

I teach Principles of Ecology & Evolution (BSCI 160, formerly BSCI 106) at least once each year and am also involved with Principles of Ecology & Evolution Lab (BSCI 161, formerly BSCI 106) as the faculty course supervisor. Although I have already been covering some important sustainability-related topics in BSCI 106, I am eager to incorporate additional sustainability-related content, as detailed below.

**(1)** In BSCI 160, I plan to dedicate the final three lectures of the semester to the broad topic of “Human impacts on the environment”. Among other topics incorporated in these three class periods:

- a) I will incorporate a class exercise to explore the **Tragedy of the Commons**. Time permitting, I will implement some version of the widely used exercises involving groups of three or four students “fishing” for goldfish crackers and deciding each year how many to catch. Whether or not I incorporate a full class exercise this fall, I will expand my discussion of the Tragedy of the Commons, with examples (and possible solutions), and if I don’t use a full in-class exercise I will introduce the topic with a quick hypothetical experiment: If I were to offer you either 3 extra points or 10 extra points on your final exam—with the caveat that if more than 10% of the class chooses 10 extra points then NOBODY will receive extra points—what would you choose? Subsequent discussion would include both consideration of how each student’s particular situation might affect his/her choice and how this exercise might apply to real-world situations.

**Learning objective:** *Have students develop a good understanding of why the Tragedy of the Commons arises and some possible strategies for avoiding it.*

**Assessment:** *Key points will be included on a mid-term exam and on the final exam.*

- b) I will introduce the concepts of the **triple bottom line** (which considers direct and indirect environmental, economic, and social costs), **true-cost (or full-cost) accounting** (which looks at the triple bottom line rather than simply direct financial costs and benefits), and **externalities** (costs or benefits that affect parties who did not choose to incur them, which are often important components of the triple bottom line). We will do a think-pair-share exercise to come up with some possible “hidden” costs and externalities associated with various actions or policies that might be taken by government, businesses, or individuals.

**Learning objective:** *Have students develop a good understanding of the concepts “triple bottom line”, “true cost accounting”, and “externalities” and be able to apply them to real world situations, including coming up with real or hypothetical examples to illustrate each.*

**Assessment:** *Key points will be included on a mid-term exam and on the final exam.*

- c) I will introduce the traditional measures of a country's economic "success" (GDP/GNP) and do a think-pair-share exercise to come up with additional possible measures of "success", then very briefly introduce some of the **alternative indices of economic success** that have been developed and look at comparisons that have been made to see how these correlate with GNP.

**Learning objective:** *Have students understand that GNP is an important measure of a society's economy, but that it ignores many factors that many people consider very important and that may or may not be correlated with GNP.*

**Assessment:** *Key points will be included on a mid-term exam and on the final exam.*

- d) I will assign a homework assignment that has students watch "The Story of Stuff" and reflect (in writing) on how it relates (or doesn't relate) to themselves or those around them.

**Learning objective:** *Have students think about the role of consumption in the "disposable economy", the positive and negative effects of "stuff" on our quality of life, and the sustainability of our current economic system.*

**Assessment:** *Homework assignment will be the assessment.*

- e) I will consider replacing some of my current discussion of global climate change in lecture with Al Gore's riveting and inspiring 2016 TED talk.

**Learning objective:** *Have students understand the major evidence for long-term global climate change and its largely anthropogenic causes; the challenges this rapid climate change poses for life on Earth, including humans; and prospects for slowing and reversing these changes.*

**Assessment:** *Key points from Gore's talk will be included on a mid-term exam and on the final exam.*

**(2)** In BSCI 160, when I cover human population growth I will do a think-pair-share exercise to have students consider "carrying capacity" in the context of human population growth and discuss what criteria they would use to determine an optimal world population size if they could adjust it with a wave of a magic wand.

**Learning objective:** *Have students understand that "carrying capacity" is not a static number and depends on conditions. Have them think about what sort of conditions we*

*would like to be living under and how this might affect “carrying capacity” for humans on Earth.*

**Assessment:** *Key points may be included on a mid-term exam and/or the final exam.*

**(3)** Toward the end of the BSCI 161 semester, students spend several class periods designing and carrying out experiments to explore the relationship between nutrient limitation and population growth in freshwater algae. For the new edition of the lab manual that will be used in Fall 2016, I have already added material explaining how poorly managed chicken manure fertilizer on agricultural fields on Maryland’s Eastern Shore causes algal blooms and a host of resulting problems in Chesapeake Bay. This provides an excellent illustration of how our exploration of Leibig’s Law (i.e., population growth is limited not by total resources available but by whatever specific resources are limiting) is not merely an academic idea but actually has very real and important implications.

**Learning objective:** *Have students see the relevance of Leibig’s Law (and, more broadly, academic biology) to real world environmental problems.*

**Assessment:** *Key points may be included on a lab quiz.*