J. SCOTT CHRISTIANSON

Media inadequately convey science's uncertain nature

Environmental science is seemingly under constant attack by the likes of Rush Limbaugh, "Fossil Bill" Kramer and others who simply don't want to examine how human activities affect the natural world. They base their shallow editorials on the inability of scientists to make predictions about the environment with absolute certainty. These commentators quickly categorize all environmental scientists as "environmental wackos" or selfishly motivated charlatans and never mention that uncertainty is inherent in the process of science.

"Scientists are trained to treat facts with doubt and to question their validity and reliability," writes Barry Noon of the U.S. Forest Service. "Uncertainty is inherent in the scientific process because the goal of science is to gradually reduce levels of uncertainty by subjecting alternative hypotheses or ideas to rigorous tests of their validity. Scientists do not construct conclusions from data, rather they construct hypotheses that are tested with data. They do not prove any assertion. Rather, they fail to disprove that assertion."

In other words, scientists start out with many different ideas, or hypotheses, and then try their best to disprove each one. The idea that explains the phenomenon and cannot be disproved is most likely the right idea. Because there is always a small chance that any hypothesis might be partly wrong, scientists don't say that an hypothesis is correct. Instead, they say that the data support the hypothesis.

Scientific predictions are rarely made with absolute certainty — most predictions are based on the probability that something will happen, given certain conditions.

Unfortunately, the media often fail to communicate the uncertainty of science and the conditions on which scientific predictions are based. A classic example was the 1992 prediction that the ozone layer over the Northern Hemisphere might thin under certain climate conditions. In a hurry to make headlines, some in the media quickly forgot the conditions on which the prediction was based and published reports of impending doom for the Northern Hemisphere.

Due to an unexpected warming of the stratosphere, the ozone layer didn't thin as predicted. Although one of the conditions on which the prediction was based — continued cold air in the stratosphere — was not met, the media launched investigations into this "flawed" theory.

In the hands of Fossil Bill, any "failure" of scientists to predict the future is the result of bad science done by "scientists concerned less about truth than self-aggrandizement ... who invent fact, exaggerate and lie to accomplish selfish ends." And he puts forth the call for a return to "pure science" — a magically noble process that proves everything beyond all doubt.

Such commentators are eager to bury the uncertainties of science in a fog of insults because they dislike the medicine that good science often prescribes.

A fear of what good science might reveal appeared to be the motivation behind an effort to stop the National Biological Survey, an in-depth study of North America's biodiversity. And when opponents were unable to defeat the NBS, they instigated an effort to increase the cost of the survey by ensuring that volunteers were not allowed to collect data for the survey.

"They claimed that this was necessary to protect property owners from undesirable intrusions by birders, botanists, and other dangerous elements of the citizenry participating in breeding bird surveys and the like," wrote J.P. Myers, director of the W. Alton Jones Foundation. "But their real logic probably read: 'If we can make it cost too much, we can probably kill it.' "

"The bottom line here is that time and again during the last several decades, science has revealed problems requiring strong action and new approaches," continued Jones. "Without that science, we would be in a fog of ignorance, perhaps suspecting that there was a mountain in the way, but without the instruments to know if it was real. Conservatives would have us plunge ahead, testing the reality of the mountain with the front-end of the airplane."

Those who look to science for absolute truth and don't understand the uncertainty of science are quick to believe superficial attacks on science. And the commentators who use the uncertainty of science to discredit environmental scientists are doing a great public disservice.

If you have a suggestion for a column, a gripe, a success story or whatever, write it down and send it to me, care of the Columbia Daily Tribune, PO Box 798, Columbia, Mo., 65205.