

Environmental Sustainability
First Midterm (Take Home) Exam
Professor Womersley
(Worth 26.6% of final grade)

Instructions

Answer all questions. If you don't know an answer, put down what you do know. You may research answers. Give diagrams if needed. Cite important research other than material given in class or in the texts for the class. You must work alone.

Part One: Comprehension. (Paragraph-length answers). Answer all 6 (60%)

- 1) Explain the problem with artificial nitrogen fertilizer and energy.
- 2) Why does “feedback” create exponential functions? Explain in detail, using an example, and giving mathematical specificity to your explanation.
- 3) Summarize Kahan *et al* 2007 (see link on the documentation page) and apply to questions of human sustainability
- 4) Explain the demographic transition theory and apply to world population projections. Give numerical details. What is the inherent problem or “Achilles heel,” if the theory is correct?
- 5) What kinds of changes do we need to make in agriculture, according to Rebecca Hoskin of the BBC's *A Farm for the Future*?
- 6) According to Dr. Colin Campbell, featured in *A Farm for the Future*, what is the fundamental and specific constraint to current and future oil availability? What effects will there be on supply and demand in global oil markets if Campbell is correct?

Part 2: Essay/problem-solving. Do only one.

1) Write a short essay addressing only one out of the following four questions or problems. (40%)

1. Is Maine dairy farming ecologically disastrous? Explain why or why not?
2. Research and explain M. King Hubbert's model of oil depletion
3. Summarize the movie “A Farm for the Future.” What do you think of Rebecca Hoskin's point of view. Could it be adapted to New England successfully?
4. Give a trophic analysis of a human agricultural or horticultural system.