
UNIT 3 ECOSYSTEM DIVERSITY

Structure

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3.1 INTRODUCTION

An ecosystem is a geographical area in which plants, animals, and other species, as well as climate and topography, work together to create a bubble of life. The ecosystem refers to how all of these different organisms coexist in close quarters and interact with one another as well as the abiotic elements of the environment. Weather, earth, sun, soil, climate, and atmosphere are examples of abiotic habitats. The biosphere is the world's largest ecosystem, encompassing all ecosystems. Separate ecosystems have emerged as a result of differences in physiographic, climate, natural vegetation, soil, and water bodies. There are various ecosystems operating on a global and micro scale around the planet. Ecosystems might be large, with hundreds of different creatures and plants coexisting in perfect harmony, or they can be small. Ecosystems in very harsh environments, such as the North and South Poles, are generally simple since only a few types of organisms can survive the freezing temperatures and terrible living conditions. Some organisms can be found in a variety of environments around the world, interacting with other or similar creatures in

various ways. Due to the difference in topography, geography, climate and species composition, different types of ecosystems prevail on earth. Major ecosystems are discussed in this unit.

3.2 OBJECTIVES

After studying this Unit we shall be able to:

- Learn about the major ecosystems
- State the distribution of major ecosystems
- Explain the importance of each ecosystem
- Differentiate among the ecosystems

3.3 TROPICAL FORESTS

Tropical forests are found between the Cancer and Capricorn lines, which are both 23.5 degrees north and south of the equator. These forests are classified into two types: evergreen and deciduous. Tropical Evergreen or tropical rain forests are found near the equator, are hot and humid throughout the year, get up to 2000 mm of rain per year, and have a uniformly high relative humidity. The Amazon Basin of Latin America is home to 57% of tropical rainforests, and Brazil is home to one-third of the world's tropical rainforests. These forests are important biodiversity hotspots on the world. There are 2,500 tree species in the Amazon rainforest alone. In Peru, such woods encompass 60% of the land area, while only 10% of the population lives there. So it is with Brazil's Amazon Basin, which is rightfully referred to as the world's greatest "deserts" (due to its extremely low population density - one person per square mile). The limited settlement is due to dense vegetation, a severe tropical environment, and poor soil quality in general. Agriculture, logging, migrant resettlement, industrial fuel, hydro-electric development, and other factors all contribute to the destruction of tropical rain forests. Tropical deciduous forests are the other type of tropical forest. Southeast Asia, Sri Lanka, the Malaysian Peninsula, the Indonesian Archipelago, Borneo, Sarawak, and Papua New Guinea, as well as the Pacific Islands, are home to these forests.

CHECK YOUR PROGRESS EXERCISE 1

Note: a) Use the space below for your answer.

b) Compare your answer with those given at the end of the unit.

Tick mark on the correct answer for the statement given below.

1. Ecosystem includes
 - a) Plants
 - b) Animals
 - c) Abiotic components
 - d) Biotic and abiotic components

3.3 TEMPERATE FORESTS

A temperate forest is one that is situated in the temperate zone, halfway between the tropical and boreal zones. It is the world's second largest biome, containing 25% of the planet's forest area. These forests can be found at latitudes ranging from 25 to 50 degrees in both hemispheres. Temperate forests experience a wide range of temperatures that correspond to the seasons. Summers are hot, with highs of 86 degrees Fahrenheit, while winters are bitterly cold, with lows of -22 degrees Fahrenheit. Temperate forests receive a lot of rain, typically between 20 and 60 inches each year. Rain and snow are the two types of precipitation. Temperate forests are able to host a diverse range of plant life and flora due to ample rainfall and rich soil humus. The vegetation in this area is divided into numerous strata, ranging from lichens and mosses on the ground to huge tree species such as oak and hickory that rise above the forest floor. Beavers, black and brown bears, deer, foxes, raccoons, skunks, rabbits, and a variety of bird species thrive in these forests. Deciduous, coniferous, and Broad-leaved Evergreen forests are the three types of temperate forests. The Eastern United States, Canada, Europe, China, and Japan are home to deciduous forests on the southern edge of the Boreal forests. The Eastern United States, Europe, Western Turkey, Eastern Iran, Western China, and Japan are all home to these forests, which are mostly located between 30 and 50 degrees north latitude. Warm summers and frigid winters (temperatures as low as -30°C) are the norm for temperate deciduous woods. The most common trees are maples, beech, hickories, and oaks. All of tree leaves fall off in the winter months in temperate deciduous woods, which have four different seasons. Photosynthesis decreases as temperatures drop and daylight hours shorten in the fall. As a result, when warmer temperatures and longer hours of daylight return in the spring, new leaves arise from the buds. The highland forests are covered in temperate coniferous forests (also known as cloud forests because they receive most of their precipitation from the mist or fog that comes up from the lowlands). High-elevation tropical, subtropical, and temperate zones of North America, Europe, and Asia are home to some of these montane forests and grasslands. *Abies*, *pinus*, *pseudotsuga*, and *Thuja* are all important trees. Fir, oak, ash, maple, birch, beech, poplar, and elm are among the most common trees found in broad-leaved evergreen forests. Olive, cork, oak, and stone pine are widely spaced hardwood evergreen trees prevalent in the Mediterranean region.

3.4 BOREAL FORESTS

Boreal forests receive less rain than other forests and are home to evergreen trees that remain green throughout the year. This is due to their needles, which require less water than typical tree leaves. Only the Northern Hemisphere has boreal forests, which can be found in the high latitudes of North America and Eurasia, from Scandinavia to eastern Siberia. Extreme cold prevails, soil remains beneath the surface, and the frost-free season lasts 50-100 days. This type of forest covers roughly 20% of the world's total forest area. Plant richness is significantly lower than in temperate forests, with a few number of coniferous species dominating the tree population. The biodiversity of the fauna is also lower than in temperate forests, although it supports a significant number of nesting birds during the summer. Spruces, firs, and larches are among the trees

found. The forest floor is intensively shadowed by relatively small trees that do not surpass 30 metres in height. There is a lot of fire. In Canada, Alaska, and Russia, enormous swaths of boreal forest cover vast swaths of land. Boreal woods also serve as a significant carbon sink. They absorb carbon dioxide, a major contributor to global warming and climate change, as do all forests, eliminating it from the atmosphere and contributing to the overall health of the earth.

CHECK YOUR PROGRESS EXERCISE 2

Note: a) Use the space below for your answer.

b) Compare your answer with those given at the end of the unit.

1. Fill in the blanks with appropriate words.

- a) A temperate forest is one that is situated in the temperate zone, halfway between theand.....zones.
- b) Temperate forests receive a lot of rain, typically between.....to..... inches annually.
- c)forests serve as a significant carbon sink.

3.5 GRASSLANDS

Grassland is a type of environment dominated by grasses and other herbaceous blooming plants, with a few trees and bushes thrown in for good measure. Grasslands are an intermediate stage in ecological succession that encompass a portion of the land at all altitudes and latitudes when climatic and soil conditions prevent tree growth. Grasslands cover over a quarter of the earth's surface. The types of plants that thrive here are mostly determined by the climate and soil conditions. Grasslands are found in locations where there isn't enough consistent rainfall to support forest growth, but not less to constitute a desert. During the monsoon, the low rainfall limits the growth of many trees and shrubs, but it is sufficient to maintain the growth of grass cover. Grasslands cover around a quarter of the Earth's surface. Grasslands can be found in nature or as a result of human activity. 'Anthropogenic Grasslands' are grasslands that have been developed and sustained by human activity. Natural Grasslands are those that form naturally.

Grasslands are known by various names in different parts of the world

Country	Name
Australia	Down
Canada	Prairies
Mexico	Pampas
South Africa	Veldt
Brazil	Campos
Asia	Steppes

Tropical Grasslands are found between the Tropics of Cancer and Capricorn, near the equator. The majority of Tropical Grasslands are found between

Tropical Rain Forests and Tropical Deserts in the interior parts of continents. Savannahs are another name for tropical grasslands. The tropical grasslands feature a tropical continental climate with alternate wet and dry seasons. The Grasslands are warm all year, with average monthly temperatures of 64° F or higher. The average yearly rainfall is between 30 and 50 inches. During the dry season, less than 4 inches of rain is obtained for at least five months of the year. The low sun period is related with the dry season. Bedrock and edaphic factors influence soil composition. However, because laterization is the most common soil-forming process, poor fertility oxisols are to be expected.

Temperate Grasslands are found north of the Tropic of Cancer and south of the Tropic of Capricorn, in the mid-latitudes. They are found in the transition zone between deserts and temperate forests. Summers in temperate grasslands are hot and humid, with an average temperature of 18° C, and winters are chilly and dry, with an average temperature of 10° C. These areas get between 10 and 20 inches of rain each year on average. Much of it falls as snow, which serves as a moisture reservoir for the start of the growth season. Because of the high evaporation rate, just a small amount of rain reaches the soil. Trees are uncommon in the Temperate Grasslands due to a lack of moisture, as they have longer life cycles and require a longer growing season than Grasses. Because grasses dry out in the winter, the appearance of grasslands in the winter is often brown. In these places, calcification is the most common soil-forming process. The dark brown mollisols generated under the Temperate Grasslands are characterised by mild leaching, high organic content, and a high concentration of calcium carbonate in the B horizon. When this procedure is used on a calcium-rich loess (silt deposit), the Chernozems, the world's most productive soils, are developed (black soil). Animal diversity in the Temperate Grassland is quite limited, especially when compared to the Tropical Grasslands. North American Bison, Pronghorn Antelope, Pocket Gopher, Ground Squirrels, Prairie Dog, Coyote, Badger, and Black-Footed Ferret are among the creatures.

CHECK YOUR PROGRESS EXERCISE 3

Note: a) Use the space below for your answer.

b) Compare your answer with those given at the end of the unit.

1. Match the words in column A with appropriate pairs in column B

Column A	Column B
Australia	Steppes
Mexico	Campos
Asia	Down
Brazil	Veldt
South Africa	Pampas

3.6 INLAND WETLANDS

Rivers, streams, springs, oases, seasonal streams, ponds, and lakes are examples of fresh running waterways. Marshes are one of the four basic forms of inland wetlands. Herbaceous plant species predominate over woody plant species in marshes. Marshes

form a transition between the aquatic and terrestrial ecosystems along the borders of lakes and streams. Grasses, rushes, and reeds are frequently dominant. If there are any woody plants, they are mostly low-growing shrubs. A forested wetland is known as a swamp. Swamps are known for their slow-moving or stagnant waters. They are frequently linked to nearby rivers or lakes. Swamp water can be freshwater, brackish water, or seawater. A mire is a wetland that is devoid of trees and is dominated by peat-forming plants and may be a bog or a fen. A bog is a peat-accumulating marsh. It's a dome-shaped landform that rises above the surrounding environment, with precipitation providing the majority of its water. A carbon sink is created by the gradual accumulation of dead plant material in bogs. A fen, on the other hand, is a wetland that receives water from both groundwater and precipitation. It's on an incline, flat, or dip.

3.7 COASTAL ECOSYSTEMS

Coastal ecosystems are one of the world's ecosystems. The Earth, as we all know, contains two sorts of ecosystems: a land environment and a water ecosystem. This ecology on the beach is a form of land ecosystem. The coastal ecology is a land ecosystem that is next to the marine ecosystem. Coastal ecosystems are defined as a unit of both biotic and abiotic components that are found along the coast, interact with one another, and impact one another while forming an energy flow. The interplay between these components creates a biotic framework as well as the material cycle, in addition to generating energy. This coastal habitat, like other ecosystems, contains a variety of biotic and abiotic components. Algae, mangroves, marine anemones, shrimp, crabs, fish, and other coastal plants and animals are examples of biotic components found in coastal habitats. Sand, land, temperature, air, humidity, rocks, and sunlight are some of the abiotic components that the coastal environment possesses. The bulk of the world's coastal ecosystems have these abiotic components. This is because we can easily find components in the area surrounding the coast. Tides have a significant impact on coastal ecosystems. The daily cycle of sea water is represented by these tides. As a result, the only flora and animals that may live in the coastal zone are those that have adapted by adhering themselves to the hard ground in order to avoid being carried away by the waves. The Coastal Ecosystem is a one-of-a-kind ecosystem that includes land, seawater, and air. The coastal ecosystem is made up of a number of different units. These units are only owned by coastal ecosystems and not the other ecosystems. One of the most important units of coastal ecosystems are the Mangroves.

"Mangroves represent a characteristic littoral (near the sea shore) forest ecosystem, and they are mostly evergreen forests that grow in sheltered low lying coasts, estuaries, mudflats, tidal creeks backwaters (coastal waters held back on land), marshes, and lagoons of tropical and subtropical regions," according to one of its oft-quoted definitions. Mangroves are 'halophyte' plants, meaning they can survive in a salty environment. Temperature, salinity, dissolved oxygen, tide, and wind speed all have a part in mangrove ecosystem growth. Mangrove species are classified as 'front', 'mid', or 'back' mangroves depending on their ability to tolerate salinity. Mangroves have evolved special adaptations to help them survive and thrive in a harsh environment. Their strategic intertidal location, on the other hand, provides habitat for a wide range of plant and animal species, making the mangrove ecosystem extremely

productive. The mangrove environment is found in 112 tropical and subtropical countries, and it requires a temperature of at least 24°C to survive. Sundarbans is the world's biggest mangrove forest, spanning portions of India and Bangladesh. Mangroves may be found in all of India's coastal states and islands. Mangroves cover roughly 304 square kilometres of coastline in Maharashtra, covering 52 creeks and the beach. Mangroves are ecologically important because they provide home for a wide variety of land and marine creatures. Because mangroves are at the intersection of terrestrial and marine habitats, they have a greater diversity of organisms. Mangroves have a high salt tolerance, hence some species that require this environment thrive there. To cope with salt water immersion, mangroves have a "complex salt filtering system" and a "complicated root system." They've also evolved to cope with the low oxygen levels seen in damp mud. To filter saline water through their roots, they need a lot of sunlight. As a result, mangroves can only be found in tropical and subtropical coastal seas. There are around 80 different species of mangrove trees discovered. Mangrove trees have a vital function in shoreline stabilisation and reinforcement. In this way, they safeguard these coastlands from erosion caused by the frequent activity of waves and tides. They operate as a protective barrier against storms. This power of mangrove forests has saved precious property and many lives from destruction all across the world. Mangrove plants have a number of adaptations that enable them to thrive in tough conditions. Mangroves are vital to the coastal environments in which they live. They act as a physical barrier between marine and terrestrial communities. They shield beaches from storms, waves, and flooding.

3.8 OPEN OCEANS

The Ocean is biotic ecosystems that exists in the ocean and helps marine life thrive. The ocean is separated into three strata. The photic zone is the ocean layer through which sunlight can pass, allowing photosynthesis to take place. The aphotic zone is located underneath the photic zone, where photosynthesis is not possible. The muddy bottom of the ocean is referred to as the benthic zone, just as it is in lakes. The ocean biome is home to a diverse range of aquatic species, from whales to little fish. It's also a place where experience breeds and thrives in the water, with full support from the surrounding community. It has several zones where marine life develops, grows, and thrives. The Pacific, Atlantic, Arctic, Indian, and Southern Oceans are the five oceans that make up the Marine Biome. The Ocean Biome is colder at the poles for natural causes, but it becomes warmer near the Equator when the sun shines directly on the sea, raising the temperature. Any change in climatic circumstances has a significant impact on marine life. Waves and currents cause typhoons and hurricanes, which have a major impact on marine organisms and ecosystems. The annual precipitation averages over 100 inches. Because the raindrops are large and the Biome is made up of water, most of the world's rain falls on the ocean. Some animals have evolved to cope with the unpredictable nature of seasonal calamities. When calamity occurs or is expected to happen in the near future, they want to migrate to safer regions. Seagrasses, algae, and seaweeds are the most common plants found in the Ocean Biome. Seaweeds are mature plants and algae, which are the purest form in the tiny dimension. Aquatic plants, primarily seagrasses and macroalgae, provide food and shelter to a variety of

creatures. The Marine Biome is home to a variety of water species that feed on the Biome's flora and small animals. Animals can find refuge in the vegetation. Crustaceans, whales, sea anemones, mollusks, microbes, and fungi are some of the animals that live in the Biome.

CHECK YOUR PROGRESS EXERCISE 4

Note a) Use the space below for your answer.

b) Compare your answer with those given at the end of the unit.

1 Write True or False in front of the statements given below.

- a) A mire is a wetland that is devoid of trees and is dominated by peat-forming plants.
- b) Tides do not have a significant impact on coastal ecosystems.
- c) Mangroves are ecologically important because they provide home for a wide variety of land and marine creatures.
- d) The photic zone is the ocean layer through which sunlight can pass, allowing photosynthesis to take place.
- e) The mangrove environment is found in 212 tropical and sub-tropical countries, and it requires a temperature of at least 54 ° C to survive.

3.9 ARID AND SEMI-ARID LAND

Arid regions are defined by their lack of precipitation, which is often less than 10 inches (25 cm) per year. Rainfall in semi-arid areas ranges from 10 to 20 inches (25 to 50 cm) per year. Despite the fact that the rocks and tectonic elements that underpin dry regions are similar to those found elsewhere, the landscape is distinct. Erosion is the most important force in altering the ground surface because there is minimal vegetation and often loose surface material. Erosions are common in these areas, and water is a major cause of erosion in arid areas. Streams may only be active during and immediately after a heavy rain, but flowing water during a flash flood can transport massive volumes of material. Badland, pediments, bajadas, and playas are arid and semi-arid landforms formed by the mechanical disintegration of rocks and the action of water. Arid zones and scorching deserts cover roughly 1/3 of the world's geographical surface. Arid and semi-arid biomes cover over 41% of the world's land area and provide critical ecosystem services (such as food, fibre, biofuel, and biodiversity) to a rapidly rising global population.

CHECK YOUR PROGRESS EXERCISE 5

Note: a) Use the space below for your answer.

b) Compare your answer with those given at the end of the unit.

1. Compare the blank spaces in the following statements with appropriate words.

Arid zones and scorching.....cover roughly....of the world's geographical surface. Arid and semi-arid biomes cover over.....of the world's land area and provide critical ecosystem services such as.....
.....and biodiversity to a rapidly rising global population.

3.10 ARCTIC AND ALPINE ECOSYSTEMS

The low lying treeless plains of the tundra, which range from moist meadows to dry fields, cover large portions of the Arctic in North America and northern Asia. Of course, alpine locations are non-contiguous and subject to a range of regional climate constraints. Despite this, there are many similarities between the arctic and alpine environments. The treeless character of both tundra settings is often attributed to cool summers, and the mean annual temperature provides an indication of the existence of permafrost throughout the arctic and is increasingly recognised in alpine ecosystems as well. The arctic receives essentially little sun radiation for up to six months of the year, but the alpine receives regular diurnal and seasonal regimes appropriate to their latitudes. Although the arctic is not particularly windy, the alps have maximum and high mean wind speeds. Temperature appears to be the key limiting factor in arctic and alpine ecosystem productivity, with net output in the same range as in deserts.

3.11 AGRO-ECOSYSTEMS

The interacting elements of environmental and biological characteristics of a farm and the surrounding area are described as agroecosystems. An agroecosystem is defined as a region that is touched by agricultural activity, such as changes in the complexity of species assemblages and energy flows, as well as the net nutrient balance, and is not limited to the immediate location of agricultural activity (e.g. the farm). Agroecosystems are complex and difficult to maintain, and as a result, they are frequently the most disturbed of the planet's ecosystems. In comparison to a natural environment like a forest, an agroecosystem has a lower diversity of animal and plant species. Only one to four major crop species and six to ten major pest species are found in a typical agroecosystem. Both intentional and spontaneous diversity characterise agroecosystems. Planned diversity refers to the spatial and temporal arrangement of domesticated plants and animals that farmers intentionally put in the system, as well as the addition of beneficial organisms. Weedy plants, herbivores, predators, bacteria, and other creatures that survive after the system has been converted to agriculture or colonise it from the surrounding landscape are examples of unplanned variety. Both types of diversity have a significant impact on agroecosystem production, stability, pest control, soil processes, and organism mobility between agriculture and natural habitats in the agricultural landscape. An agroecosystem is heavily managed by humans and subjected to abrupt changes such as ploughing, intercultivation, and pesticide treatment. These strategies are crucial in pest management because they have a significant impact on pest populations. Due to a lack of diversity in plant and insect species, as well as rapid weather and human-induced changes, agroecosystems can be more vulnerable to pest damage and catastrophic outbreaks. An agroecosystem, on the other hand, is a complex of food chains and food webs that combine to form a stable unit.

3.12 PLANTATION FORESTS

Plantation forests span roughly 140 million hectares in the world, accounting

for around 7% of total forest cover. In terms of delivering a sustainable volume of timber and fibre, cultivated forests are usually more productive than natural forests. Around 40% of industrial wood is produced on plantations. Both the area of plantations and their contribution to global wood output are expected to grow in the near future.

CHECK YOUR PROGRESS EXERCISE 6

Note: a) Use the space below for your answer.

b) Compare your answer with those given at the end of the unit.

1. Write a short note on the following ecosystems:

a) Agroecosystem

.....
.....
.....
.....

b) Arctic and alpine ecosystems

.....
.....
.....
.....

3.13 LET US SUM UP

An ecosystem is a geographical area in which plants, animals, and other species, as well as weather and topography, work together to create a bubble of life. Ecosystems might be large, with hundreds of different creatures and plants coexisting in perfect harmony, or they can be small. Due to the difference in topography, geography, climate and species composition, several major ecosystems prevail on earth. Major ecosystems are;

Tropical forests are found between the Cancer and Capricorn lines, which are both 23.5 degrees north and south of the equator. These forests are classified into two types: evergreen and deciduous. Tropical Evergreen or tropical rain forests are found near the equator, are hot and humid throughout the year, get up to 2000 mm of rain per year, and have a uniformly high relative humidity. Tropical deciduous forests are the other type of tropical forest. Southeast Asia, Sri Lanka, the Malaysian Peninsula, the Indonesian Archipelago, Borneo, Sarawak, and Papua New Guinea, as well as the Pacific Islands, are home to tropical rainforests.

A temperate forest is one that is situated in the temperate zone, halfway between the tropical and boreal zones. It is the world's second largest biome, containing 25% of the planet's forest area. Temperate woods receive a lot of rain, typically between 20 and 60 inches each year. Rain and snow are the two

types of precipitation. Temperate forests are able to host a diverse range of plant life and flora due to ample rainfall and rich soil humus. Deciduous, coniferous, and Broad-leaved Evergreen forests are the three types of temperate forests.

Boreal forests receive less rain than other forests and are home to evergreen trees that remain green throughout the year. This type of forest covers roughly 20% of the world's total forest area. Plant richness is significantly lower than in temperate forests, with a few number of coniferous species dominating the tree population.

Grassland is a type of environment dominated by grasses and other herbaceous blooming plants, with a few trees and bushes thrown in for good measure. Grasslands are found in locations where there isn't enough consistent rainfall to support forest growth, but not less to constitute a desert.

Rivers, streams, springs, oases, seasonal streams, ponds, and lakes are examples of fresh running waterways. Marshes are one of the four basic forms of inland wetlands. A forested wetland is known as a swamp. Swamps are known for their slow-moving or stagnant waters. They are frequently linked to nearby rivers or lakes. Swamp water can be freshwater, brackish water, or seawater. A mire is a wetland that is devoid of trees and is dominated by peat-forming plants and may be a bog or a fen.

Coastal ecosystems are one of the world's ecosystems. Coastal ecosystems are defined as a unit of both biotic and abiotic components that are found along the coast, interact with one another, and impact one another while forming an energy flow. The interplay between these components creates a biotic framework as well as the material cycle, in addition to generating energy. Algae, mangroves, marine anemones, shrimp, crabs, fish, and other coastal plants and animals are examples of biotic components found in coastal habitats. Sand, land, temperature, air, humidity, rocks, and sunlight are some of the abiotic components that the coastal environment possesses. Mangroves are 'halophyte' plants, meaning they can survive in a salty environment. Temperature, salinity, dissolved oxygen, tide, and wind speed all have a part in mangrove ecosystem growth. Mangroves have evolved special adaptations to help them survive and thrive in a harsh environment. Mangroves have a high salt tolerance, hence some species that require this environment thrive there. To cope with salt water immersion, mangroves have a "complex salt filtering system" and a "complicated root system."

The Ocean is biotic ecosystems that exists in the ocean and helps marine life thrive. The ocean biome is home to a diverse range of aquatic species, from whales to little fish. Any change in climatic circumstances has a significant impact on marine life. Waves and currents cause typhoons and hurricanes, which have a major impact on marine organisms and ecosystems. The annual precipitation averages over 100 inches. Seagrasses, algae, and seaweeds are the most common plants found in the Ocean Biome.

Arid regions are defined by their lack of precipitation, which is often less than 10 inches (25 cm) per year. Rainfall in semi-arid areas ranges from 10 to 20 inches (25 to 50 cm) per year. Erosion is the most important force in altering the ground

surface because there is minimal vegetation and often loose surface material. Arid and semi-arid biomes cover over 41% of the world's land area and provide critical ecosystem services (such as food, fibre, biofuel, and biodiversity) to a rapidly rising global population.

The low lying treeless plains of the tundra, which range from moist meadows to dry fields, cover large portions of the Arctic in North America and northern Asia. Of course, alpine locations are non-contiguous and subject to a range of regional climate constraints. Temperature appears to be the key limiting factor in arctic and alpine ecosystem productivity, with net output in the same range as in deserts.

The interacting elements of environmental and biological characteristics of a farm and the surrounding area are described as agroecosystems. Agroecosystems are complex and difficult to maintain, and as a result, they are frequently the most disturbed of the planet's ecosystems. In comparison to a natural environment like a forest, an agroecosystem has a lower diversity of animal and plant species. Only one to four major crop species and six to ten major pest species are found in a typical agroecosystem.

Plantation forests span roughly 140 million hectares in the world, accounting for around 7% of total forest cover. Around 40% of industrial wood is produced on plantations. Both the area of plantations and their contribution to global wood output are expected to grow in the near future.

3.14 KEYWORDS

Ecosystem: An ecosystem is a geographical area in which plants, animals, and other species, as well as weather and topography, work together to create a bubble of life.

Anthropogenic Grasslands: Grasslands that have been developed and sustained by human activity.

Savannah: Another name for tropical grasslands.

Chernozems: A fertile black soil rich in humus.

Mire: A wetland that is devoid of trees and is dominated by peat-forming plants.

Bog: A bog is a peat-accumulating marsh.

Fen: A wetland that receives water from both groundwater and precipitation.

Littoral: Near the sea shore

Halophyte: Plant that can tolerate salty environments.

Photic zone: Ocean layer through which sunlight can pass, allowing photosynthesis to take place

Aphotic zone: located underneath the photic zone, where photosynthesis is not possible.

3.15 TERMINAL QUESTIONS

- a) What is an Ecosystem?
- b) Differentiate between Tropical Evergreen and Tropical Deciduous forests?
- c) What are Natural and Anthropogenic grasslands?
- d) What are Halophytes?
- e) What is a Mire?

3.16 ANSWERS TO CHECK YOUR PROGRESS EXERCISES

Check Your Progress Exercise 1

- 1) D

Check Your Progress Exercise 2

- 1. A) Temperate and boreal
- B) 20;60
- C) Boreal ecosystems

Check Your Progress Exercise 3

Column A	Column B
Australia	Down
Mexico	Pampas
Asia	Steppes
Brazil	Campos
South Africa	Veldt

Check Your Progress Exercise 4

- 1. A) True
- B) False
- C) True
- D) True
- E) False

Check Your Progress Exercise 5

- 1. Deserts; 1/3; 41%; food, fibre, biofuel

Check Your Progress Exercise 6

- 1. a) An agroecosystem is defined as a region that is touched by agricultural activity, such as changes in the complexity of species assemblages and energy flows, as well as the net nutrient balance, and is not limited to the immediate location of agricultural activity.

b) The arctic receives essentially little sun radiation for up to six months of the year, but the alpine receives regular diurnal and seasonal regimes appropriate to their latitudes.

3.17 ANSWERS TO TERMINAL QUESTIONS

- a) An ecosystem is a geographical area in which plants, animals, and other species, as well as climate and topography, work together to create a bubble of life.
- b) Anthropogenic Grasslands are grasslands that have been developed and sustained by human activity. Natural Grasslands are those that form naturally.
- c) Salt tolerating plants are known as Halophytes.
- d) Mire is a wetland that is devoid of trees and is dominated by peat-forming plants and may be a bog or a fen.

3.18 SOME USEFUL BOOKS

- Sharma, P.D. 2018. Ecology and Environment, Rastogi Publications.
- Odum, E. 2005 (Edition). Fundamentals of Ecology, Cengage Learning India
- Rana, S.V.S. 2013. Essentials OF Ecology and Environmental Science, Fifth Edition 5th Edition.