters. All tourists are given compulsory training before they set off rafting in the waters.
- The turbulent river flows through the dense forests of Brahmagiri Wildlife Sanctuary.

News Excerpt:

The National Tiger Conservation Authority (NTCA) has recommended to the authorities that

Nugu Wildlife Sanctuary

the Nugu Wildlife Sanctuary abutting the Bandipur Tiger Reserve be declared as a core critical tiger habitat.



About Nugu Wildlife Sanctuary:

- Nugu Wildlife Sanctuary is situated in **Heggadadevanakote** Taluka of **Mysore** district and comprises Lakshmanapura State Forest and adjacent revenue lands this sanctuary is **situated north of Bandipur National Park**.
- The backwaters of the **Nugu Dam** form part of the **Nugu Wildlife Sanctuary and lie on the western side of the sanctuary**.
- On the southwest side, the area touches Alaganchi State Forest, which comes under **Bandipur National Park** (Project Tiger Area).
- The Ministry of Environment, Forests, and Climate Change declared Nugu Wildlife Sanctuary an **eco-sensitive zone** due to excessive commercial tourism, aiming to protect dense elephant populations.
- The other **Fauna** found in this Sanctuary include **elephant, leopard, jungle cat, wild pig, spotted deer, sambar deer, barking deer**, mouse deer, jackal, hare, common mongoose, common otter, small Indian civet, common palm civet, and porcupine.

Changthang Wildlife Sanctuary/ First Night Sky Sanctuary

News Excerpt:

South East Asia's first **Night Sky Sanctuary** - The **Dark Sky Reserve** will be a part of **Changthang Wildlife Sanctuary**.



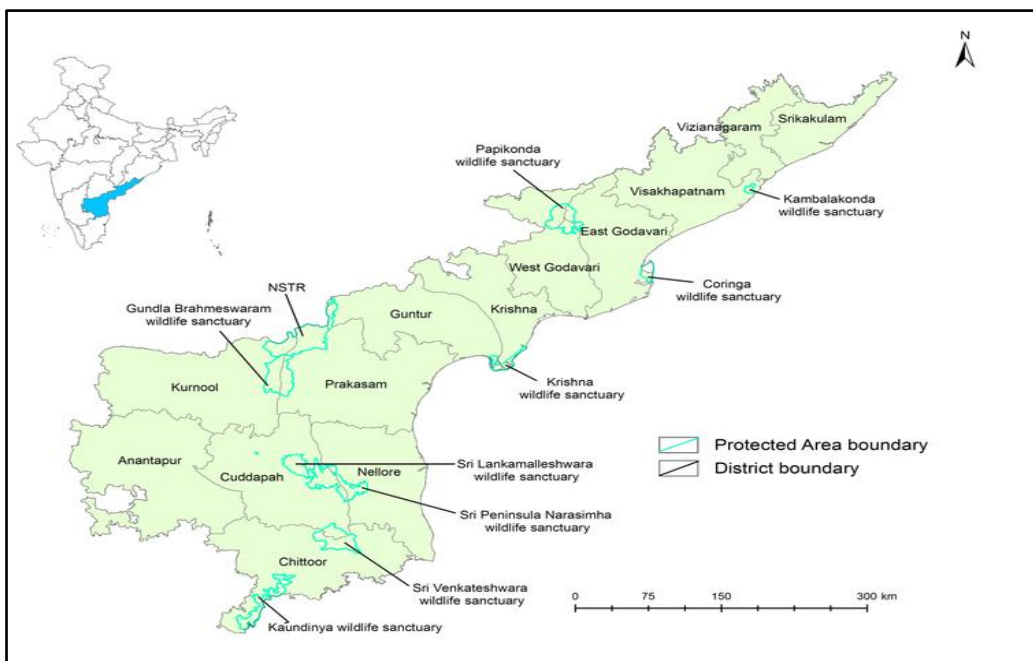
About Night Sky Sanctuary - The Dark Sky Reserve:

- It is dedicated to maintaining the night sky's darkness, allowing people to see **celestial objects** more clearly, making it an **ideal spot** for **stargazing enthusiasts**.
- It allows visitors to enjoy the beauty of the night sky **without interference from city lights**.
- It will boost **astro-tourism** in India and be one of the world's highest-located sites for **optical, infrared** and **gamma-ray telescopes**.
- A **tripartite MoU** was signed among the **UT Administration, Ladakh Autonomous Hill Development Council (LAHDC) Leh** and **the Indian Institute of Astrophysics (IIA), Bengaluru**.
- **Location:**
 - It will be located at **Hanle village** in **eastern Ladakh** as a part of **Changthang Wildlife Sanctuary** and adjacent to the **Indian Astronomical Observatory**, the second-highest optical telescope in the world, of the Indian Institute of Astrophysics at Hanle at an elevation of 4500 metres.

**Kambalako
nda
Wildlife
Sanctuary |
Eastern
Ghats
Nature
Interpretati
on Center**

News Excerpt:

A **Nature Interpretation Centre**, a new project of the Andhra Pradesh Forest Department will be located along the periphery of the **Kambalakonda Wildlife Sanctuary** in **Visakhapatnam, Andhra Pradesh**.



About the Natural Interpretation Centre:

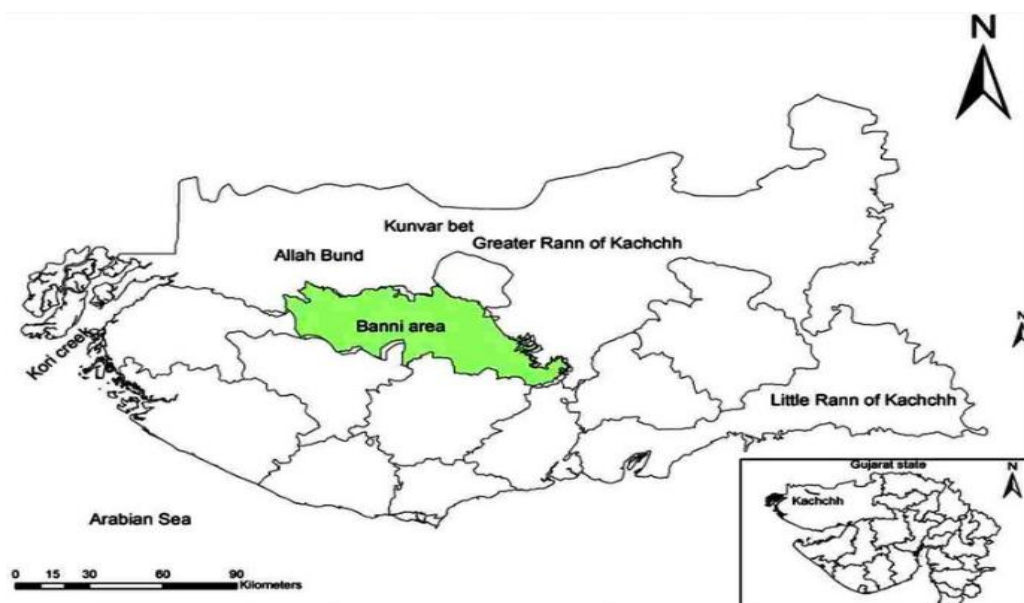
- This centre will be a unique blend of **nature and art**, where conservation, education, and artistic expression will converge.
- It is a **bilingual project** in English and Telugu.
- This centre will showcase the **critical ecosystems of the Eastern Ghats** and also show the association of tribal communities with the forests.
- It is divided into different sections such as marine, coastal, and wetland ecosystems.
- **The mangrove ecosystem replica is the highlight of the Nature Interpretation Centre.**
 - As the state of **Andhra Pradesh is vulnerable to cyclones**, a separate mangrove wall highlights **how a mangrove forest stands like a wall of defence** along the Andhra Pradesh coast protecting it from **storms and cyclones**.

About the Kambalakonda Wildlife Sanctuary:

- It is named after the local hillock " Kambalakonda " and covers an area of 71 square kilometres.
- It is located in the **Eastern Ghats region in Andhra Pradesh** and was granted **legal status in the year 2002**.
- **Fauna:**
 - **The invertebrate fauna includes insects, arachnids, etc.**
 - **Reptilian fauna is represented by Russell viper, Common Cobra, Chameleon, etc.**
 - **Avifauna includes Paradise flycatchers, Tree pie, Quails, Partridges, etc.**
 - **The mammalian fauna includes mammals like Leopard, Barking Deer, Jackal, etc and Indian Leopard is its Indicator species.**
 - Indian Leopard is categorized as **"Vulnerable"** under the IUCN Red List.
- **Flora:**
 - Kambalakonda Wildlife Sanctuary hosts **dry evergreen forests with scrubs and meadows**, a highly threatened and unique forest type seen only in Tamil Nadu and Andhra Pradesh in India.

Banni Grasslands, Kutch

News Excerpt: Cheetahs to return to Gujarat as Centre approves breeding centre in Banni grasslands.



About:

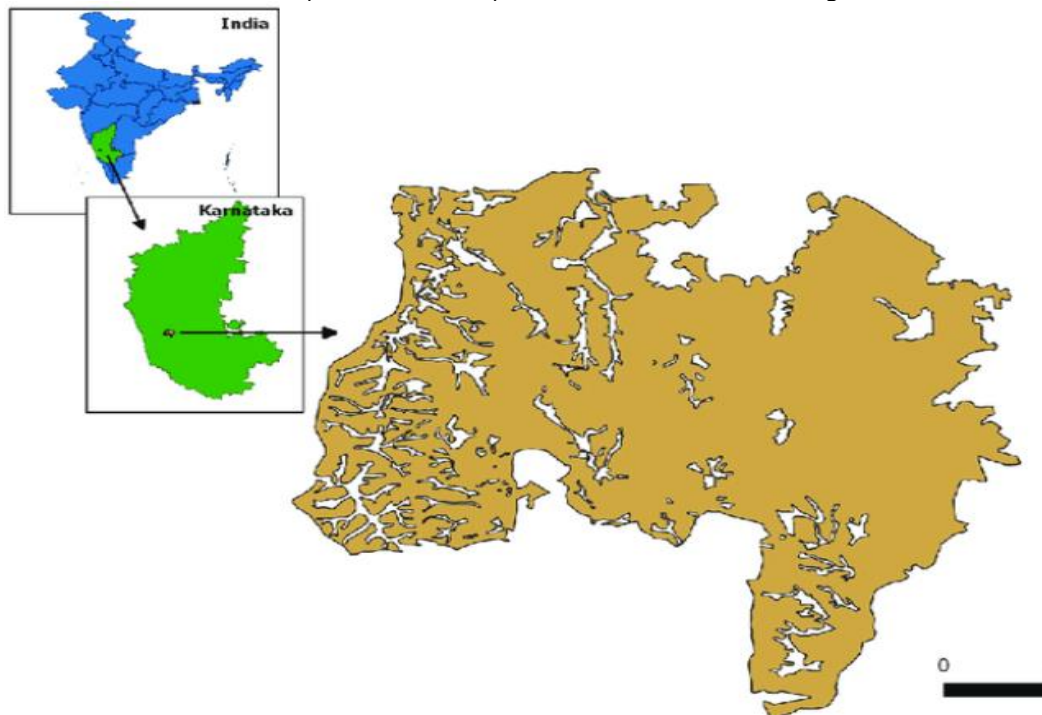
- **Banni Grasslands** used to be the habitat of **cheetahs**, which became extinct over time.
- To support the restoration of the cheetah population in the country, the state government of Gujarat prepared a proposal under the **National Compensatory Afforestation Fund Management Authority (National CAMPA)** for using Banni Grassland as one of the centres.
- The **National Tiger Conservation Authority (NTCA)** will monitor the progress of the project.
- Spanning 2,618 sq km, it is located along the northern border of Kachchh district in the state of Gujarat.
- They are among the largest 2 stretches of contiguous grassland in India.

- It is **home to 40,000 Maldharis**, a pastoral community known for rearing **high-yielding buffaloes and cows**.
 - It consists of two ecosystems in juxtaposition, viz., **wetlands and grasslands**.
- Concerns:**
- The grassland is facing encroachment due to increased agricultural activities.
 - With the disintegration of traditional management practices, these grasslands are degrading rapidly due to excessive pressure from livestock grazing and increased soil salinity leading to invasion of *Prosopis juliflora*, water scarcity, climate change, and desertification.

Shettihalli Wildlife Sanctuary (SWS)

News Excerpt: Recently, **the National Green Tribunal (NGT)** has asked the state government to resolve the issues in the delay in the notification of **eco-sensitive zone (ESZ) status for SWS**.

ESZ is a designated area around a protected area where certain activities are regulated to minimize human impact and protect the surrounding environment.

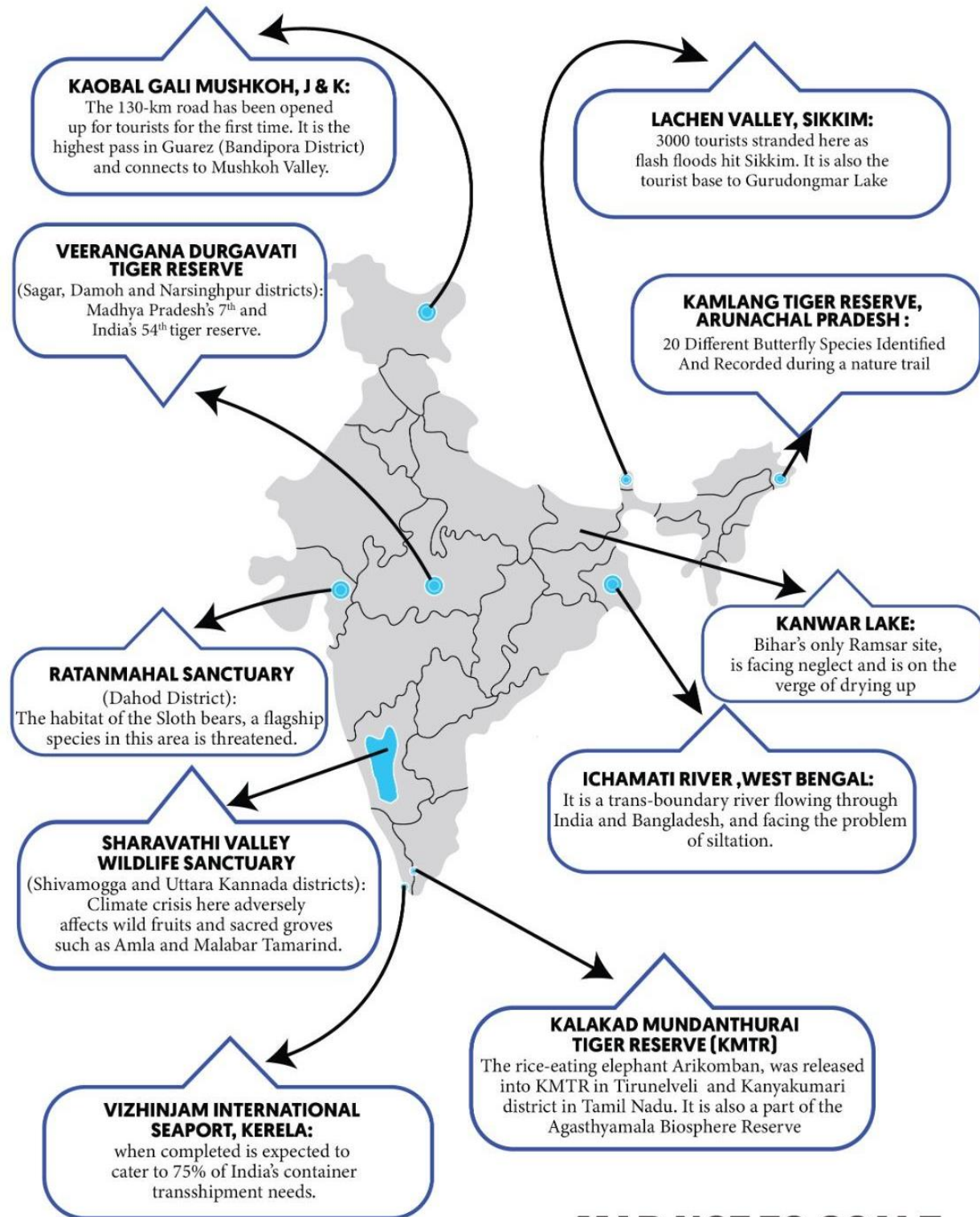


About SWS:

- The geographic location of Shettihalli Wildlife Sanctuary in the central part of Western Ghats, Karnataka state.
- It is spread over parts of three taluks of Shimoga district: Shimoga, Hosnagara and Thirthahalli taluks.
- **Declared Wildlife Sanctuary in 1974.**
- Main rivers- Thunga and Kumadwhathi
- Fauna- Sambar, Indian Gaur, Tiger, Elephant, Sloth bear, etc.
- Mandagadde Natural Bird Sanctuary, is also a part of this Sanctuary.
- The vegetation in the region mainly consists of **dry deciduous, moist deciduous and semi-evergreen types**.
- The Sanctuary receives rainfall from **southwest monsoon**.

<p>NGT on Bhoj Wetland</p>	<p>News Excerpt: The National Green Tribunal (NGT) ordered the Madhya Pradesh government to stop the operation of cruise vessels as well as other motor-propelled boats in the Bhoj wetland.</p> <p>About the Bhoj Wetland:</p> <ul style="list-style-type: none"> • It consists of two contiguous human-made reservoirs, the Upper Lake called Bhojtal (Bada Talaab) and the Lower Lake called Chhota Talaab, located in Bhopal, Madhya Pradesh. • The lakes are very rich in biodiversity, particularly for macrophytes, phytoplankton and zooplankton. • It was designated as the Ramsar site in 2002.
<p>Bandipur Tiger Reserve (BTR)</p>	<p>News Excerpt: The Karnataka Forest Department directed the Bandipur Tiger Reserve’s eco-sensitive zone (ESZ) monitoring panel to act against illegal cottages built within the reserve’s ESZ.</p> <p>About Bandipur Tiger Reserve (BTR):</p> <ul style="list-style-type: none"> • It is situated in two contiguous districts (Mysore and Chamarajanagar) of Karnataka and located at the tri-junction area of the States of Karnataka, Tamil Nadu and Kerala. • Geographically, it is an “ecological confluence” of the Western and Eastern Ghats. • It is part of the larger Nilgiri Biosphere Reserve, which is recognised as a UNESCO World Heritage Site. • BTR is surrounded by: <ul style="list-style-type: none"> ○ Nagarahole Tiger Reserve (Tamil Nadu) in the North West (Kabini Reservoir separates the two). ○ Mudumalai Tiger Reserve (Tamil Nadu) in the South. ○ Wayanad Wildlife Sanctuary (Kerala) in the South West. • Rivers: It is surrounded by River Kabini in its north and River Moyar in its south. • Climate: Bandipur has a typical tropical climate with distinct wet and dry seasons. • Flora: Diverse vegetation ranging from dry deciduous to tropical mixed deciduous. • Fauna: It is a shelter for the largest population of wild Asian elephants in South Asia. It comprises other mammals such as Bengal tiger, gaur, sloth bear, golden jackal, dhole, four-horned antelope, etc.
<p>Ranthambore National Park</p>	<p>News Excerpt: With the arrival of three new tiger cubs in the Ranthambore National Park in SawaiMadhopur, there are 79 big cats including five cubs.</p> <p>About:</p> <ul style="list-style-type: none"> • Ranthambhore national park is located at the junction of the Aravali and Vindhya hill ranges. It’s named after a huge fort. Forests located beside it are Sawai Man Singh Sanctuary & Keladevi Sanctuary. • Ramgarh Vishdhari wildlife Sanctuary in Rajasthan is declared India’s 52nd tiger reserve taking the total count in state to 4. Others being: Ranthambore Tiger Reserve, Mukundra Hills Tiger Reserve and Sariska Tiger Reserve. • Ramgarh Vishdhari is buffer area for Ranthambore national park and connects it with mukundra tiger reserve. • It will solve the overpopulation problem of Ranthambore as tigers will be able to migrate to Mukundara and Ramgarh Vishadhri more easily now. <p>Other recent tiger reserves:</p> <ul style="list-style-type: none"> • UP’s Ranipur tiger reserve becomes 53rd tiger reserve. In Chhattisgarh, the combined areas of Guru Ghasidas National Park and Tamor Pingla Wildlife Sanctuary is approved as tiger reserve, taking the total to 54. This will be the fourth tiger reserve in Chhattisgarh, after the Achanakmar, Udanti-Sitanadi and Indravati reserves.

PLACES IN NEWS - INDIA



MAP NOT TO SCALE

Western Sector
 With 2,150 km of border, the two sides differ over the boundary line that separates J&k from Xinjiang province of China.
 India accuses China of illegally occupying Aksai Chin, and some other parts of Ladakh region.
 The 1962 war saw fierce fighting.
 Tense standoffs occasionally takes place, and in summer months, the two sides send deep patrols to assert their respective claims on boundary region.

Eastern Sector
 The 1,140 km long boundary is contentious and historically referred to as the McMahon Line, which Chinese do not accept because this line was agreed by Tibetan representatives.
 China claims the whole Arunachal Pradesh around 85,000 sq. km, as Chinese territory.
 The two sides fought during 1962 but a better prepared Chinese had the advantage.

Middle sector
 The 625 km in this sector are the least controversial of the three. Himachal Pradesh and Uttaranchal abet the boundary.
 Both sides do not have much disagreement over this area.

CHINA

Ladakh
Himachal Pradesh
Uttarakhand
NEPAL
Bagmati river
Umiyam Lake
Arunachal Pradesh
Bhoj Wetland

The National Green Tribunal (NGT) ordered Madhya Pradesh government to stop the operation of cruise vessels as well as other motor-propelled boats in the Bhoj wetland

The Meghalaya High Court held the PIL on cleanliness of Umiyam lake. It is one of the biggest artificial lakes in Meghalaya. The surrounding Sylvan Hills and Khasi pines add the majesty to this vast lake.

Recently, a boat carrying 32 school students capsized in the Bagmati River in Bihar's Muzaffarpur

Meagolithic Dolmine sites
 Unique terracotta figurines in different states of preservation have been found in recent archaeological explorations conducted in the megalithic dolmen site at Mudu Konaje, near Moodbidri, in Dakshina Kannada.

Bandipur Tiger Reserve
Adichanallur
 The Union Finance Minister laid the foundation stone for the 'Iconic Site Museum' at the Adichanallur site.

The Karnataka Forest Department recently directed the Bandipur Tiger Reserve's eco-sensitive zone (ESZ) monitoring panel to act against illegal cottages built within the reserve's ESZ

Mana village

- o It is located near the famous pilgrimage site of Badrinath in Chamoli district of Uttarakhand.
- o The village has gained prominence recently after it was renamed as part of the government's 'Vibrant Village' scheme.
- o It aims to develop villages in 46 border blocks across 19 districts, four states, and one Union Territory.

Maa Kamakhya corridor

- o Maa Kamakhya temple is one of the oldest of the 51 pithas in the Shakta tradition.
- o This temple is located at Nilachal Hills Guwahati, Assam, near the southern bank of the Brahmaputra River.
- o Apart from main temple, it is dedicated to the ten Mahavidyas of Saktism.

Tilting of Tungnath Temple

- o Temple is located in the Rudraprayag district of Garhwal Himalayas.
- o It is tilting by five to six degrees.
- o According to ASI officials, the central government has been notified about the temple's condition and that it should be included as a protected monument.

Nathu La

- o A massive avalanche swept away a group of tourists in east Sikkim's Nathu La area near the China border

Dawki land port

- o It was inaugurated by Union Minister Shri Nityanand Rai in Meghalaya.
- o The port will promote trade and commerce between India and Bangladesh.
- o The port is situated in West Jaintia Hills in Meghalaya.

Lithium Reserves

- o The Geological Survey of India has found India's second Lithium reserves in Rajasthan.
- o Lithium deposits are found in Degana, from where the tungsten mining was previously done.

Nawegaon-Nagzira Tiger Reserve

- o Tigress gives birth to 4 cubs in this protected area.
- o It is situated in Gondia and Shandara Districts of Maharashtra.
- o The reserve is rich in biodiversity and has linkages with Kanha, Pench and Tadoba Tiger Reserves.

The Kottayam Greenfield Airport project

- o The ministry of civil aviation has granted site clearance for the new 'Greenfield Airport' project in Kerala's Kottayam district.
- o The new airport at Sabarimala, hailing as it is "great news" for tourism, particularly for those on a spiritual journey.

Saltoro Mountains

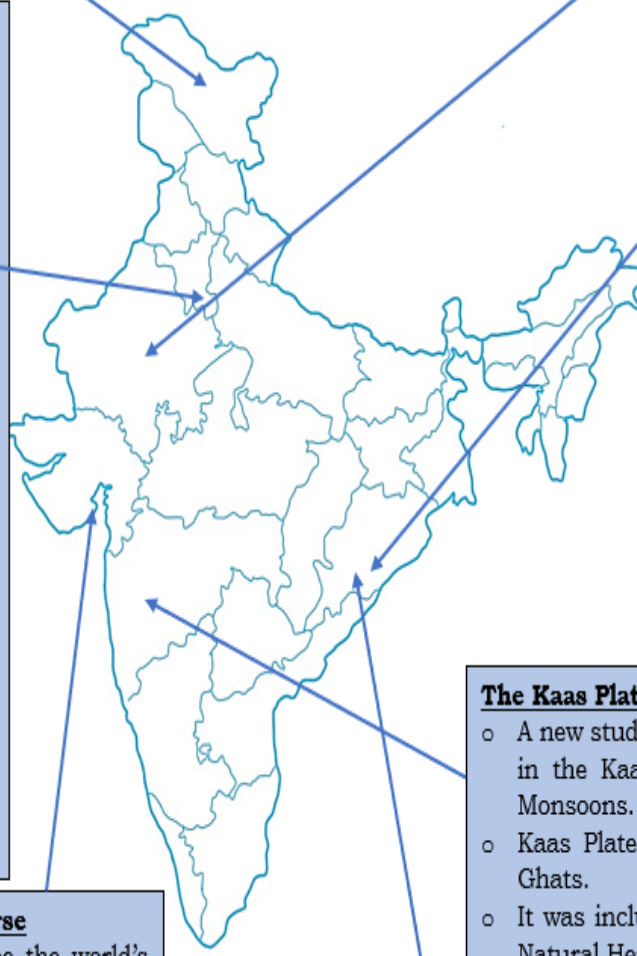
- The Saltoro Mountains are a subrange of the Karakoram Range.
- They are located in the southeast Karakoram on the southwest side of the Siachen Glacier.
- This range is shared with the Saltoro Valley which is located to the westward.
- Saltoro Mountains drop steeply to the valleys of the Kondus and Dansam River.

Aravalli-Delhi Fold Belt

- It consists of highly folded and deformed rocks exhibiting polyphase metamorphism.
- It represents a collage of three independent linear fold belts.
- It is seismically active region; Jaipur was shaken recent by earthquake.
- It is characterised by small and occasionally moderate magnitude earthquakes.

Delhi Ridge

- Dry deciduous forestland called Delhi Ridge, is the northern extension of the Aravalli Range. (Called the lungs of Delhi).
- It protects capital from the hot winds of Rajasthan's desert owing to its greenery.
- The Ridge comprises four parts—Northern Ridge, Central Ridge, South Central Ridge and Southern Ridge.



Debrigarh Wildlife Sanctuary

- Debrigarh Sanctuary freed from human settlement.
- It is located near the Hirakud dam.
- The sanctuary is home to tigers, leopards, bison, hyena, spotted deer, Indian hare, monitor lizard and chameleons, among other animals.

The Kaas Plateau

- A new study of the sediments from lake in the Kaas Plateau indicate shift in Monsoons.
- Kaas Plateau, nestled in the Western Ghats.
- It was included in the UNESCO World Natural Heritage Site in 2012.
- It is designated as a biodiversity hotspot.

Surat Diamond Bourse

- It is claimed to be the world's biggest office.
- It will serve as a hub for trade, innovation, and collaboration, further boosting our economy and creating employment opportunities.
- It is aimed to shift diamond industry from Mumbai to Surat.
- It has been built on an area of 66 lakh square feet at DREAM

Natural Arc

- India's biggest natural arch formed 184 million years ago discovered in Odisha by GSI.
- It is located within the dense Chhengapahar Reserve Forest.
- Arch has a maximum length of 30 metres at the base and maximum height of 12 metres.

Danna Village

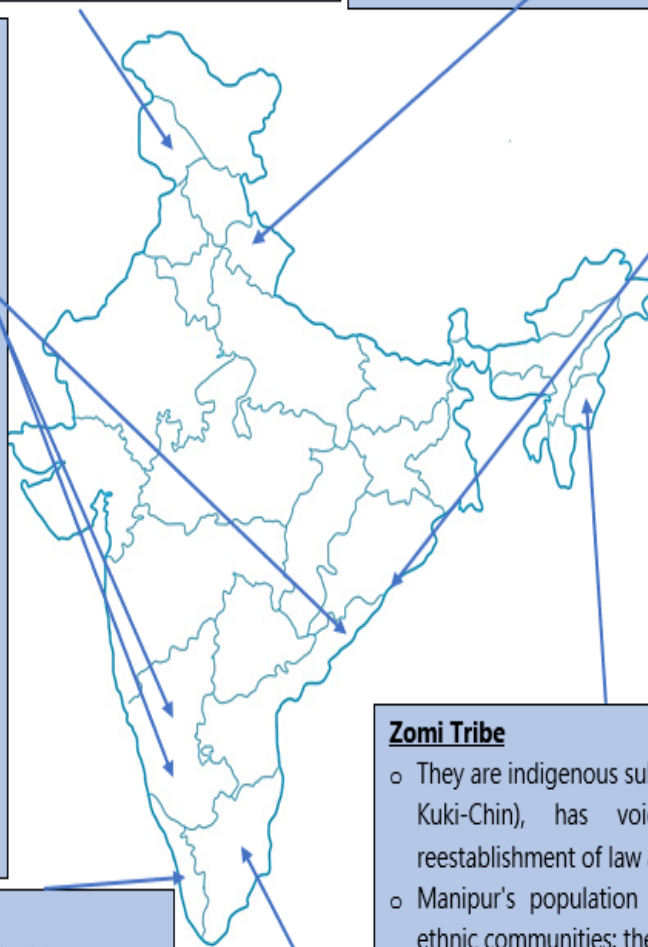
- o The Indian Army inaugurated the “Bhagat Bridge” in Danna Village in Jammu and Kashmir.
- o The bridge not only connects the remote village but also symbolizes the Army’s commitment to the welfare of the people of Jammu and Kashmir.

Yankti Kuti valley

- o Multiple events of glacial advances have been witnessed from the Yankti Kuti valley situated in the extreme eastern part of Uttarakhand.
- o It is the last valley before the border with Tibet.
- o It runs along the Northwest to Southeast axis and is formed by the river Kuti Yankti.
- o This valley is mainly dominated by Byansis.

Strategic oil Storage Facilities

- o The country’s three existing strategic oil storage facilities — at Mangaluru and Padur in Karnataka, and Visakhapatnam in Andhra Pradesh.
- o They are made up of excavated rock caverns.
- o Countries build strategic crude oil reserves to mitigate major supply disruptions in the global supply chain.



Chilika Lake

- o It is a brackish water lagoon located on the eastern coast of India, touching the states of Odisha and Andhra Pradesh.
- o It is the largest coastal lagoon in India and the second-largest in the world.
- o The lake is known for its rich biodiversity, serving as a haven for migratory birds during winter.

Zomi Tribe

- o They are indigenous subgroup of the Zo people (Mizo-Kuki-Chin), has voiced its demand for the reestablishment of law and order within the Manipur.
- o Manipur’s population is divided into three primary ethnic communities: the Meiteis, residing in the valleys, and the Nagas and Kuki-Chins, who inhabit the hills.

Idukki Dam

- o The Idukki Dam is a double curvature arch dam constructed across the Periyar River in a narrow gorge between two granite hills locally known as Kuravan and Kurathi.
- o It is one of the highest arch dams in Asia.
- o The dam type is a concrete, double curvature parabolic, thin arc dam.

Adichanallur Museum

- o It will exhibit 3,000-year-old artefacts.
- o An excavation by the Archaeological Survey of India, in Thoothukudi district, has unearthed a number of burial urns, metal and bronze products and even a gold diadem.

Gaula River

- o Gaula river originates from Sattal Lake and flows through the regions of Shahi, Haldwani and Kathgodam.
- o It was in news due to rampant mining.
- o It an important tributary of Ramganag, and Ganga River System.
- o It flows in Kamoun Himalaya.

Amchang Wildlife Sanctuary

- o Indian Army generates unique ecosystem for peaceful co-existence with wild animals in this protected area.
- o It is small sanctuary, rich in mammals and birds.
- o Amchang's habitat is dominated by tropical moist deciduous forest with semi-evergreen forest in depressions and river-valleys.
- o Around 100 Elephant are found in this sanctuary.

Juna Khatiya site

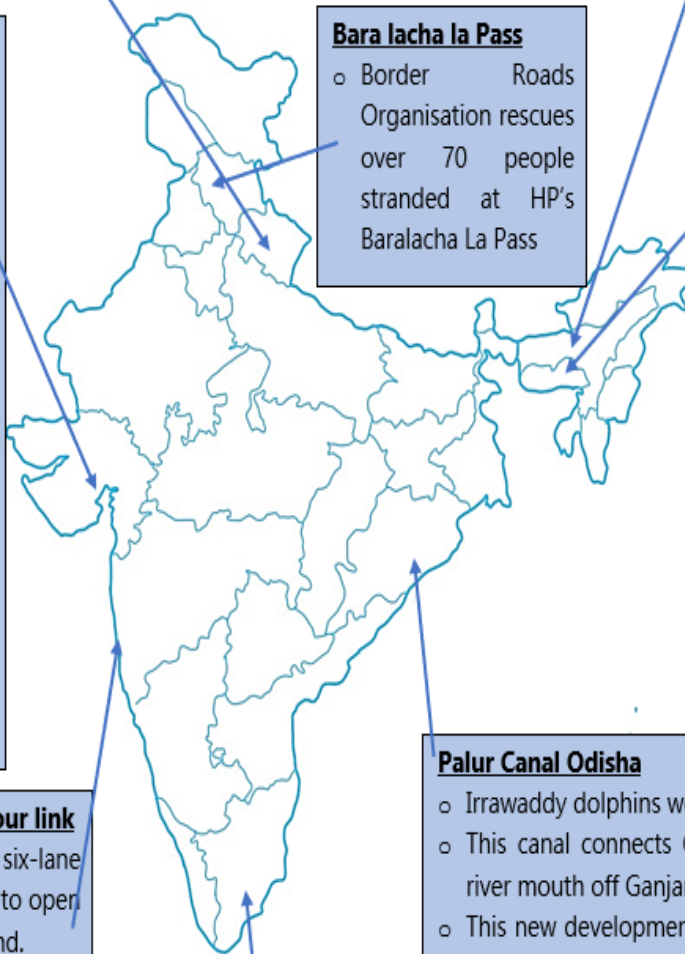
- o It is an Early Harappan burial site.
- o The burial site, spread over 16 hectares in a Kutch village, is considered to be the largest pre-urban Harappan cemetery.
- o A shell bangle, pottery shards, stones blades, even human skeletal remains were found.

Bara lacha la Pass

- o Border Roads Organisation rescues over 70 people stranded at HP's Baralacha La Pass

NohKalikai Falls

- o Cherrapunji, one of the wettest places on earth, is home to the stunning Nohkalikai Falls.



Mumbai Trans harbour link

- o The 22-kilometre, six-lane bridge is expected to open for traffic by yearend.
- o It is being built with loan assistance from the Japan International Cooperation Agency.
- o The link will provide faster connectivity with the proposed Navi Mumbai International Airport and cities like Pune, Goa, and Bengaluru.

Palur Canal Odisha

- o Irrawaddy dolphins were sighted in canal.
- o This canal connects Chilika lake with Rushikulya river mouth off Ganjam coast.
- o This new development has brought cheer among wildlife activists and local people.

Cumbum Valley

- o The region of Cumbum in Tamil Nadu is one of South India's most fertile lands.
- o It is famous for Grape Cultivation apart from paddy, vegetables, mango and pomegranate.