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The Alpine pennycress is a hyperaccumulator used to clean toxic metals from soils. [USDA-ARS photo]

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The Soil and Water Conservation Society fosters the development and application of science-based policies and practices for managing soil, water, and related natural resources in order to achieve sustainability. As a multidisciplinary professional association, SWCS promotes, through education and example, 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:

Prior to 1977, 1.1 million acres in more than 20 states were left damaged by coal mining.

In 1977, the Surface Mining Control and Reclamation Act was passed, making it mandatory for coal mining companies to reclaim lands after mining them. It also requires these companies to pay a tax on each ton of coal produced. According to the law, the reason for collecting this tax is to finance the reclamation of coal mine sites that were mined prior to 1977. The Rural Abandoned Mine Program (RAMP) is one of four programs set up under the law to carry out these projects.

The intention of the law is clear. The coal companies are reclaiming the sites they mine today and are paying tax to fund the reclamation of old sites. The problem is that the collected funds must be annually allocated through the federal budgetary process, and these appropriations have been consistently inadequate. This has resulted in a current unappropriated fund balance of more than \$1 billion, of which \$110 million could be used for RAMP projects. The United States Congress, however, has decided that no funding will be appropriated for RAMP in the fiscal year 1996 Federal budget.

We simply want to see that the funds which have been collected (and are still being collected) are used for their intended purpose.

—L.H. Burnett

*Tennessee Abandoned Coal Mine Reclamation Committee
National Coalition for Abandoned Coal Mine Reclamation*

To the editor:

One of the most important things to know about conserving soil is knowing the mathematical relationships of the velocity of runoff water and its eroding power. I raise this point because we—including our leaders and policy makers—are depending on no-till management and residue cover to conserve soil. The problem with this approach is that after a big rain, residue cover will be piled in drifts along fence rows and ditch banks.

We need to use terraces to reduce the velocity of runoff, and I believe SWCS should put more emphasis on this point.

Yes, I do believe that crop residue is important for biological cycles, which are needed for sustainable agriculture. But, if we want sustainable agriculture, we must look ahead 10,000 years. And our leaders and policy makers, as well as *Journal* readers, must be able to answer this question—If the velocity of runoff is doubled, how much is the eroding power increased? **This** is important for sustainable agriculture.

—James E. Jackson
Carlisle, Indiana

Errata

The following interpretive summary was omitted from the article *Economics of tillage practices and spring wheat and barley crop sequence in the northern Great Plains* by J.K. Aase and G.M. Schaefer, 51(2):167-170.

The economics of annual cropping in relation to no-till seeding and variants of tillage practices as compared with conventional fallow-crop sequence

have not been seriously considered in the northern Great Plains. We compared economics of fallow-crop versus annual cropping following 10 years of cropping and tillage comparisons. The study was conducted in northeastern Montana. Tillage practices on annually cropped treatments included: sweep tillage in the fall with spring disking; sweep tillage in the spring; and no-till. A conventional fallow-crop rotation was included. The 10-year average net return was highest for no-till annual cropped wheat and lowest for barley-wheat rotation. Under the conditions of this 10-year study, we conclude that annually cropped no-till wheat production was the most efficient and profitable cropping practice.

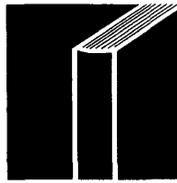
The following interpretive summary should replace the summary originally printed with the article *Economic analysis of best management practices in the Gum Creek Watershed water quality program* by Henglun Sun, Jack Houston, and John Bergstrom, 51(2):176-180.

Crop growth and nonpoint pollution levels for nitrogen ground and surface water contamination were simulated using historic weather and market observations to predict farmers' expected net returns and environmental effects of implementing "Best Management Practices." Stochastic dominance analysis reveals the economically preferred best management practices, the trade-offs relative to production and market uncertainties, and the costs of altering current practices to meet prospective

future regulatory limits for nitrogen runoff and leaching. Options to improve upon current management practices and productivity exist within tolerable water quality limits. These simulations suggest that normal crop production practices would not change nitrogen impacts to the surface water and groundwater dramatically and that alternative agricultural water quality protection measures and/or controlling other potential non-agricultural pollution sources may be more important. Simulation of expected returns allows the identification of those producers who could most efficiently reduce N leaching/runoff.

The following correction should be made in the article *Energy production from forages (or American agriculture—back to the future)*, an SWCS Commentary by Kenneth P. Vogel, 51(2): 137-139: In Table 1, the annual soil loss from continuous corn in LaCrosse, WI, should read 112 tons/acre instead of 12 tons/acre.

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; email swcsjswc@netins.net or check our web site at <http://www.netins.net/showcase/swcs/>
—Editor



BOOKS, ETC.

The Holistic Resource Management Quarterly. Published by the Center for Holistic Resource Management, 1007 Luna Circle NW, Albuquerque, NM 87102; 505-842-5252. \$25 a year.

Here is a periodical, which at first glance seems addressed to farmers and ranchers, in which we can see the development of a major new tool of thought. Since 1983 it has recorded the learning process in an "invisible university" of people who are striving to reverse the losses of biodiversity on their land, get out of debt, make family businesses work better, and stop the bleeding in their communities. They are doing this by changing the way they make decisions.

"For several centuries now," writes Editor Jody Butterfield, "we've labored under the belief that if we could only manage the parts well, the whole would come right. But increasingly, voices from every quarter imaginable are refuting that belief."

This isn't your average alternative magazine. The *Quarterly* makes it obvious that this novel and practical decision making has been developed in response to complex problems—such as desertification and the failure of family farms and ranches—that did not respond to conventional "solutions." Each issue is filled with questions, observations, stories, and advice by ranchers, farmers, businesspeople, teachers, government workers, and community activists who have made or are making the mental shifts necessary in order to change their decision making. Readers will encounter actual change, rather than vague or untested recommendations.

For many ranchers, these shifts have kept them in business. "After nearly 90 years of my family on this ranch, we are finally learning how to operate it," observes a Montana rancher. There are accounts and advice on dysfunctional family relationships, debt

reduction, and monitoring changes on rangeland and in the soil. The magazine delivers an unequaled view of the real (and seldom discussed) problems and successes in agriculture.

An Alberta ranch couple says: "In our family, we thought we were communicating and that each of us knew what was important to the other. When we sat down to actually discuss what was important, we found we all had made a number of false assumptions. Assuming we knew what the others wanted resulted in the whole family moving in a direction no one really wanted to go."

An Argentine rancher observes, "Once I was able to view myself as a part—and only a part—of larger wholes, all the tenets of conventional management began to fall one after another: nature as a passive object; engineering as a god-like endeavor; species divided into good and 'bad'; 'weather' as a problem; technology as the paramount solution; my family and my personal life as something apart from the way I make my living."

The magazine runs regular features that analyze policy, research, and organizational function from the point of view of the whole. There are examples of how to focus human creativity on real problems, thus avoiding the fragmentation and continued defense of faulty decisions so characteristic of turf battles.

One article points out that we have been deceiving ourselves in attributing the Mississippi flooding of 1993 to the system of levees, the draining of swamps, or unheard-of rainfall. All of these contribute to flooding, yet the overriding factor, we learn, is a damaged water cycle over the majority of the watershed's surface. Past and present human management on much of these farmlands and rangelands typically deprives the soil of cover and reduces organic matter, leading to excessive runoff (as well as heavy erosion)

when the heavy rains do come. Unless we address the fundamental causes of the watershed deterioration as a whole, we will continue to experience such flooding.

A teacher reports on the decision-making at his agricultural and technical college. "There is absolutely no concern about quality of life. Oh, we talk about it in the classroom, but the success of our graduates, as tracked by the placement office, is measured strictly by the salaries earned. This measure is then translated as the academic merit of individual departments, which then drives the budget allocations, which shapes the curriculum." Yet he sees hope in his students and in the holistic learning process. "The fact that I use their creativity to help make decisions, that we can talk about what is going on with the plants, the soil, and the animals without quoting the literature, and the fact that they can see results, is going to make classroom life more challenging for their other teachers."

Allan Savory, the Rhodesian wildlife biologist who founded the Center for Holistic Resource Management, has several articles on global warming. He suggests that unless we can reverse large-scale shifts in ecological succession (such as desertification) that are harming earth's ability to balance atmospheric gases, we are unlikely to be able to stabilize the carbon content of the atmosphere even if we do succeed in cutting industrial emissions. It is not an argument in favor of relaxing environmental regulations, but a sobering view of the limitations of the widely held interpretations that shape policy.

Savory writes that we can begin to address these problems successfully, including all human causes of global climate change and excessive flooding, if we base our decisions on a comprehensive goal that begins from our most deeply held values and hopes—instead of

on our problems, which all too often are the residue of previous decisions. "Until we do change the way decisions are made, we'll merely be rearranging the chairs on the decks of the Titanic."

Paul Hawken sums up one of the key insights of this holistic view. "If you ask any group of people anywhere in the world, 'How many of you woke up this morning with the intention of destroying the world?' nobody would raise their hand. So if we're doing it without intention and yet we're doing it anyway, it means that it's embedded in how we do things as opposed to being something that we want to do. And that tells me it can be reversed."

Judging from the *Quarterly*, the Center and its members are not just talking about such a reversal—they are living it. From a practical standpoint, they show us which difficulties are imaginary and which are real. With an approach that unites the material and the spiritual, they are showing us how possible it is for us to take real responsibility for where we are headed.

—Review by Peter Donovan and Cliff Montagne. Peter Donovan is an independent scholar who caretakes a cattle ranch near Enterprise, Oregon. Cliff Montagne is Associate Professor of Soils, Department of Plant, Soil and Environmental Sciences, Montana State University, Bozeman.

General

The Genius of C. Warren Thornthwaite, Climatologist-Geographer (ISBN 0-8061-2787-2). By John R. Mather and Marie Sanderson. 226 pp., 1996. University of Oklahoma Press, 1005 Asp Avenue, Norman, OK 73019-0445. Hardbound.

Mediterranean Erosion & Desertification: Circular No. 5. Compiled by Mike Meadows. 15 pp., 1995. International Geographical Union. Contact Mike Meadows, Department of En-

Environmental & Geographical Science, University of Cape Town, Rondebosch 7700, SOUTH AFRICA.

Environmental Site Assessments and Their Impact on Property Value: The Appraiser's Role. By Robert V. Colangelo and Ronald D. Miller. 1995. The Appraisal Institute, Chicago, IL. Contact: Brownfield Development Corporation, 225 W. Wacker Drive, Suite 2300, Chicago, IL 60606; phone 708-342-8330. \$45.00.

The Proceedings of the CSEP '95 Annual Meeting: Space and Time in Environmental Information Systems. Edited by Horst Kremers and Werner Pillmann. 880 pp., 1995. Contact METROPOLIS Verlag, Postfach 1748, D-35007 Marburg, GERMANY; fax +49-6421-681918.

Stability Problems in Fracture Mechanics (ISBN 0-471-12546-6). By Vladimir V. Bolotin. 188 pp., 1996. John Wiley and

Sons, Inc., 605 Third Avenue, New York, NY 10158-0012; phone 212-850-6336. \$64.95 hardbound.

Land is Coming Up: The Burunge of Central Tanzania and Their Environments (ISBN 91-7153-404-0). By Wilhelm Ostberg. 260 pp., 1995. AW International AB, P.O. Box 4627, Karlbergsvagen 77-81, S-116 91, Stockholm, SWEDEN; phone +46(0)8-728-2500. Softbound.

State of the World (ISBN 0-393-03851-3, hardbound; ISBN 0-393-31339-5, softbound). By Lester R. Brown and the Worldwatch Institute staff. 267 pp., 1996. W.W. Norton and Company, Inc., 500 Fifth Avenue, New York, NY 10110; phone 212-354-5500; fax 212-869-0856. \$23.00 hardbound, \$11.95 softbound.

Environmental Chemodynamics: Movement of Chemicals in Air, Water, and Soil (ISBN 0-471-61295-2). By Louis J. Thi-

bodeaux. 593 pp., 1996. John Wiley and Sons, Inc., 605 Third Avenue, New York, NY 10158-0012; phone 212-850-6336. \$69.95 hardbound.

Agriculture

Quality of U.S. Agricultural Products (ISBN 1-88738305-0). By the Council for Agricultural Science and Technology (CAST). 288 pp., 1996. CAST, 4420 West Lincoln Way, Ames, IA 50014-3447; phone 515-292-2125; fax 800-375-2278. \$40.00. Also available is a 21 pp. summary and conclusions publication (ISSN 0194-4088). \$10.00. Orders of 6 through 99 copies are discounted 25%; 100 or more are discounted 35%.

Family Agriculture. By David G. Francis. 300 pp., 1995. St. Lucie Press, 100 E. Linton Boulevard, Suite 403B, Delray Beach, FL 33483; phone 407-274-9906; fax 407-274-9927. \$39.95.

Ecology

Agricide: The Hidden Farm and Food Crisis That Affects Us All, 2nd Edition (ISBN 0-89464-945-0). By Michael W. Fox. 1996. Krieger Publishing Company, P.O. Box 9542, Melbourne, FL 32902-9542; Phone 407-727-7270; fax 407-951-3671.

Terra Nova: Nature and Culture (ISSN 1081-0749). A journal available from MIT Press Journals, 55 Hayward Street, Cambridge, MA 02142; phone 617-253-2889. 1996 subscription rates: \$32.00/ year for individuals; \$95.00/ year for institutions; and \$24.00/ year for students and retired persons.

Land Mosaics: The Ecology of Landscapes and Regions (ISBN 0-521-47462-0, hardbound; ISBN 0-521-47980-0, softbound). By Richard T.T. Forman. Cambridge University Press, 40 West 20th Street, New York, NY 10011-4211. \$120.00 hardbound, \$39.95 softbound.

Environmental Effects of Mining (ISBN 1-884015-76-X). By E.A. Ripley, R.E. Redmann, and A.A. Crowder. 300 pp., 1996. St. Lucie Press, 100 E. Linton Boulevard, Suite 403B, Delray Beach, FL 33483; phone 407-274-9906; fax 407-274-9927. \$65.00.

Ecology and Management of Tidal Marshes (ISBN 1-57444-026-8). Edited by Charles L. Coultas and Yuch Ping Hsieh. 350 pp., 1996. St. Lucie Press, 100 E. Linton Boulevard, Suite 403B, Delray Beach, FL 33483; phone 407-274-9906; fax 407-274-9927. \$59.95.

Conservation of Great Plains Ecosystems: Current Science, Future Options. Edited by S.R. Johnson and Aziz Bouzaher of the Center for Agricultural and Rural Development (CARD) at Iowa State University, Ames, IA. 454 pp., 1995. Contact Kluwer Academic Publishers, Order Department, P.O. Box 358, Accord Station, Hingham, MA 02018-0358; phone 617-871-6600; fax 617-871-6528.

Forests

Trees of the Northern United States and Canada (ISBN 0-8138-2740-X). By John Laird Farrar. 521 pp., 1996. Iowa State University Press, 2121 S. State Avenue, Ames, IA 50014-8300; phone 800-862-6657. \$39.95 hardbound.

Principles of Forest Pathology (ISBN 0-471-12952-6). By F.H. Tainter and F.A. Baker. 805 pp., 1996. John Wiley and Sons, Inc., 605 Third Avenue, New York, NY 10158-0012; phone 212-850-6336. \$79.95 hardbound.

Forest Stand Dynamics: Update Edition (ISBN 0-471-13833-9). By Chadwick D. Oliver and Bruce C. Larson. 520 pp., 1996. John Wiley and Sons, Inc., 605 Third Avenue, New York, NY 10158-0012; phone 212-850-6336.

Land Use and Planning

The Urban Open Space Manager. This publication is a new quarterly newsletter about wildlife and nature conservation in urban, suburban, and urbanizing areas. To place your name on the mailing list, contact Urban Wildlife Resources, 5130 W. Running Brook Road, Columbia, MD 21044; phone 410-997-7161; fax 410-997-6849.

Land Use in America (ISBN 1-55963-464-2). By Henry L. Diamond and Patrick F. Noonan. 368 pp., 1996. Island Press, Box 7, Covelo, CA 95428; phone 800-828-1302 or 707-983-6432; fax 707-983-6414; \$26.95 softbound.

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Law, Legislation, and Politics

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Western Public Lands and Environmental Politics (ISBN 0-8133-8947-X, hardbound; ISBN 0-8133-2970-1, softbound). Edited by Charles Davis. 224 pp., 1996. Westview Press, 5500 Central Avenue, Boulder, CO 80301-2877; inside the U.S. phone 800-386-5656; in Canada phone 800-387-0117; outside U.S. and Canada phone 303-444-3541. \$59.50 hardbound, \$18.50 softbound.

Green Justice: The Environment and the Courts, 2nd Edition (ISBN 0-8133-2602-8, hardbound; ISBN 0-8133-2603-6, softbound). By Thomas More Hoban and Richard Oliver Brooks. 250 pp., 1996. Westview Press, 5500 Central Avenue, Boulder, CO 80301-2877; inside the U.S. phone 800-386-5656; in Canada phone 800-387-0117; outside U.S. and Canada phone 303-444-3541. \$65.00 hardbound, \$19.95 softbound.

Pollution

Smog in America: The High Cost of Hysteria (Policy Study No. 128). By Kenneth Chilton and Christopher Boerner. 28 pp., January 1996. Center for the Study of American Business, Washington University, Campus Box 1208, One Brookings Drive, St. Louis, MO 63130-4899; phone 314-935-5630.

Food, Climate, and Carbon Dioxide: The Global Environment and World Food Production (ISBN 0-87371-796-1). By Sylvan H. Wittwer. 236 pp., 1995. CRC Press, Inc., 2000 Corporate Boulevard NW, Boca Raton, FL 33431; phone 800-272-7737; fax 800-374-3401. Hardbound.

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By Michael J. Singer and Donald N. Munns. 480 pp., 1996. Prentice-Hall, Inc., Simon and Schuster Building 2, 200 Old Tappan Road, Old Tappan, NJ 07675-7095.

The Nature and Property of Soils

(ISBN 0-02-313371-6). By Nyle C. Brady and Ray R. Weil. 740 pp., 1996. Prentice-Hall, Inc., Simon and Schuster Building 2, 200 Old Tappan Road, Old Tappan, NJ 07675-7095.

Rural Land Degradation in Australia (ISBN 0-19-553436-0).

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Soils: A New Global View (ISBN 0-300-06576-0, hardbound;

ISBN 0-300-06609-0, softbound). By T.R. Paton, G.S. Humphreys, and P.B. Mitchell. 213 pp., 1996. Yale University Press, P.O. Box 209040, New Haven, CT 06520-9040; phone 203-432-0964. \$40.00 hardbound, \$20.00 softbound.

Soil Mechanics in Engineering Practice (ISBN 0-471-08658-4).

By Karl Terzaghi, Ralph B. Peck, and Gholamreza Mesri. 549 pp., 1996. John Wiley and Sons, Inc., 605 Third Avenue, New York, NY 10158-0012;

phone 212-850-6336. \$75.00 hardbound.

Soil Erosion, Conservation, and Rehabilitation (ISBN 0-8247-8984-9). Edited by Menachem Agassi. 416 pp., 1996. Marcel Dekker, Inc., Cimarron Road, Monitcello, NY 12701; phone 914-796-1919. \$150.00 hardbound.

The Economics of Soil Degradation: An Illustration of the Change in Productivity Approach to Valuation in Mali and Malawi (ISSN 1357-924X). By Joshua Bishop. 140 pp., 1995. International Institute for Environment and Development, 3 Endsleigh Street, London ENGLAND, WC1H0DD; phone +44-171-388-2117; fax +44-171-388-2826.

The Economics of Soil Degradation: Technological Change and Policy Alternatives (SMSS Technical Monograph No. 22). By John H. Sanders, Douglas D. Southgate, and John G. Lee. Prepared by the Department of Agricultural Economics, Purdue University, West Lafayette, IN 47907-1145. Copies available from World Soil Resources, Natural

Resources Conservation Service, U.S. Department of Agriculture, P.O. Box 2890, Washington, D.C. 20013; phone 202-690-0333; fax 202-720-4593. Free.

Water Resources

Clean Water Handbook, 2nd Edition (ISBN 0-86587-512-X). By Lynn M. Gallagher and Leonard A. Miller. 375 pp., 1996. Contact Alex Horwitz at 301-921-2355. \$89.00 softbound.

Chemical Water Treatment: Principles and Practice (ISBN 1-56081-518-3). Edited by Henri Roques. 688 pp., 1995. VHS Publishers, Customer Service Center, 303 Northwest 12th Avenue, Deerfield Beach, FL 33442-1788; phone inside the U.S. and Canada 800-367-8249; fax 800-367-8247; phone outside the U.S. and Canada 305-428-5566; fax 305-428-8241. \$165.00 hardbound.