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To advance the science and art of good land use

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Cover
The Richmond, Virginia, skyline provides a dramatic backdrop for a hard-at-work farmer. Beautiful as it is, cropland in the urban-rural fringe faces a bleak future. See page 135. SCS photo by Tim McCabe.

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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PEN POINTS

Windbreak plantings increase

The article "Windbreak Removals Offset by New Plantings" appearing in the March-April issue of the *JSWC* [page 97] disturbs me. The article stated that Oklahoma was the only state surveyed that failed to offset windbreak removals with new plantings and called our situation serious. The article is correct. However, it covered a time frame over five years ago.

Oklahoma has completely turned its windbreak program around since 1975, a fact I feel the *JSWC* should recognize. In 1976, 264,575 trees were planted in windbreaks. The number of trees planted has increased yearly since then. Last year, 1,242,000 trees were planted in windbreaks, and even though the figures are not in this year, it appears another increase in trees planted in windbreaks will be recorded. In each of the last two years, more feet of field windbreaks were planted than removed during the entire five-year period, 1970 to 1975. By the same token, windbreak removals have nearly ceased.

We appreciate your coverage of areas of concern. The change in the program should be of interest to the public. I hope you will take steps to show the change and correct the misleading information that was included in the article.

Roland Willis
Soil Conservation Service
Stillwater, Oklahoma

More on the land in farms

I too was surprised to find that land in farms had decreased 88 million acres from 1969-1978 ["The National Agricultural Lands Study Goes Out with a Bang," *JSWC*, March-April 1981, page 91]. I wonder if NALS compared its estimates and Census data with the USDA series on land in farms. It might be helpful to some of those who seemingly have made up their minds regarding the "numbers controversy" to see this comparison [see table below].

H. Thomas Frey
Economics and Statistics Service
Washington, D.C.

Land in farms.

Year	Census			CRB*		NALS†
	Published	Original	Old Definition	Old Definition	New Definition	
	million acres					
1969	1,063	1,063	1,063	1,108		1,137
1974	1,017	1,017	1,025	1,084		1,084
1978	1,031	1,016	1,049	1,072	1,045	1,049
Change 1969-78	−32	−47	−14	−36	‡	−88

*Crop Reporting Board, Economics and Statistics Service, USDA.
†From a manuscript, "Calculating Changes in 'Land in Farms' from the 1969, 1974, and 1978 Census of Agriculture," by NALS staff members Charles Benbrook and Allen Hildebaugh.
‡Estimates for 1969 and 1974 have not been revised to fit the new definition.

Erosion vs. soil productivity

Your March-April issue contained an informative and well-documented article on the effects of soil erosion on productivity [pages 82-89]. The report is one of many fine review articles done recently on the topic. This flurry of articles reflects many factors, including the public's growing concern over the social consequences of erosion. Another motivation is in part defensive. The value of public soil conservation expenditures has been convincingly challenged in recent years. Farmers cite the continuing climb in average crop yields, and the analytic results of objective evaluations of conservation program costs and benefits are discouraging at best. Shortcomings in our ability to quantify conservation benefits credibly are well-known and have been singled out as a serious impediment to the development of better conservation programs.[1]

Soil scientists recognize, correctly, that the erosion-productivity relationship lies at the heart of the debate over the costs and benefits of conservation programs. Accordingly, work is progressing on a number of fronts to provide the needed empirical basis for sound conservation policy decision-making.

This research is vital to the conservation effort. The SEA article, however, raises serious questions about whether the research program within USDA will provide the information needed to revitalize the conservation effort. Without swift, decisive progress toward more effective federal conservation programs, substantial harm to a portion of this country's soil resources seems inevitable.

In my judgment, developing better conservation programs is a more pressing need than appropriating additional funding for programs that perform poorly [see the recent *JSWC* article (January-February 1981, pages 24-27) on the Agricultural Conservation Program performance.] Thus, a well-planned and deliberately executed conservation research program is of tremendous importance.[2]

Perhaps the major piece of information needed to better administer public conservation programs is quantification of the relationship between erosion and productivity. From a policy perspective, the relevant approach is considering the impacts of erosion on the productivity of all resources used in the farm production process. Conservationists tend to ignore or discount the social value of resources consumed directly or indirectly by the application of conservation practices. These costs must be objectively appraised and weighed against the benefits stemming from adoption of conservation measures. Policy analysts who urge that this balancing be done are not enemies of conservation. Typically, they recognize the fiscal and analytic realities awaiting those with the task of defending conservation program expenditures. Indeed, the job of defending the programs often falls on these same policy analysts. I feel safe in generalizing that most would rather be armed with scientifically valid, credible facts than with

[1]William E. Larson, Leo M. Walsh, B. A. Stewart, and Don H. Boelter, eds., 1981, "Executive Summary," National Workshop on Soil and Water Resources Research Priorities, Soil Science Society of America, Madison, Wisconsin.

[2]Charles Benbrook and Arnold Miller, 1981, "Soil and Water Conservation: Production Pressure, Conventional Wisdom, and Research Needs," paper prepared for the workshop, "Soil and Water Resources: Research Priorities for the Nation," February 23-27, Madison, Wisconsin.

the results of public opinion surveys.

And when the next round of debate opens, we can be sure to encounter the following quote from the SEA article in the *JSWC*: "Soil erosion depletes soil productivity, but the relationship between erosion and productivity is not well defined." With 40 years of erosion research completed and cited in the article, why was this team of experts compelled to make this sobering confession?

Fortunately, the reason for this apparent lack of understanding becomes clear from a close look at the article. The committee states in the very first paragraph of the article that "because of the emphasis on a soil's capacity to produce crops, *productivity should be expressed in terms of yields*" (emphasis added). On the next page, the committee writes, "One of the most dangerous characteristics of the erosion-productivity problem is its difficulty of detection...improved technology often masks the reduction in productivity" (from erosion).

Improved technology in the article refers to production inputs, such as fertilizers, seeds, pesticides, and irrigation, in addition to rising levels of application per acre of these inputs. Technology masks the impacts of erosion on productivity only when productivity is defined in terms of crop yields alone. A multiple-resource definition of productivity would not lead to this conceptual blind alley. When the impacts of erosion on the productivity of all resources is considered, the impacts of soil erosion can be quantified meaningfully. Many soil scientists argue that excessive erosion may or may not change crop yields but invariably requires farmers to rely more on nonsoil production inputs.

Technology masks the effects of erosion on productivity only when a single resource definition is relied upon. Technology can substitute for soil lost or degraded through farming activities. This substitution, furthermore, nearly always entails a real cost because of the value of other scarce resources. Furthermore, it is very fortunate for the nation and our foreign customers that technological inputs have this capability to enhance crop yields even where excessive erosion has, or is, occurring. Use of the word "masks" suggests a negative connotation undeserved by agricultural technology.

The unresolved questions, however, are these: How long will this substitution of energy-intensive farm inputs for soil remain affordable? What soils will be subject in the near future to rapid degradation after which yields cannot be maintained regardless of the levels of inputs applied? What conservation practices should be used on soils subject to excessive erosion to maximize the positive increment in the resources saved over the resources consumed by the conserving activities? Answers to these basic questions should establish the broad focus and targeting strategy of the nation's future soil conservation programs. Other impacts of erosion, such as water pollution, would, of course, modify the priorities given to certain types of conservation practices in different areas.

Conservation research in SEA should be designed, at least in part, to support the expeditious resolution of these critical questions. The committee of scientists writing the *JSWC* article evolved from a workshop critiquing the Yield-Soil Loss Simulator, a component of the RCA study. This econometric model holds great promise to provide needed information on a nationwide scale regarding the effects of erosion on productivity (both single and multi-resource).

It is true that a SEA workshop in early 1980 and subsequent appraisals of the simulator identified needed refinements of the model, both structural and empirical.[3] Indeed, many attending the SEA workshop understood that the research planning committee's basic charge was to examine and develop in detail what these refinements to the simulator were and how SEA expertise could be tapped to bring them about.

The program of research outlined in the article has, in my view, strayed far from the committee's original goal. The article contains no substantive recommendations for improving the simulator; worse yet, no analysis is offered to back up SEA criticisms voiced at the workshop and elsewhere about the simulator's validity, with the possible exception of a reference to 33 articles in the literature. However, after reviewing the same body of literature, I concluded that most of the research results in these articles are not comparable to the simulator because the research projects spanned four decades under highly variable conditions. In addition, the experimental designs of most of these studies differed significantly from the field and management conditions assumed to exist in the data base from which the simulator's regression equations were estimated.

The plan of research outlined in the article will not any time soon produce the information needed to improve the effectiveness of conservation programs. The SEA team proposes an extremely sophisticated and complex computer modeling exercise that will provide highly detailed information under a very precisely defined set of conditions. Knowledge gained about the fundamental physical processes involved could, after many years, assist in macro-modelling exercises like that carried out in developing the simulator. In the meantime, our conservation programs will still have no widely applicable methodology to target expenditures onto those soils most in need of protection against erosion.

The SEA modelling proposal is basic research. Applied research within SEA is needed to provide other USDA agencies with information they need to achieve better administration of on-the-ground conservation programs. It is troubling to me that USDA has not continued work on the simulator, especially since opportunities for improvements in the simulator's accuracy and reliability have been identified and recommended to USDA.

The recent workshop in Madison, Wisconsin, on conservation research priorities provided a much needed chance for an exchange of views regarding what is needed to enhance the conservation of soil, water, and other resources. A key missing ingredient, it seems to me, is for all conservation researchers to gain a broader perspective of the factors causing our agricultural resources to be unnecessarily degraded. A broader perspective and more frequent communication between research scientists and program managers can vastly improve the overall effectiveness of federal conservation expenditures.

Charles Benbrook
Staff Director, House Subcommittee on Department Operations, Research, and Foreign Agriculture
Washington, D.C.

[3]Charles Benbrook, 1980, "Review of the Yield-Soil Loss Simulator," paper prepared for the RCA Coordinating Committee, USDA.

Conservation Farming. By Harold A. Hughes. 150 pp., illus., refs., tbls., gloss., 1980. John Deere Technical Services, Moline, Ill. 61265. $11.40.

Did you know:

- An hour of farm labor today produces four times as much food and fiber as it did 25 years ago?
- Only one percent of all water on earth is both fresh and usable?
- Three billion tons of topsoil are lost to erosion in the United States annually?
- The manure from one dairy cow for one year includes 155 pounds of nitrogen, 62 pounds of phosphate, and 124 pounds of potash?

Conservation Farming is full of facts such as these. It is also beautifully illustrated with colored charts and photographs. The language is not highly technical, but a basic knowledge of agricultural practices is assumed.

The book concerns conservation in a broad sense. It has separate sections on energy, water, soil, fertilizer, and pesticides. Author Harold Hughes, an associate professor of agricultural engineering at Virginia Polytechnic Institute, was assisted by 13 highly qualified consulting editors in assembling the book.

The section on energy discusses and classifies energy use in agriculture, then goes into detail on ways to conserve energy. An on-farm energy audit is described, and guidelines are given for conservation practices in tractor selection and operation, tillage, harvest, fuel storage and handling, and grain drying.

The section on water clearly illustrates and explains the hydrologic cycle. Drainage and irrigation methods are also discussed, with emphasis on water use efficiency.

Types of soil erosion are described, and factors in the universal soil loss equation are discussed briefly. The many erosion control alternatives are summarized without great detail.

The sections on fertilizers and pesticides emphasize proper and efficient use.

A final section explains how conservation practices interrelate with other farming operations.

For the most part, *Conservation Farming* is not a how-to-do-it book. It is designed to stimulate thought and allow farmers and farm managers to make logical decisions about conservation practices.

This book will be useful to anyone who works, teaches, or lectures in the area of conserving agricultural resources. It will also be a valuable reference for high school vocational agriculture classes and undergraduate college courses.

Deere and Company is to be commended for supporting this book. It provides information that will prove valuable as conservation of agricultural resources becomes a necessity rather than just desirable.—*DONALD R. GRIFFITH, Cooperative Extension Service, Purdue University, West Lafayette, Indiana 47907.*

General

Rural Society and Environment in America. By John E. Carlson, Marie L. Lassey, and William R. Lassey. 425 pp., illus., refs., gloss., apps., indexes, 1981. McGraw-Hill Book Co., New York, N.Y. 10020. $18.95.

Environment and Equity: A Regulatory Challenge. By Daniel R. Mandelker. 162 pp., 1981. McGraw-Hill Book Co., New York, N.Y. 10020. $24.95.

Technology for Local Development. 250 pp., illus., app., 1981. Office of Technology Assessment, Washington, D.C.

America's Soil and Water: Condition and Trends. 32 pp., illus., 1980. Soil Conservation Service, Washington, D.C. 20013.

Manual of Photogrammetry (fourth edition). 1,056 pp., illus., 1981. American Society of Photogrammetry, Falls Church, Va. 22046. Member, $44.95; student member, $34.95; nonmember, $59.95.

Public Choice and Rural Development. Edited by Clifford S. Russell and Norman K. Nicholson. 312 pp., 1981. RFF Res. Paper R-21. Johns Hopkins Press, Baltimore, Md. 21218. $12.00.

Small is Possible. By George McRobie. 331 pp., refs., index, 1981. Harper & Row, New York, N.Y. 10022. Cloth, $14.95; paper, $5.95.

The Farm & the City: Rivals or Allies? Edited by Archibald M. Woodruff. 184 pp., illus., index, 1980. Prentice-Hall Inc., Englewood Cliffs, N.J. 07632. $5.95.

The Holy Earth. By Liberty Hyde Bailey. 112 pp., 1980. Cornell Distribution Center, Ithaca, N.Y. 14850. $4.95.

Cost Data for Landscape Construction, 1981. 248 pp., 1981. Kerr Associates, Inc., Minneapolis, Minn. 55403. $24.95.

Soil and Water Resources: Research Priorities for the Nation. Edited by William E. Larson, Leo M. Walsh, B. A. Stewart, and Don H. Boelter. 45 pp., 1981. Soil Science Society of America, Madison, Wisc. 53711.

What is Land Improvement? Illus. 1981. Land Improvement Contractors of America, Maywood, Ill. 60153.

Forests

New Means of Analysis Required for Policy Decisions Affecting Private Forestry Sector. 46 pp., 1981. U.S. General Accounting Office, Gaithersburg, Md. 20760. Single copies free.

Rooting Habits of Selected Commercial Tree Species of the Eastern United States—A Bibliography. 59 pp., bibliog., apps., 1980. U.S. Government Printing Office, Washington, D.C. 20402.

The Handbook of Weed & Insect Control Chemicals for Forest Resource Managers. By Michael Newton and Fred Knight. 160 pp., app., 1981. International Scholarly Book Services, Inc., Forest Grove, Oregon 97116. Cloth, $24.95; paper, $17.95.

Forest Cover Types of the United States and Canada. Edited by F. H. Eyre. 148 pp., refs., apps., index, 1980. Society of American Foresters, Washington, D.C. 20014. $7.50.

Soils

Landforms of the Basin & Range Province—Defined for Soil Survey. By Frederick F. Peterson. 52 pp., illus., refs., apps., gloss., 1981. Tech. Bull. 28. Max C. Fleischmann College of Agriculture, University of Nevada, Reno 89557.

Soil and Water Conservation Structures, Hydraulic Models and Field Applications. 33 pp., illus., 1980. AAT-NC-6. St. Anthony Falls Hydraulic Laboratory, Minneapolis, Minn. 55414.

Erosion and Sediment Transport in Pacific Rim Steeplands. Proceedings of the Christchurch Symposium, January 1981. 654 pp., 1981. International Association of Hydrological Sciences, Washington, D.C. 20009. $45.00.

The Mineralogy, Chemistry, and Physics of Tropical Soils with Variable Charge Clays. By Goro Uehara and Gavin Gillman. 170 pp., illus., tbls., refs., index, 1981. Westview Press, Boulder, Colo. 80301. $30.00.