

Acid Rain Experts Find No Simple 'Cause and Effect'

By Jill Baron

A special symposium of "Acid Rain Impacts on Wilderness, Parks and Nature Reserves" was held as part of the recent World Wilderness Conference. Organized by John McCrone (CPSU, Clemson University), the symposium contained a poster session and four days of invited speakers organized into themes of atmospheric processes, effects on vegetation, and aquatic effects.

Complexity was a unifying thread running through most of the talks. Donald Whitehead (Indiana University) spoke of piecing together paleo-historical evidence to reconstruct the processes of acidification. Paleolimnological techniques document changes in lake, watershed, and atmospheric deposition over time, but this work shows how hard it is to exhibit simple cause and effect.

Mark Harmon (Oregon State University) spoke on the complexity of tree and whole forest response to perturbation. There may be extreme circumstances where air quality is so deteriorated from photochemical oxidants, heavy metals and acid deposition that acute effects are readily seen. Two case studies of these situations were given by David Cibrian, University of Mexico City, and by Jan Materna (Czechoslovakia). A more common situation was presented by John Skelly on pathological causes for forest or tree species decline: while air pollution may be responsible for loss of vigor in some instances, the confounding effects of other factors, such as long-term climate change, disease or insect infestation are so poorly understood that it is often difficult to understand cause and effect.

While it is well known that acidification of lakes will cause reproductive failure in fish, complexity was apparent in studies presented by David Schindler (Freshwater Institute, Winnipeg, Manitoba). Many species of aquatic organisms respond to very small shifts in aquatic chemical composition, so that the biological assemblage of lakes may change dramatically even

before fisheries start exhibiting adverse effects to acidification. Again, simple cause and effect were difficult to discuss, because sediment processes may ameliorate the effects of acid addition, or the abundance of base cations may enable species to withstand the influence of acidification.

The National Acid Precipitation Assessment Program (NAPAP) Interim Assessment was issued during the week of the World Wilderness Conference. The conclusions of the Assessment generally played down the importance of acidic deposition in causing environmental damage, in contrast to many of the conclusions reached through NAPAP-funded research. This caused a strong response from members of the symposium, all of whom are internationally-recognized experts in the field. According to paleolimnological reconstructions, lake acidity has not stabilized in many areas of North America, in direct contradiction of one NAPAP conclusion. Another NAPAP conclusion was based upon an arbitrary "acidification" value of 5.0 for determining the status of lakes. Lakes with pH above 5.0 were not considered acidified, again a direct contradiction of findings presented at the symposium detailing complex biological responses to even slight fluctuations in lake acidity.

Perhaps the most controversial NAPAP conclusion dealt with the effects of acidic deposition on forest vigor, stating that direct effects of acidic deposition are unlikely to cause damage to forests at current levels. However, since research results are inconclusive at this time, it was puzzling to the scientists at the symposium how such a conclusion could be reached.

Park Service research was well represented at the symposium. Bill Malm (Air Quality Division) was an invited speaker on sulfur dioxide sources causing visibility impairment in western parks. Posters were presented on research in Rocky Mountain, Sequoia, Isle Royale, Great Smoky Mountains, and Grand Canyon National Parks.

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