GLY 102 – Global Environmental Science part 2
Handout for Lecture 1

One of the goals of this course is to learn to separate science from emotional appeals and faulty logic. Throughout the semester you will be reading articles that you will be expected to evaluate by applying critical thinking.

Critical Thinking:

1. Identify the premises and conclusions
   what evidence is presented in the material
   does the evidence support the conclusions ?

2. Locate vagueness (hand-waving) and contradictions

3. Distinguish between facts/evidence and feelings/moral judgements

4. Recognize and assess assumptions
   does the article actually focus on the correct problem(s) ?
   do the assumptions make any sense ?

5. Look at the source. Are they bias ? Are they qualified ?
   Are they supported by the evidence ?

6. What underlying conceptual frameworks could be affecting the author ?

In his book, *The Demon Haunted World*, Carl Sagan developed what is commonly referred to as CARL SAGAN'S BALONEY DETECTION KIT, a series of tools for testing arguments and detecting fallacious or fraudulent arguments. These tools work not only for the types of problems that Dr. Sagan was discussing in his book, but for pretty much any form of media or persuasion. The following is a summary of several of the ways that you will find yourself to be manipulated by authors, the media and advertisements, taken both from Dr. Sagan's list and my own experience. While you are reading the articles for this class, keep your eye out for the following forms of manipulation or faulty logic:

ad hominem -- Latin for "to the man," attacking the arguer and not the argument (e.g., Sir Isaac Newton is known to have been a pretty nasty person, but that does not mean that gravity doesn't work or that Calculus is invalid);

argument from authority – Dr. Soandso says that this is true. (e.g., President Richard Nixon should be re-elected because he has a secret plan to end the war in Southeast Asia -- but because it was secret, there was no way for the electorate to evaluate it on its merits; the argument amounted to trusting him because he was President: a mistake, as it turned out);

argument from adverse consequences (e.g., If you don't immediately stop using disposable fast food containers we are all going to die !);
appeal to ignorance -- the claim that whatever has not been proved false must be true, and vice versa (e.g., There is no compelling evidence that UFOs are not visiting the Earth; therefore UFOs exist -- and they have been monkeying around with our farmers.);

peer pressure – Everyone else believes this, so why don't you ? (e.g., More Americans want snowmobiles in the National Parks" Or: "Nine out of ten dentists recommend that you used X brand tongue cleaner.");

begging the question, also called assuming the answer (e.g., We must institute the death penalty to discourage violent crime. But does the violent crime rate in fact fall when the death penalty is imposed ?);

observational selection, also called the enumeration of favorable circumstances, or as the philosopher Francis Bacon described it, counting the hits and forgetting the misses * (e.g., A state boasts of the Presidents it has produced, but is silent on its serial killers). The article only presents the information that is favorable to its position;

suppressed evidence or half-truths – (There were only 2,000 live births of caribou last year – neglecting to mention that this is actually an improvement over last year. Or: Only 8,000 barrels of oil were spilled at Prudhoe Bay last year – neglecting to mention that this is a 200% increase in spills.)

statistics of small numbers -- a close relative of observational selection (e.g., "My baby has doubled in weight three times in the first 18 months of its life – if this keeps up I will have a thousand pound baby !" Or "They say 1 out of every 5 people on Earth is Chinese. How is this possible? I know hundreds of people, and none of them is Chinese." Or: "I've thrown three sevens in a row. Tonight I can't lose.");

misunderstanding of the nature of statistics (e.g., President Dwight Eisenhower expressing astonishment and alarm on discovering that fully half of all Americans have below average intelligence);

inconsistency (e.g., Prudently plan for the worst of which a potential military adversary is capable, but thriftily ignore scientific projections on environmental dangers because they're not "proved." Or: Attribute the declining life expectancy in the former Soviet Union to the failures of communism many years ago, but never attribute the high infant mortality rate in the United States (now highest of the major industrial nations) to the failures of capitalism.);

non sequitur -- Latin for "It doesn't follow" (e.g., Use of contraceptives has increased in New York in the past few years and mosquitoes introduced the West Nile Virus in New York a few years ago, therefore we must all stop using contraceptives or die from the West Nile Virus.);

post hoc, ergo propter hoc -- Latin for "It happened after, so it was caused by" (e.g., Jaime Cardinal Sin, Archbishop of Manila: "I know of ... a 26-year-old who looks 60 because she takes [contraceptive] pills." Or: Before women got the vote, there were no nuclear weapons);

excluded middle, or false dichotomy -- considering only the two extremes in a continuum of intermediate possibilities (e.g., "Either you want to save the owls or you want to save the economy" Or: "Either you love your country or you hate it." Or: "If you're not part of the solution, you're part of the problem");

confusion of correlation and causation -- (e.g., A survey shows that more college graduates are homosexual than those with lesser education; therefore education makes people gay.);

straw man -- caricaturing a position to make it easier to attack (e.g., Environmentalists care more for snail darters and spotted owls than they do for people), basically ridiculing or making fun of a position rather than debating its merits or lack thereof;

weasel words or words selected specifically for their emotional appeal (e.g., "The fish in the Great Lake are being tortured by our onerous use of horrific toxins").

Throughout the semester you will need to be on the look out for these and other forms of manipulation. Keep this sheet handy and try to use these terms in your homework when you run into examples.