to millennia. Thus, we are not asked to rely on predictive views to study the interaction between people and environment, but we are presented with an intelligent history of this interaction. The more speculative study of the possible consequences of greenhouse-gas-induced climate change is discussed in the last chapter, after the past and present have been carefully examined.

After an introductory chapter, changes in the physical climate system are discussed in three chapters. First, an overview of the methodology of reconstructing past climates is presented, followed by discussions of patterns and causes of climate change, and the consequences of this change for the oceans, cryosphere, and biota. The emphasis is on the most recent 20,000 years, the realm of human activity. The next two chapters deal with human components of the system — the impact of environmental change on people and the historical impact of people on the environment. A separate chapter is devoted to erosion, followed by a short chapter on the cultural history of conservation. The final chapter summarizes some contemporary climate change issues, mostly greenhouse warming with some mention of ozone depletion and acid rain.

It should be noted that this book is a compelling read, despite the lack of depth in the treatment of some topics. I appreciate the breadth of the volume and the connections that it makes. Besides being of general interest to the wide-ranging environmental community, *Late Quaternary Environmental Change* should be of interest to "disciplinary" scientists struggling for broader views in their research or undergraduate teaching. The text is straightforward and readable, the figures are helpful and clear, and the references are exhaustive. —KERRY H. COOK, Dep. of Soil, Crop, and Atmospheric Sciences, Cornell University, Ithaca, NY 14853.

**Nitrogen Isotope Techniques**


The processes of the nitrogen cycle in the biosphere have been the subject of intensive study for many years, because of their profound importance for the functioning of terrestrial and aquatic ecosystems. The use of tracer techniques to help unravel some of the complexities of nitrogen transformations is well-established, and is likely to become ever more widespread as the necessary instrumentation becomes more affordable and more user-friendly.

This increased availability of the necessary technology for isotopic studies increases the need for detailed guides to the techniques and for information on their applications. This book is a welcome contribution to the fulfillment of these needs. It contains detailed coverage of both mass spectrometric and optical emission methods for $^{15}N$ analysis, and also has a specialist chapter on $^{15}N$ techniques. This short-lived isotope, with a 10-min half-life, can only be produced in specialist particle accelerator facilities, but it has played a valuable role in establishing biochemical pathways, and inclusion of a review of its uses is welcome.

The same goes for the chapter on $^{15}N$ natural abundance studies. These, as the authors readily acknowledge, provoked a storm of controversy when first applied to the identification of the source of nitrate pollution, but for processes such as the estimation of biological fixation of atmospheric $N_{2}$, they offer a genuine alternative to other techniques, provided a mass spectrometer with sufficient precision is available.

The remainder of the book is comprised of chapters focusing on particular N-transformation processes and ecosystems. Nitrogen fixation, mineralization/assimilation processes, and nitrification and denitrification are considered; the first two have separate chapters dealing, respectively, with terrestrial soil—plant systems and flooded soils/sediments and aquatic systems. Unfortunately, however, denitrification in sediments is not covered. In general, these chapters provide a wealth of useful experimental procedures and essential calculations that should prove invaluable to researchers entering these fields of activity for the first time — and provide a welcome standard of practice against which "old hands" can measure themselves.

The book will be of use primarily to researchers in agriculture, ecology, and environmental science, but should also be useful to those teaching, and taking, advanced courses in analytical methods and use of isotopes. — K.A. SMITH, Department of Soil Science, SAC, West Mains Road, Edinburgh EH9 3JG, UK.

The 1993 Information Please Environmental Almanac

Compiled by the World Resources Institute (Allen Hammond, editor-in-chief), Houghton Mifflin Company, One Beacon St., Boston, MA 02108, 656 p. $10.95 paper, $21.95 cloth.

This is the second annual issue of the Environmental Almanac, which is promoted as a "sourcebook for the environmentally conscious." About one-third of the text consists of generally informative articles on popular environmental topics, which try to define critical issues. Attention is given to air pollution, energy conservation, waste management, losses of forest, wetlands, wildlife, global warming, stratospheric ozone depletion, etc. There is not much of direct interest to crop or soil scientists in these articles. The remaining text gives a statistical comparison of population, land and water use, energy and industry between countries worldwide, provinces in Canada, and states in the USA. This is intended to provide background for activists wishing to change environmental practices and/or government policies.

Nearly all of the statistical information was obtained from official government or United Nations publications. Most of the data are for 1990 or 1991, although in some categories older data were used. Fiscal year 1988 expenditures by the states on environment and natural resources are given. From this one learns that Wyoming spent the most per capita ($267.33) while Texas spent the least ($6.76). Next to the top in per capita environmental expenditures were Alaska, Montana, New Jersey, and Oregon. Next to the bottom were Indiana, Ohio, Oklahoma, and New York. Per capita, Wyoming spent more than any other state on water resources ($136.75) and mining reclamation ($69.57). Alaska spent the most on fish and wildlife ($147.30), followed by Wyoming, Montana, Idaho, and Oregon. New Jersey spent the most on water quality ($57.96), followed by Wisconsin, Massachusetts, Nevada, Illinois, and Iowa. Hawaii spent the most on air quality ($6.13), followed by Oregon, Alaska, Connecticut, and Illinois. Iowa spent the most on soil conservation ($5.08), followed by Louisiana, North Carolina, Vermont, and Missouri.

This book will be a good source of information for persons wishing to become involved locally or politically with environmental issues. It contains short reviews of 50 books on the environment, as well as descriptions of grassroots activities in several states and provinces, with addresses for those interested. The 1991 environmental voting records, as rated by the League of Conservation Voters for representatives and senators from each state, are given. The annual publication of the Al-