NOTES

SOCIAL SCIENCE

(GEOGRAPHY)

CLIMATE

9th

REVISION NOTES
CHAPTERWISE &
TOPICWISE

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Chapter 4: Climate

Concepts Covered:

CLIMATE AND WEATHER

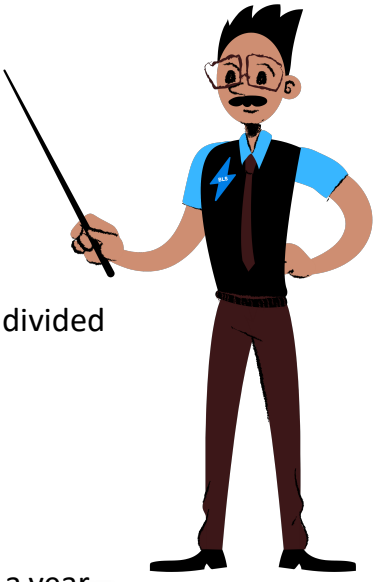
Indian Climate

Climate

- Sum total of weather conditions and variations over a large area for a long period of time is known as Climate.
- It can also be called Weather condition more than thirty years.

Weather

State of the atmosphere over an area at any point of time is called weather of that area.
Weather is a Day-to-Day phenomenon.
Elements remains the same. Day to Day phenomenon.



- Temperature
- Atmospheric pressure
- Wind
- Humidity
- Precipitation

On the basis of the generalised monthly atmospheric conditions, the year is divided into seasons such as winter, summer or rainy seasons.

India

- Monsoon type of climate.
- Monsoon refers to the seasonal reversal in the wind direction during a year.

Monsoon type of climate

Found in South and Southeast Asia.

Despite an overall unity in the general pattern there are perceptible regional variation in climatic conditions.

- Rainfall
- Temperature

Summers in kashmir | Summers in Rajasthan

Multiple examples

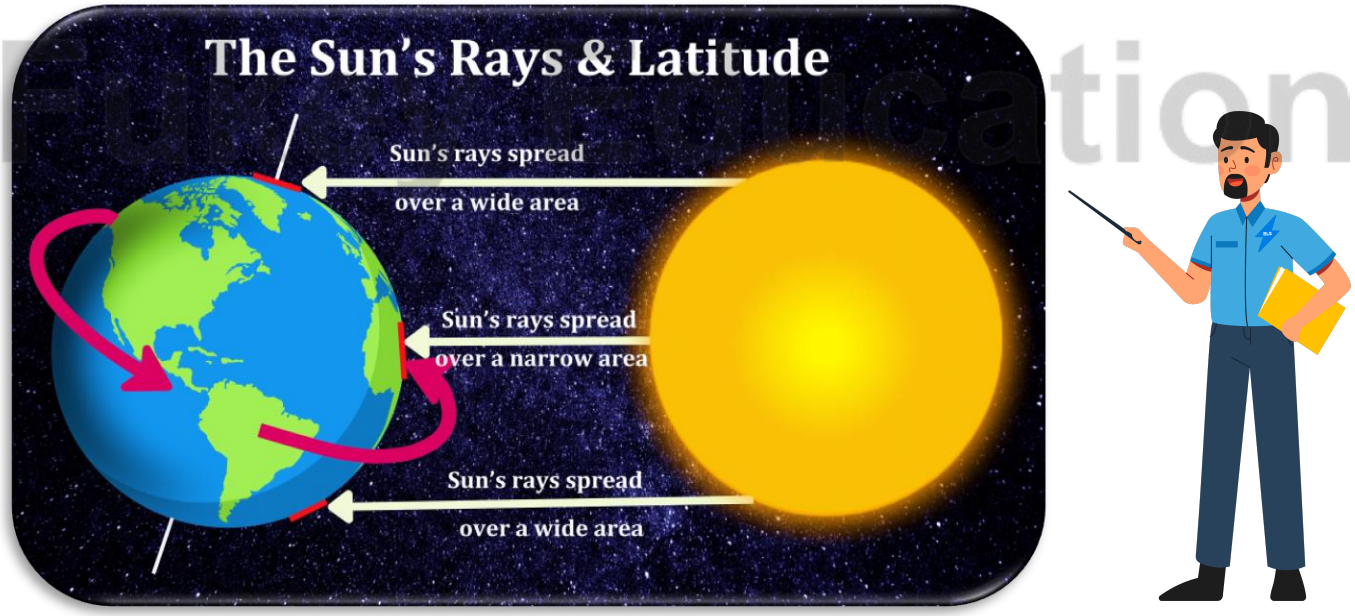
- Difference in the temperature level.
- There are variations in the form and type of precipitation.
- Coastal and interior parts: Variations
- There is decrease in rainfall generally from east to west in the Northern Plains.

CLIMATIC CONTROLS

Climate change produced by human activities that release greenhouse gases into the atmosphere is predicted to increase the frequency of extreme weather events such as drought, extreme temperatures, flooding, high winds, global warming, and severe storms. Global Warming is frequently referred to as “Climate Change.”

Latitude

Due to the curvature of the earth, the amount of solar energy received varies according to latitude.



Altitude

Altitude is a distance measurement in vertical or up direction. The climate conditions at higher altitude varies from that of lower altitude.

Pressure and Wind System

Pressure and wind system depend upon the latitude and altitude of the place. The low pressure and high pressure define the direction of the wind.

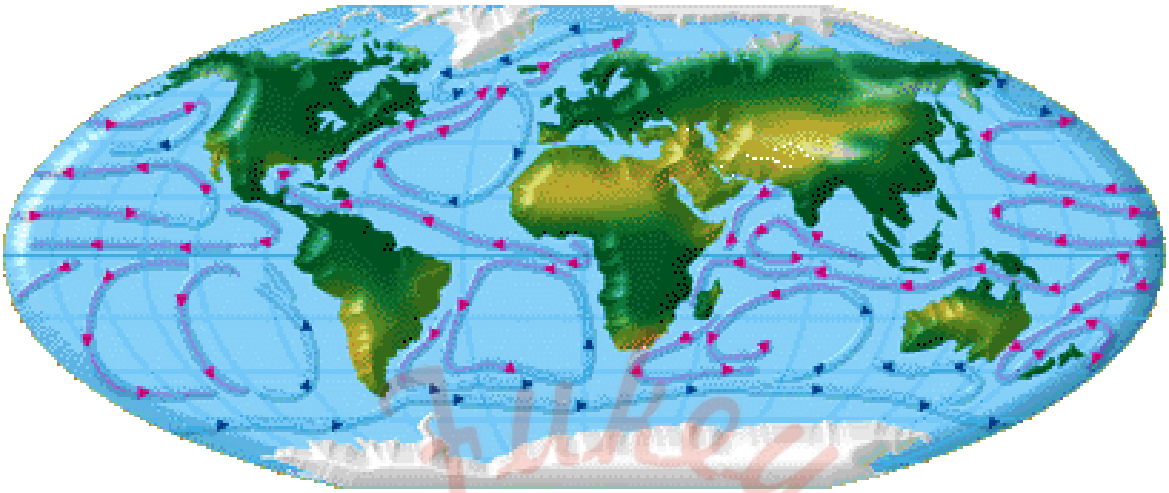
- **Low**
- **High**

Pressure and wind influence the temperature and rainfall pattern.

Distance from the sea

As the distance from the sea increases, its moderating influence decreases and the people experience extreme weather conditions. (Continentality)

Movement of Ocean Current



Relief

- Relief too plays a major role in determining the climate of a place.
- Physical features control the climate of an area.

Example -

- High Mountains act as barriers for cold or hot winds.
- Windward side cause precipitation.
- Leeward side of mountains remains relatively dry.

FACTORS AFFECTING INDIA'S CLIMATE

Latitude

India's climate depends on its latitudinal extent.

Tropic of cancer divides country into almost two halves.

Part lying South of tropic of Cancer.

- Tropical Climate

Part lying South of tropic of Cancer.

- Subtropical Climate

Altitude

Himalayas in the North, which have an average height of about 6,000 meters.

- Prevents the cold winds from Central Asia from entering the Subcontinent.
- Because of these mountains, the subcontinent experiences comparatively milder winters compared to the central Asia.

In this way the Altitude of Himalayas affects climate of India.

Pressure and Winds

India's climate and associated weather condition in India are governed by the following atmospheric conditions:

- Pressure and Surface winds
- Upper air conditions
- Western cyclonic disturbances and tropical cyclones
- India lies in the region of North easterly winds.
- They blow South, get deflected the right due to the Coriolis force and move on towards the equatorial low-pressure area.
- Carries very little moisture. According to this, India should be an arid land and low rainfall should be there.

Coriolis Force

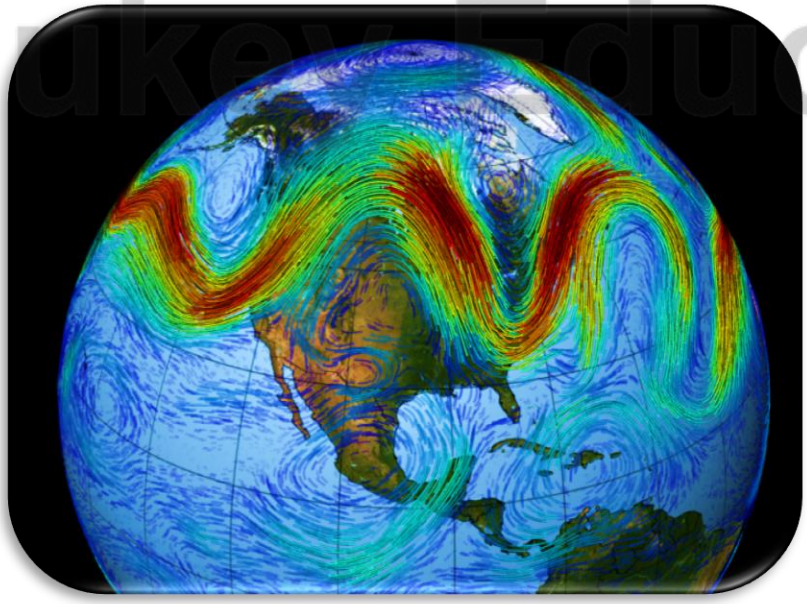
It is a force responsible for deflection of winds towards the right in the Northern hemisphere and towards and towards the left in the Southern hemisphere due to the difference in the linear velocity of earth's rotation and its atmosphere.

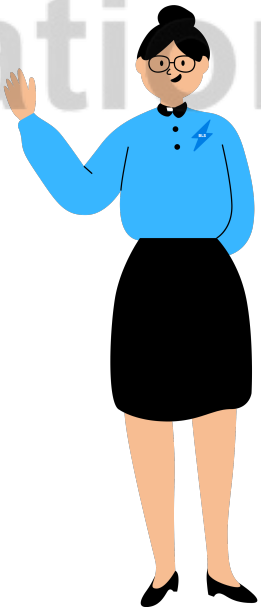
The climatic condition over India is unique. Difference during winters and summer.

- Low pressure area over the interior of the Asia.
- High pressure on Southern Indian Ocean
- Southwest winds start moving towards the Indian mainland [H.P to L.P].
- Moving over the oceans, these winds carry and causing rainfall.

Jet Stream

These are a narrow belt of high altitude (above 12,000m) westerly winds in the troposphere. Their speed varies from about 110km/h in summer to about 184km/h in winter. A few separate jet streams have been identified. The most constant are the mid-latitude and the subtropical jet stream.





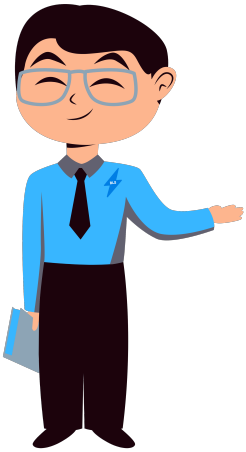
Western Cyclonic Disturbances

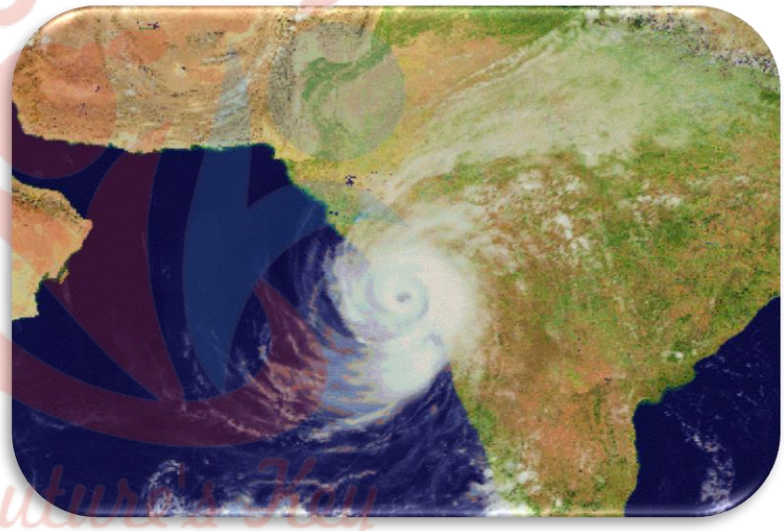
- Located approximately over 27^0 - 30^0 Position of the jet stream in Summer and Winter.
- This influences the climate of India.

Western Cyclonic Disturbances

- The weather phenomena of the winter months occur due to winds [jet streams] brought in due to the westerly flow from the mediterranean region.
- Due to Western Cyclonic Disturbances. The weather of the North and North - Western part of the country is influenced.

Rain showers are brought in the part of the country.

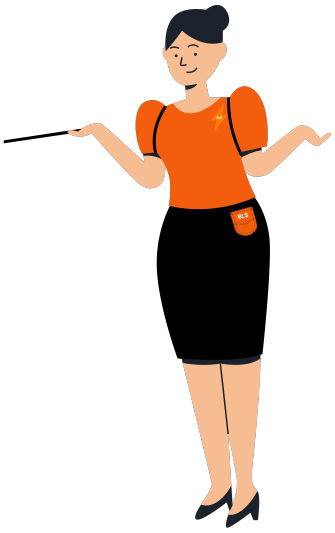




- Occur during the monsoon as well as in October-November.
- These affects the coastal regions of the country. [Rainfall, destruction, floods etc]

THE INDIAN MONSOON

Factors affecting mechanism of Monsoon



Seasonal reversal in the wind direction during a year.

Sailors first noticed this phenomenon and were benefited from this.

The Monsoon are experienced in the tropical area roughly between 20^{O} N and 20^{O} S. The Mechanism of Monsoons depends on the following factors.

- The differential heating and cooling of land and water.
- The shift of the position of Inter Tropical Convergence Zone (ITCZ).
- The presence of the high-pressure area, east of Madagascar.
- The Tibetan plateau gets intensely heated.
- The movement of the westerly jet stream to the north of the

Himalayas and the presence of the tropical easterly jet stream over the Indian peninsula during summer.

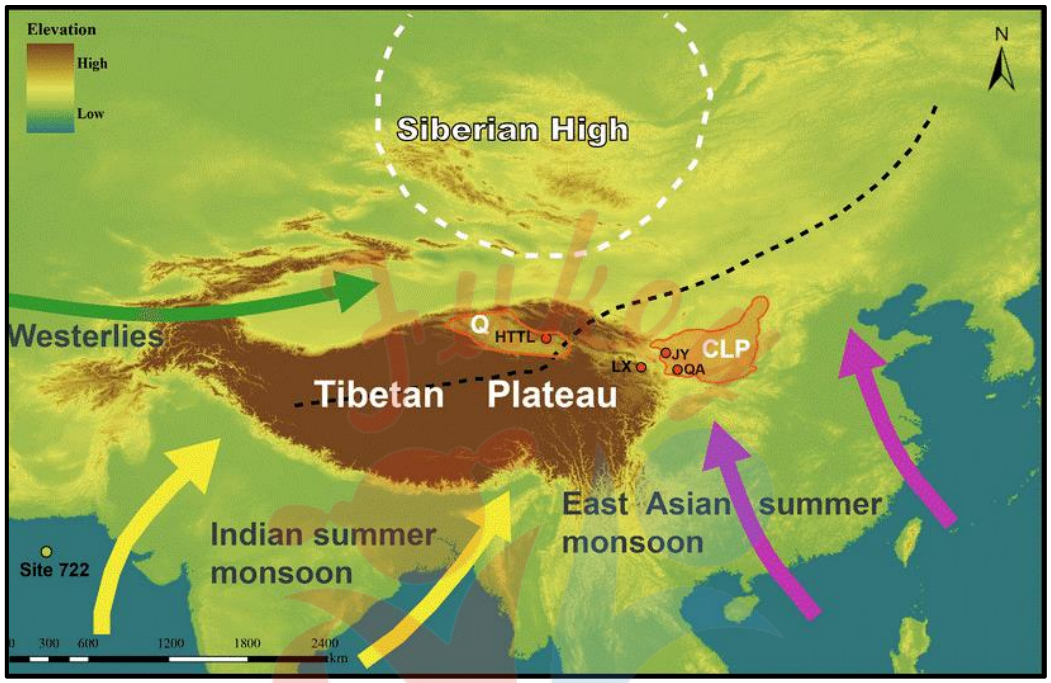
- **The differential heating and cooling of land and water.**
- **Land Heats up faster and Cools down faster than water**

Inter tropical convergence zone.

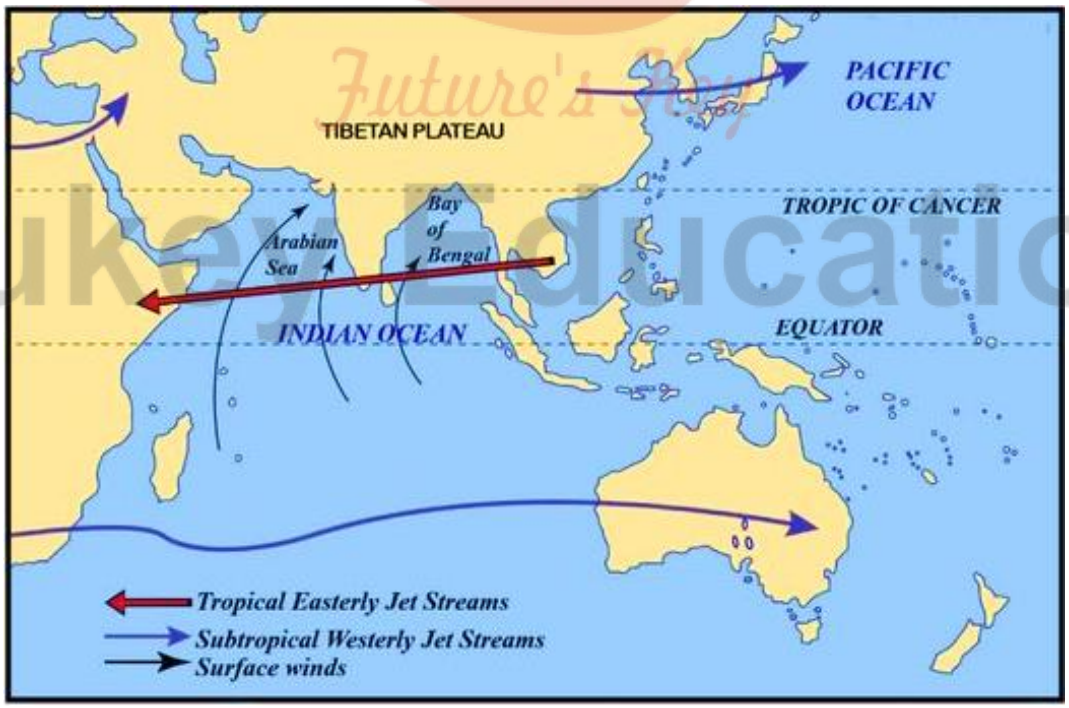
The Inter Tropical Convergence Zone [ITCZ] is a broad trough of low pressure.

1. This through [Belt] is formed due to convergence of Northeast and Southeast trade winds.

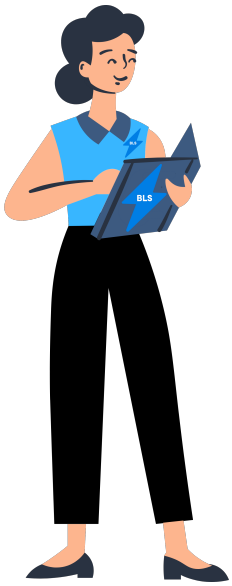
2. The ITCZ belt's normal position is an equatorial latitude, but it moves North or South with the apparent movement of the sun. '
3. The presence of the high-pressure area, east of Madagascar.
4. The Tibetan plateau gets intensely heated.

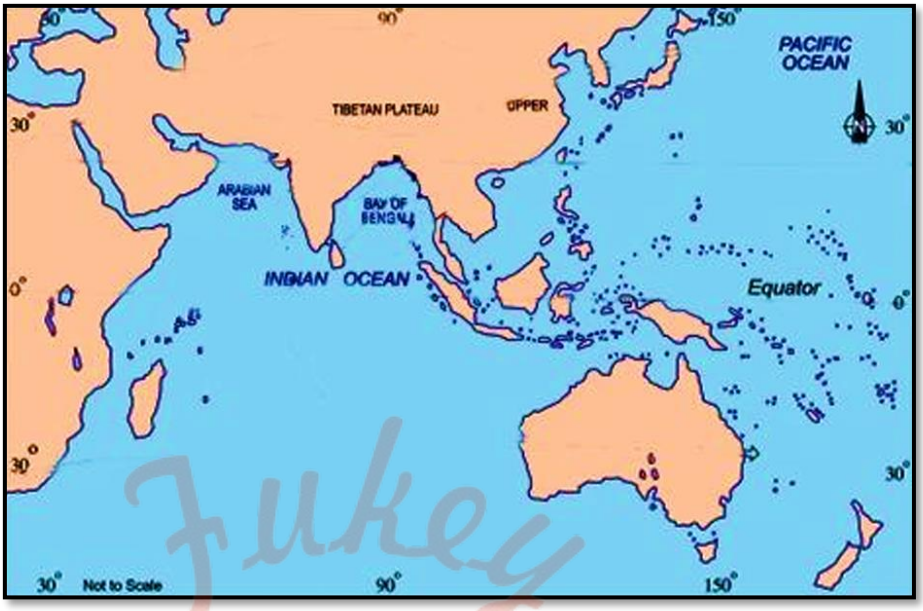


5. The movement of the westerly jet stream to the north of the Himalayas and the presence of the tropical easterly jet stream over the Indian peninsula during summer.



Let's sum up the whole story.

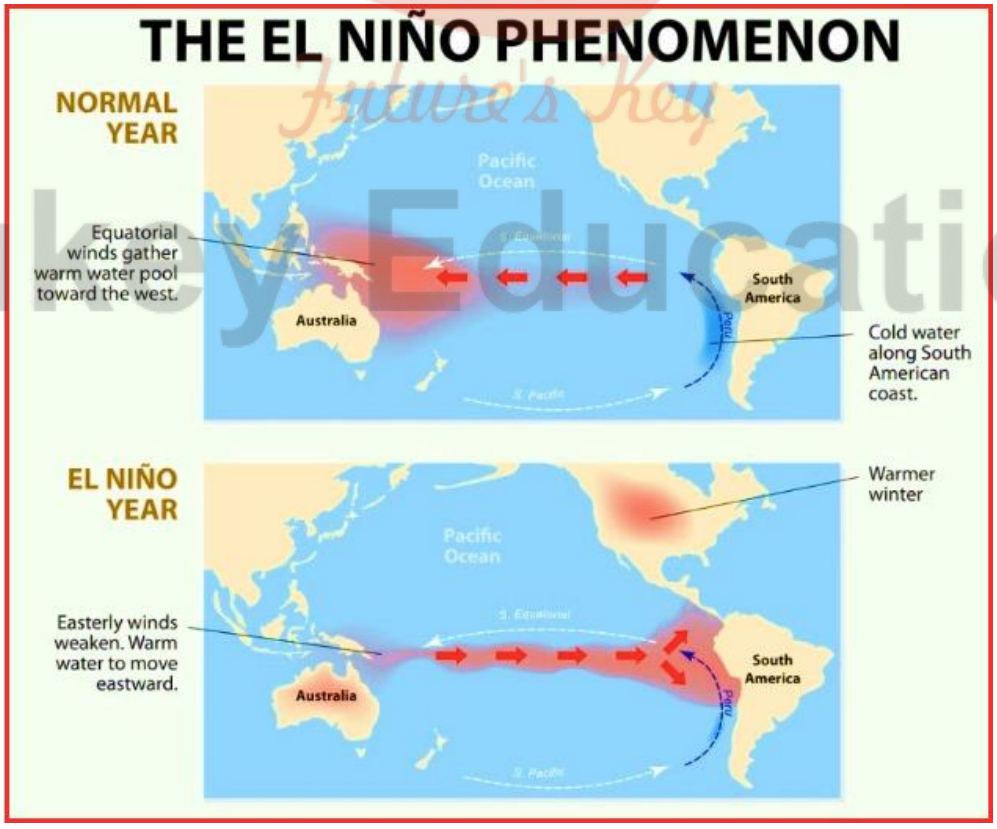


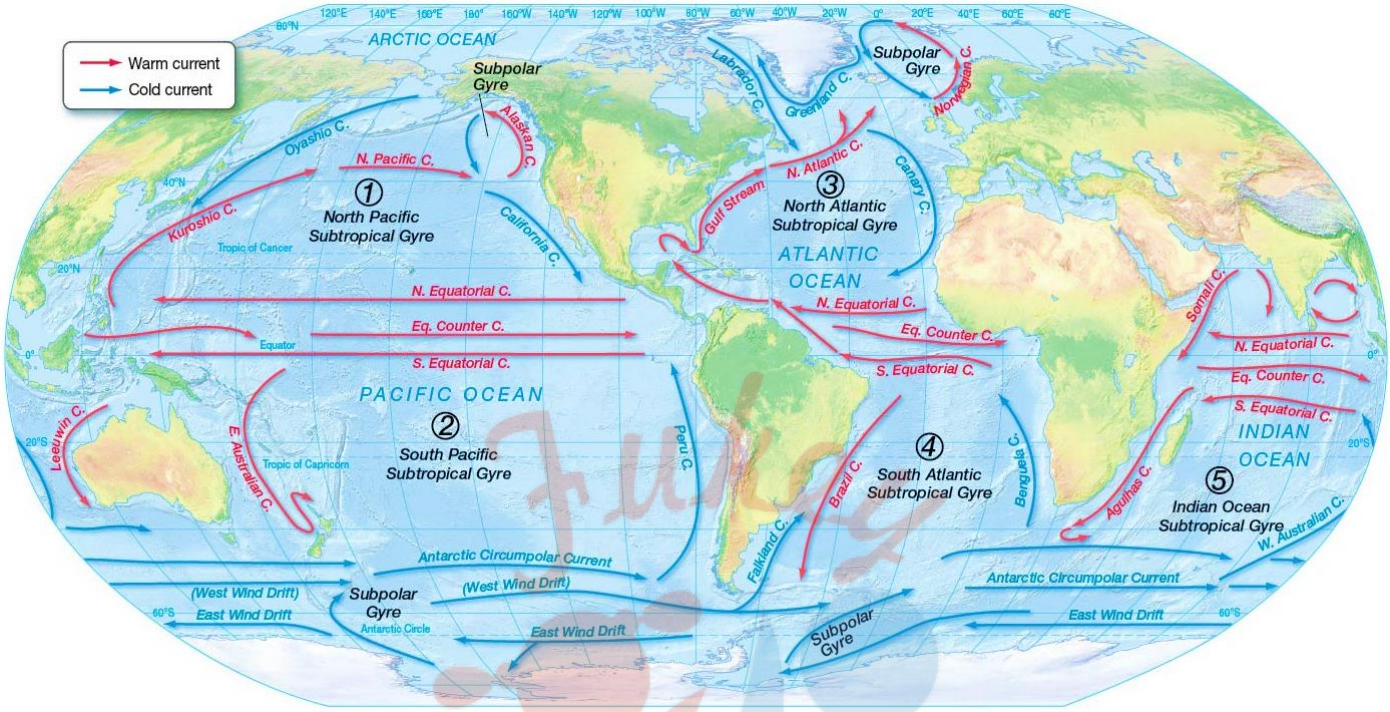


El Nino Southern Oscillation (ENSO)

Both the phenomenon is interrelated and affect the Monsoon.

- Is the periodic development of a warm ocean current along the coast of Peru. The El Nino replaces the cold Peruvian Current.
- Due to El Nino the sea surface temperature increases and the trade winds in this region becomes weak.



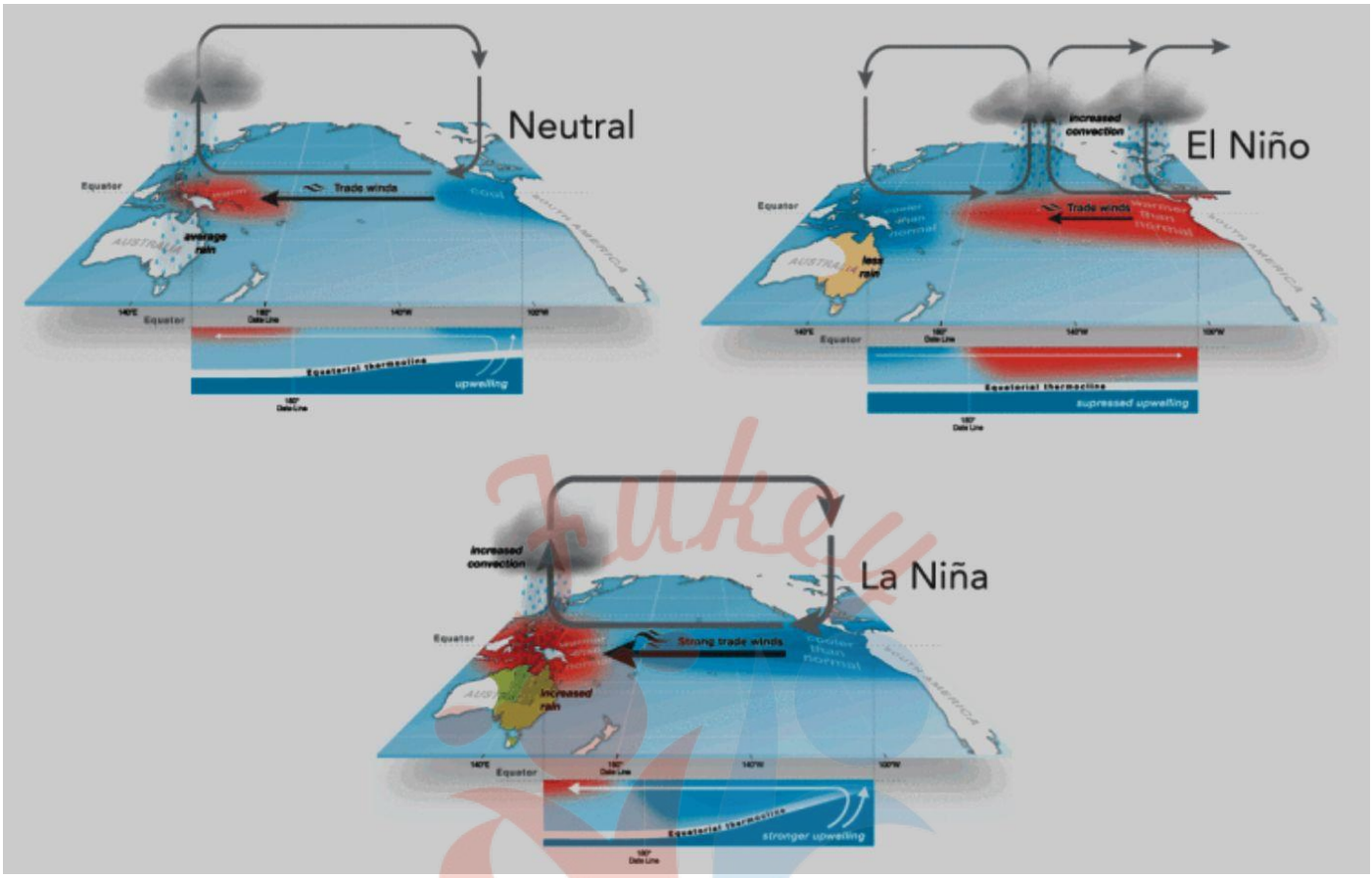


Normal Situation -

- High pressure at Tropical Eastern South Pacific.
- Tropical Eastern Indian Ocean/Tropical Pacific Ocean experiences low pressure.
- Strong Easterlies flows and the ocean current is governed by them, further phenomenon is followed by this in a cyclic manner.
- But when this Pressures conditions got reversed, this is known as Southern oscillation.

Reversal of Pressure conditions in Pacific Ocean.

- Weak high pressure [low pressure] in Southeastern Pacific Ocean.
- High pressure at the western Pacific Ocean.
- Change in the direction of the surface wind, climate and precipitation also changes.
- Connection with El Nino



THE ONSET OF THE MONSOON AND WITHDRAWAL

Two branches of Monsoon

Monsoon winds are pulsating in nature Spread over 100 - 120 days [June to Mid-September]

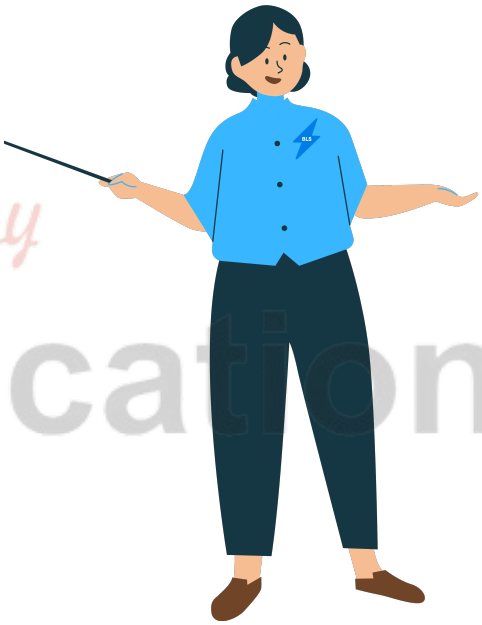
Burst' of the Monsoon Normal rainfall increases suddenly and continuous constantly for several days.

Let us see how the Monsoon arrives in India?

By the first week of June, the monsoon arrives at the Southern tip of the Indian Peninsular.

Divides itself into two Branches -

1. The Arabian Sea Branch
2. The Bay of Bengal Branch



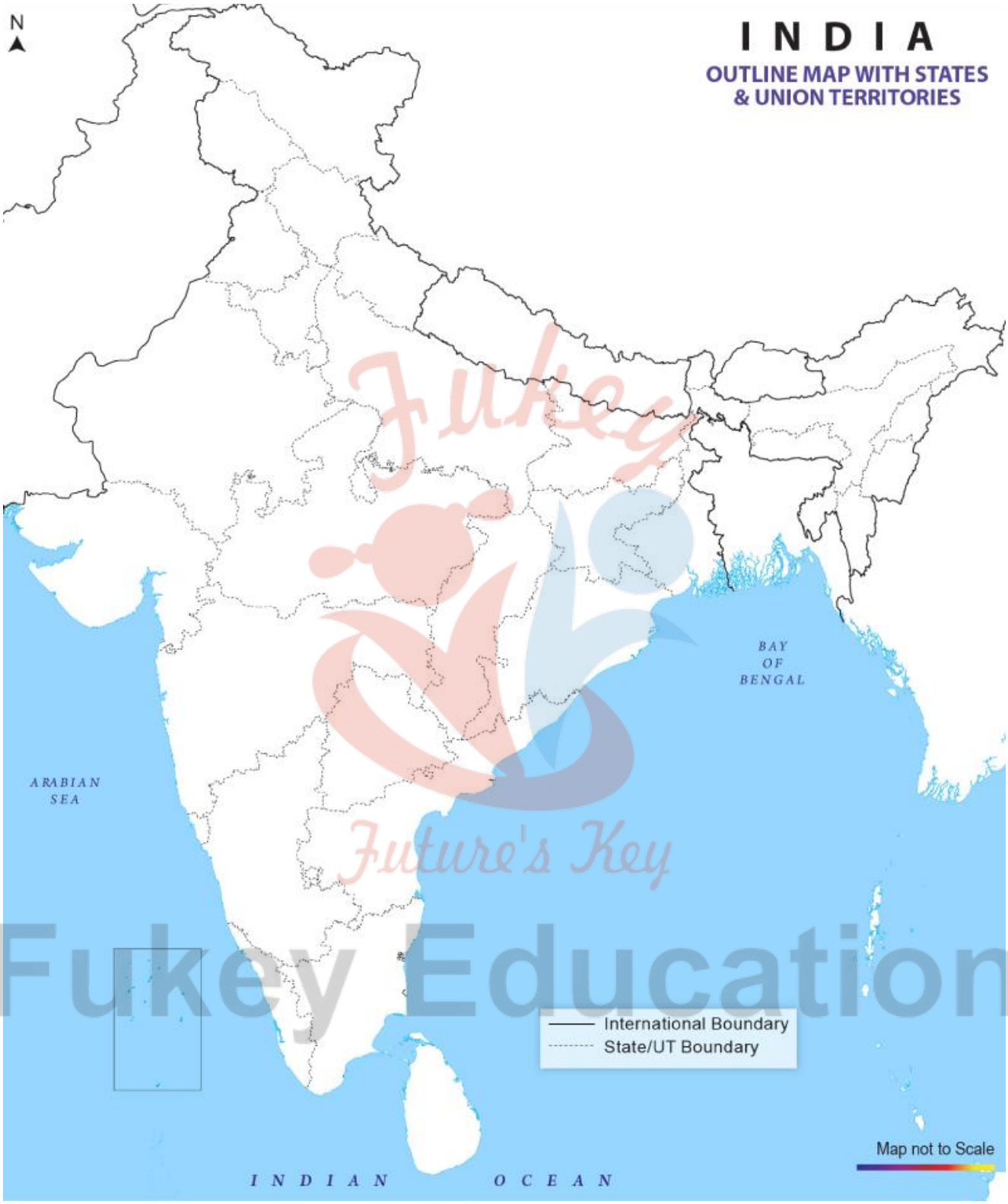
The Arabian Sea Branch

- Reaches Mumbai by 10th June.
- Moves to Saurashtra-Kachchh and central part.

The Bay of Bengal Branch

- Arrives in Assam by first week of June.
- Due to Himalayas, deflect west on Ganga plains.

Merges over Northwestern part, by first week of July, Western U.P., Punjab, Haryana, and experiences monsoon in Eastern Rajasthan.



On the other hand, the withdrawal of monsoon is a more gradual process.

- Begins from the Northwestern states of India by early September.
- By Mid-October it withdraws completely from the Northern half of the peninsular
- By December, the monsoon withdraws from the whole country.
- Withdrawal of monsoon over islands.

THE SEASONS

The Monsoon type of Climate Is characterised by a distinct seasonal Pattern. [Weather Phenomenon]

The Weather condition greatly change from one season to the other.

On the basis of this, four main seasons can be identified in India.

The Seasons Mostly observed in the Interior part, the coastal areas do not experience many variations.

- The Cold weather season [Winter]
- The Hot weather season [Summer]
- The Advancing monsoon season [Rainy]
- The Retreating monsoon season [Transition]

The Cold Weather Season (Winter)

- Begins from Mid-November, stays till February. [December-January is the coldest]
- Temperature decreases from South to the North.
- Northeast winds prevail over the country.

Dry season

[Some amount of Rainfall Occurs on the Tamil Nadu Coast]

- Due to low pressure, winds blow from the surface [Interior land] Normally clear sky, low. temperature and low humidity and feeble variable winds are the characteristic of this weather.
- Impact of Western Cyclonic disturbances? Winter Rainfall [Maharat], useful for Rabi crop.
- Impact on Peninsular Region.

The Hot Weather Season (Summer)

- It begins from March to May.
- Due to the Northward movement of the Sun, there is Northward shift of Pressure belt.

Characteristic of the Hot weather Season -

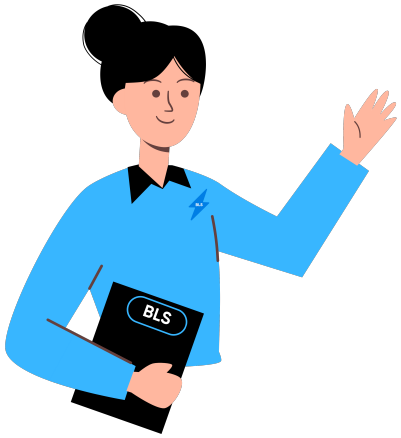
- Increase in the temperature over the time. [exception Peninsular region]
- Formation of low pressure over the Indian land mass. [Mainly Ganga plain]
  These are strong, gusty, hot, dry winds blowing during the day over the North and Northwestern India.
- Direct exposure to these winds may even prove to be fatal.
- Dust storms are very common in northern India during this time. At times, these storms bring temporary relief.
- Lower the temperature and brings light Rain and cool breeze.
- During the end to this season, thunderstorms, violent winds, torrential downpours, often accompanied by hail are observed known as Kal Baisakhi in West Bengal.
- Pre-Monsoon showers known as 'Mango shower'.

Advancing Monsoon (The Rainy Season)

It begins by early June Bringing rainfall for the whole country.

Characteristics of Advancing Monsoon –

- Southwest winds, flowing with an average velocity of 30 km per hour.
- Brings a total change in the weather.



Rainfall

Amount of Rainfall received may vary from region to region.

- Monsoons have a 'break' in rainfall.
- Impact of the uncertainties of the monsoon.

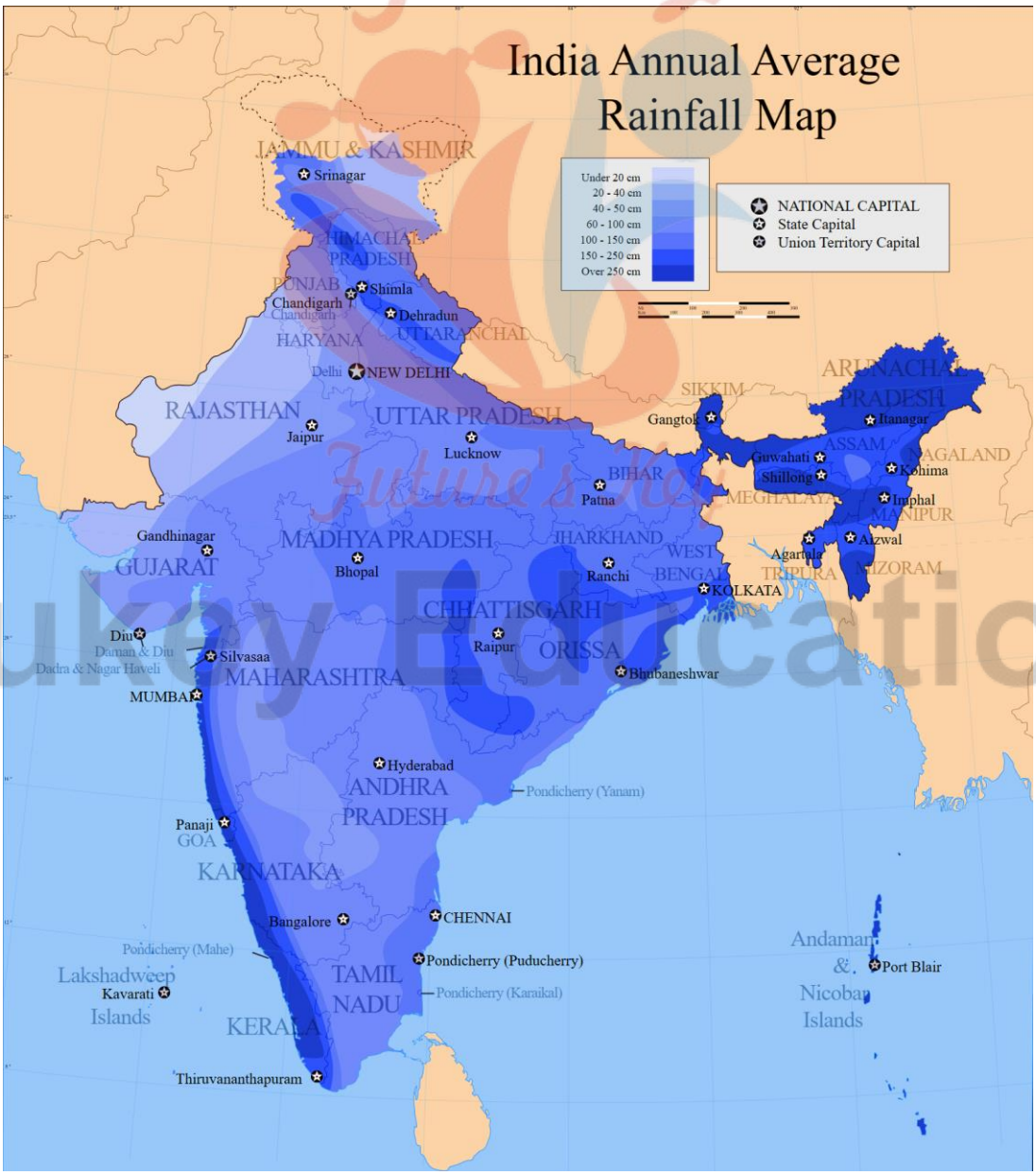
Retreating/Post Monsoon

- Beings October-November with the apparent movement of the sun towards the south. Gradually replacement of low pressure with high pressure and the monsoon winds also withdraws from the country.
- Period of transition [Hot Rainy Season to Dry Winter Conditions]
- Phenomenon of October heat.
  Due to the condition of High temperature and humidity the oppressive weather is felt. during October.
- This shift in the pressure condition is associated with the occurrence of Cyclones. Along with them comes the destruction.

DISTRIBUTION OF RAINFALL

The Rainfall over India is unevenly distributed.

- Western coast and Northeastern parts receive over about 400 cm rainfall.
- Whereas the parts of Western Rajasthan and adjoining areas receives less than 60 cm of rainfall.
- The rainfall is equally low in the interior part of the Deccan plateau.
- Similarly, the part of Ladakh also receives less rainfall.
- Rest part of the country receives moderate rainfall, snowfall is restricted to the Himalayan region.
- Along with the uneven distribution, the annual rainfall is also highly variable.



MONSOON AS A UNIFYING BOND

Physical features Helps in the Monsoon type of climate which Leads to Rhythmic cycle of seasons.

Monsoon -

- Entire phenomenon such as landscapes, animal and plant life revolve around the monsoon.
- Whole agriculture calendar depends on monsoon.
- The life of the people including their festival revolves around the monsoon.
- Whole country eagerly waits for the arrival of the monsoon.
- It provides water to river and ponds which unites the whole nation.

04 CLIMATE

MIND MAP