

Checking Concepts

1. The process that makes change possible in living things is natural selection. When members of a species have certain characteristics that give them an advantage over other members of the species, the individuals may pass these favourable characteristics on to their offspring.
2. From one species of stickleback arose several species that were adapted to different niches.
3. Changes in the abiotic parts of an ecosystem, which occur in ecological succession include an increase in the availability of nutrients, soil, and light.
4. Micro-organisms aid in decomposition and recycle nutrients back to the soil.
5. Pioneer species change the biotic and abiotic environment by decaying waste and creating more soil. They provide food for insects and other organisms, which attract animals into the community.
6. Mature communities include tundra and temperate rainforests. Sand dunes and wetlands have more rapid changes occurring.
7. Sample answer: Flooding can result in soil erosion and soil pollution if toxic chemicals are present in flood waters.
8. Three effects of prolonged drought include the destruction of habitats when water becomes scarce, plants and animal deaths, crop failures, and livestock deaths.
9. The importance of sustainability is that resources will be available for future generations while the functions and health of the ecosystem are maintained.
10. Examples of sustainable practices described in this chapter include redeveloping industrial areas, streambed restoration after logging, grassland management, mine reclamation, controlled burning, and plant bioremediation.
11. Human activities cause habitat fragmentation when roads are constructed through a habitat and the ecosystem is divided into smaller pieces.
12. Examples of resource exploitation are harvesting fish, timber, mining, and extracting fossil fuels.
13. Water contamination can result from resource exploitation when untreated chemicals and other wastes leach into water supplies.

14. Students' answers will vary but could include competitors such as burweed, Scotch broom, European starling; predators such as crazy ants, Norway rat, and American bullfrog; diseases and parasites such as viruses, bacteria, and blister rust; and habitat alterations such as those caused by wild boars and Eurasian milfoil.
15. Two examples of populations of keystone species that have been negatively affected by invasive species are the Garry oak by the gypsy moth and the whitebark pine by a fungus called blister rust.

Understanding Key Ideas

16. As some food sources became limited, finches with particular beak characteristics were better suited for the environment and were able to use other food sources. They were able to mate and pass on these favourable beak characteristics to the next generation. This is natural selection.
17. A living organism becomes extinct when the biotic or abiotic conditions change so much that the organism can no longer survive and reproduce. Causes of extinction include habitat loss, the introduction of invasive species, and overexploitation.
18. The two main causes of soil degradation are water and wind erosion of soil from the effects of agricultural practices as well as deforestation.
19. (a) The importance of land use includes the ways we use the land to meet our needs such as urban development, agriculture, and industry. Resource use is how we obtain and use these materials.
(b) Land use and resource use have greatly increased to meet the need of the growing human population.
20. A soil management practice that improves plant growth is aeration, in which plugs removed from the soil allow water and air to enter the roots better.
21. Sample answer: Overexploitation affects a food web because it will reduce the number of predators and increase the number of prey, which will upset the balance of the whole food web.

22. Traditional ecological knowledge can be applied to resource management as controlled burning renews grassland ecosystems and reduces forest litter, which decreases the intensity of forest fires. Traditional ecological knowledge can be applied to biodiversity conservation as burning recycles nutrients and increases plant growth. More animals are attracted to the area, and an increased variety of plants is able to grow.
23. Factors that have caused an increase in invasive introduced species and losses in global biodiversity are climate change and increased trade and transportation globally.
24. (a) The introduction of an invasive plant species might alter a habitat for other plants as the plants may change the light levels available to neighbouring plants, decrease oxygen content in the water, change the soil chemistry, or increase soil erosion.
- (b) The introduction of an invasive plant species might alter a habitat for animals when the pollinators change in the ecosystem, which affects the predators of the pollinators and could change the food web.

Applying Your Understanding

25. (a) The white sturgeon may become extinct if the young are unable to reproduce or do not survive until adulthood.
- (b) Possible human-caused changes could be overexploitation of sturgeon or their prey; loss of habitat because of pollutants in the water, which destroys the sturgeon's prey; increased water temperatures with climate change, which affects fry; muddy water from soil erosion, which affects the development of the young; and the introduction of invasive species.
- (c) Sustainable practices would include restricting the catching of sturgeon until their number substantially increases and protecting the spawning grounds of the sturgeon. Also, determine which factors led to their decline. If particular introduced species have helped cause their decline, then create laws to prevent the spread of these species.