

## Ecology Homework 1 – Spring 2010

### I. An Inconvenient Truth

A. Watch the movie “An Inconvenient Truth”. There are two copies on 2-hour reserve at the library.

B. (6 pts). Based on this movie, your textbook reading and lecture information, **draw a box and arrow diagram that illustrates the chain of causality linking elevated atmospheric CO<sub>2</sub> with the following concepts, patterns, and mechanisms:**

fossil fuel emissions, land use change, natural CO<sub>2</sub> variation, natural temperature variation, enhanced greenhouse effect, ice-age, interglacial periods, global warming, ocean temperature, precipitation change, sea-level rise, methane, nitrous oxide, altered ecological niches, ice cap melting, thermal expansion, hurricane intensity, hurricane frequency

To make a box and arrow diagram, use boxes for main concepts, patterns, or mechanisms, then connect causal or related concepts with arrows. If necessary, you can label the arrows as well as the boxes, and you can add labels not on the list above (but be sure to include all the required terms from above). You can have more than one “line” of causation, that is, multiple factors could influence any given pattern.

C. (10 pts.) Think critically: identify at least one statement in the movie related to patterns, causes and impacts of climate change that you wonder about – is it really true? How well do we really know that? Look for answers in one of the two recently released IPCC reports:

1) Climate Change 2007: The Physical Science basis

(<http://www.ipcc.ch/pdf/assessment-report/ar4/wg1/ar4-wg1-spm.pdf>).

2) Climate Change 2007: Climate change impacts, adaptation and vulnerability

(<http://www.ipcc.ch/pdf/assessment-report/ar4/wg2/ar4-wg2-spm.pdf>).

NOTE – you don’t need to read the entire documents – you can scan for the pieces relevant to your question. If you want more detailed information, you can look at the postings here: <http://ipcc-wg1.ucar.edu/wg1/wg1-report.html>, or here: <http://www.ipcc.ch/ipccreports/ar4-wg2.htm>.

**For Part I, turn in:** a) your box and arrow diagram, b) what your question was, c) what the conclusion of the report was, and d) where you found the information (which report, which page). If you can’t find information there, you can look for info from other sources (web sites, scientific literature, etc.), but you **MUST** include a full citation of the source and include a statement that critically evaluates the source for scientific rigor.

### II. Test practice questions

(9 points) Answer the following two multiple choice questions by circling the letters of any choices that are correct. For each question, none, one or more (and potentially all) of the choices could be correct. For any choices NOT selected, briefly state (one or two sentences) YOUR REASON for not choosing it (necessary for getting full credit).

1. The relationship between atmospheric CO<sub>2</sub> concentrations and temperature going back ~650,000 years, as derived from ice cores, indicates the following
  - a. current CO<sub>2</sub> concentrations are well within natural variation observed over the past 6-7 glacial/interglacial cycles.
  - b. atmospheric CO<sub>2</sub> concentrations are the primary mechanism driving the temperature variation associated with the glacial/interglacial cycles.
  - c. there is correlation between atmospheric CO<sub>2</sub> concentrations and temperatures over previous glacial/interglacial cycles, but the mechanisms of causation are not completely understood.
  - d. The fluctuations in temperature and CO<sub>2</sub> in these data are good predictors of potential future conditions on Earth in response to elevated CO<sub>2</sub> because the magnitude of change in CO<sub>2</sub> concentrations is similar to the past.
  
2. Based on what is known about sinks for CO<sub>2</sub> in natural ecosystems
  - a. northern ecosystems like tundra and boreal forests could act as positive feedbacks to warming because of faster decomposition of soil organic matter at higher temperatures.
  - b. CO<sub>2</sub> is one of the main limiting resources for primary production.
  - c. Elevated CO<sub>2</sub> will almost certainly lead to higher rates of photosynthesis in plants, and thus greater ecosystem CO<sub>2</sub> sequestration.
  - d. Fertilizing the oceans with iron will lead to large net uptake of atmospheric CO<sub>2</sub> wherever phytoplankton are limited by this nutrient.

**For Part II, turn in typed replies to the above questions.**