Environmental Sciences PhD:
Interdisciplinary Learning for an Interdisciplinary Degree

As a student in the EVS PhD program, you should understand that the program is "interdisciplinary", and that it's designed to give you an "interdisciplinary perspective" on the field of environmental science, and on your particular research problem.

You've taken the classes. You've heard that it'll be assessed on the comprehensive exams. But, what IS "interdisciplinary learning", and how can you demonstrate it?

You'll find a lot of material available online that asks, and tries to answer, this important question. One article that may be helpful is Allen Repko's article "Assessing Interdisciplinary Learning Outcomes" in *Academic Exchange Quarterly*, Fall 2008, pp. 171-178. (You can find a copy online pretty easily.) (Quoted material in the rest of this comes from this article unless otherwise stated.)

Repko's article identifies four cognitive (reasoning) abilities that come from interdisciplinary learning:

First, the ability to approach a problem from multiple different perspectives. For instance, you might approach the question "how can we reduce the impact of climate change?" from a sociological perspective, looking at how different populations might be affected by climate change. Or, you might approach it from a chemical perspective, looking at technologies for carbon sequestration or alternative energy sources. Approaching the problem from multiple perspectives "involves understanding alternative viewpoints – including disciplinary-based viewpoints – on a given issue."

Second, the ability to develop "structural knowledge" of problems. Structural knowledge is "an understanding of higher-order relationships and organizing principles." It goes beyond understanding facts and equations, into a deeper understanding of how different components of that discipline relate to each other. It is "developed by acquiring declarative knowledge (factual information) and procedural knowledge (process-based information) that is used for problem-solving or step-by-step task completion."

Third, the ability to integrate expert views from two or more disciplines. These insights can overlap and reinforce. For instance, understanding how underlying rock formations and water chemistry influence the health of plants and animals that live in a stream. In other cases, the two different disciplines may have very different answers about the causes, mechanisms and solutions for large scale environmental problems.

Fourth, your ability to produce a true "cognitive advance" from your interdisciplinary understanding of a problem. A "cognitive advance" is "the ability to explain a phenomenon, solve a problem, create a product, or raise a new question 'in which ways which would have been unlikely through single disciplinary means'". Interdisciplinary learning as a means to an end, not an end in itself; the "end" is the cognitive advance enabled by interdisciplinary learning and thought processes.

As you prepare for the comp exams, reflect back on the classes you have taken (both core and concentration classes) and look for ways to practice these reasoning abilities. Look for recurring themes (such as climate change) as opportunities to integrate disciplines. How do they connect to your research project? How does your research project connect to the world you're trying to understand and help?