

Hunter Ch. 6 – Mass Extinction and Global Change – Study Questions
Conservation Biology
Spring 2009

Extinction is a misunderstood and often politically misused concept. All species are destined to go extinct at some time. Furthermore, you will see that extinction rates do vary over time and there have been a number of major extinction events during the earth's history. However, it is very evident that we are presently living through an anthropogenic major extinction event and this fact is at the very center of conservation biology. Please read this chapter very carefully and devote some thought to the ideas here, especially in regard to what we have previously learned about evolution, speciation and community/ecosystem composition and function.

1. Fig. 6.1 -- Note the general increase in species over the last 600 million years – this corresponds to the establishment of multicellular life and the invasion of land. Also note the periodic major extinctions that have occurred. The present is not shown. Know the Permian –Triassic (P) and Cretaceous-Tertiary (K-T) extinctions (case studies). Note that natural causes of mass extinctions are diverse and often due to multiple factors (Permian for example).
2. What is the typical time span required for recovery from a major extinction event? Do you think minor events require proportionately shorter times and if so, is there some limit (i.e., is there anything different about major and minor extinction events besides the number of species affected?) – apply what you know about evolution and biodiversity to answer in this question.
3. What are the two main problems associated with trying to estimate present extinction rates? What is the notion of Centinelan extinction?
4. Note the application of island biogeography theory (e.g., species area curves that we considered in community ecology) and its use to estimate extinction rates. We will look at this example a bit more in class. From an analysis like Wilson's (p120) do you expect that the majority of species that go extinct are specialists or generalists in terms of their niches (i.e., have narrow or broad tolerances and requirements (think of the n-dimensional hypervolume again)? Is one type any more valuable than the other type? Finally, note the bottom line estimate of a 10-25% loss of all species by the time human populations stabilize – with the figure being larger if we do not adopt means to conserve species.
5. Know the most important reasons for natural global climate change.
6. Note also that climate change is not necessarily gradual. If climate change is abrupt, what should be the effect on extinction rate and why (you should be able to provide several reasons to justify your answer). Note – is temperature change independent of rainfall?
7. With regard to climate change, please see the report of the UN study group elsewhere on this course website. Much of climate change is anthropogenic. Period.
8. What are the two reasons that populations are predicted to not be able to adapt to anthropogenic climate changes as well as they adapted to previous natural changes in the climate?
9. Why are special bottlenecks (don't confuse these with genetic bottlenecks) likely to be produced in terrestrial habitats near the ocean?

10. What is the role of species mobility in being able to avoid climate-change associated extinction?

Please also look over all the questions at the end of the chapter.

Terms:

Permian Triassic (P) extinction	Cretaceous-Tertiary extinction (K-T)
Centinelan extinction	Climate refugia (p123)