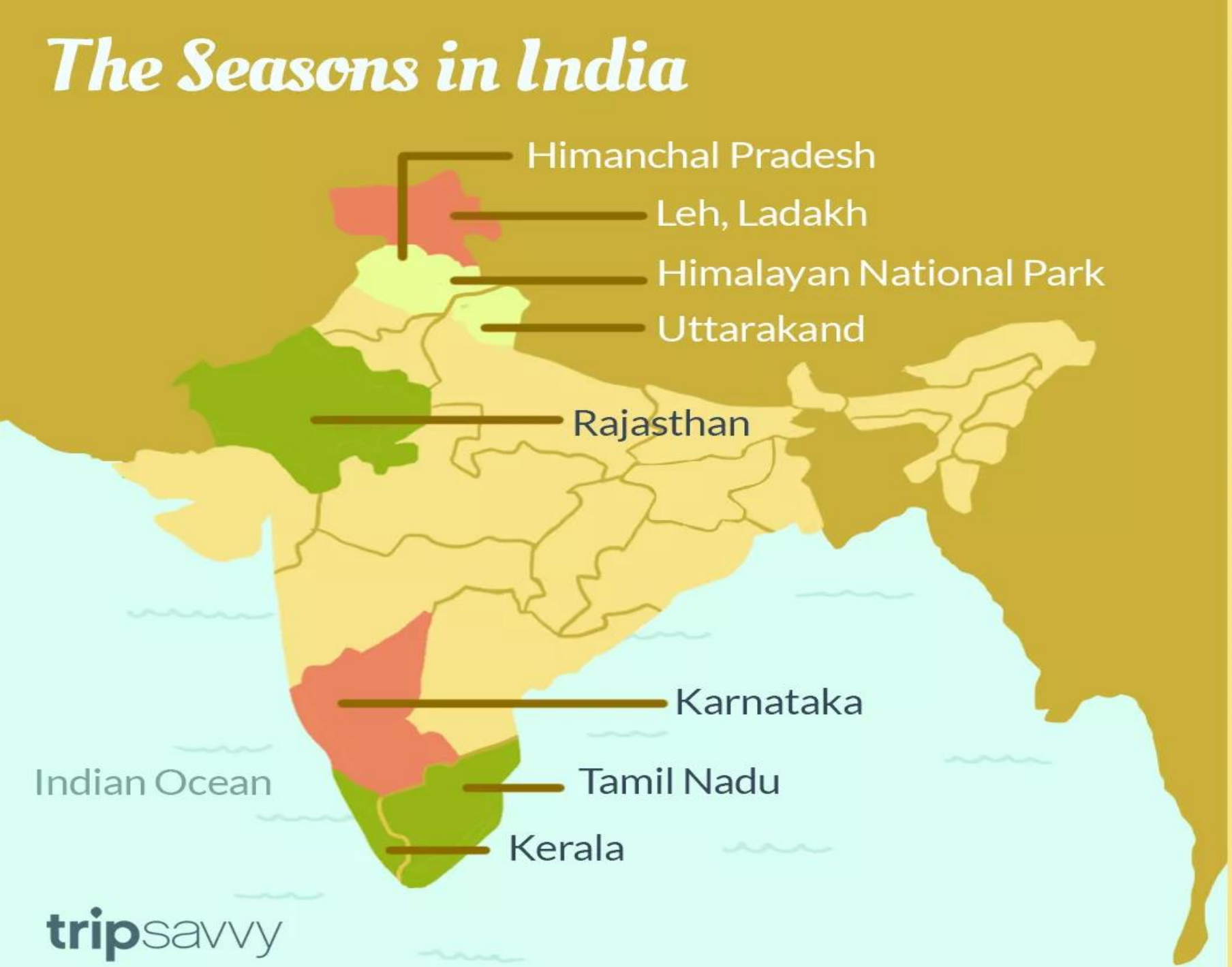
SEASONS OF INDIA

DR. UPMA CHATURVEDI

The India Meteorological Department (IMD) designates four climatological seasons:

- ✓Winter, occurring from December to February. ...
- ✓Summer or pre-monsoon **season**, lasting from March to May. ...
- ✓Monsoon or rainy **season**, lasting from June to September. ...
- ✓Post-monsoon or autumn **season**, lasting from October to November.

The Seasons in India



tripsavvy

Where to Go

Summer
March - May
- Mountains
- Hill stations
- National parks

Winter
November - February
- Beaches
- Desert state

Monsoon
June - October
- High-altitude places
- Heavy discounts at beach locations

INDIA'S HINDU CALENDAR HAS SIX SEASONS

VASANT RITU

SPRING

GRISHMA RITU

SUMMER

VARSHA RITU

MONSOON

SHARAD RITU

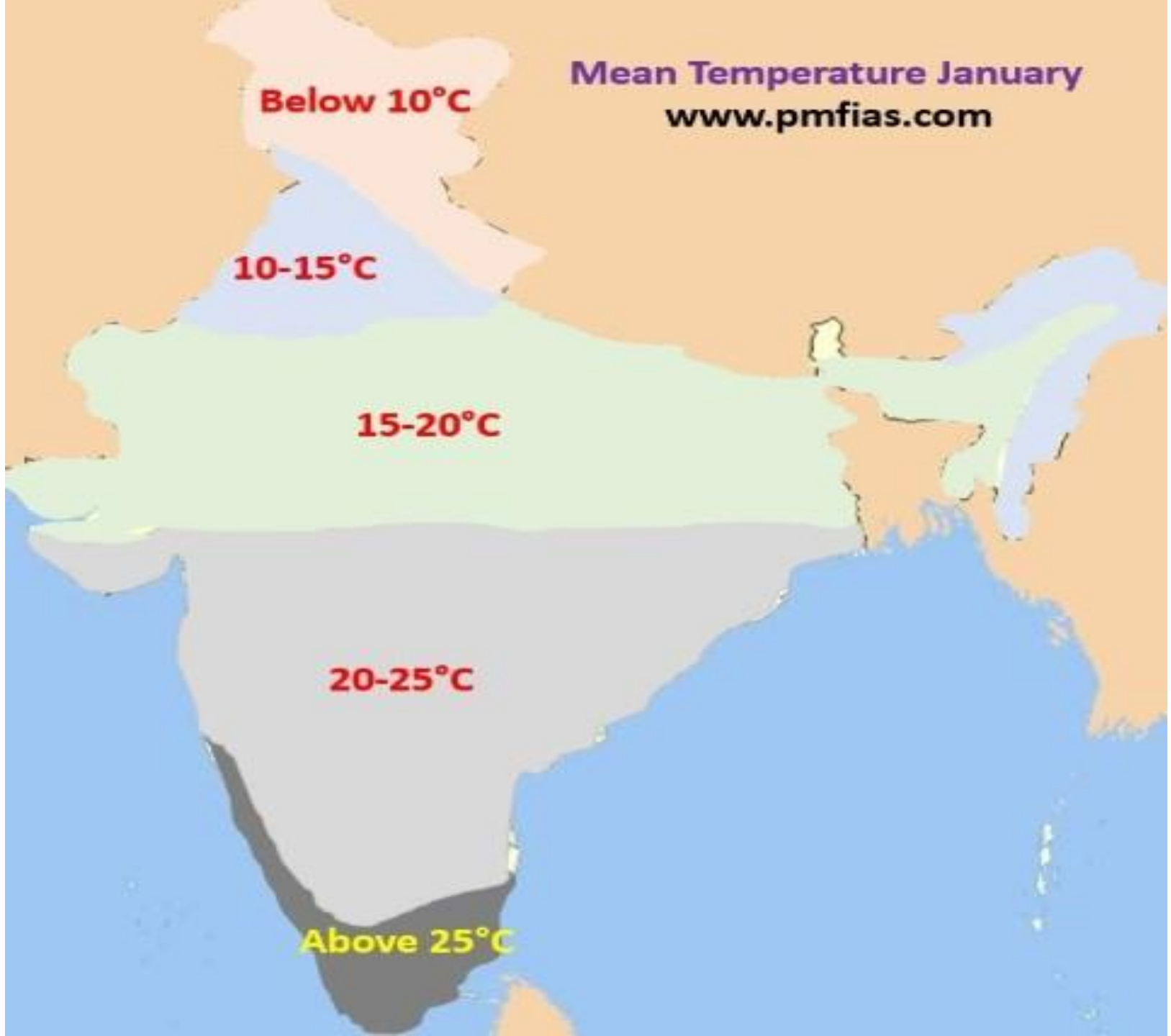
AUTUMN

HEMANT RITU

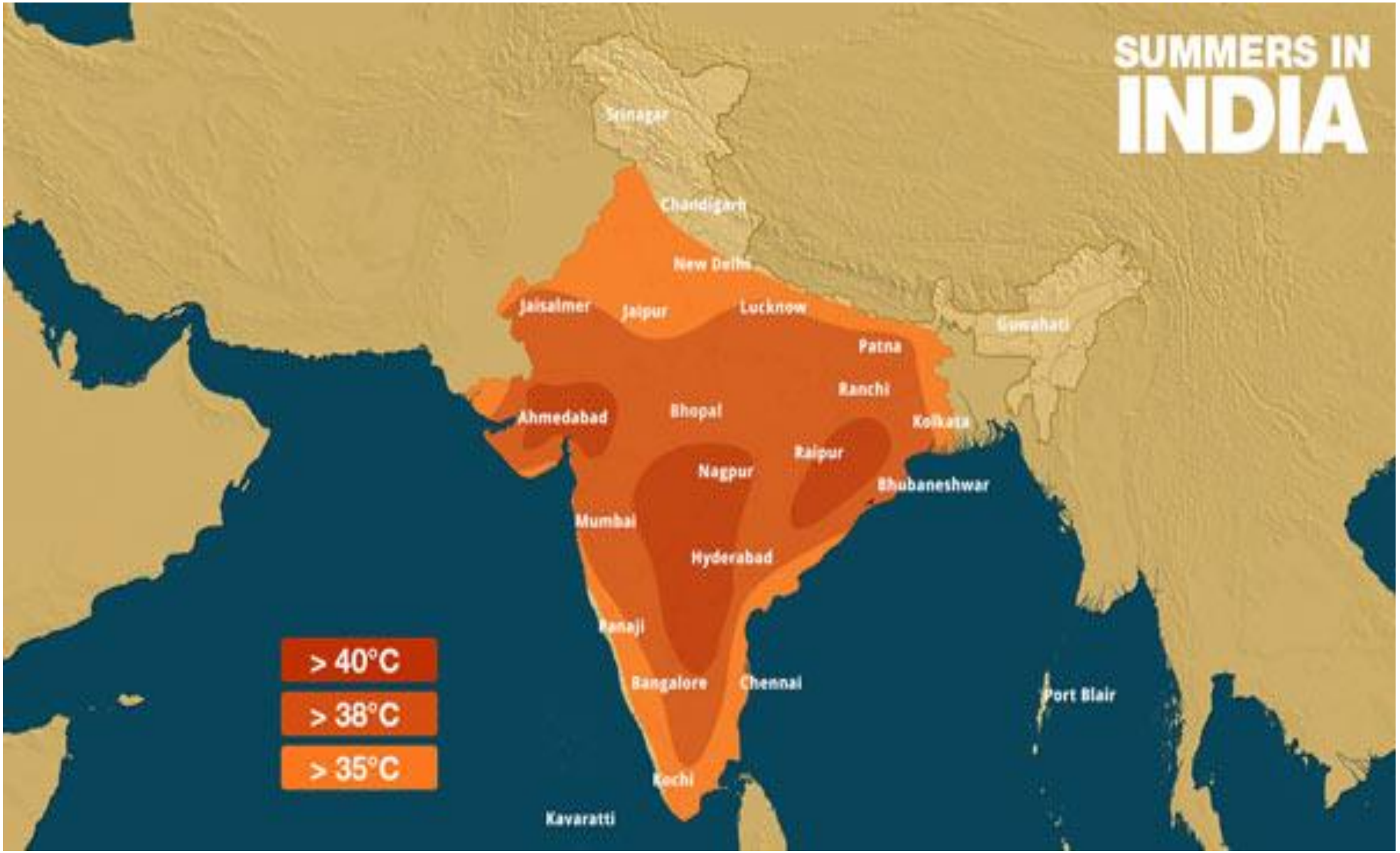
PRE-WINTER

SHITA RITU

WINTER


Mean Temperature January
www.pmfias.com
Below 10°C
10-15°C
15-20°C
20-25°C
Above 25°C

Seasons remind us that change is the law of nature and a sign of progress. In India, there are mainly six seasons as per the ancient Hindu calendar (the Lunisolar Hindu). The twelve months in a year are divided into six seasons of two-month duration each. These seasons include ***Vasant Ritu*** (Spring), ***Grishma Ritu*** (Summer), ***Varsha Ritu*** (Monsoon), ***Sharad Ritu*** (Autumn), ***Hemant Ritu*** (Pre-Winter) and ***Shishir Ritu*** (Winter). However, as per the India Meteorological Department (IMD), there are ***four seasons in India*** like other parts of the world.


SUMMERS IN
INDIA
Srinagar
Chandigarh
New Delhi
Jaisalmer
Jaipur
Lucknow
Guwahati
Patna
Ranchi
Ahmedabad
Bhopal
Kolkata
Raipur
Nagpur
Bhubaneshwar
Mumbai
Hyderabad
Panaji
Bangalore
Chennai
Port Blair
Kochi
Kavaratti
> 40°C
> 38°C
> 35°C

1) Spring Season (Vasant Ritu)

- The spring season in India is a season of two-month duration which are ***March and April***. In the Hindu calendar, this season occurs in the months of ***Chaitra and Baisakh*** respectively.
- It is a pleasant and beautiful season with an average temperature of ***32 degree centigrade***. It starts after the winter and lasts till summer starts. ***The day becomes longer and nights become shorter in this season***.

The people come out of the blankets and woolen clothes and start wearing light clothes. They are filled with excitement and happiness. The ***tree shed their leaves, new leaves start appearing***. Birds and animals also love this season and are happy in this season. Birds start chirping, singing and butterflies start hovering over the flowers. Besides this, many famous ***Hindu festivals*** are celebrated in this season such as ***Holi, Vasant Panchami, Gudi Padwa, Baisakhi, Hanuman Jayanti***, and more.

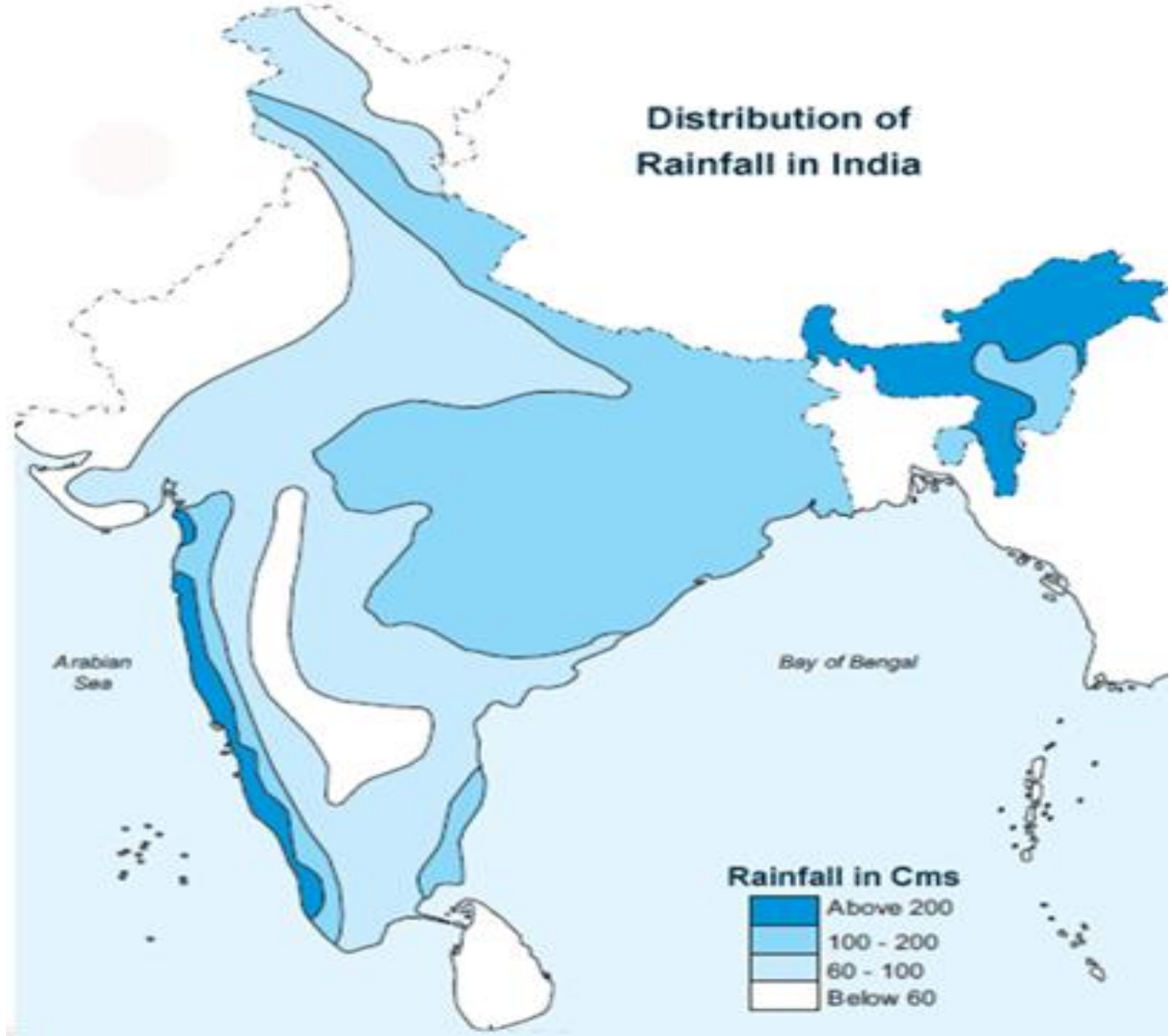
2) Summer (Grishma Ritu)

- It is also a two-month duration season that includes the months of ***May and June***. As per the Hindu calendar, this season mainly occurs in ***Jyeshta and Aashaadha***. In this season, the weather is very hot in most of the parts of India. This season starts with the end of April and lasts till the end of June, e.g. ***duration after spring and before autumn***.

- The ***average temperature remains around 38 degree centigrade***. The ***days are longest*** in this season while the ***nights have the shortest duration***.
- Due to the scorching sun and high temperature, the water level of ponds, rivers goes down and people including animals, birds, etc., feel uncomfortable and tends to stay inside as much as they could.
- Although this season may be annoying, it is good for the crops as they ripen only in the summer season.
- Also, there are lots of options in this season to stay hydrated and beat the heat such as watermelon, fruit juices, lassi, ice cream, lemon water, and more.
- The major Indian festival celebrated in the summer season are ***Guru Purnima and Rath Yatra***.

3) Monsoon (Varsha Ritu)

- It includes the months of ***July and August***. As per the Hindu calendar, this season comes in the months of ***Shravana and Bhadrapada (Sawan and Bhado)***.
- As the name indicates, rainfall occurs in most of India in this season.
- As compared to the summer season, the ***days are short and nights are long*** in this season and the average temperature ***remains around 34 degree centigrade***.
- It is sometimes called '***green season***' by the officials of the tourism sector.
- The earth is carpeted with greenery, birds sing melodiously and level of water rises in the rivers, ponds and canals in this season.
- The sky is filled with black clouds before it rains and rainbow can be seen in the sky after the rain stops.
- The ***important Hindu festivals*** that are celebrated in this season are ***Onam, Krishna Janmashtami, and Raksha Bandhan***.


Distribution of
Rainfall in India
Arabian
Sea
Bay of Bengal
Rainfall in Cms
Above 200
100 - 200
60 - 100
Below 60

4) Autumn (Sharad Ritu)

- The season of autumn comes in the months of ***September and October***.
- As per the Hindu calendar, this season comes in ***Ashwin and Kartik months***.
- The hot and humid weather starts disappearing and leaves start falling off the trees in this season, so it is also known as the ***fall season***.
- The sky becomes clearer as compared to the monsoon season and clear moon can be seen in the sky along with countless starts that look like pearls scattered in the sky.
- The water of the rivers and ponds settle down and becomes clean and there is no mud in the villages.
- The insects and mites gradually start disappearing with the arrival of autumn.
- It ***starts after the monsoon or rainy season and lasts till the start of the pre-winter season***.
- The average temperature in this season remains around ***33 degree centigrade***.
- The length of the day and night is almost equal in this autumn. ***Equinoxes also occur in this season***.
- It is an event in which the Earth's axis is titled in a way that it is neither inclined towards nor away from the Sun.
- The ***major Hindu festivals*** that are celebrated in this season are ***Navaratri*** in which Hindu devotees worship the nine different forms of Goddess Shakti, ***Sharad Purnima*** which is celebrated as the harvest festival, and ***Vijayadashami (Dussera)*** to celebrate the victory of Ram over Ravana.

5) Pre-winter (Hemant Ritu)

This season comes in the months of ***November and December***.

As per the Hindu calendar, these season occurs in the ***Agrahayana and Pausha*** (Agahan and Poos) months.

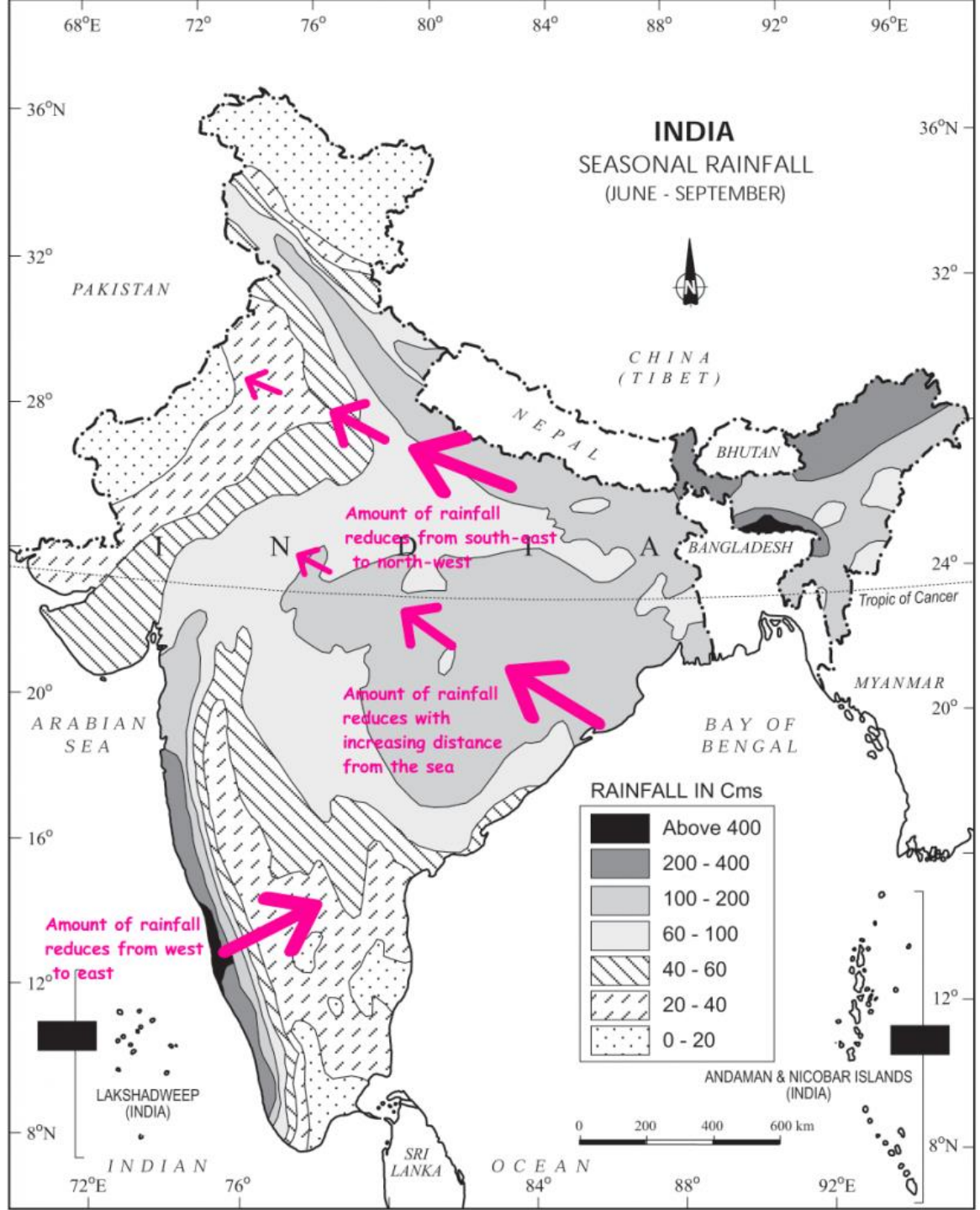
It starts with the end of October and lasts till the start of winter season or January. So, it precedes the winter season.

- This season is moderately cold with an ***average temperature*** of around ***27 degree centigrade***.
- It is the transition from autumn to winter and is the most pleasant and enjoyable time of the year. The ***days become shorter than nights*** and the nights are foggy, colder.
- Rainfall is occasional in this season.
- The trees in the Mountains and hills start shedding their ripe leaves to reduce evaporation of trees to compensate the loss of water.
- However, soon the trees are loaded with new leaves and flowers. So, it gives the message of leaving the old temptation and go for newness or innovation.
- Winter sports of national and international level are organized in this season.
- The ***flowers that bloom in this season*** are Hibiscus, Rose, Bougainvillea, Jasmine, and more.
- The important Hindu festivals which are celebrated in this season include ***Diwali*** and ***Bhai Dooj***.
- Besides so many benefits, there are also a ***few things that are not liked in this season***.
- Such as diseases like cough, asthma, cold start appearing and infecting the people.
- Due to ***low rainfall***, some crops may get spoiled and crops and vegetables may rot due to fog and frost.

6) Winter (Shishir or Shita Ritu)

- The winter season in India comes in the months of ***January and February***.
- As per the Hindu calendar, this season occurs in the months of ***Magha and Phalguna***.
- This season lies between pre winter and spring season.
- This season is characterized by dryness, cold winds, occasional rainfall and snowfall.
- It is the ***coldest season of the year*** with an average temperature of around ***20 degree centigrade*** and the weather is affected by air pressure.
- An area of high pressure develops in the northern region of the Himalayas that causes the flow of wind from this region towards the Indian subcontinent.
- In some regions temperature falls below 0 degree centigrade and snowfall is also very common in most of the hill stations of India in this season.
- The ***Kharif crops ripen in this season***.
- A large variety of fruits, flowers and green vegetables are available in abundance in this season.
- Besides this, winter season in India starts with the winter ***solstice***.
- It is a geographical event in which the sun is at the highest summit in the sky.

Theories of origin of Indian Monsoon

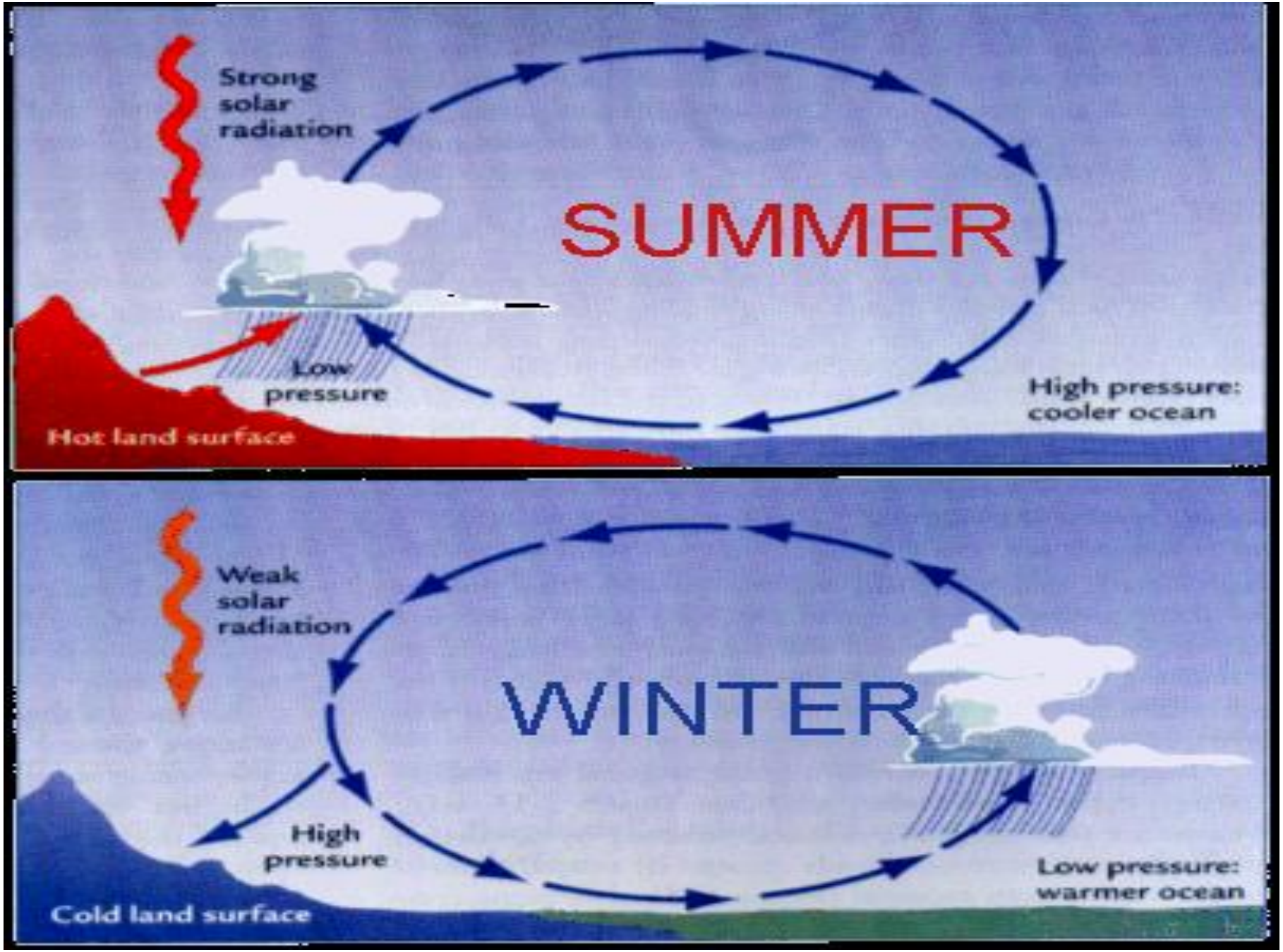

INDIA
SEASONAL RAINFALL
(JUNE - SEPTEMBER)
68°E
72°
76°
80°
84°
88°
92°
96°E
36°N
32°
28°
24°
20°
16°
12°
8°N
PAKISTAN
CHINA (TIBET)
NEPAL
BHUTAN
BANGLADESH
MYANMAR
INDIA
Tropic of Cancer
ARABIAN SEA
BAY OF BENGAL
INDIAN OCEAN
SRI LANKA
Amount of rainfall reduces from south-east to north-west
Amount of rainfall reduces with increasing distance from the sea
Amount of rainfall reduces from west to east
RAINFALL IN Cms
Above 400
200 - 400
100 - 200
60 - 100
40 - 60
20 - 40
0 - 20
LAKSHADWEEP (INDIA)
ANDAMAN & NICOBAR ISLANDS (INDIA)
0 200 400 600 km

Monsoon Thermal Theory by Sir Edmund Hailey:

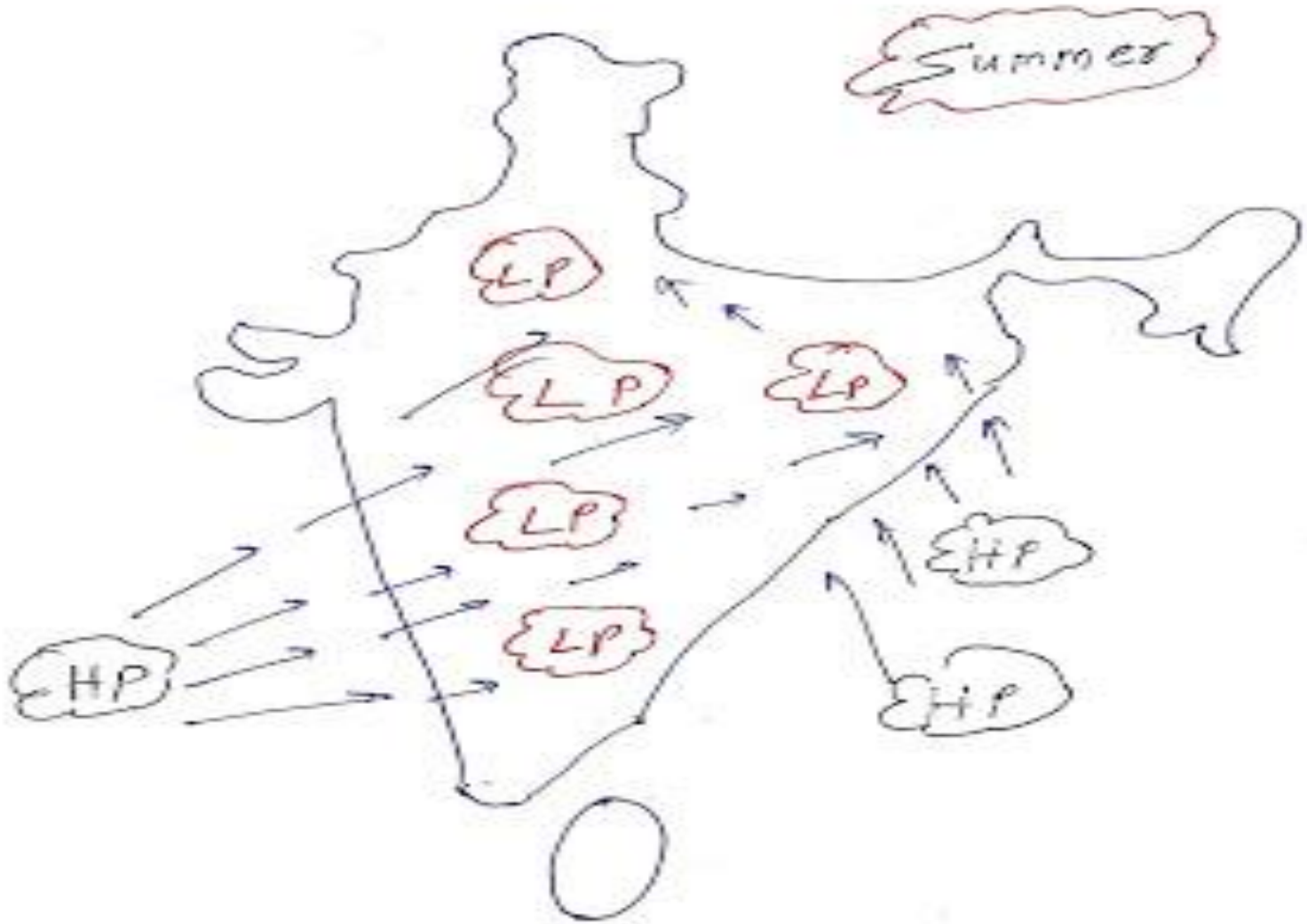
- In 1686, Sir Edmund Halley tried to explain the Monsoon phenomenon based on the classical knowledge of atmospheric circulation.

- It is also called the extension of land and sea breeze on a larger scale.

- As we all know, thermal heating is different on land and water, due to the different heating nature of land and water, pressure difference created and winds blow from high pressure to low pressure zone.


Strong
solar
radiation
SUMMER
Low
pressure
Hot land surface
High pressure:
cooler ocean
Weak
solar
radiation
WINTER
High
pressure
Cold land surface
Low pressure:
warmer ocean

Thermal theory of Monsoon by Halley



As per Hailey;

- **In the Summer;**
- Sun shines vertically in the tropic of cancer over northern India; low pressure generated due to thermal heating over India and high pressure is generated over the Indian Ocean, Bay of Bengal, and the Arabian Sea.
- Winds blow from the ocean with loaded moisture and precipitated in the continents

- **In the Winter;**
- There is an opposite situation of Summer atmospheric condition;
- Sunshine vertically in the Indian ocean and low pressure belt is created on the ocean and high-pressure belt created over Indian continents and
- winds blow from land to ocean is called winter monsoon.

Limitation of Thermal Theory of Halley:

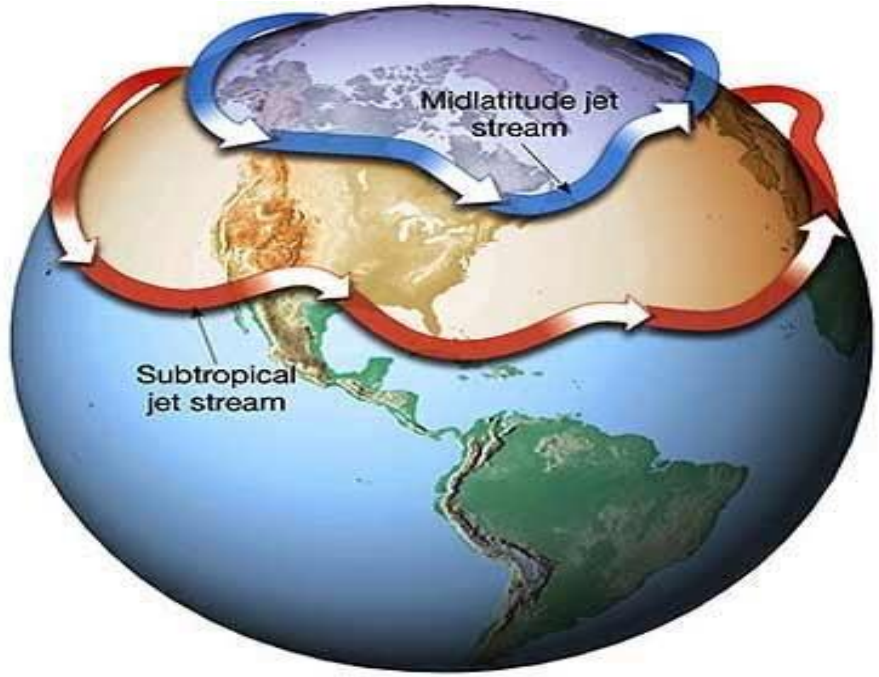
- Not able to explain the sudden burst of Indian Monsoon
- Not able to explain the break-in Indian Monsoon
- Not able to explain the weak monsoon Phenomenon
- It explains the convectional type of rainfall, but monsoonal rainfall is a mix of the convection, orographic and cyclonic rainfall.

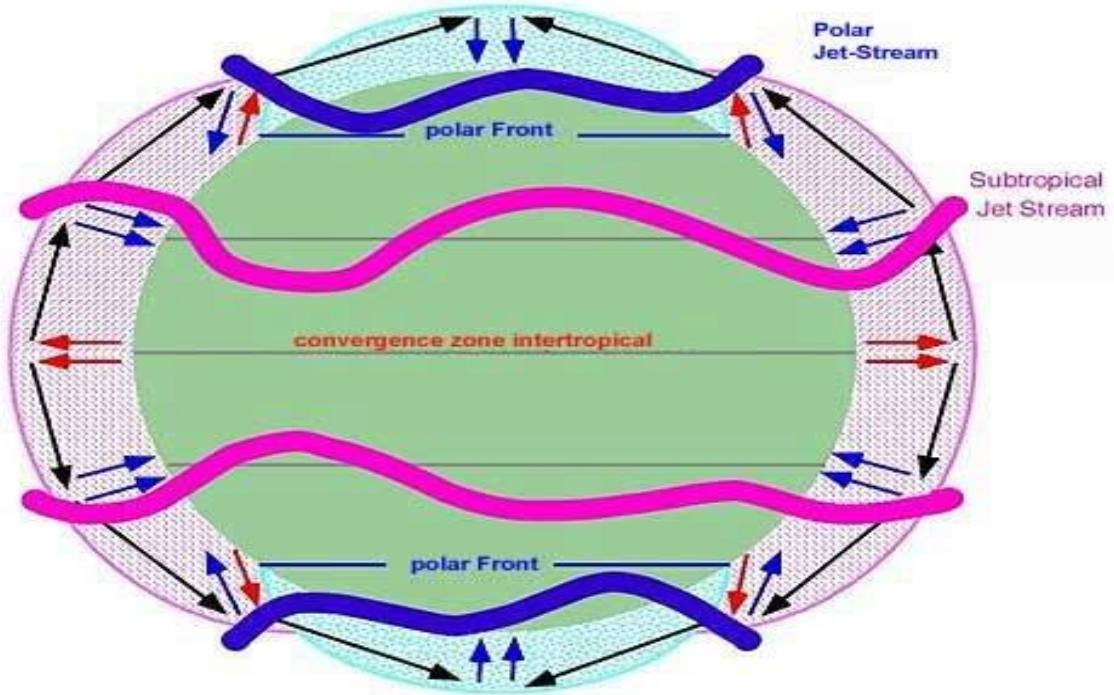
Indian Monsoon Mechanism and the Role of Sub Tropical Jet Streams

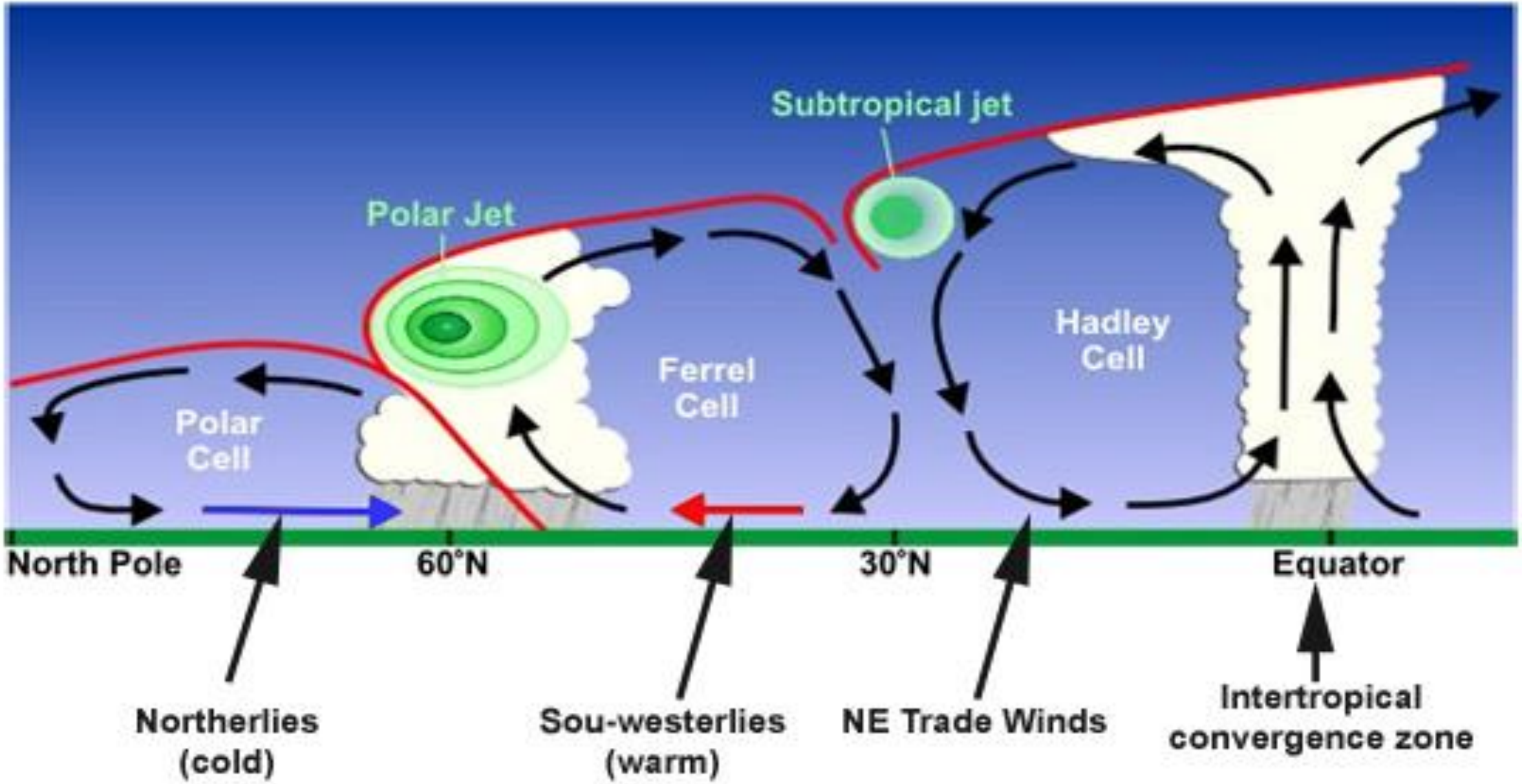
- The burst of monsoons depends upon the upper air circulation which is dominated by Sub Tropical Jet Streams (STJ).

- The south west monsoon coming in India is related to tropical easterly stream. It blows between 8 degree- 35 degree North latitudes.

- The north east monsoon (winter monsoon) is related to the subtropical westerly Jet Stream which blows between 20 degree and 35 degree latitudes in both hemispheres.


Midlatitude jet stream
Subtropical jet stream


Polar Jet-Stream
polar Front
Subtropical Jet Stream
convergence zone intertropical
polar Front


Subtropical jet
Polar Jet
Hadley Cell
Ferrel Cell
Polar Cell
North Pole
60°N
30°N
Equator
Northerlies (cold)
Sou-westerlies (warm)
NE Trade Winds
Intertropical convergence zone

Seasonal Migration of STJ

- In winter, STJ flows along the southern slopes of the Himalaya and in summer shifts northwards dramatically, flowing along the edge of Himalayas in early June and in late summer (July-August) along the northern edge of the Tibetan Plateau.
- The periodic movement of the Jet Stream often indicates the onset and subsequent withdrawal (STJ returns back to its position – south of Himalayas) of the monsoon.
- Northward movement of the subtropical jet is the first indication of the onset of the monsoon over India.

STJ in Summer

- With the beginning of summer, the STJ [upper westerlies] start their northward march.
- The weather over northern India becomes hot, dry and squally due to larger incoming solar radiation and hot winds like loo.
- Over India, the Equatorial Trough (ITCZ) moves northwards with the weakening of the STJ south of Tibet, but the burst of the monsoon does not take place until the upper air circulation has switched to its summer pattern
- By the end of May the southern jet breaks and later it is diverted to the north of Tibet Plateau.
- There is sudden burst of monsoons (the ridge moves northwards into Central Asia, the high pressure zone over north-west India moves northwards into Central Asia making way for south-west monsoon winds).
- The clockwise cyclic origin in the middle of the troposphere begins in the winds rising up from the plateau of Tibet after it becomes too hot. While going up separates near tropopause. One of these blows in the form of the easterly Jet Stream towards the equator and the other blows in the form of the westerly Jet Stream towards the poles.
- Western and eastern jets flow to north & south of Himalayas respectively. The eastern jet becomes powerful and is stationed at 15° N latitude.
- The easterly winds become very active in the upper troposphere and they are associated with westerly winds in the lower troposphere (south-west monsoon winds).
- This results in more active southwest monsoon and heavy rainfall is caused. The plateau of Tibet and central Asia becoming too hot is considered for its origin.
- It is to be noted that the westerly Jet Stream begins to settle down in the Arabian sea by blowing in the south west direction and also creates a very high pressure belt there. Inversely, when this hot Jet Stream blows over the Indian sub continent, it pulls up the surface air and creates a very low pressure there. To fill up the low pressure, winds from high pressure area of the Arabian Sea begins to blow towards in the north east direction-known as the southwest monsoon.

Indian Monsoon

ITCZ Shifting
South-East Winds
Monsoon timeline
Retreat of Monsoon
Tibet Effect on Jet stream
subtropical & tropical
Jet Stream Effect

STJ in Winters

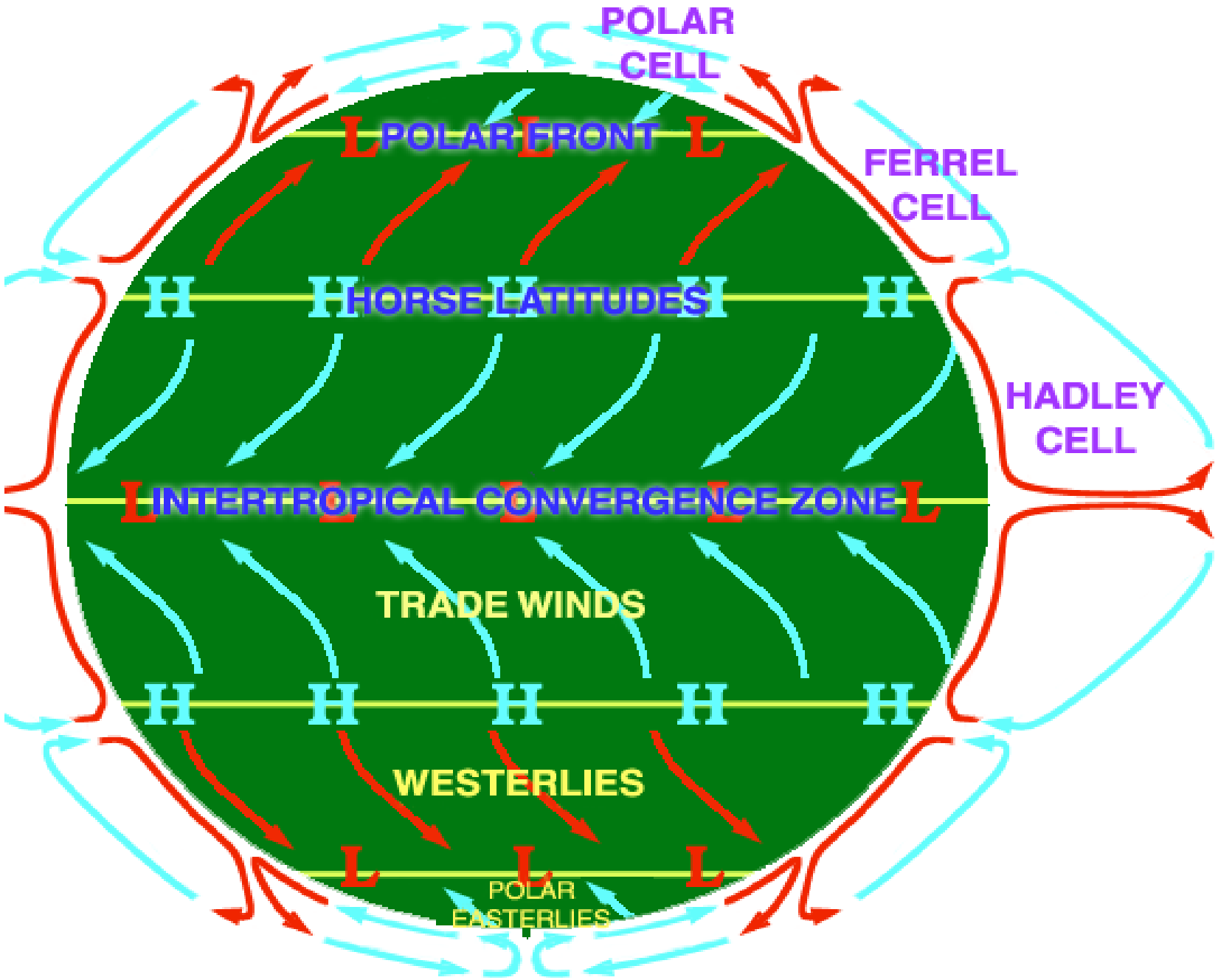
- The winter subtropical westerly Jet Stream **blows from the west to the east in the entire west and middle Asia**
- It is **bifurcated by the Himalayan ranges and Tibetan Plateau.** One of the branch blows parallel to the plateau from the north while the other moves towards the east in the south of the Himalayas.
- The western disturbance which enter the Indian subcontinent in winter are brought by these westerly winds.
- The southern branch blows to the south of the Himalayan ranges along 25° north latitude.

How Does It Trigger The North East Monsoon?

•The westerly Jet Stream, a cold wind which pushes down wind to the surface creating a high pressure on the surface.
•Dry winds from this high pressure area (north western part of India) start blowing towards the low pressure area (Bay of Bengal).
•These winds in turn bring cold waves in winter in the northern part of the country including UP and Bihar.
•After reaching the Bay of Bengal, westerly under the influence of Ferrel's cell take the form of north east monsoon.
•When this wind reaches the coast of Tamil Nadu, it causes rainfall with the humidity received from the Bay of Bengal.

The Equatorial Westerly Theory

- **The Equatorial Westerly Theory has been propounded by Flohn.**
- **He thinks of the thermal low of northern India and the accompanying monsoon as simply an unusually great northward displacement of the Northern Inter-Tropical Convergence Zone (NITCZ).**
- **The seasonal shift of the ITCZ has given the concept of Northern Inter- Tropical Convergence Zone (NITCZ) in summer (July) and Southern Inter-Tropical Convergence Zone (SITCZ) in winter (Jan.).**
- **The fact that the NITCZ is drawn to about 30° latitude may be associated with the unusually high temperature over north India**


POLAR
CELL
L POLAR FRONT L
FERREL
CELL
H H HORSE LATITUDES H H
HADLEY
CELL
L INTERTROPICAL CONVERGENCE ZONE L
TRADE WINDS
H H H H H
WESTERLIES
L L L
POLAR
EASTERLIES

The Equatorial Westerly

- According to him, the thermal effect as the main reason for the origin of the monsoon.
- He suggested that the tropical monsoon of tropical Asia is simply a modification of the planetary winds of the tropics.
- He thinks of the thermal low of northern India and the accompanying monsoon as simply an unusually great northward displacement of the Northern Inter-Tropical Convergence Zone (NITCZ).
- The seasonal shift of the ITCZ has given the concept of Northern Inter- Tropical Convergence Zone (NITCZ) in summer (July) and Southern Inter-Tropical Convergence Zone (SITCZ) in winter (Jan.).
- The fact that the NITCZ is drawn to about 30° latitude may be associated with the unusually high temperature over north India.

- In summer, the inter-tropical convergence (ITC) happens in the north of the equator because of the northern movement (sometimes up to the Shiwalik foothills) of the thermal equator.
- The equatorial westerly now begins blowing towards the low pressure created on the Indian peninsula. It is the south-west monsoon.
- The Inter Tropical Convergence Zone (ITCZ) is known as the monsoon trough.
- In winter, the area of low pressure changes into that of high pressure because of winter solstice and the north-east trade winds once again become active.

This theory was based on the thermal effect, it was also criticized on the basis on which was done of the thermal theory.

Theory of El Niño

- The warm waters along the equator in the east cause the areas of heavy rain to move eastward from Melanesia and Fiji to the central Pacific.

- Essentially, a major source of heat for the atmospheric circulation moves from the west to the central Pacific, and the whole atmosphere responds to the change.

- After the Kelvin wave reaches the coast of Ecuador,

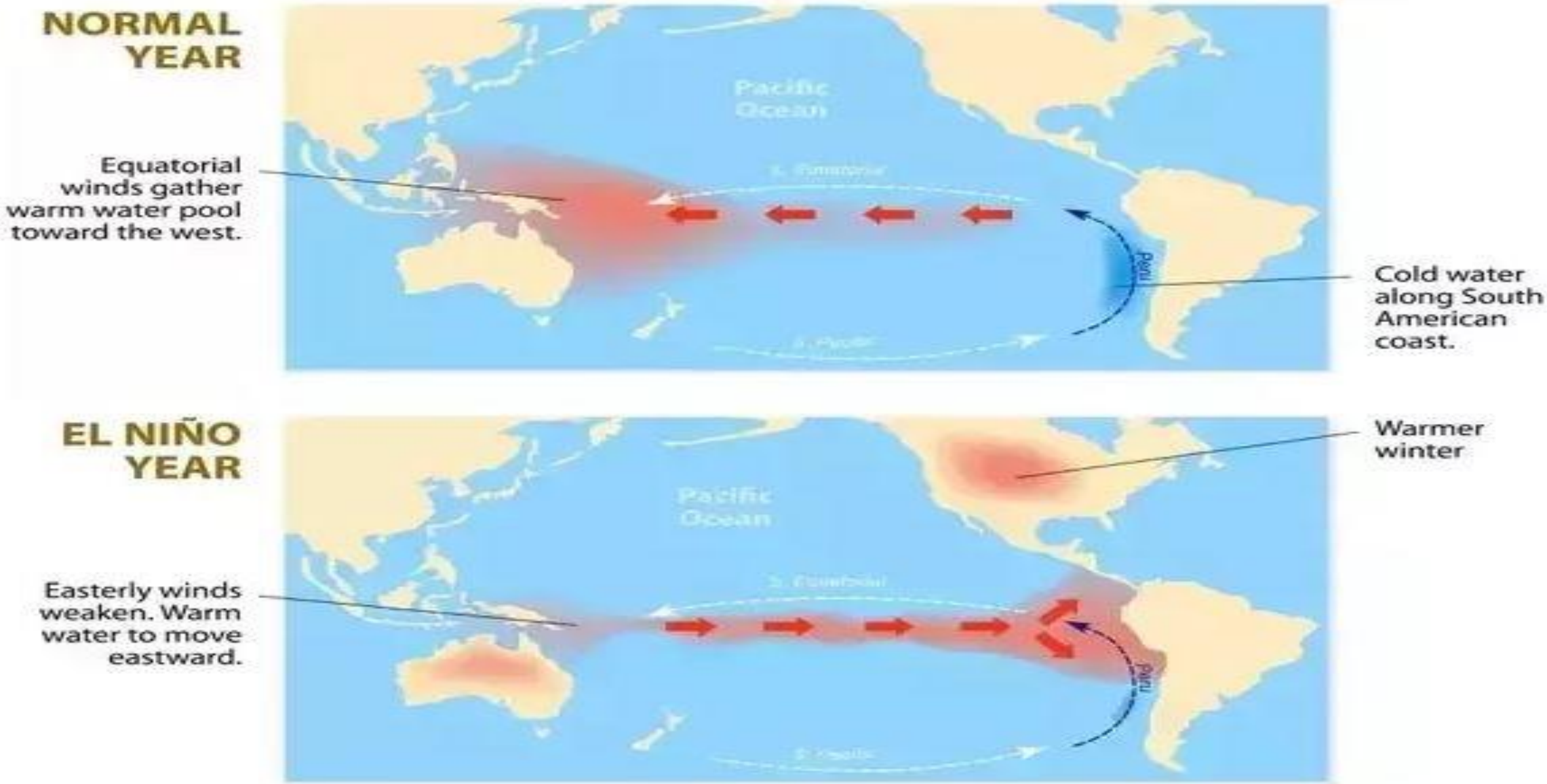
  part is reflected as an *westward propagating Rossby wave*,

  & part propagates north and south as a *coastal trapped Kelvin wave* carrying warm water to higher latitudes.

- For example, during the 1957 El Niño, the northward propagating Kelvin wave produced unusually warm water offshore of California, and it eventually reached Alaska.

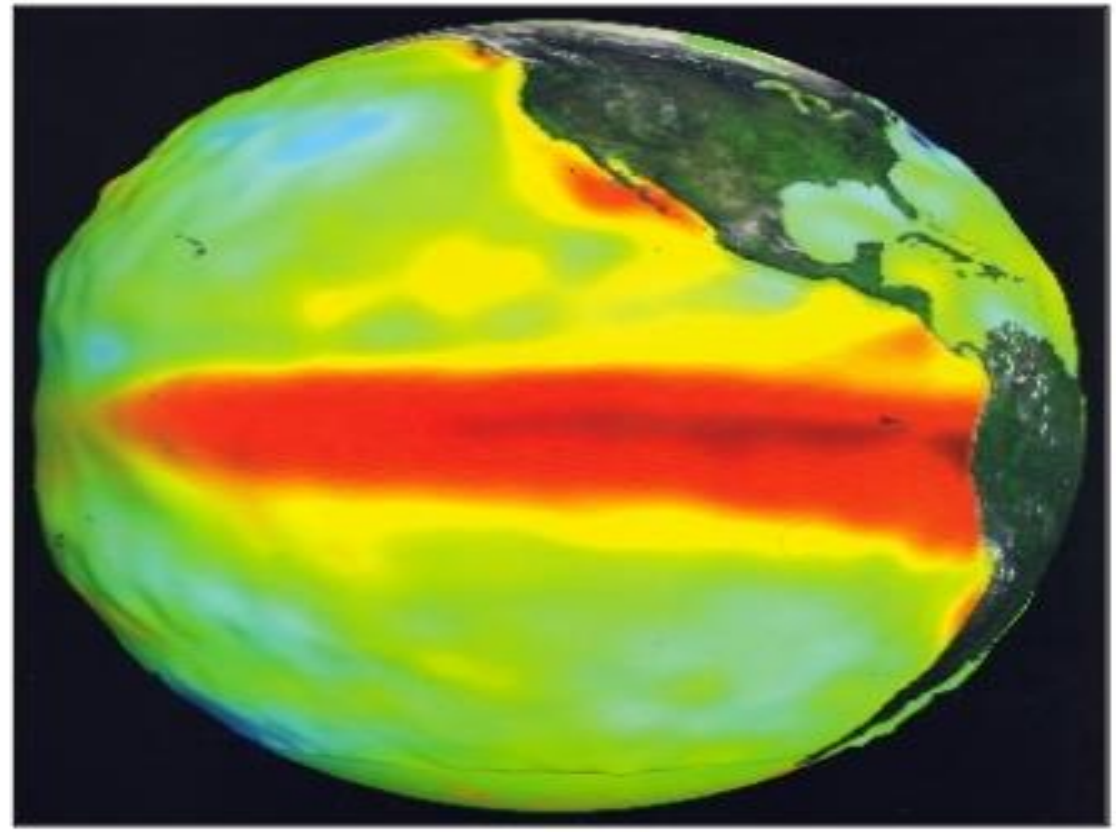
  This warming of the west coast of North America further influences climate in North America, especially in California.

THE EL NIÑO PHENOMENON



El Niño Southern Oscillation

- After the seasons, **El Niño** and **La Niña** are the single largest causes of year-to-year climate variability on Earth.
- In the past two decades, the **El Niño Southem Oscillation (ENSO)** has become one of the most studied **phenomena** on the planet, because it is also one of the most feared.



- An **El Niño** event is the **reversal** of the usual weather patterns that occur in the tropical Pacific, caused by irregular fluctuations in sea surface temperatures. The oceans have a considerable heat storage capacity which makes them a major influence on world climates. If ocean temperatures change, this will have a considerable effect upon weather patterns in adjacent land masses.

Distribution of Rainfall in India

- Rainfall in India is highly uneven over a period of time in a year.
- The western coasts and North East India receive rainfall of over 400 cm.
- It is less than 60 cms in western Rajasthan and adjoining parts of Gujarat, Haryana and Punjab. Similarly, rainfall is *low in the interiors of the Deccan Plateau and east of Western Ghats*.
- Then, Leh in Jammu and Kashmir is also an area of low precipitation.
- The average annual rainfall is about 125 cm, but it has great spatial and temporal variations.

Here are some more observations about distribution of rainfall in India

- As we move from Meghalaya to Haryana or Punjab in Northern plains, we observe that the rainfall decreases.
- In peninsular India, rainfall decreases from coast to interior parts.
- In North-East India, the *rainfall increases with altitude.*
- Maximum rainfall (above 200 cms) in India occurs in the western coast, sub Himalayan regions of north-east and Garo, Khasi and Jaintia hills of Meghalaya.
- Moderate rainfall (100-200cm) occurs in some parts of the Western Ghats, West Bengal, Odisha and Bihar and many states.
- Low rainfall (60 to 100cm) occurs in parts of Uttar Pradesh, Rajasthan, and interior Deccan plateau.
- Inadequate rainfall (Less than 60cm) occurs in western part of Rajasthan and Gujarat, Ladakh and south central part receives a rainfall of less than 20cm.

Temporal variation:

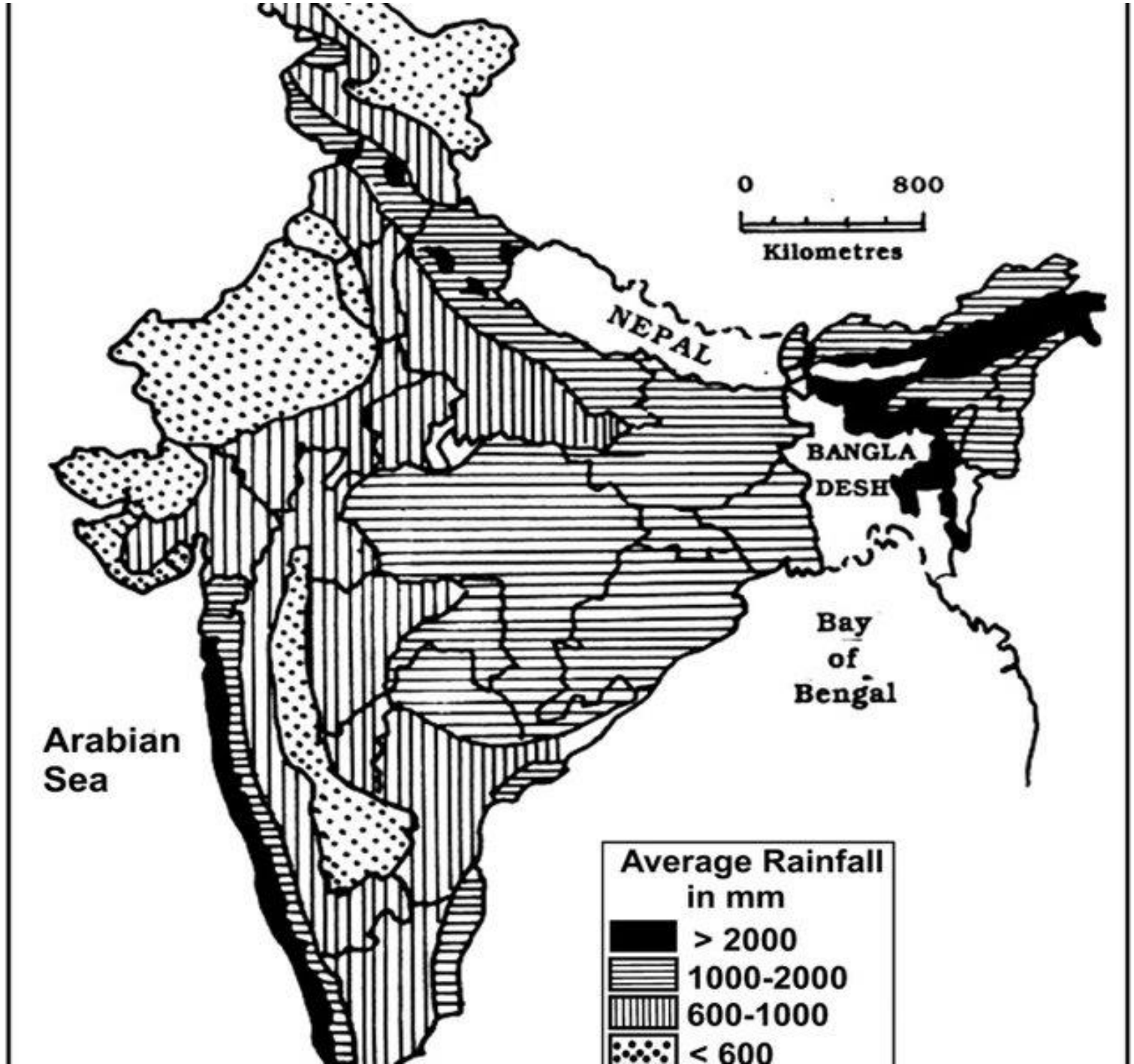
The distribution of rainfall varies temporally as per an annual cycle of seasons. The meteorologists recognize four seasons. The rainfall in these seasons varies in the following manner:

1. Cold Weather Season:
Little rainfall in some parts of India. Some weak temperate cyclones from the Mediterranean Sea cause rainfall in north-western India, which are called Western Disturbances.

2. Hot weather season
A sudden contact between dry and moist air masses gives rise to local storms which are associated with torrential rains.

3. Southwest Monsoon season
Over 80% of the annual rainfall is received in the four rainy months of June to September. The monsoon may burst in the first week of June in the coastal areas of Kerala, Karnataka, Goa and Maharashtra while in the interior parts of the country; it may be delayed to the first week of July.
Monsoonal rainfall is largely governed by relief or topography and rainfall has a declining trend with increasing distance from the sea.

4. Retreating Monsoon
By the end of September, the monsoon becomes weak in response to the southward march of the sun.
The weather is dry in north India but is associated with rain in the eastern part of the Peninsula.

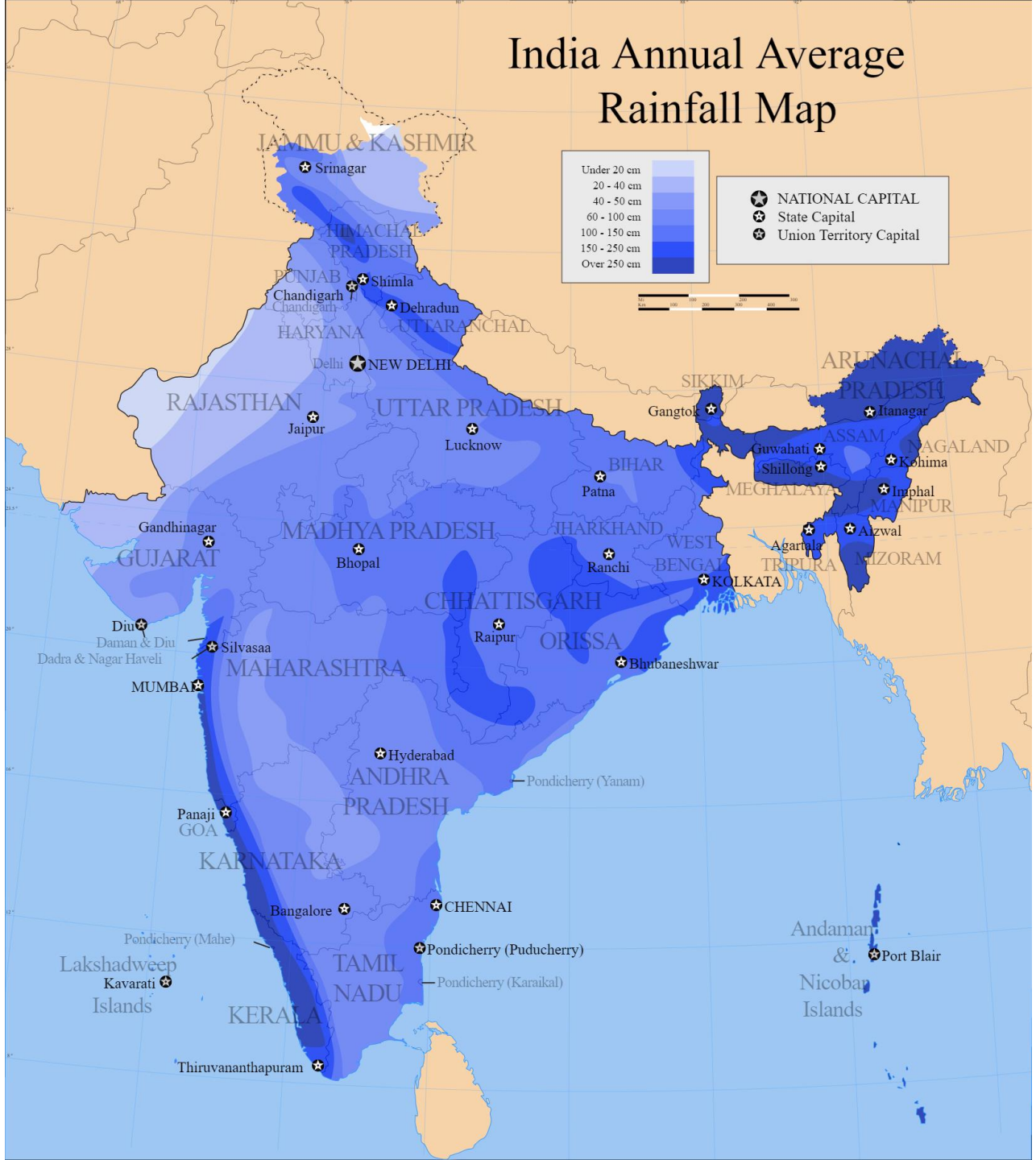

0
800
Kilometres
NEPAL
BANGLA
DESH
Bay
of
Bengal
Arabian
Sea
Average Rainfall
in mm
> 2000
1000-2000
600-1000
< 600

Spatial Distribution of Rainfall

Areas of High Rainfall (Over 200cm): Highest rainfall occurs along the mountain ranges obstructing the approaching moist winds, like the west coast, as well as in the sub-Himalayan areas in the northeast
Areas of medium Rainfall (100-200 cm): In the southern parts of Gujarat, east Tamil Nadu, north-eastern Peninsula covering Orissa, Jharkhand, Bihar, eastern Madhya Pradesh, northern Ganga plain along the sub-Himalayas and the Cachar Valley.

Areas of low Rainfall (50-100 cm): Most of the regions having the effect of continentality like Western Uttar Pradesh, Delhi, Haryana, Punjab, Jammu and Kashmir, eastern Rajasthan, Gujarat and Deccan Plateau.
Areas of inadequate Rainfall (Less than 50 cm): These are arid regions lying in the interior parts of the Peninsula, especially in Andhra Pradesh, Karnataka and Maharashtra, Ladakh and most of western Rajasthan.

In the north India, rainfall decreases westwards and in Peninsular India, except Tamil Nadu, it decreases eastward.


India Annual Average Rainfall Map
Under 20 cm
20 - 40 cm
40 - 50 cm
60 - 100 cm
100 - 150 cm
150 - 250 cm
Over 250 cm
NATIONAL CAPITAL
State Capital
Union Territory Capital
JAMMU & KASHMIR
Srinagar
HIMACHAL PRADESH
Shimla
PUNJAB
Chandigarh
Dehradun
UTTARANCHAL
HARYANA
Delhi
NEW DELHI
RAJASTHAN
Jaipur
UTTAR PRADESH
Lucknow
SIKKIM
Gangtok
ARUNACHAL PRADESH
Itanagar
ASSAM
Guwahati
Shillong
NAGALAND
Kohima
BIHAR
Patna
MEGHALAYA
Imphal
MANIPUR
Aizwal
MIZORAM
Agartala
TRIPURA
WEST BENGAL
KOLKATA
JHARKHAND
Ranchi
Gandhinagar
GUJARAT
MADHYA PRADESH
Bhopal
CHHATTISGARH
Raipur
ORISSA
Bhubaneshwar
Diu
Daman & Diu
Dadra & Nagar Haveli
Silvasaa
MAHARASHTRA
MUMBAI
Hyderabad
ANDHRA PRADESH
Pondicherry (Yanam)
Panaji
GOA
KARNATAKA
Bangalore
CHENNAI
Pondicherry (Mahe)
Pondicherry (Puducherry)
Lakshadweep
Kavarati
Islands
TAMIL NADU
Pondicherry (Karaikal)
KERALA
Thiruvananthapuram
Andaman & Nicobar Islands
Port Blair

Changing pattern of rainfall in India:

There is a general consensus that monsoon pattern in India is changing in terms of intensity, duration, frequency and spatial distribution:

Rainfall extremes have increased threefold over the last few years.

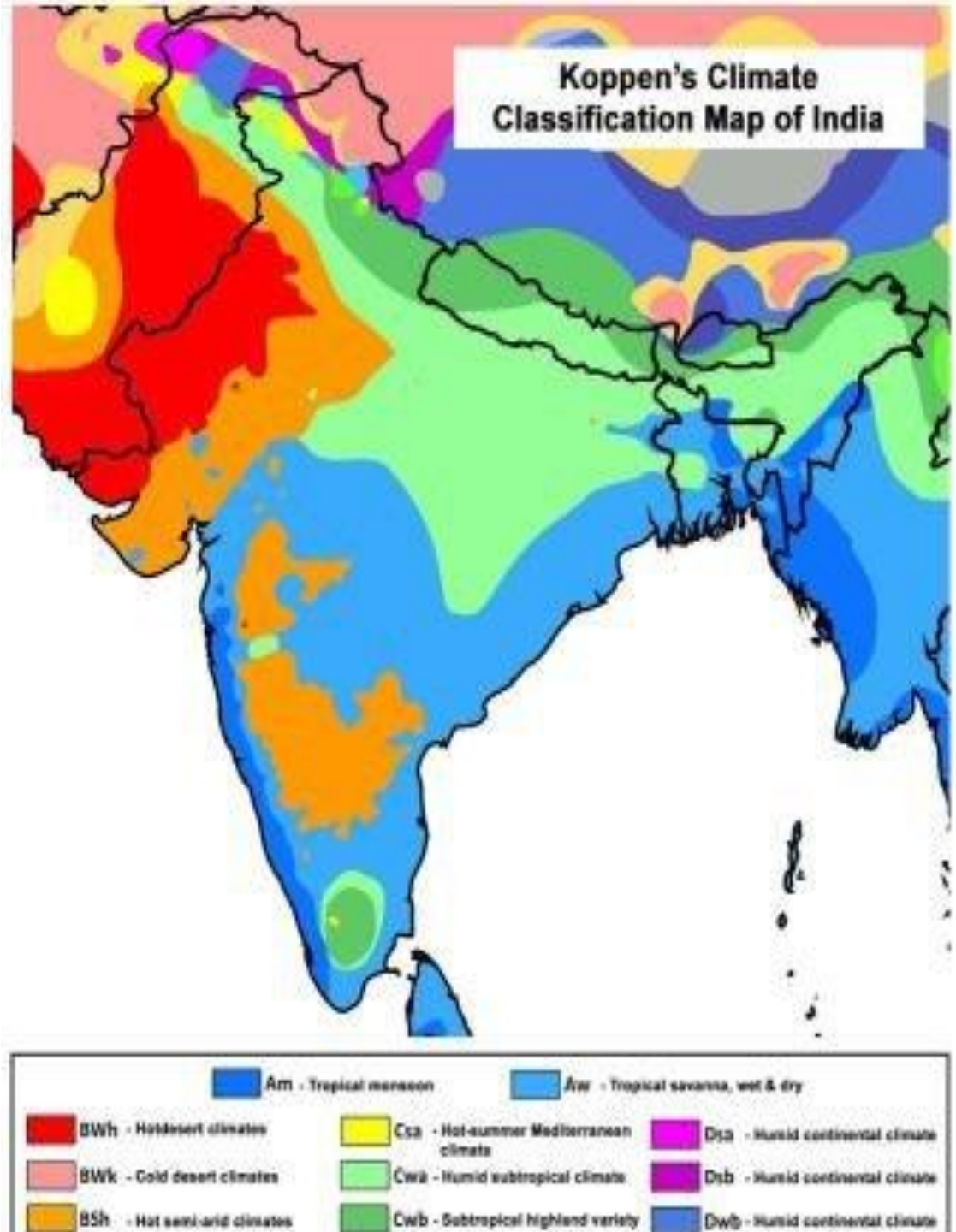
The frequency of floods in northwest and the northeast while rainfall deficit in south has increased.

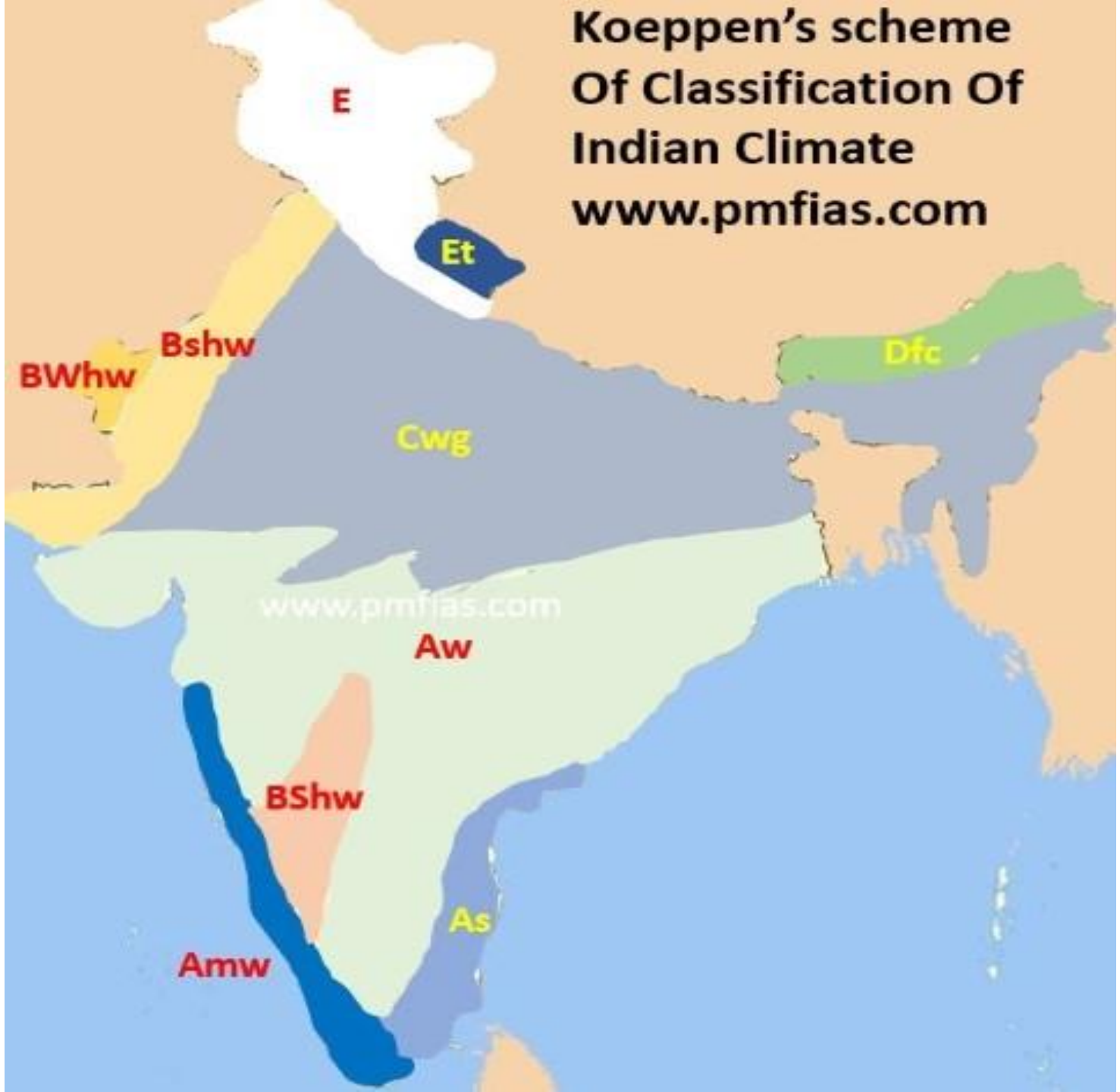
The onset of the monsoon has been delayed due to a regime shift in climate i.e. from a weak to a strong El Niño period.

Monsoons have also been ending sooner thereby reducing the length of the rainy season.
Monsoon seasons are witnessing random 'break periods' when there is little to no rainfall.
Though it's difficult to attribute exact reasons for changing pattern, the following factors have affected the **Monsoon pattern:**

- The ripple effects of global warming and climate change
  Frequent El-Nino and La-Nina, the Indian Ocean Dipole and the Atlantic Nino
  Break periods are associated with rainfall systems moving northwards from the equatorial region.
  The high rate of deforestation
- Thus it becomes imperative for India to work towards restoring the balance of nature in collaboration with other countries, so that the monsoon pattern doesn't change permanently.

Koppen’s Classification of Climate w.r.t India


Koppen's Climate
Classification Map of India
Am - Tropical monsoon
Aw - Tropical savanna, wet & dry
BWh - Hot desert climates
BWk - Cold desert climates
BSh - Hot semi-arid climates
Csa - Hot-summer Mediterranean climate
Cwa - Humid subtropical climate
Cwb - Subtropical highland variety
Dsa - Humid continental climate
Dsb - Humid continental climate
Dwb - Humid continental climate


Koeppen's scheme
Of Classification Of
Indian Climate
www.pmfias.com
E
Et
Bshw
BWhw
Dfc
Cwg
www.pmfias.com
Aw
BShw
As
Amw

What is Koppen Climate Classification?

- The Koppen Climate Classification System is the most widely used system for classifying the world's climates which was created by Wladimir Koppen, a German botanist and climatologist. Wladimir Koppen catagorised the vegetation zones or the biomes across the globe in accordance with their climatic boundaries.

- In 1900, after its inception the climatic classification scheme was a fresh concept. In 1918, Koppen revised and republished his own classification system. Koppen continued to revise this system until his death in 1940. In year 1928, the Koppen climate classification system was co-authored by Koppen's student Rudolph Geiger and was introduced as a road map. Ever since then, various geographers modified and utilized this classification system to divide various areas on the basis of their climatic conditions.

- This system of classification mainly depends on the temperature and the precipitation received by an area which in turn is ascertained by their latitudinal position, the amount of solar radiation received, the air masses, high and low-pressure zones, patterns of wind, exchange of heat with the ocean, the spread of land and the sea, the topography, and the altitude.
- The Koppen system recognizes five major climatic types; each type is designated by a capital letter, A, B, C, D and E. Here 'A' stands for Tropical Moist climate, 'B' for Dry Climates, 'C' for Moist Mid-Latitude Climates with Mild Winters, 'D' for Moist Mid-Latitude Climates with Cold Winters and 'E' stands for the Polar Climates.
- It is very important to note that this scheme does not account for extreme weather conditions substantively, and is intended to serve as a general guide to the overarching climatic zones on the planet. This system cannot be referred for instantaneous or the micro-climatic shifts.

India’s Koppen Climate Classification System

- The classification of Koppen climate in India however is a cumbersome exercise because of its vast land mass that experiences wide variety of climate from one corner to the other. Along with that the monsoon which is the prime source of rainfall in India is not uniform and in time. Therefore the division of the Indian land mass into various climatic zones is very important.
- The major climatic types of India based on Koppen’s scheme are:
- **A. Tropical climates:** Here the mean monthly temperature throughout the year remains over 18°C.
- **B. Dry climates:** The places which have the dry climate, receive very low precipitation in comparison to their temperature, and hence remain dry throughout the year. If dryness is less, it is regarded as semiarid (S); if it is more, then the climate is regarded as arid (W).
- **C. Warm temperate climates**: Warm temperate climates, where the mean temperature of the coldest month is between 18°C and minus 3°C.
- **D. Cool temperate climates:** The areas which fall in this climatic zone experiences mean temperature of the warmest month over 10°C, and the mean temperature of the coldest month under minus 3°C.
- **E. Ice climates:** This climatic zone is coldest of all where the mean temperature of the warmest month remains under 10°C.

- Each type of the climatic zone is further sub-divided into sub-types on the basis of seasonal variations in the distributional pattern of rainfall and temperature. As per the scheme, S stands for semi-arid and W stands for arid. Similarly the sub types are represented by small letters like, f for sufficient precipitation, m for rain forest despite a dry monsoon season, w represents dry season in winter, h stands for dry and hot weather, c for less than four months with mean temperature over 10°C, and g represents Gangetic plain. Accordingly, India can be divided into eight climatic regions as highlighted below:
- 1. **Amw** which represents Monsoon with short Dry season. This type of climate is experienced in the west coast of India, like the south of Goa.
- 2. **As** which stands for Monsoon with dry Summer. The Coromandel coast of Tamil Nadu experiences this type of climate in particular.
- 3. **Aw** is for the Tropical Savannah which is in seen in the South of the Tropic of Cancer like most of regions of the Peninsular Plateaus.
- 4. **Bshw** represents the semi-arid steppe climate. The North- western Gujurat, Some parts of the Western Rajasthan and the Punjab experiences this type of climate.
- 5. **Bwhw** is the hot desert and the western Rajasthan alone falls into this climatic zone.

- 6. **Cwg** is monsoon with dry winter that is predominantly experienced in Ganga plain, eastern Rajasthan, northern Madhya Padesh and most of the North-eastern part of our country.
- 7. **Dfc** represents the cold humid winter with short summer. Arunachal Pradesh falls in this climate zone.
- 8. **E** stands for polar type. This type of climate is prevalent in Jammu and Kashmir, Himachal Pradesh and the Uttarakhand.

- India is a land of varieties and so are its climates. From the above classification it clear that India experiences a wide range of climate. From places experiencing heavy downpour like Cherrapunji to hot deserts of Rajasthan, from the hot humid summers of the Tamil Nadu to the chilly winters of the Kashmir, India has it all.

- The climatic classification which depends on varied factors is not an easy task. That is why there is no classification that is totally appropriate and recognized. Apart from the Koppen's climatic classifications, there are various other classifications as described by many authors like Penck (1910), L.S. Berg (1925), C.W Thronthwait (1948) and B.P. Alisovov (1950).

Difference between Himalayan and Peninsular rivers

Rivers have been of fundamental importance throughout human history. Water from rivers is a basic natural resource, essential for various human activities. Therefore, riverbanks have attracted settlers from ancient times. Using rivers for irrigation, navigation and hydropower generation is of special significance — particularly to a country like India, where agriculture is the major source of livelihood of the majority of its population.

- **Tow major river system**

- The Indian rivers are divided into two major groups:
- The Himalayan rivers
- The Peninsular rivers

Criterion	Himalayan Rivers	Peninsular rivers
1. **Place of origin**	Himalayan mountain covered with glaciers	Peninsular plateau and central highland
2. **Basin Size**	These rivers have very large basins and catchment areas.	Small basins and catchment areas.
3. **Type of drainage**	Antecedent and consequent leading to dendritic pattern in plains	Super imposed, rejuvenated resulting in trellis, radial and rectangular patterns
4. **Valleys**	The Himalayan rivers flow through steep sided V-shaped valleys .	These flow in comparitively shallow valleys. These are more or less graded valleys i.e. the rivers have little erosional activities to perform.
5. **Water flow**	Perennial; receive water from glacier and rainfall	Seasonal; dependent on monsoon rainfall
6. **Stage**	These rivers flow across the young fold mountains and are still in a youthful stage.	These rivers have been flowing in one of the oldest plateaus/shields and have almost reached their base levels of erosion.
7. **Meanders**	When these rivers enter the plains, there is a sudden reduction in the speed of the flow of water. Under these circumstances, these rivers form meanders and often shift their beds.	The hard rock surfaces and non-alluvial character of the plateau permits little scope for the formation of meanders. The rivers of the peninsular plateau have more or less straight courses.
8. **Delta formation and Estuaries**	These rivers make only deltas. The Sundarbans delta is the largest in the world.	These rivers make deltas (Krishna, Kaveri and Godavari) and estuaries like Narmada and Tapi.

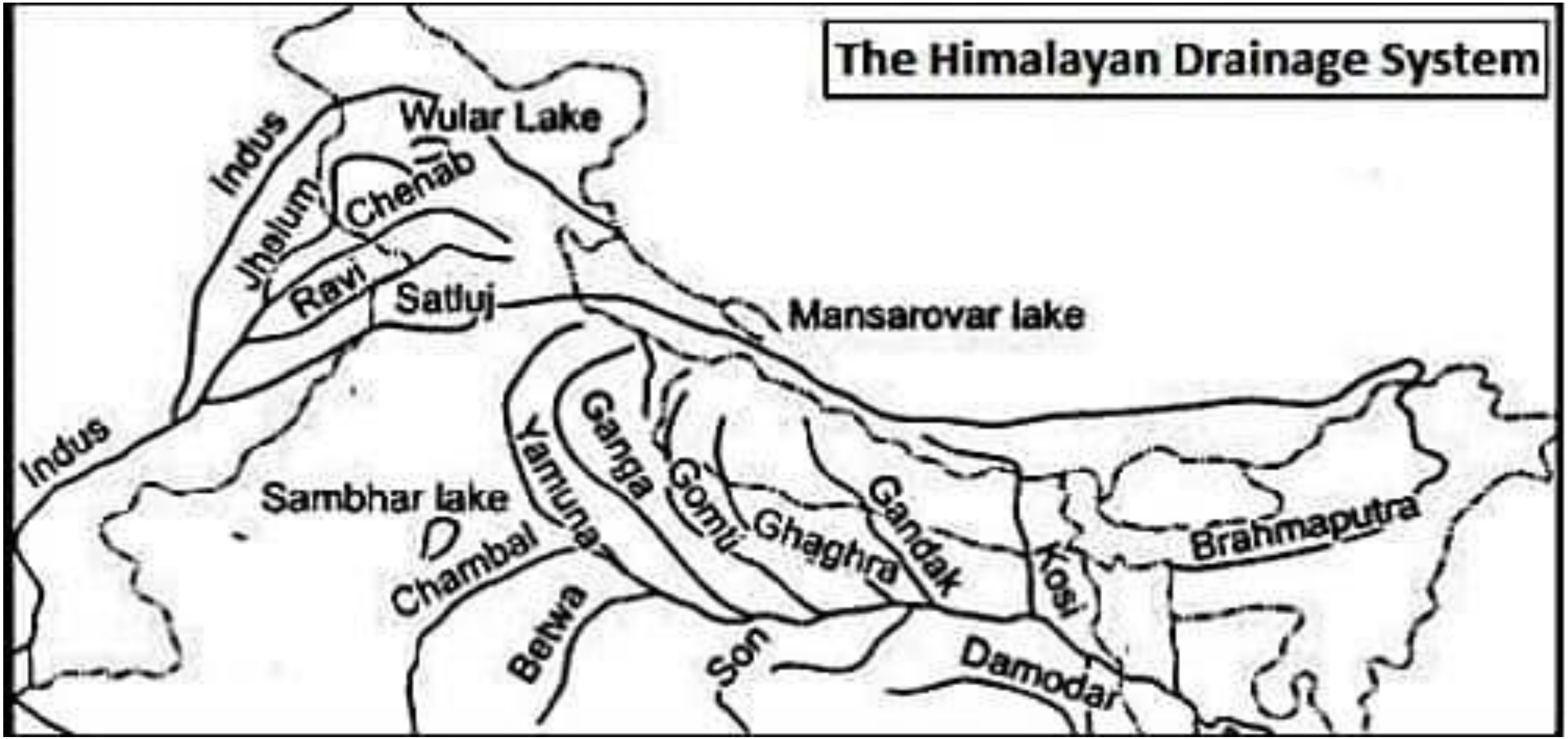

India River Map
Map Showing all Major Rivers of India
N
W
E
S
PAKISTAN
CHINA
NEPAL
BHUTAN
BANGLADESH
MYANMAR
Jhelum
Indus
Chenab
Ravi
Beas
Satluj
Indus
Tsangpo
Lohit
Brahmaputra
Sambhar
Ganga
Yamuna
Chambal
Luni
Gomati
Ghaghara
Kosi
Ganga
Son
Goma
Son
Hugli
Mouth of Ganga
Narmada
Tapi
Penganga
Godavari
Mahanadi
Sabari
Chilika
Bay of Bengal
Godavari
Krishna
Bhima
Krishna
Tungabhadra
Penner
Pulicat
Cauvery
Arabian Sea
Palk Strait
Vembanad
Vaigai
Periyar
Gulf of Mannar
INDIA
OCEAN
Copyright © Prokerala.com

The Himalayan Drainage system

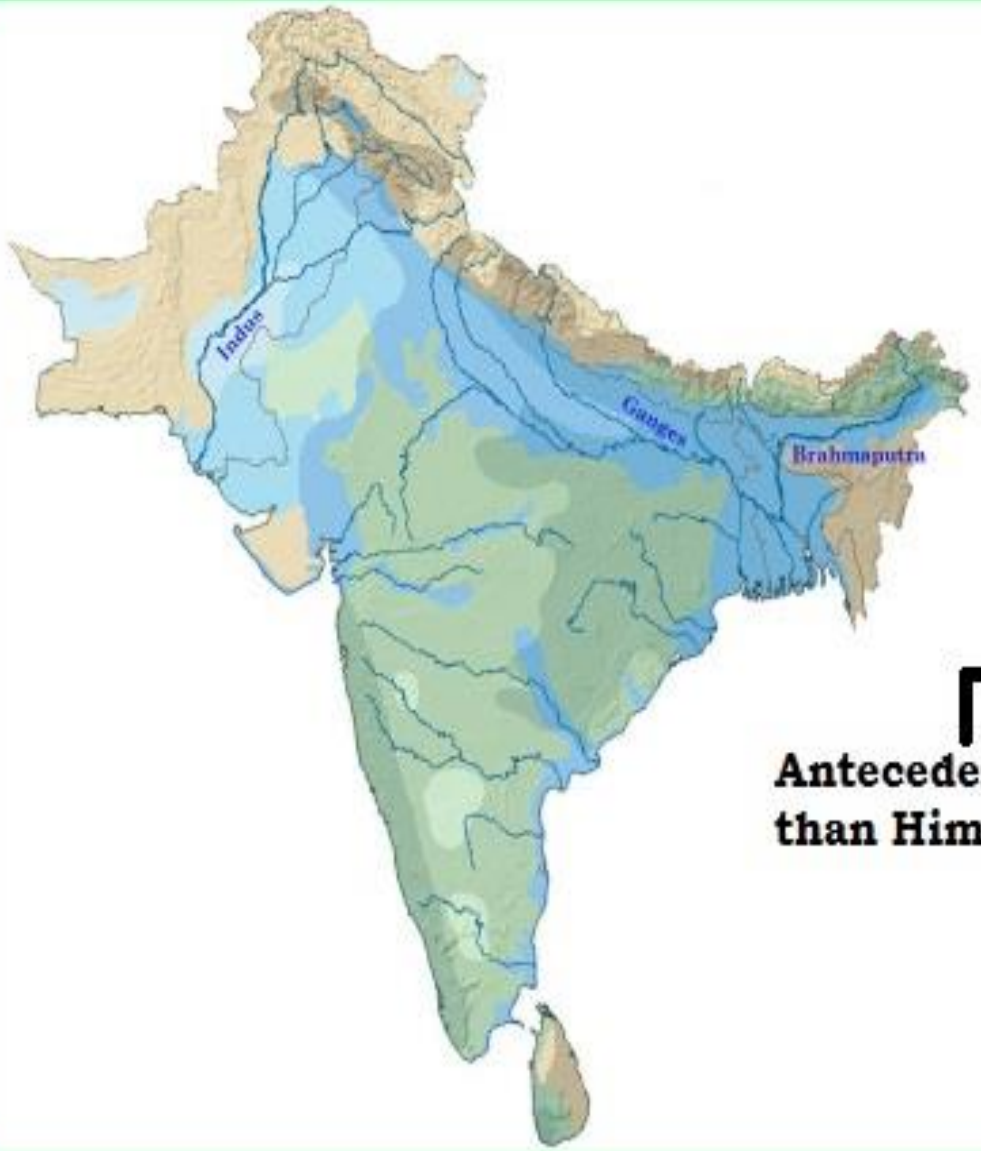
The Indus River System
The Ganga River System
The Brahmaputra River System

DRAINAGE SYSTEMS OF INDIA

Indian drainage **system consists of a large number of small and big rivers.** It is the **outcome of the evolutionary process of the three major physiographic units** and the nature and characteristics of precipitation.


The Himalayan Drainage System
Indus
Wular Lake
Jhelum
Chenab
Ravi
Satluj
Mansarovar lake
Indus
Sambhar lake
Yamuna
Ganga
Gomti
Ghaghra
Gandak
Kosi
Brahmaputra
Chambal
Betwa
Son
Damodar

- The Himalayan drainage system has evolved throughout a lengthy geological narration.
- The three major Himalayan Rivers are the Indus, the Ganga, and the Brahmaputra.
- There are differences of estimation about the evolution of the Himalayan Rivers.
- These rivers are long and are connected by many tributaries. The river came into being due to earth movements which took place in the Tertiary era and is thought to be descendant of the Himalayan Sea.
- Rivers along with its tributaries form a river system.
- There are differences of opinion about the evolution of the Himalayan Rivers.
- However, geologists believe that a mighty river called Shiwalik or Indo-Brahma traversed the entire longitudinal extent of the Himalaya from Assam to Punjab and onwards to Sind, and finally discharged into the Gulf of Sind near lower Punjab during the Miocene period some 5-24 million years ago.
- The remarkable continuity of the Shiwalik and its lacustrine origin and alluvial deposits consisting of sands, silt, clay, boulders, and conglomerates support this viewpoint.
- It is opined that in due course of time Indo-Brahma river was dismembered into three main drainage systems:
- (i) the Indus and its five tributaries in the western part;
- (ii) the Ganga and its Himalayan tributaries in the central part; and
- (iii) the stretch of the Brahmaputra in Assam and its Himalayan tributaries in the eastern part.



Indian Drainage System

- **Himalayan Rivers**
  - Antecedent (Older than Himalaya)
  - Non- antecedent (Younger than Himalaya)
- **Peninsular River**
  - West flowing
  - East flowing

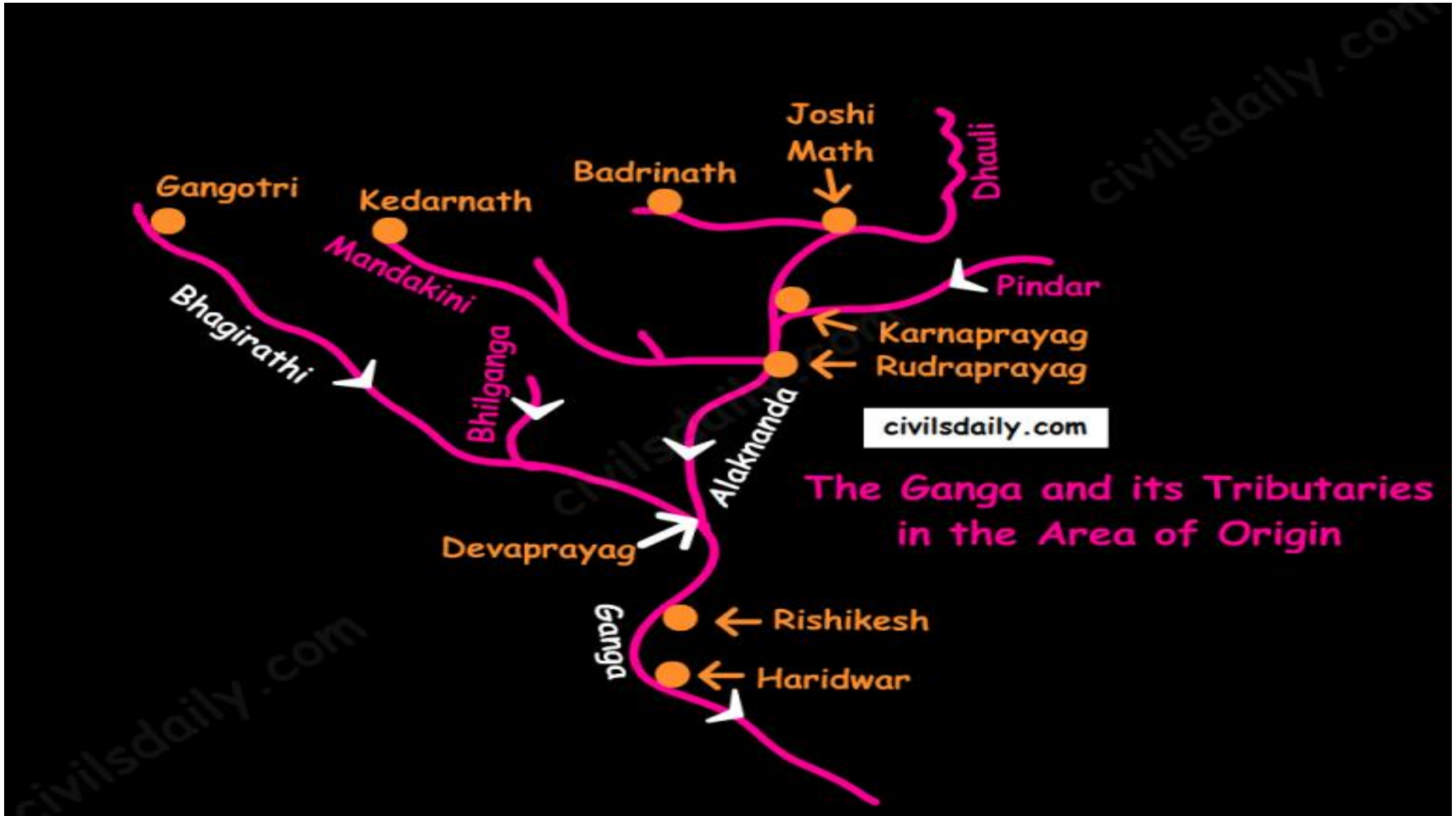
Himalayan Rivers

The Ganges, the Brahmaputra and the Indus together are known as the Himalayan Rivers.

The Ganga River System

- The Ganga river system is the largest in India having a number of perennial and non-perennial rivers originating in the Himalayas in the north and the Peninsula in the south, respectively. It accounts for 26.3% of the geographical area of the country and is shared by ten states.
- Ambala is located on the water divide between Indus and Ganga.
- **Origin**: It rises in the Gangotri glacier near Gaumukh in the Uttarkashi district of Uttaranchal. Here, it is known as the Bhagirathi. At Devprayag, the Bhagirathi meets the Alaknanda; hereafter, it is known as the Ganga.

The Ganga and its Tributaries in the Area of Origin



The river-course:

- The Ganga enters the plains at Haridwar.
- From here, it flows first to the south, then to the south-east direction to reach Allahabad. Here it is joined by the Yamuna.
- Further, near Rajmahal hills, Ganga turns south-east and bifurcates at Farakka into Bhagirathi – Hugli in West Bengal and as the Padma in Bangladesh.
- The river finally discharges itself into the Bay of Bengal near the Sagar Island.


PAKISTAN
Source of the Ganges
HIMALAYAS
CHINA
TIBET
NEPAL
NEW DELHI
KATHMANDU
Mt. Everest
29,035 ft.
(8,850 m)
BHUTAN
Ganges Canal
Ganges
Sarda
Agra
Chambal
Yamuna
Kanpur
Ghaghara
Gomati
Rapti
Gandak
Sapt Kosi
Banas
Sind
Parbati
Kali Sindh
Betwa
Dhasan
Ken
Son
Damodar
Ganges
BANGLADESH
DHAKA
Rihand
Indore
Kolkata
(Calcutta)
INDIA
N
0
200 Miles
0
200 Kilometers
Area drained by the Ganges River and its tributaries
DECCAN PLATEAU
Mouths of the Ganges
Bay of Bengal

- Important **left bank tributaries** of the Ganga:

- Ramganga
- Gomati
- Ghaghara
- Gandak
- Kosi
- Mahananda

- Important **right bank tributaries** of the Ganga:

- Son
- Yamuna

The Brahmaputra River System:

- **Origin**: The Brahmaputra has its origin in the Chemayungdung glacier of the Kailash range near the Mansarovar lake. Mariam La separates the source of the Brahmaputra from the Manasarovar Lake.

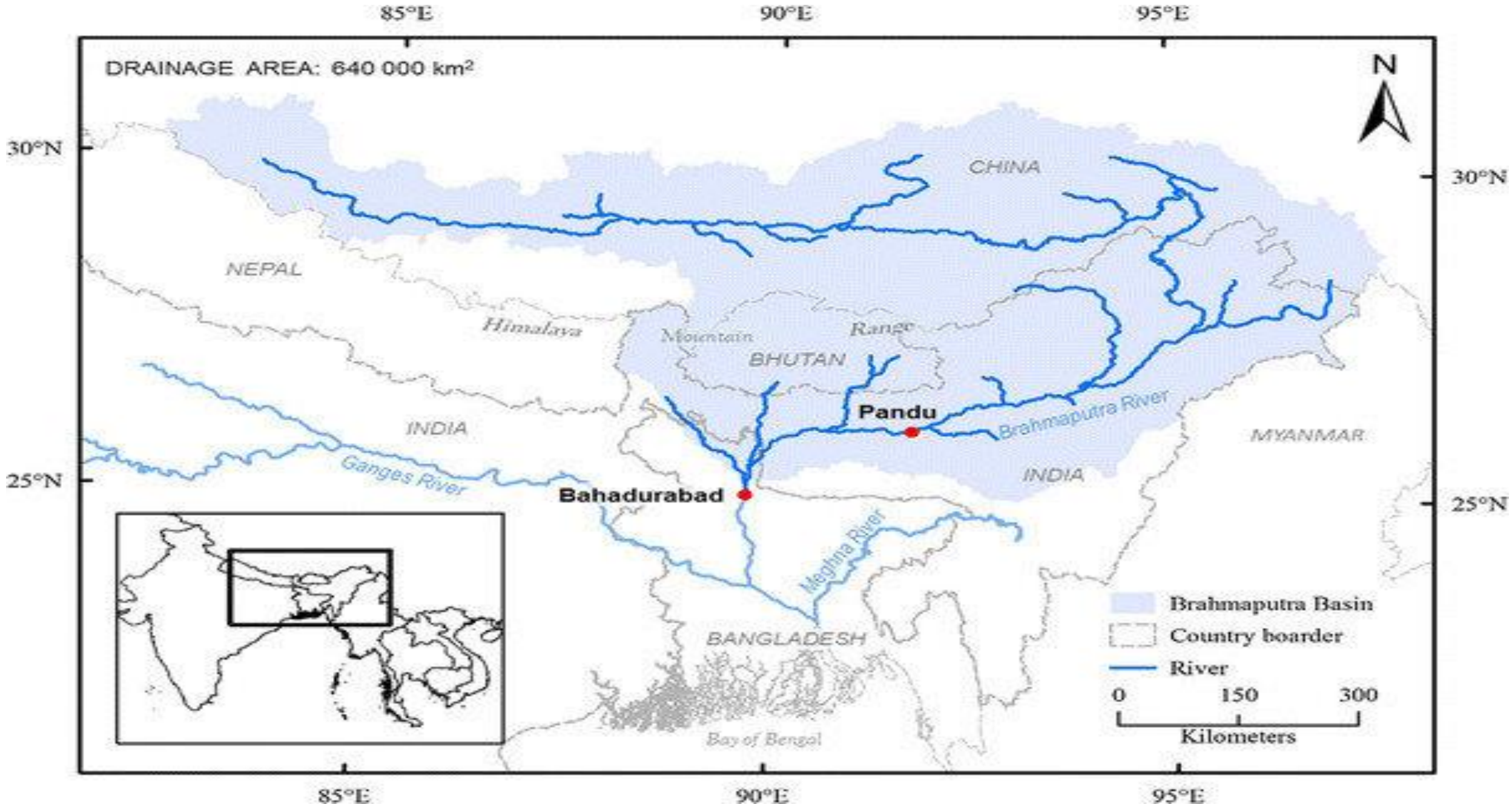

Yarlung Tsangpo (Brahmaputra)
NEPAL
SIKKIM
Ghaghara
Gangak
Kosi
Tista
Manas
Brahmaputra
Lohit
NAGALAND
UTTAR PRADESH
BIHAR
MEGHALAYA
MANIPUR
Son
JHARKHAND
WEST BENGAL
TRIPURA
MIZORAM
Ganges
MYANMAR

The river-course:

- Most of the course of the Brahmaputra lies in Tibet, popularly known as Tsangpo. It flows eastwards parallel to the Himalayas. It receives a large number of tributaries in Tibet. The first major tributary is the Raga Tsangpo meeting the Tsangpo near Lhatse Dzong.
- After reaching Namcha Barwa, it takes a “U” turn (also known as Hair Pin turn) and enters India west of Sadiya town in Arunachal Pradesh through the deep Dihang or Siang gorge of Himalayas. Here initially it is called as Siang and then as Dihang.
- It is joined by Dibang, Lohit, Kenula and many other tributaries and finally forms the Brahmaputra in Assam.
- It then enters into Bangladesh near Dhubri and flows southward. In Bangladesh, the Tista joins it on its right bank from where the river is known as the Jamuna. [Note: The Tista was a tributary of the Ganga prior to the floods of 1787 after which it diverted its course eastwards to join the Brahmaputra.]

The Jamuna and Ganga confluence at Goalundo and afterwards are called as the Padma. Further south, Padma is joined by Meghna (Barak river in India) and thence onward it is known as Meghna to finally merge in the Bay of Bengal.

It is called: The Tsangpo in Tibet (Tsangpo = ‘the purifier.’)
The Brahmaputra in India and The Jamuna in Bangladesh.


DRAINAGE AREA: 640 000 km²
N
85°E
90°E
95°E
30°N
25°N
CHINA
NEPAL
Himalaya
Mountain
Range
BHUTAN
INDIA
Pandu
Brahmaputra River
MYANMAR
Ganges River
Bahadurabad
Meghna River
BANGLADESH
Bay of Bengal
Brahmaputra Basin
Country boarder
River
0
150
300
Kilometers

- **Major left bank tributaries**:

- Burhi Dihing,
- Dhansari (South)
- Kalang

- **Major right bank tributaries**:
- Subansiri (It has its origin in Tibet and is an antecedent river.)
- Kameng
- Manas
- Sankosh

- **Characteristic Features**:
- River Brahmaputra is a little longer than the river Indus.
- It forms a spectacular Grand Canyon – like canyon in Tibet.
- The river is nearly 16 km wide at Dibrugarh and forms many islands, the most important of which is Majuli. Majuli is the world's largest riverine island and India's first island district.
- The Brahmaputra has a braided channel. It carries a lot of silt and there is excessive meandering.
- The Brahmaputra is well-known for floods, channel shifting and bank erosion. This is due to the fact that most of its tributaries are large, and bring large quantity of sediments owing to heavy rainfall in its catchment area.

The Indus River System

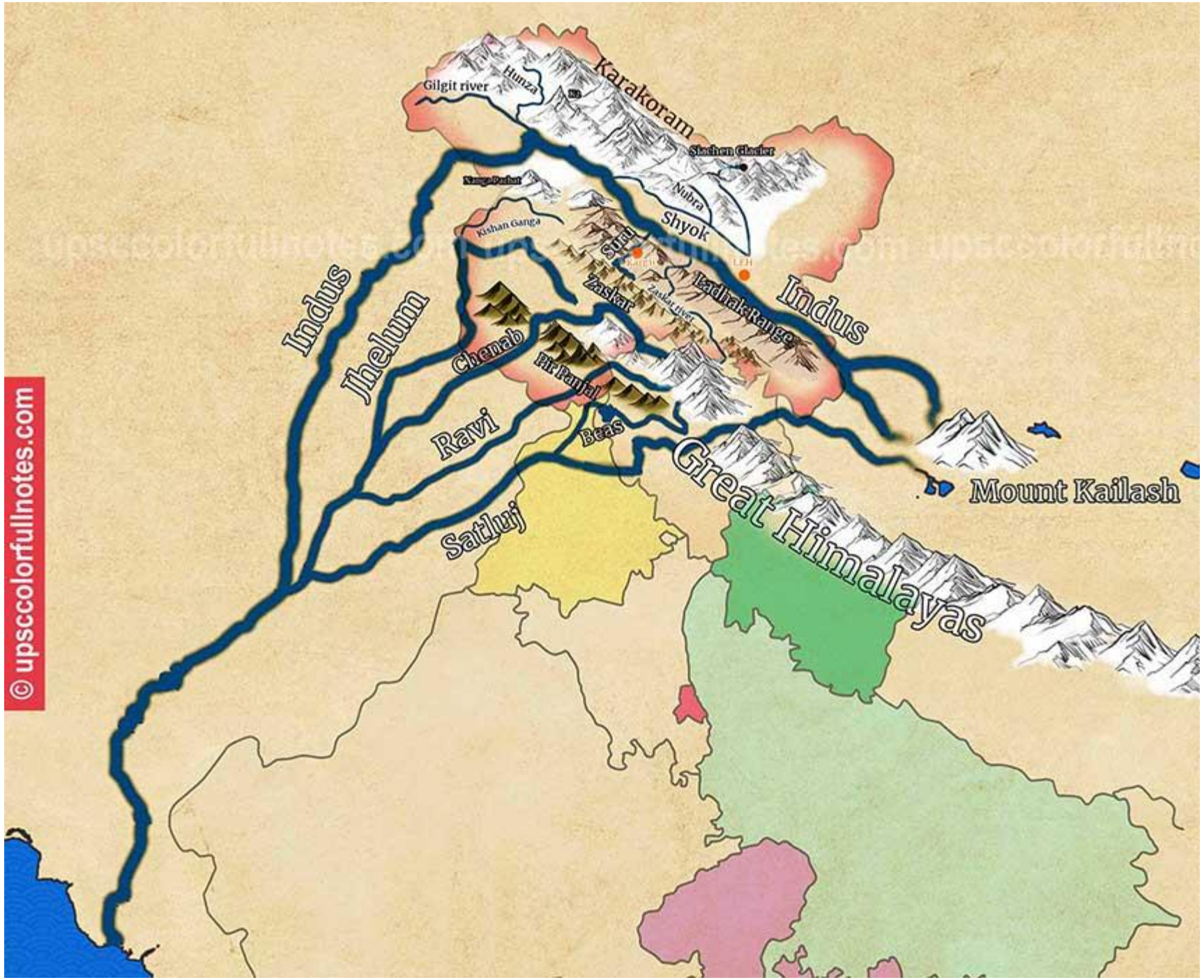
- India got her name from Indus.
- 'The Indus Valley Civilization' was born around this river.
- It flows in north-west direction from its source **(Glaciers of Kailas Range –** Kailash range in Tibet near Lake Manasarovar**)** till the **Nanga Parbhat** Range.
- It's length is about 2,900 km. Its total drainage area is about 1,165,000 square km [more than half of it lies in semiarid plains of Pakistan]. It is joined by **Dhar River** near Indo-China border.
- After entering J&K it flows between the **Ladakh** and the **Zaskar Ranges**. It flows through the regions of Ladakh, Baltistan and Gilgit.
- The **gradient of the river in J&K is very gentle** (about 30 cm per km).
- Average elevation at which the Indus flows through JK is about **4000 m** above sea level.
- It is joined by the **Zaskar River at Leh** (these kind of points are important for prelims).
- Near **Skardu**, it is joined by the **Shyok** at an elevation of about 2,700 m.
- The **Gilgit, Gartang, Dras, Shiger, Hunza** are the other Himalayan tributaries of the Indus.
- It crosses the Himalayas (ends its mountainous journey) through a 5181 m deep gorge near **Attock**, lying north of the **Nanga Parbat.** It takes a sharp southerly bend here **(syntaxial bend).**
- **Kabul river** from Afghanistan joins Indus near **Attock.** Thereafter it flows through the **Potwar plateau** and crosses the **Salt Range** (South Eastern edge of Potwar Plateau).
- Some of the important tributaries below Attock include the **Kurram, Toch** and the **Zhob-Gomal.**
- Just above **Mithankot**, the Indus receives from **Panjnad (Panchnad)**, the accumulated waters of the five eastern tributaries—the Jhelum, the Chenab, the Ravi, the Beas and the Satluj.
- The river empties into the Arabian Sea south of **Karachi** after forming a huge delta.


AFGHANISTAN
CHINA
INDIA
PAKISTAN
Gilgit
Shyok
Shyok
Nubra
Kunar
Swat
Kunhar
Kishen Ganga
Jhelam
Kabul
Kabul
Kurram
Kabul
Srinagar
Indus
Islamabad
Zanskar
Tochi
Indus
Sohan
Jhelam
Gumal
Chenab
Chenab
Beas
Kundar
Zhob
Amritsar
Ravi
Satluj
Chenab
Satluj
Panjnad
New Delhi
Indus
Hyderabad
ARABIAN SEA

Major Tributaries of Indus River

Jhelum River

•The Jhelum has its source in a **spring at Verinag** in the south-eastern part of the **Kashmir Valley.**
•It flows northwards into **Wular Lake** (north-western part of Kashmir Valley). From Wular Lake, it changes its course southwards. At **Baramulla** the river enters a gorge in the hills.
•The river forms steep-sided narrow gorge through **Pir Panjal Range** below **Baramula**.
•At **Muzaffarabad**, the river takes a sharp hairpin bend southward.
•Thereafter, it forms the India-Pakistan boundary for 170 km and emerges at the Potwar Plateau near Mirpur.
•After flowing through the spurs of the Salt Range it **debouches (emerge from a confined space into a wide, open area)** on the plains near the city of Jhelum.
•It joins the Chenab at **Trimmu**.
•The river is **navigable for about 160 km** out of a total length of 724 km.

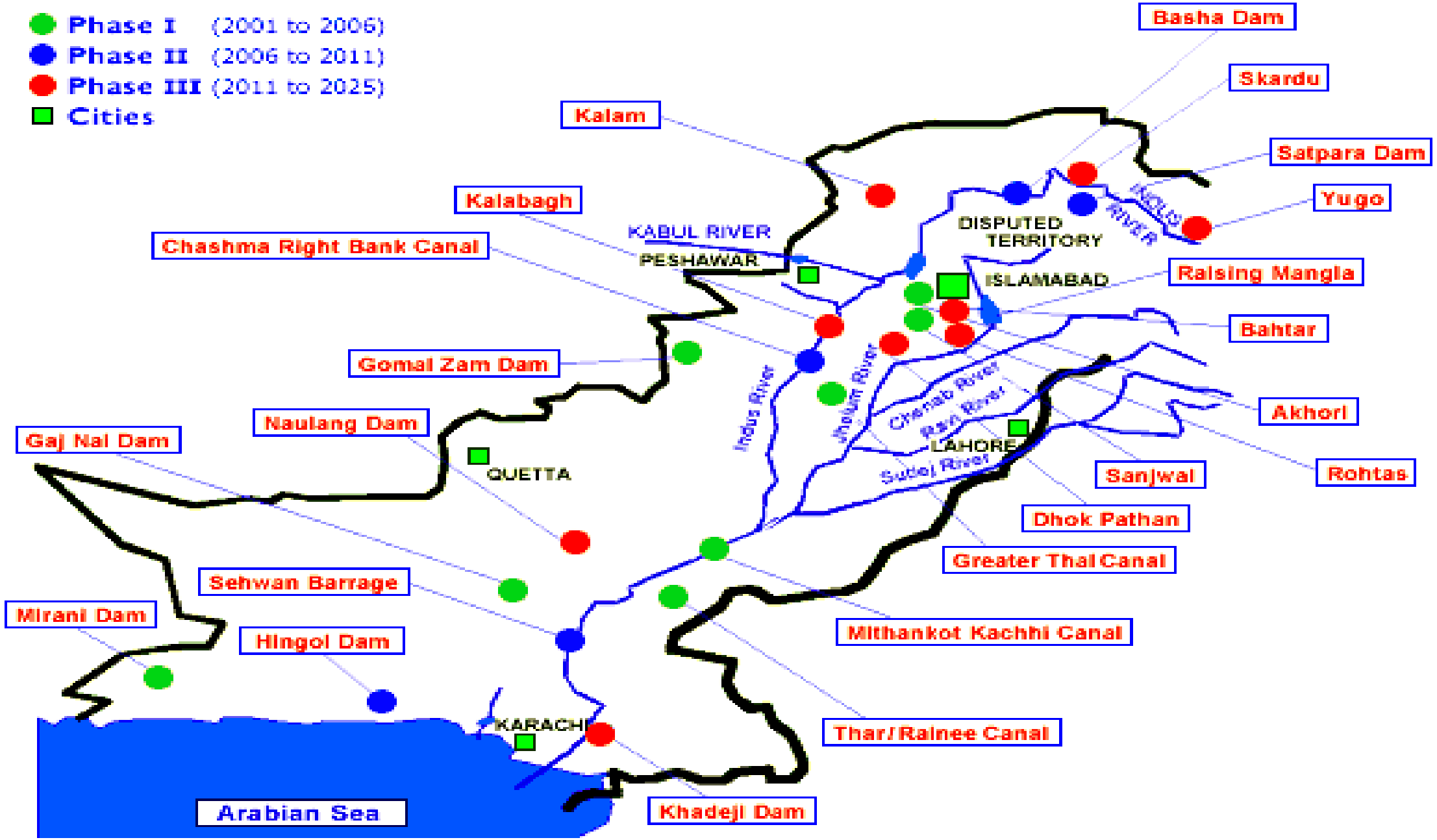

Karakoram
Gilgit river
Hunza
Siachen Glacier
Nubra
Shyok
Kishan Ganga
Suru
Zaskar
Ladhak Range
Indus
Indus
Jhelum
Chenab
Ravi
Satluj
Beas
Great Himalayas
Mount Kailash
© upsccolorfullnotes.com

Chenab River

•The Chenab originates from near the **Bara Lacha Pass** in the **Lahul-Spiti** part of the **Zaskar Range.**
•Two small streams on opposite sides of the pass, namely **Chandra** and **Bhaga**, form its headwaters at an altitude of 4,900 m.
•The united stream **Chandrabhaga** flows in the north-west direction through the **Pangi valley**, parallel to the Pir Panjal range.
•Near **Kistwar**, it cuts a deep gorge.
•It enters the plain area near **Akhnur** in Jammu and Kashmir.
•From here it through the plains of Pakistani Punjab to reach Panchnad where it joins the **Satluj** after receiving the waters of Jhelum and Ravi rivers.

Ravi River

•The Ravi has its source in **Kullu hills** near the **Rohtang Pass** in Himachal Pradesh.
•It drains the area between the **Pir Panjal** and the **Dhaola Dhar ranges**.
•After crossing Chamba, it takes a south-westerly turn and cuts a deep gorge in the Dhaola Dhar range.
•It enters Punjab Plains near **Madhopur** and later enters Pakistan below Amritsar.
•It debouches into the Chenab a little above **Rangpur in Pakistani Punjab**.


Phase I (2001 to 2006)
Phase II (2006 to 2011)
Phase III (2011 to 2025)
Cities
Basha Dam
Skardu
Kalam
Satpara Dam
Yugo
Kalabagh
Chashma Right Bank Canal
KABUL RIVER
PESHAWAR
DISPUTED TERRITORY
ISLAMABAD
Raising Mangla
Bahtar
Gomal Zam Dam
Indus River
Jhelum River
Chenab River
Ravi River
Sutlej River
LAHORE
Akhori
Naulang Dam
Gaj Nal Dam
QUETTA
Sanjwal
Rohtas
Dhok Pathan
Greater Thal Canal
Sehwan Barrage
Mirani Dam
Mithankot Kachhi Canal
Hingol Dam
KARACHI
Thar/Rainee Canal
Khadeji Dam
Arabian Sea

Beas River

•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.**
•It crosses the Dhaola Dhar range and it takes a south-westerly direction and meets the Satluj river at **Harike in Punjab.**
•It is a comparatively small river which is only 460 km long but **lies entirely within the Indian territory.**

Satluj River

•The Satluj rises from the **Manasarovar-Rakas Lakes** in western Tibet at a height of 4,570 m within 80 km of the source of the Indus.
•Like the Indus, it takes a north-westerly course upto the Shipki La on the Tibet-Himachal Pradesh boundary.
•It cuts deep gorges where it pierces the Great Himalaya and the other Himalayan ranges.
•Before entering the Punjab plain, it cuts a gorge in Naina Devi Dhar, where the famous **Bhakra dam** has been constructed.
•After entering the plain at Rupnagar (Ropar), it turns westwards and is joined by the **Beas at Harike.**
•From near **Ferozepur to Fazilka** it forms the boundary between India and Pakistan for nearly 120 km.
•During its onward journey it receives the collective drainage of the Ravi, Chenab and Jhelum rivers. It joins the Indus a few kilometres above **Mithankot.**
•Out of its total length of 1,450 km, it flows for 1,050 km in Indian territory.

Important rivers of peninsular India- Kaveri, Krishna, Godavari etc.

The Peninsular River System

The Peninsular drainage system is older than the Himalayan one. This is evident from the broad, largely-graded shallow valleys, and the maturity of the rivers. The Western Ghats running close to the western coast act as the water divide between the major Peninsular Rivers, discharging their water in the Bay of Bengal and as small rivulets joining the Arabian Sea. Most of the major Peninsular Rivers except Narmada and Tapi flow from west to east.

- ✓The Chambal, the Sind, the Betwa, the Ken, the Son, originating in the northern part of the Peninsula belong to the Ganga river system.
- ✓The other major river systems of the peninsular drainage are – the Mahanadi the Godavari, the Krishna and the Kaveri.
- ✓Peninsular rivers are characterised by fixed course, absence of meanders and non-perennial flow of water.
- ✓The Narmada and the Tapi which flow through the rift valley are, however, exceptions.

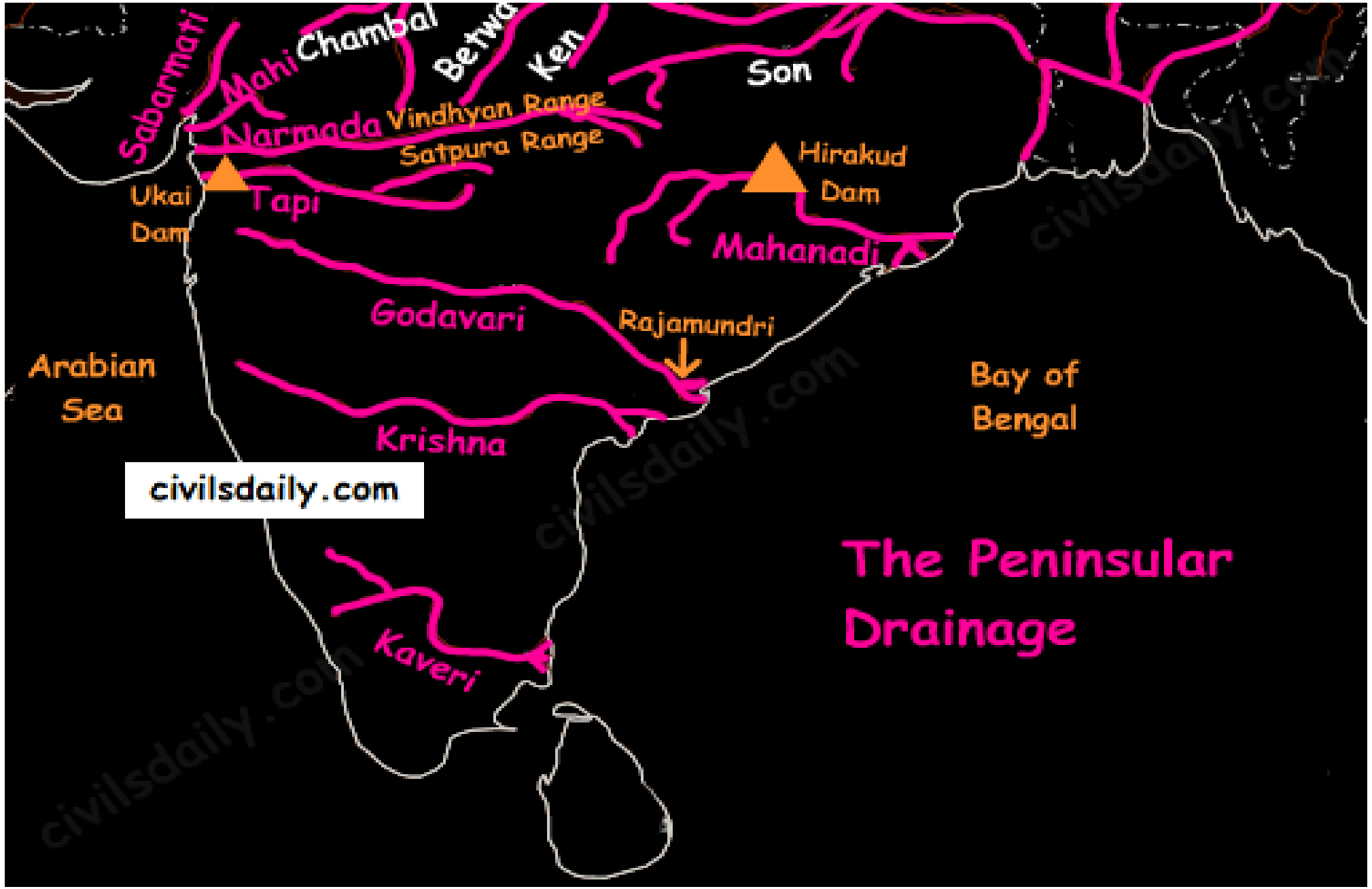
Evolution of Peninsular Drainage System

- Three major geological events in the distant past have shaped the present drainage systems of Peninsular India:
- Subsidence of the western flank of the Peninsula leading to its submergence below the sea during the early tertiary period. Generally, it has disturbed the symmetrical plan of the river on either side of the original watershed.
- Upheaval of the Himalayas when the northern flank of the peninsular block was subjected to subsidence and the consequent trough faulting. The Narmada and The Tapi flow in trough faults and fill the original cracks with their detritus materials. Hence, there is a lack of alluvial and deltaic deposits in these rivers.
- Slight tilting of the peninsular block from northwest to the south-eastern direction gave orientation to the entire drainage system towards the Bay of Bengal during the same period.

Rivers of the peninsular India

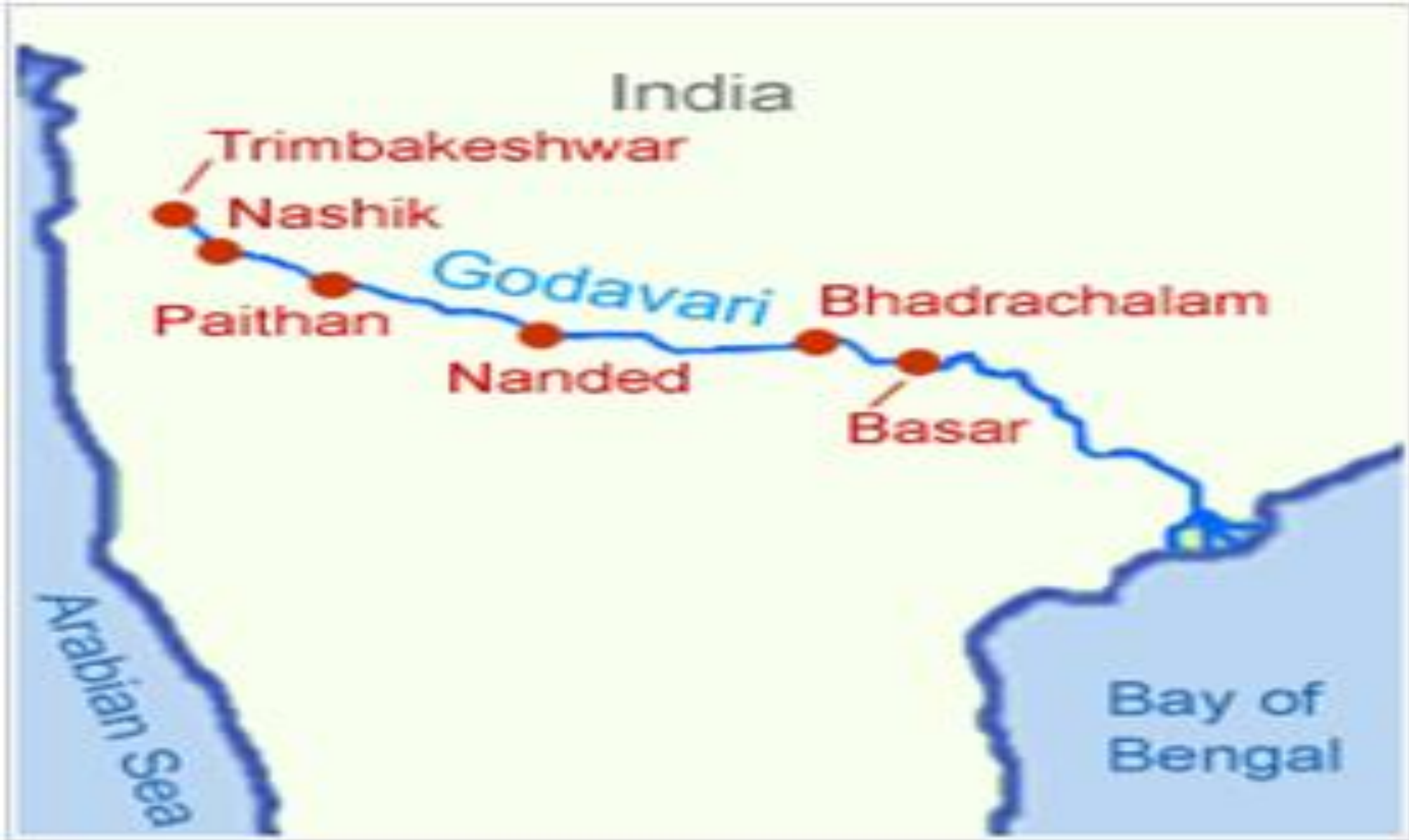
- The major river systems of the peninsular drainage are –

- The Mahanadi
- The Godavari,
- The Krishna And
- The Kaveri, The Narmada,
- The Tapi And
- The Luni


Sabarmati
Mahi
Chambal
Betwa
Ken
Son
Narmada
Vindhyan Range
Satpura Range
Ukai Dam
Tapi
Hirakud Dam
Mahanadi
Godavari
Rajamundri
Arabian Sea
Bay of Bengal
Krishna
civilsdaily.com
Kaveri
The Peninsular Drainage

The Godavari: It is the largest peninsular river system due to this it is **also called the Dakshin Ganga.**

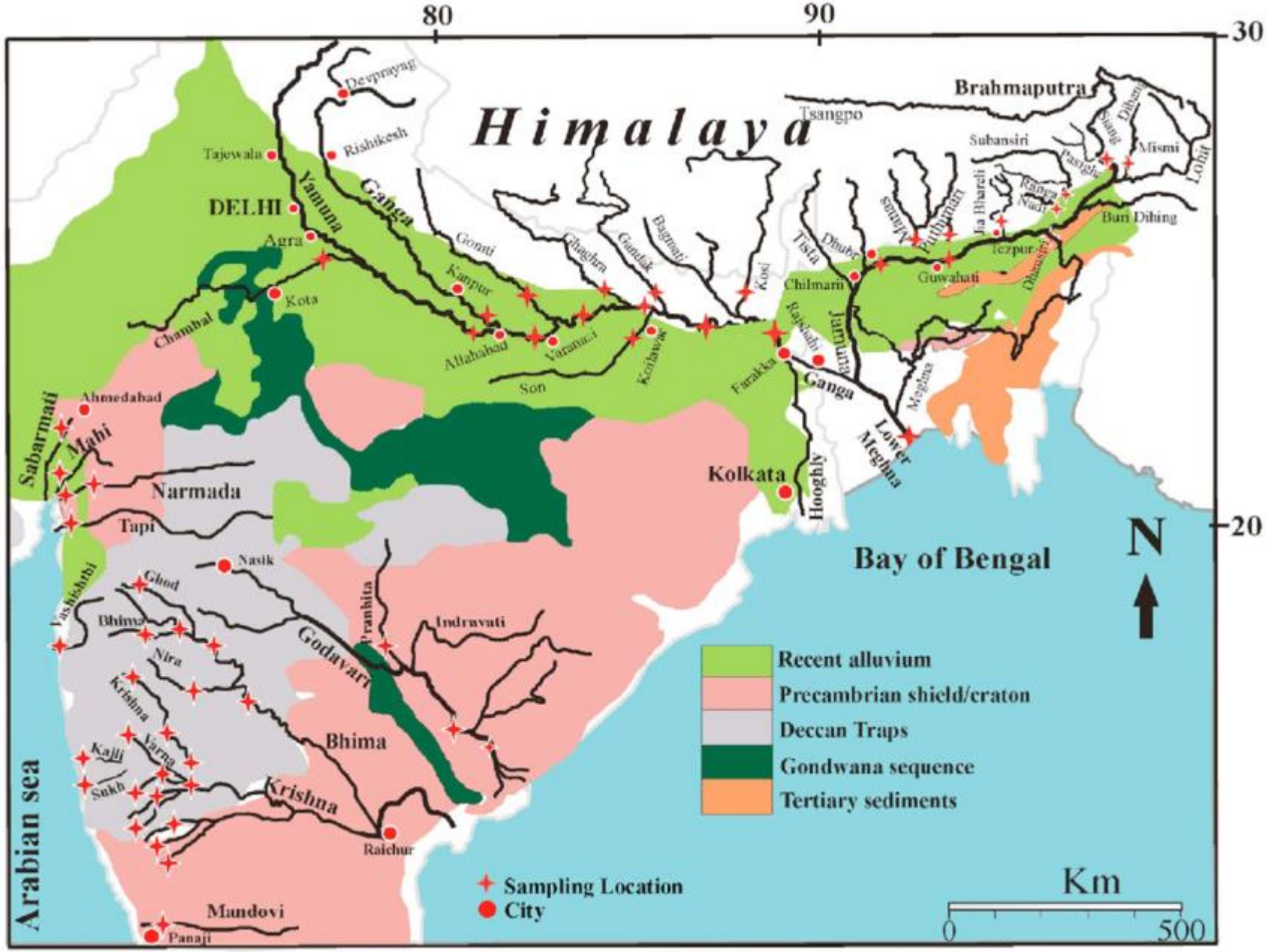
- It rises in the Nasik district of Maharashtra and discharges its water into the Bay of Bengal.
- Its tributaries run through the states of Maharashtra, Madhya Pradesh, Chhattisgarh, Orissa and Andhra Pradesh.
- The Penganga, the Indravati, the Pranhita, and the Manjra are its principal tributaries.
- The Godavari is subjected to heavy floods in its lower reaches to the south of Polavaram, where it forms a picturesque gorge.
- It is navigable only in the deltaic stretch.
- The river after Rajamundri splits into several branches forming a large delta.


India
Trimbakeshwar
Nashik
Paithan
Godavari
Nanded
Bhadrachalam
Basar
Arabian Sea
Bay of Bengal

The Krishna:

- It is the second largest east flowing Peninsular River which rises near Mahabaleshwar in Sahyadri.
- Its total length is 1,401 km.
- The Koyna, the Tungbhadra and the Bhima are its major tributaries.


India
Mahabaleshwar
Narasoba Waadi
Krishna
Amaravati
Srisailam
Vijayawada
Nagarjuna
Konda
Arabian Sea
Bay of
Bengal


80
90
30
20
Himalaya
Brahmaputra
Tsangpo
Devprayag
Rishikesh
Tajewala
DELHI
Agra
Kota
Yamuna
Ganga
Chambal
Gomti
Kanpur
Ghaghra
Gandak
Bagmati
Kosi
Allahabad
Varanasi
Son
Koilawar
Farakka
Rajshahi
Jamuna
Ganga
Chilmari
Tista
Dhubri
Guwahati
Tezpur
Subansiri
Ranga Nadi
Pasighat
Siang
Dihang
Dibang
Lohit
Mismi
Buri Dihing
Dhansiri
Manas
Pathamari
Ja Bhareli
Meghna
Lower Meghna
Hooghly
Kolkata
Ahmedabad
Sabarmati
Mahi
Narmada
Tapi
Nasik
Ghod
Bhima
Nira
Krishna
Kajli
Varna
Sukh
Godavari
Pranhita
Indravati
Bhima
Krishna
Raichur
Mandovi
Panaji
Vashishthi
Arabian sea
Bay of Bengal
N
Recent alluvium
Precambrian shield/craton
Deccan Traps
Gondwana sequence
Tertiary sediments
Sampling Location
City
Km
0
500

The Mahanadi:

- It rises near Sihawa in Raipur district of Chhattisgarh and runs through Orissa to discharge its water into the Bay of Bengal.
- It is 851 km long and its catchment area spreads over 1.42 lakh sq. km.
- Some navigation is carried on in the lower course of this river.
- Fifty three per cent of the drainage basin of this river lies in Madhya Pradesh and Chhattisgarh, while 47 per cent lies in Orissa.


India
Raipur
Nepal
Mahanadi
Sambhalpur
Cuttack
Dhamtari
Paradip
Bay of
Bengal

- **The Kaveri:**
- It rises in Brahmagiri hills (1,341m) of Kogadu district in Karnataka.
- Its length is 800 km and it drains an area of 81,155 sq. km.
- Since the upper catchment area receives rainfall during the southwest monsoon season (summer) and the lower part during the northeast monsoon season (winter), the river carries water throughout the year with comparatively less fluctuation than the other Peninsular Rivers.
- It’s important tributaries are the Kabini, the Bhavani and the Amravati.

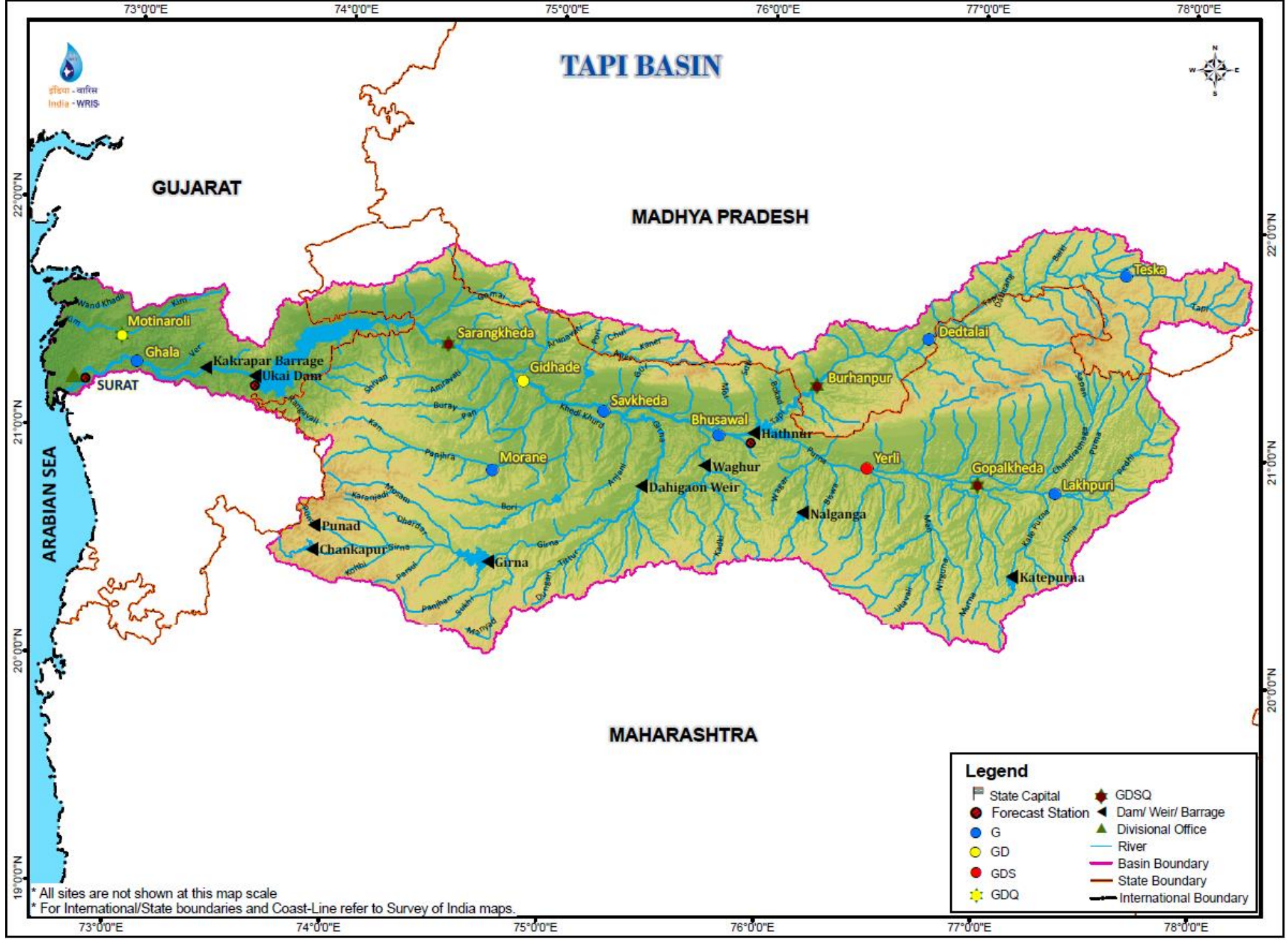

KARNATAKA
Andhra Pradesh
Banglore
Chennai
Hassan
Krishnaraja
Sagar
TAMIL NADU
Mysore
Kabini
Mettur Reservoir
Erode
Cauvery
Thanjavur
Bay of Bengal
Arabian
Sea
KERALA
Madurai

- **The Narmada:**
- It originates on the western flank of the Amarkantak plateau at a height of about 1,057 m. flowing in a rift valley between the Satpura in the south and the Vindhyan range in the north; it forms a picturesque gorge in marble rocks and Dhuandhar waterfall near Jabalpur.
- After flowing a distance of about 1,312 km, it meets the Arabian sea south of Bharuch, forming a broad 27 km long estuary.
- Its catchment area is about 98,796 sq. km.
- The Sardar Sarovar Project has been constructed on this river.

Map of Narmada River

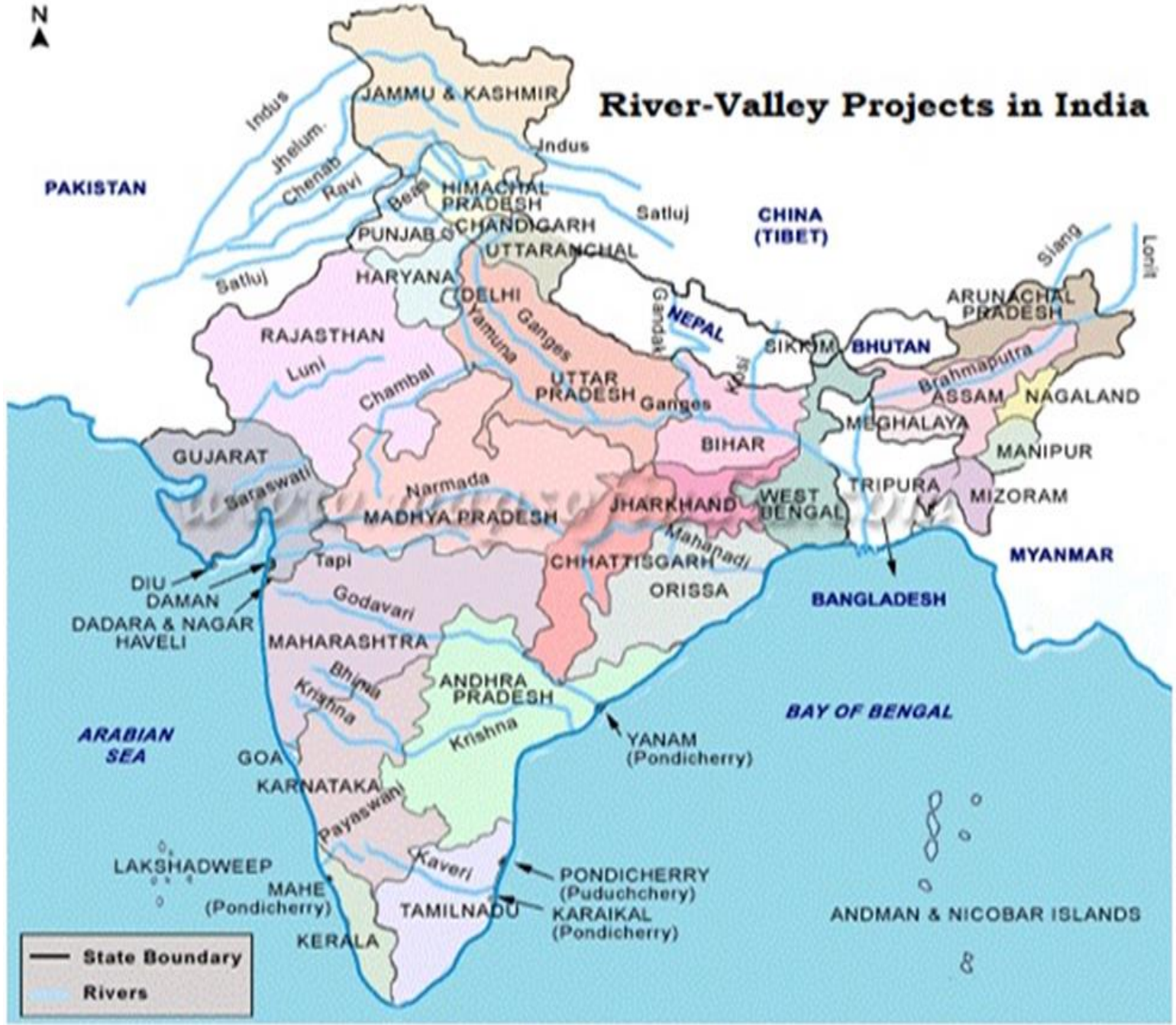
- **The Tapi:**

- It is the other important westward flowing river.
- It originates from Multai in the Betul district of Madhya Pradesh.
- It is 724 km long and drains an area of 65,145 sq. km.
- Nearly 79 per cent of its basin lies in Maharashtra, 15 per cent in Madhya Pradesh and the remaining 6 per cent in Gujarat.


TAPI BASIN
GUJARAT
MADHYA PRADESH
MAHARASHTRA
ARABIAN SEA
Motinaroli
Ghala
SURAT
Kakrapar Barrage
Ukai Dam
Sarangkheda
Gidhade
Savkheda
Morane
Punad
Chankapur
Girna
Bhusawal
Hathnur
Waghur
Dahigaon Weir
Nalganga
Yerli
Burhanpur
Dedtalai
Teska
Gopalkheda
Lakhpuri
Katepurna
Legend
State Capital
Forecast Station
G
GD
GDS
GDQ
GDSQ
Dam/ Weir/ Barrage
Divisional Office
River
Basin Boundary
State Boundary
International Boundary
* All sites are not shown at this map scale
* For International/State boundaries and Coast-Line refer to Survey of India maps.
73°0'0"E
74°0'0"E
75°0'0"E
76°0'0"E
77°0'0"E
78°0'0"E
22°0'0"N
21°0'0"N
20°0'0"N
19°0'0"N

Multipurpose River Valley Projects in India

Multipurpose river valley projects are basically designed for the development of irrigation for agriculture and electricity through the construction of dams. Initially, dams were built only for storing rain water to prevent flooding but now it became multipurpose.


River-Valley Projects in India
N
JAMMU & KASHMIR
Indus
Jhelum
Chenab
Ravi
Beas
Satluj
PAKISTAN
HIMACHAL PRADESH
CHANDIGARH
PUNJAB
UTTARANCHAL
HARYANA
DELHI
RAJASTHAN
Luni
Chambal
Yamuna
Ganges
UTTAR PRADESH
Gandak
NEPAL
Kosi
CHINA (TIBET)
SIKKIM
BHUTAN
ARUNACHAL PRADESH
Siang
Lohit
Brahmaputra
ASSAM
NAGALAND
MEGHALAYA
MANIPUR
TRIPURA
MIZORAM
BIHAR
JHARKHAND
WEST BENGAL
GUJARAT
Saraswati
Narmada
MADHYA PRADESH
Mahanadi
CHHATTISGARH
ORISSA
MYANMAR
BANGLADESH
Tapi
DIU
DAMAN
DADARA & NAGAR HAVELI
Godavari
MAHARASHTRA
Bhima
Krishna
ANDHRA PRADESH
BAY OF BENGAL
ARABIAN SEA
GOA
KARNATAKA
Payaswani
YANAM (Pondicherry)
LAKSHADWEEP
MAHE (Pondicherry)
Kaveri
PONDICHERRY (Puduchchery)
KARAIKAL (Pondicherry)
TAMILNADU
KERALA
ANDMAN & NICOBAR ISLANDS
State Boundary
Rivers

- **1. Almatti Dam**

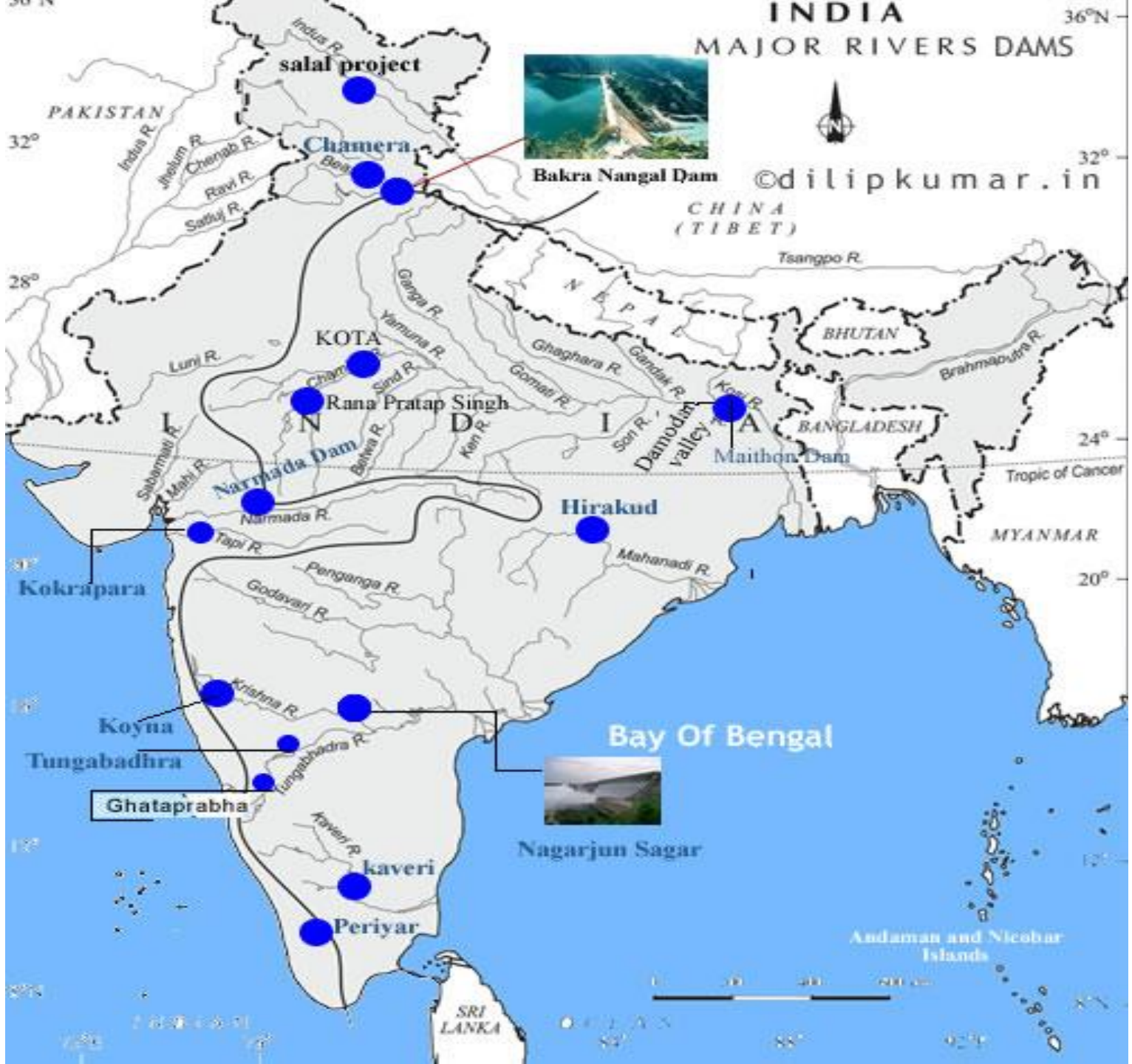
- It is a hydroelectric project constructed on the river Krishna.

- **2. Baspa Hydro-Electric Project**

- It is the first Independent Power Producer (IPP) project after the Government of India liberalized the power policy by inviting private sector participation in setting up a hydropower project on “BOO” basis. It is located in Kinnaur district of Himachal Pradesh. It is the largest private hydroelectric project and has been built by Jaypee group. It is located on Baspa River, a tributary of the Satluj.

- **3. Beas Project**

- It is a joint venture of the governments of Punjab, Haryana and Rajasthan. It consists of two units: (i) Beas-Sutlej Link and (ii) Beas Dam at Pong. The project links the Beas and the Sutlej rivers in Punjab through 38.4 km of hills and valleys. The waters of the Beas were poured into the mighty Sutlej river on July 10, 1977 at the first-ever man-made confluence of the two major rivers at Slapper in Himachal in a mighty bid to augment the water resources of the Gobind Sagar Lake of the Bhakra-complex. This completed the Rs 380- crore dream which was realised in a period of only 12 years.


INDIA
MAJOR RIVERS DAMS
©dilipkumar.in
salal project
Chamera
Bakra Nangal Dam
KOTA
Rana Pratap Singh
Narmada Dam
Hirakud
Maithon Dam
Damodar valley
Kokrapara
Koyna
Tungabadhra
Ghataprabha
kaveri
Periyar
Nagarjun Sagar
Bay Of Bengal
Andaman and Nicobar Islands
PAKISTAN
CHINA (TIBET)
NEPAL
BHUTAN
BANGLADESH
MYANMAR
SRI LANKA
Tropic of Cancer
Indus R.
Jhelum R.
Chenab R.
Ravi R.
Satluj R.
Ganga R.
Yamuna R.
Ghaghara R.
Gandak R.
Kosi R.
Brahmaputra R.
Tsangpo R.
Luni R.
Sabarmati R.
Mahi R.
Tapi R.
Narmada R.
Betwa R.
Ken R.
Son R.
Mahanadi R.
Penganga R.
Godavari R.
Krishna R.
Tungabhadra R.
Kaveri R.

- **4. Bhadra Reservoir Project**

- It is constructed across the river Bhadra which is in Karnataka.

- **5. Bhakra-Nangal**

- Project (Himachal Pradesh) Largest multipurpose project in India and the highest straight gravity dam in the world (225.5 m high) on the river Sutlej.

- **6. Chambal Valley Project**

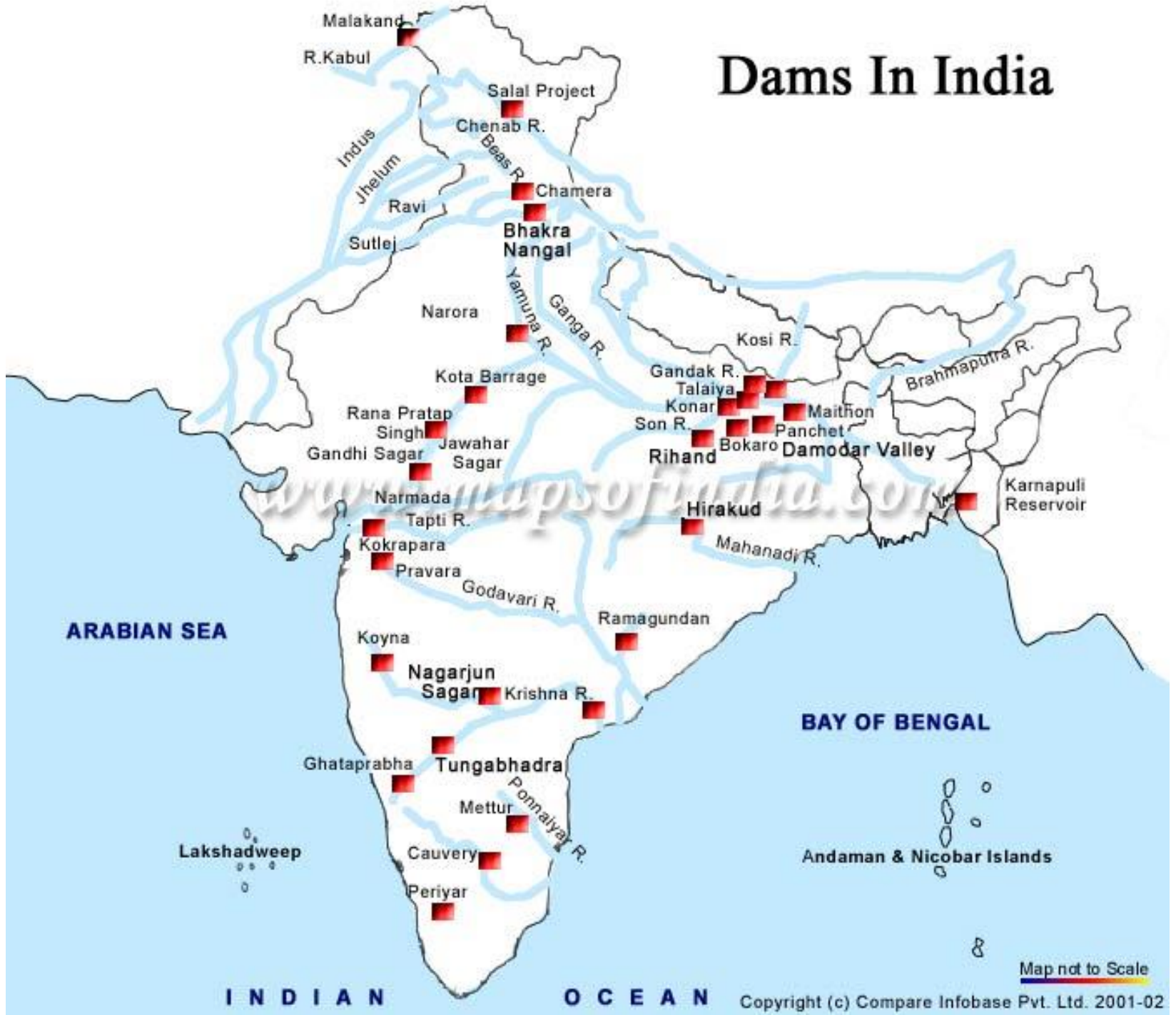
- It is a joint undertaking by the Rajasthan and Madhya Pradesh governments. The Rana Pratap Dam at Bhata, 48 km from Kotah, was inaugurated on Feb 9, 1970. The project comprises construction of two other dams: Gandhi Sagar Dam in Madhya Pradesh and Jawahar Sagar (Kotah) Dam in Rajasthan.

- **7. Chamera Hydro-Electric Project**

- The 540 MW Chamera hydro-electric project on the Ravi river in Himachal Pradesh was implemented with Canadian credit offer of about Rs 335 crore.

- **8. Chukha Project**

- The 336 MW project is the most prestigious and largest in Bhutan. It has been completely built by India. The dam has been constructed on Wang Chu River. The project costed Rs 244 crore.



- **9. Damodar Valley Project (West Bengal and Bihar)**

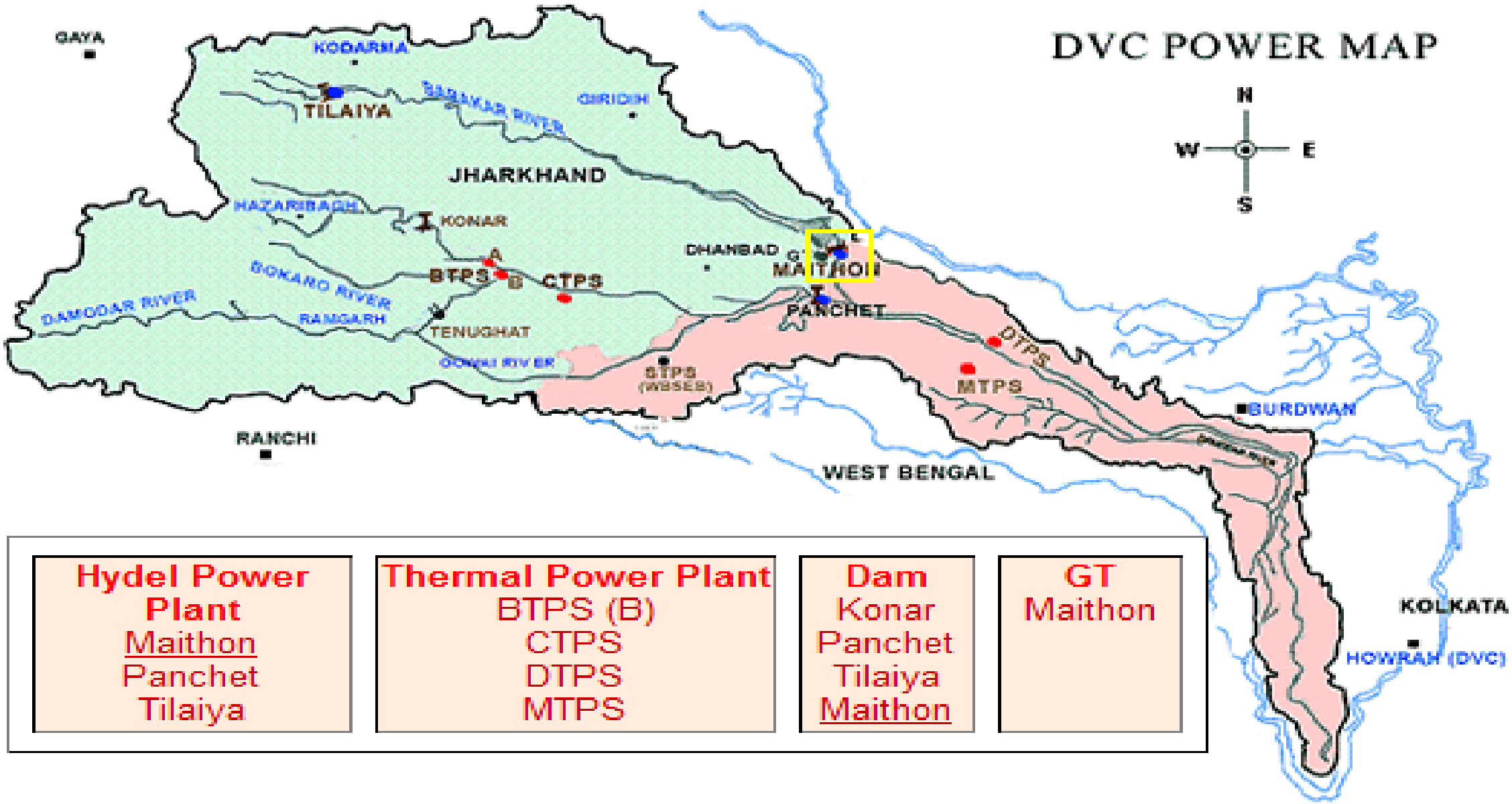
- Principal object of this multipurpose scheme is to control the flowing of the Damodar which is notorious for its vagaries and destructiveness. It is designed on the lines of the Tennessee Valley Authority (T.V.A.) in U.S.A.

- **10. Dul-Hasti Hydro-Electric Project**

- The Rs. 1263 crore project is being built on river Chenab in Jammu and Kashmir. The foundation of the project was laid in September 1984. The project will consist of a power plant of 390 MW capacities. The power house will be located underground.

- **11. Dhauliganga Project**

- The Rs. 600 crore, 280 MW project is to be located on Dhauliganga River in Uttaranchal


DVC POWER MAP
N
W
E
S
GAYA
KODARMA
TILAIYA
BARAKAR RIVER
GIRIDIH
JHARKHAND
HAZARIBAGH
KONAR
DHANBAD
MAITHON
BTPS
CTPS
PANCHET
DAMODAR RIVER
BOKARO RIVER
RAMGARH
TENUGHAT
DTPS
STPS (WBSEB)
MTPS
BURDWAN
RANCHI
WEST BENGAL
KOLKATA
HOWRAH (DVC)
Hydel Power Plant
Maithon
Panchet
Tilaiya
Thermal Power Plant
BTPS (B)
CTPS
DTPS
MTPS
Dam
Konar
Panchet
Tilaiya
Maithon
GT
Maithon

- **12. Farakka Barrage**

- The basic aim of the Farakka Barrage is to preserve and maintain Calcutta port and to improve the navigability of the Hooghly river. It consists of a barrage across the Ganga at Farakka, another barrage at Jangipur across the Bhagirthi, a 39-km long feeder canal taking off from the right bank of the Ganga at Farakka and tailing into the Bhagirathi below the Jangipur barrage, and a road-cum-rail bridge have already been completed. Specially, the object of Farakka is to use about 40,000 cusecs of water out of the water stored in the dam to flush the Calcutta port which is getting silted up.

- **13. Gandak Project (Bihar and U.P)**

- This is a joint venture of India and Nepal as per agreement signed between the two governments on Dec 4, 1959. Bihar and Uttar Pradesh are the participating Indian States. Nepal would also derive irrigation and power benefits from this project.

- **14. Hirakud Project (Odisha)**

- It is the first of a chain of three Dams planned for harnessing the Mahanadi.

- **15. Idukki Hydro-Electric Project**

- It is a giant hydro-electric project of Kerala and one of the biggest in the country, constructed with Canadian assistance with an installed capacity of 390 MW in the first stage and 780 MW in the second stage. The project envisages to harness Periyar waters, has three major dams, the 169 m high Idukki arch dam across Periyar river, 138 m high Cheruthoni Dam across the tributary of Cheruthoni river and 99.9 m high Kulamavu Dam.

- **16. Jayakwadi Dam (Maharashtra)**

- The 10-km-long Jayakwadi dam on the Godavari is Maharashtra's largest irrigation project located near Paithan.

- **17. Kalpong Hydro-Electric Project**

- This is the first hydel power plant of Andaman and Nicobar Islands. The 5.25 MW project was commissioned on July 1, 2001. It is located near Kalara village of Diglipur Tehsil in North Andaman and has been built by National Hydel Power Corporation.

- **18. Kakrapara Project**

- It is situated on the Tapti near Kakrapara, 80 km upstream of Surat. The project is financed by the Gujarat Government.

- **19. Koel Karo Project**

- The project envisages construction of earthen dam across river south Koel at Basia in Bihar and another dam over north Karo at Lohajimi. The capacity will be 710 MW.

- **20. Kol Project**

- The 600 MW project is to be located on the Satluj, 6 km upstream of the Dehar Power House on the Beas-Satluj link project in Mandi district, Himachal Pradesh. Besides generating power, the dam will also serve as a check dam for the 1,050-MW Bhakra Dam and prolong its life by at least 10 years.

- **21. Kosi Project**

- This project will serve Bihar and Nepal. The Kosi rises in Nepal, passes through Bihar and joins the Ganges. The river is subject to heavy floods. Two dams are to be built across it.

- **22. Nagarjunasagar Project**

- This Project is a venture of Andhra Pradesh for utilizing water of the Krishna River. The Nagarjunasagar Dam was inaugurated on Aug 4, 1967. It is situated near Nandikonda village in Miryalguda Taluk of Nalgonda district.

- **23. Nathpa-Jhakri Hydro-Electric Project**

- India’s largest hydro-electric project, it is located at Nathpa Jhakri in Himachal Pradesh. It is built on Satluj River. The first of the six 250 MW units was commissioned on December 30, 2002. The project is being executed by Satluj Jal Nigam (formerly Nathpa Jhakri Power Corporation).

- **24. Parambikulam Aliyar Project**

- It is a joint venture of Tamil Nadu and Kerala States. It envisages construction of seven inter-connected reservoirs by harnessing rivers including two major rivers viz., Parambikulam on the western slopes of Annamalai Hills and Aliyar on the eastern slopes.

- **25. Parappalar Dam**

- The Rs 1-crore Parappalar Dam with a storage capacity of 167 million cubic feet near Oddenchatram, about 75 km from Madurai in Palni taluk (Tamil Nadu), was inaugurated on August 30, 1976.

- **26. Parvati Valley Project**

- It is the first inter-State hydel power project of India. Gujarat, Rajasthan, Haryana and Delhi have joined hands with Himachal Pradesh to set up the project. The 2050 MW project will be built near Kullu, on Parvati river, a tributary of Beas.

- **27. Periyar Valley Scheme (Kerala)**

- The scheme envisages the construction of a masonry barrage 210.92 metres long across the river Periyar near Alwaye, in Ernakulam district.

- **28. Rajasthan Canal Project**

- It is a bold venture of bringing irrigation to a desert area. The project, which uses water from the Pong dam, consists of 215-km long Rajasthan feeder canal (with the first 178 km in Punjab and Haryana and the remaining 37 km in Rajasthan) and the 467-km long Rajasthan main canal lying entirely in Rajasthan.

Periyar Dam

- **29. Ramganga River Project**

- This Project in Uttaranchal envisages construction of a dam across the river Ramganga, one of the major tributaries of the Ganga at 3.2 km upstream of Kalagarh in Garhwal district. RANJIT SAGAR DAM PROJECT Formerly known as Thein dam, it was dedicated to the nation on March 4, 2001. It is built on the Ravi River near Thein village in Punjab. Total installed capacity is 600 MW.

- **30. Rihand Project (Mirzapur District—U.P)**

- This project has been completed by the U.P. Government and comprises the construction of a concrete gravity dam across the Rihand River in Mirzapur District (U.P.) and a Power House at Pipri and necessary transmission lines. Gobind Ballabh Pant Sagar is a part of this project.

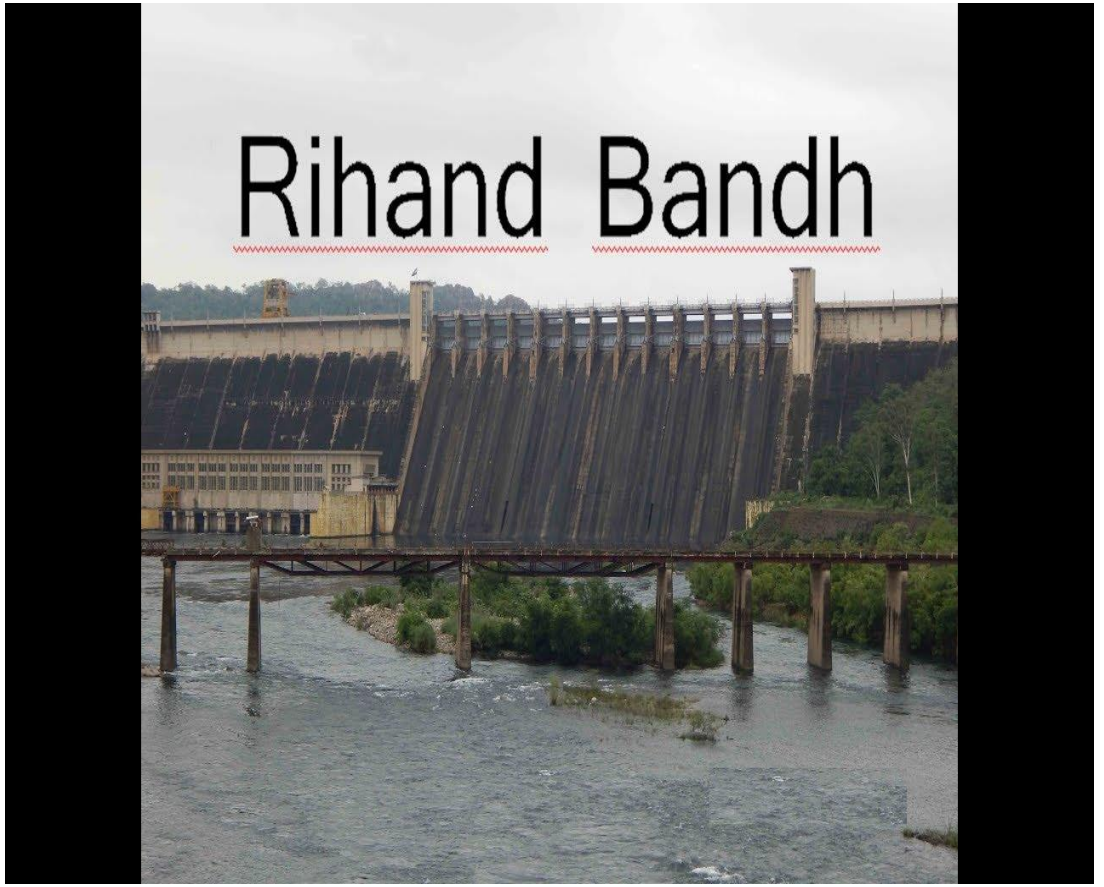
- **31. Rongtong Project World's Highest Hydro Power Project**

- It is ringtone project that is situated in Kazan in the Spiti Valley in Himachal Pradesh. The project has helped transform the entire cold mountain desert into a lush greenbelt.

- **32. Salal Project**

- It has been built on River Chenab in Jammu and Kashmir. The first stage was completed on February 9, 1989 and marked the beginning of the harnessing of hydro power potential of river Chenab. At present the capacity of the powerhouse is 345 MW. With the completion of the second stage the capacity will double.


Yamuna River
Ganga River
Chambal River
Ken River
Son River
INDIA


Rihand Bandh

- **33. Sankosh Hydel-Power Project**

- India and Bhutan have signed an agreement for building of a gigantic Sankosh hydel power project. It will be one among the ten largest projects in Asia. The project is to be constructed near Kerabari in Gaylegphug district of Bhutan on Sankosh River. It will include a 600 metre-long and 239 metre high dam and a reservoir with a catchment area of 10,525 sq km. It is estimated to cost around Rs 2000 crore. Once completed, the project will generate 1,525 MW of power and help irrigate eight lakh hectares of land.

- **34. Sanjay Vidyut (Hydel) Project**

- It is Asia's first fully underground Hydel Project. The 120 MW project is located near Bhaba Nagar in Kinnaur district of Himachal Pradesh. It harnesses the water of the Bhaba Khud, a tributary of the Satluj.

- **35. Sardar Sarovar Project**

- It is one of the largest river valley schemes in the country. The project envisages construction of 163-metre-high cement concrete dam at Navagam in Gujarat. This will create irrigation potential of 1.79 million hectares and generate 1450 MW of power.

Sardar Sarovar Dam

- **36. Sawalkote Hydro Project**

- The 600 MW project in Jammu & Kashmir is being built by a Norwegian consortium.

- **37. Sharavati Project (Karnataka)**

- It is located 400 km from Bangalore near the Gersoppa falls; the Sharavati Project is one of the world's major power projects, built by Indian engineers with American collaboration.

- **38. Srisailarn Project**

- It is a massive power project, 110 km away from Nagarjunasagar in the upper reaches of the river Krishna.

- **39. Subarnarekha Project**

- It is Rs 130-crore multipurpose project, which would, when completed, provide assured irrigation to 7,06,000 acres to the chronically drought-prone areas of Orissa and Bihar.

- **40. Tehri Dam Project**

- The World's fifth and Asia's largest hydroelectric project has been constructed on river Bhagirithi, a tributary of Ganga in Tehri district of Uttaranchal. The height of the earth and rockfill dam is 260.5 m, making it the highest dam in the country. Once fully operational, the project will produce 1000 MW electricity.

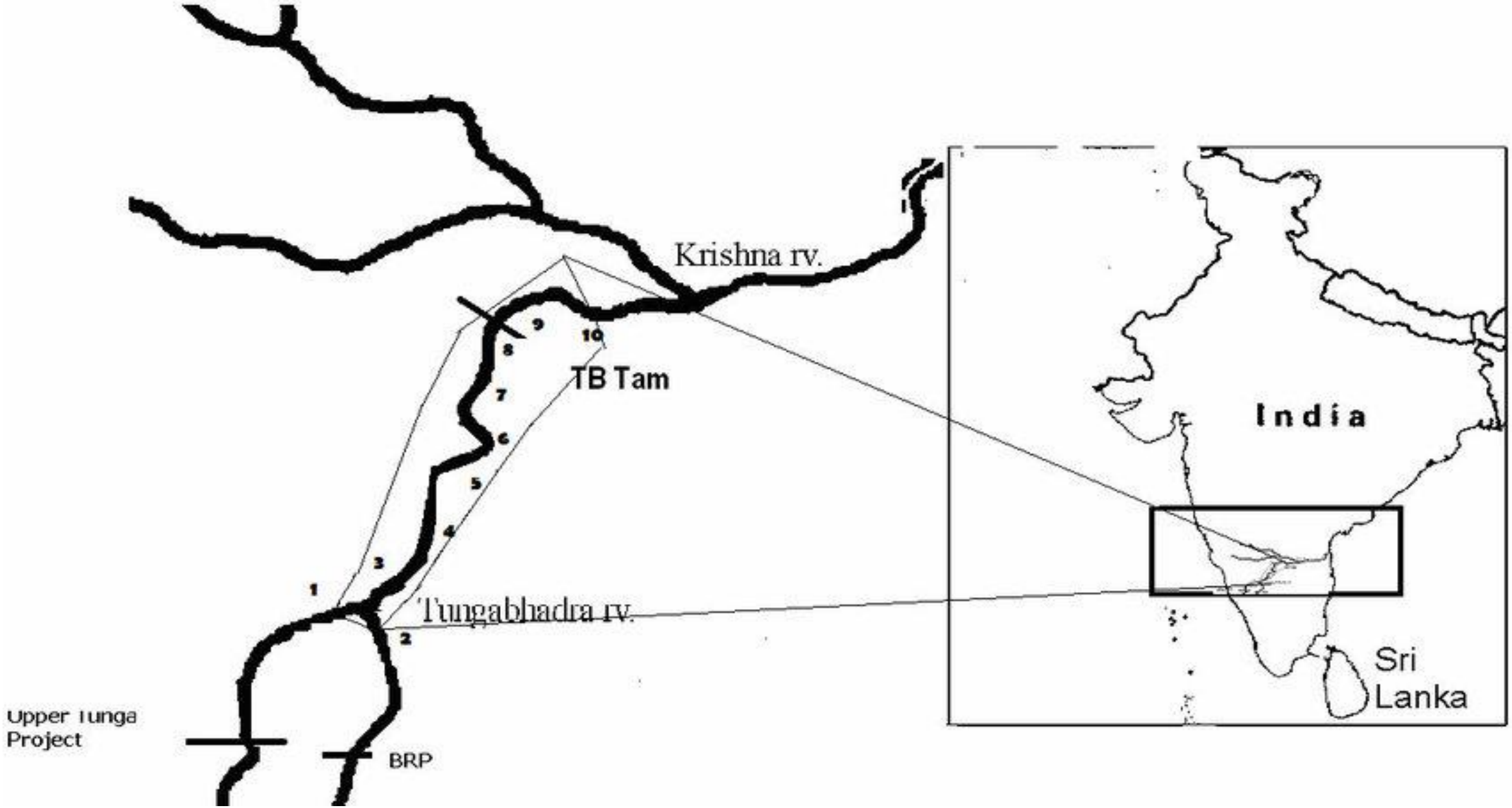

TEHRI DAM

- **41. Tungabhadra Project (Andhra And Karnataka)**

- It is a joint undertaking by the governments of Andhra Pradesh and Karnataka. The project comprises a dam across the Tungabhadra River near Mallapuram.

- **42. Ukai Project**

- It is a power project of Gujarat equipped with power generating sets manufactured by Bharat Heavy Electricals Limited was inaugurated on October 12, 1977. It has added a 540,000 KW of installed capacity to the State’s existing power network.


Krishna rv.
TB Tam
Tungabhadra rv.
Upper Tunga
Project
BRP
India
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Lanka
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Important Waterfalls of India

Highest Waterfalls In India

Which is the highest waterfall in India? Kunchikal Falls in Shimoga District Karnataka is the highest waterfall in India with the height of 1493 feet.

What are the Types of Waterfalls?

- Cataract: A large, powerful waterfall.
- Horsetail: Descending water maintains some contact with bedrock.
- Plunge: Water descends vertically, losing contact with the bedrock surface.
- Block: Water descends from a relatively wide stream or river.
- Multi-step: A series of waterfalls one after another of roughly the same size each with its own sunken plunge pool.
- Segmented: Distinctly separate flows of water form as it descends.
- Cascade: Water descends a series of rock steps.
- Punchbowl: Water descends in a constricted form and then spreads out in a wider pool.
- Tiered: Water drops in a series of distinct steps or falls.
- Fan: Water spreads horizontally as it descends while remaining in contact with bedrock.

Waterfalls in India	Location	Height Metre/ Feet	Feature
Kunchikal Falls	Shimoga district, Karnataka	455 metres (1,493 ft)	Tiered, Highest waterfall in India
Barehipani Falls	Mayurbhanj district, Odisha	399 metres (1,309 ft)	2 tiered waterfalls
Nohkalikai Falls	East Khasi Hills district, Meghalaya	340m (1115 feet)	tallest plunge type waterfalls
Nohsngithiang Falls or Mawsmai Falls	East Khasi Hills district, Meghalaya	315 metres (1,033 ft)	segmented type waterfalls
Dudhsagar Falls	Karnataka and Goa	310 m(1017 feet)	4 tiered waterfalls

Kynrem Falls	East Khasi Hills district, Meghalaya	305 metres (1,001 ft)	3 tiered waterfalls
Meenmutty Falls	Wayanad district, Kerala	300 metres (984 feet)	3 tiered waterfalls/ segmented type
Thalaiyar Falls	Batlagundu, Dindigul district, Tamil Nadu	297 metres (974 ft)	horsetail type waterfalls
Vajrai Falls	Satara district, Maharashtra	260 metres (853 ft)	3 tiered, 2nd tallest plunge type waterfall
Barkana Falls	Shimoga district, Karnataka	259 metres (850 ft)	tiered waterfalls
Jog Falls	Shimoga district, Karnataka	253 metres (830 ft)	cascade waterfalls
Khandadhar Falls	Kendujhar district & Sundergarh district, Odisha	244 metres (801 ft)	Horse tail type falls

Vantawng Falls	Serchhip district, Mizoram	229 metres (751 ft)	2 tiered waterfalls
Kune Falls	Pune district, Maharashtra	200 metres (660 ft)	3 tiered waterfalls
Soochipara Falls, Thoseghar Waterfalls	Wayanad district, Kerala, Satara district Maharashtra	200 metres (656 feet)	3 tiered waterfalls
Magod Falls	Uttara Kannada district, Karnataka	198 metres (650 ft)	2 tiered/Segmented waterfalls
Joranda Falls	Mayurbhanj district, Odisha	181 metres (594 ft)	plunge type waterfalls
Hebbe Falls	Chikkamagaluru district, Karnataka	168 metres (551 ft)	2 tiered waterfalls
Duduma Falls	the border of Koraput (Odisha) and Visakhapatnam (Andhra Pradesh)	157 metres (515 ft)	plunge type waterfalls

DIGI PAGE

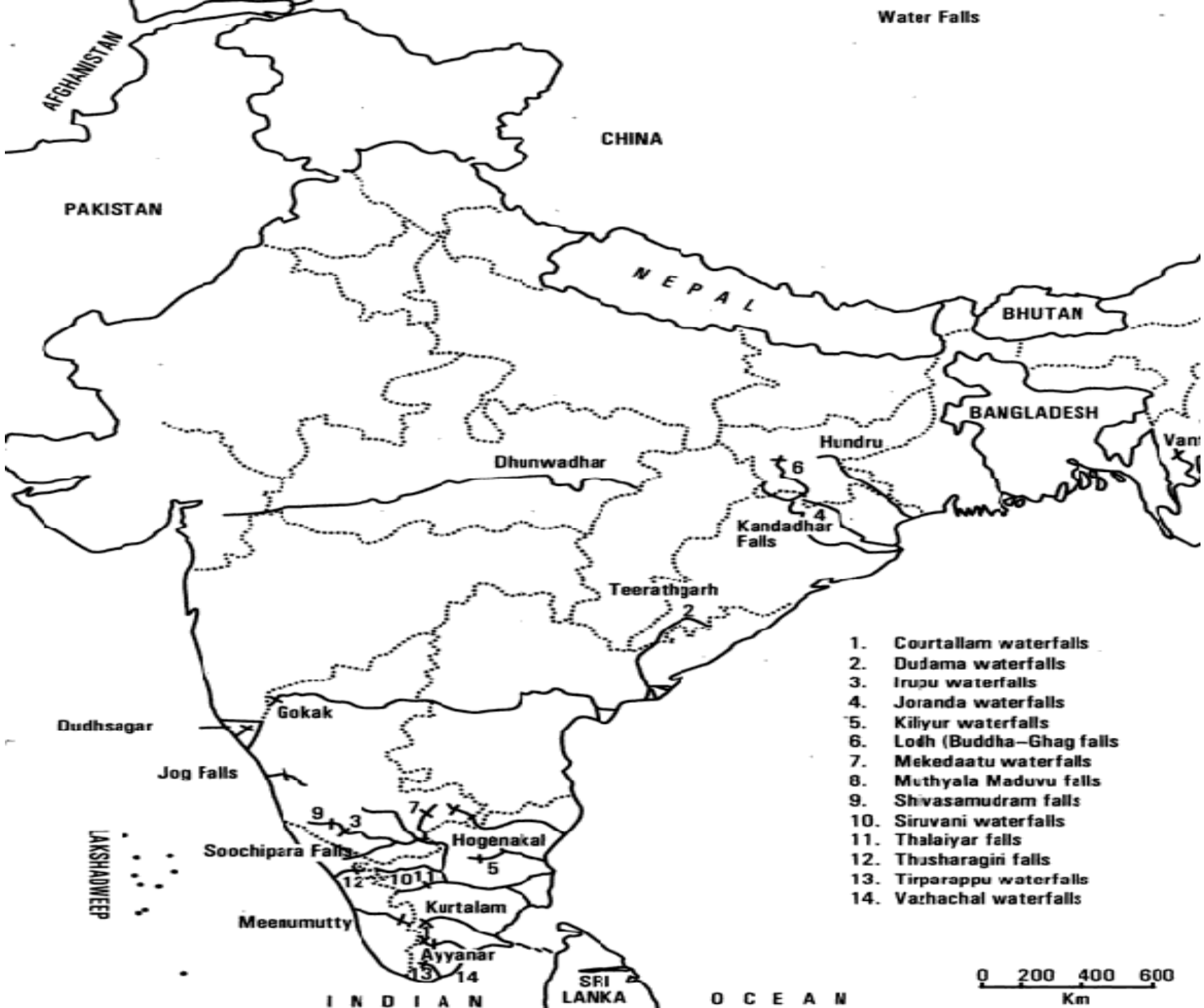
Waterfalls in India

Subject - G.S.

Date of Release - 22-Nov-2017

Waterfall	Location
Langshiang Falls	West Khasi Hills district, Meghalaya
Nohkalikai Falls	East Khasi Hills district, Meghalaya
Kynrem Falls	East Khasi Hills district, Meghalaya
Meenmutty Falls	Wayanad district, Kerala
Thalaiyar Falls	Dindigul district, Tamil Nadu
Barkana Falls	Shimoga district, Karnataka
Jog Falls	Sagar, Karnataka
Khandadhar Falls	Sundargarh district, Odisha
Vantawng Falls	Serchhip district, Mizoram
Penchalakona Falls	Nellore district, Andhra Pradesh
Kune Falls	Lonavla, Maharashtra
Soochipara Falls	Wayanad district, Kerala
Hebbe Falls	Chikkamagaluru district, Karnataka
Duduma Falls	Koraput district, Odisha
Joranda Falls	Mayurbhanj district, Odisha
Palani Falls	Kullu district, Himachal Pradesh
Lodh Falls	Latehar district, Jharkhand
Bishop Falls	Shillong, Meghalaya

Palani Falls	Kullu district, Himachal Pradesh	150 metres (490 ft)	Surge waterfalls
Lodh Falls	Latehar district, Jharkhand	143 metres (469 ft)	2 tiered waterfalls
Bahuti Falls	Mauganj, Rewa district, Madhya Pradesh	198 metres (650 ft)	2 tiered waterfalls, tallest waterfall in madhya Pradesh
Bishop Falls	East Khasi Hills district, Meghalaya	135 metres (443 ft)	3 tiered waterfalls
Chachai Falls	Rewa district, Madhya Pradesh	130 metres (430 ft)	on bihad river, comes down from Rewa Plateau
Keoti Falls	Rewa district, Madhya Pradesh	130 metres (430 ft)	segmented type waterfall
Kalhatti Falls	Chikkamagaluru district, Karnataka	122 metres (400 ft)	–
Beadon Falls	East Khasi Hills district, Meghalaya	120 metres (390 ft)	3 tiered waterfall, twin of Bishop Falls
Keppa Falls	Uttara Kannada district, Karnataka	116 metres (381 ft)	fan type waterfall
Koosalli Falls	Udupi, Karnataka	116 metres (381 ft)	6 tiered waterfall
Dabbe falls	Shivamogga, Sagar, Karnataka	110 metres(360 ft)	–
Pandavgad Falls	Thane, Maharashtra	107 metres (351 ft)	Plunge waterfall
Rajat Prapat	Hoshangabad district, Madhya Pradesh	107 metres (351 ft)	horsetail type waterfall
Bundla Falls	kaimur district bihar	100 metres (330 ft)	–
Vantawng Falls	Serchhip district, Mizoram	230 metres (750 ft)	2 tiered waterfalls


Water Falls
AFGHANISTAN
CHINA
PAKISTAN
NEPAL
BHUTAN
BANGLADESH
Hundru
Dhunwadhar
Kandadhar Falls
Teerathgarh
Gokak
Dudhsagar
Jog Falls
Soochipara Falls
Hogenakal
Kurtalam
Meenumutty
Ayyanar
LAKSHADWEEP
SRI LANKA
INDIAN OCEAN
1. Courtallam waterfalls
2. Dudama waterfalls
3. Irupu waterfalls
4. Joranda waterfalls
5. Kiliyur waterfalls
6. Lodh (Buddha–Ghag falls
7. Mekedaatu waterfalls
8. Muthyala Maduvu falls
9. Shivasamudram falls
10. Siruvani waterfalls
11. Thalaiyar falls
12. Thusharagini falls
13. Tirparappu waterfalls
14. Vazhachal waterfalls
0 200 400 600
Km

Most Important Lakes in India (State Wise)


INDIA
LAKES
N
AFGHANISTAN
PAKISTAN
CHINA
NEPAL
BHUTAN
BANGLADESH
MYANMAR
SRI LANKA
Arabian Sea
Bay of Bengal
Gulf of Kachchh
Gulf of Khambhat
Palk Strait
Mouth of Ganga
Jhelum
Indus
Chenab
Ravi
Beas
Satluj
Ganga
Sambhar
Luni
Chambal
Gomati
Ghaghara
Yamuna
Son
Kosi
Lohit
Brahmaputra
Padma
Hugli
Narmada
Tapi
Godavari
Penganga
Wardha
Mahanadi
Krishna
Bhima
Sabari
Pennar
Tungabhadra
Cauvery
Vaigai
Periyar
Pulicat
Lakshadweep Sea
LAKSHADWEEP (INDIA)
ANDAMAN & NICOBAR ISLANDS (INDIA)
Pangong Tso
Tso Moriri
Gobind Sagar
Gandhi Sagar
Govind Ballabh Pant Sagar
Hirakud
Chilika
Nizam Sagar
Nagarjuna Sagar
Tungabhadra Reservoir
Linganmakki Sagar
Bhadra Reservoir
Krishna Raja
Bhavani Sagar
Stanley Reservoir
LEGEND
International Boundary
Lakes
River
Map not to Scale

Largest lakes in India

- Located between Krishna and Godavari delta.
- **Sambhar Lake-Rajasthan**
- India’s largest inland salt lake.
- Mahabharata mentions the Sambhar Lake as part of the kingdom of the demon king Brishparva.
- **Pushkar Lake- Rajasthan**
- Located in the town of Pushkar in Ajmer district of the Rajasthan.
- Pushkar Lake is a sacred lake of the Hindus.
- **Wular Lake-Jammu & Kashmir**
- Largest Freshwater Lake in India.
- Lake Basin was formed as a result of tectonic activity and is fed by the Jhelum River.
- **Pulicat Lake- Andhra Pradesh**
- Second largest brackish – water lake or lagoon in India.
- The large spindle-shaped barrier island named Sriharikota separates the lake from the Bay of Bengal.
- The island is home to the Satish Dhawan Space Centre, the launch site of India’s successful first lunar space mission, the Chandrayaan-1.
- **Loktak Lake- Manipur**
- Largest freshwater lake in North -East India
- KeibulLamjao the only floating national park in the world floats over it, which is the last natural refuge of the endangered Sangai or Manipur brow-antlered deer.

Sasthamcotta Lake- Kerala

Largest fresh water lake in Kerala.

The purity of the lake water for drinking use is attributed to the presence of large population of larva called cavaborus that consumes bacteria in the lake water.

Vembanad Lake -Kerala

Longest lake in India, and the largest lake in the state of Kerala.

The Nehru Trophy Boat Race is conducted in a portion of the lake.

Chilka Lake -Odisha

It is the largest coastal lagoon in India and the second largest lagoon in the world.

Chilika Lake is the largest wintering ground for migratory birds, on the Indian sub-continent.

Dal Lake – Jammu Kashmir

Dal Lake is a lake in Srinagar and is integral to tourism known as the "Jewel in the crown of Kashmir" or "Srinagar's Jewel".

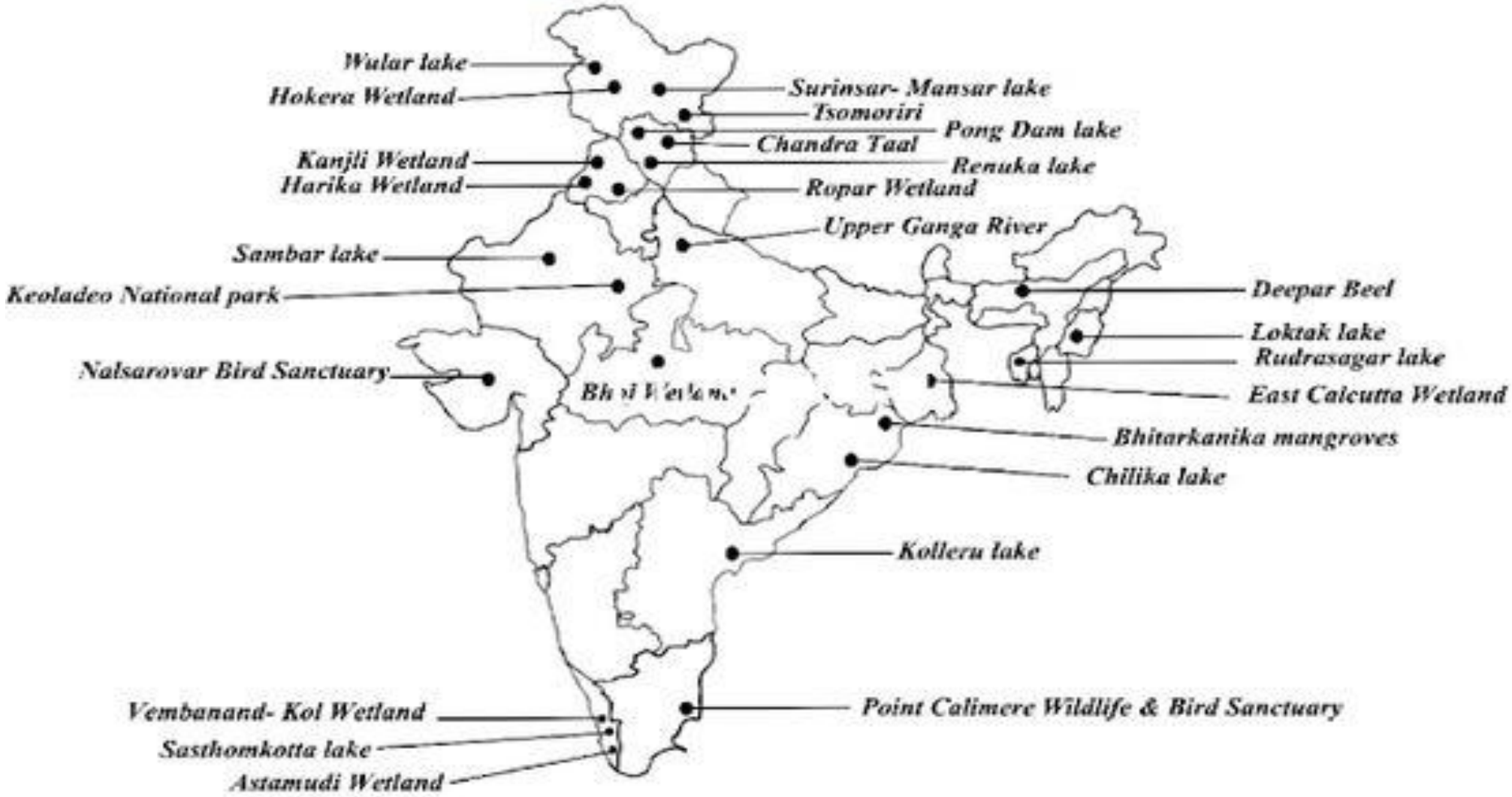
Asia's largest Tulip garden is on the banks of Dal Lake.

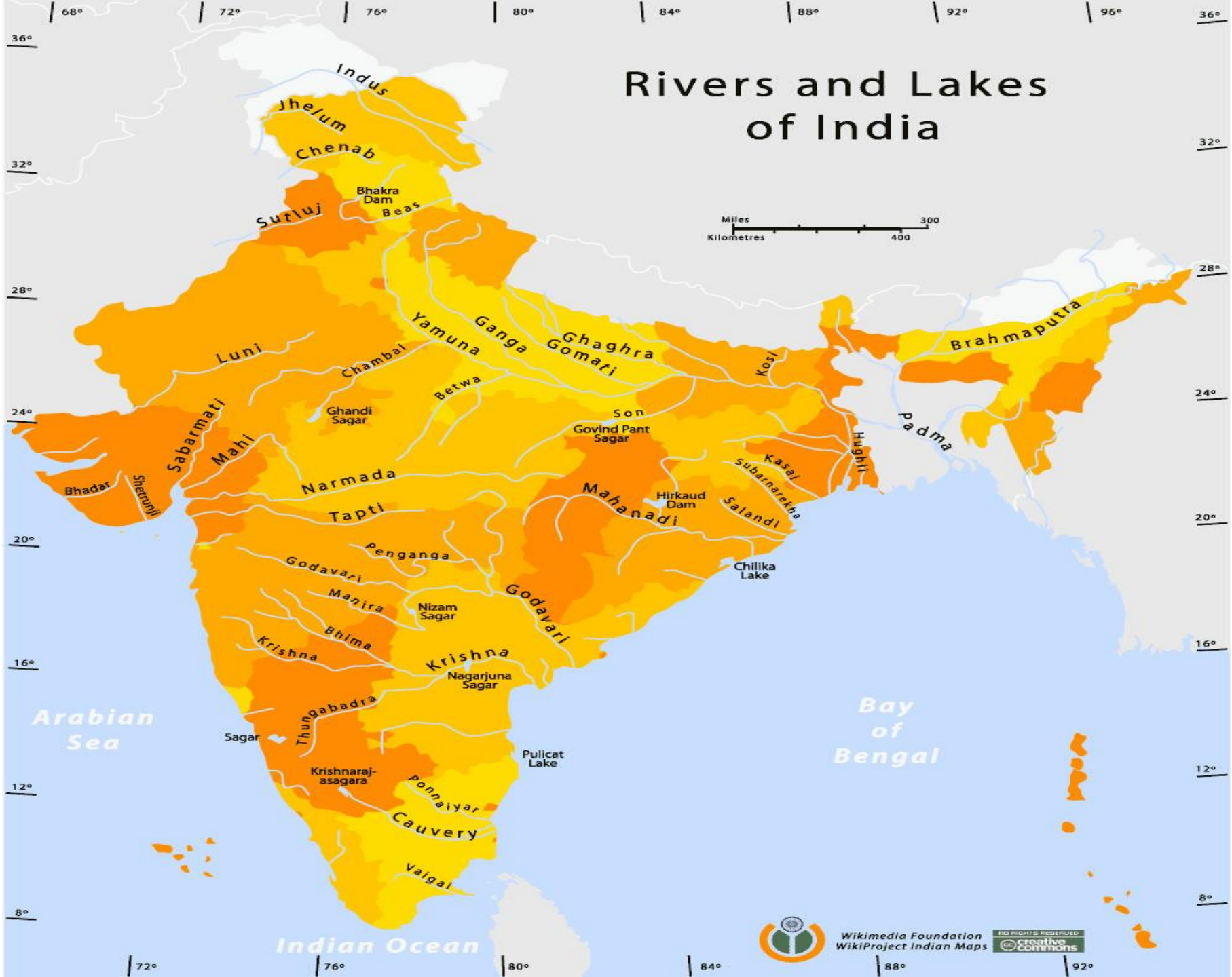
Mughal gardens, Shalimar Bagh and the NishatBagh are on the banks of Dal Lake.

Nalsarover Lake- Gujarat

The lake – Nalsarovar – and the wetlands around it were declared a bird sanctuary in 1969.

Important Lakes in India




Rivers and Lakes of India
Miles
Kilometres
300
400
Indus
Jhelum
Chenab
Bhakra Dam
Beas
Sutluj
Yamuna
Ganga
Ghaghra
Gomati
Kosi
Brahmaputra
Luni
Chambal
Betwa
Ghandi Sagar
Son
Govind Pant Sagar
Padma
Hughli
Kasai
Subarnarekha
Sabarmati
Mahi
Bhadar
Shetrunji
Narmada
Tapti
Hirkaud Dam
Mahanadi
Salandi
Penganga
Godavari
Chilika Lake
Manjra
Nizam Sagar
Bhima
Krishna
Nagarjuna Sagar
Thungabadra
Sagar
Pulicat Lake
Krishnaraj-asagara
Ponnaiyar
Cauvery
Vaigai
Arabian Sea
Bay of Bengal
Indian Ocean
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WikiProject Indian Maps
creative commons

Tsomgo Lake – Sikkim

Tsongmo Lake or Changu Lake, is a glacial lake in the East Sikkim.

The lake is the venue for the Guru Purnima festival in which Jhakris of Sikkim assemble at the lake area to derive benefits from the healing qualities of the lake waters.

Bhimtal Lake – Uttarakhand

It is the largest lake in Kumaon region, known as the "lake district of India".

It is a "C" shaped lake.

Barapani Lake- Meghalaya

Barapani or Umiam Lake is in Shillong.

The origin of Lake in 1965 is due to the UmiamUmtru Hydro Electric Power Project, the first Hydel power project in the North-east region of India.

Nainital Lake – Uttarakhand

Kidney shaped or crescent shaped.

Situated in the Nainital district called the Lake District of India.

Periyar Lake -Kerala

Periyar Lake is formed by the construction of the dam across the Mullaperiyar River in 1895.

The notable elephant reserve and a tiger reserve, Periyar Wildlife Sanctuary is located on the banks of PeriyarLake.

Hussain Sagar Lake – Telengana

The lake is in Hyderabad, built by Hazrat Hussain Shah Wali in 1562, during the rule of Ibrahim QuliQutub Shah. Connects the twin cities of Hyderabad and Secunderabad.

A major attraction at the Hussain Sagar is the 16 meter high, 350 tonne monolithic Buddha statue on the ‘Rock of Gibraltar’ installed at the center of the lake.

Salim Ali Lake – Maharashtra

It has been renamed after the great ornithologist, naturalist Salim Ali and also known as birdman of India.

Salim Ali Sarovar (lake) popularly known as Salim Ali Talab is located near Delhi Gate, opposite Himayat Bagh, Aurangabad.

Kanwar Lake- Bihar

The Kanwar Taal or Kabar Taal Lake is Asia's largest freshwater oxbow lake.

Nakki Lake – Rajasthan

'Nakki Lake is situated in the Indian hill station of Mount Abu in Aravalli range.

Mahatma Gandhi's ashes were immersed in this Holy Lake on 12 February 1948 and Gandhi Ghat was constructed.

Bhojtar Lake Madhya Pradesh

Also known as Upper Lake lies on the western side of the capital city of Madhya Pradesh, Bhopal.

Largest artificial lake in Asia.

Important Lakes in India

IBPS Guide
Complete Guide for Bank & SSC Exams

State	Name of the Lake
Andhra Pradesh	Kolleru Lake
	Pulicat Lake
Assam	Dipor Bil Lake
	Haflong Lake
	Son Beel Lake
Bihar	Kanwar Lake
Gujarat	Hamirsar Lake
	Kankaria Lake
	Nal Sarovar Lake
	Narayan Sarovar
	Thol Lake
	Vastrapur Lake
	Lakhota Lake
	Sursagar Lake
Himachal Pradesh	Brighu Lake
	Dashair Lake
	Dhankar Lake
	Kareri lake
	Khajjiar Lake
	Macchial Lake
	Maharana Pratap Sagar Lake
	Manimahesh Lake
	Nako Lake
	Pandoh Lake
	Prashar Lake
	Renuka Lake
	Rewalsar Lake
	Seruvalsar Lake
	Suraj Tal Lake
	Chandra Tal Lake
Haryana	Badkhal Lake
	Karna Lake
	Surajkund Lake
	Tilyar Lake
	Blue Bird Lake
Madhya Pradesh	Bhojtal Lake
	Lower Lake

State	Name of the Lake
Jammu & Kashmir	Dal Lake
	Wular Lake
	Manasbal Lake
	Mansar Lake
	Sheshnag Lake
Karnataka	Bellandur Lake
	Ulsoor Lake
	Sankey Lake
	Hebbal Lake
	Lalbagh Lake
	Puttenahalli Lake
	Madiwala Lake
	Agara Lake
	Karanji lake
	Kukkarahalli lake
	Lingambudhi Lake
	Pampa Sarovar Lake
Kerala	Ashtamudi Lake
	Mananchira Lake
	Paravur Lake
	Punnamada Lake
	Shasthamkotta lake
	Vellayani Lake
Maharashtra	Lonar Lake
	Pashan Lake
	Powai Lake
	Rankala Lake
	Shivsagar lake
	Talao Pali Lake
	Upvan Lake
	Venna Lake
Manipur	Loktak Lake
Odisha	Anshupa Lake
	Chilka Lake
	Kanjia lake
West Bengal	Rabindra Sarobar
	Senchal Lake
	Santragachi Lake