

**ALL ARE REQUIRED TO DO QUESTION #1 – 25 points.**

**Question #1.** This question will assess your understanding of coevolution, and in particular coevolutionary mutualism.

- (a). View the slide show during which you should list and BREIFLY explain 5 totally different ways that flowering plants ensure efficient pollination by limiting the number of different species of animals that visit their flowers.
- (b). When is it coevolution versus ordinary evolution? What are the two key differences?
- (c). Explain how competition can cause coevolution, and then offer a biological example, perhaps used in class, that could have resulted from coevolution due to competition.
- (d). Explain how predation can cause coevolution, and then offer a biological example, perhaps used in class, that could have resulted from coevolution due to a predator prey interaction.
- (e.) Explain how mutualism can cause coevolution, and then offer a biological example, perhaps used in class, that could have resulted from coevolutionary mutualism

**CHOOSE ANY 5 QUESTIONS of the remaining questions and put a big "X" across the 2 questions you do NOT want me to grade.**

#2. Please BRIEFLY explain the four major objectives of ecosystems ecology. Please use a diagram where relevant in each of your explanations.

#3. This question will assess your understanding of the ecological significance of fire to conifer dominated ecosystems such as Yellowstone or the New Jersey Pine Barrens.

- (a). Please briefly explain two different ways in which fire is beneficial to the Yellowstone or Pine Barrens ecosystems.
- (b). How might anthropogenic manipulation of the fire cycle (either by fire suppression or by scheduled controlled burns at pre-specified intervals) negatively affect the natural processes ongoing under a natural fire cycle? based on your knowledge of ecological processes SPECULATE!  
negative ecosystem effects of fire suppression? (be specific)  
negative ecosystem effects of scheduled controlled burns? (be specific)

#4. This question will assess your understanding of the "intermediate disturbance hypothesis" for the maintenance of local species diversity.

- a. On the axes at right plot the relationship between disturbance and diversity according to the "intermediate disturbance hypothesis." Please LABEL THE AXES!
- c. According to the "intermediate disturbance hypothesis," why is diversity low at very low levels of disturbance?
- d. According to the "intermediate disturbance hypothesis," why is diversity low at very high levels of disturbance?
- e. According to the "intermediate disturbance hypothesis," why is diversity high at intermediate levels of disturbance?

#5 (a). According to archeologist Gary Rollefson, the dramatic abandonment of the Neolithic settlements such as the 'Ain Ghazal at 6000 b.c. was due to anthropogenic degradation of the fragile Jordan Valley ecosystem. Imagine yourself as one of the members of this community at about 6100 b.c., just prior to its abandonment. What were the major environmental signposts that the 'Ain Ghazal culture and way of life were nearing a collapse?

- (b). Please list 5 major global environmental signposts that our "modern" culture and way of life are not sustainable. (note: precision is not expected for any numbers you give)

#6. This question will assess your understanding of biodiversity (its value and the causes and consequences of its decline).

- (a). How might higher biodiversity enhance ecosystem stability? Please offer one specific mechanism for this from class.

- (b). Of what economic value is biodiversity to humans? {Hint: this question is NOT about aesthetics, it's about economics.} Please list three totally different sources of value.
- (c). What is the principal reason for the high and historically unprecedented rate of biodiversity loss presently underway (50% of all species extinct by 2100)?
- (d). Exactly why might the rate of biodiversity loss accelerate if we allow atmospheric CO<sub>2</sub> to double and the Earth's temperature to rise by 1-4°C? Please offer two different specific reasons. (note: species cooking to death is NOT a reason)

#7. This question will test your understanding of ecological economics. Below is a sketch of the relationships between “natural capital,” “human capital,” and “human-generated waste” that we used in class to describe the present unsustainable economic system (referred to as the “Neolithic” model).



- (a). List and briefly explain the three basic assumptions under which this economic model operates:
  - (b). List and briefly explain the three basic assumptions under which a “sustainable” economic system (or the “post-Neolithic” model) would operate:
  - (c). Herman E. Daly, an internationally recognized economist, once wrote that "There is something fundamentally wrong in treating the earth as if it were a business in liquidation..." Please briefly explain what he meant by this comment. Exactly what is being liquidated?
- #8. This question will assess your understanding of the types of challenges to solve in order to move our global society toward one that is sustainable.
- (a). According to Ted Koppel's Nightline episode that was shown in class, in what specific ways were the industry funded TV commercials that were critical of the Kyoto Climate Change Treaty pitched in a “gloom and doom” manner?
  - (b). Also, according to this program (as well as material I presented) in what specific ways were the “pro-environmental” materials by the environmental movement (e.g. the Sierra Club) similarly pitched in a “gloom and doom” manner?
  - (c). How effective is the “gloom and doom” tactic at propelling the public to commit to long term solutions to environmental problems?
  - (d). According to the material I presented in class, what are some of the specific educational experiences or types of curriculum that might do a better job of moving our global society toward ecological sustainability. Please list at least three.

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