

TERRESTRIAL ECOSYSTEMS: MEANING, TYPES AND THEIR PROPERTIES



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INTRODUCTION

- A terrestrial ecosystem is a land-based community of organisms and the interactions of biotic and abiotic components in a given area. Examples of terrestrial ecosystems include the tundra, taigas, temperate deciduous forests, tropical rainforests, grasslands, and deserts.
- The type of terrestrial ecosystem found in a particular place is dependent on the temperature range, the average amount of precipitation received, the soil type, and amount of light it receives.

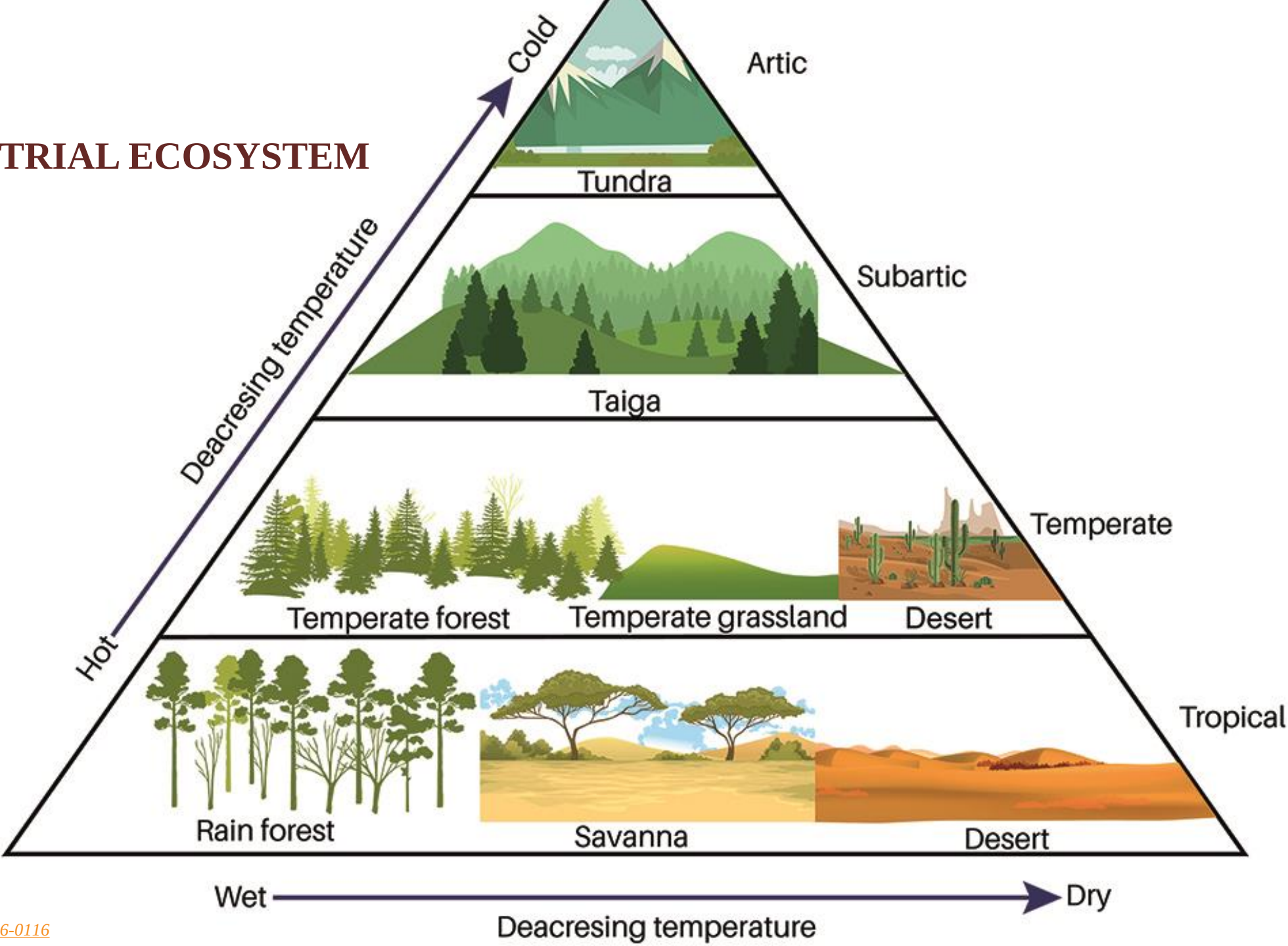
INTRODUCTION

- Terrestrial ecosystems cover approximately 148 million km², corresponding to 29% of the total surface area of the earth. They include such diverse habitats as the frigid regions around the poles, the searing heat of tropical deserts, and lush temperate and tropical rainforests.
- Ecosystems are usually classified according to the dominant vegetation type for a region, which is in turn determined largely by geographical and environmental factors.

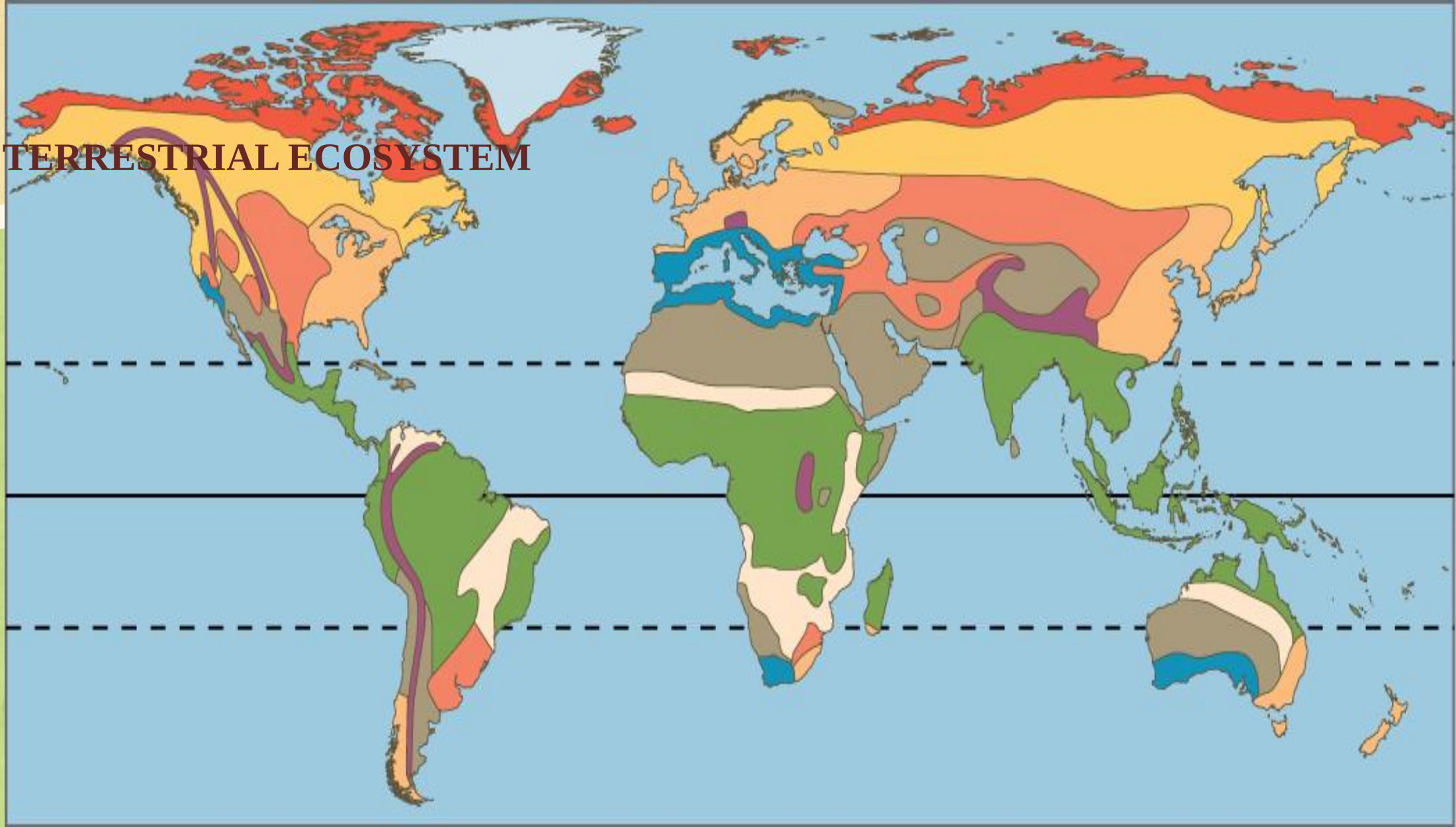
TYPES OF TERRESTRIAL ECOSYSTEM

- Tundra Biome
- Taiga or Boreal Biome
- Temperate Deciduous Biome (North-Western Europe – British Type Climate)
- Temperate Rainforest Biome
- Sub-Tropical Deciduous Biome in Eastern China, South Eastern USA
- Steppe or Temperate Grassland Biome
- Temperate Deciduous Biome (Mediterranean Climate)
- Tropical Deciduous Biome (Monsoon Climate)
- Savanna or Tropical Wet and Dry Biome
- Tropical Rain Forest Biome
- Desert Biome

TYPES OF TERRESTRIAL ECOSYSTEM



TYPES OF TERRESTRIAL ECOSYSTEM



Tropical forest

Savanna

Desert

Chaparral

Temperate forest

Boreal forest

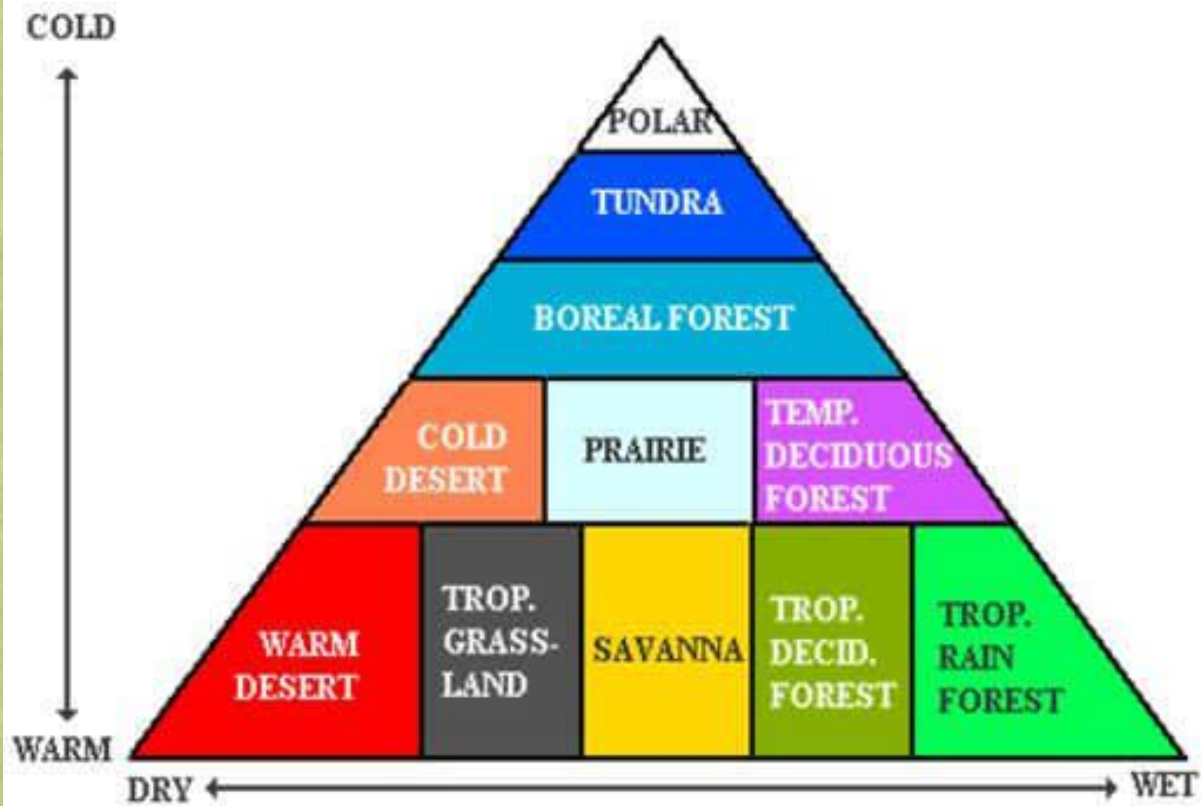
Tundra

Mountains

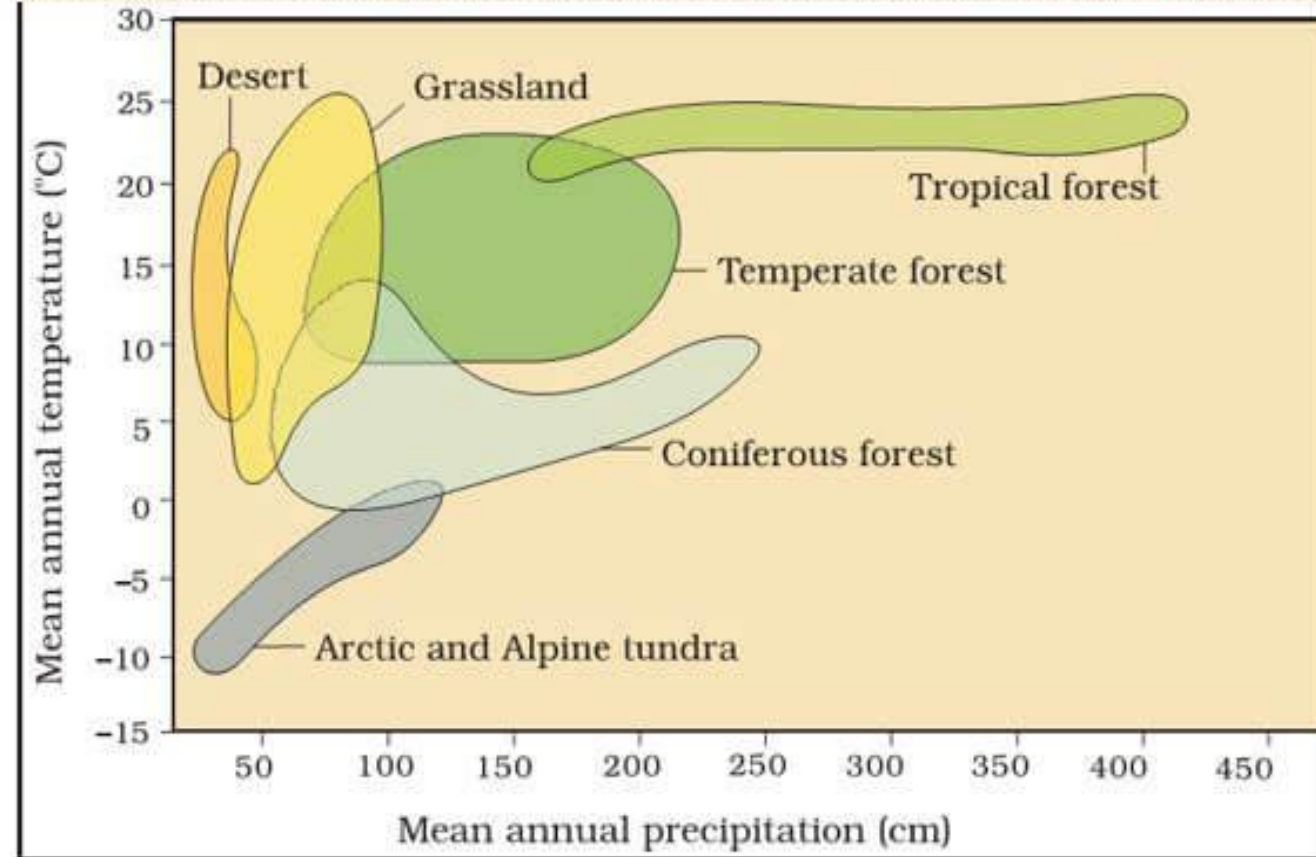
Polar ice

Temperate grassland

TYPES OF TERRESTRIAL ECOSYSTEM



Biome distribution with respect to annual temperature and precipitation



TUNDRA BIOME

- There are two types of tundra – arctic and alpine.
- Alpine tundra occurs at high mountains above the tree line. E.g. High ranges of the Himalayas, Andes, Alps etc.
- There are **no trees** in the tundra (due to **permafrost**).
- The lowest form of vegetation like **mosses, lichens** are sparsely found on bare rocks.
- Coastal lowlands **reindeer moss** which provides the only pasturage for reindeers.
- In the summer, birds migrate north to prey on the numerous insects which emerge when the snow thaws.
- Insects have short life cycles which are completed during the favourable period of the year.
- Animals like the reindeer, arctic fox, wolves, musk-ox, polar bear, lemming, arctic hare, arctic willow live in tundra region.
- **Reptiles and amphibians are almost absent.**
- Most of the animals have **long life**, e.g. arctic willow has a life span of 150 to 300 years.
- They are protected from chillness by the presence of **thick cuticle and epidermal hair or fur**.
- Mammals **have a large body size and small tail and ear** to avoid the loss of heat from the surface.

TUNDRA BIOME



TAIGA BIOME

- Boreal forest soils are characterized by thin **podzols** and are rather poor. This is because: **The weathering of rocks proceeds slowly** in cold environments, **the litter derived from conifer needle (leaf) is decomposed very slowly** and is not rich in nutrients (humus content is low). Podzols are the typical soils of a **coniferous or boreal biome**.
- The top layer of the soil is very thin and is overlain over sandy or loamy subsurface which has no organic matter (**lost due to leaching of nutrients** to the bottom layers). The soils are characterized by low levels of moisture (excessively drained) and nutrients and are loamy or sandy. Others have shallow rooting zones and poor drainage due to subsoil cementation.
- A low pH further compounds issue. The **low pH (acidic)** is due to **excessive leaching of alkaline** matter which if present would neutralise the organic acids of the accumulating litter. Hence, most Podzols are **poor soils for agriculture**. They are mostly used for grazing.
- The predominant vegetation is an evergreen coniferous forest with species such as spruce, fir and pine. The conifers require little moisture are best suited to this type of sub-Arctic climate. The productivity of boreal forest is lower than those of any other forest ecosystem. Animals found in this region include Siberian tiger, wolverine, lynx, wolf, bear, red fox, squirrel, and amphibians like Hyla, Rana, etc.

TAIGA BIOME



TEMPERATE DECIDUOUS BIOME (NORTH-WESTERN EUROPE – BRITISH TYPE CLIMATE)

- Soils of temperate forests are **podzolic** and fairly deep.
- The natural vegetation of this climatic type is **deciduous**.
- The trees shed their leaves in the cold season.
- This is an adaptation for protecting themselves against the winter snow and frost.
- Shedding begins in autumn, the ‘fall’ season. Growth begins in spring.
- Some of the common species include oak, elm, ash, birch, beech, and poplar.

TEMPERATE DECIDUOUS BIOME



TEMPERATE RAINFOREST BIOME

- This is a small biome in terms of area covered. The main stretch of this habitat is along the northwestern coast of North America from northern California through southern Alaska.
- There are also small areas in southern Chile, New Zealand, Australia and a few other places around the world.
- **Big coniferous trees** dominate this habitat, including Douglas fir, Western red cedar, Mountain hemlock, Western hemlock, Sitka spruce and Lodgepole pine.
- In addition to the trees, mosses and lichens are very common, often growing as **epiphytes**.
- Grizzly bears are the common mammals found in Alaska.

TEMPERATE RAINFOREST BIOME



SUB-TROPICAL DECIDUOUS BIOME IN EASTERN CHINA, SOUTH EASTERN USA

- Supports luxuriant vegetation.
- The lowlands carry both evergreen broad-leaved forests and deciduous trees (hardwood).
- On the highlands, various species of conifers such as pines and cypresses are important.
- Perennial plant growth is not checked by either a dry season or a cold season.

STEPPE OR TEMPERATE GRASSLAND BIOME

- They are practically **treeless**, and the grasses are much shorter.
- Grasses are fresh and nutritious.
- Poleward, an increase in precipitation gives rise to a transitional zone of wooded steppes where some conifers gradually appear.
- Do not have much animal diversity.

TEMPERATE GRASSLAND BIOME

Major Grasslands of the World

Savanna

1. Llanos of the Orinoco in Venezuela and Colombia
2. Campos of Brazil
3. Sudan in Africa
4. South African veld
5. Australia

Prairie

1. Midwestern United States and Canada
2. Pampa of Argentina, Uruguay, and southeastern Brazil
3. Plains of Hungary, Romania, and historic Yugoslavia
4. Black Earth Belt of Russia
5. Manchurian Plain

Steppe

1. Great Plains of North America
2. Kyrgyz Steppe
3. Australia
4. Sudan in Africa



TEMPERATE GRASSLAND BIOME



TEMPERATE DECIDUOUS BIOME (MEDITERRANEAN CLIMATE)

- Trees with small broad leaves are widely spaced and never very tall.
- Regions with adequate rainfall are inhabited by low, broad-leafed evergreen trees (mostly evergreen oaks).
- **Fire** is an important hazardous factor in this ecosystem, and the adaptation of the plants enable them to regenerate quickly after being burnt.
- Plants are in a continuous struggle against heat, dry air, excessive evaporation and prolonged droughts.
- They are, in short **xerophytic (drought tolerant)**.

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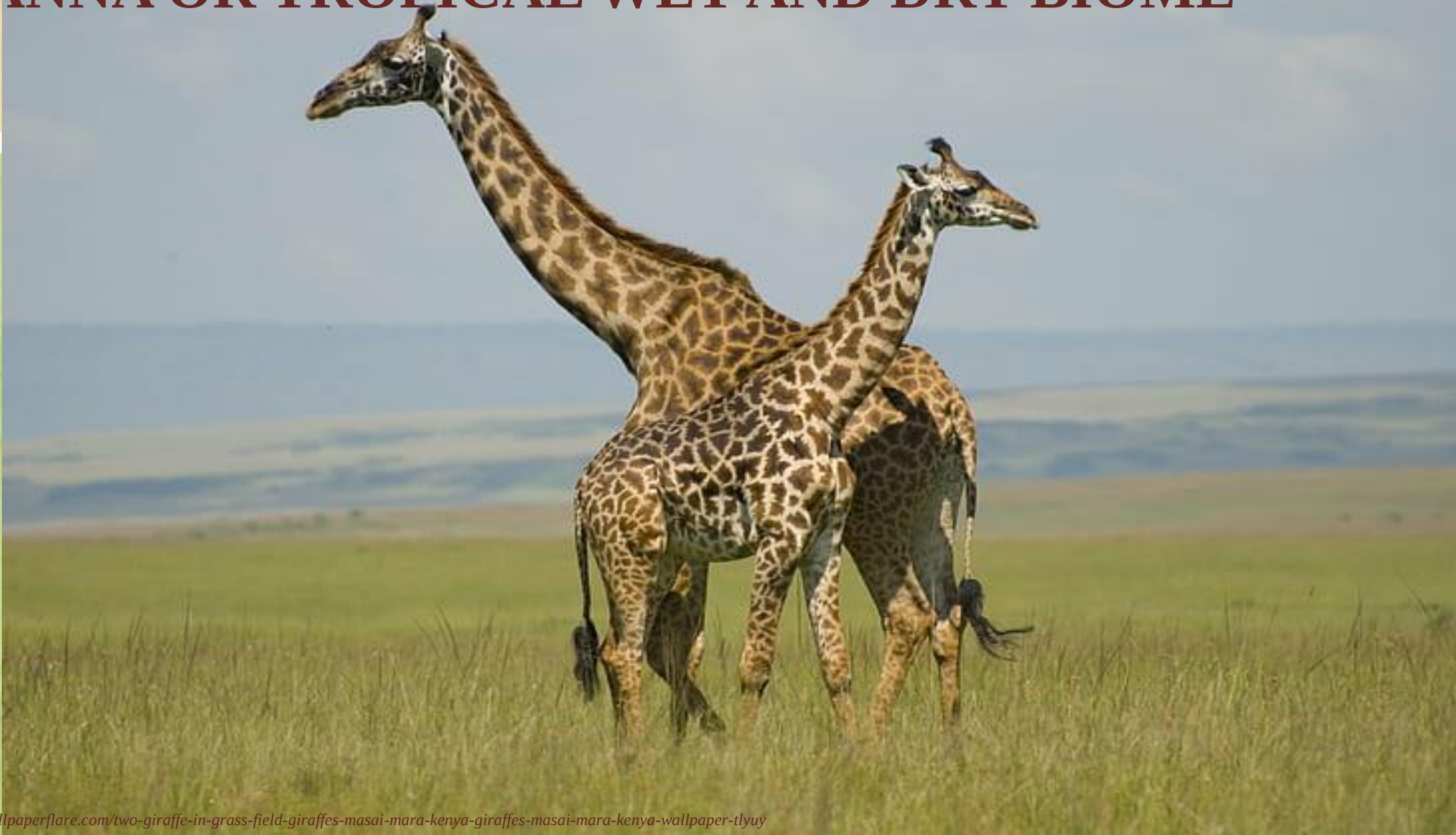
TROPICAL DECIDUOUS BIOME (MONSOON CLIMATE)

- Tropical Monsoon Forests are also known as a drought-deciduous forest; dry forest; dry-deciduous forest; tropical deciduous forest.
- **Teak, neem, bamboos, sal, shisham, sandalwood, khair, mulberry** are some of the important species.

SAVANNA OR TROPICAL WET AND DRY BIOME

- The savanna landscape is typified by **tall grass and short trees**.
- 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.
- Many trees are umbrella shaped, exposing only a narrow edge to the strong winds.
- Savanna biome is **rich in mammal, bird and reptile diversity**.

SAVANNA OR TROPICAL WET AND DRY BIOME



SAVANNA OR TROPICAL WET AND DRY BIOME



TROPICAL RAIN FOREST BIOME

- High temperature and abundant rainfall support a luxuriant tropical rain forest.
- The equatorial vegetation comprises a multitude of evergreen trees, e.g. mahogany, ebony, dyewoods etc.
- In the coastal areas and brackish swamps, mangrove forests thrive.
- All plants struggle upwards (most epiphytes) for sunlight resulting in a peculiar layer arrangement (canopy).
- Epiphyte (**commensalism** – epiphyte benefits without troubling the host): 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.

TROPICAL RAIN FOREST BIOME



Thank you