EEB 2208: TOPIC 1

WHAT IS CONSERVATION BIOLOGY ALL ABOUT?

Background for this topic

Primack: Chapters 1 and 6
Sodhi and Ehlich: Chapter 1

1. Underlying goals and principles of the field

A) BIODIVERSITY PROTECTION IS THE UNDERLYING GOAL

i) Preventing extinctions (both local and global) is central to much conservation biology.
ii) But species extinctions are not the only way in which biological diversity is being lost, so the field has a broader focus that includes preventing population declines, avoiding genetic impoverishment, maintaining ecosystem functions, etc.

B) WHAT COUNTS (AND WHAT DOES NOT) AS CONSERVATION BIOLOGY?

i) Conservation biology is a specific field that constitutes the subset of environmental science that relates to the protection of biological diversity. Consequently, many things that would be considered part of environmental science are not really a part of conservation biology.
ii) Environmental issues that relate solely to humans are not a part of conservation biology.
iii) Example: The loss of wetland habitat due to sea-level rise and consequent effects on wetland species is a focus of conservation biology. The flooding of human homes (although clearly an important concern for society) is not.
iv) Example: The adverse effects of pollutants on biodiversity are within the field of conservation biology. But, the effects of the same pollutants on human health (though, again, important) are not.

C) CONSERVATION BIOLOGY IS APPLIED, MULTIDISCIPLINARY, INEXACT, AND VALUE-DRIVEN

i) Scientific knowledge from the fields of ecology, genetics, taxonomy, evolution, etc. underlies all of conservation biology. But, unlike much of the work in these disciplines, the fundamental focus is on using science to solve specific societal problems.
ii) Biology alone is not enough to achieve the goals of the field, so conservation biologists must draw on many other fields in order to achieve results. These other fields range from economics to law, from geography to sociology.
iii) Also, conservation practitioners are making decisions every day, and often cannot wait for detailed scientific research to be done. Therefore, decisions must often be based on the "best available" information. This information is often not as good as people would like it to be.
iv) Conservation in practice is completely value driven. Some organisms are valued more than others (e.g., compare the bacterium that causes Lyme disease to a giant panda – which would you prefer to protect?). Many argue that conservation biology itself should be more detached from social biases – i.e., its role is simply to provide the information on which social decisions about what to protect, and how, can be made.

Others argue that conservation biology should play more of an advocacy role. In reality, there is inevitable blurring between these two perspectives, because research directions are always influenced by where there is funding and because most people who are interested in conservation science also feel strongly about the political/social aspects of conservation protection.

v) In many of these respects, conservation biology is analogous to medicine. We would all like doctors to have perfect knowledge about why we get sick and always be able to make us better. But in reality there is often much uncertainty, and where research is focused is often influenced by political and social issues.

2. Why is it important to protect biological diversity?

A) AESTHETIC REASONS

i) People like nature, as shown by the number of people who feed wildlife, go bird-watching, visit zoos and national parks, watch TV nature specials, etc., etc., etc.

B) MORAL OR ETHICAL REASONS

i) Many people believe that other organisms have intrinsic value and an intrinsic right to exist. The reasons for this view vary from a belief in deep ecology or animal rights to deep-felt religious views that a diversity of life was created by some greater being, and that we have no right to destroy that life.

ii) Another ethical argument for protecting biological diversity is simply that we owe it to future generations to give them what we have available to us. This argument could be utilitarian (i.e., we should not use up all the resources that other generations could use) or not (i.e., future generations deserve to see redwood forests and polar bears, simply because these things are extraordinary).

C) ECONOMIC REASONS

i) Biological diversity is an important source of economic productivity. Agriculture uses species derived from wild organisms, and could potentially benefit from other species that have yet to be domesticated. Even if this is not the case, then the genetic diversity present in wild species could be helpful in enhancing modern crops.

ii) More directly, there are many wild organisms that are exploited for economic gain and that are an integral part of society. Forestry provides paper, timber, etc. Fisheries provide human food, food for livestock, etc.

iii) Medicine is another area where there is potential economic (as well as human well-being) value to protecting biological diversity. For example, the drug digitalis – which has been one of the most important heart medicines for over 200 years – is derived from a common European plant called the foxglove.

D) ECOLOGICAL SERVICES

i) Yet another set of reasons for protecting biological diversity come from the many "services" that ecological systems provide.

ii) In some cases, these services can be viewed in economic terms, but in others it is hard to quantify the financial value.

iii) Examples of such services include things like: the role that wetlands play in preventing flooding, the extent to which vegetation cover prevents soil erosion, and the pollination of agricultural crops by insects.

E) ECOLOGICAL INTEGRITY

i) The final concept is that it is important to protect species in order to maintain "ecological integrity".

ii) The idea is that, although ecosystems may be able to withstand the loss of a few individual species, there will be some point at which multiple extinctions add up to create a catastrophic change in the system.

iii) An analogy that has been drawn is the idea of "rivet-popping" (Ehrlich & Ehrlich 1981, summarized here) on aircraft – a plane may be able to withstand the loss of a few rivets, but if you lose too many then suddenly you have a plane that is doomed to crash.

iv) Since, it is hard to predict exactly how many rivets (or species) can be lost without a catastrophe occurring, some argue that one should take a precautionary approach and ensure that none (or as few as possible) are lost.

v) Whether this analogy is an accurate portrayal of the way in which ecological systems work is unclear – but, many suggest that it is not something we would want to be wrong about.

Note that it is possible that I will move on to the material for lecture topic 2 before the first class period is over.