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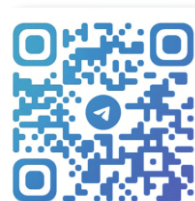
ADVANCED LEVEL

Biology

ENGLISH MEDIUM

TRULY
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boundless BIOMES



**SAMPATH
LANKADHEERA**
B.Sc. (Hons), M.Sc.

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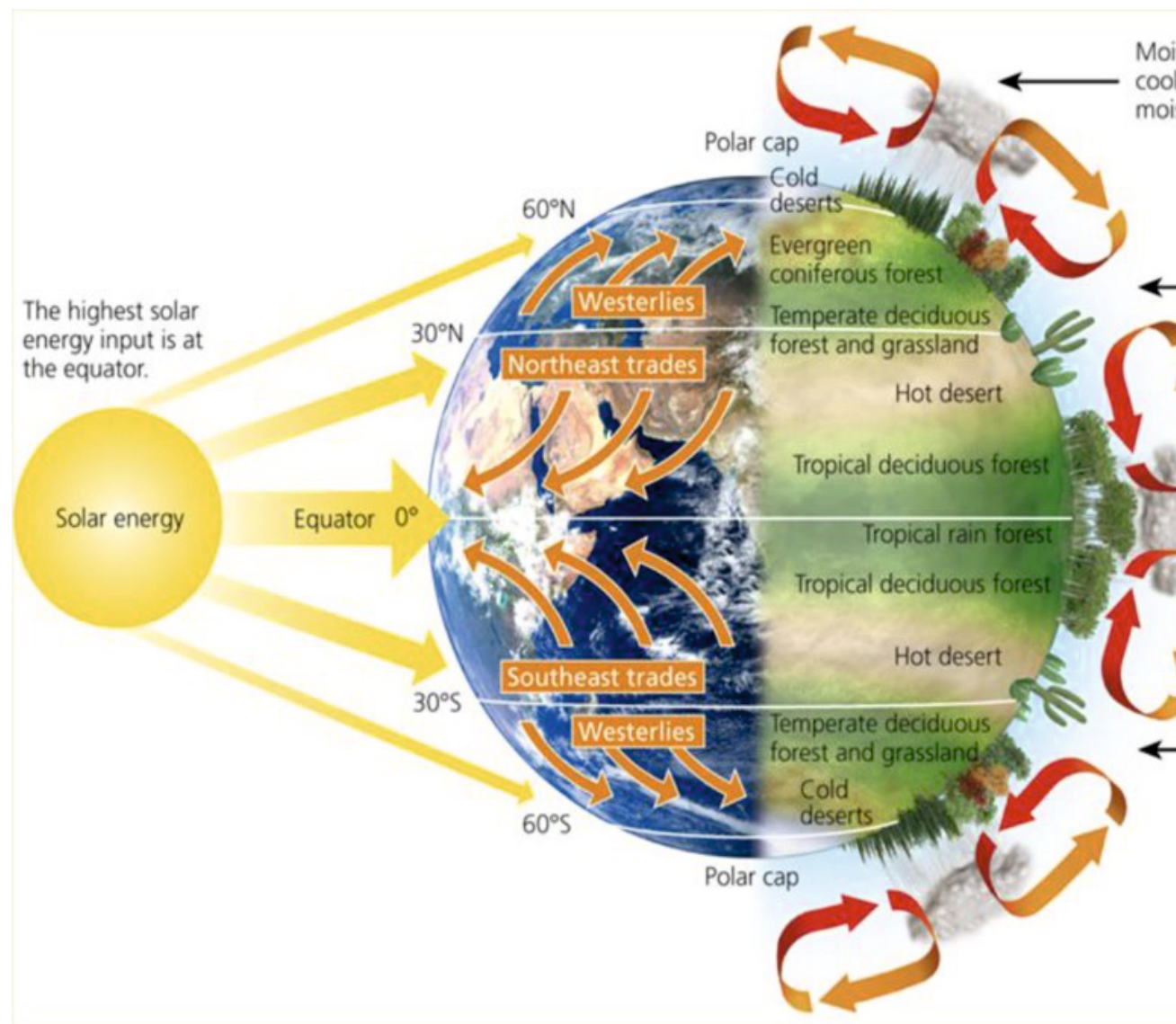
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UNIT
08

Environmental Biology 2
Terrestrial Biomes

**SAMPATH
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17. Three animals that live in tundra are

- (1) caribou, wolf and bear. (2) siberian tiger, fox and brown bear.
- (3) reindeer, tiger and moose. (4) reindeer, siberian tiger and bear.
- (5) musk oxen, fox and moose.

AL 2021/35

18. When a migratory bird flies northward from Sri Lanka along a straight line path, the biomes it could encounter in correct sequence are

- (1) tropical forests, chaparrals, temperate broad leaf forests, northern coniferous forests and tundra
- (2) tropical forests, deserts, temperate grasslands, northern coniferous forests and tundra.
- (3) savanna, deserts, chaparrals, temperate grasslands and tundra.
- (4) tropical forests, chaparrals, savanna, temperate broad leaf forests and tundra.
- (5) savanna, deserts, temperate grasslands, northern coniferous forests and tundra.

AL 2023/34

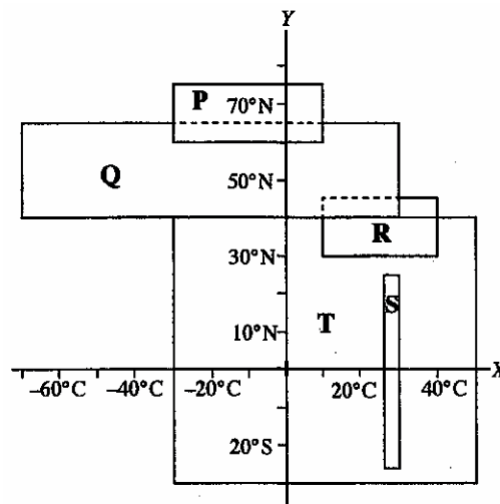
Which of the following 'Biome - Climatic feature - Characteristic of vegetation' combination is correct?

- (1) A, I, c (2) C, II, a (3) D, I, d (4) A, IV, b (5) B, III, d 2013 Old/38

13. Which of the following terrestrial biomes shows the least variation in temperature?

- (1) Temperate grasslands (2) Temperature broad leaf forests (3) Coniferous forests
(4) tropical forests (5) Deserts 2016/33

14. Approximate ranges of temperature (X-axis) of five major terrestrial biomes labelled as P, Q, R, S and T and the latitudes of their distribution (Y-axis) are shown in the following diagram.



Which of the following statements regarding the biomes P, Q, R, S and T is/are correct?

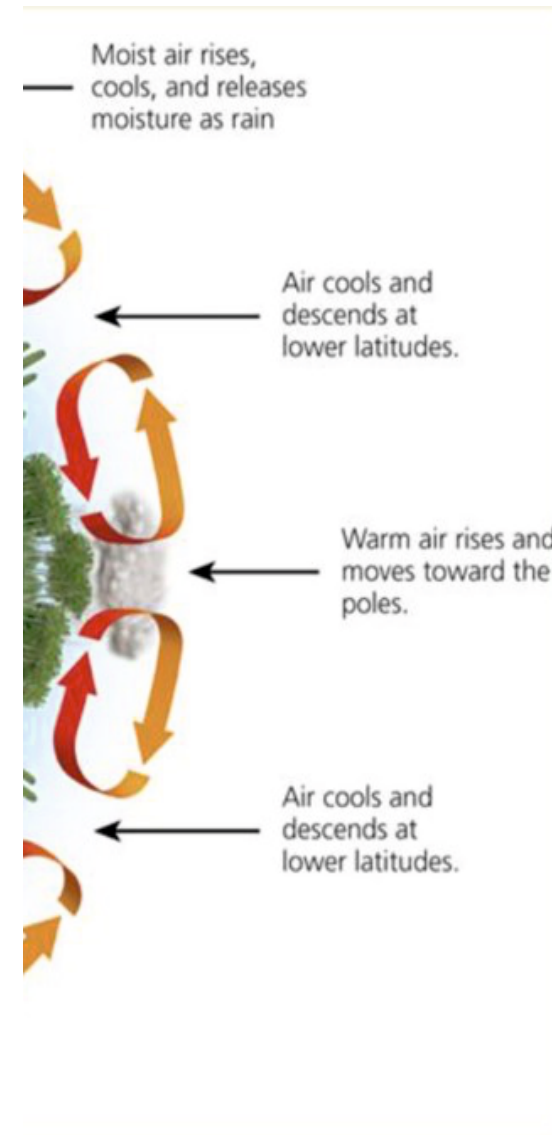
- (A) Dominant plants in biome Q are conifers.
(B) If the annual rainfall is above 1000mm, biome with the highest biodiversity is S.
(C) Largest terrestrial biome is T.
(D) Dominant plants in biome R are small trees and shrubs.
(E) Longest food chains are found in biome P.

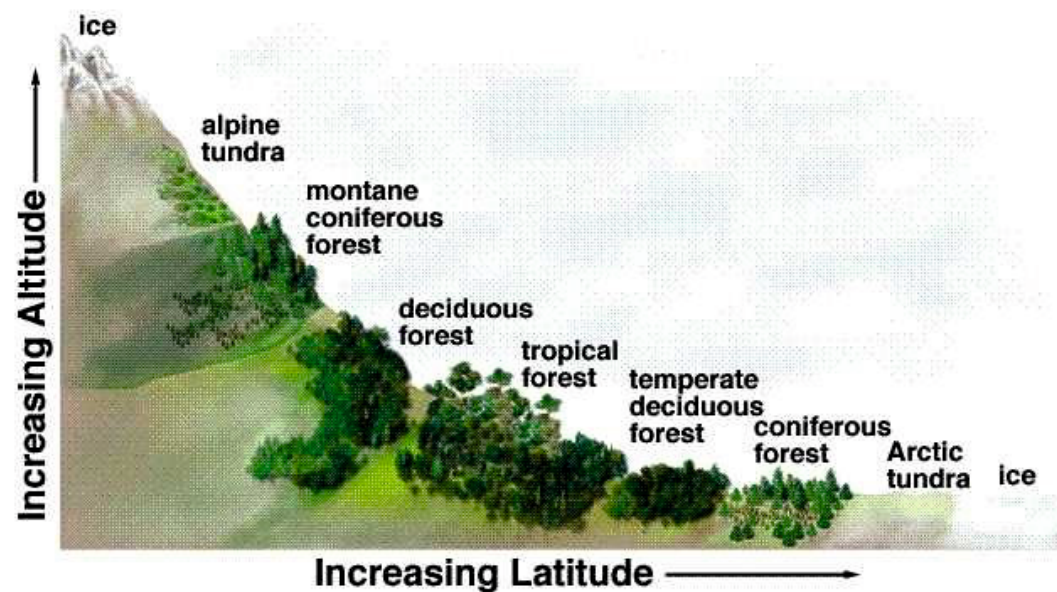
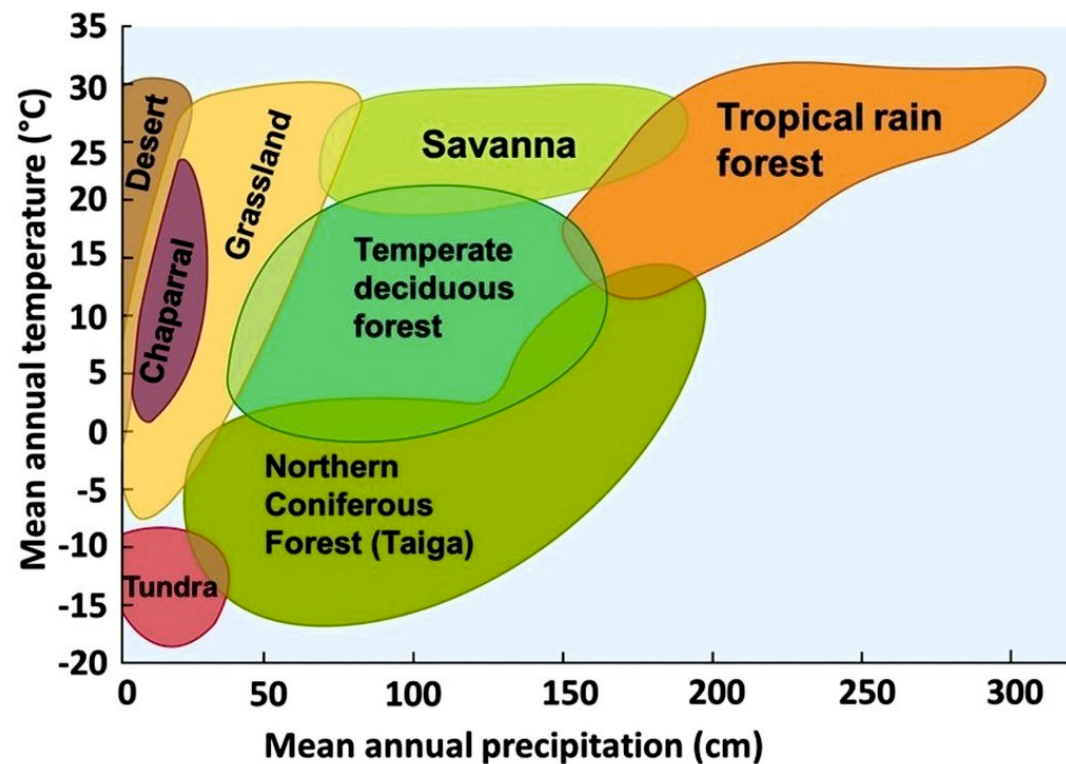
15. In which of the following responses, the biomes that are encountered when traveling from the north pole towards equator are given in correct sequence?

- (A) Tundra, coniferous forests, temperate grasslands, deserts, tropical forests
(B) Tundra, coniferous forests, temperate broad-leaf forests, chaparral, deserts
(C) Tundra, temperate grasslands, coniferous forests, deserts, tropical forests
(D) Tundra, temperate broad-leaf forests, coniferous forests, tropical forests, deserts
(E) Tundra, coniferous forests, chaparral, temperate grasslands, savanna AL 2019/48

16. Which of the following responses indicates the biomes in increasing order of average annual rainfall/precipitation?

- (1) Arctic tundra, temperate grasslands, temperate broad leaf forests
(2) Temperate grasslands, savannas, tropical rain forests
(3) Alpine tundra, northern coniferous forests
(4) Arctic tundra, chaparrals, savannas
(5) Tropical dry forests, chaparrals, Alpine tundra AL 2020/34





4. When compared with tropical biomes, the temperate biomes
 - (1) have a higher biological diversity. (2) have a higher density of plants
 - (3) have trees which do not show annual growth rings. (4) show clear stratification in plants.
 - (5) have more deciduous plants. (2008/38)
5. Which one of the following activities of man affects the carbon cycle least?
 - (1) Hydroelectric power generation (2) Use of fossil fuels (3) Lime industry
 - (4) Disposal of garbage (5) Clearing of forests (2008)
6. Which of the following biomes are present between the equator and tropic of cancer of the earth?
 - (1) Tropical rain forests, deserts, monsoon forests, savanna
 - (2) Tropical rain forests, tropical deciduous forests, tundra, coniferous forests
 - (3) Tropical rain forests, deserts, chaparral, savanna
 - (4) Tropical rain forest, tropical deciduous forest, coniferous forest, taiga
 - (5) Tropical rain forest, deserts, tropical deciduous forest, chaparral (2010)
7. Savannah grass lands are more distributed in which of the following regions
 - (1) Close to equator (2) Equator and 30° latitude (3) Near 30° latitude
 - (4) South pole (5) Between 30° and 60° latitudes
8. Which of the following biome can not be seen in most of the continents
 - (1) Tropical rain forests (2) Taiga (3) Savannah (4) Deserts (5) Chaparrals
9. What is the biome with rain limited to one season, temperate climate, small trees and plants.
 - (1) Savannah (2) Temperate evergreen forests (3) Tropical rain forest (4) Tundra (5) Taiga
10. Which of the following ecosystems has evergreen trees with continuous canopy?
 - (1) Dry mixed evergreen forest (2) Thorn forest (3) Montane forest (4) Tropical rain forest
 - (5) Mangrove forest (2011/35)
11. Which of the following is incorrect regarding tropical rain forests
 - (1) Evergreen (2) Highest endemic species present (3) Well grown ground layer absent
 - (4) Rapid recycle of nutrients present (5) Deep soil present
12. Four biomes, some of their climatic features and some characteristics of their vegetation are given below.

Biomes	Climatic features	Characteristics or vegetation
A. Chaparral	I. Low temperature	a. Continuous canopy
B. Tundra	II. Low rainfall	b. Evergreen plants
C. Dry evergreen forests	III. High rainfall	c. Deciduous plants
D. Taiga ,	IV. V ariable temperature	d. Many epiphytes

- b.....
- c.....

(vi) What is the largest terrestrial biome?

2022 AL

State the main anthropogenic activity that has severely affect each of the following biomes

- (a)Tundra :
- (b)Temperate grassland :
- (c) Northern coniferous forests :
- (iii) State four main features of a savanna ecosystem

MCQ

- The correct order in which some of the biomes can be seen by a person walking from the northern part of earth towards the equator is
 (A) Taiga, Tundra, Deciduous forests, Rain forests.
 (B) Deciduous forests, Taiga, Rain forests, Deserts.
 (C) Tundra, Taiga, Deciduous forests, Rain forests.
 (D) Taiga, Deciduous forests, Deserts, Tropical grasslands.
 (E) Tundra, Temperate grasslands, Taiga, Deserts. (2002/53)
- Which one of the following biomes has the highest animal diversity?
 (1) Taiga (2) Temperate deciduous forests (3) Grasslands (4) Tropical rain forests
 (5) Savannah (2004/33)
- An ecological pyramid of biomass is often an inverted pyramid in which one of the following ecosystems?
 (1) Mangroves (2) Grasslands (3) Tropical rain forests (4) Tundra (5) Oceans (2006)

What is a Biome

The climate and geography of a region determines what type of biome can exist in that region. Each biome consists of many ecosystems whose communities have adapted to the small differences in climate, topography and soil conditions within the biome. Major terrestrial biomes include, tropical forests, savanna, desert, chaparral, temperate grass land, temperate broadleaf forest, northern coniferous forests and tundra.

Biomes in Tropical Region	Biomes in Temperate Region
<ul style="list-style-type: none"> Tropical Forests Tropical Grasslands (Savanna) Tropical Deserts 	<ul style="list-style-type: none"> Temperate broad leaf forest/ Temperate deciduous Forest Temperate Evergreen Forests/Chaparral Temperate Grasslands Northern coniferous forest/Taiga
Biomes in Cold Region	
<ul style="list-style-type: none"> Tundra 	

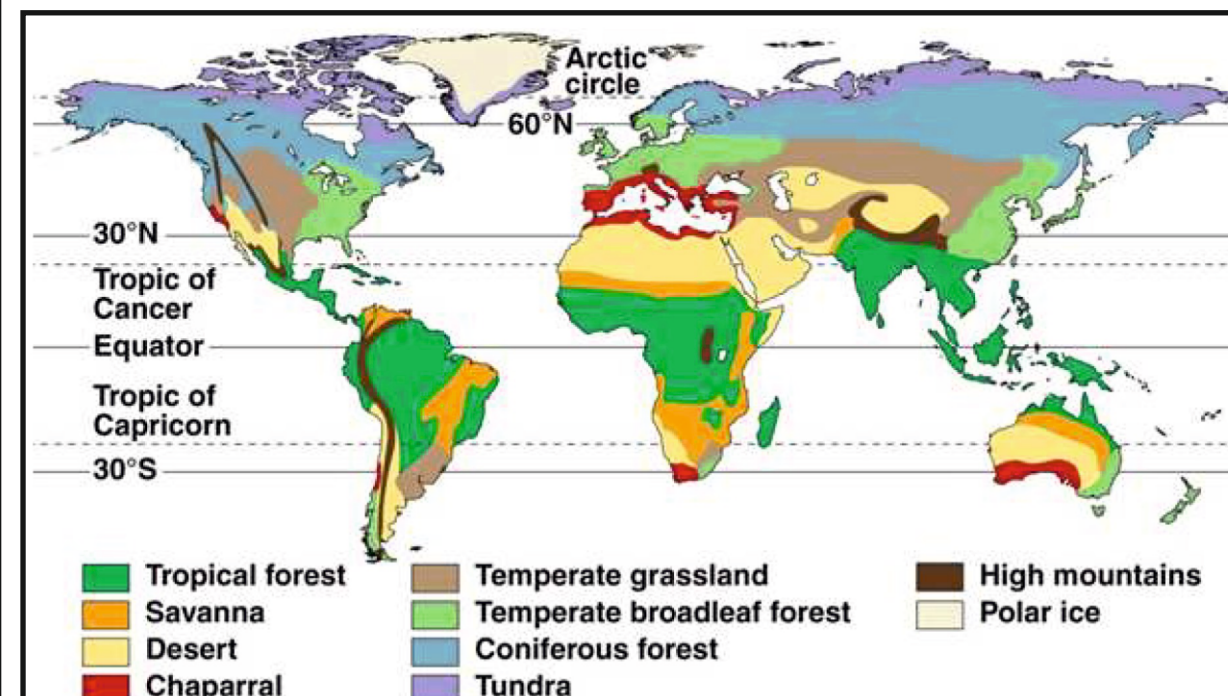
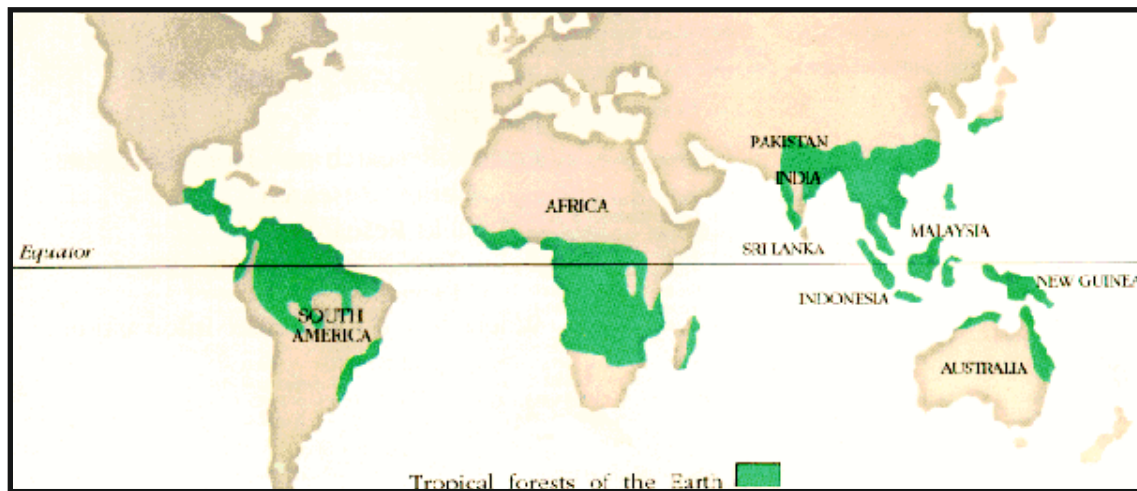


Figure: World distribution of different types of biomes

1. Tropical forests



This biome is distributed close to the equator and extends to the sub equatorial areas. Therefore both tropical rainforests and tropical dry forests are included.

Tropical rainforests have an average temperature of 25 -29 °C, whereas in the tropical dry forests it may reach up to 33 °C.

In tropical rainforests an emergent layer, canopy and sub canopy layers are visible. These are followed by an understory layer which consists of shrubs, and large herbaceous plants.

This biome covers expansive areas of the arctic region, amounting 20% of earth's land surface.

Alpine tundra occurs at high altitudes on mountains, while arctic tundra occurs at high latitudes.

Most tundras receive very small inputs of water as precipitation, but nevertheless their soil may be moist or wet because there is little evaporation in such cold climates, and deep drainage may be prevented by frozen soil.

Mostly herbaceous plants can be seen that includes different types of grasses and forbs. Shrubs, mosses, lichens and trees also can be found in tundra. A layer of permafrost which is a permanently frozen layer of soil can be seen. This permafrost layer restricts the growth of the roots of plants. Large grazing mammals such as Caribou and reindeer (migratory), musk oxen (resident) and predatory wolves, foxes, bears together with many species of migratory birds that nest during summer can be seen in this biome.

This area is sparsely colonized by humans, but heavily used for extraction of minerals and oils.

Structured Essay

1. A. (i) Name major terrestrial biomes?

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(ii) Name **three** biomes found in the tropics and state two major vegetable characteristics of each of them.

Biome	Major vegetation characteristics
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a.....

The largest biome on earth is the northern coniferous forest. It is extended as a broad band from upper band of Arctic tundra.

The northern forest is dominated by coniferous trees. Eg. Fir, Pine, spruce are common tree species.

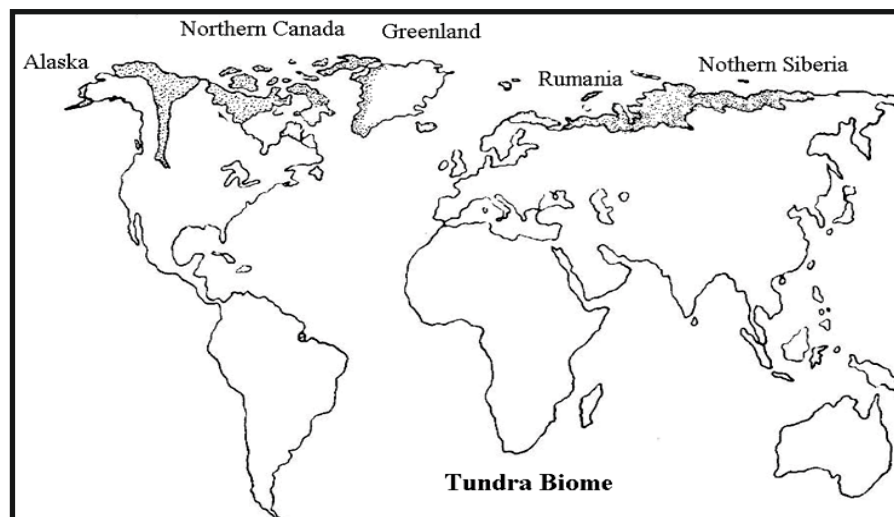
Many conifers are conical in shape and this shape of trees prevents accumulation of snow, thus preventing the breaking down of branches. They have needle like leaves that prevent high transpiration.

The diversity of shrubs and herbs in these forests is less than that of temperate broad leaf forests because of the limitations in precipitation and warm temperature.

Commonly found mammals are brown bears, moose, and Siberian tigers. During some period of time dominant plants can be killed by sudden attacks of insects.

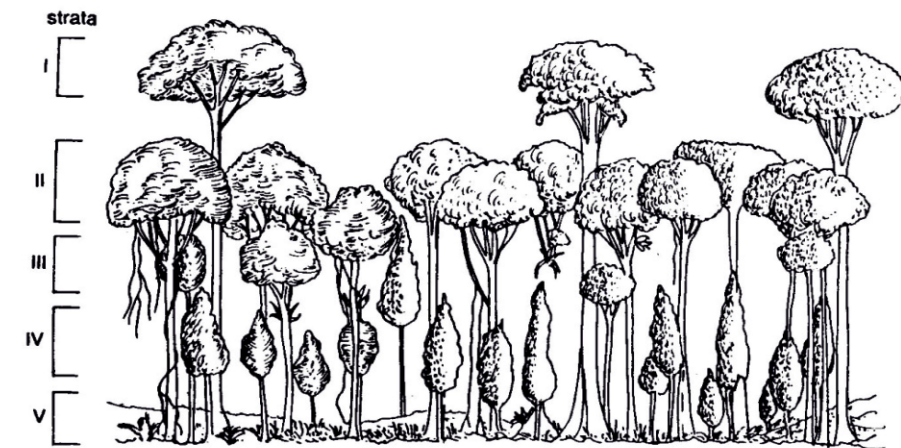
These areas are not heavily populated by humans, but logging is a severe threat.

8. Tundra



The forest floor consists of small herbaceous plants, mushrooms, and a thick layer of dried plant litter.

Therefore the vegetation is arranged in several vertical layers and stratification is observed.



Evergreens are prominent in tropical rain forests whereas in dry forests leaves of deciduous species fall in the dry season. Epiphytes are common in this biome. However in dry forests they are less common. Shrubs with thorns as well as succulent plants often occur in dry forests. Tropical forests constitute the higher diversity of plants and animals out of all terrestrial biomes. It has many mammal species and 5-30 million species of arthropods some of which have not been fully described yet.

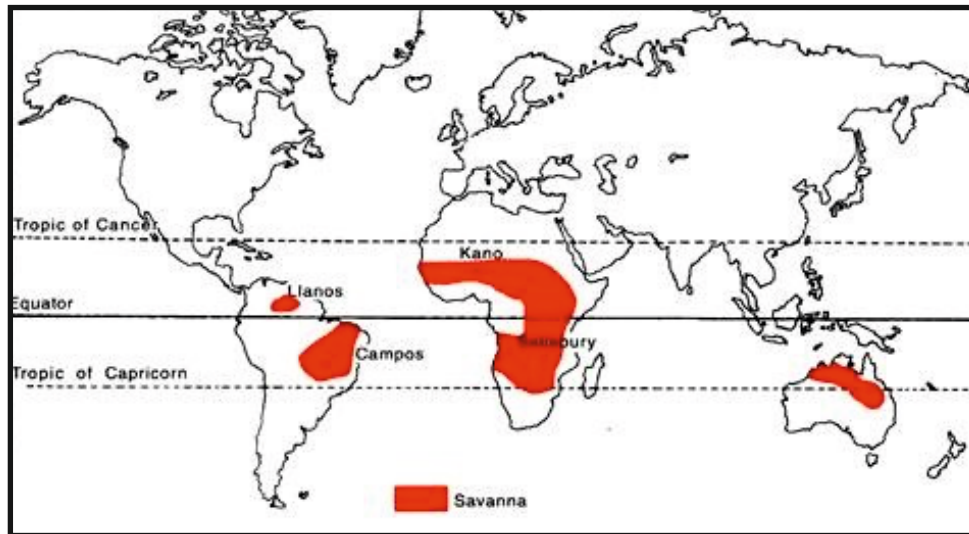
Animals in this biome have adaptations to suit the environment. Animals in the rainforests show year round activity. Camouflage is common among small animals. Large animals may have markings in their bodies. Birds often migrate to other regions during dry period.

Human involvement in agriculture and development related activities has led to destruction of these forests.

2. Savanna



Savanna is spread close to the equator and subequatorial areas.

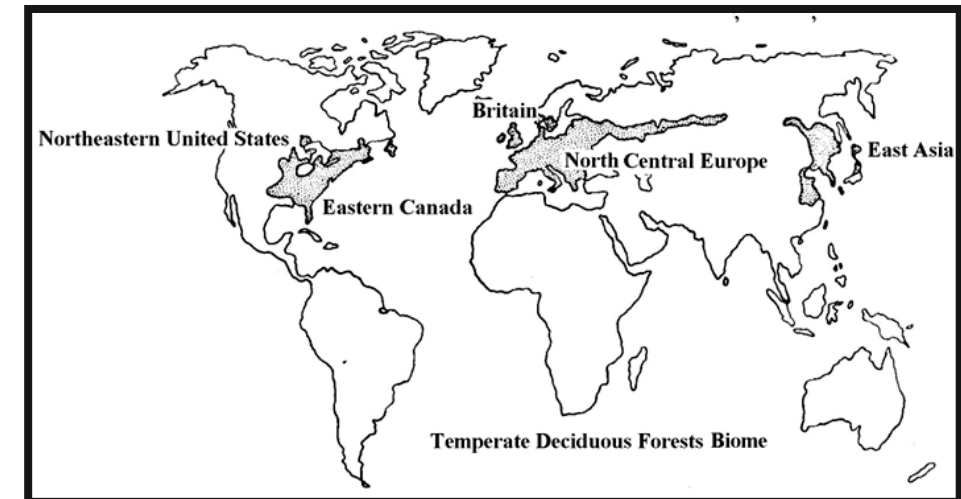


Savannas are characterized by a landscape that supports scattered trees in a tall grass cover. During dry periods the dried grasses catch fire easily. Therefore grasses adapted to withstand drought, naturally grow in savannas. These grasses have a very good underground connectivity. The few herbs found among grass cover contain small leaves to reduce transpiration and thorns to be protected from herbivores.

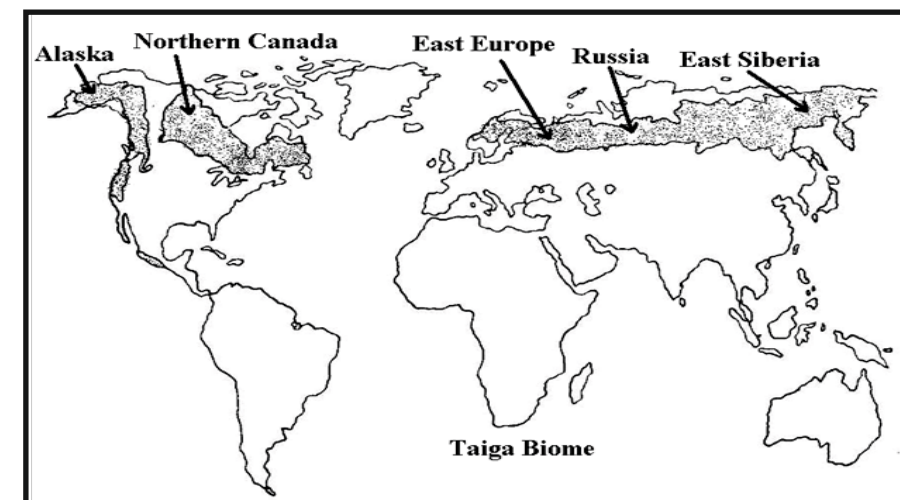
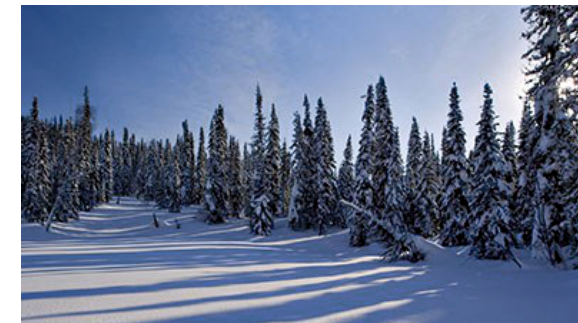
Seasonal rains encourage a fresh growth of grasses to compensate the loss of biomass due to consumption by herbivores.

Many insects (mainly termites), lions, zebras are the common animals in this region. Many animals have effective locomotion for long distance migration and long range vision for hunting. Human settlement from a very early time has been reported in these areas. Due to rearing of cattle and hunting of animals by humans the population of mammals have been decreased. Fires caused by human aid help to maintain the grass cover of this biome in one way but it may also have a negative impact by suppressing the growth of trees.

They are closed canopy layer, one or two strata of understory trees, shrub layer and herb layer. There are only few epiphytes can be found. Many mammals can be seen and they hibernate during winter seasons while the birds species migrate to areas where climate is warmer. Forests are disturbed due to logging, clearance for agriculture and for human settlements.



7. Northern coniferous forests



Grasses are the dominant plant species in these grasslands. The prairie is often divided into three types according to height of the dominant vegetation—tall-grass, mixed-grass, and short-grass.

The height of grasses vary from few centimeters to two meters in tall grass prairie.

Fire and droughts are occurred in these grasslands but many plants growing in those areas have adaptations to cope with fire.

Large grazers such as horses and many types of burrowing mammals (prairie dogs in North America) are found in these areas.

The tall-grass prairie is now an endangered natural ecosystem, because it has been almost entirely converted to agriculture and farmlands.

6. Temperate Broadleaf forest

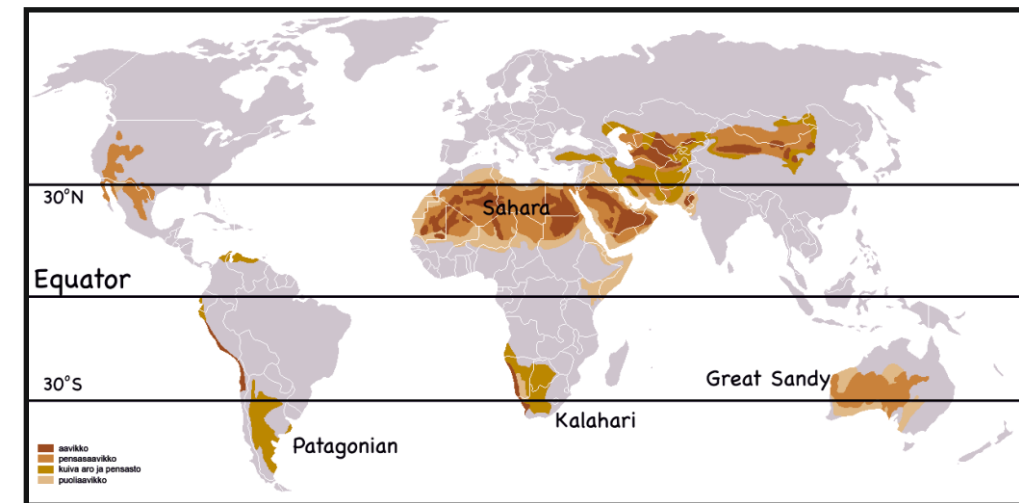


Significant amount of precipitation is received throughout the year in summer as rain and in winter as snow.

Average temperature during winter is zero while in summer it is up to 35 °C. Summer is hot and humid and allow a favorable time to the growth of trees.

The dominant trees are mostly deciduous. A vertical layering (stratification) can be seen in temperate broadleaf forests.

3. Desert



Desert is a temperate or tropical biome, commonly occurring near 30° north and south latitudes (Eg. Sahara), and in the center of continents (Eg. Gobi desert in north central Asia).

Deserts have more bare lands. If the vegetation is found they are sparse and widely scattered. Desert plants have several adaptations to withstand the high temperature and scarcity of water.

- Succulent plant body (Eg. Cacti and Euphorbs)
- Most plants have C4 pathway of photosynthesis
- Deep roots in shrubs
- Ability to tolerate heat and desiccation

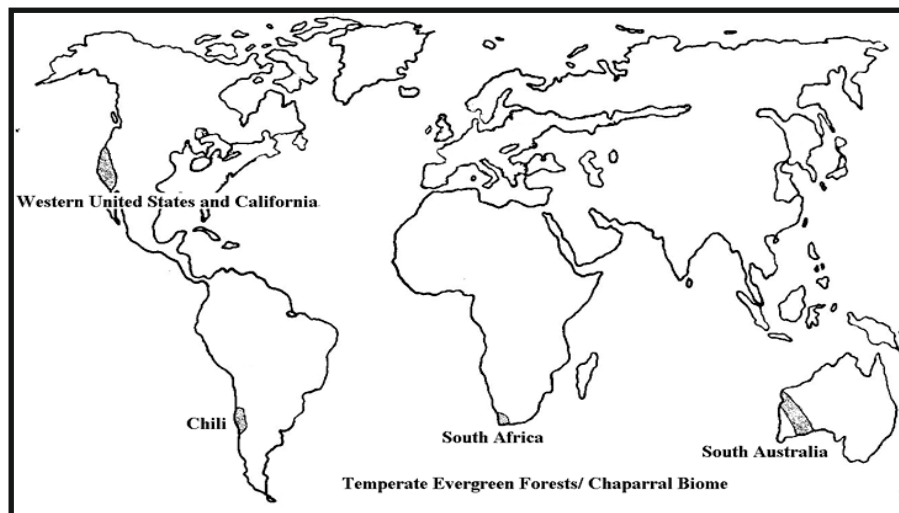
- Reduced surface area of leaves
- Presence of spines/ thorns
- Presence of toxins in leaves

Nocturnal animal species are abundant in deserts. Water conservation is a prominent feature, with some species surviving solely on water obtained during the breaking down of carbohydrates in seeds. Animals include, snakes, lizards, beetles, ants, scorpions, rodents and birds. Compared to other bioms, desserts relatively escape from disturbances due to human activities as these areas experience extreme temperature and contain limited water.

4. Chaparral



Chaparral occurs in mid latitude coastal regions such as North America, Chile, Spain, Southern France and South Africa.



Chaparral is best developed in Southern California.

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The Chaparral biome is typically composed of dwarf forests and shrubs, and interspersed herbaceous vegetation which include grasses and herbs. Chaparral is highly prone to events of catastrophic wildfire. Therefore plants show the some of the following adaptations;

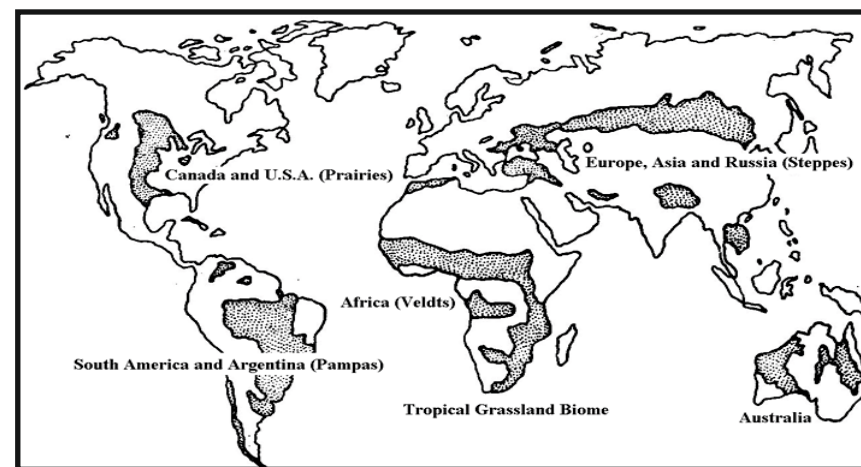
- Seed germination occurring only after a hot fire.
- fire resistant roots.
- Uses of food stored in the fire resistant roots for re-sprouting after a fire.
- Quick re -sprouting enables usage of nutrients released by the fire.
- Tough evergreen leaves in woody plants to survive in droughts.

Most of the native mammals in chaparrals are browsers. They include deers and goats.

Chaparrals are rich in diversity of small mammals, and several species of amphibians, birds, reptiles and insects.

These areas have been reduced and disturbed due to human settlement, urbanization and agricultural conversions. Chaparral is vulnerable to fire caused by human activities.

5. Temperate Grasslands



These grasslands occur under temperate climatic regimes that are intermediate to those that support forest and desert. Grasslands in North America are called prairie (they are often called steppe in Eurasia and called pampas in Argentina).

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