Teacher's Notes for Activity 3L

In studying hazards on a short time scale, hours or days, the main task is prediction, to ensure individual safety – "will this storm hit me?" At a longer time scale, the analysis is more like calculating insurance premiums – "what is the probability of having a destructive tornado in this place in ten years?"

This Activity was an "Aha" moment for teachers in a summer institute. They agreed it was important to study hazards, but a few kept repeating that this activity was too complicated for their students and they did not have the background to run an open-ended lesson like this. I was trying to hide my irritation, because dozens of teachers had reviewed the lesson favorably, but somehow I couldn't get that across. Finally, I called a halt and said we could go on to another topic, but only after I asked three questions:

1. Remember, the dark shading means more of whatever is being shown on the map. Now, if I said that map G was about snow, would you believe me? No, of course not.
2. OK, which two maps could possibly be snow? After a pause, they agreed on maps C and F.
3. Now we have simplified the job. Are there any more that we could put into a group this way?

At that point, one of the teachers turned and said, "Isn't this exactly what we are supposed to do? Give students a tough-looking task and then help them get the skills to do it?" We then went on to the point I was hoping they'd realize – namely that this kind of activity is especially good because there are multiple ways to solve the problem, and students who favor one way or another can often learn from each other:

1. Some students solve this kind of problem *anecdotally*. They have somehow picked up a number of disconnected facts about weather around the country, like "It snows a lot in Buffalo," and therefore "I think Map C is snow, because this map is the darkest around Buffalo."
2. Others solve this kind of problem *analytically*. They know some principles about weather but do not have a lot of facts connected to them. They are likely to say, "I know it takes both cold air and water to make snow, so I think map C is snow because water can come from the Great Lakes."
3. A few solve it *analogically*. They conclude that places east of big lakes have a lot of snow (more about analogies in Chapter 6).

The power comes if you can put an anecdotal recaller, analytical solver, and analogic reasoner together in a group. They can teach each other! In doing so, they illustrate a main point in this book chapter, namely that teaching and learning geography is a process of weaving facts, theories, and judgments together to make a memory more durable. Here are "the answers" and some comments worth making:

1. Fog is map E. Fog needs moisture and calm air. It forms near rivers and lakes and in mountain valleys. It is rare in deserts and in the Great Plains, which are more likely to have strong winds and even tornadoes. (This is usually the hardest one, often solved by process of elimination.)
2. Snow is map C – It falls in the cold north or on high mountains, and not too far from a source of moisture. The famous blizzards of the northern Plains are windy storms, not especially snowy.
3. Cold is map F – Because the sun angle is low, winters are cold in the north. The Great Lakes keep their shores warmer. Mountains are like peninsulas of cold reaching into warmer latitudes. The northern Great Plains are too cold and too far from moisture to have much snow.
4. Hot days are map A, almost a mirror image of map F. Mountains are still like peninsulas of cold. The cold currents of the Pacific Ocean keep its shores cool; the warmer Atlantic still keeps the shore from being really hot; the Gulf of Mexico gets hot enough to make hurricanes.
5. Heavy rain is map G. The key is "heavy," which requires heat as well as moisture. Seattle has a lot of rain, but it usually falls in drizzles of a few tenths of an inch per day, not downpours.
6. Tornadoes are map B. "Tornado Alley" needs warm moist air from the Gulf of Mexico to collide with cold airmasses from Canada. Europe and China have few tornadoes, because Europe doesn't have really cold air and China doesn't have a Gulf of Mexico to supply moisture.
7. Lightning is map D. It's like Map G with a few extra prongs reaching up along the east slopes of the Rockies (go hiking there in July, and plan for an afternoon thunderstorm!). If you want to make the whole activity much simpler, give them this correct answer right at the start.