

I. Short Answer Questions. Please DO ALL QUESTIONS

- SAQ #1. Please BRIEFLY explain the three major objectives of ecosystems ecology. Please use a diagram for each, AND write an explanation.
diagram and explain objective 1, and explain the key “emergent properties” that this objective aims to explain –
diagram and explain objective 2, and explain the key “emergent properties” that this objective aims to explain –
diagram and explain objective 3, and explain the key “emergent properties” that this objective aims to explain –
- SAQ #2. Of what economic value is biodiversity to humans? Please list three totally different ways in which biodiversity is of economic value. {Hint: this question is NOT about aesthetics, it's about economics. }
- SAQ #3. Please briefly explain two different ways in which the natural fire cycle fire is beneficial to the Yellowstone or Pine Barrens conifer dominated ecosystems.
- SAQ #4. How might anthropogenic manipulation of the fire cycle **by fire suppression** negatively affect the natural processes ongoing under a natural fire cycle? Based on your knowledge of ecological processes speculate using specific examples from the text and/or from class.
- SAQ #5. This question will assess your understanding of the "intermediate disturbance hypothesis" for the maintenance of local species diversity.
On the axes at right plot the relationship between disturbance and diversity according to the "intermediate disturbance hypothesis." Please LABEL THE AXES!
- SAQ #6. According to the "intermediate disturbance hypothesis," why is diversity low at very low levels of disturbance?
- SAQ #7. According to the "intermediate disturbance hypothesis," why is diversity low at very high levels of disturbance?
- SAQ #8. According to the "intermediate disturbance hypothesis," why is diversity high at intermediate levels of disturbance?
- SAQ #9. Please use a diagram and briefly explain what is the greenhouse effect?
- SAQ #10. What are the principal greenhouse gasses and what are their main sources? (please list 4)
- SAQ #11. Current models predict that +2-5°C warming is likely by 2100 if nothing is done and atmospheric CO₂ concentration is allowed to double. Please list at least three of the principal predictions for what is likely if global warming on this magnitude were to occur.
- SAQ #12. According to the readings and videos from class, why has **so little progress** been made in reaching international agreement on treaties to limit the emissions of greenhouse gasses that contribute to global warming?
- SAQ #13. Please briefly define “ecological literacy”.
- SAQ #14. **Besides global warming**, Please list 4 **other** 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)

I. Longer Answer Questions (15 points) CHOOSE ONE QUESTION and put a big “X” across the page of the question you do not want.

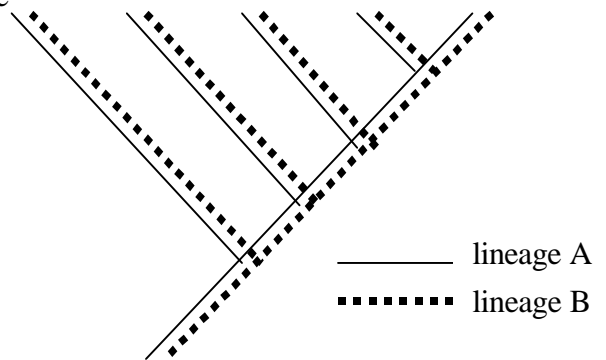
LAQ#1. This question will assess your understanding of the role of coevolutionary mutualisms in the origin of biological diversity.

- (a). Please briefly explain what is a coevolutionary mutualism. (5 pts)
- (b). According to a simple model of two species **mutualism** such as:

$$\frac{1}{N_1} * \frac{\Delta N_1}{\Delta t} = -r_1 + \mathbf{a} * N_2 \qquad \frac{1}{N_2} * \frac{\Delta N_2}{\Delta t} = -r_2 + \mathbf{b} * N_1$$

...recall that it is not possible for these species to regulate each other – either they go to extinction or infinity.

What does this finding imply about the mechanisms of regulation for these species, and what is the argument for why tight obligatory mutualisms, for which essential needs of each species are met by the other, might enhance rates of speciation of both lineages in phylogenetic parallel (their phylogenetic trees perfectly overlap)?



LAQ#2. 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?

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