

Environmental Studies 30 -- The Global Ecosystem

HINTS -- MAKING NATURAL HISTORY OBSERVATIONS

I. Preparation

A. **Read up as thoroughly as you have the time and interest for.** Interpreting nature is a synergistic activity, the more you know the more interesting and enjoyable will be your own observations. For the purposes of the class exercise, Elna Bakker's book, the class syllabus section the Mediterranean Biome (Lecture 9) and the specific guide for the trip you have chosen are enough. If you do want to read more, do not hesitate to ask me for suggestions.

B. **Plan to keep a notebook.** I use a small bound book to record my casual natural history observations. This one is more for fun than for serious science, so I keep it more like a personal diary than a data sheet. There are two main purposes for a notebook. First, it forces you to verbalize what you are thinking and seeing. This usually has the effect of clarifying your thoughts and observations. Second, human memories are rotten. If you do not make written records, all your observations become jumbled mush pretty quickly. For an exercise like this, photos are also useful. In fact, if any of you care to, you can give me a slide or picture talk in lieu of the written exercise. Sketches are useful in notebooks too. Write up your notebook as you go. Don't wait any longer between looking, thinking, and writing than you have to.

C. **Plan to specialize your observations.** Not all the organisms and processes in communities are equally easy to see, and there are a bewildering variety of things to look at. Plant adaptations and vegetation patterns are relatively easy because plants sit still and are out in the open. Human uses are also generally visible. Animals are generally more difficult to observe well on a quick trip like this. Birds and some of the smaller animals are relatively easy to observe, but useful observations of mammals, reptiles, etc., generally take more work. If you take the trip with someone from the class, it would be a good idea to divide up tasks and compare notes.

D. **Taxonomy is helpful.** Knowing the names of plants and animals is an excellent aid to systematic observation. It is also psychologically comforting to know the names of things. A wide variety of natural history publications are available to use to identify plants and animals. For plants, for example, you can get everything from the little California Tree-Finder pamphlet to Munz and Keck's California Flora, a 5 lb., 1,000 page tome. Regional guides for both plants and animals, like Storer and Usinger's classic Sierra Nevada Natural History, are extremely useful to get started on for the more common species. Do not get bogged down in taxonomy, but I would definitely recommend finding a simple taxonomic treatment of your special group and learning a few basic names. You will find that it is fun, and that you get a sense of accomplishment from knowing them. If you have trouble finding a suitable book, I'll lend you something.

E. **Do not forget to plan food, clothing, camping arrangements, etc.!**

II. What to look for.

Advice on this score is difficult. Natural communities are complex and seldom look like the pictures in books. All the principles of biogeography will not be immediately manifest in every bit of scenery you see. A lot of hard work is generally necessary to demonstrate any particular principle in any particular place. Why chaparral suddenly gives way to an annual grassland may be hard to figure out. On the other hand, a few things usually stand out in each particular spot. For example the water economy along streams in our semi-arid country is usually quite different from the uplands, and plants generally exhibit the classic contrasts of leaf morphology, life form, and phenology expected of humid vs. semi-arid adaptations. On a trip like this, go for the easy ones.

Hints -- Making Natural History Observations

Look for patterns that have a fairly obvious explanation, at the level of a plausible guess at least. Only expect to be able to give a decent explanation for a small fraction of the patterns you can see. Ecologists have to be comfortable with explaining only a small part of what they can observe descriptively, even at the level of a preliminary hypothesis. If you can make one or two acute observations per stopping place on your field trip, you will be doing well.

Practice looking hard and actively at nature. After a quick general look at gross patterns walk around, pick up leaves, turn over rocks, key out things. etc. (Be careful of poison oak.) You might try crushing and smelling leaves to get a rough idea of the number that have strong secondary compound defenses. Make a minimum mess, of course, but get a little dirty yourself. Keep trying to make sense out of the observations you make, and if you get a good idea, jot it down.

Here are a few things to remember to look for:

A. Environment

1. **Slope and aspect.** On hilly topography, figure out where North is and note which way slopes face and how steep they are. Does vegetation respond to slope and aspect, or is it uniform?
2. **Moisture.** Look for wetter and drier areas. Differences in water economy can be obvious or subtle. Subtle effects include moist spots on hillsides without an obvious spring, often marked by having trees with big, thin, deciduous leaves, or flats with deep soils where roots can reach to ground water. Do not be afraid to guess what environmental conditions must be like from observing the plants. Also, keep in mind the general pattern of rainfall in California, high on the west slope of the Coast Range and the Sierra, higher at higher elevations, high in the north, low in the south, etc.
3. **Soils.** Note the surface color of soils, texture (sandy or clayey) and any signs of soil depth (bedrock outcrops). Road cuts in the vicinity may permit a close look at soils.
4. **Elevation.** Try to guess roughly what the elevation of a particular site is. Towns usually have the elevation on a sign you can use to help keep track.
5. **Climate.** Several of the above factors can help you guess the general climate of an area and microclimate effects. To do a serious job, one would have to assemble climate diagrams. To help with the field trip, a copy of the Sunset magazine climate zone system with a map is attached. This system does not include rainfall.
6. **Signs of disturbance.** Look for evidence of logging, grazing, fire, landslides, and other indications of human or natural disturbances. Fire is especially important in California. These are often fairly hard to spot a few years after the disturbance occurred, so look closely. By 10-15 years after a fire, the signs become dim; fire-scarred trees, especially the presence and size of fire adapted plants like knobcone pine or the stump sprouting chaparral shrubs, may be the only clues to fire frequency.

Hints -- Making Natural History Observations

B. Organisms

1. **General Pattern.** Note the conspicuous patterns of the vegetation mosaic; where grassland, chaparral, and forest occur. Within the general categories, look for more subtle differences in color or texture that suggest different dominant species. Note any obvious correspondence to environmental factors.
2. **Within a particular community, note its general structure, the mix of life forms, evidence for vegetation layers, etc.** Compare with the other communities on the same site or other sites.
3. **Are there particular plant adaptations that dominate the vegetation, for example sclerophyllous trees with an annual herb understory? Or are several basic adaptations mixed together? Are there any unusual plants, such as climbing vines?**
4. **Does the community appear to be diverse, or just have a few species?**
5. **Look for signs of animal activity as well as for the animals themselves.** Tracks and scats, signs of deer browsing, insect damage, the composition of road kills and so forth are all clues to the animal component of the ecosystem.
6. **What human uses are being made of the area? Are there any historical uses that seem to have been abandoned?**

Try to think up hypotheses that might explain a particular observation as you go along. Then try to make further observations to check out the hypothesis. If you get the hang of doing this, your notebook will be a mixture of observed facts and more or less tentative explanations of these facts. In the field, none of this will be at all polished or fancy, save fixing it up for the report and some later reflection.

Most of all, aim to have fun! Natural history is the most enjoyable part of ecology and evolutionary biology. Treat it more like reading a novel than a textbook.