



**INSIGHTSIAS**

SIMPLIFYING IAS EXAM PREPARATION

# INSTA PT 2021 EXCLUSIVE

## GEOGRAPHY AND PLACES IN NEWS

JUNE 2020 – MARCH 2021

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## Important Geophysical phenomena and geographical features

### 1. Space hurricane

Scientists from China recently **discovered a space hurricane for the first time ever above the North pole.**

- Previously, it was believed, space hurricanes were a theoretical phenomenon.

As per their report, the hurricane measured roughly 600 miles across and rained down charged electrons for as long as eight hours.

#### Why it matters?

The new finding could help scientists learn more about how the Sun affects Earth's atmosphere, gathering more details on how space weather might harm satellites and other objects in orbit.

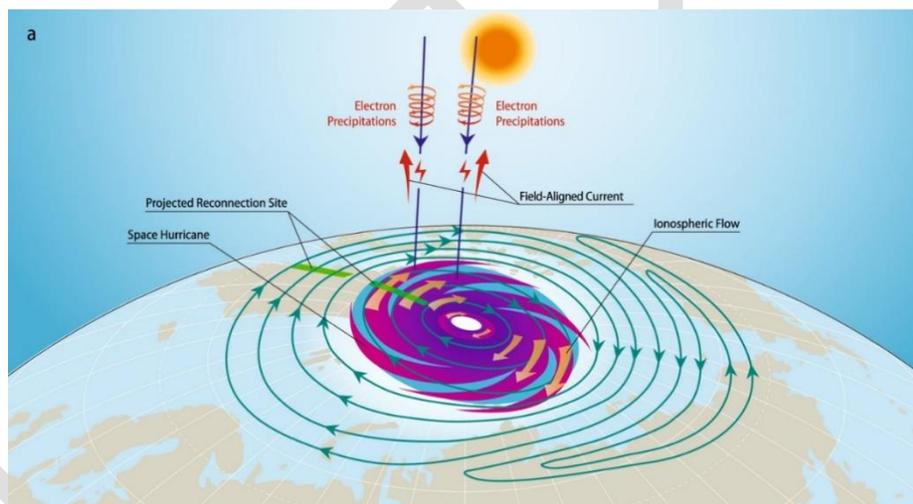
#### What are space hurricanes?

- They are thought to be a result of the solar wind and Earth's magnetic field interacting.
- It is a huge, funnel-like, spiral geomagnetic storm that occurs above the polar ionosphere of Earth, during extremely quiet conditions.
- They are related to the aurora borealis phenomenon, as the electron precipitation from the storm's funnel produces gigantic, cyclone-shaped auroras.
- They are made up of plasmas, consisting of extremely hot ionized gases that rotate at extremely high speeds.

#### Formation:

Space hurricanes are **caused by plasma unleashed from the sun as solar wind.**

These charged particle clouds travel through space and fuel magnetic storms as they interact with magnetic fields.



#### Impact:

- The researchers think these kinds of storms could create more **drag on satellites** and **interfere with radio signals and communications**, making these events particularly important to understand.

### 2. Cyclones

Seven days after **Cyclone Nivar** hit the Karaikal coast, another **cyclone, Burevi**, crossed Tamil Nadu's southernmost district of Kanyakumari.

Why Cyclone Burevi wasn't as strong as Cyclone Nivar?

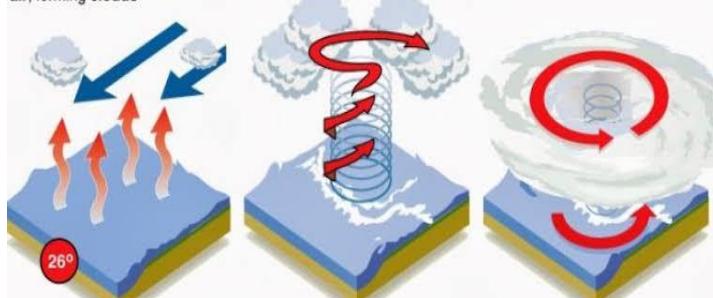
#### How tropical storms are formed

High humidity and ocean temperatures of over 26°C are major contributing factors

Water evaporates from the ocean surface and comes into contact with a mass of cold air, forming clouds

A column of low pressure develops at the centre. Winds form around the column

As pressure in the central column (the eye) weakens, the speed of the wind around it increases



- Due to **upwelling caused by Nivar**, Cyclone Burevi had limited intensity.
- When such consecutive systems develop in the same region of the ocean, the predecessor system leads to upwelling -- the process in which cooler waters from lower ocean surfaces are pushed towards upper ocean surfaces.
- In the absence of warm sea surface conditions, any cyclone, in this case Burevi, will not get enough fuel to intensify further while at sea.

**What is a cyclone?**

Tropical Cyclone is any large system of winds that circulates about a center of low atmospheric pressure in a counter-clockwise direction north of the Equator and in a clockwise direction to the south.

**Cyclone formation:**

- Cyclone is the formation of very low-pressure system with very high-speed winds revolving around it.
- Factors like wind speed, wind direction, temperature and humidity contribute to the development of cyclones.
- Before cloud formation, water takes up heat from the atmosphere to change into vapour. When water vapour changes back to liquid form as raindrops, this heat is released to the atmosphere.
- The heat released to the atmosphere warms the air around. The air tends to rise and causes a drop in pressure. More air rushes to the centre of the storm. This cycle is repeated.

India Meteorological Department Tropical Cyclone Intensity Scale	
Category	Sustained winds (3-min average)
Super Cyclonic Storm	>120 kt >222 km/h
Very Severe Cyclonic Storm	64–119 kt 118–221 km/h
Severe Cyclonic Storm	48–63 kt 88–117 km/h
Cyclonic Storm	34–47 kt 62–87 km/h
Deep Depression	28–33 kt 52–61 km/h
Depression	≤27 kt ≤51 km/h

**What are the different parts of a cyclone’s structure?**

**The eye:** The eye of the storm is the **centre**. It’s a **relatively calm space**.

When the eye passes over an area, winds slow down and everything feels like it has cleared up. The part that comes after the eye usually inflicts the most damage.

**The eyewall:** This is where the most effective part of a cyclone rests. The eyewall houses extremely high wind speeds, causing damage to both lives and property. It is a ring of thunderstorms, and changes in the eye or the eyewall affects the storm’s intensity.

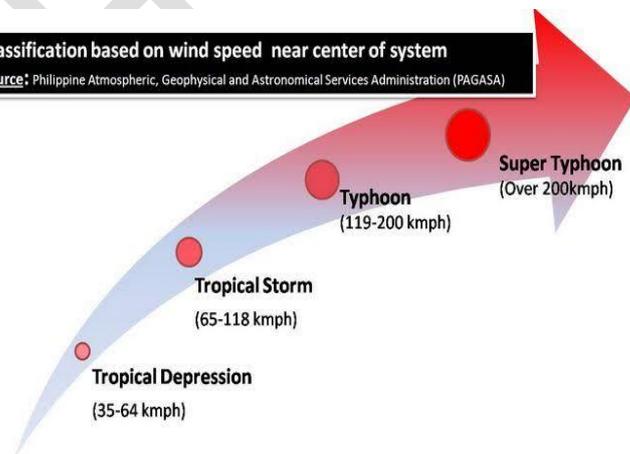
**Rainbands:** These are the outer parts of a cyclone where sudden bursts of rain happen. There can also be gaps between rainbands where no rain or wind occurs.

**General factors responsible for the origin of Cyclones in Bay of Bengal region are:**

1. **Large sea surface with temperature higher than 27° C.**
2. **Presence of the Coriolis force** enough to create a cyclonic vortex.
3. **Small variations in the vertical wind speed.**
4. A **pre-existing weak low-pressure area** or low-level-cyclonic circulation.
5. **Upper divergence** above the sea level system.

**Arabian Sea is comparatively less prone to cyclonic storms than Bay of Bengal:**

Classification based on wind speed near center of system  
Source: Philippine Atmospheric, Geophysical and Astronomical Services Administration (PAGASA)



- **Temperature:** BOB is hotter than Arabian sea. Hot water temperature is the basic criteria for the development & intensification of cyclones.
- **Salinity:** Arabian sea has higher salinity than BOB. It's easier to heat & simultaneously evaporate water having lower salinity.
- **Location:** The typhoons originating in the Pacific Ocean too influences the cyclones in BOB, not the case in Arabian Sea.
- **Movement:** According to IMD cyclones originating in Arabian Sea are believed to move northwest. So they actually move away from Indian mainland.
- **The Bay receives higher rainfall and constant inflow of fresh water from the Ganga and Brahmaputra rivers.** This means that the Bay's surface water keeps getting refreshed, making it impossible for the warm water to mix with the cooler water below, making it ideal for a depression.

### 3. Why did cyclones give October a miss?

October to December period is among the favourable months for the development of cyclones in the Bay of Bengal and the Arabian Sea. In 2020, however, October passed without witnessing a cyclonic storm.

#### Usually, when do cyclones form and hit Indian coasts?

About 80 cyclones are formed around the world annually, out of which five are formed in the Bay of Bengal and the Arabian Sea, together known as **the North Indian Ocean**.

Cyclones in the North Indian Ocean are **bi-modal in nature**, that is, they occur during two seasons— April to June (pre-monsoon) and October to December (post-monsoon).

- Of these, May and November remain the most conducive for the development of cyclones.

#### Why were there no cyclone developments?

- Ocean disturbances enter the Bay of Bengal from the South China sea side and head towards the Indian coast. However, **there was no system which intensified to form a cyclone**.
- Another reason is **the weak La Nina conditions** along the equatorial Pacific Ocean.
- There was also the influence of **Madden Julian Oscillation (MJO)**. MJO is kind of an eastward-moving cyclic weather event along the tropics that influences rainfall, winds, sea surface temperatures and cloud cover. They have a 30 to 60-day cycle.
- Also, in November, **the vertical wind shear** created due to significant wind speed difference observed between higher and lower atmospheric level prevented the low-pressure systems and depression from strengthening into a cyclone.

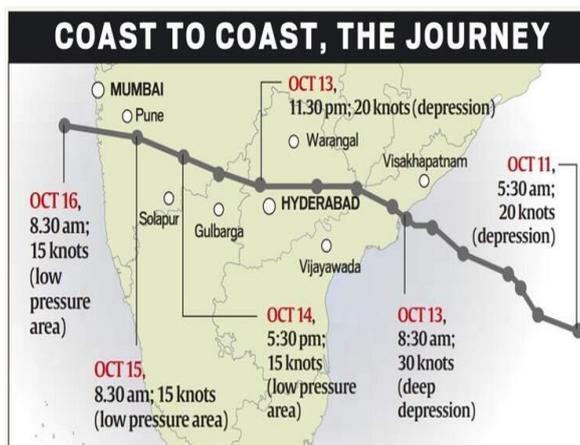
### 4. Why floods occurred in Hyderabad

Hyderabad was recently listed as **the rainiest place in the country** by Skymet, an independent weather forecasting agency, after it recorded 72.5mm of rainfall.

#### What caused this havoc?

This was caused by a weather that formed in the Bay of Bengal, hit the east coast and moved westward, weakening on the way.

- Normally, cyclones lose steam upon making their landfall. This particular system, however, clocked a long east-west track cutting across Andhra Pradesh, Telangana, north-interior Karnataka and Maharashtra.
- All these states experienced above-normal rain during the monsoon season. **As a result, the soil in these regions has retained significant moisture content.**



- In addition, **vertical wind shear** — the result of a significant difference in wind speed between higher and lower atmospheric levels — helped the system maintain its intensity as a deep depression or a well-marked low pressure area even on land.

**But, why floods occur in Hyderabad?**

Hyderabad is a system of catchments.

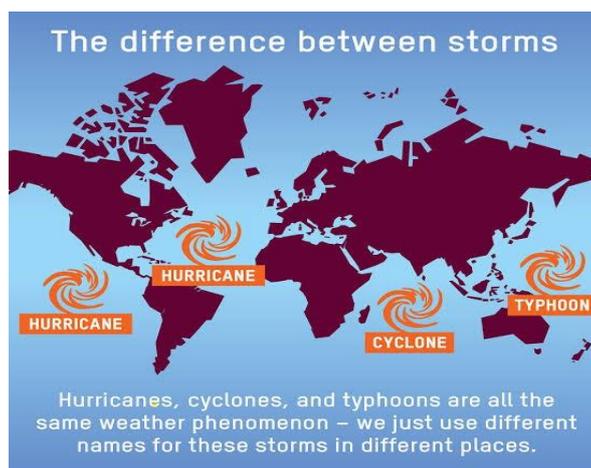
1. The western edge is in the Godavari river basin.
2. To the east, it's in the Krishna River basin.
3. Also, Hyderabad is in the Deccan region, which has a chaotic drainage pattern — water here does not flow in a single direction as the slope is in multiple directions.

**5. Typhoon**

**Hurricanes, typhoons and cyclones: What's the difference?**

They are all the same thing: **tropical storms**. But they are known by different names in different locations.

1. In the North Atlantic Ocean and Northeast Pacific, they are called **hurricanes**.
2. But if the same type of disturbance takes place in the **Northwest** Pacific Ocean, it is known as a typhoon.
3. And in the South Pacific and Indian Ocean, **cyclone** is the correct term.



**How storms form?**

- Air rises quickly when it is heated by warm sea water.
- As the air cools down again it is pushed aside by more warm air rising below it.
- This cycle causes strong winds. Over the sea, a tropical storm can whip up huge waves.
- When these waves reach land they can flood large areas, including towns and cities.
- Over land the strong winds can cause a lot of damage - they can flatten homes, knock over trees and even tip over cars.

**6. Polar vortex**

Polar vortex is losing stability and its splitting causes dramatic, extreme weather implications across the western nations such as the US and Europe. With a 'disrupted' polar vortex in 2021, the colder air is expected to spill out of the Arctic and result in the onset of extremely harsh winters.

**What exactly is a polar vortex?**

It is described as a whirling cone of low pressure over the poles that is strongest in the winter months due to the increased temperature contrast between the polar regions and the mid-latitudes, such as the US and Europe.

NATIONAL WEATHER SERVICE  
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**What is the Polar Vortex?**

- A persistent, large-scale upper level cyclone near one or both of earth's poles.
- It **ALWAYS** exists at the poles, but weakens in summer and strengthens in winter.
- Many times in winter, a piece of the vortex breaks off and is sent southward with the jet stream which is what is happening now.

**The Polar Vortex is Not.....**

- is not something new.
- is not something that exists at the earth's surface, it is in the upper atmosphere.
- is not something that will be visibly observed like tornadoes, funnel clouds, thunderstorms, lightning etc.
- is not something in itself dangerous to humans, but the cold, arctic air associated with them at the surface could be.

**Features:**

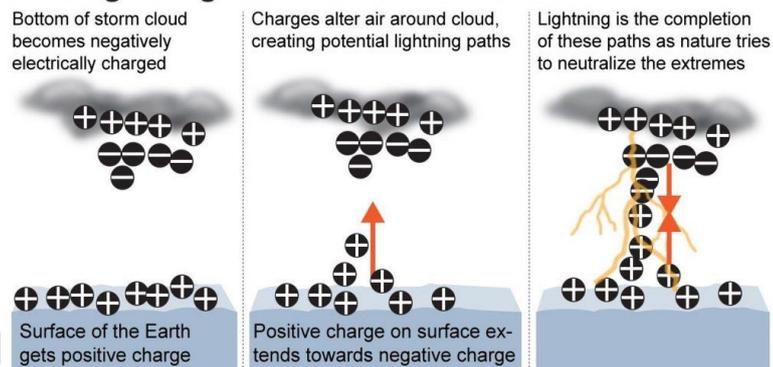
- The polar vortex spins in the stratosphere.
- Usually, when the vortex is strongest, cold air is less-likely to plunge deep into North America or Europe. In other words, it forms a wall that protects the mid-latitudes from cold Arctic air.
- But occasionally, the polar vortex is disrupted and weakens, due to wave energy propagating upward from the lower atmosphere. When this happens, the stratosphere warms sharply in an event known as sudden stratospheric warming, in just a few days, miles above the Earth's surface.
- The warming weakens the polar vortex, shifting its location somewhat south of the pole or, in some instances, 'splitting' the vortex up into 'sister vortices'.

**Effects of Polar Vortex:**

- The split higher up in the atmosphere can give rise to both, sudden and delayed effects, much of which involves declining temperatures and extreme winter weather in the eastern US along with northern and western Europe.
- A sudden stratospheric warming also leads to a warm Arctic not only in the stratosphere but also in the troposphere as well.
- A warmer Arctic, in turn, favours more severe winter weather in the Northern Hemisphere mid-latitudes including the eastern US.

**7. Lightning**

- It is a very rapid — and massive — discharge of electricity in the atmosphere, some of which is directed towards the Earth's surface.
- These discharges are generated in giant moisture-bearing clouds that are 10-12 km tall.
- Every lightning strikes around a fixed period and almost similar geographical locations in similar patterns.

**How lightning strikes the Earth's surface**

Sources: Ariel Cohen, Tina Stall; Meteorologists NOAA National Weather Service @latimesgraphics

**8. Sadiya earthquake**

- Scientists have found the first geological evidence of an earthquake at Himebasti Village on the border of Assam and Arunachal Pradesh, documented by historians as Sadiya earthquake.
- Sadiya earthquake is recorded to have caused massive destruction in the region and almost destroyed the town in 1697 CE.
- This finding could contribute to a seismic hazard map of the eastern Himalaya, which can facilitate construction and planning in the region.

**9. How Mount Everest got 3 feet higher**

The Foreign Ministers of **Nepal and China** jointly certified the elevation of Mount Everest at **8,848.86 metres** above sea level **86 cm** higher than what was recognised since 1954.

**About Mount Everest:**

- Mount Everest rises from the border between Nepal and China.
- Everest is also known as **Sagarmatha in Nepal and Mount Qomolangma in China.**

**How and when was the earlier measurement of 8,848 m done?**

- Earlier measurement was determined by the **Survey of India in 1954**, using instruments like theodolites and chains, with GPS still decades away. The elevation of 8,848 m came to be accepted in all references worldwide except by China.
- In 1999, a US team put the elevation at 29,035 feet (nearly 8,850 m).



**10. Aurora Borealis and Aurora Australis**

The **Northern Lights**, also known as **aurora borealis**, are usually witnessed far up in the polar regions or the high latitude regions of Europe. But, they **could be visible in parts of Illinois and Pennsylvania in the US.**

**Why?**

This is **due to a solar flare, which emerged from a Sunspot.** The flare is accompanied by a **Coronal Mass Ejection (CME)** — a large bubble of radiation and particles emitted by the Sun that explodes into space at high speed. This causes **the Northern Lights to be visible in more number of areas than usual.**

**What is Aurora?**

An Aurora is a display of light in the sky predominantly seen in the high latitude regions (Arctic and Antarctic). It is also known as a **Polar light.**

**Types:**

There are two types- the **aurora borealis and aurora australis** – often called the northern lights and southern lights.

**Where do they occur?**

They commonly occur at high northern and southern latitudes, less frequent at mid-latitudes, and seldom seen near the equator.

**Colors:**

While usually a milky greenish color, auroras can also show red, blue, violet, pink, and white. These colors appear in a variety of continuously changing shapes.

**Science behind their occurrence:**

- Auroras are a spectacular sign that our planet is electrically connected to the Sun. These light shows are provoked by energy from the Sun and fueled by electrically charged particles trapped in Earth’s magnetic field.
- The typical aurora is caused by collisions between fast-moving electrons from space with the oxygen and nitrogen in Earth’s upper atmosphere.
- The electrons—which come from the Earth’s magnetosphere, the region of space controlled by Earth’s magnetic field —transfer their energy to the oxygen and nitrogen atoms and molecules, making them “excited”.

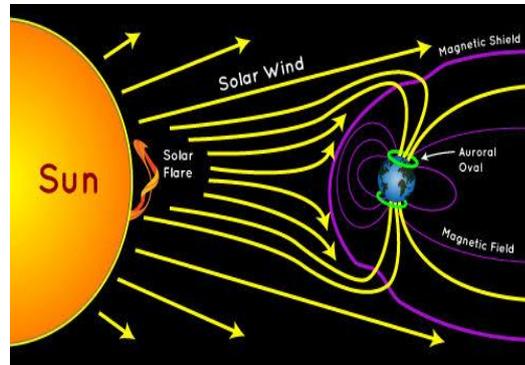
- As the gases return to their normal state, they emit photons, small bursts of energy in the form of light.
- When a large number of electrons come from the magnetosphere to bombard the atmosphere, the oxygen and nitrogen can emit enough light for the eye to detect, giving us beautiful auroral displays.

**Where do they origin?**

They origin at altitudes of 100 to more than 400 km.

**Why do auroras come in different colors and shapes?**

The color of the aurora depends on which gas — oxygen or nitrogen — is being excited by the electrons, and on how excited it becomes. The color also depends upon how fast the electrons are moving, or how much energy they have at the time of their collisions.



**Effects:**

- Auroras affect communication lines, radio lines and power lines.
- It should also be noted here that Sun’s energy, in the form of solar wind, is behind the whole process.

**11.El Nino**

As per latest findings, **nearly six out of 10 droughts**, in **non-El Nino years**, that occurred during the Indian summer-monsoon season in the past century **may have been driven by atmospheric disturbances from the North Atlantic region**.

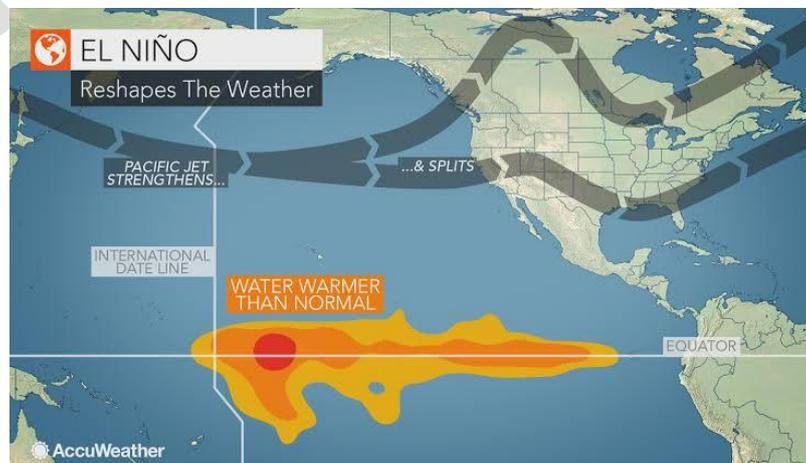
- In 2014, India saw a 14% rainfall deficit — or a drought — that wasn't linked to El Nino and before that in 1986 and 1985.

**Factors that influence these droughts:**

- These droughts are a consequence of a sudden and steep drop in rainfall in late August.
- Winds in the upper atmosphere are interacting with a deep cyclonic circulation above the abnormally cold North Atlantic waters. The resulting wave of air currents, called a **Rossby wave**, curved down from the North Atlantic squeezed in by the Tibetan plateau and hit the subcontinent around mid-August, suppressing rainfall and throwing off the monsoon that was trying to recover from the June slump.

**What is El Nino?**

- El Nino is a climatic cycle characterised by high air pressure in the Western Pacific and low air pressure in the eastern.
- During this event, there is a warming of the sea surface temperature in the eastern and central equatorial Pacific Ocean.
- It is one phase of an alternating cycle known as **El Niño Southern Oscillation (ENSO)**.



**What causes El Nino?**

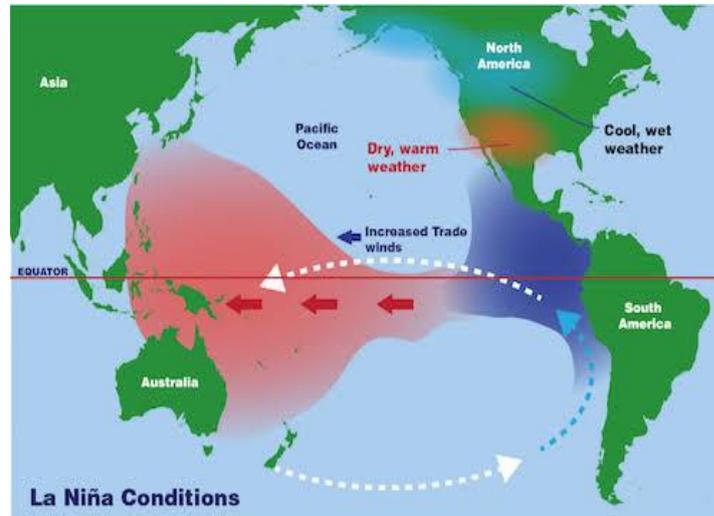
- El Nino sets in when there is anomaly in the pattern.
- The westward-blowing trade winds weaken along the Equator and due to changes in air pressure, the surface water moves eastwards to the coast of northern South America.
- The central and eastern Pacific regions warm up for over six months and result in an El Nino condition.

**12. La Niña**

**What is La Niña?**

It means **the large-scale cooling of ocean surface temperatures in the central and eastern equatorial Pacific Ocean**, together with changes in the tropical atmospheric circulation, namely winds, pressure and rainfall.

- It has **the opposite impacts on weather and climate as El Niño**, which is the warm phase of the **El Niño Southern Oscillation (ENSO)**.



**Weather changes because of La Nina:**

1. The Horn of Africa and central Asia will see below average rainfall due to La Niña.
2. East Africa is forecast to see drier-than-usual conditions, which together with the existing impacts of the desert locust invasion, may add to regional food insecurity.
3. It could also lead to increased rainfall in southern Africa.
4. It could also affect the South West Indian Ocean Tropical Cyclone season, reducing the intensity.
5. Southeast Asia, some Pacific Islands and the northern region of South America are expected to receive above-average rainfall.
6. In India, La Niña means the country will receive more rainfall than normal, leading to floods.

**How is La Niña linked with the Northeast monsoon?**

While La Niña conditions enhance the rainfall associated with the Southwest monsoon, it has a negative impact on rainfall associated with the Northeast monsoon.

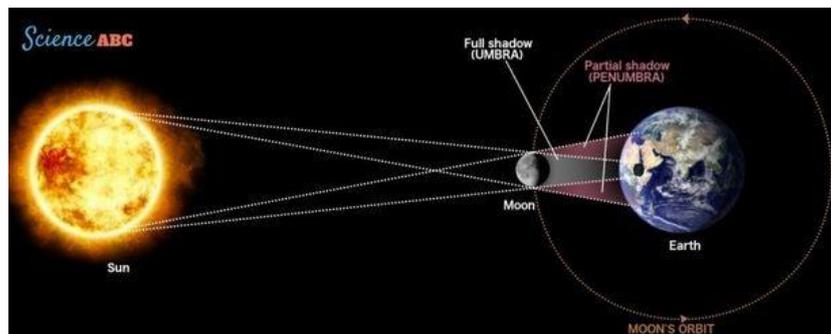
**During La Niña years**, the synoptic systems — low pressure or cyclones — formed in the Bay of Bengal remain significantly to the north of their normal position.

- Besides, instead of moving westwards, these systems recurve. As they lie to the north of their normal position, not much rainfall occurs over southern regions like Tamil Nadu.

**13. Solar Eclipse**

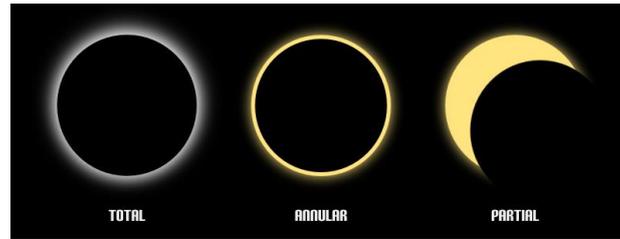
It is a natural event that takes place on Earth when the Moon moves in its orbit between Earth and the Sun (this is also known as an occultation).

- It happens at New Moon, when the Sun and Moon are in conjunction with each other.
- During an eclipse, the Moon’s shadow (which is divided into two parts: the dark umbra and the lighter penumbra) moves across Earth’s surface.



**Then, why isn't there a solar eclipse every month?**

- If the Moon was only slightly closer to Earth, and orbited in the same plane and its orbit was circular, we would see eclipses each month.
- The lunar orbit is elliptical and tilted with respect to Earth's orbit, so we can only see up to 5 eclipses per year.
- Depending on the geometry of the Sun, Moon and Earth, the Sun can be totally blocked, or it can be partially blocked.



**Solar Eclipse Types:**

**1. Total Solar Eclipse:**

It occurs **when the Moon completely blocks the solar disk**. In a total solar eclipse, the narrowest part of the path (where the Sun is completely blocked and the Moon casts its darkest shadow (called the **umbra**)) is called the **“zone of totality”**.

A phenomenon called **“Bailey’s Beads”** often appears as sunlight shines out through valleys on the lunar surface.

**2. Annular Solar Eclipse:**

**When the Moon is farther away in its orbit than usual, it appears too small to completely cover the Sun’s disk**. During such an event, a bright ring of sunlight shines around the Moon. This type of eclipse is called an **“annular”** eclipse.

**3. Partial Solar Eclipse:**

It occurs when Earth moves through the lunar penumbra (the lighter part of the Moon’s shadow) as the Moon moves between Earth and the Sun. The Moon does not block the entire solar disk, as seen from Earth. Depending on your location during a partial eclipse, you might see anything from a small sliver of the Sun being blotted out to a nearly total eclipse.

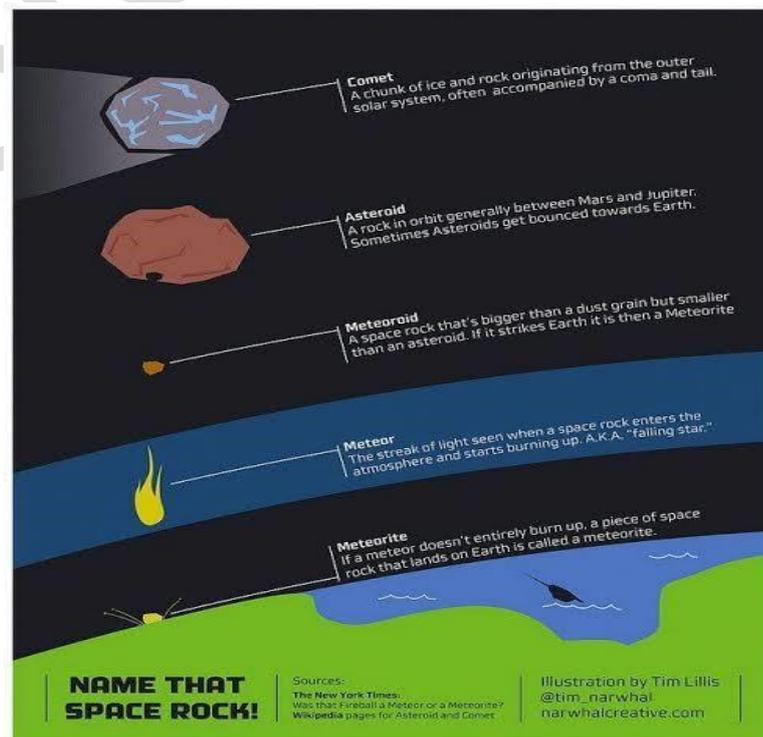
**14. Geminids meteor shower**

The **Geminids meteor shower**, believed to be the strongest of the year, was active from December 4-December 20, 2020.

**What are meteor showers?**

- Meteors are bits of rock and ice that are ejected from comets as they manoeuvre around their orbits around the sun.
- Meteor showers are witnessed when Earth passes through the trail of debris left behind by a comet or an asteroid.

**Why is the Geminid meteor shower considered to be the best of the year?**



The Geminids meteor showers are unique because **their origin does not lie in a comet, but what is believed to be an asteroid or an extinct comet.** The Geminids emerge from **3200 Phaethon**, which meteor scientists consider to be an asteroid.

The asteroid is over 5 km in diameter and was named after **the Greek myth of Phaethon**, the son of Sun god Helios.

#### What Are The Differences Between An Asteroid, Comet, Meteoroid, Meteor and Meteorite?

1. Asteroid: A relatively small, inactive, rocky body orbiting the Sun.
2. Comet: A relatively small, at times active, object whose ices can vaporize in sunlight forming an atmosphere (coma) of dust and gas and, sometimes, a tail of dust and/or gas.
3. Meteoroid: A small particle from a comet or asteroid orbiting the Sun.
4. Meteor: The light phenomena which results when a meteoroid enters the Earth's atmosphere and vaporizes; a shooting star.
5. Meteorite: A meteoroid that survives its passage through the Earth's atmosphere and lands upon the Earth's surface.

### 15. Dip in Delhi's temperature

Recently, a rapid decline in minimum temperature in Delhi was noted from 14.4 degrees Celsius to 4.1 degrees.

- The dip was five degrees below the normal temperature for this time of the year.

#### What caused the dip in Delhi's temperature?

- There was significant amount of **snowfall** for few days in states falling in the western Himalayan range Jammu & Kashmir, Himachal Pradesh and Uttarakhand under the influence of a **Western Disturbance**.
- Snowfall in the western Himalayan range means **cold, north-westerly winds** blowing over Delhi from the direction of this high altitude area, and clearing of cloud cover with the passing of Western Disturbance, and leads to a fall in temperatures.
- **The lack of cloud cover** also leads to higher radiation from the Earth's surface into the atmosphere at night time, which also cools the ground.
- Moreover, **under the influence of an active La Niña climate pattern**, temperatures across the globe have been dipping.

**A Western Disturbance**, labelled as **an extra-tropical storm** originating in the Mediterranean, is an area of low pressure that brings sudden showers, snow and fog in northwest India.

### 16. In tree rings, warning of Brahmaputra floods

The scientists have come up with an innovative idea in which they have tried to analyse floods by relating them to **tree rings**.

#### What does the new study suggest?

The new study is based on examinations of tree rings, which provided a picture of rainfall patterns going back seven centuries.

- The rings showed that **the post 1950s period was actually one of the driest since the 1300s**- there have been much wetter periods in the past.
- The tree-rings suggest that **the recent decades (particularly from the 1950s to 1980s) were unusually dry**. Therefore, in general, past conditions were wetter.
- It also suggests that the future will likely be wetter due to our emissions of carbon-dioxide.

#### How tree rings helped?

- As trees grow they incorporate information about the environmental conditions they are living in in their annual growth rings.

- Tree rings **grow wider in years when soil moisture is high**. Trees in the region grow more and put on wide rings in wet monsoon years.
- Conversely, **in dry monsoon years (or droughts) they grow less and put on narrow rings**. Since some of these trees can live for a long time, by taking a small, pencil-thin tree-core from these trees and measuring their rings under a microscope scientists could learn more about climate conditions for the past several centuries.

#### Significance:

The findings are obviously relevant to Assam and Northeast India too. With this, flood risks could be compounded by planned projects in the region.

### 17. Geothermal springs in Himalayas

Scientists of the **Wadia Institute of Himalayan Geology (WIHG)** conducted a study on Geothermal springs in Himalayas.

#### Key observations and findings:

1. Geothermal springs cover about **10,000 square kms in the Garhwal region of the Himalayas in Uttarakhand**.
2. The Himalayas host hundreds of geothermal springs and **they release a huge amount of carbon dioxide in the atmosphere**.
3. **CO<sub>2</sub> in these thermal springs are sourced from metamorphic decarbonation of carbonate rocks** present deep in the Himalayan core along with **magmatism and oxidation of graphite**.
4. **Most of the geothermal water** is dominated by evaporation followed by weathering of silicate rocks.

#### What are hot/geothermal springs?

A hot spring is a spring **produced by the emergence of geothermally heated groundwater** that rises from the Earth's crust.

#### Science behind hot water:

1. **Deeper we go down the earth hotter it gets and find magma (molten rock) at the outer core of the earth**. This magma (800-1300°C) is surrounded by different layers of the earth.
2. If there is a crack or thrust fault in the layers of earth, tremendous amount of heat will be transferred from the magma to the surrounding rocks.
3. Now, all that thermal energy will be transferred from the rocks along that thrust fault to the water present down there.
4. As the temperature of the water increases, its density decreases which results in the rise of the hot water toward the surface along this thrust fault in the form of hot springs.

### 18. Volcanoes

Indonesia is home to many active volcanoes, due to its position on the **“Ring of Fire”, or the Circum-Pacific Belt**, which is **an area along the Pacific Ocean** characterised by active volcanoes and frequent earthquakes.

- The **Ring of Fire is home to about 75 per cent of the world’s volcanoes** and about **90 per cent of its earthquakes**.

#### Why do volcanoes erupt?

A volcano can be **active, dormant or extinct**.

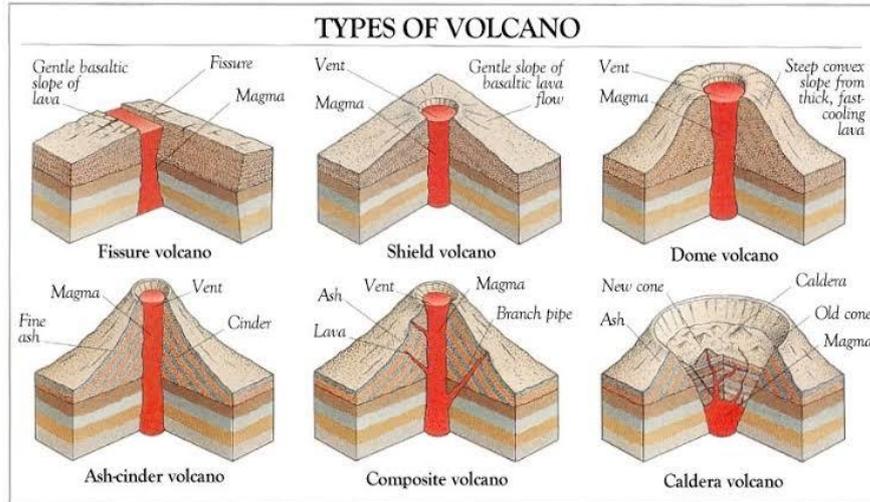
An eruption takes place **when magma (a thick flowing substance), formed when the earth’s mantle melts, rises to the surface**.

Because **magma is lighter than solid rock**, it is able to rise through vents and fissures on the surface of the earth. **After it has erupted, it is called lava**.

**When are they explosive?**

Not all volcanic eruptions are explosive, since explosivity depends on the composition of the magma.

- When the magma is runny and thin, gases can easily escape it, in which case, the magma will flow out towards the surface.
- On the other hand, if the magma is thick and dense, gases cannot escape it, which builds up pressure inside until the gases escape in a violent explosion.



**19. Aravali Range**

1. They are **aligned in north-east to south-west direction**. They run between **Delhi and Palanpur in Gujarat**.
2. The highest peak is **Guru Shikhar** at 1,722 metres (5,650 ft).
3. They are one of the oldest **fold mountains** of the world and the oldest in India.
4. According to some geographers, **one Branch of the Aravalis extends to the Lakshadweep Archipelago through the Gulf of Khambhat** and the other into Andhra Pradesh and Karnataka.
5. At the south-west extremity the range rises to over 1,000 m. Here **Mt. Abu** (1,158 m), a small hilly block, is separated from the main range by **the valley of the Banas**.
6. **Pipli Ghat, Dewair and Desuri passes** allow movement by roads and railways.
7. The **Aravalli Range joins two of the ancient earth's crust segments** that make up the greater Indian craton- **Aravalli Craton and Bundelkand Craton**.



**Rivers:**

Three major rivers and their tributaries flow from the Aravalli, namely **Banas and Sahibi rivers** which are tributaries of Yamuna, as well as **Luni River** which flows into the Rann of Kutch.

**20. Zealandia**

Researchers have announced that they mapped **the shape and size of the Zealandia** continent in unprecedented detail.

**Latest findings:**

1. **Zealandia's** area is nearly 2 million square miles (5 million square kilometers) — about half the size of Australia.
2. But **only 6% of the continent is above sea level**. That part underpins New Zealand's north and south islands and the island of New Caledonia.
3. The map is part of a **global initiative to map the planet's entire ocean floor by 2030**.
4. This map also reveals where Zealandia sits across various tectonic plates, which of those plates are being pushed under the other in a process known as subduction, and how quickly that movement is happening.

**How Zealandia evolved?**

**Gondwana** formed when Earth's ancient supercontinent, **Pangea**, split into two fragments.

- **Laurasia** in the north became Europe, Asia, and North America.
- **Gondwana** in the south dispersed to form modern-day Africa, Antarctica, South America, and Australia.

Further, **Geologic forces** continued to rearrange these land masses, and **Zealandia was forced under the waves about 30 million to 50 million years after it broke off Gondwana as the largest tectonic plate** — the Pacific Plate — slowly subducted beneath it.

**Zealandia 'lost continent'**

New Zealand is part of a previously unknown continent mostly submerged in the South Pacific, scientists said Friday



## Places in News

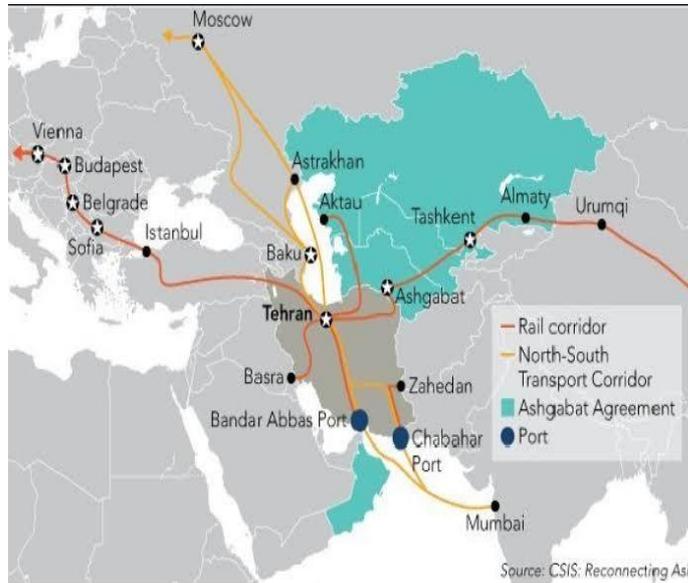
### 1. International North South Transport Corridor

**About INSTC:**

It is a **7,200-km-long multi-mode network of ship, rail, and road route** for moving freight.

**Regions involved:** India, Iran, Afghanistan, Azerbaijan, Russia, Central Asia and Europe.

It will synchronize with **the Ashgabat agreement**, a Multimodal transport agreement signed by India, Oman, Iran, Turkmenistan, Uzbekistan and Kazakhstan, for creating an international transport and transit corridor facilitating transportation of goods between Central Asia and the Persian Gulf.



### 2. China’s string of pearls

- The String of Pearls is a geopolitical theory on potential Chinese government intentions in the Indian Ocean region (IOR).
- It refers to the network of Chinese military and commercial facilities and relationships along its sea lines of communication, which **extend from the Chinese mainland to Port Sudan in the Horn of Africa**.
- The sea lines run through several major maritime choke points such as the **Strait of Mandeb, the Strait of Malacca, the Strait of Hormuz, and the Lombok Strait** as well as other strategic maritime centres in Pakistan, Sri Lanka, Bangladesh, the Maldives, and Somalia.



### 3. Taiwan

**Taiwan** is a country in East Asia. Neighbouring countries include the People's Republic of China (PRC) to the northwest, Japan to the northeast, and the Philippines to the south.

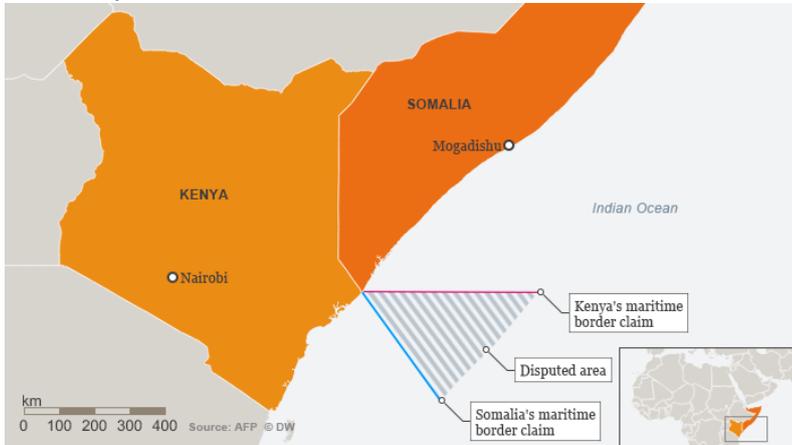
**Taiwan Strait:**

- The Taiwan Strait is a 110-mile-wide channel that separates mainland China from the island of Taiwan.
- It is also known as the Formosa Strait or the Tai-hai (the Tai Sea).



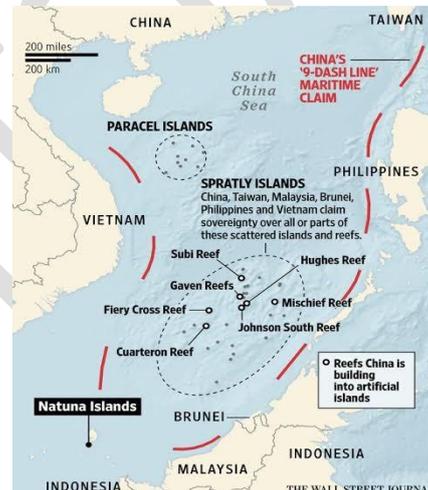
- The Taiwan Strait makes up part of the South China Sea, and its northern portion is linked to the East China Sea.
- The strait borders the south eastern part of China and runs along the eastern part of China's Fujian Province.

#### 4. Kenya and Somalia



#### 5. South China Sea

- A disputed reef in the region - **Reed Bank**.
- States and territories with borders on the sea include: the People's Republic of China, the Republic of China (Taiwan), the Philippines, Malaysia, Brunei, Indonesia and Vietnam.



#### 6. East China Sea

After two Chinese coast guard ships entered waters off **the Senkaku islands recently**, Japan protested against China's intrusion in the uninhabited islets in **the East China Sea**.

Japan and China are locked in a dispute over the islands in the East China Sea which Tokyo calls **the Senkakus** and Beijing **the Diaoyu**. The islets are administered by Japan, however, Beijing claims the islands as its own.

It connects with the Sea of Japan in the northeast through the Korea Strait, the South China Sea in the southwest via the Taiwan Strait.



### 7. Myanmar

- Myanmar is bordered by Bangladesh and India to its northwest, China to its northeast, Laos and Thailand to its east and southeast, and the Andaman Sea and the Bay of Bengal to its south and southwest.
- Mizoram, Manipur, Nagaland and Arunachal Pradesh states of India border Myanmar.



### 8. Suez Canal

A large cargo ship named 'Ever Given' got stuck near the southern end of the Suez Canal due to a mishap caused by bad weather.

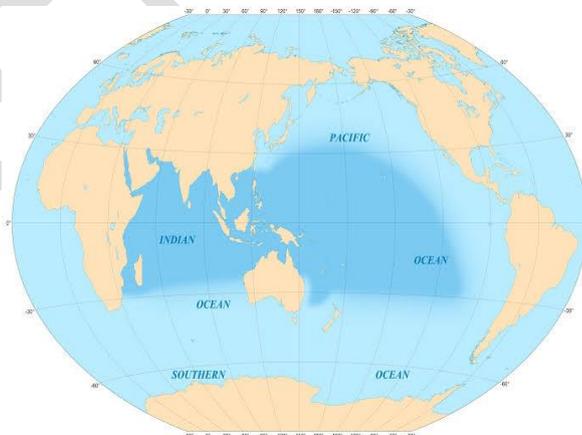
#### Key facts:

- The Suez Canal is an artificial sea-level waterway running north to south across the Isthmus of Suez in Egypt, to connect the Mediterranean Sea and the Red Sea.
- The canal separates the African continent from Asia.
- It provides the shortest maritime route between Europe and the lands lying around the Indian and western Pacific oceans.
- It is one of the world's most heavily used shipping lanes, carrying over 12% of world trade by volume.



### 9. Indo-Pacific

The term 'Indo-Pacific' refers to the maritime space stretching from the littorals of East Africa and West Asia, across the Indian Ocean and western Pacific Ocean, to the littorals of East Asia.



### 10. Pangong Tso

- Pangong Tso literally translates into a "conclave lake".
- Pangong Tso Lake is an endorheic lake in the Himalayas situated at a height of about 4,250 m.
- It is 134 km (83 mi) long and extends from India to the Tibetan Autonomous Region, China. Approximately 50% of the length of the lake lies within the Tibetan Autonomous Region.
- It is formed from Tethys geosyncline.



- The **Karakoram Mountain range** ends at the north bank of Pangong Tso. Its southern bank too has high broken mountains sloping towards **Spangur Lake** in the south.
- Pangong Tso is strategically crucial as it is very close to **Chusul Valley**, which was one of the battlefronts between India and China during the 1962 war.
- During winter the lake freezes completely, despite being saline water. It has a **land-locked basin separated from the Indus River basin** by a small elevated ridge, but is believed to have been part of the latter in prehistoric times.
- The lake is in the **process of being identified under the Ramsar Convention** as a wetland of international importance. This will be the first trans-boundary wetland in South Asia under the convention.

The **Line of Actual Control (LAC)** – the line that separates Indian and Chinese troops since 1962 – generally runs along the land except for the width of **Pangong Tso**. Here, it runs through water.

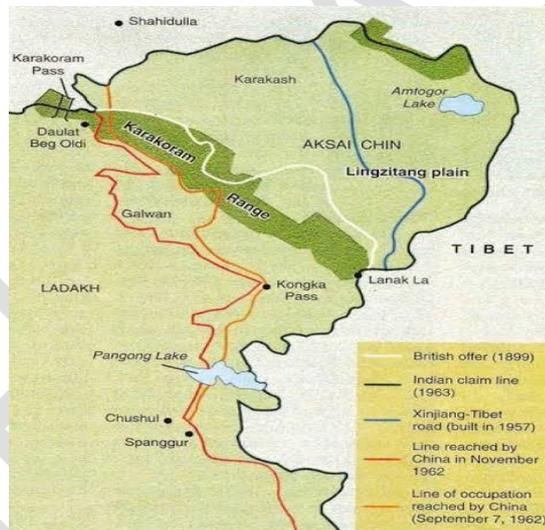
- Both sides have marked their areas announcing which side belongs to which country.
- **India controls about 45 km stretch of the Pangong Tso** and China the rest.

### 11.Chushul

It is a village in Leh, Ladakh, India.

It is located in the Durbuk tehsil, in the area known as **“Chushul valley”**.

- It is close to **Rezang La and Panggong Lake** at a height of 4,360 metres.
- Chushul is **one of the officially agreed Border Personnel Meeting points** between the Indian Army and the People’s Liberation Army of China for regular consultations and interactions between the two armies to improve relations.
- This place is famous for the Indian Army who fought to the **‘last man, last round’** at Rezang La (Chushul) on November 18, 1962. Without this crucial victory, the territory might have been captured by China.



### 12.Pangda village

- It is a new border village built by China.
- The village is located on territory disputed by China and Bhutan.
- The area is east of the India-Bhutan-China trijunction on the Doklam plateau, the site of a 72- day stand- off in 2017.

#### Focal point

The map shows the location of Pangda, the new border village said to be built by China in disputed territory

- The area is east of the India-Bhutan-China trijunction on the **Doklam plateau**, the site of a 72-day stand-off in 2017
- Chinese media said the village had **27 households**, a public square, a village committee, a health room, a police room, a kindergarten, a supermarket and a plastic runway



### 13.Doklam and Naku La

**Naku La sector** is a **pass** at a height of more than 5,000 metres above Mean Sea Level (MSL) **in the state of Sikkim**. It is located ahead of **Muguthang or Cho Lhamu (source of River Teesta)**.

The **other passes located in the state of Sikkim** are **Nathu La Pass and Jelep La Pass**.

**Doklam (or Zhonglan or Donglong)**: It is an area with a plateau and a valley which lies on the Bhutan-China border, near India. It is located between Tibet's Chumbi valley to the North, Bhutan's Ha valley to the East and India's Sikkim state to the West.



### 14. Kalapani

- Kalapani is a region located in the easternmost corner of Uttarakhand’s Pithoragarh district.
- It shares a broder on the north with the Tibet Autonomous Region of China and Nepal in the east and south.
- The region resembles a slice of cake wedged in between Limpiyadhura, Lipulekh and Kalapani.
- The area is in India’s control but Nepal claims the region because of historical and cartographic reasons.
- The area is the largest territorial dispute between Nepal and India consisting of at least 37,000 hectares of land in the High Himalayas.

**TRI-JUNCTION TROUBLE**

Lipulekh mountain pass at the 80-km-long Uttarakhand-Nepal border

**Kalapani**  
 Lowest point 11,980 ft  
 Highest point 20,280 ft (Lipulekh Pass)

- Nepal has two tri-junctions with India and China
- The one in dispute now is Lipulekh in Kalapani, at the border of Uttarakhand with Nepal
- In 1816, the Sugauli Treaty signed by Nepal and British India identified Kali river as

Nepal’s boundary with India

- Nepal claims the river to Kalapani’s west is the main Kali, and thus Nepal has territorial rights to it
- India holds that a ridgeline to Kalapani’s east is the border, thus Kalapani falls within its territory

The five Indian states that share a land border with Nepal are Uttarakhand, Uttar Pradesh, Bihar, West Bengal, and Sikkim.

**The Sharda River demarcates Nepal's western border with India.**

### 15. Shahtoot Dam

India set to build **Shahtoot Dam in Afghanistan**, provide drinking water for 2 million residents of Kabul.

- The dam would **come upon the Maidan river tributary of Kabul river.**



### 16. Bhasan Char

Bhasan Char is an island specifically developed to accommodate 1,00,000 of the 1 million Rohingya who have fled from neighbouring Myanmar.

**BHASAN CHAR: NEW HOME FOR ROHINGYAS**

Bhasan Char, meaning “floating island”, emerged from silt around 20 years ago. It regularly floods during Jun-Sep monsoon season

Bhasan Char project  
 Area: 6.7 sq km  
 Cost: \$280m

### 17. Arab Nations

- Arab nation consists of the 22 Arab countries which are members of the Arab League.
- A majority of these countries are located in Western Asia, North Africa, and the Horn of Africa.
- The region stretches from the Atlantic Ocean in the west to the Arabian Sea in the east, and from the Mediterranean Sea in the north to the Indian Ocean in the southeast.



Horn of Africa is a peninsula and the easternmost projection of the African continent. The Horn of Africa consists of the countries of **Djibouti, Eritrea, Ethiopia, and Somalia**.

### 18. Persian Gulf

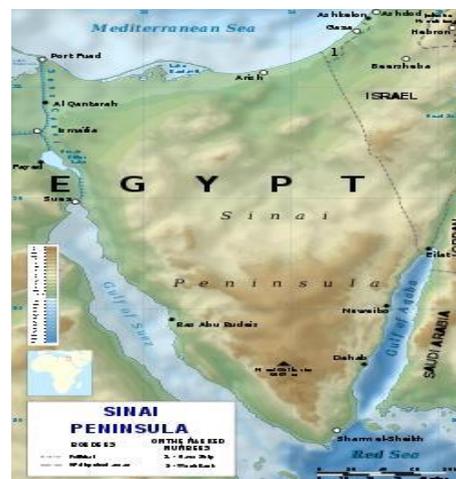
The lands around the Persian Gulf are shared by **eight countries**- Bahrain, Iran, Iraq, Kuwait, Oman, Qatar, Saudi Arabia, and the United Arab Emirates.

- These countries are **major producers of crude oil and natural gas**, and thereby contribute critically to the **global economy and to their own prosperity**.
- The area has approximately **two-thirds of the world's estimated proven oil reserves and one-third of the world's estimated proven natural gas reserves**.
- A **considerable amount of sea trade** passes through the gulf, leading to heavy traffic in the region.



### 19. Sinai Peninsula

- The Sinai Peninsula is a peninsula in Egypt, and the only part of the country located in Asia.
- It is situated between the Mediterranean Sea to the north and the Red Sea to the south, and is a land bridge between Asia and Africa.



## 20. West Bank

- It is a landlocked territory near the Mediterranean coast of Western Asia, bordered by Jordan to the east and by the Green Line separating it and Israel on the south, west and north.
- The West Bank also contains a significant section of the western Dead Sea shore.



### Where is Gaza?

- Gaza is a densely populated strip of land that is mostly surrounded by Israel and peopled almost exclusively by Palestinians. Israel used to have a military presence, but withdrew unilaterally in 2005.
- Gaza is governed by the Islamist group **Hamas**, which formed in 1987 as a militant “resistance” group against Israel.

## 21. Caspian Sea

- The Caspian Sea is the **world's largest inland body of water**, variously classed as the world's largest lake or a full-fledged sea.
- An **endorheic basin**, it lies between Europe and Asia; east of the Caucasus, west of the broad steppe of Central Asia.
- Countries bordering Caspian sea are Kazakhstan, Russia, Azerbaijan, Iran and Turkmenistan.
- Its main freshwater inflow, Europe's longest river, the Volga, enters at the shallow north end.



## 22. Turkey

Turkey is bordered on its northwest by Greece and Bulgaria; north by the Black Sea; northeast by Georgia; east by Armenia, Azerbaijan, and Iran; southeast by Iraq; south by Syria and the **Mediterranean Sea**; and west by the **Aegean Sea**.



## 23. Bamiyan

- Bamiyan is situated in the high mountains of the Hindu Kush in the central highlands of Afghanistan.
- The valley, which is set along the line of the Bamiyan River, was once integral to the early days of the Silk Roads, providing passage for not just merchants, but also culture, religion and language.

## 24. Hagia Sophia and Chora

After Hagia Sophia, Turkey’s historic Chora Church also switched to mosque

### 25. Nagorno-Karabakh

- Nagorno-Karabakh, also known as **Artsakh**, is a landlocked region in **the South Caucasus**, within the mountainous range of **Karabakh**.
- It is a disputed territory, **internationally recognized as part of Azerbaijan**, but mostly governed by **the Republic of Artsakh**, a de facto independent state.



### 26. Puerto Rico:

**Context:**

For the third time in ten years, the United States territory of Puerto Rico has voted in favour of statehood.

- Puerto Rico is a Spanish-speaking island located in the Caribbean Sea.
- In 1917, Puerto Ricans were granted US citizenship, but the island itself was never made a full state, and continues to remain a "US territory", along with Guam, North Mariana Islands, American Samoa, and the US Virgin Islands.



### 27. Tristan da Cunha:

- Tristan da Cunha is inhabited by less than 300 humans.
- It is a small chain of islands over 6,000 miles from London in the South Atlantic and the water around the islands are considered to be the richest in the world.
- It is an **UK Overseas Territory**.
- It was recently declared **the largest fully protected marine reserves in the Atlantic Ocean at 687,000 square kilometres**.



### 28. Thailand

- Thailand is a country in Southeast Asia.
- Thailand is bordered to the north by Myanmar and Laos, to the east by Laos and Cambodia, to the south by the Gulf of Thailand and Malaysia, and to the west by the Andaman Sea and the southern extremity of Myanmar.



- It also shares maritime borders with Vietnam in the Gulf of Thailand to the southeast, and Indonesia and India on the Andaman Sea to the southwest.
- Southern Thailand consists of the narrow Kra Isthmus that widens into the Malay Peninsula.
- Kra Canal or Kra Isthmus Canal, refers to proposals for a canal that would connect the Gulf of Thailand with the Andaman Sea across the Kra Isthmus in southern Thailand.



### 29. Mekong River

- The Mekong begins on the Tibetan Plateau and runs for more than 2,600 miles through China, Myanmar, Thailand, Laos, Cambodia, and Vietnam before emptying into the South China Sea.
- The capital of Laos and Cambodia are situated on the banks of the Mekong River.

### 30. Borneo Island

Borneo Island is the third-largest island in the world and the largest in Asia. The island is politically divided among three countries: **Malaysia and Brunei in the north, and Indonesia to the south.**



### 31. Katchatheevu

- Katchatheevu is a 285-acre uninhabited island administered by Sri Lanka and was a disputed territory claimed by India until 1976.
- In 1974, then Prime Minister of India, Indira Gandhi ceded Katchatheevu to Sri Lanka under the "Indo-Sri Lankan Maritime agreement" aimed at resolving the maritime boundaries in the Palk Strait.
- Another agreement signed in 1976 restricted both the countries' fishermen from fishing in the other's exclusive economic zones.

### 32. Kyrgyzstan

- Often referred to as 'Central Asia's only democracy.'
- Capital- Bishkek.
- It is a landlocked Central Asian country.
- Shares a long border with China.
- China has built road and rail networks with Kyrgyzstan and Uzbekistan.
- It is a member of the Russia-led Collective Security Treaty Organisation and hosts a Russian air base.



### 33. New Caledonia

The South Pacific territory of New Caledonia chose to remain French, narrowly rejecting independence from France in a referendum.

- Located in the southwest Pacific Ocean, to the south of Vanuatu, about 1,210 km east of Australia.
- The archipelago, part of the Melanesia subregion, includes the main island of Grande Terre, the Loyalty Islands, the Chesterfield Islands, the Belep archipelago, the Isle of Pines, and a few remote islets.
- It is part of Zealandia.
- The **Diahot River** is the longest river of New Caledonia.



### 34. Mediterranean Sea

The Mediterranean is a vast sea positioned between Europe to the north, Africa to the south, and Asia to the east.

The Mediterranean Sea connects:

1. to the Atlantic Ocean by the Strait of Gibraltar (known in Homer's writings as the "Pillars of Hercules") in the west
2. to the Sea of Marmara and the Black Sea, by the Straits of the Dardanelles and the Bosphorus respectively, in the east
3. The 163 km long artificial Suez Canal in the southeast connects the Mediterranean Sea to the Red Sea.



### 35. Fiji

- It is an island country in **Melanesia, part of Oceania** in the South Pacific Ocean about 1,100 nautical miles northeast of New Zealand.
- Fiji consists of an archipelago of more than 330 islands.



### 36. Crete Island

It is the largest and most populous of the Greek islands.

- Crete became part of Greece in December 1913.
- It is located in the southern part of the Aegean Sea separating the Aegean from the Libyan Sea.



### 37. Sir Creek

Sir Creek is a 96-km strip of water disputed between India and Pakistan in the Rann of Kutch marshlands.

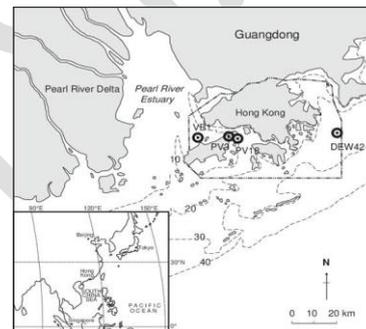
- Originally named **Ban Ganga**, Sir Creek is named after a British representative.
- The Creek opens up in the Arabian Sea and roughly divides the Kutch region of Gujarat from the Sindh Province of Pakistan.



### 38. Pearl River estuary

The Pearl River estuary includes Hong Kong, Macau as well as the mainland Chinese cities of Shenzhen, Guangzhou and Dongguan.

Chinese pink dolphins are making a comeback in the Pearl river estuary, one of the most heavily industrialised areas on Earth.

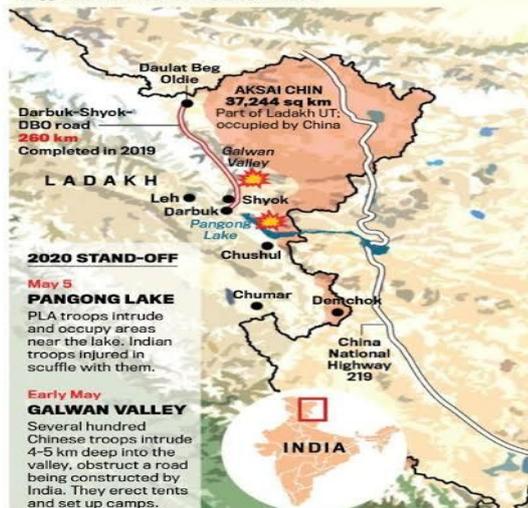


### 39. Demchok sector

- It is a disputed region centered on the villages of Demchok, Ladakh and Dêmqog, Ngari Prefecture, situated near the confluence of the Charding Nullah and Indus River.
- It is part of the greater Sino-Indian border dispute between China and India. Both India and China claim the disputed region, with a Line of Actual Control between the two nations situated along the Charding Nullah.

#### LADAKH ON THE EDGE

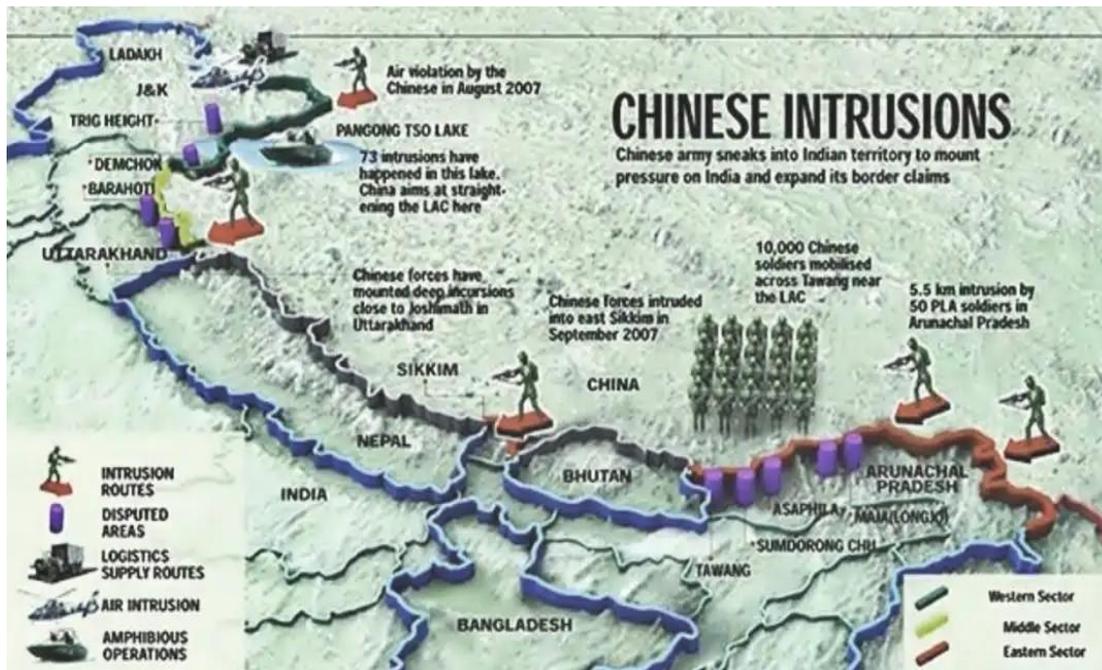
While previous flashpoints over differing perceptions of the LAC have been settled on an average in three weeks, the scale of the current incursions suggests this needn't always be the case



### 40. Sumdorong Chu

- In 1986–87, a military standoff took place between India and China in the Sumdorong Chu Valley bordering the Tawang district, Arunachal Pradesh and Cona County, Tibet.

The standoff was the first military confrontation along the disputed **McMahon Line** after the 1962 war and gave rise to fears of escalation.



#### 41. Grand Ethiopian Renaissance Dam (GERD)

- **LOCATION:** Benishangul-Gumuz region, Ethiopia.
- Formerly known as **the Millennium Dam**, is under construction in **the Benishangul-Gumuz region of Ethiopia**, on the **Blue Nile River**, which is located about 40km east of Sudan.
- Grand Renaissance Dam hydropower project, when completed, will be Africa's largest.
- The main waterways of the Nile run through Uganda, South Sudan, Sudan and Egypt, and its drainage basin runs through several countries in East Africa, including Ethiopia, the portion where this dam is being constructed.



#### 42. Ethiopia

- **Ethiopia, is an East African landlocked country on the Horn of Africa.** It shares borders with Eritrea, Djibouti, Somalia, Kenya, South Sudan and Sudan.
- Blue Nile is a river originating at Lake Tana in Ethiopia.
- A large number of civilians were brutally killed in Ethiopia's Tigray region amid fighting between the local and federal governments.



### 43. Nile River



### 44. Kailash Range

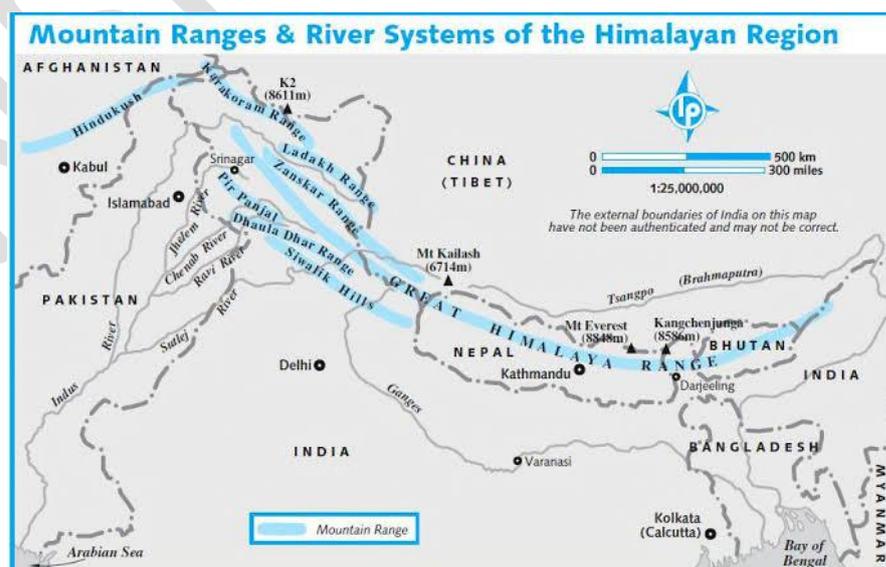
The Kailash Range was the theatre of conflict during the 1962 Chinese offensive, with key battles at **Rezang La and Gurung Hill**.

- In 2020, Indian troops secured Kailash Ridge in an operation that took the Chinese by surprise.

#### The Kailash Range:

The **Karakoram Range** ends on the northern side of the Pangong Tso.

1. The Kailash Range originates from the southern bank and runs northwest to southeast for over 60 km.
2. The Kailash Ridge is characterised by rugged, broken terrain with heights varying between 4,000-5,500m.



- Its key features include Helmet Top, Gurung Hill, Spanggur Gap, Muggar Hill, Mukhpari, Rezang La and Rechin La. The Ridge dominates Chushul Bowl; an important communications centre.

#### 45. Daulat Beg Oldie

- DBO is **the northernmost corner of Indian territory in Ladakh**, in the area better known in **Army parlance as Sub-Sector North**.
- It has **the world's highest airstrip**, originally built during the 1962 war but abandoned until 2008, when the Indian Air Force (IAF) revived it as one of its many Advanced Landing Grounds (ALGs) along the LAC.
- DBO is **less than 10 km west of the LAC at Aksai Chin**.
- To the west of DBO is **the region where China abuts Pakistan in the Gilgit-Baltistan area**, once a part of the erstwhile Kashmir principality.



#### 46. Nathu La

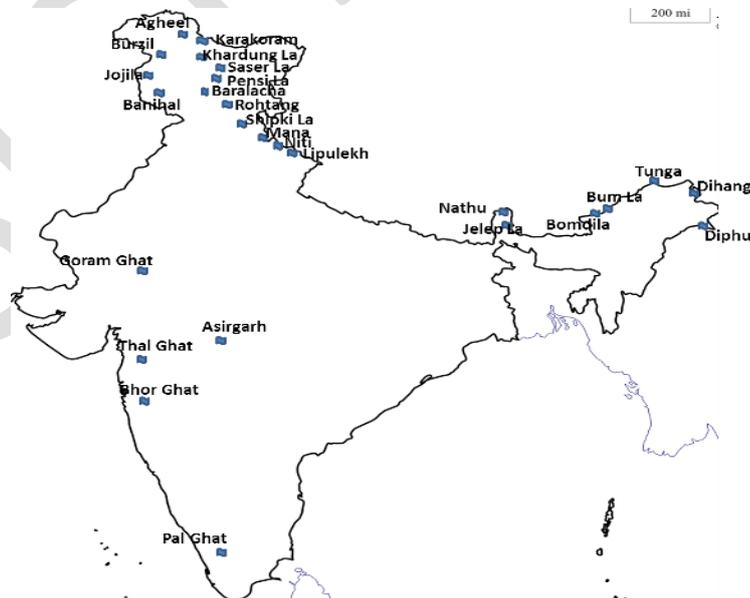
- Nathu La is a mountain pass in the Himalayas.
- It connects the Indian state of Sikkim with China's Tibet Autonomous Region.
- It is also one of the officially agreed BPM (Border Personnel Meeting) points between the Indian Army and People's Liberation Army of China for regular consultations and interactions between the two armies, which helps in defusing stand-offs.



India and China have signed a memorandum on opening border trade through the Sikkim-Tibet frontier crossing of Nathu La.

#### 47. Baralacha Pass

- Baralacha Pass** is a high mountain pass in Zaskar range.
- Connects Lahaul district in Himachal Pradesh to Leh district in Ladakh, situated along the Leh-Manali Highway.
- The pass also acts as a water-divide between the Bhaga river and the Yunam river.



#### 48. Sadhna Pass

Sadhna Pass, previously called as **Nastachun pass**, is a mountain pass in Jammu and Kashmir.

- It is located in the Himalayas and connects Karnah tehsil of Kupwara district with the rest of the Indian administrated Kashmir valley.
- It is located in the vast Shams Bri mountainous range.



### 49. Rohtang Pass

It is a high mountain pass on the eastern Pir Panjal Range of the Himalayas around 51 km (32 mi) from Manali.

- It connects the Kullu Valley with the Lahaul and Spiti Valleys of Himachal Pradesh, India. Manali-Leh Highway, a part of NH 21, transverses Rohtang Pass.
- River Ravi rises west of the Rohtang pass in the Kullu Hills.

### 50. Dzukou Valley

- Located at the borders of the states of Nagaland and Manipur.
- Famous for the Dzükou Lily and it is found only in this valley.
- The Asian Highway 1 and also the NH-2 passes through its foothills.

### 51. North Sentinel Island

- North Sentinel Island is one of the Andaman Islands, an archipelago in the Bay of Bengal which also includes South Sentinel Island.
- It is home to the Sentinelese, an indigenous people in voluntary isolation who have defended, often by force, their protected isolation from the outside world.
- The island is a protected area of India.



### 52. Haldibari-Chilahati Rail Link

- The Haldibari-Chilahati rail link was made functional from December 17, 2020.
- It is the 5th rail link between India and Bangladesh.
- This rail link was operational till 1965. This was part of the broad gauge main route from Kolkata to Siliguri during partition. However, the war of 1965 effectively cut off all the railway links between India and the then East Pakistan.
- After the partition in 1947, seven rail links were operational between India and the then East Pakistan (up to 1965).
- Presently, there are four operational rail links between India and Bangladesh. They are Petrapole (India)-Benapole (Bangladesh), Gede (India)-Darshana (Bangladesh), Singhabad (India)-Rohanpur (Bangladesh), Radhikapur (India)-BiroI (Bangladesh)."



### 53. Kilauea volcano

The Kilauea volcano on Hawaii's Big Island erupted recently. Also called Mount Kilauea, the volcano is located in Hawaii Volcanoes National Park.

### 54. Kevadia

Prime Minister Narendra Modi recently flagged off eight trains connecting Kevadia in Gujarat, where the Statue of Unity is located, to different regions of the country.

### 55. Assam-Mizoram boundary issues

The dispute stems from a notification of 1875 that differentiated Lushai Hills from the plains of Cachar, and another of 1933 that demarcates a boundary between Lushai Hills and Manipur.

**Location:**

- Mizoram borders Assam's Barak Valley; both border Bangladesh.

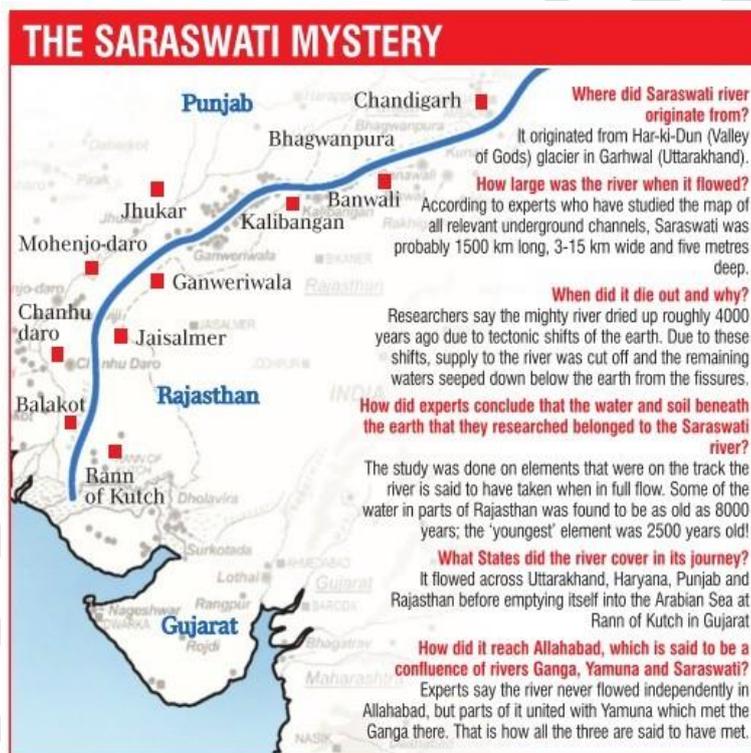


### 56. Saraswati river

The river, which had originated from Kapal tirth in the Himalayas in the west of Kailash, was flowing southward to Mansarovar and then taking a turn towards west.

The river flowed through Haryana, Rajasthan and North Gujarat. It also flowed through Pakistan before meeting Western Sea through Rann of Kutch and was approximately 4,000 km in length.

- **The river had two branches:** western and eastern. The Himalayan-born Satluj "of the PAST", which flowed through the channels of present-day Ghaggar-Patialwali rivulets, represents the western branch of the ancient river.
- On the other hand, Markanda and Sarsuti represented the western branch of Saraswati, known as Tons-Yamuna.
- The confluence of the branches was near Shatrana, 25 km south of Patiala. And suddenly, it flows crossing the desert (Rann of Kutch) and meet gulf of western sea.



**Historical evidence:**

- The Saraswati River is one of the main Rigvedic rivers mentioned in the scripture Rig Veda and later Vedic and post-Vedic texts.
- Book 6 of the Rig Veda includes a hymn called the 'Nadistuti Sukta', which sings praises of the Saraswati as being "perfect mother, unsurpassed river, supreme goddess".
- For 2000 years, between 6000 and 4000 B.C., the Saraswati flowed as a great river.

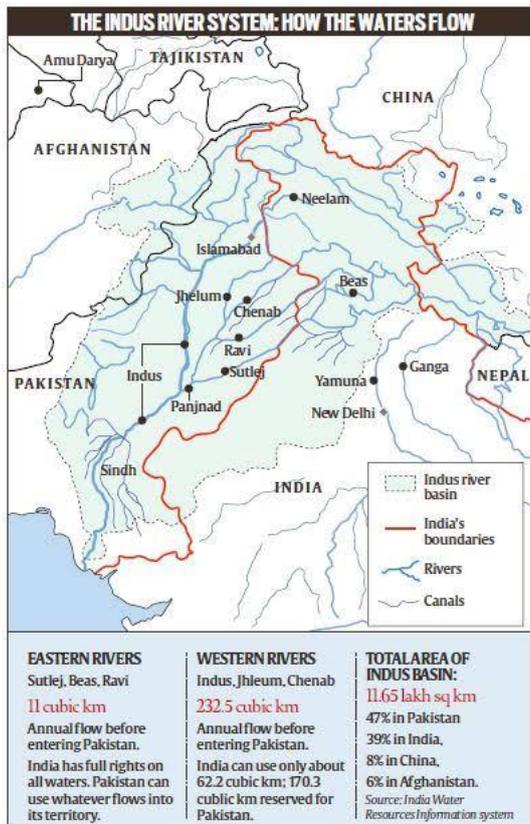
### 57. Sabarmati River

- It is one of the west flowing rivers along with Narmada and Tapi.
- It Originates from Aravalli hills near Tepur village in Udaipur Dist of state Rajasthan.
- Mouth of the river: Gulf of Cambey ( Khambhat).
- Ahmedabad city is located along the bank of this river.



### 58. Indus river

The transboundary Indus river basin has a total area of 1.12 million km<sup>2</sup> distributed between Pakistan (47 percent), India (39 percent), China (8 percent) and Afghanistan (6 percent).



### 59. Beas River

1. The Beas originates near **the Rohtang Pass**, at a height of 4,062 m above sea level, on the southern end of **the Pir Panjal Range**, close to the source of the Ravi.
2. It crosses **the Dhaola Dhar range** and it takes a south-westerly direction and **meets the Satluj river at Harike in Punjab**.
3. It is a comparatively small river which is only 460 km long but lies entirely within the Indian territory.



### 60. Yamuna River

- The river Yamuna is a major tributary of river Ganges.
- Originates from the Yamunotri glacier near Bandarpooch peaks in the Mussoorie range of the lower Himalayas in Uttarkashi district of Uttarakhand.
- It meets the Ganges at the Sangam in Prayagraj, Uttar Pradesh after flowing through Uttarakhand, Himachal Pradesh, Haryana and Delhi.
- Tributaries: Chambal, Sindh, Betwa and Ken.

#### Spike in ammonia levels in Yamuna

Ammonia is a colourless gas and is used as an industrial chemical in the production of fertilisers, plastics, synthetic fibres, dyes and other products.

- It consists of hydrogen and nitrogen. In its aqueous form, it is called **ammonium hydroxide**.
- This inorganic compound has a pungent smell.
- **Occurrence:** Ammonia occurs naturally in the environment from the breakdown of organic waste matter.
- It is lighter than air.

### 61. Nag River

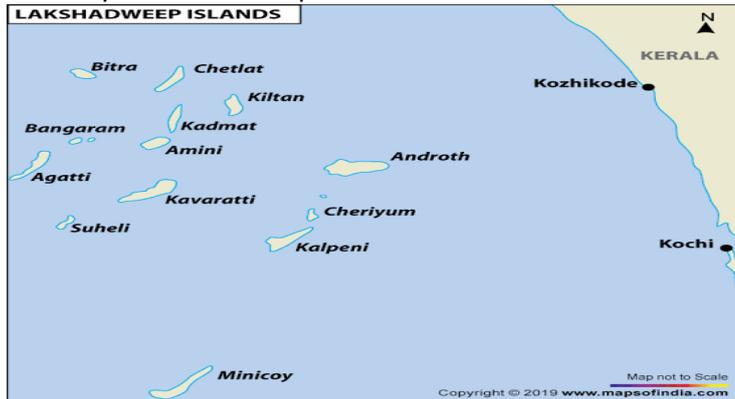
- The Nag River is a river flowing through the city of Nagpur in Maharashtra, India.
- It is known for providing the etymology for the name Nagpur.
- Forming a part of the Kanhan-Pench river system, the Nag River originates in Lava hills near wadi.

### 62. Tsari Chu river

- Satellite image shows China built new village in Arunachal.
- The settlements are situated on the banks of **Tsari Chu river in Upper Subansiri district of Arunachal**.
- The village lies south of **the McMahon Line**. The McMahon Line demarcates between Tibet and India's Northeast, which is disputed by China.

### 63. Agatti island

Agatti Island is a 7.6 km long island, situated on a coral atoll called Agatti atoll in the Union Territory of Lakshadweep.



### 64. India and Bangladesh border

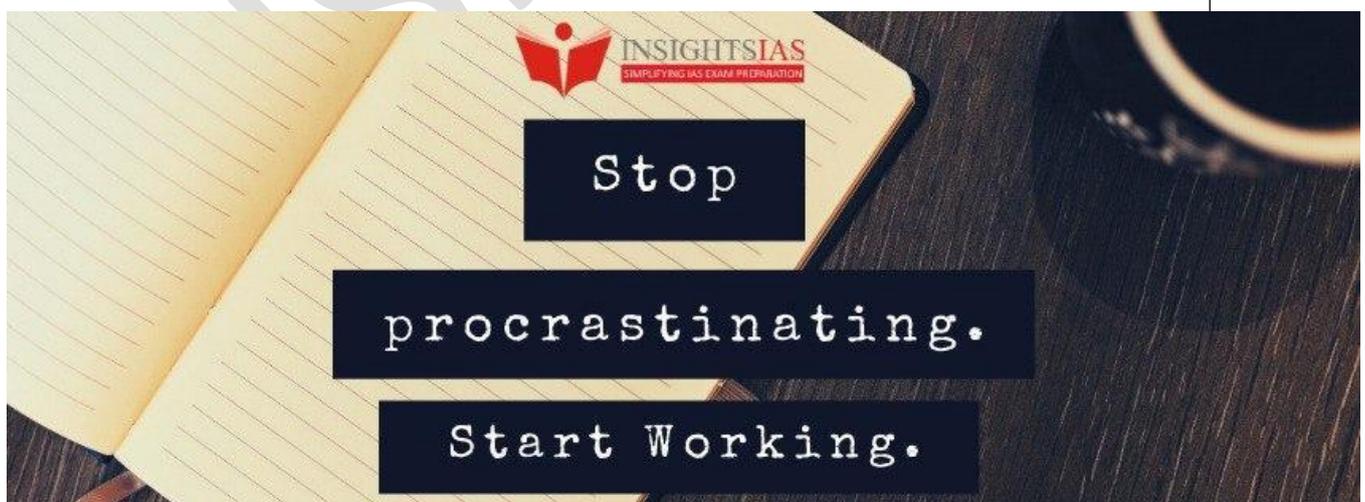
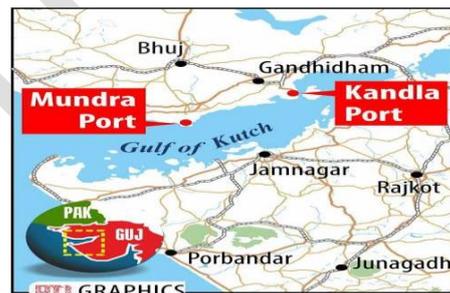
Bangladesh and India share a **4,156-kilometre-long international border, the fifth-longest land border in the world.**

This includes 262 km in Assam, 856 km in Tripura, 180 km in Mizoram, 443 km in Meghalaya, and 2,217 km in West Bengal.



### 65. Mundra Port

It is the largest private port of India located on the north shores of the Gulf of Kutch.



## Dams and River Water Sharing Agreements

(Note: Please try to have an overview of important irrigation projects and rivers across which they are being built. Also, locate them on the map.)

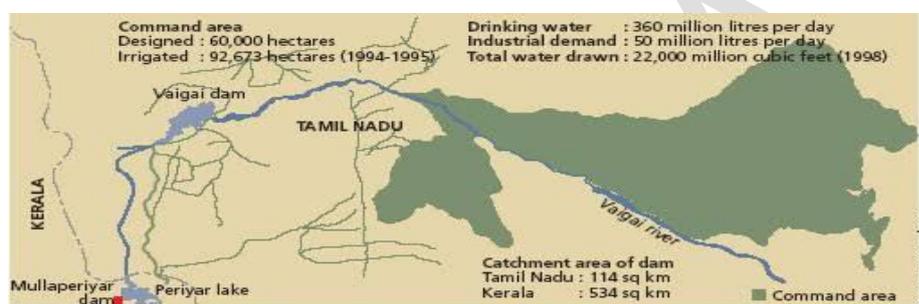
### 1. Mullaperiyar Dam

Although **the dam is located in Kerala**, it is **operated by Tamil Nadu** following an 1886 lease indenture for 999 years (the Periyar Lake Lease Agreement) that was signed between the Maharaja of Travancore and the Secretary of State for India for the Periyar Irrigation works.

- Constructed between 1887 and 1895, the **dam redirected the river to flow towards the Bay of Bengal, instead of the Arabian Sea** and provide water to the arid rain region of Madurai in Madras Presidency.
- The dam is located on the **confluence of the Mullayar and Periyar rivers** in Kerala's Idukki district.

#### What Tamil Nadu says?

Tamil Nadu claims that although it has undertaken measures to strengthen the dam, the Kerala government has blocked any attempt to raise the reservoir water level – resulting in losses for Madurai farmers.



Source: A Mohanakrishnan 1997, *History of the Periyar dam with century long performance*, Central Board of Irrigation and Power, New Delhi

*Mullaperiyar dam is in Kerala, Tamil Nadu its main beneficiary*

#### Kerala's arguments:

Kerala, however, highlights fears of devastation by residents living downstream in the earthquake-prone district of Idukki. Scientists have argued that if there is an earthquake in the region measuring above six on the Richter scale, the lives of over three million people will come under grave danger.

### 2. Eastern Rajasthan Canal Project (ERCP)

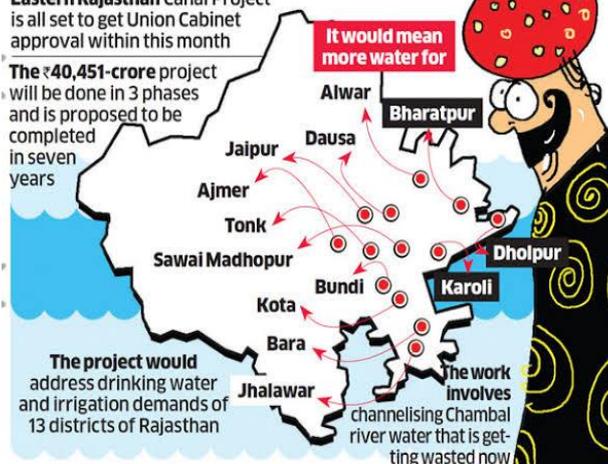
The Eastern Rajasthan Canal Project aims to harvest surplus water available during the rainy season in **rivers in southern Rajasthan such as Chambal and its tributaries including Kunnu, Parvati, Kalisindh**.

Rajasthan Chief Minister has been demanding **national project status for the Eastern Rajasthan Canal Project (ERCP)**.

#### Hydropolitics in Desert State

Eastern Rajasthan Canal Project is all set to get Union Cabinet approval within this month

The ₹40,451-crore project will be done in 3 phases and is proposed to be completed in seven years



**RENEFITS FOR EASTERN RAJASTHAN**

### 3. Ken-Betwa Interlinking Project

Conceived as a **two-part project**, this is **the country's first river interlinking project**. It is perceived as a **model plan for similar interstate river transfer missions**.

- The project aims to **transfer surplus water from the Ken river in MP to Betwa in UP to irrigate the drought-prone Bundelkhand region** spread across the districts of two states mainly Jhansi, Banda, Lalitpur and Mahoba districts of UP and Tikamgarh, Panna and Chhatarpur districts of MP.

**Booster shot** Key aspects of the ₹18,000 crore Ken Betwa river interlink project



MAP SOURCE: NATIONAL WATER DEVELOPMENT AGENCY

- The Ken Betwa project will transfer surplus water from the Ken river to the Betwa basin to help irrigate the drought-prone Bundelkhand region and the adjoining areas
- The 230 km concrete canal will pass through Jhansi, Banda and Mahoba districts of U.P. and Tikamgarh, Panna and Chhatarpur districts of M.P.
- The project will also benefit U.P. and M.P in terms of meeting their irrigation and drinking water needs

**Hazards:** The project involves deforesting a portion of the Panna Tiger reserve (approximately 10%) in M.P.

**Key facts:**

1. Ken and Betwa rivers originate in MP and are the tributaries of Yamuna.
2. Ken meets with Yamuna in Banda district of UP and with Betwa in Hamirpur district of UP.
3. Rajghat, Paricha and Matatila dams are over Betwa river.
4. Ken River passes through Panna tiger reserve.

### 4. Polavaram project

- The dam is being **built across the Godavari River in Andhra Pradesh**.
- It will facilitate an inter-basin **transfer to the Krishna river basin through its Right canal**.
- Its **reservoir spreads in parts of Chhattisgarh and Orissa States also**.
- The project is a multipurpose major terminal reservoir **project for development of Irrigation, Hydropower and drinking water facilities**.
- The project was **accorded national status in 2014** in the Andhra Pradesh Bifurcation Act and its design was changed.

### 5. Pakal Dul Hydro Electric Project

The Pakal Dul Hydro Electric Project (1,000 MW) is proposed on **the Marusudar river, a tributary of the Chenab river**, in Kishtwar district in Jammu and Kashmir.



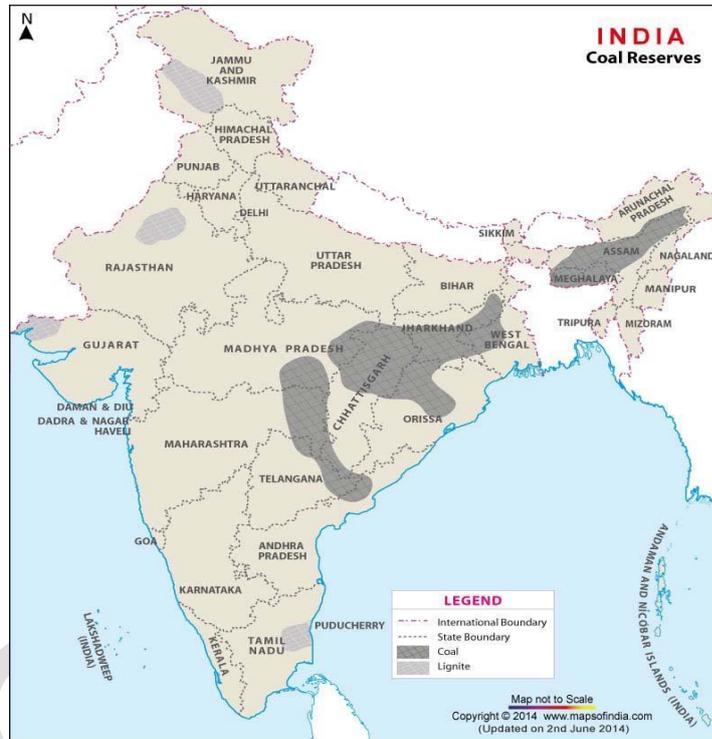
## Miscellaneous

### 1. Dhubri-Phulbari bridge

- The 19-km long four-lane bridge connecting Dhubri in Assam and Phulbari in Meghalaya will be India's longest bridge once completed.
- Assam & Meghalaya will have a direct connection with West Bengal through this bridge.
- The bridge will be located on NH-127B, originating from Srirampur on NH-27 (East-West Corridor), and terminating at Nongstoin on NH-106 in the State of Meghalaya.

### 2. Coal sector in India

- Over 97 per cent of coal reserves occur in the valleys of Damodar, Sone, Mahanadi and Godavari.
- **India's state-run coal giant has been unable to meet growing demand** despite abundant resources.
- The **South Asian nation depends on Coal India for more than 80 per cent of its domestic production** and the miner has consistently fallen short of production targets in the last few years.
- The government has been progressively **liberalizing the coal sector** over the last several months to attract new investments, and getting rid of this archaic end-use restriction was a key step.
- Studies show that the sulphur content in Indian coal is hardly 0.7%.
- **Coal gasification** is the process of converting coal into synthesis gas (also called syngas), which is a mixture of hydrogen (H<sub>2</sub>), carbon monoxide (CO) and carbon dioxide (CO<sub>2</sub>). The syngas can be used in a variety of applications such as in the production of electricity and making chemical products, such as fertilisers.



#### Stages of Coal formation:

As organic material dies and is deposited in swamps or swampy lakes, the material undergoes bacterial and chemical changes to create **peat deposits**. Over millions of years, this peat gets buried under many layers of sediment the pressure and temperature of the peat increases. Gradually, the peat turns into **lignite or brown coal**, then sub-bituminous coal, **bituminous coal**, and finally hard **anthracite coal**. While coal is being formed, the decomposing organic material produces methane gas - the main component of natural gas - along with nitrogen and carbon dioxide. With the pressure of being buried under sediment, most of the methane stays trapped on the surface of the coal.

**Majority of the coal found in India are of bituminous type.** A small amount of Lignite found in Nveli region of Tamil Nadu.