

UNIT 3 ASSIGNMENTS

EXAM =A-DAY 10/23 B-DAY 10/24

Answer everything in complete sentences

Chapter 5 Questions: A-day DUE 9/23 B-day DUE 9/24

1. Explain the logic that supports the concept of natural selection.
2. Name two examples of evidence for natural selection.
3. How does allopatric speciation occur?
4. Name three organisms that have gone extinct.
5. What is the difference between a species and a population?
6. What is the difference between a population and a community?
7. Contrast the concepts of habitat and niche.
8. List and describe each of the five major population characteristics discussed in this chapter.
9. Can any species undergo exponential growth forever? Explain.
10. Describe how limiting factors relate to carrying capacity.
11. Explain the difference between K-selected species and r-selected species.
12. Give two examples of each (K-selected and r-selected) that were not mentioned in the chapter.
13. What types of species are most vulnerable to extinction? Why?
14. Do you think the human species can continue raising its global carrying capacity? How so, why or why not?
15. Describe the evidence suggesting that changes in temperature and precipitation led to the extinction of the golden toad and to population crashes for other amphibians at Monteverde.
16. What do you think could be done to help make future such declines less likely?

FRQ 1: A-day DUE 9/27 B-day DUE 9/30

Species such as the dusky seaside sparrow, the passenger pigeon, and the woolly mammoth are extinct. Populations of other species have declined to the point where they are designated as threatened or endangered.

- (a) **Identify** one threatened or endangered species and **explain** why its population has declined.
- (b) **Describe** three characteristics of organisms that would make them particularly vulnerable to extinction.
- (c) **Present** three **arguments** in favor of the maintenance of biodiversity.
- (d) **Name and describe** one United States federal law or one international treaty that is intended to prevent the extinction of species.

Chapter 6 Questions: A-day DUE 10/1 B-day DUE 10/2

1. How does competition lead to a realized niche?
2. Contrast the several types of exploitative species interactions. How do predation, parasitism, and herbivory differ?
3. Give examples of symbiotic and nonsymbiotic mutualisms.
4. Compare and contrast trophic levels, food chains, and food webs. How are these concepts related and how do they differ?
5. What is meant by a keystone species? What types of organisms are most often considered keystone species?
6. Explain primary succession.
7. How does primary succession differ from secondary succession?
8. Give an example of primary succession and secondary succession.
9. Explain and contrast Clement's and Gleason's views of ecological communities.
10. Name five changes to the Great Lakes communities that have occurred since the invasion of the zebra mussel. (Look at the Science behind the story.)

11. Explain the trophic cascade of the otters, urchins, kelp, and whales. (Look at the Science behind the story.)
12. What factors most strongly influence the type of biome that forms in a particular place on land?
13. What factors determine the type of aquatic system that may form in a given location?
14. Draw climate diagrams for a tropical rainforest and for a desert. Label all the parts of the diagram.
15. Describe all types of information an ecologist could glean from such a diagram.
16. Explain what altitude does to an area.

FRQ 2: A-day DUE 10/9 B-day DUE 10/14

Termites are social insects that are essential decomposers in tropical rain forest ecosystems. Termites may account for up to 95% of insect biomass in tropical rain forests. Termites consume vast amounts of dead and decomposing plant material, thanks to the work of mutualistic cellulose-digesting microorganisms that inhabit their guts. In addition to their roles as important decomposers, termites digest plant materials and directly contribute to carbon dioxide and methane emissions into the atmosphere. It is likely that, like many insect species, termites and their symbionts may be sensitive to changes in their microclimate caused by global climate change, especially with regard to temperature and humidity.

		RELATIVE HUMIDITY		
		50%	70%	90%
TEMPERATURE	20°C	0.04	0.05	0.05
	25°C	0.05	0.07	0.10
	30°C	0.12	0.13	0.27
	35°C	0.09	0.13	0.15
	40°C	0.00	0.00	0.00

- (a) Respond to the following using the data in the table above, which gives the rate of wood consumption by termites, in mg per day per termite, under various temperature and relative humidity conditions. Under optimal conditions, the emission rate of methane by termites is approximately 70 kilograms of CH₄ per year per 1000 termites.
 - (i) According to the data, what are the optimal temperature and relative humidity for termite activity?
 - (ii) Given a density of 4.5×10^7 termites per hectare and optimal conditions, calculate the annual amount of methane emitted, in kilograms, by the termites inhabiting a 2000-hectare tropical rain forest.
 - (iii) Supposed the temperature increases to 35°C and the relative humidity decreases to 50 percent. Using the data provided, determine the amount of methane, in kilograms, that would be emitted by the termites in the 2000-hectare tropical forest.
 - (iv) Explain why the population size of termites is also affected by temperature and humidity.
- (b) It has been observed that soon after a tropical rain forest is cleared, termite density increases to an estimate 6.8×10^7 termites per hectare. Thereafter, the termite population size decreases dramatically.
 - (i) What is the most likely reason that the density of the termites increases when a tropical rain forest is cleared?
 - (ii) Why do the termite populations eventually decrease dramatically?
- (c) Describe one way, other than changes in termite activity that tropical rain forest destruction contributes to anthropogenic climate change.

Chapter 11 Questions A-day DUE 10/15 B-day DUE 10/16

1. What is biodiversity?
2. List and describe three levels of biodiversity.
3. What are the five primary causes of biodiversity loss?
4. List five invasive species and describe their impacts.
5. Define the term *ecosystem services*.
6. Give three examples of ecosystem services that humans would have a hard time replacing if their natural resources were eliminated.
7. What is the relationship between biodiversity and food security.
8. What is the relationship between biodiversity and pharmaceuticals?
9. Give three examples of potential benefits of biodiversity conservation for food security and medicine.
10. Describe four reasons why people suggest biodiversity conservation is important.
11. What is the difference between an umbrella species and a keystone species?
12. Could one species be both an umbrella species and a keystone species? How/How not?
13. Explain the theory of island biogeography.
14. Use the example of the Siberian tiger to describe how this theory can be applied to fragmented terrestrial landscapes. (refer back to the case study at the beginning of the chapter)
15. Name two successful accomplishments of the U.S. Endangered Species Act.
16. Name two reasons some people have criticized it.
17. What is a biodiversity hotspot?
18. Describe community-based conservation.
19. Some people declare that we shouldn't worry about endangered species because extinction has always occurred. How would you respond to this view?

EXTRA CREDIT FRQ 3: A-Day DUE 10/17 B-day DUE 10/18

Read the following article from the *Fremont Examiner*.

Worm Invasion

A researcher studying the ecology of the deciduous forest outside of Fremont has made an alarming discovery. While taking inventory of the species present on the forest floor, Professor Peter Tate discovered many earthworms of an Asian species not previously known to live in this area. The Asian worms, unlike native worms, have voracious appetites. The forest floor is home to a myriad of species that live in leaf litter, which is composed of several years' accumulation of slowly decomposing leaves. Dr. Tate explained that "leaf litter is critical to the survival of local species of forest plants." Dr. Tate has found that Asian worms, unlike their indigenous cousins, consume the entire layer of leaf litter in a single season. He said, "This sets the stage for takeover by invasive exotics such as Japanese stilt grass." Dr. Tate and other scientists are exploring strategies for the control of the Asian worms.

- (a) Support Dr. Tate's assertion that "the leaf litter is critical to the survival of local species of forest plants." Include in your discussion the roles of leaf litter in a deciduous forest ecosystem.
- (b) Describe THREE abiotic changes that would be likely to result if the exotic worms consumed all the leaf litter in a single year.
- (c) For one of the changes you identified in part (b), explain how the change could set the stage for the takeover of Japanese silt grass or other exotic species.
- (d) Design a controlled experiment to determine whether the worms, in fact, do change the forest ecosystem. Identify the environmental factor you will measure, and include the specific hypothesis you will test and the data you will collect.