

CHAPTER 3 THE BIOSPHERE – SUMMARY**3.1 What is Ecology?**

Ecology is the scientific study of interactions among organisms and between organisms and their environment. Earth's organisms live in the biosphere. The biosphere consists of the parts of the planet in which all life exists. It includes land, water, and air, or atmosphere.

Ecology includes the study of all the different levels of life, ranging from the individual organism to the biosphere. Above the level of the individual organism is the species. A species is a group of organisms so similar to one another that they can breed together and produce fertile offspring. A group of individuals that belong to the same species and live in the same area is called a population. A collection of different populations that live together in an area is referred to as a community. An ecosystem includes all the organisms that live in a particular place, together with their physical environment. A group of ecosystems that have the same climate and similar dominant communities is called a biome.

Ecologists use three basic methods of research: observing, experimenting, and modeling. Observing often leads to questions and hypotheses. Experimenting can be used to test hypotheses. Experimenting may be done in a laboratory or in the natural world. Modeling helps ecologists understand complex processes.

3.2 Energy, Producers, and Consumers

All organisms need to obtain energy from their environment to power life processes. Sunlight is the main energy source for life on Earth. Some organisms rely on the energy stored in inorganic chemical compounds. Organisms that can capture energy from sunlight or chemicals and use that energy to produce food are called autotrophs. Autotrophs are also known as producers. Only plants, some algae, and certain bacteria are producers. On land, plants are the main autotrophs.

The process in which autotrophs use light energy to make food is called photosynthesis. In photosynthesis, light provides the energy needed

to turn carbon dioxide and water into oxygen and carbohydrates. The process in which autotrophs use chemical energy to produce carbohydrates is called chemosynthesis. Chemosynthesis is performed by only certain types of bacteria.

Organisms that rely on other organisms for their energy and food are called heterotrophs. Heterotrophs are also referred to as consumers. There are many different types of heterotrophs. Herbivores, such as cows, obtain energy by eating only plants. Carnivores, such as snakes, eat only animals. Omnivores, such as humans, eat both plants and animals. Detritivores, such as earthworms, feed on plant and animal remains and other dead matter. Decomposers, such as fungi, break down organic matter.

3.3 Energy Flow

Energy flows through an ecosystem in one direction. It flows from the sun, or from inorganic compounds, first to autotrophs and then to heterotrophs. A food chain is a series of steps in which organisms transfer energy by eating and being eaten. A food web links together all the food chains in an ecosystem. Each step in a food chain or food web is called a trophic level. Producers make up the first trophic level. Consumers make up higher trophic levels. Each consumer depends on the trophic level below it for energy.

An ecological pyramid is a diagram that shows the relative amounts of energy or matter contained within each trophic level in a food chain or food web. Types of ecological pyramids are energy pyramids, biomass pyramids, and pyramids of numbers. Energy pyramids show how much energy is available within each trophic level. Only about 10 percent of the energy available within one trophic level is transferred to organisms at the next trophic level.

Biomass pyramids show the biomass, or total amount of living tissue, within each trophic level. A pyramid of numbers shows the relative number of individual organisms at each trophic level.

3.4 Cycles of Matter

Matter, unlike energy, is recycled within and between ecosystems. Matter is passed from one organism to another and from one part of the biosphere to another through biogeochemical cycles. These cycles connect biological, geological, and chemical processes. Matter can cycle through the biosphere because biological systems do not use up matter, they only change it.

All living things require water to survive. Water cycles between the ocean, atmosphere, and land. Several different processes are involved in the water cycle, including evaporation and transpiration. Evaporation is the process in which water changes from a liquid to a gas. Transpiration is the process in which water evaporates from the leaves of plants.

All the chemical substances that an organism needs to survive are called nutrients. Like water, nutrients cycle within and between ecosystems.

The three most important nutrient cycles are the carbon, nitrogen, and phosphorus cycles. Carbon is a key ingredient of living tissue. Processes involved in the carbon cycle include photosynthesis and human activities such as burning. Nitrogen is needed by all organisms to build proteins. Processes involved in the nitrogen cycle include nitrogen fixation and denitrification. In nitrogen fixation, certain bacteria convert nitrogen gas into ammonia. In denitrification, other bacteria convert nitrogen compounds called nitrates back into nitrogen gas. Phosphorus is needed for molecules such as DNA and RNA. Most of the phosphorus in the biosphere is stored in rocks and ocean sediments. Stored phosphorus is gradually released into water and soil, where it is used by organisms.

The primary productivity of an ecosystem is the rate at which organic matter is created by producers. One factor that controls primary productivity is the amount of available nutrients. When an ecosystem is limited by a single nutrient that is scarce or cycles very slowly, this substance is called a limiting nutrient. If an aquatic ecosystem receives a large quantity of a limiting nutrient, there may be a sudden increase in the amount of algae, called an algal bloom.

Matching *In the space provided, write the letter of the definition that best matches each term.*

- | | |
|--------------------------|---|
| _____ 1. Biosphere | a. collection of different populations that live together in an area |
| _____ 2. Community | b. consumer that feeds on plant and animal remains and other dead matter |
| _____ 3. Autotroph | c. process in which water evaporates from the leaves of plants |
| _____ 4. Chemosynthesis | d. combined parts of the planet in which all life exists |
| _____ 5. Detritivore | e. each step in a food chain or food web |
| _____ 6. Biomass | f. total amount of living tissue within a trophic level |
| _____ 7. Transpiration | g. organism that can capture energy and use it to produce food |
| _____ 8. Denitrification | h. group of ecosystems that have the same climate and similar dominant communities |
| _____ 9. Biome | i. process in which organisms use chemical energy to produce carbohydrates |
| _____ 10. trophic level | j. process in which bacteria convert nitrates into nitrogen |

True or False Determine whether each statement is true or false. If it is true, write true in the space provided. If the statement is false, change the underlined word or words to make the statement true.

	A(An) <u>species</u> is a collection of all the organisms that live in a particular place, together with their physical environment.
	The process in which autotrophs use light energy to make carbohydrates is called <u>nitrogen fixation</u> .
	Heterotrophs that eat both plants and animals are referred to as <u>carnivores</u> .
	A(An) <u>food web</u> links together all the food chains in an ecosystem.
	The rate at which organic matter is created by producers is called the <u>limiting nutrient</u> of an ecosystem.
	<u>Ecology</u> is the scientific study of interactions among organisms and between organisms and their environment
	A(An) <u>community</u> is a group of individuals that belong to the same species and live in the same area.
	Autotrophs are also called <u>consumers</u> .
	Organisms that break down organic matter are called <u>herbivores</u> .
	The process in which water changes from a liquid to a gas is called <u>evaporation</u>

SUMMARY

CHAPTER 4 – ECOSYSTEMS AND COMMUNITIES

4.1 CLIMATE

Weather is the condition of Earth's atmosphere at a particular time and place. Climate is the average yearly condition of temperature and precipitation in a region. Climate is caused by latitude, winds, ocean currents, and the shape and height of landmasses. Climate affects ecosystems, because all organisms have certain needs for temperature and other aspects of climate. Temperature on Earth stays within a range suitable for life due to the greenhouse effect.

The greenhouse effect is the trapping of heat by gases in the atmosphere. Differences in latitude determine the angle of sunlight striking Earth. This angle determines how much of the surface is heated. Differences in heating result in three main climate zones: polar, temperate, and tropical. Unequal heating of Earth's surface also causes winds and ocean currents. Winds and currents move heat through the biosphere.

4.2 Niches and Community

Organisms in ecosystems are influenced by both biological, or biotic, and physical, or abiotic, factors. Biotic factors include all the living things with which organisms interact. Abiotic factors include temperature, soil type, and other nonliving factors.

The area where an organism lives is called its habitat. A habitat includes both biotic and abiotic factors. A niche consists of all the physical and biological conditions in which an organism lives and the way in which the organism uses those conditions. For example, a niche includes what an organism eats and how it gets its food.

Organisms in communities may interact in one of three ways: competition, predation, or symbiosis.

Competition occurs when organisms try to use the same resources, or necessities of life. Competition often results in one organism dying out. This is the basis of the competitive exclusion principle. This principle states that no two species can occupy the same niche in the same habitat at the same time. Predation occurs when one organism (the predator) captures and eats another (the prey).

Symbiosis occurs when two species live closely together in one of three ways: mutualism, commensalism, or parasitism. In mutualism, both species benefit from the relationship. In commensalism, one species benefits and the other is neither helped nor harmed. In parasitism, one species benefits by living in or on the other and the other is harmed.

4.3 SUCCESSION

As an ecosystem ages, older inhabitants gradually die out and new organisms move in. The series of predictable changes that occurs in a community over time is called ecological succession. Primary succession occurs on bare rock surfaces where no soil exists. The first species to live in an area of primary succession are called pioneer species. Secondary succession occurs when a disturbance changes a community without removing the soil.

4.4 BIOMES

A biome is a group of communities on land that covers a large area and is characterized by certain soil and climate. Within a biome, there may be microclimates. A microclimate is the climate of a small area that differs from the climate around it. Species may be found over a large or small area, depending on their tolerance. Tolerance is the ability to survive and reproduce under difficult conditions. There are ten major biomes: tropical rain forest, tropical dry forest, tropical savanna, desert, temperate grassland, temperate woodland and shrubland, temperate forest, northwestern coniferous forest, boreal forest (or taiga), and tundra. Each biome has a unique set of abiotic factors and a characteristic collection of organisms.

In tropical forests, the tops of tall trees form a covering, called the canopy. Shorter trees and vines form another layer, called the understory. In other forests, trees may be deciduous, meaning they shed their leaves during a particular season each year. Coniferous forests have trees called conifers that produce seed cones. Temperate forests have soils rich in humus, which forms from decaying leaves and makes soil fertile. Tundra is characterized by permafrost, a layer of permanently frozen subsoil. Some areas, such as mountains and polar ice caps, do not fall neatly into the major biomes.

4.5 Aquatic Ecosystems

Aquatic ecosystems are determined mainly by the depth, flow, temperature, and chemistry of the water. Chemistry refers to the amount of salts, nutrients, and oxygen in the water. In many aquatic ecosystems, tiny organisms called plankton are common. Plankton consist of phytoplankton and zooplankton. Phytoplankton are single-celled algae that use nutrients in water to produce food. They form the base of many aquatic food webs. Zooplankton are animals that feed on phytoplankton.

Freshwater ecosystems include flowing water ecosystems (rivers and streams), standing-water ecosystems (lakes and ponds), and freshwater wetlands (bogs and swamps). In wetlands, water either covers the soil or is present at or near the surface for at least part of the year. Estuaries are wetlands formed where rivers meet the sea. They contain a mixture of fresh and salt water. Most of the food produced in estuaries enters food webs as tiny pieces of organic matter, called detritus. Salt marshes are temperate estuaries. Mangrove swamps are tropical estuaries.

Marine ecosystems are found in the ocean. The ocean can be divided into zones based on how much light penetrates the water. The photic zone is the well-lit upper layer of water where photosynthesis can occur. The aphotic zone is the permanently dark lower layer of water where only chemosynthesis can occur. The ocean also can be divided into three zones based on depth and distance from shore: the intertidal zone, coastal ocean, and open ocean. The intertidal zone is exposed to the rise and fall of tides each day. This may lead to zonation, or horizontal distribution of different types of organisms. Coastal ocean is the relatively shallow border of water that surrounds the continents. Kelp forests and coral reefs are found in coastal ocean. Open ocean consists of the rest of the ocean. Nutrients are scarce in open ocean, and fish are the dominant animals. The ocean floor is the benthic zone. Organisms that live on the ocean floor are called benthos.

Vocabulary Review

Multiple Choice *In the space provided, write the letter of the answer that best completes each sentence*

<p>1. The situation in which atmospheric gases trap the sun's heat and keep Earth's surface warm is called :</p> <p>a. weather. b. greenhouse effect. c. climate. d. primary succession.</p>
<p>2. Earth's three main climate zones are the result of:</p> <p>a. latitude and angle of heating. b. precipitation and temperature. c. winds and ocean currents. d. air masses and mountains.</p>
<p>3. An example of a biotic factor is:</p> <p>a. air temperature. b. availability of water. c. soil type. d. soil organisms.</p>
<p>4. The type of community interaction that involves one species living in or on another organism and harming the other organism is called:</p> <p>a. commensalism. b. parasitism. c. competition. d. mutualism.</p>
<p>5. A group of communities on land that covers a large area and is characterized by certain soil and climate is referred to as a(n):</p> <p>a. niche. b. wetland. c. biome d. habitat.</p>

Completion *Fill in the blanks with terms from Chapter 4.*

The average yearly condition of temperature and precipitation in a region is called _____.

A physical factor that influences an ecosystem is called a(an) _____.

When one organism captures and eats another it is referred to as _____.

The first species to live in an area of primary succession are called _____.

The area where an organism lives is its _____.

The ability of organisms to survive and reproduce under less than optimal conditions is called _____.

The well-lit upper layer of ocean water is known as the _____.

Kelp forests are found in the ocean zone called _____.

Organisms that live on the ocean floor are referred to as _____.

Zonation occurs in the ocean zone called the _____.

Section 3–1 What Is Ecology?**Interactions and Interdependence (page 63)**

1. What is ecology?

2. What does the biosphere contain?

3. Why do ecologists ask questions about events and organisms that range in complexity from an individual to the biosphere?

4. Complete the table about levels of organization.

LEVELS OF ORGANIZATION

Level	Definition
Species	
	A group of individuals that belong to the same species and live in the same area
Community	
Ecosystem	
	A group of ecosystems that have the same climate and dominant communities

What is the highest level of organization that ecologists study?

What are the three basic approaches scientists use to conduct modern ecological research?

Why might an ecologist set up an artificial environment in a laboratory?

Why are many ecological phenomena difficult to study?

Why do ecologists make models?

Is the following sentence true or false? An ecological model may consist of a mathematical formula. _____

Energy Flow

What is at the core of every organism's interaction with the environment?

What source of energy do organisms use that don't use the sun's energy?

What are autotrophs?

Why are autotrophs also called producers?

What do autotrophs do during photosynthesis?

For each of the following, write which kind of autotroph is the main producer.

a. Land:

b. Upper layers of ocean:

c. Tidal flats and salt marshes:

What is chemosynthesis?

Where do bacteria that carry out chemosynthesis live?

Heterotrophs are also called _____

Plant and animal remains and other dead matter are collectively called _____

Complete the table about types of heterotrophs.

Type	Definition	Examples
Herbivore		Cows, rabbits
	Heterotroph that eats animals	
Omnivore		Humans, bears, crow
Detritivore		
Decomposer		

How does energy flow through an ecosystem?

Complete the table about feeding relationships.

Term	Description
Food Chain	
Food Web	

What does a food web link together?

What is a trophic level?

In a food web, what organisms make up the first trophic level? _____

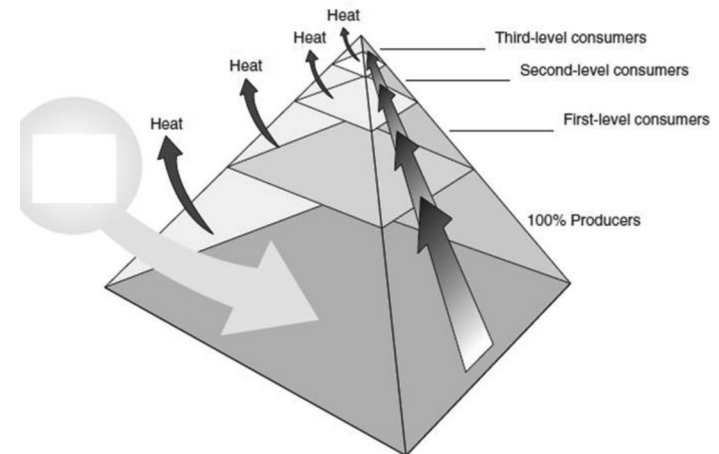
What does a consumer in a food chain depend on for energy?

Ecological Pyramids

What is an ecological pyramid?

Why is it that only part of the energy stored in one trophic level is passed on to the next level?

Complete the energy pyramid by writing the source of the energy for the food web and how much energy is available to first-, second-, and third-level consumers.



What is biomass?

What does a biomass pyramid represent?

What does a pyramid of numbers show?

Why can each trophic level support only about one tenth the amount of living tissue as the level below it?

Cycles of Matter

What are the four elements that make up over 95 percent of the body in most organisms?

How is the movement of matter through the biosphere different from the flow of energy?

Matter moves through an ecosystem in

What do biogeochemical cycles connect?

The Water Cycle

Water can enter the atmosphere by evaporating from the leaves of plants in the process of

Circle the letter of each process involved in the water cycle.

- | | |
|------------------|------------------|
| a. precipitation | b. evaporation |
| c. runoff | d. fertilization |

Nutrient Cycles

What are nutrients?

What are the three nutrient cycles that play especially prominent roles in the biosphere?

- a.
- b.
- c.

Why is carbon especially important to living systems?

What are three large reservoirs where carbon is found in the biosphere?

- a. As carbon dioxide gas in the _____
- b. As dissolved carbon dioxide in the _____
- c. As coal, petroleum, and calcium carbonate rock found _____

In what process do plants use carbon dioxide?

What is the main reservoir of nitrogen in the biosphere?

What is nitrogen fixation?

What is denitrification?

What role does denitrification play in the nitrogen cycle?

Circle the letter of each sentence that is true about the phosphorus cycle.

- a. Phosphate is released as rocks and sediments wear down.
- b. Plants absorb phosphate from the soil or from water.
- c. Phosphorus is abundant in the atmosphere.
- d. Organic phosphate cannot move through food webs.

Why is phosphorus essential to living things?

Nutrient Limitation

What is the primary productivity of an ecosystem?

If a nutrient is in short supply in an ecosystem, how will it affect an organism?

When is a substance called a limiting nutrient?

In the ocean and other saltwater environments, what is often the limiting factor?

What is the typical limiting factor in streams, lakes, and freshwater environments?

When an aquatic ecosystem receives a large input of a limiting nutrient, what is often the result, and what is this result called?

Why do blooms occur?

WordWise

Complete the sentences by using one of the scrambled words below.

dcruorps meio aieoioibgchmcl yecl
mtssyceoe ythnssieoemhcs tnnreiu

The process by which organisms use chemical energy to produce carbohydrates is _____.

A collection of all the organisms that live in a particular place, together with their physical environment, is a(an) _____.

A chemical substance that an organism requires to live is a(an) _____.

Autotrophs, which make their own food, are also called _____.

A group of ecosystems that have the same climate and dominant communities is a(an) _____.

A process in which elements, chemical compounds, or other forms of matter are passed from one organism to another and from one part of the biosphere to another is a(an) _____.

Chapter 4 Ecosystems and Communities

What Is Climate?

How is weather different from climate?

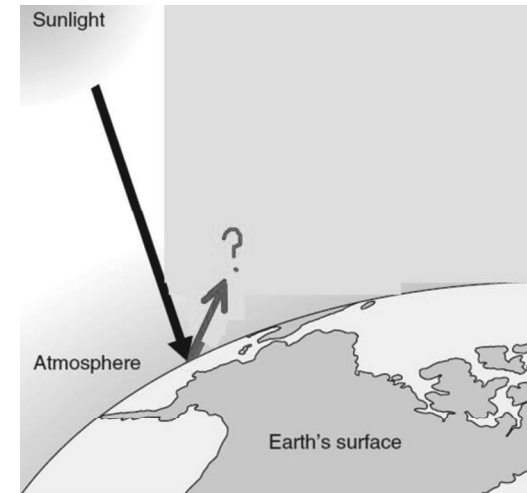
What factors cause climate?

The Greenhouse Effect

3. Circle the letter of the world's insulating blanket.

- a. oxygen b. the atmosphere
c. the oceans d. solar energy

Complete the illustration of the greenhouse effect by showing in arrows and words what happens to the sunlight that hits Earth's surface.



What effect do carbon dioxide, methane, and a few other atmospheric gases have on Earth's temperature?

What is the greenhouse effect?

The Effect of Latitude on Climate

Why does solar radiation strike different parts of Earth's surface at an angle that varies throughout the year?

Circle the letter of where the sun is almost directly overhead at noon all year.

- a. the North Pole b. China c. the equator d. the South Pole

Why does Earth have different climate zones?

Complete the table about Earth's three main climate zones.

MAIN CLIMATE ZONES

Climate Zone	Location	Climate Characteristics
	Areas around North and South poles	
	Between the polar zones and the tropics	
	Near the equator	

Heat Transport in the Biosphere

What force drives winds and ocean currents?

The process in which water rises toward the surface in warmer regions is called: _____

Circle the letter of each sentence that is true about ocean currents.

- a. Patterns of heating and cooling results in ocean currents.
 b. Ocean currents transport heat within the biosphere.
 c. Surface water moved by winds results in ocean currents.
 d. Ocean currents have no effect on the climate of landmasses.

Niches and Community Interactions

Biotic and Abiotic Factors

Complete the table about factors that influence ecosystems.

FACTORS THAT INFLUENCE ECOSYSTEMS

Type of Factor	Definition	Examples
Biotic factors		
Abiotic factors		

What do the biotic and abiotic factors together determine?

The Niche

What is a niche?

In what ways is food part of an organism's niche?

Explain the difference between a nice and a habitat?

Circle the letter of each sentence that is true about niches.

- a. Different species can share the same niche in the same habitat.
- b. No two species can share the same niche in the same habitat.
- c. Two species in the same habitat have to share a niche to survive.
- d. Different species can occupy niches that are very similar.

Community Interactions

When does competition occur?

What is a resource?

What is often the result of direct competition in nature?

What is the competitive exclusion principle?

What is predation?

When predation occurs, what is the organism called that does the killing and eating, and what is the food organism called?

What is symbiosis?

Complete the table about main classes of symbiotic relationships

MAIN CLASSES OF SYMBIOTIC RELATIONSHIPS

Class	Description of Relationship
Mutualism	
Commensalism	
Parasitism	

The organism from which a parasite obtains nutritional needs is called a(an) _____.

Circle the letter of each sentence that is true of parasites.

- a. They generally weaken but do not kill their host.
- b. They obtain all or part of their nutritional needs from the host.
- c. They neither help nor harm the host.
- d. They are usually smaller than the host.

Ecological Succession

What is ecological succession?

What is primary succession?

The first species to populate an area when primary succession begins are called _____.

When a disturbance changes a community without removing the soil, what follows?

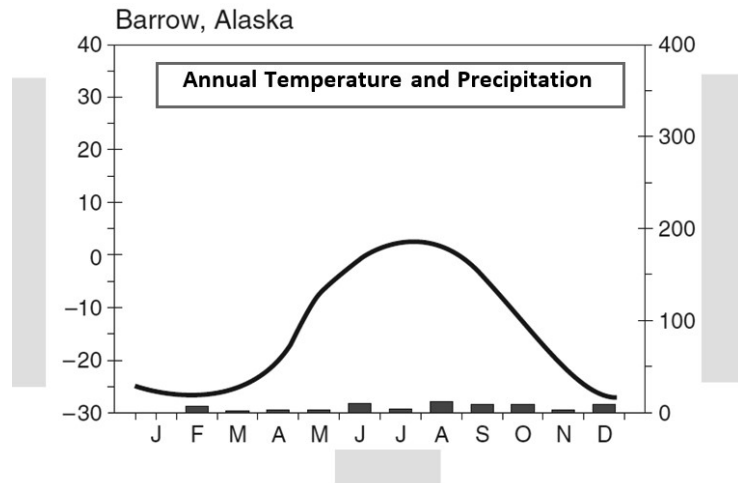
An area that was once referred to as a climax community may appear to be permanent, but what might cause it to undergo change?

Biomes

What is a biome?

What does a climate diagram summarize?

Complete the climate diagram by adding labels to the bottom and both sides of the graph to show what the responding variables are.



On a climate diagram, what does the line plot, and what do the vertical bars show?

What is a microclimate?

The Major Biomes

Circle the letter of *each* sentence that is true about how each of the world's major biomes is defined.

- Each is defined by a unique set of abiotic factors.
- Each has a characteristic ecological community.
- Each is defined by the country it is in.
- Each is particularly defined by climate.

In what kind of place do tropical dry forests grow?

What is a deciduous tree?

What is another name for tropical savannas?

Is the following sentence true or false? Savannas are found in large parts of eastern Africa.

Circle the letter of each sentence that is true about deserts.

- They are hot, day and night.
- The soils are rich in minerals but poor in organic material.
- Cactuses and other succulents are dominant plants.
- Reptiles are the only wildlife.

What amount of annual precipitation defines a desert biome?

What factors maintain the characteristic plant community of temperate grasslands?

Why is fire a constant threat in temperate woodland and shrubland?

Communities that are dominated by shrubs are also known as _____.

What kinds of trees do temperate forests contain?

What is a coniferous tree?

What is humus?

What is the geographic distribution of the northwestern coniferous forest?

Boreal forests are also called _____.

What are the seasons like in a boreal forest?

Circle the letter of each sentence that is true about boreal forests.

- a. Dominant plants include spruce and fir.
- b. They have very high precipitation.
- c. They have soils that are rich in humus.
- d. Dominant wildlife include moose and other large herbivores.

What is permafrost?

What happens to the ground in tundra during the summer?

Why are tundra plants small and stunted?

Other Land Areas

When are the polar regions cold?

What plants and algae can be found in the polar ice regions?

In the north polar region, what are the dominant animals?

The abiotic and biotic conditions of mountain ranges vary with _____

Number the sequence of conditions you would find as you moved from the base to the summit of a mountain. (Number the conditions at the base 1)

- _____ a. Stunted vegetation like that in tundra
- _____ b. Grassland
- _____ c. Forest of spruce and other conifers
- _____ d. Open woodland of pines

Aquatic Ecosystems

Aquatic ecosystems are primarily determined by what characteristics of the overlying water?

- a.
- b.
- c.
- d.

What does the depth of the water determine?

What does water chemistry primarily refer to?

Freshwater Ecosystems

What are the two main types of freshwater ecosystems?

- a.
- b.

Where do flowing-water ecosystems originate?

How does the circulating water in a standing-water ecosystem affect the ecosystem?

What is plankton?

What is a wetland?

What is brackish water?

What are three main types of freshwater wetlands?

- a.
- b.
- c.

What distinguishes a marsh from a swamp?

Estuaries

What are estuaries?

Tiny pieces of decaying plants and animals make up the _____ that provides food for organisms at the base of an estuary's food web.

Circle the letter of each sentence that is true about estuaries.

- a. Most primary production is consumed by herbivores.
- b. They contain a mixture of fresh water and salt water.
- c. Sunlight can't reach the bottom to power photosynthesis.
- d. They are affected by the rise and fall of ocean tides.

What are salt marshes?

Marine Ecosystems

What is the photic zone of the ocean?

The permanently dark zone below the photic zone is called the _____.

What are the three main vertical divisions of the ocean based on the depth and distance from the shore?

- a.
- b.
- c.

Circle the letter of each sentence that is true about the intertidal zone.

- a. Organisms there are exposed to extreme changes in their surroundings.
- b. The rocky intertidal zones exist in temperate regions.
- c. Organisms are battered by currents but not by waves.
- d. Competition among organisms often leads to zonation

What is zonation?

What are the boundaries of the coastal ocean?

Why is the coastal ocean often rich in plankton and many other organisms?

A huge forest of giant brown algae in the coastal ocean is a(an)

_____.

Circle the letter of each sentence that is true about coral reefs.

- a. The coasts of Florida and Hawaii have coral reefs.
- b. The primary structure of coral reefs is made of the skeletons of coral animals.
- c. Almost all growth in a coral reef occurs within 40 meters of the surface.
- d. Only a few organisms are able to live near coral reefs.

What are the boundaries of the open ocean?

The benthic zone covers the ocean _____.

What are the boundaries of the benthic zone?

Organisms that live attached to or near the bottom of the ocean are called _____.

WordWise

Answer the questions by writing the correct vocabulary terms from Chapter 4 in the blanks. Use the circled letter from each term to find the hidden word. Then, write a definition for the hidden word.

What are physical factors that shape ecosystems?

— — — — — — — — — — —

What is the full range of physical and biological conditions in which an organism lives and the way in which the organism uses those conditions?

— — — — —

What are the planktonic animals called?

— — — — — — — — — — —

What is a layer of permanently frozen subsoil in the tundra?

— — — — — — — — — — — — —

What is the average, year-after-year condition of temperature and precipitation in a particular region?

— — — — — — — — — — — — — — — — —

Hidden Word: — — — — —

Definition: