Chapter 3 Answers

3.1 Section Review

1. An ecosystem is a collection of organisms and their physical surroundings. An example is a rain forest; it has many types of organisms that have their own habitat or dwelling in the trees. Everything an organism needs to survive is found within their ecosystem. Student lists of ecosystems may vary.
   A habitat is the home of a particular organism. An organism's habitat may include a hole in the ground, for land-dwelling creatures. For another organism, a tree or group of trees in an area make up a different habitat.
2. The picture illustrates a fish habitat. Physical variables for the fish habitat include the proper temperature. Even though they are cold-blooded animals, fish have a minimum and maximum temperature they can tolerate to maintain their health. In addition, the fish need a pH that is within the range (6-8), and dissolved oxygen levels high enough for them to use.
3. The physical variables of land habitats include:
   - a moderate temperature.
   - a certain amount of precipitation that dictates what organisms can survive in the environment.
   - sunlight that provides the energy for the organisms.
   - soil type which also determines the moisture and fertility of the ground (this also influences what plant life can be sustained in the location).
   - the level of oxygen present (higher the elevation, lower the levels of oxygen because the molecules spread out. In other words, there is less oxygen per unit of volume).
4. b. large rock particles and very little decayed matter.
5. Answers are:
   a. When Carlos sets up his aquarium, he needs to consider if the water has the proper temperature, the pH is in the neutral range from 6-8, and the water has enough dissolved oxygen for the fish to breathe and stay healthy.
   b. Carlos needs to have an air pump with a clean filter in the aquarium to circulate fresh air and water in the aquarium and it will also remove impurities and waste from the water. Carlos should also buy a cleaning hose to vacuum out the waste that collects at the bottom of the aquarium. Aquatic plants can also provide a source of oxygen for the fish in the tank. It is important for Carlos to purchase water testing kits so he can check the pH, levels of chlorine, nitrogen or other impurities that may contaminate the water.
   c. It is very important that Carlos buys the kit to check pH. The pH vial in the kit shows the proper pH range (6-8) the water needs to be for the fish to stay healthy. If the water falls out of the safe range, chemicals need to be added to the tank to either raise or lower the pH. If Carlos does not monitor the pH, his fish can develop scale and skin disease. Bacteria live on the scales of fish that help to keep them healthy, and if the water is not properly maintained, the bacteria can die, thus harming the fish. The bacteria that live on the fish body represent a symbiotic relationship since the bacteria contribute to keeping the fish healthy.
6. Hatchetfish that live deep in the ocean must adapt to very cold water and an environment that has very little light. The lack of sunlight deep in the ocean restricts the amount of energy available for life to exist down that deep. It requires special adaptations for any form of life to exist with those challenges present at great depths of the ocean.
7. The three factors that determine if a substance is a pollutant are:
   - the ability to cause harm to other organisms or the environment.
   - the concentration per unit of air, water, or soil, and
   - how long it will stay in the environment.
8. Nitrates and phosphates can be released into the water supply from crops or from residential yards through fertilizer applications. Once nitrates and phosphates are in the water, they can cause aquatic plants to grow. When plants die, the plant material is eaten by bacteria resulting in an increased population of bacteria since they have a plentiful food source. The bacteria use up dissolved oxygen that is needed by the fish. The reduced dissolved oxygen in the water makes it difficult to impossible for fish to live and prosper.

3.2 Section Review

1. A population is a group of the same species living in a given area. Examples of populations may include the coyote, eagle, dolphin, cat, deer, or human population. The majority of the time, a population refers to the number of a specific kind of animal, but it can also include other organisms, especially in the case of endangered species living in a given area.
2. Three things a population needs to increase are plenty of space, nutrients, and energy.
3. Graph C shows a negative growth of population since it slopes downward to the right.

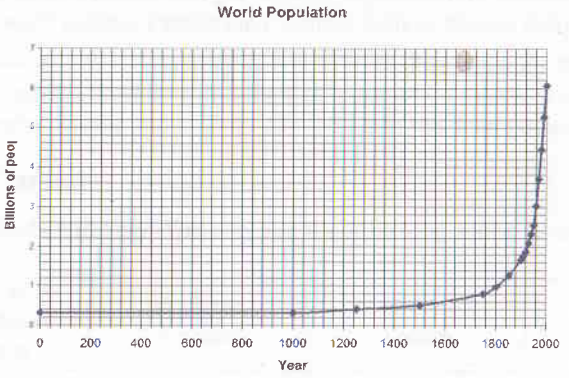
4. A population is the number of a specific series. A community includes all of the populations in a given area. Example of communities include forest, prairie, bay, reef, and aquarium.
5. d. commensalism
6. Answers are:
   a. Tuna fish eat producers or food such as phytoplankton. Toxins like mercury can be ingested into the body through food the organism eats. Many toxins are oil soluble and attach to body fat and most of the organs. Since the toxins are oil soluble, they are not released out of the body by water that is consumed and eliminated through waste. This can cause long-term harmful effects on the body and can also lead to death since the toxins remain in the body.
   b. Drawing should show how toxins magnify as you move up the food chain. For example:
   plankton (1 toxin) → shrimp eats 10 plankton (=10 toxins) → small fish eats 10 shrimp (=100 toxins) → larger fish eats 10 smaller fish (=10,000 toxins) → tuna eats 10 larger fish (=100,000 toxins).

Connection

1. Yellow star thistle makes expensive ranch land useless for pasture, and it removes a huge amount of water from the soil.
2. Beekeepers find that yellow star thistle flowers are great nectar-producers. The honey that bees make from this nectar is prized for its delicate flavor and is sold at a premium price. Students can find this information through the Weed Resource Information Center of the University of California-Davis http://wric.ucdavis.edu/yst/biology/biology-repro.html.
3. Biodiversity is a measure of the variety of life forms present in an ecosystem. An ecosystem with greater biodiversity has more types of organisms than a less biodiverse ecosystem. Biodiversity is important because a more diverse ecosystem is better able to withstand harsh environmental conditions—it is more stable. Biodiversity is important to humans for health reasons. Many medicines are derived from plant sources, so the loss of plant species means the potential loss of medicines. The loss of species can also have an economic impact, as many plants and animals are important sources of income for farmers, fishermen, textile workers as well as many other industries.

Activity

Student graph should look similar to the one below:



a. It increased more than six times, from 0.98 billion people to 6.06 billion. It doubled from approximately 3 billion people to 6 billion people.
b. In 2040, 12 billion, and in 2080, 24 billion if the pattern observed on this graph continues.
c. Between 0 and 10 years.
d. At about 10 to 12 years, 15 to 18 years, 22 to 24 years, and 26 to 28 years.
e. From 30 years forward.
f. The human population graph looks like the first part of the carrying capacity graph. If the human population follows a similar pattern, it will decrease and then increase again several times before leveling off.

Chapter 3 Assessment

Vocabulary

Section 3.1

1. pollutants
2. habitat
3. ecosystem

Section 3.2

4. symbiosis
5. food chain
6. population
7. community
8. growth rate
9. competition

Concepts

Section 3.1

1. Habitats where organisms may yet to be found and identified might include in the ocean or in parts of the rain forest. Both places are so vast they contain areas that have not been explored yet. As people travel into new areas of the ocean or in the rain forest, new specimens are discovered. This may include organisms in any of the six kingdoms. Sometimes the discovery of new organisms results in having to create a new kingdom, as was the case with bacteria. Previously, and not too long ago, there were only five kingdoms Monera, Protista, Fungi, Plantae, and Animalia. The discovery of new forms of bacteria meant the Monera kingdom had to be divided into two kingdoms, Archaebacteria and Eubacteria, because the discovered bacteria did not fit the old description of bacteria in the Monera kingdom.
2. b. dissolved oxygen
3. The three variables of freshwater inhabitants include:
   a. a pH adjusted within the 6-8 range.
   b. plenty of dissolved oxygen so the animals can contain their needed oxygen.
   c. controlling levels of contaminants such as nitrates and phosphates.
4. Life is concentrated at the surface of the ocean because the environmental conditions are most suited for organisms to survive in this area. Toward the top of the ocean, there is plenty of sunlight to provide plants (producers) with the energy they need to survive. This also gives other organisms (consumers) a food source. The temperature near the surface of the ocean is warmer; therefore, it is more tolerable for the aquatic creatures. Even though many of the animals in the ocean are cold-blooded, they need the temperature to be in a certain range to survive. The pressure is lower in the upper levels of the ocean than the pressure is at greater depths, making it easier for living things to survive. However, there are creatures that live in very deep parts of the ocean that are equipped with special adaptations, like emitting their own light. They also have an available food source and their body structure is adapted to withstand the higher pressure deep in the ocean.

Section 3.2

5. Cell, tissue, organ, organ system, population, community, ecosystem, biosphere
6. d. all of the above
7. b. decreases
8. Answers are:
   a. competition
   b. symbiosis
   c. predator/prey
9. b. chain, web, pyramid
10. Answers are:
    a. +
    b. O
    c. -

Math and Writing Skills

Section 3.1

1. Have students write a page long (or more) paper describing their creature. Descriptions may include details such as color of skin, size, color, and kind of eyes (such as simple or compound eyes). Also, they need to include how their organism deals with the extreme low temperature, high pressure, and lack of sunlight energy. Students need to explain how their creature survives under such adverse conditions and what they do for a food source. Students should reflect on information they learned from this chapter. Also, students need to think about their own needs on a day-to-day basis and what the creature would do to compensate for their needs in this environment. If students have

difficulty starting this assignment, have them think of a science fiction show or movie like *Star Wars* or *ET* to get an idea for their creature.

2. Students may use the Reduce, Reuse, Recycle method to help stop pollution. They may also develop a new scheme or lifestyle for humans to follow, like eliminating many sources of technology. Students need to understand that much of our technology is what has led to pollution. Students need to reflect on how our lives would be different if we did not have the technology we have today. Students might also mention starting an environmental club or joining an existing one so they can conduct environmental recycling projects and encourage family and friends to do the same.

3. >
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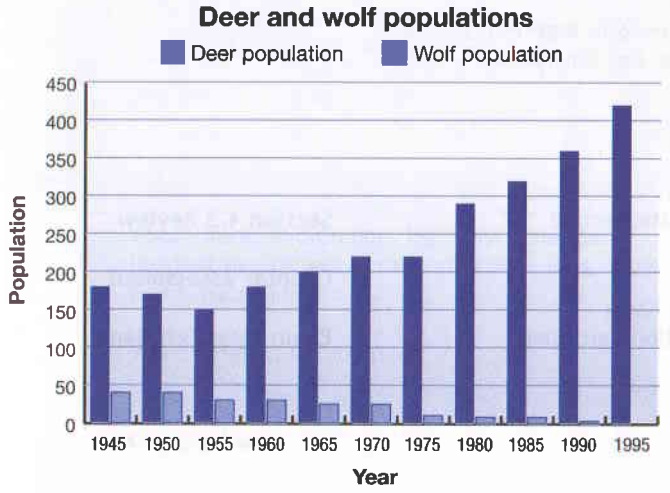
Section 3.2

10. Graph:



a. Deer population increased by 200, wolves decreased in population by 10.

b. Because the deer are a food source for the wolves, it would be expected that the wolf population would have increased proportionately.

c. Increased food supply and/or increased hunting regulation and enforcement may be contributing factors of the dramatic deer population growth.

d. The human population growth has expanded into undeveloped areas of the wolf habitat. People have hunted wolves to near extinction.

e. The deer population growth will slow as they reach the maximum sustainable food level. As the deer population increases beyond the food supply, disease and malnutrition will thin the deep population naturally.

Chapter Project

Student products will vary. You may use the following rubric to score the project:

Members can be found in chosen community	All correct 5 points	Most correct 4 points	Some correct 3 points
Mobile shows correct food chain connections	All correct 5 points	Most correct 4 points	Some correct 3 points
Each community member is correctly labeled	All correct 5 points	Most correct 4 points	Some correct 3 points
Mobile is neat and easy to read	Very readable 5 points	Good readability 4 points	Poor readability 3 points
Pictures of community members are correct	All correct 5 points	Most correct 4 points	Some correct 3 points
		Total	