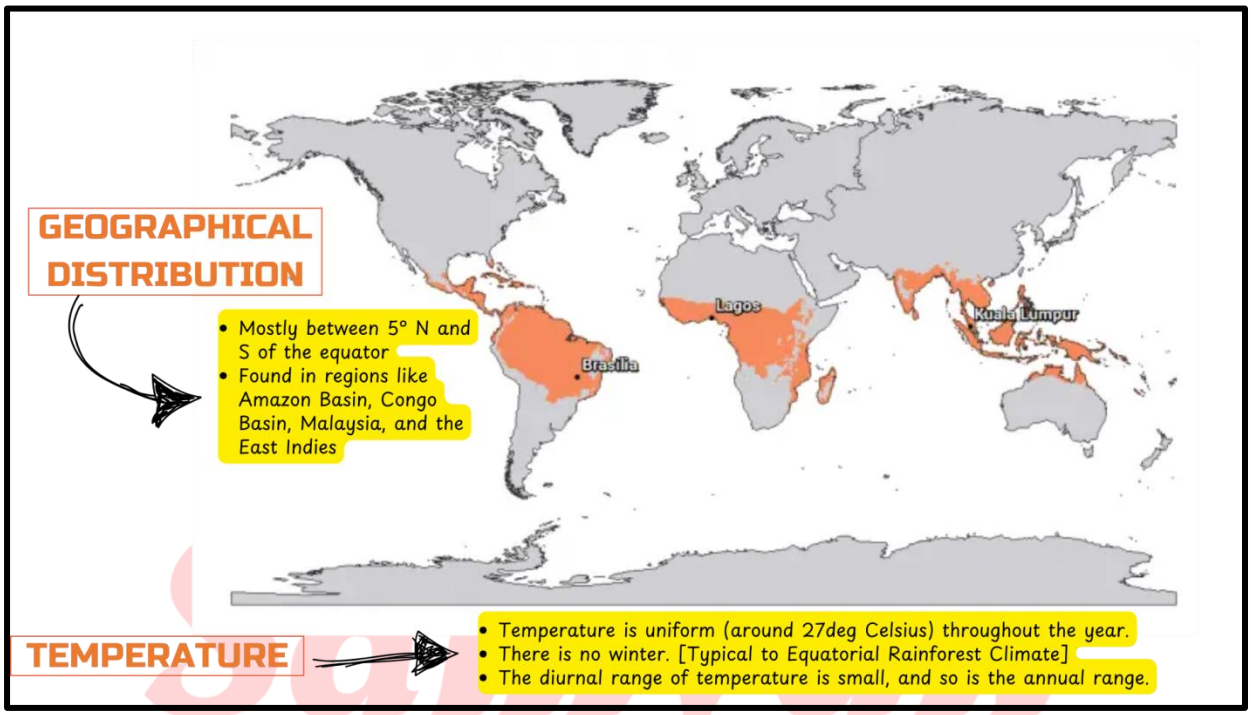
Samyak
An Institute For Civil Services

LECTURE 5 – CLIMATOLOGY III – CLIMATIC REGIONS

EQUATORIAL CLIMATE / TROPICAL RAIN FOREST



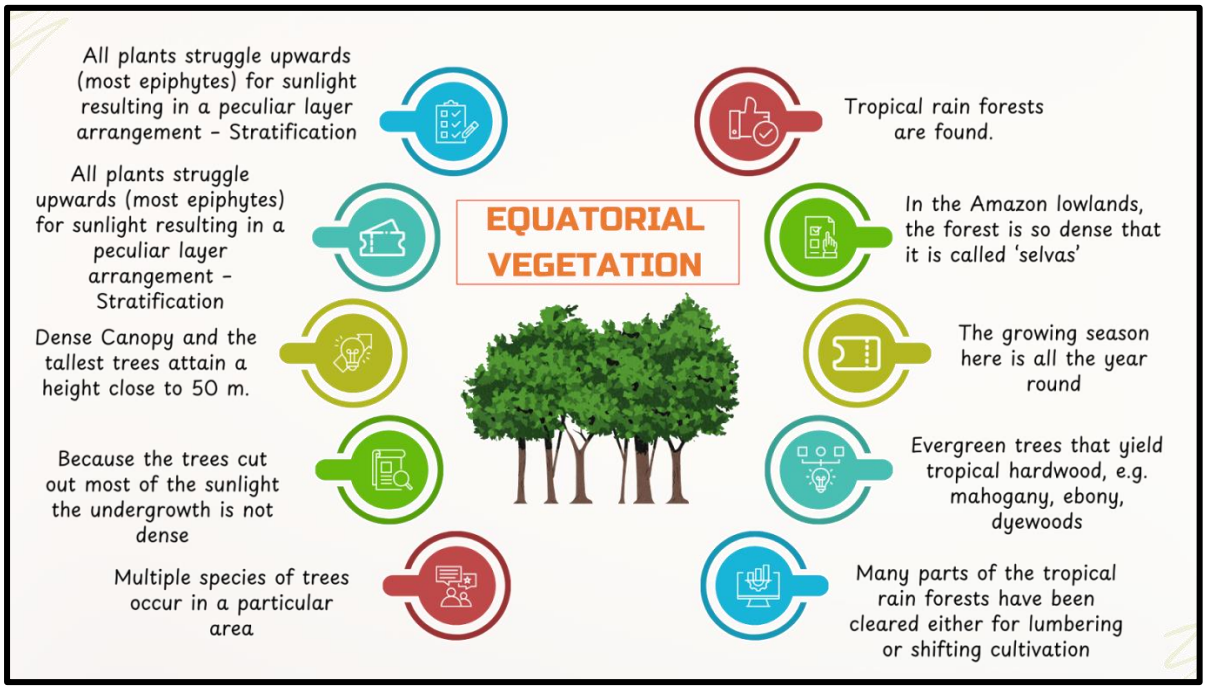
PRECIPITATION

- Precipitation is heavy and **well distributed throughout the year**.
- Annual average is always above **150 cm**.
- There is **no month without rain (distinct dry season is absent)**.
- **Heavy thunderstorms in the afternoon.**

EQUATORIAL VEGETATION

EPIPHYTE
An epiphyte is a plant that **grows harmlessly upon another plant (such as a tree)** and derives its moisture and nutrients from the air, rain, and sometimes from debris accumulating around it.

MULTIPLE SPECIES
➢ **Multiple species of trees occur in a particular area** (trees do not occur in homogenous stands or pure stands) making commercial exploitation a difficult task. ➢ Many of the tropical hardwoods (very heavy) **do not float** readily on water and this makes transportation an expensive matter. ➢ Therefore, many tropical countries are **net timber importers**.



AGRICULTURE

- Practice of **Shifting Cultivation / Slash and Burn**
- **Crops** – Rubber, Oil Palm, Cocoa, coconuts, sugar, coffee, tea, tobacco, spices
- Livestock farming is greatly handicapped by an **absence of meadow grass. The grass is so tall and coarse that it is not nutritious.**

REGION	NAME OF SHIFTING CULTIVATION
Thailand	➢ Tamrai
SriLanka	➢ Chena
Africa and Central America	➢ Milpa
North-East India	➢ Jhum
Java	➢ Humah
Philippines	➢ Caingin

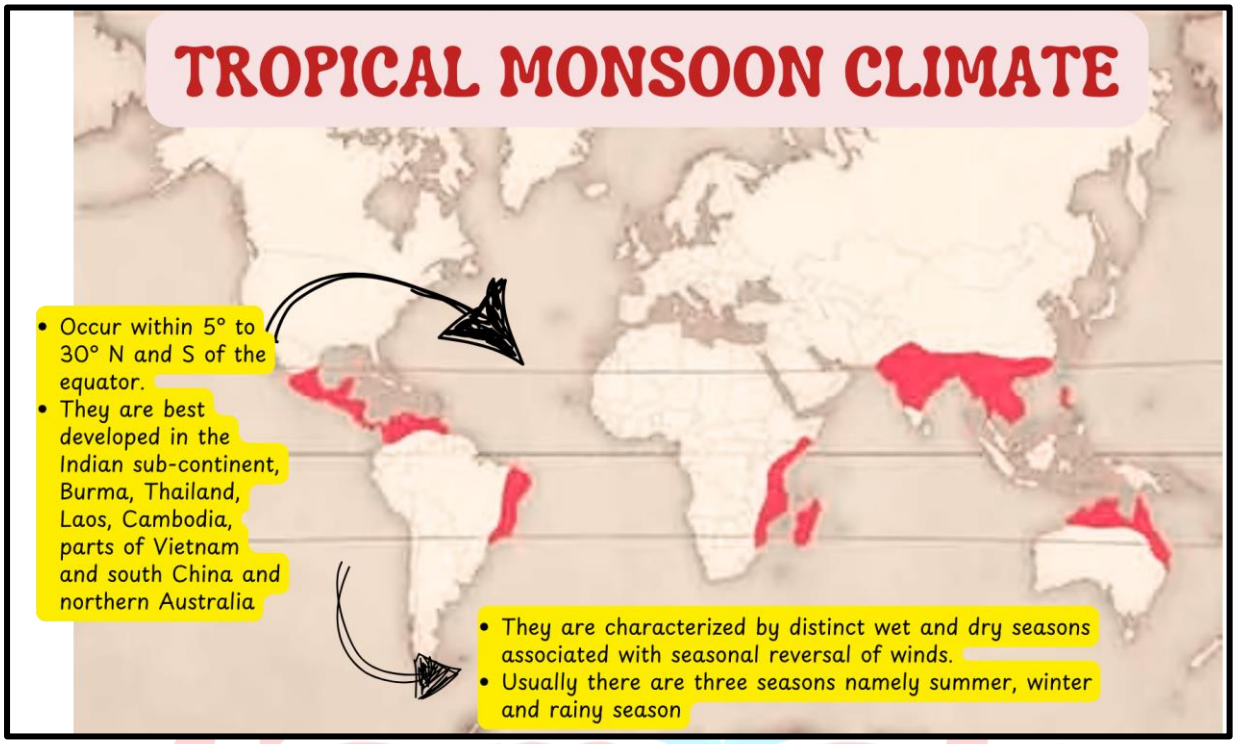
TRIBES

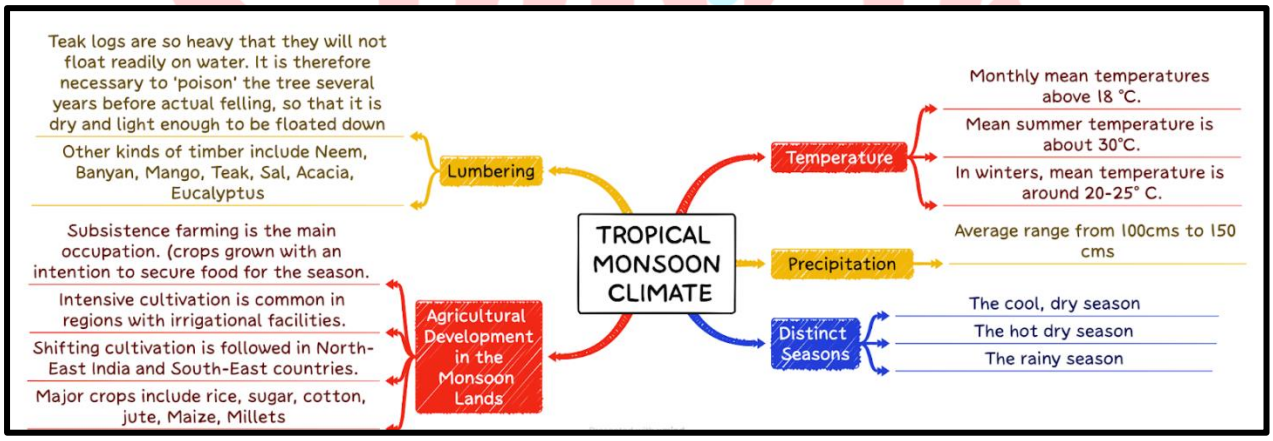
- Amazon basin - **Indian tribes**
- Congo Basin - **Pygmies**
- Malaysia - **Orang Asli**

WHY DOES RESTORATION OF LOST FORESTS TAKE DECADES IN EQUATORIAL REGIONS?

- The **fertility of top soil in rainforest regions is very poor**. Torrential downpours wash out most of the top soil nutrients because of **Leaching.**
- It takes **decades** to replenish the soil of lost nutrients.
- So, a **seed doesn't usually germinate and even if it does, its development is hindered due to little availability of sunlight.**
- ***Lalang (tall grass)*** and thick undergrowth spring up as soon as the trees are cut. They choke the restoration of forests.

TROPICAL MONSOON AND MARINE CLIMATE





TROPICAL MARINE CLIMATE

- Outside the monsoon zone, the climate is modified by the influence of the on-shore Trade Winds **all the year round**. This type of climate is called Tropical Marine Climate. Such a climate has a more **evenly distributed rainfall**.
- Such a climate is experienced in **Central America, West Indies, north-eastern Australia, the Philippines, parts of East Africa, Madagascar, the Guinea Coast and eastern Brazil.**

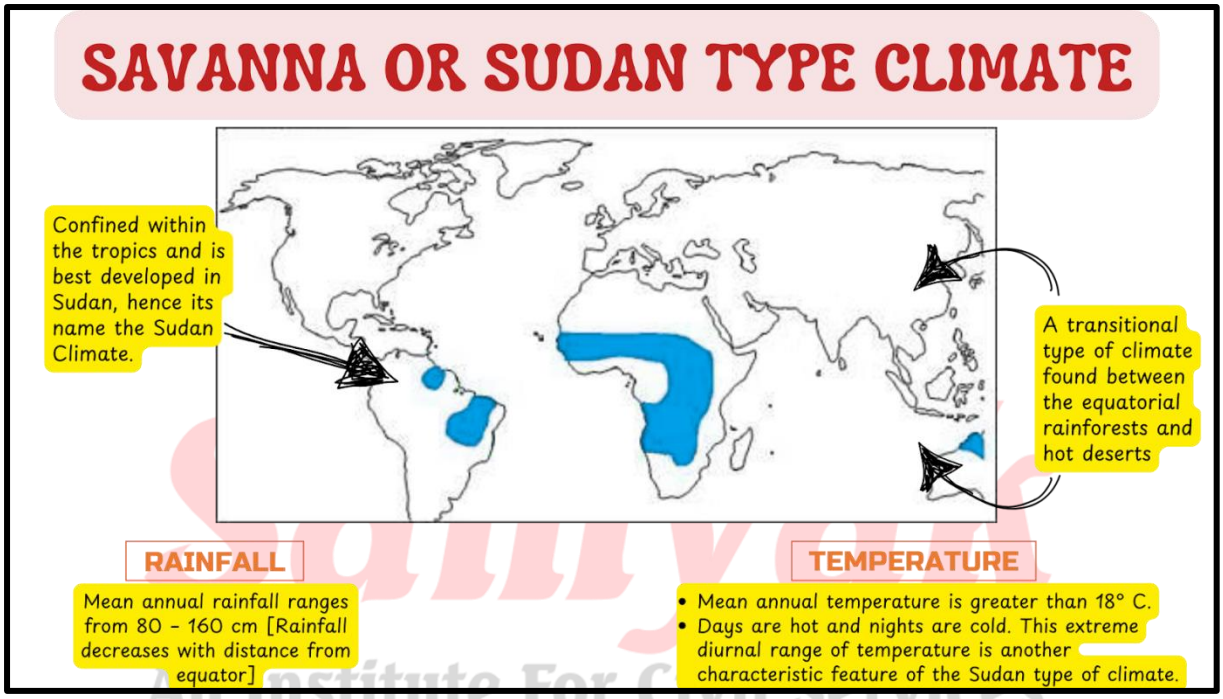
TROPICAL MONSOON FORESTS

- **Drought-deciduous forest; dry forest; dry-deciduous forest; tropical deciduous forest.**
- **Broad-leaved hardwood trees**.
- Trees are normally deciduous, because of the marked dry period, during which they shed their leaves to withstand the drought [They shed their leaves to prevent loss water through **transpiration**].

- The forests are more open and **less luxuriant** than the equatorial jungle and there are far **fewer species.**

SAVANNA OR SUDAN TYPE

- This type of climate has **alternate wet and dry seasons** similar to monsoon climate but has **considerably less annual rainfall**.
- Also, there is **no distinct rainy season** like in monsoon climate.
- [**Only two seasons** – winter and summer. **Rains occur in summer**].



WHAT IS THE REASON FOR ALTERNATING WET AND DRY SEASONS IN SAVANNA TYPE CLIMATE?

- On shore winds is summer bring rains.
- Off-shore winds in winter keep the climate dry.

NATURAL VEGETATION OF SAVANNA CLIMATE

- **Tall grass and short trees**.
- The grasslands are also called as ***'bush-veld'.***
- The trees are **deciduous**, shedding their leaves in the cool, dry season to prevent excessive loss of water through transpiration, e.g. acacias.
- Trees usually have **broad trunks**, with water-storing devices to survive through the prolonged drought.
- In true savanna lands, the grass is **tall and coarse**, growing 6 to 12 feet high. The **elephant grass** may attain a height of even 15 feet.
- As the rainfall diminishes towards the deserts the savanna merges into thorny scrub.

TRIBES IN THE SAVANNA

- Tribes like the **Masai** tribes of the East African plateau are pastoralists whereas **Hausa** of northern Nigeria are settled cultivators.

CROPS IN SAVANNA

- Immense agricultural potential for **plantation agriculture** of cotton, cane sugar, coffee, oil palm, groundnuts and even tropical fruits.
- In the cooler highlands, temperate crops have been successfully raised.

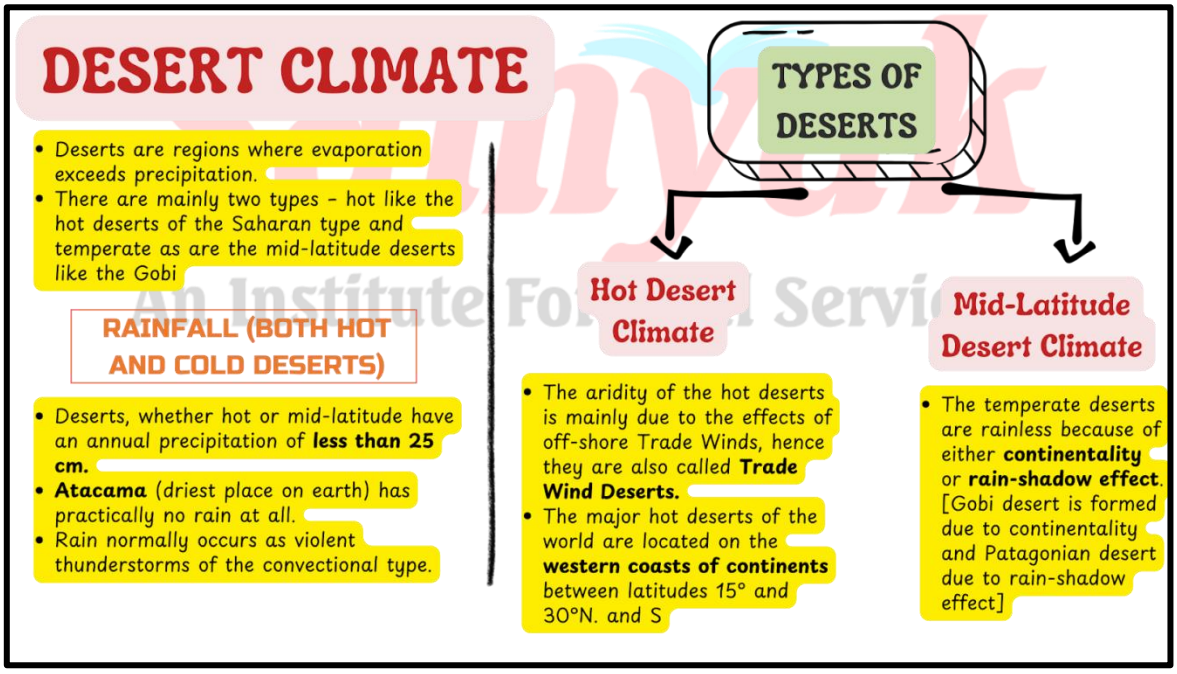
FARMING

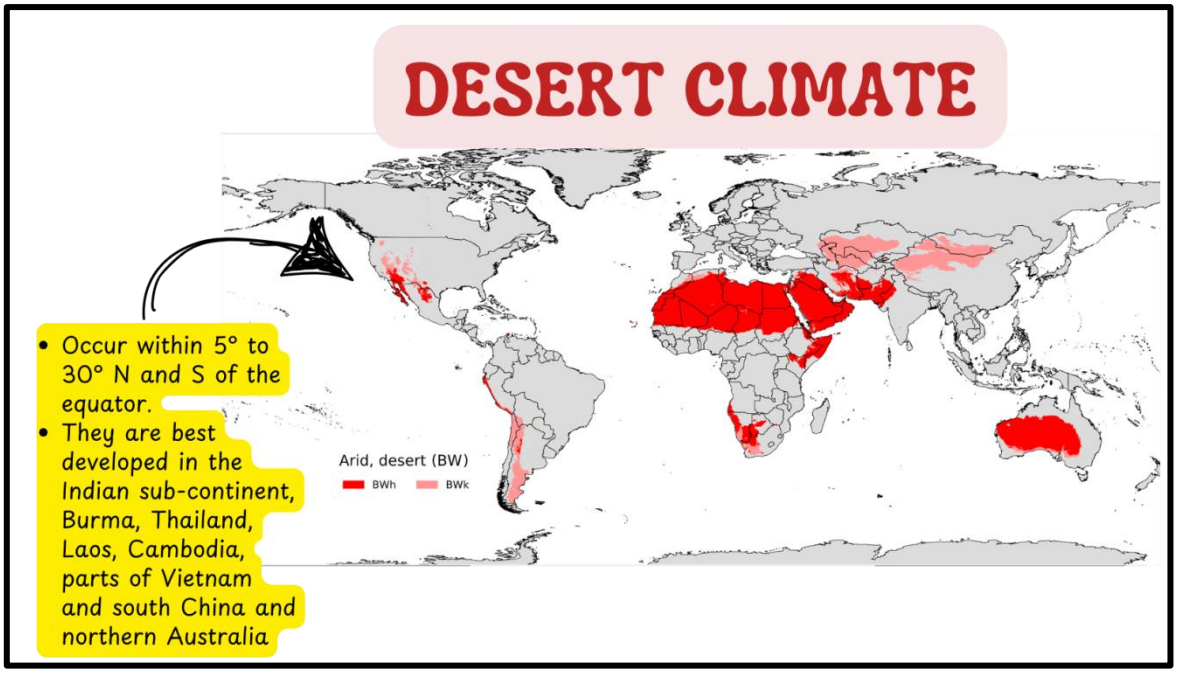
- The Sudan Climate, with **distinct wet-and-dry periods** is responsible for the **rapid deterioration of soil fertility**.
- During the rainy season, torrential downpours of heavy rain cause leaching of nitrates, phosphates and potash.
- During the dry season, intense heating and evaporation dry up most of the water.
- Many savanna areas therefore have **poor lateritic soils** which are incapable of supporting good crops.

CATTLE REARING

- The **quality of grass doesn't support large scale ranching**.

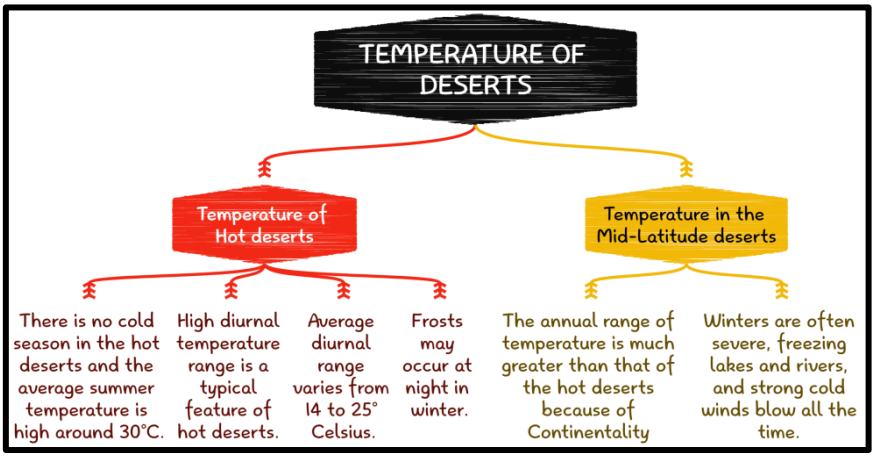
DESERT CLIMATE





MAJOR HOT DESERTS IN NORTHERN HEMISPHERE ARE LOCATED BETWEEN 20-30 DEGREE NORTH AND ON THE WESTERN SIDE OF THE CONTINENTS. WHY?

- Here the **air is descending with anti-cyclonic conditions**, a condition least favorable for precipitation of any kind to take place.
- The **rain-bearing Trade Winds blow off-shore** and the Westerlies that are on-shore blow outside the desert limits.
- Whatever winds reach the deserts **blow from cooler to warmer regions**, and their **relative humidity is lowered**, making condensation almost impossible.
- **On the western coasts, the presence of cold currents** gives rise to **mists and fogs** by chilling the on-coming air. This air is later warmed by contact with the hot land, and little rain falls.



DESERT VEGETATION

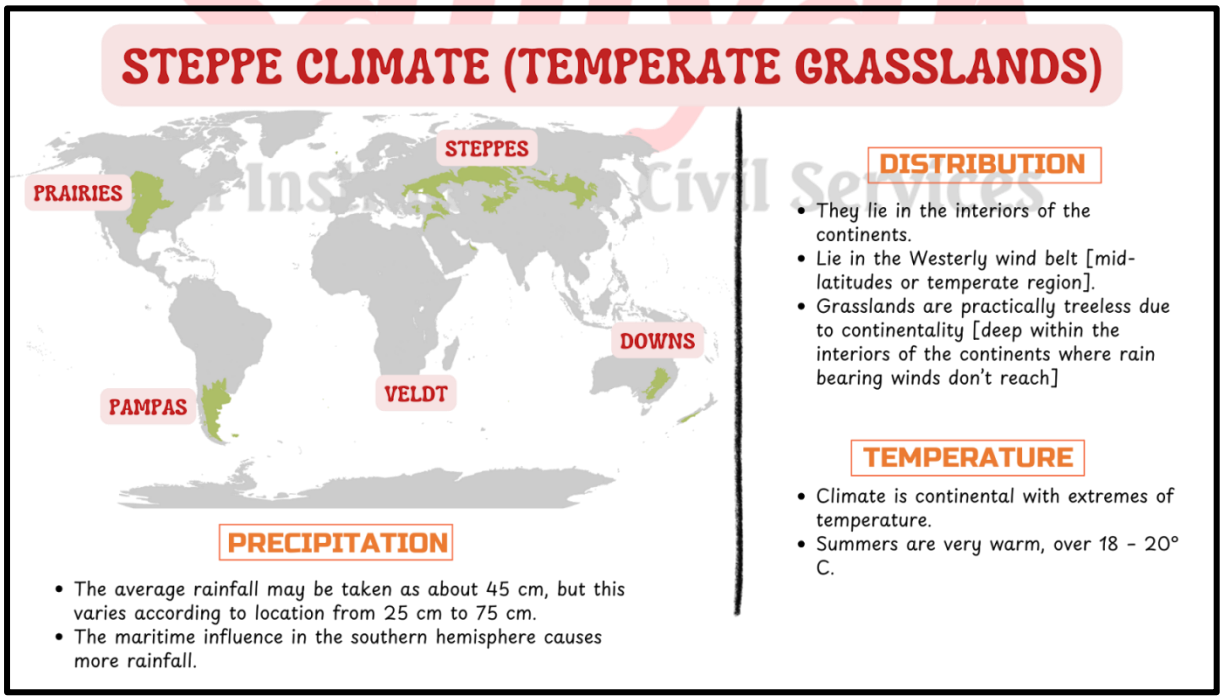
- **Xerophytic** or drought-resistant vegetation.

- This includes the **cacti, thorny bushes, long-rooted wiry grasses and scattered dwarf acacias.**
- Trees are rare except where there is abundant ground water to support clusters of **date palms.**
- **Intense evaporation increases the salinity of the soil** so that the dissolved salts tend to accumulate on the surface forming hard pans [Bajada, Palaya].
- **Absence of moisture retards the rate of decomposition** and desert soils are very **deficient in humus**.
- Most desert shrubs have long roots and are well spaced out to gather moisture, and search for ground water. Plants have few or no leaves and the foliage is either **waxy, leathery, hairy or needle-shaped** to reduce the loss of water through transpiration.
- The seeds of many species of grasses and herbs have **thick, tough skins** to protect them while they lie dormant.

TRIBES

TRIBES	DESERT	OCCUPATION
Tuaregs	Sahara	Nomadic Herdsmen
Gobi Mongols	Gobi	Nomadic Herdsmen
Bedouin Arabs	Arabia	Nomadic Herdsmen
Bushmen	Kalahari	Primitive Hunters
Bindibu	Australia	Primitive Hunters

STEPPE CLIMATE (TEMPERATE GRASSLANDS)



CHINOOK: LOCAL WINDS IN PRAIRIE REGIONS

- On the **eastern slopes of the Rockies in Canada and U.S.A**. a local wind, called the Chinook, comes in a south-westerly direction to the Prairies.
- It is a hot wind and may raise the temperature by 5° C within a matter of 20 minutes.
- It melts the snow-covered pastures.

NATURAL VEGETATION OF STEPPE CLIMATE

Grasses

- Greatest difference from the tropical savanna is that steppes are practically **treeless** and the **grasses are much shorter**.
- Grasses are fresh and **nutritious**.
- The grasses are not only shorter but also **wiry [**lean, tough**] and sparse [**thinly dispersed or scattered**]**.

AGRICULTURE

- In recent years, the grasslands have been ploughed up for extensive, mechanized wheat cultivation and are now the **'granaries of the world' [Prairies].**
- **Mechanized Wheat cultivation -** The **levelness of the Steppes** and other temperate grasslands all over the world makes ploughing and harvesting a comparatively easy job.
- Pastoral Farming

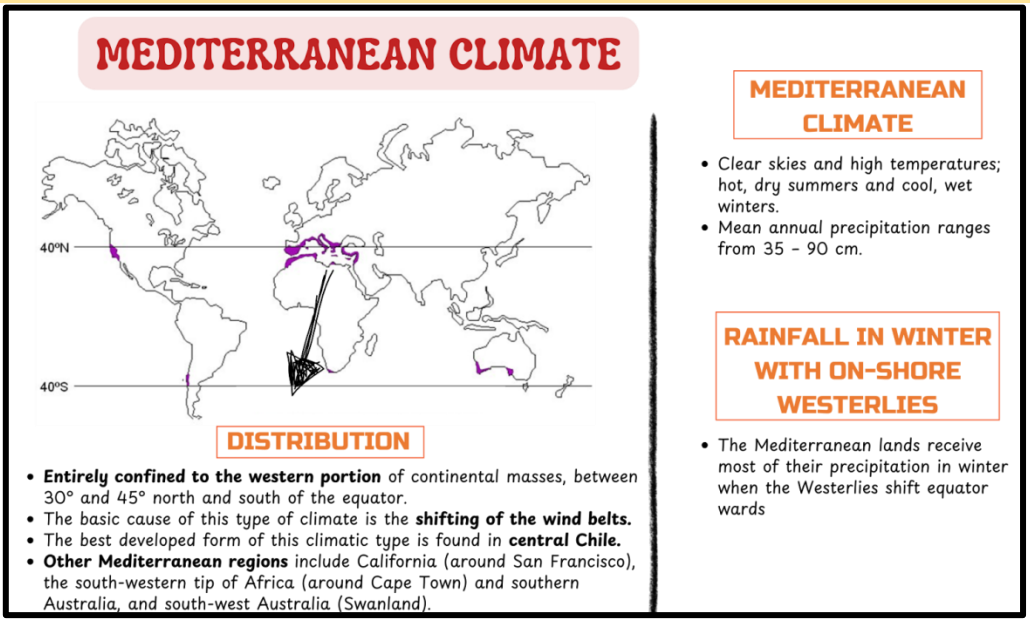
RANCHING

- The tufted grasses have been replaced by the more **nutritious Lucerne or alfalfa grass** for cattle and sheep rearing.
- These temperate grasslands are now the **leading ranching regions** of the globe.

STEPPES ARE KNOWN BY THEIR REGIONAL NAMES IN DIFFERENT PARTS OF THE WORLD

NAME	REGIONS
Prairies	North America
Pustaz	Hungary
Pampas	Argentina and Uruguay
Downs	Australia
Canterbury	New Zealand
Velds	South Africa
Steppe	Eurasia

MEDITERRANEAN CLIMATE



A DRY, WARM SUMMER WITH OFF-SHORE TRADE WINDS

- In summer when the sun is overhead at the Tropic of Cancer, the belt of influence of the **Westerlies is shifted a little pole wards**. Rain bearing winds are therefore not likely to reach the Mediterranean lands.
- The **prevailing Trade Winds [tropical easterlies] are off-shore** and there is practically no rain.
- Strong winds from inland desert regions pose the **risk of wildfires.**

RAINFALL IN WINTER WITH ON-SHORE WESTERLIES

- The Mediterranean lands receive most of their precipitation in **winter** when the **Westerlies shift equator wards.**

NATURAL VEGETATION IN THE MEDITERRANEAN CLIMATE

- Trees with **small broad leaves** are widely spaced and **never very tall**.
- The **absence of shade** is a distinct feature of Mediterranean lands.
- Plants are in a continuous struggle against heat, dry air, excessive evaporation and prolonged droughts. They are, in short **xerophytic [drought tolerant]**

MEDITERRANEAN EVERGREEN FORESTS

- These are open woodlands with **evergreen oaks**.
- The trees are **normally low, even stunted, with massive trunks, small leathery leaves and a wide-spreading root system** in search of water.
- The **cork oaks** are specially valued for their thick barks, used for making **wine-bottle corks** and for export around the world.
- In Australia, the **eucalyptus** forests replace the evergreen oak.
- The giant **redwood** is typical of the **Californian** trees.

EVERGREEN CONIFEROUS TREES

- These include the various kinds of **pines, firs, cedars** and cypresses which have evergreen, needle-shaped leaves and tall, straight trunks.

MEDITERRANEAN BUSHES AND SHRUBS

- This is the most predominant type of Mediterranean vegetation.

Grass

- Conditions in the Mediterranean **do not suit grass**, because most of the rain comes in the cool season when growth is slow.
- Even if grasses do survive, they are so **wiry [**lean, tough**] and bunchy** that they are **not suitable for animal farming.**
- Cattle rearing is thus unimportant in the Mediterranean.

AGRICULTURE IN THE MEDITERRANEAN CLIMATE

Orchard farming

- Are known as the **world's orchard lands.**
- A wide range of ***citrus fruits*** such as oranges, lemons, limes, citrons.

- The **fruit trees have long roots to draw water** from considerable depths during the long summer drought.
- The **thick, leathery skin of the citrus fruits** prevents excessive transpiration.
- The long, sunny summer enables the fruits to be ripened and harvested.
- The **olive tree** is probably the most typical of all Mediterranean cultivated vegetation.
- Besides olives, **many nut trees like chestnuts, walnuts, hazelnuts and almonds are grown**.

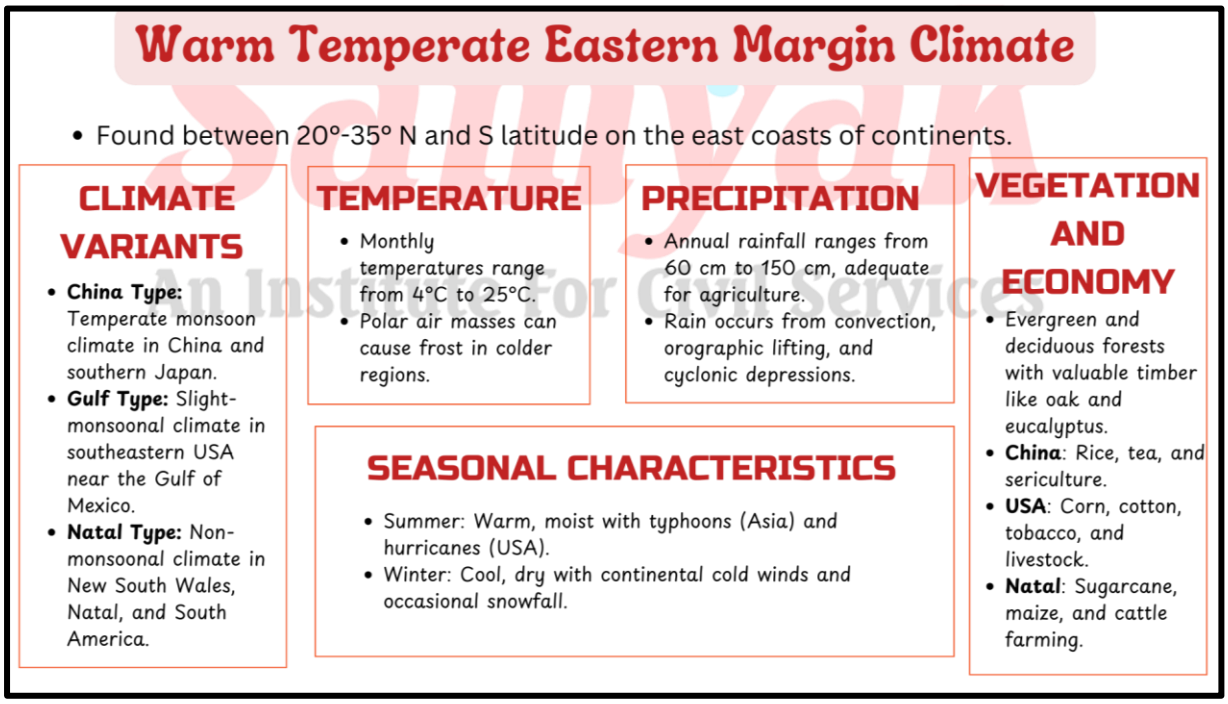
CROP CULTIVATION AND SHEEP REARING

- **Wheat** is the leading food crop. **Barley** is the next most popular cereal.
- **Transhumance** is widely practiced (moving up and down the hills in search of pastures according to seasons).

WINE PRODUCTION

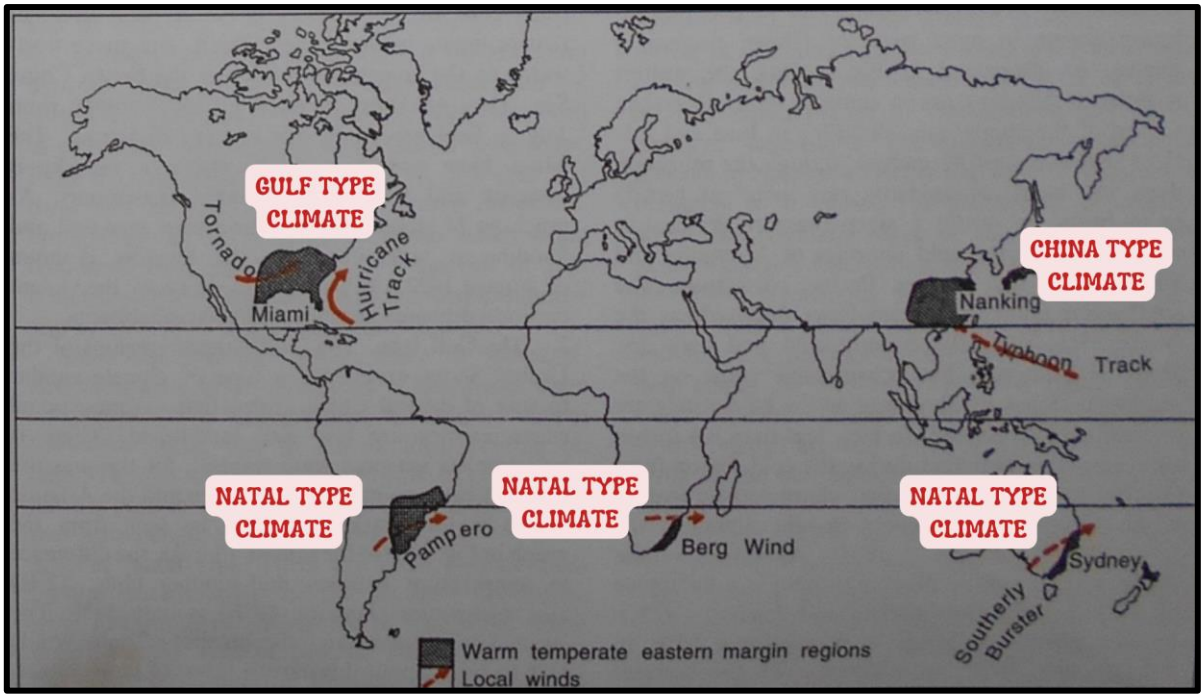
- **Viticulture** is by tradition a Mediterranean occupation.

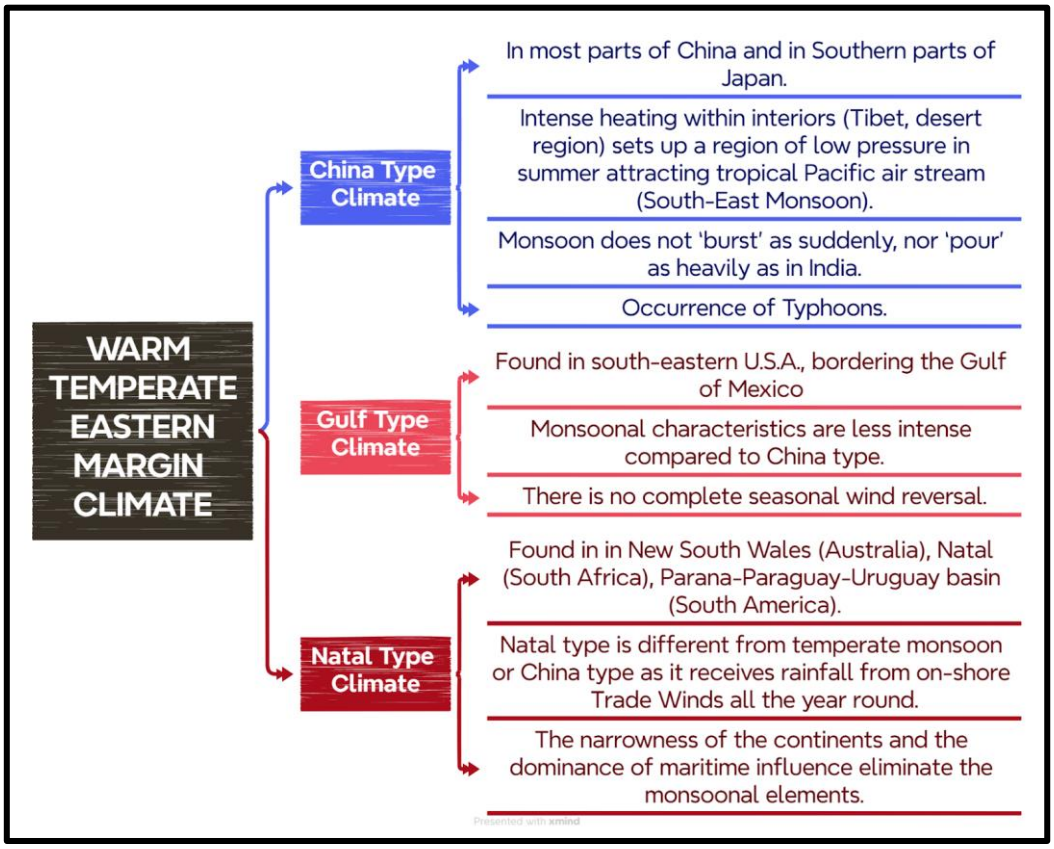
WARM TEMPERATE EASTERN MARGIN CLIMATE (CHINA TYPE, GULF TYPE AND NATAL TYPE)



NATURAL VEGETATION

- The lowlands carry both evergreen broad-leaved forests and deciduous trees [**hardwood**].
- On the highlands, there are various species of conifers such as pines and cypresses which are important **softwoods.**


GULF TYPE CLIMATE
Tornado
Hurricane Track
Miami
CHINA TYPE CLIMATE
Nanking
Typhoon Track
NATAL TYPE CLIMATE
Pampero
NATAL TYPE CLIMATE
Berg Wind
NATAL TYPE CLIMATE
Sydney
Southerly Burster
Warm temperate eastern margin regions
Local winds


WARM TEMPERATE EASTERN MARGIN CLIMATE
China Type Climate
In most parts of China and in Southern parts of Japan.
Intense heating within interiors (Tibet, desert region) sets up a region of low pressure in summer attracting tropical Pacific air stream (South-East Monsoon).
Monsoon does not 'burst' as suddenly, nor 'pour' as heavily as in India.
Occurrence of Typhoons.
Gulf Type Climate
Found in south-eastern U.S.A., bordering the Gulf of Mexico
Monsoonal characteristics are less intense compared to China type.
There is no complete seasonal wind reversal.
Natal Type Climate
Found in in New South Wales (Australia), Natal (South Africa), Parana-Paraguay-Uruguay basin (South America).
Natal type is different from temperate monsoon or China type as it receives rainfall from on-shore Trade Winds all the year round.
The narrowness of the continents and the dominance of maritime influence eliminate the monsoonal elements.
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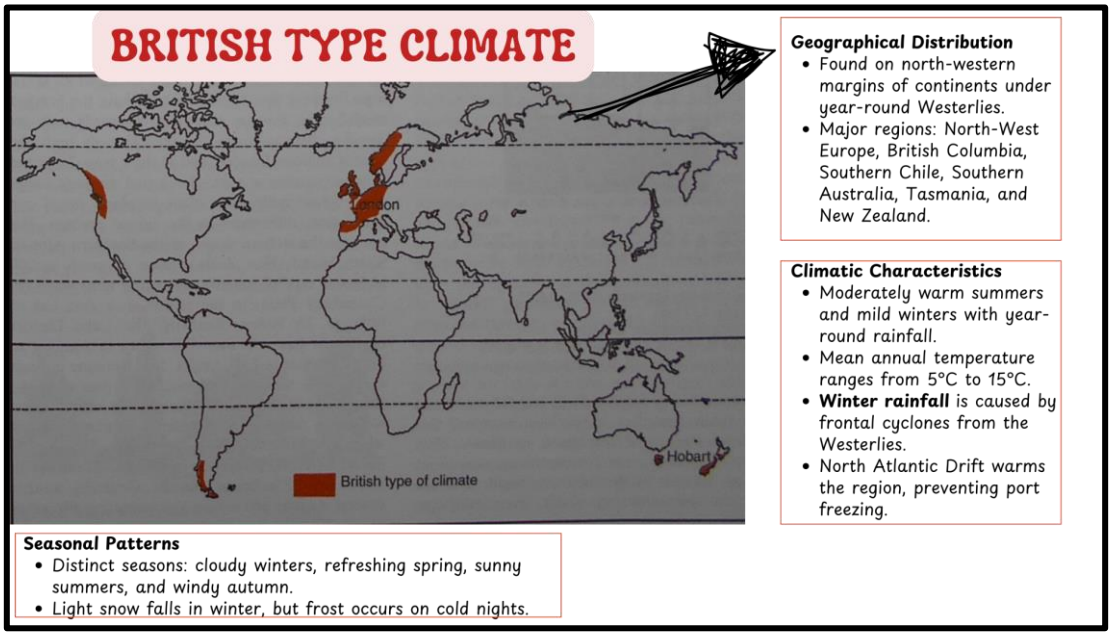
BRITISH TYPE OF CLIMATE / EUROPEAN MARITIME



- The cool temperate western margins are **under the influence of the Westerlies all-round the year.**
- They are the regions of **frontal cyclonic activity [Temperate Cyclones]**.
- This type of climate is typical to Britain, hence the name 'British Type'.
- Also called as North-West European Maritime Climate due to **greater oceanic influence.**

THE SEASONS

- As in other temperate regions there are **four distinct seasons**.
- This type of climate with its four distinct seasons is something that is **conspicuously absent in the tropics.**

NATURAL VEGETATION IN BRITISH TYPE CLIMATE

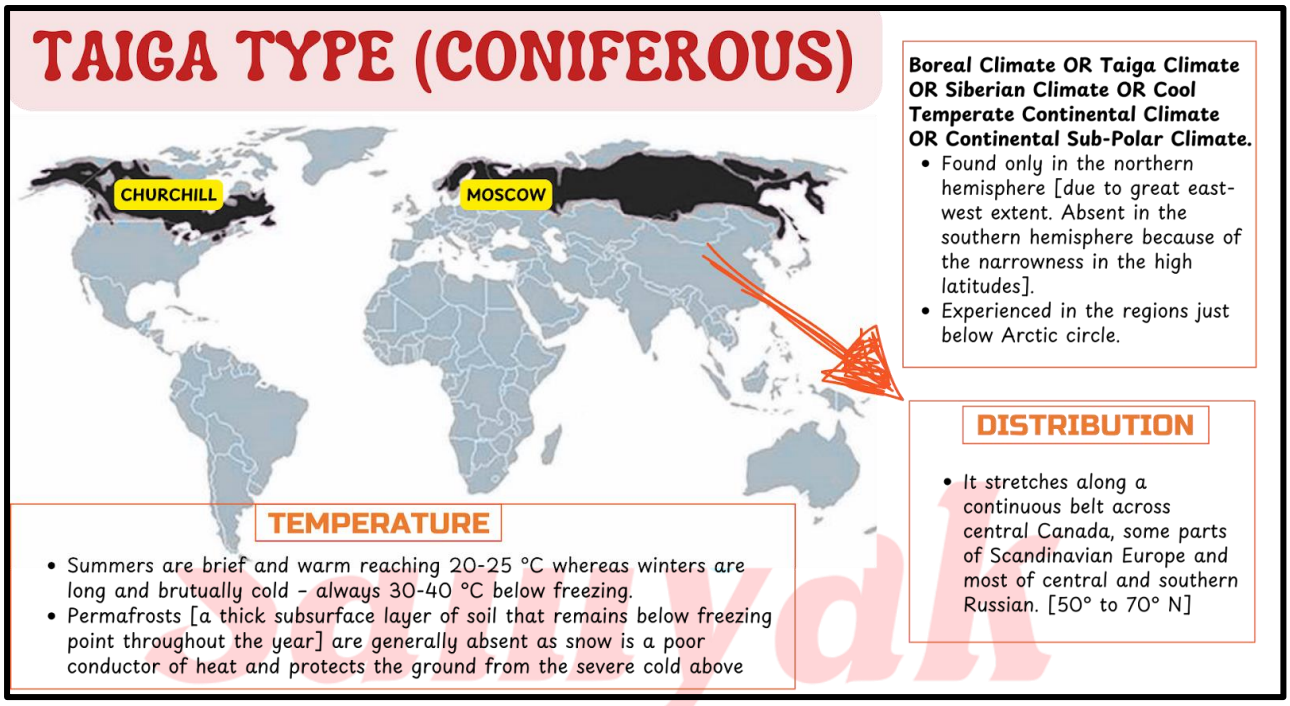
- THE natural vegetation of this climatic type is **deciduous forest.**
- The trees shed their leaves in the **cold season.** This is an adaptation for protecting themselves against the winter snow and frost.
- Some of the common species include **oak, elm, ash, birch, beech, and poplar**.
- **In the wetter areas grow willows** (Light weight cricket bats are made from willows. In India willows are found in Kashmir).

AGRICULTURE

- **Market gardening**
    - All the north-western European countries are highly industrialized and have high population densities. There will normally be **great demand for fresh vegetables, eggs, meat, milk and fruits.**
    - As the crops are perishable, a good network of transport is indispensable. The produce are shipped by high speed trucks **(truck farming**, which is commonly used in the United States)

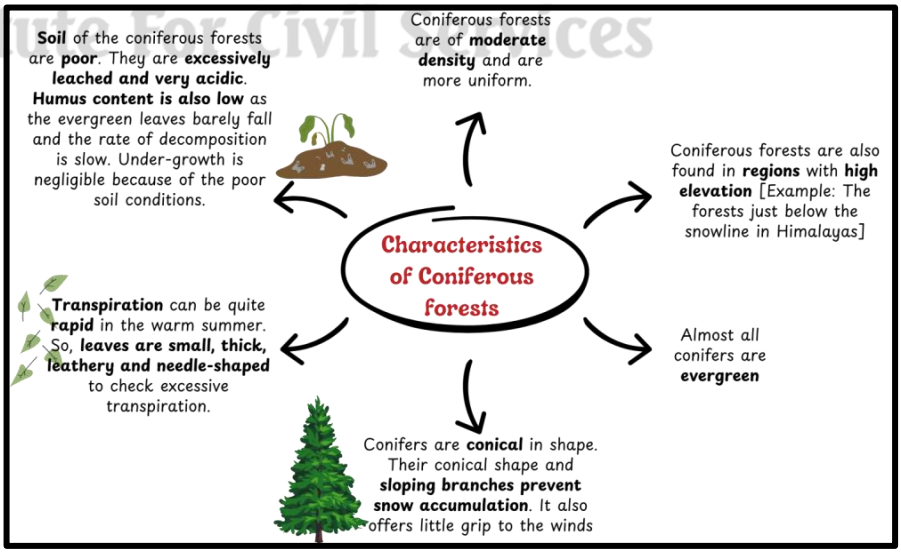
- **Mixed farming**
  - Throughout north-western Europe**, farmers practice both arable farming** (cultivation of crops on ploughed land) and **pastoral farming** (keeping animals on grass meadows).

TAIGA TYPE (CONIFEROUS)



PRECIPITATION

- Typical annual precipitation ranges from 38 cm to 63 cm.
- It is quite **well distributed throughout the year**



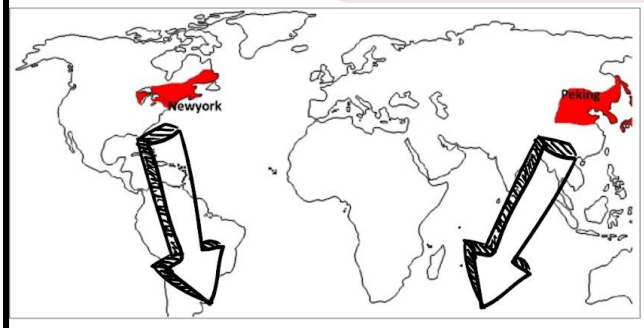
NATURAL VEGETATION OF TAIGA CLIMATE

- The predominant vegetation is **evergreen coniferous forest**.
- **Softwood trees**
- Four major species – **Pine, Fir, Spruce and Larch**.
- Their presence in **pure stands** and the existence of only a few species are a great advantage in commercial forest exploitation.

LAURENTIAN TYPE

- Intermediate type of climate between the **British Type Climate (moderate)** and the **Taiga Type Climate (extreme)** of climate.

LAURENTIAN CLIMATE



GEOGRAPHICAL DISTRIBUTION

- Found only in the northern hemisphere in two main regions:
  - North American Region: Eastern Canada, northeast USA, and Newfoundland.
  - Asiatic Region: Eastern Siberia, North China, Korea, and northern Japan.
- Absent in the southern hemisphere due to geographic and climatic barriers.

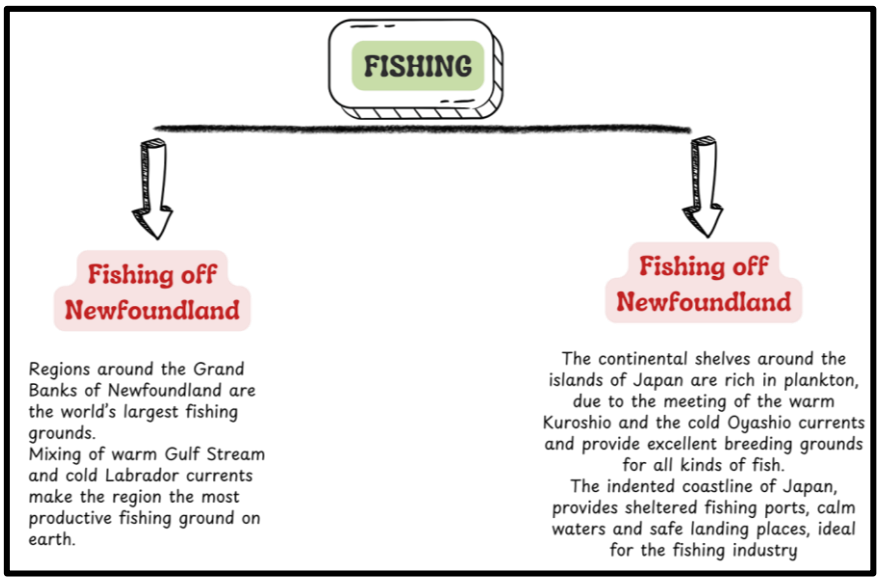
- **Climatic Characteristics**
  - Cold, dry winters below freezing point and warm, wet summers up to 25°C.
  - 75 cm to 150 cm annual rainfall with summer maxima from Westerlies
- **Regional Variations**
  - North America: Heat waves in summer, snowfall in winter, fog near Newfoundland.
  - Asia: Extreme temperatures, monsoon rains, and fog from ocean currents.
- **Fishing Industry**
  - Grand Banks is the world's largest fishing ground due to plankton-rich waters.
  - Japan is a leading fishing nation with large-scale operations worldwide.
  - Japan also leads in cultured pearl production.
- **Vegetation:** Coniferous forests (north) and deciduous forests (south of 50°N latitude).

PRECIPITATION

- ✓ Rainfall occurs throughout the year with **summer maxima** [easterly winds from the oceans bring rains]
- ✓ Annual rainfall ranges from 75 to 150 cm

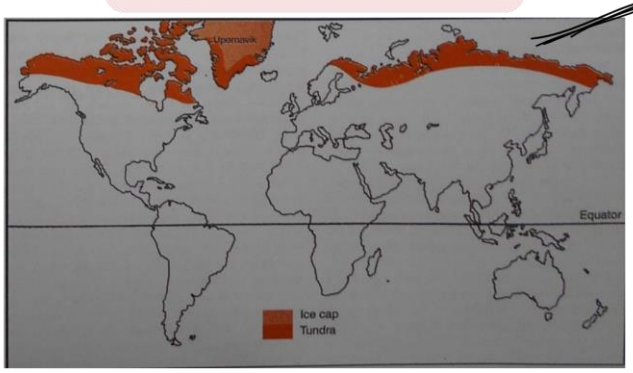
ECONOMIC DEVELOPMENT

- ✓ **Agriculture is less important** because of long and severe winters.
- ✓ In the North American region, farmers are engaged in **dairy farming.**
- ✓ Fishing is, however, the most outstanding economic activity.



TUNDRA

TUNDRA CLIMATE



Geographical Distribution
- Found north of the Arctic Circle and south of the Antarctic Circle.
- Ice-caps cover Greenland, Antarctica, and high latitude highlands.
- Tundra lowlands include Greenland's coast, northern Canada, Alaska, and the Arctic seaboard of Eurasia.

Temperature
- Extremely low mean annual temperature.
- Winter temperatures drop to -40°C to -50°C.
- Summer temperatures remain above freezing for only four months.
- Continuous darkness occurs during winter due to Earth's tilt

Precipitation
- Precipitation occurs mainly as snow and sleet.
- Convectional rainfall is absent due to low temperatures.
- Natural Vegetation
- No trees grow due to permafrost and harsh conditions; Mosses, lichens, and hardy grasses dominate the landscape.