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An industrial smoke plume typical of the kind of emissions that contribute to acid precipitation, the subject of this issue's "Viewpoint" (page 67) and an upcoming SCSA symposium (page 94). Environment Canada photo by F. H. Fanaki.

The Soil Conservation Society of America is dedicated to promoting the science and art of good land use, with emphasis on conservation of soil, water, air, and related natural resources, including all forms of beneficial plant and animal life. To this end, SCSA seeks through the *Journal of Soil and Water Conservation* and other programs to educate people so that mankind can use and enjoy these natural resources forever.

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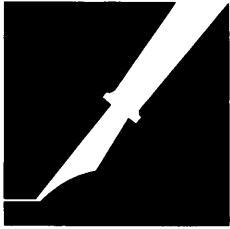
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PEN POINTS

Controversy over sludge

Research on sludge application has demonstrated that proper management can reduce risks of soil and groundwater pollution from contaminants. However, the scientific community remains divided about the threshold levels which define an acceptable risk to society.

At the one pole in this division are researchers from Cornell University, who have concluded that nearly all sludges are too toxic for land application and, therefore, should be burned [November-December 1981, pp. 336-337]. Of special concern to them is the possibility that cadmium levels in humans could be increased above acceptable levels if animals produced for human consumption are fed with crops produced on sludge-amended soils. They believe that human cadmium levels are already approaching maximum permissible levels and that even a slight increase poses an unacceptable degree of risk. They are also concerned about possible soil and groundwater contamination.

On the other side of the controversy are findings by several universities that suggest minimal increases in cadmium levels when relatively clean sludge is properly managed in land application. But monitoring of sludge contaminants and their potential for movement through soil and groundwater and uptake by plants and animals is essential.

Ultimately, the question of defining an acceptable risk to society will be decided in the political arena—not by scientists. Partially as a consequence of the Cornell research, New York State has banned land application of sludge for a two-year period in order to further investigate the risks involved. Other states have determined that land application presents an acceptable risk—provided proper management is followed.

Wendell Fletcher
Washington, D.C.

Farmer competition in Colombia

There is a statement in the article "Eroding the Base of Civilization" [September-October 1981, pp. 255-260] to which I take exception. This is the statement: "In Andean Latin America.... Wealthy ranchers use the relatively level

valley floors for cattle grazing, forcing small landholders onto steep slopes to produce subsistence crops."

The statement surfaced in Colombia in 1961-1962 as part of a drive to establish a new land reform institute, INCORA. It was directed particularly at the Cauca River Valley.

At the time I was land use advisor on a U.S. AID team assigned to the Colombian land reform program.

It was then true in the Cauca Valley and to some extent in the Sinu River Valley that the fertile alluvial valley floors were being used for grazing by beef and dairy cattle and that most of the small farmers were up on the sloping lands of the valley sides. From that point on the above statement is, in my opinion, a political misinterpretation rather than a technical evaluation of the situation. The valley floors were being grazed for the very sound reason that they were not suitable for cropping. Planted crops were so frequently flooded as to not be profitable or practical on most of the valley floor. An exception to this generality was the slightly higher river terraces bordering the river, and these were mostly in the hands of small cultivators.

Since the above statement was made, the Cauca overflows have been largely controlled by diking. Water from side drainages has been controlled by channeling and drainage. The Cauca River bottoms are now almost entirely in crops; sugarcane is the most important.

To imply that the small farmers were forced onto the slopes by the big cattlemen is simply not true. Small farms along the Cauca River tend to concentrate on areas having volcanic soils and elevations suitable for coffee. These coffee lands were opened up many years ago by small farmers. Subsistence food crops were grown and continue to be grown, but the principal reason for the farms being there is to produce coffee.

Coffee is probably the best land use for those slopes. Growing of subsistence crops does cause erosion, and the slopes do not lend themselves to modern mechanized agriculture. To further complicate the problem, there have been several generations of large families produced on the slopes, which has tended to overcrowd the area and to require more subsistence crops to feed the population.

There is a need to find a productive outlet for surplus people from the slopes in the Colombian economy. The agricultural development of the Cauca River floodplain has provided much greater employment than existed in the early 1970s, but the surplus of employable people trying to enter the economy continues to be a problem.

Wayne H. Miles
Bogota, Colombia

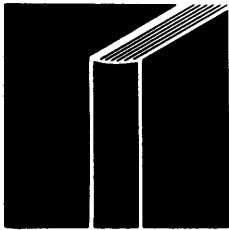
Lester Brown's "Eroding the Base of Civilization" provides a timely warning of the inadequacy of the future world cropland base. The soil conservation fraternity in New Zealand, however, is left wondering as to the relevance of the classic photograph of braided Rakaia River draining from the Southern Alps of New Zealand.

Not only are the words "spectacular erosion and sedimentation" in the caption on page 259 conspicuously absent from the text, but the chosen example of Rakaia River, far from robbing the capacity of agricultural land, is one of our more benign rivers requiring little control. It is a continuing source of loess to surrounding soils. At one exceptional site adjacent to the river, we have detected loess deposition in excess of 20 mm a⁻¹ from Cesium 137 profiles. The gravel load of the same river is somewhat short of spectacular, being perhaps 200,000 tonnes a year at the coast, where it mitigates coastal erosion consequent on the post-glacial rise in sea level.

Here in New Zealand we live in the climax of a mountain-building episode, and examples of spectacular erosion and sedimentation are commonplace and largely unavoidable.

Fortunately for the world cropland base, we find no long-term net loss of agricultural land from these causes, but rather there seems to be something approximating a steady state between the spectacular losses in one area and the gains through slow healing in others. But, a steady state is not a static state and provides little solace to the farmer facing a rampaging mountain torrent whittling away his bottom fields.

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BOOKS, ETC.

The Dust Bowl: An Agricultural and Social History. By R. Douglas Hurt. 214 pp., illus., refs., bibliog., index, 1981. Nelson-Hall Publishers, Chicago, Illinois 60606. Hardbound, \$19.95; paperback, \$9.95.

Although four decades have elapsed since the devastating drought of the 1930s, public and scientific interest in this period of American history continues. The attention is well deserved for several reasons. The incalculable impact of the drought and depression left a lasting impression on this country, and documentation of this impact provides a valuable reference for future generations. Also, the current national interest in the wise and sustained use of natural resources has focused attention once again on the era of the "black blizzards." This focus serves as a stark reminder of what can happen under circumstances of drought, economic stress, and the misuse and abuse of natural resources.

R. Douglas Hurt has written an authoritative, interesting, well-documented and readable book on the agricultural and social history of the Dust Bowl region. Although the book concentrates primarily on those states that suffered severe wind erosion during the 1930s, namely Kansas, Oklahoma, Texas, Colorado, and New Mexico, it broadly references the entire Great Plains region.

Chapters 1 and 2 discuss settlement of the region and early farming attempts that were in part responsible for the dust storms of the 1930s. Chapters 3 and 4 describe these storms in detail, giving the reader a better understanding of life in the Dust Bowl. Chapters 4 through 6 review the agricultural impacts of the drought and federal drought relief programs, both short-term and long-term. Hurt pays special attention to emergency livestock programs and the Shelterbelt Project. Fortunately, his treatment of the subject does not end with the 1930s. Chapter 5 discusses the drought and wind erosion problems that plagued the Dust Bowl in the 1950s, and the epilogue discusses briefly the drought of the 1970s, including future implications.

Hurt's appraisal of the Dust Bowl's causes are generally realistic. As for the future, he believes that another Dust Bowl can be prevented through the conservation programs initiated during and following the 1930s. Although this may be true, there are causes for concern currently—the discontinuation or cutbacks in some govern-

ment agricultural programs, the plow-up of marginal lands, the destruction of windbreaks and terraces to accommodate center-pivots, irrigation systems, the depletion of groundwater reserves, and the high indebtedness of farmers.

The Dust Bowl... is an excellent reference for scientists and nonscientists alike who are interested in the Great Plains. Because of the current interest in climate variability, the carbon dioxide controversy, depletion of the Ogallala aquifer, and desertification, the book should prove to be a timely addition to almost any library.—DONALD A. WILHITE, *Center for Agricultural Meteorology and Climatology, University of Nebraska, Lincoln, 68583.*

Freshwater Marshes: Ecology and Wildlife Management. By Milton W. Weller. 146 pp., illus., refs., tpls., apps., index, 1981. University of Minnesota Press, Minneapolis, 55414. Hardbound, \$22.50; paperback, \$8.95.

Freshwater marshes are among the least appreciated and most imperiled landscapes in America. They are unappreciated largely because the general public knows little of what they do. Unfortunately, the value of marshes is most often discussed in terms of ducks, and usually by hunters. Marshes are destroyed primarily because of economic competition for the land they occupy. Obviously, raising wild ducks for someone hundreds of miles away to enjoy is a hollow reason for a near-bankrupt farmer not to drain a wetland and plant grain. Thus, freshwater marshes in the prairie pothole region of the country are succumbing to drain tile and plow at the rate of 35,000 acres each year. Ninety percent of the marshes in California's fertile Central Valley have been eliminated.

There is more to marshes than ducks, of course. Marshes improve water quality by trapping soil, nutrients, and toxic chemical runoff from agricultural land and elsewhere. They help recharge groundwater supplies. They nurture many kinds of wildlife. And they reduce the frequency and intensity of flooding. But to appreciate the full value of a marsh, one must learn how it works. And if we are to retain a significant amount of marsh habitat, public awareness and concern for wetlands must continue to grow. *Freshwater Marshes* is an excellent introduction to the subject, for students and laymen.

Weller begins the book by describing how marsh basins are formed, filled with water, and occupied by plants and animals. He then discusses the wetland as a "system"—where energy flows in, runs through the food web, and keeps everything vital.

Particularly interesting is the chapter on restoring and managing marshes. Weller discusses management philosophies, wetlands acquisition, natural and artificial methods of vegetation and animal manipulation, and the creation of new marshes.

The book leaves off where this review begins, with a discussion of land use conflicts surrounding wetlands conservation and policies and programs designed to protect wetlands.

One could memorize and understand this book from cover to cover and still not become an expert on wetlands. The volume is not that extensive nor is it intended to be. *Freshwater Marshes*, however, is an excellent general introduction to what freshwater marshes are and do. And after all, it will be an enlightened citizenry, not a group of wetlands experts, that ultimately decides whether wetlands are worth protecting and managing.—LONNIE L. WILLIAMSON, *Wildlife Management Institute, Washington, D.C. 20005.*

Desertification of the United States. By David Sheridan. 142 pp., illus., refs., bibliog., 1981. Council on Environmental Quality, Washington, D.C. 20402.

Desertification of the United States, a rather short, attractive paperback, is neither a popular account of desertification nor a scientific analysis of the biological and physical processes involved. In his foreword, David Sheridan states that the purposes of the report are (1) to synthesize the available scientific information on desertification in the United States, and (2) to identify federal policies that promote or discourage desertification. The book fails on the first count. Only in identifying federal policies that promote or discourage good land use does it have something to offer.

The book in no way synthesizes the available scientific information on desertification. It even ignores papers listed in its own woefully inadequate bibliography on the effects of livestock grazing on soils, vegetation, and wildlife. The "scientific information" quoted includes histories, pro-

ceedings, personal interviews, and even Michener's fictional *Centennial*. Although there are 481 citations, none is from any reputable journal dealing with the subject of desertification, such as *Ecology*, *Soil Science Society of America Journal*, *Soil Science*, *Journal of Soil and Water Conservation*, or *Journal of Range Management*. The author bases his conclusions on reports that have been challenged by professional societies (such as the Challis Environmental Impact Statement) or that have been replaced by more accurate and complete analyses (such as the Bureau of Land Management's 1975 grazing report). Undocumented, in-house reports are considered when there is a wealth of literature in the scientific and professional journals of the last 50 years.

Sheridan concludes that "desertification in the United States is flagrant. Ground water supplies beneath vast stretches of land are dropping precipitously. Whole river systems have dried up; others are choked with sediment washed from denuded lands. Hundreds of thousands of acres of previously irrigated cropland have been abandoned to wind or weeds. Salts are building up steadily in some of the nation's most productive irrigated soils. Several million acres of natural grasslands are, as a result of cultivation or overgrazing, eroding at unnaturally high rates. Soils from the Great Plains are ending up in the Atlantic Ocean." But these conclusions are his own, not the result of any synthesis of the professional literature.

No one denies that each statement can be supported and examples given, if perhaps only on a local basis. Even taken as a whole, his conclusions have some merit. Unfortunately, he chose to present a one-sided brief based on dramatic and oftentimes poetic anecdotes rather than to base his conclusions on the vast amount of good scientific literature that is available. In doing so, Sheridan loses credibility.

The book does make a contribution by identifying federal policies that affect good land use. From this standpoint, Sheridan concludes, "The federal government subsidizes both the exploitation and conservation of land resources, but the subsidies for conservation are meager compared with those for exploitation. The net effect of federal subsidies is to encourage production, not conservation.... Federal subsidies are, in other words, a major force behind the desertification of the United States, but

they are certainly not the only force. The market provides powerful incentives to exploit arid land resources beyond their carrying capacity as was evidenced during the 1973-74 hike in wheat prices."

His discussion of the Great Plains Conservation Program, conservation subsidies, federal disaster relief efforts, and depletion allowances for water in the Ogallala aquifer are extremely good. His opinion on new stresses that are put upon the arid lands due to policies affecting energy and defense are worthwhile reading. Unfortunately, he will probably lose anyone familiar with the scientific literature by the time he reaches the sections on policy.

In my opinion, Sheridan's book has little value as an analysis of scientific information, or as a means of raising new ideas or synthesizing old ones on the subject of desertification. However, if the discussion on policies and subsidies inspires even one lawmaker in Congress or state legislatures to eliminate the incentives for poor land use in arid regions, then the effort will have been worthwhile and Sheridan is to be commended.—*THADIS W. BOX, College of Natural Resources, Utah State University, Logan, 84322.*

The Southwest Under Stress: National Resource Development Issues in a Regional Setting. By Allen V. Kneese and F. Lee Brown. 268 pp., illus., refs., tpls., bibliog., index, 1981. The John Hopkins University Press, Baltimore, Maryland 21218. Hardbound, \$30.00; paperback, \$9.50.

This handsomely designed book is presented as a "capstone" report on the Southwest Region Under Stress Project, a multidisciplinary study conducted from 1973 through 1978 by scholars mostly from the southwestern United States but from other regions of the country as well. The project produced some 140 published and unpublished documents, all of which are listed in this volume.

For much of the research, the Southwest was defined as the "four corners" region of Arizona, Colorado, New Mexico, and Utah. As the book illustrates, however, definitions were not entirely consistent among individual projects. Much of the focus in this final report is on the four corners area, which the authors describe as the "Southwest poverty diagonal." A book on natural resource problems in the South-

west is a welcome addition to the natural resources literature, which has largely ignored this large and unique area.

Kneese and Brown define the major potential problems of the area in terms of water, energy, the environment, and the Indians. They discuss the first three issues on the basis of quantities of natural resources in the region, the institutions surrounding natural resource use for economic development, and the possible effects of development on the environment. The final issue is whether or not the region's large Indian population would benefit from resource development.

The general approach in each chapter is to lay out the issues, present a good deal of statistical data, and then develop alternative scenarios based on a number of formal and informal models presented in the chapter appendices. Case studies are summarized in several instances to illustrate the application of the general models.

The study's principle conclusions include the following:

1. "Although there is a popular conception that water will be a severe limitation on growth in the Southwest, our assessment reaches a somewhat different conclusion. The water institutions in the region are adapting to a condition of full appropriation and the increasing importance of water transfers." The major problem "...is the unresolved equity issue...with regard to the Indian rights."

2. "There is more difficulty with the environment in general than with the water area.... First there is as yet no settled opinion about the degree of environmental preservation desired by society, regional or national, beyond that level necessary to avoid demonstrable calamities.... Secondly...we are still experimenting with different means of achieving whatever level of preservation is judged satisfactory." Kneese and Brown believe that "...air quality considerations will have a much greater bearing upon both the level and pattern of future resources development than will water scarcity."

"...in terms of eliminating the economic disparities that exist within the region, the problem of economic development is proving to be the most intractable. Although some improvement can be seen, particularly in reference to the Indian tribes that possess valuable deposits of resources, the immediate outlook remains poor."

As might be expected with a summary

report of some 140 individual studies, the quality of this book is somewhat spotty. Sometimes there seems to be too much data, sometimes not nearly enough. Curiously, the book barely mentions agriculture, an activity that accounts for about 90 percent of all water use in the region. The omission may have been intentional because, as mentioned, the authors' focus is on the smaller four corners area where there is relatively little agriculture. For many readers, however, inclusion of agriculture in the discussion, at least to show why it is not important to the analysis, would have made the book's conclusions more credible. As a 20-year student of agricultural water use in the Southwest, I support the conclusions, but not all readers will have the benefit of such experience.

The Southwest Under Stress... is a useful overview of many detailed studies in an interesting and neglected region. Perhaps the book's greatest value, however, will be to lead readers to the individual investigations comprising the basic research project. —WILLIAM E. MARTIN, Department of Agricultural Economics, University of Arizona, Tucson 85721.

General

Soil and Water Conservation: The Texas Approach. 288 pp., illus., tpls., app. 1981. Texas State Soil and Water Conservation Board, Temple, 76501.

Social and Environmental Consequences of Natural Resources Policies. Proceedings of the International Seminar, April 8-13, 1980, Durango, Mexico. 57 pp., illus., 1981. General Tech. Rpt. RM-88. Rocky Mountain Forest and Range Experiment Station, Forest Service, Fort Collins, Colo. 80526.

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Approved Practices in Soil Conservation. By Duane A. Bosworth and Albert B. Foster. 470 pp., illus., app., gloss., index, 1982. The Interstate Printers and Publishers, Danville, Ill. 61832. \$16.65.

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