I. Discussion Paper 1 due Thursday: The Tragedy of the Commons: Write a paper of no more than 1500 words that includes the following four sections and discusses each carefully and thoughtfully.
   A. Description/definition: describe a Tragedy of the Commons and identify defining aspects of a Tragedy of the Commons.
   B. Examples (these work best if you can identify two environmental problems that are similar in many ways but differ in terms of some defining aspect of a Tragedy of the Commons):
      1. Example of a Tragedy of the Commons: describe one international environmental problem and show how it has some of the defining aspects of a Tragedy of the Commons that you mention above.
      2. Example of a NON-Tragedy of the Commons: describe another international environmental problem that DOES NOT involve a Tragedy of the Commons and show what defining aspects of a Tragedy of the Commons that it lacks.
   C. 2 causes: what are the two most important factors (causes) that make a Tragedy of the Commons likely to arise?
   D. 2 solutions: identify two strategies that actors can use to solve a Tragedy of the Commons and avoid the outcomes we expect in a Tragedy of the Commons.

II. Start thinking about your final paper
   A. Make sure to read the Assignment packet from cover to cover
   B. How to get ideas for your research paper
      1. Identify THEORETICAL and CAUSAL questions that are of interest to the field, not just to you, by reading articles and seeing the questions they pose. The goal is to produce new knowledge rather than regurgitate existing knowledge
      2. Question is not only “did this treaty work?” but what part of the treaty explains why it worked. This is best addressed by such strategies as:
         a) comparing one treaty with some feature and one without it,
         b) examining a treaty that adopted a feature (sanctions, rewards) after the treaty had been around, or
         c) comparing how two different types of countries responded to a treaty - this would go to whether developed countries are more (or less) responsive to the rules of a treaty, perhaps shedding light on issues of capacity as a prerequisite for compliance.
         d) Many other options we can discuss
      3. Data will be available soon. Will be doing Excel sessions to help with analysis
   C. Readings for today
      1. Do NOT think about issues or environmental problems that interest you as the place to start – that is not likely to be a successful strategy. Re-read the Mitchell/Bernauer piece and think about it.
      2. Jacobson and Brown Weiss readings are perfect places from which to identify questions worthy of investigation and evaluation. NUMEROUS other readings are on reserve too.

III. Causality!!!
   A. Video: Humans do intervene in the environment -- but are the consequences the intended ones?
   B. MAJOR POINT OF TODAY’S LECTURE AND OF THE COURSE:
      1. We have confidence that “X” caused something in the world if we have evidence and can build an argument that things turned out differently with X in the world than they would have otherwise.
      2. E.g., we have confidence that a treaty caused environmental improvement if we find evidence and a compelling argument that the environment was better off than it would have been without the treaty.
      3. Difficult concept to grasp but taking the time to really figure out what this means will help you understand the course and its major points much better.
   C. Why causal questions matter. We want to base policies on something other than “let’s hope it works”
      1. Personal example: I insulated my house, which is heated with natural gas, in early February. Did it work? Natural Gas usage and Electricity usage
      2. Examples of “when good intentions (but no causal analysis) goes wrong”:
         a) Food aid to Sudan causes continuation of the war
         b) “Monkey Preserve Backfires: How do you protect a critically endangered species? A common way is to create reserves that are off limits to development or hunting. But in northern
Vietnam, efforts to protect a rare monkey species, Delacour’s langur, from poachers by creating reserves have backfired. The problem, says the group Conservation International, is that the reserves are more densely forested than nonreserve areas. Poachers favor the reserves because they can go undetected. As a result, the group reported at a meeting of the International Primatological Society in Italy last week, the monkeys are nearing extinction. Their numbers have declined about 50 percent during the past decade, to 300. Efforts to save about 120 of these are being stepped up”

Social programs that “do more harm than good”: A good example is “the Scared Straight program, in which at-risk teens are taken to prisons & harangued by hardened inmates to avoid a life of crime. Many communities adopted this program before it was properly tested. It turns out that not only do Scared Straight programs not work, they backfire: Teens who participate are more likely to commit crimes than a randomly assigned control group of kids who do not participate. The kids seem to be getting the message that they must be at risk of becoming criminals if convicts are going to such extreme measures to talk them out of it” (Jnl of Personality and Social Psychology, 1982)”

D. All theories are explanations of causal relationships.
   1. Ask WHY questions so can repeat success or avoid repeating failure.
   2. Have all sorts of theories floating around in our heads, even when we don’t think we do.
   3. Basic goal: test theories against facts to increase accuracy of theories to better reflect real causal relationships in world.
   4. Theories that we will be interested in are causal theories of the form X causes Y.
      a) “X causes Y” implies that we should observe BOTH
         (1) When X occurred, Y also occurred
         AND
         (2) If X had NOT occurred, Y would not have occurred (either through evidence or plausible counterfactual arguments)
      b) To evaluate theories of this form need to meet four criteria
         (1) Observe values of independent variable and dependent variable
         (2) Observe covariation, i.e., variation in dependent variable associated with variation in independent variable
         (3) Observe proper causal direction, i.e., independent variable occurs first (“free trade promotes peace” case)
         (4) Exclude other variables as explanations (eliminate “rival hypotheses”)

E. Improvement of Human Health chart (in Powerpoint slides)
   1. There are a number of diseases that historically had been endemic to our populations that dropped off significantly beginning in the mid- to late- 1800’s. What is striking about these declines in disease rates is that they occurred largely BEFORE vaccine programs, antibiotics and the big advances in modern medicine of the 20th century.
   2. Nothing, not even the miraculous scientific achievements of the 20th century combined, nothing has affected human health as profoundly as the ready availability of clean water.
   3. If drinking water is free of germs as well as chemicals, we can hydrate safely. If water is available for sanitation: sewer system, hygiene, it reduces the transmission of dz. If there is abundant access to water, we can irrigate crops and have good nutrition so our bodies can be strong and fight off dz more easily.

F. To say X caused Y is, more accurately, to say:
   1. The presence or occurrence of X caused the difference between outcome O+Y (an outcome in which Y was present or occurred) and some specified alternative outcome O (an outcome in which Y was not present or did not occur) if, under a set of conditions which were similar in all other respects, X had not been present or occurred, outcome O would have occurred but Y would not have been present or occurred.
   2. Think in probabilistic terms: The presence of X can be said to have made Y more likely to happen if we observe some outcome with Y when X is present and—in identical circumstances except where X was not present—that same outcome would have happened but with Y being much less likely.
   3. Several key distinctions
a) Whenever we say X is a cause of Y, we are really only explaining the causes of difference between outcomes in two specified sets of circumstances, not the whole outcome in a particular circumstance: X is not the cause of the outcome but only the difference between the observed outcome and a specified alternative, with the latter often implicit and underspecified.

b) Very few causes are sufficient causes: X is almost never the cause of Y under all conditions but only under a set of specific conditions (i.e., when a set of control variables take on a particular set of values). Thus, “reducing temperature to 0°C causes water to freeze” is true only under condition that water is pure and at sea level. Many conditions under which “0°C causes water to freeze” is not true (e.g., salt water, water under pressure).

c) Very few causes are necessary causes: To say X is a cause of Y does not imply that B cannot also be a cause of Y. That is, if B is also a potential cause of Y, then under identical conditions to those specified above, had B (which was not present in the original case) actually been present and X had not been present, outcome O+Y would have occurred.

G. Three types of causal questions we tend to ask: Why does a given thing vary? What are effects of variation in one thing? What are effects of one thing on another?

1. What is a variable? What is a dependent variable? What is a value of a dependent variable?
   a) Variable is some thing that we are interested in which can vary. That is, some thing which can have at least two values.
   b) Dependent variable = effect. Its what comes second or after. Sun comes up and then earth gets warm, not the other way around.
   c) Independent variable = cause. It comes first and causes variation in dependent variable.
   d) Sometimes not always clear which direction causality runs. Does economic growth encourage environmental degradation or does environmental degradation lead to economic growth or both?

2. Focus on specific DV: What causes something to vary? What are the causes of a given phenomena?
   a) Some environmental problems are addressed, others are not. Why?
   b) Some nations treat environment better than others. Why?
   c) Seeking to explain causes of a dependent variable. I.e., interested in any independent variables responsible for value of specified dependent variable.

3. Focus on specific IV: What are effects of variation in something?
   a) What are effects of international regimes? On action, policy, knowledge, views.
   b) What are effects of NGOs? On beliefs, policy, environmental protection, media?
   c) Particular cause but not clear about what effects are or want to investigate all?

4. Focus on specific IV and specific DV: What are the effects of variation in one thing on another?
   a) Do international treaties effect state behavior?
   b) Does a country’s type of government effect its treatment of the environment?
   c) Does free trade help or harm the environment?
   d) Particular causes and their effects. Independent variables of interest and trying to identify how they effect certain dependent variables.

H. Simple, one IV version of theory

1. Theoretical claim: Free trade (“more open economies”) harms the environment.
2. Counterfactual component of theoretical claim: Protectionism (“more closed economies”) helps the environment. (the counterfactual is often only an implicit part of the theoretical claim)
3. One observable implication of theoretical claim (there could be others): Since the implementation of NAFTA (or EU or Mercosur), the environment of the US, Canada, and Mexico have all been degraded more quickly than they would have been if NAFTA had not been implemented.
   a) What are other observable implications of this theory?
4. Counterfactual observable implication: Had NAFTA (or EU or Mercosur) not been implemented, the environment of the US, Canada, and Mexico would have been in better shape than it has been with NAFTA implemented.
<table>
<thead>
<tr>
<th>Cases providing evidence</th>
<th>Independent Variable</th>
<th>Dependent Variable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Theoretical claim</td>
<td>- Post-NAFTA</td>
<td><strong>Ind Var (X)</strong> Low tariffs</td>
</tr>
<tr>
<td></td>
<td>- EU members after they join</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Cuba pre-embargo</td>
<td><strong>Dep Var (Y)</strong> Degraded environment</td>
</tr>
<tr>
<td>Counterfactual element of claim</td>
<td>- Pre-NAFTA</td>
<td><strong>Ind Var (not X)</strong> HighER tariffs</td>
</tr>
<tr>
<td></td>
<td>- EU non-members</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- EU members before they join</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Cuba post-embargo</td>
<td><strong>Dep Var (not Y)</strong> LESS degraded environment</td>
</tr>
</tbody>
</table>

5. CRUCIAL POINT: Note that the comparison is between the world after 1993 with NAFTA (signing of NAFTA) and the world after 1993 without NAFTA, as opposed to the world pre-1993 without NAFTA, although we may use the latter to estimate the former.

IV. Steps to a convincing causal argument (see Mitchell and Bernauer, Jnl of Environment and Dev 7:1)
A. Identify important theoretical question
B. Develop hypotheses and identifying variables
C. Select cases to control variables (and thereby exclude rival hypotheses as explanations)
D. Link data to propositions
E. Examine correlations and causal pathways
F. Generalize to other cases

V. Completing causal theory
A. All theory simplifies the real world to sort out its complexities and develop a causal understanding of what we observe. Theory distinguishes general and important from unique and less important causes.
B. Make sure you can distinguish: variables from values, IVs from DVs, good cases from bad cases
C. General rules:
   1. DV and IV must covary, otherwise IV cannot have caused variation in DV *in these cases*. Though IV could still generally cause variation in DV.
   2. IV must change *before* DV changes.
   3. If DV varies while IV is constant, then IV can’t be a real cause (though may be permissive cause). Example: theory that corporate greed (IV) prevents international agreement (DV), but corporate greed is unlikely to vary, but agreements get signed. Lack of greed may make agreement easier but doesn’t explain why were able to get agreement in this case, since greed didn’t change.
   4. If DV is constant but IV varies, then IV is not a real cause. Example: theory that better knowledge about environmental harm (IV) reduces polluting behavior (DV), but if comparison of two cases shows new information but no difference in behavior, then information not a cause in this case.

VI. Class summary
A. What is causation?
B. What are variables, IVs, DVs, CVs?
C. How do you test theories?