

# JOURNAL OF SOIL AND WATER Conservation

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### Cover

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As a multidisciplinary membership organization, we advocate the protection, enhancement, and wise use of soil, water, and related natural resources. Through education and example, we promote an ethic that recognizes the interdependence of people and the environment.

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## P E N P O I N T S

### To the editor:

J.F. Criss's letter (May-June '95) is right in its main argument, against reliance on industrially fixed N fertilizers—we must replenish our soil with properly processed human and other organic residuals. However, its reasons are largely wrong. In approximate increasing order of importance:

1. The statement, "U.S. natural gas reserves in 1992 will last 8.17 years at our 1993 rate of consumption," is a minor classic of spurious precision. Both future consumption rates and gas reserves are estimated with uncertainties exceeding 10 percent, so a three-figure item like 8.17 years is misleading.

2. The loose term "reserves" has no place in such discussions. The distinction between proven economic reserves and the often far larger amounts which physical evidence has suggested but which no commercial organization would bother to prove escaped the Ehrlich's for their generally superb *Population, Resources, Environment* (1972); joined by physicist Holdren for the 1977 edition, they caught up with relevant definitions.

3. The deeper we drill, the more methane we find. Deep methane-laden geothermal brines around the Gulf of Mexico are one example. T. Gold's hypothesis that our planet, like several other bodies in our solar system, is loaded with primordial methane, in its most stringent test (a Swedish deep granite formation, where no ex-living material is expected) is reported to have found a major de-

posit of natural gas.

4. The Haber process for ammonia, combining atmospheric nitrogen with hydrogen, does not need natural gas. Prusal of the Encyclopaedia Britannica entry on nitrogen fixation reminds us that hydrogen was for many years produced from coal, and I fear that, as a matter of chemical engineering, coal-based process could all too readily be expanded anew as natural gas runs out. Further, non-Haber processes have worked in the past and might be redeveloped using modern catalysts.

I have been teaching for more than 20 years the same conclusion that Criss argues, but depletion of natural gas is not a main reason. Far sooner than earthly methane runs low, soil will be ruined by the ghastly crudity of bulk synthetic chemicals in agriculture. Organic methods must be revived and improved, for many overwhelming and urgent reasons which do not, however, include shortage of natural gas.

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University of Auckland, New  
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### To the editor:

Leonard Johnson's letter to the editor, reprinted in the January-February errata, is on target with his description of the basic forces that cause soil detachment on non-irrigated cropland in the northwestern wheat and range region of the United States. Most soil detachment is indeed caused by the shear and turbulent force

of flowing water, not by large raindrops and high intensity rainstorms. An erosivity factor R calculated from rainstorm energy and intensity is inadequate and inappropriate to account for detachment forces of flowing water. However, Dr. Johnson's letter discounts the effect on soil erosion of soil freezing, thawing, and the resulting low shear strength of thawing soil that are inherent to the modified R factor called REQ in the RUSLE. Furthermore, tillage and crop management have a major effect in determining the types of events that cause erosion in this region. Proper tillage and crop management can significantly reduce runoff and soil loss from the long-duration, low-intensity November and December rainfall events referred to in Dr. Johnson's letter.

The relative importance of soil freezing and thawing on soil erosion can be determined by examining data from the USDA-ARS runoff and erosion plots at the Palouse Conservation Field Station near Pullman, Washington. The main treatments of interest are continuous bare fallow (CBF), winter wheat following summer fallow (WW/SF), and winter wheat following winter wheat (WW/WW). The 13-year data set (1978/79-1990/91) was separated into events with frozen soil, thawing soil, and no recent freeze/thaw activity. For the CBF treatment, events when the soil was frozen or thawing accounted for 32% of the 60t/ac average annual soil loss and 38% of the 4.9 in average annual runoff for the 13-year period. For the WW/SF

treatment, these events accounted for 45% of the 7.9 t/ac average annual soil loss and 65% of the 2.4 in average annual runoff. For the WW/WEW treatment, these events accounted for 60% of the 0.5 t/ac average annual soil loss and 91% of the 0.9 in average annual runoff. These data imply that treatments, such as winter wheat following winter wheat (WW/WW) or other small grain, with more residue, surface roughness, incorporated residue, lower antecedent soil moisture, and/or no tillage-induced restrictive layers will not respond readily to low intensity rainfall events when the soil is not frozen, because surface storage, infiltration, and permeability are higher than most rainfall or snowmelt rates. Freeze/thaw activity is very important in causing runoff and soil loss on these treatments. Freeze thaw is relatively less important on treatments with lower levels of soil protection be-

*Pen Points is a forum for readers to comment on material that has been published in the JSWC or on land and water management issues in general. Readers are invited to express their views in a letter to the editor. Letters are judged on their clarity and pertinence to natural resource issues. Long letters may be shortened. Send letters to Editor, JSWC, 7515 Northeast Ankeny Road, Ankeny, Iowa 50021-9764; fax (515) 289-1227  
—Editor.*

cause these treatments will also respond to events with no freeze/thaw activity.

The importance of November and December rainfall events on soil erosion from selected tillage and crop managements can also be determined by examining the runoff plot data. An analysis of the fall and winter events prior to January 1 indicated frozen and thawing soils accounted for only a small portion of the runoff and soil loss on any treatments, reflecting the milder temperatures prior to January. Events with no freeze/thaw activity prior to January 1 accounted for about 21, 24, and 25%, respectively. However, much of this loss occurred in a single event in December 1987. This rainstorm accounted for 15, 52, and 88% of the average 13-year soil loss prior to January 1 for the CBF, WW/SF, and WW/WW treatments, respectively. This single unusual event had a very significant impact on the data. Without this event, only 12% of the WW/SF and 3% of the WW/WW soil loss would have occurred prior to January 1.

This data set indicates that with traditional farming methods that leave the soil pulverized and with little surface cover, we can expect to experience erosion from all manner of precipitation events, early and late winter rainstorms, as well as frozen and thawing soil events. As we abandon these methods, through conservation compliance requirements, an increased conservation ethic, or economic pressures, only rarely will we experience

soil loss from these early winter storms and runoff will occur primarily when the soil has a frozen restrictive layer. Concentrated flow erosion will occur whether the soil is totally frozen or thawing, but rill and interrill soil loss will occur mainly when the soil is thawing and in a weakened state. This is the case for most events on the WW/WW plots.

The modified R factor, called  $R_{eq}$  in RUSLE, and its distribution throughout the winter erosion season reflects the distribution of erosion events from the WW/SF and WW/WW treatments. Because  $R_{eq}$  is calculated from actual erosion measurements and soil erodibility is held constant and not varied to reflect soil that weakening, it reflects not only the effects of the shearing force of flowing water, but also the weakened shear strength of thawing soil. Thus, a major component of  $R_{eq}$  is indeed soil freezing and thawing effects.

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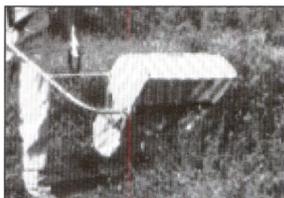
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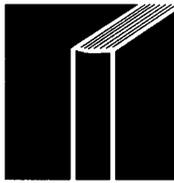
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***Soil Science Simplified, 4th Edition.*** By Helmut Kohnke and D. P. Franzmeier. 162 pp., 1995. Waveland Press, Inc., Prospect Heights, Illinois.

This is the fourth edition of this simplified and compact primer on Soil Science. The purpose of this book, as outlined by the authors in their preface, is to provide "...a distillation of soil science, written for those who want to get acquainted with the basic concepts of soils..." The authors have done an excellent job achieving their purpose. The book provides the basic fundamentals of soil science without undue complexity and detail, in an easily readable form. Consequently earlier editions have been used widely in high schools, by farmers and agronomists, and for extension education.

This 5 × 8 inch paper back is published with an attractive cover. The book consists of 12 chapters. Chapters 1 through 6 present basic information on the nature and function of soils, their physical and chemical properties, soil water, organic matter and microbial activity, and plant growth and nutrition. Chapter 11 addresses soil erosion and its control. Chapters 7 through 10 are new in the fourth edition, and cover soil formation, morphology, classification, and survey. Chapter 12 is also new to this edition and addresses soil and the environment. An excellent glossary of soil science terms and a very adequate index are included.

This book is written at a high school or beginning college level and is very readable. Readers with a good high school chemistry and physics background can easily comprehend the details. Adequate but not excessive tables and figures are used to illustrate points. Because of its brevity and level of presentation, more involved and complicated soil processes are not presented in any detail. For example, processes such as nitrification,

infiltration, and foliar analysis are defined and their functions explained mostly in one-sentence statements, with an occasional table or diagram to illustrate the process. No reference list is provided, although the source of information used in some tables and figures is referenced in the legends.

The book is entitled "Soil Science Simplified," and that is what it is—a simplified introduction to soil science. Consequently, while major soil processes and functions are defined and discussed in general, there is little detail. As might be expected, many aspects of soil science are not mentioned. For example, in nutrient balance discussions, no mention is made of possible gaseous losses (denitrification and ammonia volatilization). In discussing factors affecting plant growth, no mention is made of salinity effects. Problems associated with wind erosion are barely mentioned. These are some of the compromises that must be made in writing an abbreviated book such as this.

The new chapters on soil formation, morphology, classification, and survey are well done. Terms are well defined, and national maps of several major soil properties are presented (temperature and moisture regimes, soil orders). The thorough discussion of the soil classification system should be helpful to many.

The new Chapter 12 on Soil and the Environment covers most topics of concern in this regard. However there are certain implications in this chapter with which all soil scientists will not completely agree. Some suspected biases may be detected. For example it is implied (similar to what one finds in much environmental literature) that the environment of the United States was pristine prior to European settlement. However anyone who has read Lewis and Clark's journals or

journals of other pioneers can refute this claim. Also in this chapter it is implied that heavy metals such as mercury and lead are not naturally found in soils, regardless of concentrations. The authors mistakenly state that the Dust Bowl of the 1930s was caused by population pressures, rather than by use of improper practices. They fail to identify septic tanks as a source of nitrates in groundwater, or indicate that heavy manure application can eventually cause phosphorus leaching. They present the theories of the Ehrlichs regarding adverse effects of population without any discussion of the deficiencies of these theories or possible solutions. Hopefully in their next revision, some of these deficiencies will be corrected so that this chapter meets the standards of the other chapters in this book.

This book would generally be recommended strongly for the non-technical student of soils and soil processes. This is its intended audience, and the authors did an excellent job in addressing this audience.

—review by J.F. Power, *Research Leader, U.S. Department of Agriculture—Agricultural Research Service, University of Nebraska, Lincoln.*

***The History of Agriculture and the Environment.*** Douglas Helms and Douglas E. Bowers (eds.). 361 pp., 1994. The Agricultural History Society and the University of California Press. \$15 hardbound, \$10 softbound.

The 27 articles in *The History of Agriculture and the Environment* take an historical perspective in exploring topics, with authors from a variety of fields—history, geography, soil science, economics, environmental planning, and archaeology. The book is based on the symposium, "The History of Agriculture and the Environment," held in Washington, D.C., in 1991.

The topics explored are set in the context of a range of time periods and geography, including ancient Egypt and the Near East; nineteenth-century England; colonial Maryland and Virginia Tidewater; the Dust Bowl; and Native-American agriculture in the southern Great Plains, the Pantanal of Mato Grosso, Brazil from 1870 to 1970, as well as from more recent time periods and locations in the United States.

From another perspective these papers explore the role of government policy, public perceptions of the problems of agriculture and the environment, native American tribes, and U.S. agency programs such as the U.S. Soil Survey Program and the National Archives. In addition, aspects of the future are explored in several articles, including perspectives and prospects by Orville Freeman, environmental needs of farm policy by Clayton Ogg, sustainable agriculture by Barton Blum, and farmland preservation by Tim Lehman. Taken as a whole, the articles illustrate the complexity, breadth, and depth of the opportunities and problems of the relationship between agriculture and the environment.

A question often raised by non-historians who read history is what lessons for the future have we learned? And it is often said that people who cannot remember the past are condemned to repeat it. While the individual articles are well done, together they do not present even a fuzzy, overall picture of "what we are condemned to regret." But the readers will find a number of provocative questions to help them contemplate the future.

What might be useful to readers of this book, in addition to obtaining general perspectives? Several answers come to mind. Biologists and social scientists doing applied and basic studies will find the articles on archival sources useful. Researchers, edu-

cators, administrators, and technicians will gain new perspectives on a number of specific problems.

In conclusion, I recommend this book for a wide audience of practitioners, researchers, and educators concerned with agriculture and the environment. The broad coverage of issues over time and space make it a useful resource.

— *Review by R.J. Hildreth, retired, Farm Foundation, Oak Brook, Illinois.*

### General

*John Muir: Apostle of Nature.* By Thurman Wilkins. 336 pp., October 1995. University of Oklahoma Press, P.O. Box 787, Norman, OK 73070-0787. \$24.95 clothbound.

*Saving the Planet with Pesticides and Plastic.* By Dennis T. Avery. 432 pp., 1995. Hudson Institute, Herman Kahn Center, P.O. Box 26-919, Indianapolis, IN 46226; 317-545-1000. \$12.95 paperback.

*Expanding Partnerships in Conservation.* Jeffrey A. McNeely (ed.). 312 pp., 1995. Island Press, Box 7, Covelo, CA 95428; 800-828-1302. \$34.95 softbound.

*Best Practice management videos for corporate change.* A collection of videos dealing with corporate change. June 1995. Harvard Business School Management Productions. Order from: HBS Management Productions, Mailbox 230-5, 60 Harvard Way, Boston, MA 02163-1001. 800-545-7685. Prices range from \$675 for singles to \$1,990 for sets. Several sets available.

*Encyclopedia of Environmental Biology.* William A. Nierenberg (ed.). A three-volume set, 1995. Published by Academic Press, Inc. Order from Order Fulfillment Department, Academic Press, Inc., 6277 Sea Harbor Drive, Orlando, FL 32821-9816; \$475/set, \$395/set

through September 29, 1995.

*Social Aspects of Sustainable Dryland Management.* Daniel Stiles (ed.). 313 pp., 1995. John Wiley and Sons, 605 Third Avenue, New York, NY 10158; 212-850-6336. \$69.95 hardbound.

*The Way It Is.* By Corbin Harney. 232 pp., 1995. Blue Dolphin Publishing, Inc., P.O. Box 1920, Nevada City, CA 95945; 800-643-0765. \$16, softbound.

*Environmental Indicators: A Systematic Approach to Measuring and Reporting on Environmental Policy Performance in the Context of Sustainable Development.* By Allen Hammond, Albert Adriaanse, Eric Rodenburg, Dirk Bryant, and Richard Woodward. 36 pp. plus appendices, 1995. World Resources Institute. Order from: WRI Publications, P.O. Box 4852, Hampden Station, Baltimore, MD 21211; 800-822-0504. \$13.50 plus \$3.50 shipping and handling.

### Agriculture

*Agriculture and the Environment: Bridging Food Production and Environmental Protection in Developing Countries.* Anthony S.R. Juo and Russell D. Freed (eds.). 275 pp., 1995. ASA, CSSA, SSSA Headquarters Office, Attn: Book Order Dept. 677 Segoe Road, Madison, WI 53711-1086. \$25 softcover.

*Regenerating Agriculture: Policies and Practice for Sustainability and Self Reliance.* By Jules N. Pretty. 320 pp., 1995. Contact: Mary John, Publications, IIED, 3 Endsleigh Street, London WC1H 0DD; +44 (0)171-3. £6.95.

### Ecology

*Ecological Identity: Becoming a Reflective Environmentalist.* By Mitchell Thomashow. 228 pp., 1995. The MIT Press, 55 Hayward Street, Cambridge, MA

02142; 800-356-0343. \$25 hardbound.

*Endangered Ecosystems of the United States: A Preliminary Assessment of Loss and Degradation.* A report by the U.S. Department of Interior's National Biological Service. 58 pp., 1995. For a copy of the report, contact: Publications Unit, National Biological Service, 1849 C. Street, N.W., Mail Stop 130, Webb Building, Washington, DC 20240.

### Economics

*Economic Theory for Environmentalists.* By John Gowdy and Sabine O'Hara. 192 pp., 1995. Co-published by the Soil and

Water Conservation Society and St. Lucie Press. Contact SWCS, 7515 NE Ankeny Road, Ankeny, IA 50021-9764; 800-843-7645. \$39.95 hardbound (\$35.95 for SWCS members).

*Corporate Environmental Accounting.* Edited by the World Resources Institute. 120 pp., June 1995. WRI Publications, P.O. Box 4852, Hampden Station, Baltimore, MD 21211; 800-822-0504. \$19.95 paperback.

*Environmental Regulation, Jobs, and U.S. Competitiveness: What's the Real Issue?* By Robert Repetto. 40 pp., 1995. WRI Publications, P.O. Box 4852, Hampden Station, Baltimore,

## Soil Management and Conservation in the Tropics

Small farmers living in the tropics comprise a large sector of the world population. They operate in relatively stable subsistence agricultural systems using traditional technologies designed to achieve sustained crop production at very low yields and with minimum land degradation. However, there is a growing awareness that sustainability of subsistence agriculture is steadily deteriorating as a result of rapid growing population and over-exploitation of the land. Given the various limitations affecting tropical agriculture, few soil management and conservation options remain. This book explores potential avenues for developing strategies to maintain sustainability of tropical agriculture. To maintain sustainability, however, significant improvements in crop production must come from improved soil management practices focusing on soil and water conservation, improved crop management, and the use of cropping systems designed to reduce soil erosion and maintain soil productivity.

**SOIL MANAGEMENT AND CONSERVATION IN THE TROPICS.** Luis A. Manrique, author. Published by Manrique International Agrotech, 220 pages, 1993. Price \$48.00 plus handling charges.

All payments must be in U.S. currency. Send your order to: Manrique International AgroTech, P.O. Box 61145, Honolulu, HI 96839 USA. Phone: (808) 533-0391.

MD 21211; 800-822-0504. \$12.95 paperback.

*Growing Green: Enhancing Environmental and Economic Performance in U.S. Agriculture.* By Paul Faeth. 120 pp., 1995. WRI Publications, P.O. Box 4852, Hampden Station, Baltimore, MD 21211; 800-822-0504. \$16.95 paperback.

#### Forests

*Carbon Forms and Functions in Forested Soils.* J. Michael Kelly and William W. McFee (eds.). 594 pp., 1995. Soil Science Society of America, Book Order Dept., 677 South Segoe Road, Madison, WI 53711-1086. \$40 hardcover.

*Introduction to Forest and Renewable Resources, Sixth Edition.* Grant W. Sharpe, Wenonah F. Sharpe, John C. Hendee, and Clare W. Hendee. 608 pp., 1995. Order from McGraw-Hill, Inc., Customer Services, P.O. Box 545, Blacklick, OH 43004-0545; 800-772-4726. \$49.75 paperback.

#### Land Use

*The Small Town Planning Handbook, Second Edition.* By Thomas L. Daniels, John W. Keller, and Mark B. Lapping. 312 pp., 1995. APA Planners Press, 122 South Michigan Avenue, Suite 1600, Chicago, IL 60603-6107; \$34.95 softcover, \$50 hardcover.

#### Law, Legislation, and Politics

*Environmental Regulation, Jobs, and U.S. Competitiveness: What's the Real Issue?* By Robert Repetto. 40 pp., 1995. World Resources Institute, 1709 New York Avenue, N.W., Washington, DC 20006. \$12.95 paperback.

#### Pollution

*Monitoring and Remediation Wells: Problem Prevention, Maintenance, and Remediation.* By Stuart A. Smith. 224 pp., June 1995. CRC Press/Lewis Publishers, 2000 Corporate Blvd., N.W., Boca Raton, FL 33431; 800-272-7737. \$69.95 in U.S., \$84.00 outside U.S.

*Recycling and Reuse of Industrial Wastes.* By Lawrence Smith, Jeffrey Means, and Edwin Barth. 110 pp., May 1995. Battelle Press, 505 King Ave., Columbus, OH 43201-2693; 800-451-3543. \$34.95 (plus shipping), softcover.

*Reducing Toxics: A New Approach to Policy and Industrial Decisionmaking.* Robert Gottlieb (ed.). 450 pp., 1995. Island Press, Box 7, 2PR, Covelo, CA 95428; 800-828-1302. \$35, softbound.

*Stormwater Pollution Control: Industry and Construction NPDES Compliance.* By Roy D. Dodson. 437 pp., 1995. McGraw-Hill, Inc., 11 West 19th Street, New York, NY 10011. \$65 hardbound.

#### Soils

*The Soul of Soil: A Guide to Ecological Soil Management.* By Grace Gershuny and Joe Smillie. 1995. agAccess, P.O. Box 2008, Davis, CA 95616; 916-756-7177. \$16.95 (plus shipping) softcover.

*Variability in Rangeland Water Erosion Processes.* W.H. Blackburn, F.B. Pierson, G.E. Schuman, and R. Zartman (eds.). 106 pp., 1994. Soil Science Society of America, SSSA Publications, Book Order Dept., 677 Segoe Road, Madison, WI 53711-1086. \$24 softcover.

*Soil Management: Experimental Basis for Sustainability and Environmental Quality.* R. Lal and B.A. Stewart. 576 pp., 1995. Lewis Publishers, 2000 Corporate Blvd., NW, Boca Raton, FL 33431.

#### Waste Management

*Sewage Sludge: Land Utilization and the Environment.* C.E. Clapp, W.E. Larson, and R.H. Dowdy (eds.). 258 pp., 1994. ASA, CSSA, SSSA, Book Order Department, 677 South Segoe Road, Madison, WI 53711.

#### Water Resources

*Salinisation of Land and Water Resources: Human Causes, Extent, Management and Case Studies.* By F. Ghassemi, A.J. Jakeman, and H.A. Nix. 526 pp., 1995. CAB International. Distributed by The University of Arizona Press, 1230 N. Park Avenue, Suite 102, Tucson AZ 85719; 800-426-3797. \$115 cloth-bound.

*Soil Water and Ground Water Sampling.* By Neal Wilson. 208 pp., 1995. Lewis Publishers, 2000 Corporate Blvd., N.W., Boca Raton, FL 33431. \$49.95, \$59.95 outside the U.S.

*Hill Irrigation: Water and Devel-*

*opment in Mountain Agriculture.* By Linden Vincent. 220 pp., 1995. IT Publications, Ltd., 103-105 Southampton Row, London WC1B 4HH, UK; +44(0)71 436 9761. £12.95, softbound.

#### Wetlands

*The HYDRICsoils Disc.* An interactive CD-ROM program to teach hydric soils. Created by Mary E. Collins. 1995. Contact: Mary E. Collins, University of Florida, Soil and Water Science Dept., 2169 McCarty Hall, P.O. Box 110290, Gainesville, FL 32611-0290; 904-392-1951. \$75 includes documentation.

*Guidebook for Creating Wetland Interpretation Sites Including Wetlands and Ecotourism.* Prepared by the Association of State Wetland Managers. 140 pp., 1994. The Association of State Wetland Managers, P.O. Box 269, Berne, NY 12023-9746. \$23 plus shipping.

*Improving Wetland Public Outreach, Training and Education, and Interpretation.* Jon Kusler

and Lucretia Krantz (eds.). 180 pp., 1994. The Association of State Wetland Managers, P.O. Box 269, Berne, NY 12023-9746. \$23 plus shipping.

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