

# Perspectives

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## Why Teach About Acid Precipitation?

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There are a variety of reasons why we should teach about acid precipitation. Probably the most significant reason is simply as a recognition of the proportions of this environmental problem we have brought upon ourselves. The precipitation across two thirds of our nation has a pH low enough to be considered acidic. Acid precipitation is not a small environmental issue but a widespread phenomenon that we, as biology teachers, have a responsibility to inform our students about. It has been identified as one of two major global environmental problems by the President's Committee on Health and Environmental Effects of Increased Coal Utilization (Likens, *et al.* 1979). As the evidence pours in showing the damage that acidic precipitation causes in fragile ecosystems, it would seem that only thoughtless disregard or lack of conscience could keep the biology teacher from introducing the subject in the classroom.

Putting moral obligations aside, there are still a number of reasons to support teaching about acid precipitation. First, there is an abundance of creative teaching materials available. Many ideas and activities are presented in this issue of *ABT* and other materials are available from educational publishers and others (see "Acid Rain: Resource Materials for Schools" elsewhere in

this issue). Most of the materials use standard laboratory equipment, thereby minimizing extra costs. All of the acid rain learning materials that I am familiar with involve student activity either in the form of lab work or role playing. Student-centered activities encourage positive classroom attitudes and provide opportunities for students to develop skills of scientific investigation.

Acid precipitation affects several components of the environment so it can be brought up by biology teachers in several contexts. For example, it is an appropriate topic during studies of aquatic organisms, vascular plants, and earthworms. The complex nature of the acid rain problem, as well as its interdisciplinary aspects, provides the instructor with the opportunity to integrate an environmental problem into regular course work rather than reserving it for a special unit. By learning in an integrated manner, students should begin to develop a more well-rounded human ecological attitude toward their world. This approach also helps to discourage the idea that environmental problems are special topics reserved for radical individuals to rant and rave about.

Acid precipitation provides a graphic example for teaching some of the fundamental concepts of biology. The effects of increasing

acidity in an aquatic ecosystem demonstrate the interdependence of organisms, the complexities of food webs and chains, and the effects of removing a link of that chain. Basic chemistry for the biologist, the effect of pH on proteins, and the nature and design of experiments can all be introduced in the context of acid precipitation. In a less traditional approach, acid precipitation provides an excellent arena in which to discuss politics and science, economics and science, and other "real world" dimensions of science.

Acid rain is very much a "live" scientific issue. Students can easily locate articles in which experts disagree on their experimental findings and the effectiveness of proposed solutions. There are no "pat" solutions or easy answers for the students to memorize. In their own experiments, students may find their results do not always match those of their classmates, reflecting the difficulties faced by acid rain researchers. The complex nature of acid precipitation and its consequences provides students with a chance for scientific thought and investigation while discouraging the tendency to memorize facts and predetermine an obvious experimental outcome.

Acid precipitation is an immediate, active issue. The status of legislation and scientific evidence

changes frequently. This quality helps teachers combat the "We did this last year" and "This is boring" comments. How can a topic whose status fluctuates so often be boring? There are certainly enough new developments from year to year that will quickly outdate the information the students may have received in another course.

Another reason it is important to teach students about acid precipitation is the coverage the topic gets in the media. Articles frequently appear in newspapers and popular magazines concerning various aspects of acid precipitation. For example, the December 6, 1982 issue of *TIME* had an article on acid rain. Occasionally it is mentioned on television. Due to lack of space, time, and expertise, these reports are often sketchy and incomplete. By providing your students with more adequate background information, they will be able to read or listen with a more discerning eye or ear.

A few years after our students leave the classroom they will become voting members of society. Uninformed voters are a liability to our political system, yet amazingly few people take the time to become informed. At least in the area of acid precipitation, educators can help alleviate this problem. Many states are developing legislation concerning precipitation and Congress is reconsidering the Clean Air Act, so the opportunities for democratic participation abound. Unfortunately, that participation is not really worthwhile unless the citizens know what they are voting about at the polls or writing about in their letters to legislators.

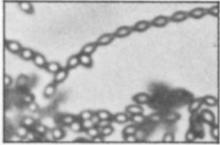
Students can become actively involved in the lessening of acid rain by means other than political approaches. Because acid precipitation has its sources in coal-fired industries and automobile emissions, any energy conservation measures students take as individuals, or encourage their families to take, will

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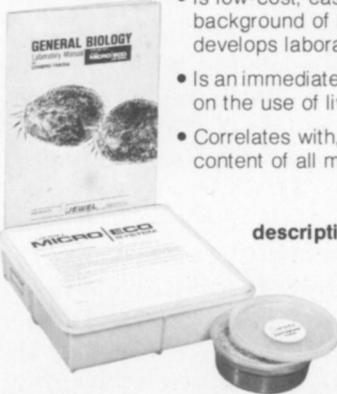




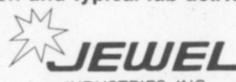

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help to reduce the problem. It is often difficult to convince students that one person can make a difference; however, if the biology instructor points out the number of classrooms where acid precipitation is discussed multiplied by the number of students in the classrooms times the number of people in their families, the students may begin to believe that they can make a dif-

ference. However, this difference will never even begin until teachers make the decision to teach about acid precipitation.

## Reference

LIKENS, G.E., WRIGHT, R.F., GALLOWAY, J.N., and BUTLER, T.J. 1979. Acid rain. *Scientific American* 241(4):43-51.