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Cover
CRP land in Minnesota.
Photo provided courtesy of M.J. Lindstrom
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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To the editor:

It was not pleasing to see our Journal used as a shill for Hillary Care. It is one thing for secretary of Agriculture (?) Espy to do his bit for socialism, but quite another for the editor of the Journal of Soil and Water Conservation to treat this as "news" relevant to the art and science of proper land use.

Sincerely,
Leonard C. Johnson
Troy, Idaho

To the editor:

As legislation is considered to reorganize the United States Department of Agriculture for the year 2000 and beyond, a purge of personnel like never before is seen is nearly complete at the Soil Conservation Service. The secretary of Agriculture's reorganization plan proposes creation of the Natural Resource Conservation Service (NRCS) to replace SCS. The NRCS would be USDA's environmental arm. Sounds good so far.

Another part of Secretary Mike Espy's agenda coming from reinventing/downsizing government is the goal to reduce SCS personnel numbers by about 1,400 in the next four years, by two techniques. One is the use of the government-wide "buy-out" (bribe) legislation, which is enticing about 1,200 employees out of their jobs. Second is the directed reassignment of several top managers, mostly in Washington, a few in key state conservationist positions, to positions of lesser influence and power.

So what does this purge at USDA-SCS mean for the agency, U.S. farmers, and other environmental interests? Before answering the "what does it mean" question, look at some of the possible reasons for this action.

Was it to reduce personnel numbers by 1,400? Not a very good reason. Two years of modest 5 percent attrition would have done that. Many perceive that the purpose is to increase the cultural/gender diversity of the agency. It is taking that look and that is probably needed. But that objective could have been realized with the two attrition and the same staffing dictates being presently used.

Was the purpose to remove all the former Associate Chief, Galen Bridges', friends? Yes, they were loyal to Bridges', but 60 years of history have provided evidence that the career professionals in SCS will follow their "in-place" leadership. Does the "hoped-for" new agency mission need an infusion of socio-environmentalists in place of the present engineering, plant science, soil science workforce? Maybe so.

Is this change engineered by, just supported, or acquiesced to by Mike Espy? There would seem to be no formidable public forces asking for it, at least not for the manner being used.

It is true that agency management was heavily weighted with engineering, soil, plant technology. Not too strange for a technical agency. Those managers believed in voluntary compliance. They also supported regulatory sticks to influence bad actors. Bad plan?

There is a growing camp that believes that a politically weak agricultural community can ultimately (that means soon) be caused to farm and ranch under environmental regulations. Those regulations can be presented in the form of best management practices and chemical standards for all producers to follow. They believe this is the least costly course, because landusers could be expected to buy part of the needed technology from the private sector. Chemical companies would be required to provide more application technology, passing the cost on to their customers. Would a modernized workforce support this alternative more readily?

These alternate plans or outcomes assume that there is a plan. Perhaps what is happening is another case of "muddling through." We could remember that, unlike the decades of the '60s, '70s, and the first half of the '80s, there is no farm bloc in the U.S. Congress. Rather, there are a few midwest, Texas, and maybe California congressional members who have a real agricultural constituency. There is now relatively little congressional oversight for USDA outside the food safety arena.

Will the new NRCS even fit with USDA?
Frank C. Scudder
Lexington, Kentucky

To the editor:

The reason given by Renard et al. (May-June issue) for modifying the R factor in the tranmogrification of the USLE to the RUSLE, whole not incorrect, is somewhat limited in its representation of the dynamics of soil erosion.

Irrespective of whether soil is frozen, partially thawed, or has not been frozen at all, it was necessary to modify the R factor to account for the fact that tractive forces associated with overland and/or open channel flow predominantly do the work of soil detachment on the croplands of the northwestern United States wheat and range regions where impact forces associated with large raindrops and high intensity rainstorms do most of the work of detachment.

Very high rates of soil erosion and extensive development of deep rills due to runoff form prolonged, low-intensity rainfall events during November and December, prior to soil freezing, are not uncommon occurrences on croplands in the Palouse region.

Sincerely,
Leonard C. Johnson
Troy, Idaho

Pen Points is a forum for readers to comment on material that has been published in the JWCC 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, JWCC, 7515 Northeast Amherst Road, Amherst, Iowa 50021-9764: fax (515) 289-1227—Editor.
Soil and Water Quality: An Agenda for Agriculture

An Agenda for Agriculture

Sandra S. Batie and Craig A. Cox

In November 1993, the National Research Council of the National Academy of Science released the report of the Committee on Long-Range Soil and Water Conservation Policy. The report, Soil and Water Quality: An Agenda for Agriculture, was written by a committee that included a broad range of experts on soil and water resource issues (see Table 1). The following is a summary of the report.

The United States has had more than a half century of programs addressing environmental and conservation problems associated with farmland. Conservation programs have focused, in the main, on one overriding concern: soil erosion. Furthermore, conservation programs have been seen as mechanisms to support farm income as well as conserve soil. Often, conserving soil has been the secondary goal (1).

In the last decade, however, it has become increasingly obvious that making soil erosion programs adjuncts to income programs is an ineffective way to achieve environmental goals. Moreover, it is now clear that the environmental effects of farming can be much broader than erosion. Soils in some areas of the United States are also being degraded by compaction, salinization, and loss of organic matter. Nitrates, phosphorus, pesticides, and salts coming from farms and ranches have been detected in surface water and groundwater. These environmental effects not only reduce agricultural productivity they also can impair aquatic ecosystems and human health.

Soil and Water Quality: An Agenda for Agriculture was a response to the need for a re-examination of the relationship between agriculture and the environment and attendant public policies. To the extent possible, this examination was comprehensive, long-range, and incorporated current scientific understanding.

Table 1. Committee on Long-Range Soil and Water Conservation members

<table>
<thead>
<tr>
<th>Name</th>
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*Virginia Polytechnic Institute & State University until September 1993.
†Iowa Department of Natural Resources until Fall, 1993.
‡Sworn in as Deputy Secretary, U.S. Department of Agriculture, May 12, 1993.
of ecological and farming systems.

The re-examination resulted in some major contributions to the policy debate. These included the:

(a) identifying the linkages between soil quality and water quality;
(b) identifying opportunities to improve both farm profitability and environmental quality;
(c) emphasizing farming systems as a basis for program design and delivery, and
(d) identifying the potential payoff from the targeting of programs and technical assistance to problem areas and problem farms within these areas.

These contributions were evident throughout the report and provided a consistent theme in both Part I—which develops the Agenda—and Part II—which examines farming systems and analyzes individual elements (such as nitrogen or pesticides) that interact within systems.

### Linkages between soil quality and water quality

The committee used a concept of “soil quality” that considers soil to be a living, dynamic substance that acts as an interface between agriculture and the environment. The committee was able to draw on a considerable body of literature (e.g., 12, 13, 14, 18, 31) that defined soil quality and estimated its importance in the production of food, fiber, and fuel; nutrient and carbon storage; water filtration, purification, and storage; waste storage and degradation; and the maintenance of ecosystem stability and resiliency.

The quality of a soil is determined by a combination of physical, chemical, and biological properties such as texture, water-holding capacity, porosity, organic matter content, and depth. Since these attributes differ among soils, soils differ in their quality. Some soils, because of their texture or depth, for example, are inherently more productive because they can better absorb and make available larger amounts of water and nutrients to plants. Similarly, some soils, because of their organic matter content, are able to immobilize or degrade larger amounts of potential pollutants.

High-quality soils can prevent water pollution by absorbing and partitioning rainfall and by breaking down agricultural chemical, wastes, and other potential pollutants. Thus, protecting soil quality is seen as an important step toward protecting water quality. In many ways, soil quality is one measure of ecosystem health. Conserving soil quality means protecting the full range of ecological services high-quality soils provide.

Soil management can either improve or degrade soil quality. Erosion, compaction, salinization, sodification, acidification, and pollution with toxic chemicals can and do degrade soil quality. Increasing soil protection by crop residues and plants; adding organic matter to the soil through crop rotations, manures, or crop residues; and careful management of fertilizers, pesticides, tillage equipment, and other elements of the farming system can improve soil quality. Protecting soil quality is not, however, synonymous with reducing erosion. All processes of soil degradation and soil improvement should be part of a holistic approach to soil management.

The committee criticized our current national policies that protect soil resources because of their narrow focus, which neglects the linkages between soil quality, soil productivity, and water quality. Protecting soil quality should be a fundamental goal of U.S. agricultural and environmental policy. While protecting soil quality alone does not assure the prevention of water pollution nor will it be cost-effective to protect soil quality in all cases, protection of soil quality is an important public goal.

Thus the first agenda item identified by the committee was that:

- national policy should seek to conserve and enhance soil quality as a fundamental first step to environmental improvement (26).

The committee recommended that the Secretary of the United States Department of Agriculture and the Administrator of the Environmental Protection Agency initiate a coordinated research program to develop a minimum data set of soil quality indicators, standardized methods for their measurement, and standardized methods to quantify changes in soil quality. The underlying motivation was to make the concept of soil quality operational so that it could better be used in a policy context and for improved soil management. The committee called for using the National Resources Inventory to quantify and to measure selected soil quality indicators that are broadened to produce estimates of compaction, salinization, sodification, acidification, and biological degradation in addition to erosion. The committee also recommended that the Resource Conservation Act appraisal process assemble all currently available information to assess the current state of and trends in soil quality.

### Pollution prevention

Agricultural production inevitably generates a certain mass of residual products including nutrients, sediments, pesticides, salts, and other elements that can become pollutants. The emphasis of traditional conservation programs has been to prevent pollutants from leaving the farming system by reducing erosion and runoff. There is another avenue to preventing pollution. That avenue is to improve the way nutrients, pesticides, and irrigation water are used. Increasing the efficiency of nutrient,
pesticide, and irrigation water use reduces the total residual mass of nitrogen, phosphorus, pesticides, salts, and trace elements that can become pollutants.

Thus, the second agenda item identified by the committee was that:

national policy should seek to increase nutrient, pesticide, and irrigation use efficiencies in farming systems (20).

In some cases, efficiency can be achieved by using fewer nutrients, pesticides, or less irrigation water to produce the same yield. In other cases, efficiency can be achieved by increasing the yield while using the same mass of inputs. Many technologies and management methods already exist that promise to dramatically increase the efficiency of nutrient, pesticide, and irrigation water use, but they need to be more widely implemented. In many cases, the cost of achieving greater efficiency in input use is offset by reduced costs of production.

**Nutrients.** One robust example of such opportunities can be found in nutrient management. There is considerable research evidence that many producers have opportunities to improve the efficiency of nitrogen use, if they would properly account for all sources of nitrogen, improve the estimates of crop nitrogen needs, have realistic crop yield goals, synchronize nitrogen applications with crop needs, and use cropping systems that prevent the buildup of residual nitrogen during the dormant season. In many cases, reductions in nitrogen use have been achieved with little or no loss in yields (7, 19, 21, 22, 29, 32).

Phosphorus applications also provide some similar "win-win" situations since phosphorus levels in soils are often already at levels above which a crop yield increase from additional phosphorus would be predicted (24, 27, 35). Mallarino et al. (23) cited several studies reporting that increases in soybean or corn yields are small or nonexistent when soil test levels for phosphorus are within the medium category (6, 8, 25, 28, 30, 34). Phosphorus additions to soils with high soil-P test results should not produce increased corn and soybean yields in the Corn Belt (2, 8, 30, 34). This phenomenon suggests that applications of additional phosphorus to 50, 65, 78, 68, and 35 percent of the soils tested in Iowa, Illinois, Indiana, Ohio, and Missouri, respectively, would be expected to produce no increase in yields.

Similar situations exist in the southeastern United States. Kamprach (14, 15) and McCollum (24) have shown that corn and soybeans grown on Piedmont and Coastal Plain soils testing high in available phosphorus do not respond to phosphorus fertilizer additions. On the basis of the soil test data, no response to phosphorus would be expected on about half of the soils in the southeastern United States.

**Pesticides.** "Win-win" situations from improving the efficiency of pesticide use also exist, although the ability of investigators to predict the behavior and transport of pesticides under field conditions is not as strong as would be desirable. Nevertheless, it seems that the existing knowledge base from research and practical field experiences is not being fully disseminated or used to protect the environment. Management practices that can be used to reduce environmental pollution from pesticide use in agro-ecosystems can be broadly categorized as follows:

- selection of proper pesticides and formulations;
- timing of and improvement in pesticide application methods to minimize drift and volatile losses;
- use of erosion and runoff control measures to reduce losses through runoff and leaching;
- use of nonchemical pest control measures such as crop rotations and management; and
- integrated pest management.

There appears to be little chance of discovering a perfect pesticide—one that is precise enough to attack the target pest and then suddenly dissipate and accurate enough to reach the target pest and not move past the root zone. Given the difficulty of predicting the fate and transport of pesticides with certainty, efforts to reduce pesticide losses by reducing the total mass of pesticides used, reducing pesticide losses through runoff and erosion, improving the efficiencies of pesticide applications, and matching the pesticide selection to site conditions must go forward at the same time that investigators improve their understanding of pesticide behavior in the environment. In many situations, currently available technologies, farming systems, and farming practices allow reductions in pesticide losses while sustaining profitability.

**Erosion and runoff.** Enhancing soil quality and improving efficiency, in a sense, address what goes into agricultural production. The third major agenda item addresses what comes out of farming systems:

- national policy should seek to increase the resistance of farming systems to erosion and runoff (26).

Conservation tillage and residue management systems are well-understood and effective means of reducing erosion and runoff. A great diversity of tillage and residue management systems are available to producers. Many of these systems result in dramatic decreases in erosion and runoff from farming systems and from agricultural watersheds. The conservation compliance provisions in the 1985 food security act (FSA) will, if fully implemented, dramatically increase the use of those conservation
systems in the U.S. The major opportunity to improve the effectiveness of these systems is to increase their use on lands that are most vulnerable to soil quality degradation or that most contribute to water pollution. In some regions the applicability of these systems may be limited, however, because of unfavorable physical or economic factors.

Much of the damage from erosion and runoff can happen during storms that occur infrequently. Incorporating the probability of storm events into the design of farming systems should help identify approaches that combine residue management with changes in cropping systems to provide more protection to the soil during periods when storms are likely. Current computer simulation capacities coupled with available climatic data potentially could identify opportunities to design farming systems that can resist damage from storm events of various duration and intensities.

Field and landscape buffers. Agriculture takes place within a particular landscape and the nature of that larger landscape has important effects on the degree to which soil and water are protected. The fourth agenda item, then was that:

national policy should seek to make greater use of field and landscape buffer zones (26).

The purpose of creating field and landscape buffer zones is to create landscape sinks that trap or immobilize sediments, nutrients, pesticides, and other pollutants before they reach surface water or groundwater. The importance of field and landscape buffer zones in reducing the delivery of pollutants has received increased attention (3, 4, 5, 9, 11, 16, 17, 33). Grass waterways and vegetative strips have been used for erosion and runoff control in croplands for some time, but the value use of these areas as sinks for nutrients and pesticides is being increasingly recognized. Field or landscape buffer zones are not a panacea, however, and should not be seen as an alternative to efforts to improve farming systems. Efforts to improve farming systems and to create field or landscape buffer zones are complementary. Emphasis on one effort to the exclusion of the other will achieve much less improvement in soil and water quality than is possible by striking a balance between the two efforts.

Farming systems as a basis for program design

Soil and Water Quality: An Agenda for Agriculture identified the traditional focus of policies on single-objective, best-management practices as an obstacle to protecting soil and water quality. There are too many links among the components of a farming system and the larger landscape for such an approach to be viable. Thus, the committee recommended that individual best-management practices need to be integrated into a farming system plan, and the implementation of that plan, rather than a single practice, should become the basis upon which farms receive assistance or are judged to meet the requirements of regulatory programs.

In addition, research and policy should focus on the linkages between natural resource data, production practices and socioeconomic data by taking a systems-level approach to analyzing agricultural production systems. To quote from the report:

The focus of such an analysis is the farming system, which comprises the pattern and sequence of crops in space and time, the management decisions regarding the inputs and production practices that are used, the management skills, education, and objectives of the producer, the quality of the soil and water, and the nature of the landscape and ecosystem within which agricultural production occurs.

An integrated systems approach is necessary for the development of policies and programs to accelerate the adoption of farming systems that are viable for producers, that conserve soil quality, and that do not degrade water quality (26).

The committee recommended that two types of research should be high priorities for USDA and EPA research programs, including (1) research directed at identifying the nature and magnitude of factors influencing producer's management of cropping and livestock production systems; and (2) research leading to the development and implementation of new technologies, cropping systems, and methods to manage farming systems that are profitable and protect soil and water quality.

Integrated farm system plans, as conceived of by the committee, can be simple, but they do involve thinking of the whole farm as a system and taking note of how the producer gathers information and makes decisions (see Table 2). The plans should be information-gathering, recommendation-building exercises rather than a selection of management practices from a list of approved alternatives. They should allow great flexibility to coordinate with individual enterprise characteristics. Integrated farm plans should focus on improving the way information is gathered and used by the producer to make farm management decisions. Indeed, standards such as record-keeping or certification requirements intended to improve the flow of information may be far more valuable than technology-based standards.

Targeting of programs

The committee did not recommend that
100 percent of U.S. farms have an integrated farm system plan. Rather the concentration of agency resources should be toward “problem areas and problem farms,” where the payoff from the use of these scarce resources is likely to be highest.

The traditional emphasis in conservation programs has been on widely distributing technical and financial assistance to encourage the use of soil and water protecting technologies and methods. With the limited information on the location of water quality pollution and soil quality degradation that has been available in the past, and with more adequate federal and state budgets, such wide distribution of programs may have been defendable. But now with the availability of new data sets, models, and improved scientific understanding, we are increasingly able to identify where problem areas and problem farms exist. Continuing with programs that are not targeted appropriately will result in our limited conservation resources being spread too thinly, impairing the effectiveness of programs.

The report addresses the need to target programs based on the following:
- articulation of national or state goals for soil and water quality;
- identification of regions where the benefits from achieving the goals per dollar invested are greatest;
- identification of the linkages among farm practices, soil quality, and water quality; and
- identification, within a targeted area, of those enterprises that contribute to the problem as well as the barriers to changing their farming systems.

Note that targeting as conceived in the report should not stop at the region or watershed level. Within a problem area, the committee recommended the targeting of programs—mandatory or voluntary—to the problem farms. Such targeting will reduce the cost and increase the effectiveness of the programs. In addition, targeting problem farms could have the added advantage of protecting farms with good stewardship practices from unnecessary costs and inconveniences (assuming the costs of compliance were borne by the producer).

While all the information necessary to undertake such targeting with a high degree of refinement, there are solid beginnings with both improved models and data sets. For example, geographic information systems (GISs) have the potential to greatly increase the usefulness of existing data.

**Information and information “marketing.”** Nevertheless, additional research and data collection is needed to identify the linkages between relevant natural resource data, production practices, and socioeconomic data in order to realize improved targeting and program direction from an integrated approach based on farming systems.

If we are to achieve soil and water quality goals, we need to change the way producers think about these issues. This change cannot be accomplished by focusing on technology standards or recommended practices alone. There is need to ascertain what information producers are using and how they are using it. This research endeavor is going to require different survey instruments than before. We need to be asking not just “what pesticide did a producer use,” or “when and where was it used,” but also “how did the producer decide to use this pesticide in this way.” Until we have this information, it will be very difficult to change producers’ thinking about their farming system or to ultimately have a long-term influence on their decisions.

In addition, modern marketing methods can be used that recognize the diversity of U.S. agriculture and tailor technical assistance and educational programs to particular audiences.

Like any product, information can be “marketed.” That is, audiences can be segmented into groups that are differentiated by their different constraints, level of

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**Table 2. An integrated farm system plan**

An integrated farm system plan begins with an inventory of farm resources and answers such questions as:
- Are there opportunities to improve pest, nutrient, or soil management through crop rotation?
- Are there livestock enterprises on the farm or nearby farms from which animal manures might be collected and used as nutrient inputs?
- Does the producer participate in U.S. farm commodity programs?
- Where is the producer getting information on which to base his or her decisions and how is it being used?

Once a general picture of the farm enterprise emerges, more detailed information on production practices and information sources can then be assembled. For example answers to the following questions might be pursued:
- What is the crop rotation history on a field by field basis?
- Are credits for the nitrogen fixed by legumes taken when making fertilizer applications?

This plan can then be used to recommend improvements that range from improved information sources to input adjustments. Further refinement can be made by assessing the soil resources within each field as the variability can be great.
knowledge, choice of practices, access to resources, resource problems, and the like. Then, information programs which are tailored to these audiences' needs can be developed and delivered. Frankly, there are lessons to be learned from “Madison Avenue” techniques of demand analysis and market segmentation. Thus, the committee recommended that the Cooperative Extension Service of the USDA should develop the information and methods needed to segment target audiences and tailor an accelerated education program to selected audiences including producers, crop soil consultants, and dealers who sell agricultural inputs as well as others who affect producer's decisions. Again, agencies should prioritize these audiences so that there is a significant concentration of technical and informational assistance directed to those audiences where a change in agronomic behavior would most influence soil and water quality.

Policies and programs

There is both substantial research and policy implications that stem from the Agenda for Agriculture that comprised the report. In addition to research on soil quality, and the development of new production technologies and management methods, imperative research needs are the determination of why producers make the decisions they make.

Traditional, voluntary approaches to improve soil and water quality need to incorporate modern market-based incentives and enlist support from the private sector—including seed, chemical, and equipment manufacturers—to improve farming practices. A program to purchase use rights from landowners through long-term easements could be developed to protect those croplands which cannot be profitably farmed without causing soil degradation, wetland destruction, or water pollution, might be included as one approach. Incentive approaches might be needed in areas where environmental problems are severe and where farm owners and managers are “unacceptably slow” in implementing improved farming techniques.

In addition state and federal laws currently lack clarity as to the legal responsibilities of landowners and land users to manage land in ways that protect oil and water quality. Permanent, publicly funded soil and water quality gains are impeded by inconsistencies in the legal definition of the rights and responsibilities of landowners and users.

The debate over national policy to protect soil and water quality has intensified over the last few years. New laws have resulted in new programs and mandates that can be used to implement many of the recommendations found in Soil and Water Quality: An Agenda for Agriculture. In the next few years, other laws will be enacted. And even in the absence of new legislation, much progress can be made by integrating the many federal, state, and local programs that already influence aspects of the soil and water quality problems.

The changes underway in current policy, when combined with the tools and information that are already available and are being developed, give this country a unique opportunity to fashion a comprehensive approach to soil degradation and water pollution.

REFERENCES CITED

Review


This book, essentially 11 essays, tackles natural resource policy and law from a number of angles, ranging from the philosophical and polemic to straight legal analysis. The main focus is upon western U.S. issues, e.g. water mining. However, not all western resources are covered (there is little discussion of timber laws and none of coastal management) and, conversely, much of the discussion is of interest to readers throughout the country. The authors' styles and approaches vary greatly; the editors have brought them together by a general essay on "rethinking resources." Throughout the work, the term "natural resources" is used in the old-fashioned sense of naturally occurring substances that can be used to raise money, such as minerals, timber, and water. This is a much more specific use than is encountered in eastern U.S. writing, where the term has become practically synonymous with "nature" as in, "We ought to do more to protect our priceless natural resources." This too gives the work a western tinge, since direct economic exploitation of resources, particularly water, is more common in the West.

Nevertheless, as the first chapter points out, the percentage of the gross domestic product derived directly from natural resources is definitely falling; and this in turn has had an effect on the thinking of Americans. When more income is derived from looking at large trees than from selling them (especially as logs), then the economics as well as the ethos of "natural resource development" will begin to change, and the law will follow. This book attempts to explain this shift, to attack it, to support it, and to predict its future.

Perhaps the most seminal article is that of Dan Tarlock of the Chicago-Kent College of Law. His view is somewhat gloomy, as indicated by his title: "Environmental Law, But Not Environmental Protection." His subject is the future of that law. Reviewing the vast jumble of regulation, he concludes it provides a "dense canopy with shallow roots." The rain forest image is a striking one, although it may not be entirely apposite: If not disturbed by humans, rain forests are among the most stable regimes in nature.

Tarlock does not agree with other contributions, such as David Getches' review of western water law and George Coggins' readable "Trends in Public Land Law," which urge that the gradual shift from the 19th century "cowboy" economy to a sustainable stewardship approach is going to work. The "positive era" of the 1970s being past, he foresees a future of six basic options, including the following: back to the 19th century; the market approach (pollution markets, tourism); incentive-based protection (sale of new technology); two varieties of the status quo—environmental protection as the defense industry of the next century; and several "shades of green" from deep ecology to "managed biodiversity."

The other essays, worth reading on their own, fit rather well into Tarlock's categories. The first, for instance, is clearly an homage to the 19th century approach. Clyde Martz urges that the "only" shortcomings of the free-enterprise period were lack of conservation of water and fuels, overgrazing, overcutting of timber, and strip mining. He believes these problems have been principally corrected as of several decades ago.

The next author, George Coggins, refutes this approach. His view of trends in western public land law includes the demise of multiple-use management (just catching on in the East) and of the doctrine of prior appropriation of water allocation. The water issue is discussed in some depth in two other chapters—"Lessons from Tahoe and the Truckee," by Charles Wilkinson, and "Water Resources" by David Getches, who urges a more integrated approach to water policy, starting with "rethinking the concept of beneficial use." These authors are pretty optimistic, although one could certainly view the Truckee solution as a typical divide-the-baby political compromise rather than an example of new thinking.

Professor Joseph Sax, a lifelong enthusiast for the public trust doctrine, makes in his chapter on the Mono Lake case a much broader claim for what seems to be managing nature, if not biodiversity. The decision, in his view, goes much further than dividing rights between hungry humans, in that the lake itself was, so to speak, given some right; or, as he puts it, the decision is one "calling upon the public trust doctrine to require accommodation between commodity and natural demands."

Of the other chapters, Lawrence MacDonnell's study of mineral law says goodbye to the "lords of yesterday" and tries to predict the future of two 1970s laws which have never really settled in—the Federal Coal Leasing Amendment Act and the Surface Mining Control & Reclamation Act. Richard Maxwell produces a straight rundown of oil and gas cases decided in the last decade. Richard Lazarus speculates on how property law is shifting to the governance of the "police power" as res communis becomes res publica—except in the U.S. Supreme Court Lucas case. It is notable that none of these authors has a word to say for our highest court when it debates environmental law.

There is a real need for more books on natural resource policy, and this one makes a good start. Existing books are either legal casebooks or focus on one or another controversy. A cohesive look at the new zeitgeist is clearly in order—a book to cover east and west, all resources including timber and fish, in terms of neither semantical nor doctrinaire. Several of these authors could do the job. —Alexandra D. Dawson, environmental lawyer, directs a program on resource management and administration at Antioch New England Graduate School in Keene, New Hampshire. Dawson is also author of Land Use Planning and the Law, Garland Press, 1982.

**General**


**Getting Started: A Guide to Bringing Environmental Education Into Your Classroom.** By Paul Krupin. 128 pp., 1994. NCEET Publications, P.O. Box 1141, Ann Arbor, MI 48106-1141. $9.95 softbound.


Best Management Practices Video. BMPs for fertilization, irrigation, and cultivation. California Department of Food and Agriculture, P.O. Box 942872, Sacramento, CA 94271-2872.

Agriculture

Agricultural Crisis in America. By Barbara McEwan. 260 pp., 1994. ABC-CLIO, 130 Cretona Drive, P.O. Box 1911, Santa Barbara, CA 93116-1911. $39.50.


Ecology


Fish and Wildlife


Land Use

Changes in Land Use and Land Cover. William B. Meyer and B.L. Turner, II, editors. 800 pp., 1994. Order from Cambridge University Press, 110 Midland Avenue, Port Chester, NY 10573-4930. $49.95 hardbound (price subject to change).


Law, Legislation, and Politics


Soils


Soil Compaction in Crop Production. B.D. Soane and C. van Ouwerkerk, editors. 662 pp., 1994. Elsevier Science, P.O. Box 211, 1000 AE Amsterdam, The Netherlands; or P.O. Box 945, Madison Square Station, New York, NY 10159-0945 USA. Dfl. 440; or $251.50 hardbound.


Water Resources

Groundwater & Public Policy. A set of 17 informational leaflets, 112 pp. Freshwater Foundation, 725 County Road 6, Wayzata, MN 55391. $15.


Modern Water Control in Irrigation. By Hervé Plusquellec, Charles Burt, and Hans John Wiley & Sons Ltd., Baffins Land, Chichester, West Sussex PO19 1UD, England. $79.95 hardbound.


Modern Water Control in Irrigation.


Wetlands
