

Unit 2 Study Guide: Introduction to conservation and biodiversity

INTRODUCTION TO CONSERVATION

1. What are the 3 types or levels of biodiversity? About how many extant (currently existing) species of plants and animals have scientists named? About how many do we estimate are actually alive today?
2. What is the natural "life expectancy" of a species? What is a mass extinction? Are current extinction rates about equal to background levels, or much higher? Justify your answer. When a mass extinction occurs, how long does it take for diversity levels to recover?
3. What 3 factors determine a species' rarity/vulnerability? What characteristics do the least rare species have? The most rare? What characteristics do humans have?
4. List the five major causes of diversity loss discussed in class. For each, describe the nature and scope of the problem, using examples to illustrate as appropriate. What single problem "drives" the rest? What are the two most important immediate threats to most species?
5. Give an economic explanation for why we should be concerned about ecosystem degradation. Given an economic explanation for why we should be concerned about the loss of species diversity (hint: there are several for each; use information from the assigned article to answer the first question and from the lecture notes/text for the second).
6. What important values, beyond economic ones, do undisturbed landscapes and species diversity provide? Discuss the ethical/aesthetic/social justice arguments for preserving biodiversity. For yourself, which argument makes the biggest impression? Why?
7. What can we do to fix the problems we're currently creating?

THE EVIDENCE FOR DESCENT

1. What form of reasoning did Darwin use to convince the scientific community that descent with modification was true beyond a reasonable doubt? Be as specific as possible.
2. Discuss the evidence for descent derived from the age of the earth, the fossil record, biogeography, and comparative anatomy (homology and vestigial structures). For each category of evidence, be sure to clearly identify the predictions derived from descent with modification and how they differ from the predictions derived from models of special creation. Be as specific as possible (including using examples from the text and the article at the end of the book) in your answer.

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SPECIATION AND EXTINCTION

1. State the biological species definition and explain what it means in terms of gene flow within and among species. How does that affect the evolutionary “future” of populations within a species vs. populations of different species?
2. List and describe the three basic steps of speciation.
3. In allopatric speciation, what creates barriers to gene flow? Explain how those kinds of barriers may arise and give at least two examples of each.
4. Explain what reproductive isolation means in terms of the ability of individuals to reproduce. Why is reproductive isolation necessary for species to diverge from one another?
5. Define pre-zygotic and post-zygotic reproductive isolating mechanisms. Define and give as many examples as you can identify from lecture and your reading of habitat, temporal, behavioral, mechanical, and gametic isolation. Define hybrid inviability, hybrid sterility, and hybrid breakdown.
6. As we noted in lecture, many kinds of plants are able to hybridize successfully. Why is this problematic? Justify your answer using the case study we discussed in class. Be sure you can identify the hypothesis, prediction, variables, and tests from that study.
7. What is a local extinction? What is a global extinction? How are the two related?
8. What general factors allow a population to persist over time? What will cause a population to become locally extinct?
9. Explain how the “divide and conquer” metaphor explains the general process of extinction.
10. What is the “root cause” of extinction? What are some of the more specific mechanisms that have been implicated? Why does natural selection not simply allow individuals within species to continually adapt over time?
11. Compare and contrast background with mass extinctions. Do we know what caused the “big 5” mass extinctions? Explain. If increasing biodiversity is considered a positive outcome, do mass extinction events have any positive outcomes? Explain.
12. Does biodiversity ever recover after a mass extinction event? If so, how long does it take?