

Observations/Questions/Hypotheses Exercise

Assignment Overview

You are required to identify and report three scientific observations that lead you to three environmental science questions. These observations may be something reported in the news or popular scientific literature or that you have observed yourself. They could be found in the scholarly scientific literature, but generally will not be. Picking your top two questions, you will prepare at least two alternative hypotheses for each one. The three observations and questions along with at least two hypotheses for your top-two questions will be presented in a report **turned in to me (via E-submit) before class on October 17** and will be presented to your peers in small group discussions on that same day to help you (1) refine them and (2) select your top question for use in the literature review exercise. Once you have selected your top question you are required to hand this in (via E-submit) as a Literature Review Topic **by October 24**. Details on the Literature Review Topic assignment can be found in the Literature Review handout.

Step 1: Identifying the Observations

You are required to identify and report three observations that lead you to three environmental science questions. These observations may be found in the newspaper or popular literature, or you may make yourself. They are not to be hypotheses or conclusions (e.g. "climate change has resulted in more tropical storms"), but are to be simple observations of nature (e.g. "there are twice as many storms in the south west Atlantic during the last decade as during the previous one.") The three observations you report need to come from three of the very general areas:

- Biodiversity: changes in numbers and distribution of species, extinction and endangerment of species.
- Health and Environment: disease incidence that may be related to environmental factors, including air, water, and soil.
- Pollution: air, water, precipitation, and soil. Includes industrial, agricultural, military, etc factors.
- Earth Science: weather, climate, composition and temperature of water and air, circulation of water and air. (Includes tropospheric, stratospheric, and ocean sciences.
- Ecology: relationships between species and their habitats.

For purposes of this class exercise, the questions **MUST** be able to be stated as "WHY" or "HOW" questions (not as "WHAT" or "WHO" questions). Take detailed notes about the observations you identify or make and the connections between the observations and questions. These observations and resulting questions can be quite specific; the observations should not usually be grand and comprehensive.

Step 2: Putting It Down In Writing

Before class on October 17, you are required to hand in (via E-submit) a list of three questions and the observations that led to those questions. Each observation should have a description of that observation (what it was, where, when, and by whom it was made), the question that came from that observation (formally stated as a question) and a brief explanation (1-3 sentences) as to how that question was derived from the observation. For the two questions that interest you the most, you should include at least two alternative hypotheses for each question. Structure the paper as follows:

I. Observations & Questions

1. Observation 1:

Observation Description:

Question 1:

Question Derivation: **if** necessary to explain how the question was derived from the observation

2. Observation 2:

Observation Description:

Question 2:

Question Derivation:

*And so on through all three observations***II. Top Two Questions**

Question 1:

Hypothesis 1A:

Hypothesis 1B:

:

Question 2:

Hypothesis 2A:

Hypothesis 2B:

:

An example for a single observation:**For Part I (in the above assignment)*****Observation 1:*** Salmonberry occurs more frequently toward the bottom of the hillslope.

Observation description: I made this observation while exploring a wetland and surrounding area along North Creek on October 5, 2005. All along the hillside leading down into the wetland there are very few shrubs and none of these were salmonberry. Once I came within 2 meters of the very bottom of the hill I began to encounter salmonberry with rapidly increasing density. It became the dominant understory species by the bottom of the slope.

Question 1: Why does Salmonberry increase in density lower on the slope?

Question derivation: This question follows very logically from the observation above and a derivation explanation is not necessary.

For Part II (in the above assignment)***Question 1:*** Why does Salmonberry increase in density lower on the slope?

Hypotheses: 1A) The density of Salmonberry is related to soil depth. As soil depth increases toward the bottom of the slope, salmonberry density increases.

1B) The density of Salmonberry is related to soil moisture availability. As soil moisture increases toward the bottom of the slope, salmonberry density increases.

1C) The density of Salmonberry is related to soil fertility. As soil fertility increases toward the bottom of the slope, salmonberry density increases.

Step 3: Peer Review

On October 17, we will devote one hour of class to small group discussions of your top two questions and hypotheses. You will be expected to bring 3 extra copies of the sheet you are handing in (assignment above) to give to your peers to facilitate the discussion. Each group member will have 15-20 minutes to discuss their observations, questions, and hypotheses. The purpose of this time is to

allow your peers to help you select one of the two questions as a topic for your literature review and to help refine your hypotheses for that question. The peer group must also make sure that the same question (or very similar ones) are not being used as the topic choice of more than one member. You will be required to hand in (via E-submit) this chosen question on October 24 for instructor approval (details on the Literature Review handout).