



AgEcon SEARCH
RESEARCH IN AGRICULTURAL & APPLIED ECONOMICS

The World's Largest Open Access Agricultural & Applied Economics Digital Library

This document is discoverable and free to researchers across the globe due to the work of AgEcon Search.

Help ensure our sustainability.

Give to AgEcon Search

AgEcon Search

<http://ageconsearch.umn.edu>

aesearch@umn.edu

*Papers downloaded from **AgEcon Search** may be used for non-commercial purposes and personal study only. No other use, including posting to another Internet site, is permitted without permission from the copyright owner (not AgEcon Search), or as allowed under the provisions of Fair Use, U.S. Copyright Act, Title 17 U.S.C.*

No endorsement of AgEcon Search or its fundraising activities by the author(s) of the following work or their employer(s) is intended or implied.

333.72
F67

FORCES SHAPING THE EFFORT TO CONSERVE SOIL AND WATER:
RESEARCH ISSUES FOR THE 1990'S

Proceedings of a NCR-149 Symposium
January 1988

Steven E. Kraft
Editor

Published for

North Central Regional Committee 149,
Changing Institutional Environment for the on-Farm
Adoption of Soil and Water Conservation

by the
Soil Conservation Society of America
7515 Northeast Ankeny Road
Ankeny, Iowa

WAITE MEMORIAL BOOK COLLECTION
DEPT. OF AG. AND APPLIED ECONOMICS
1994 BUFORD AVE. - 232 COB
UNIVERSITY OF MINNESOTA
ST. PAUL, MN 55108 U.S.A.

Contents

Contributors	ii
Introduction	
Steven E. Kraft	iii
Soil and Water Conservation in the Turbulent World of American Agriculture: Issues and Challenges for the 1990's--Comments	
Richard T. Clark	1
Eckhart Dersch	10
Biotechnology and Its Implications for Water and Soil Conservation	
Yao-chi Lu	13
Research Issues in the Arena of Soil and Water Conservation Policy	
J. D. Esseks and Steven E. Kraft	30
Changing Agricultural Property Rights in the Environmental Sector	
Stephen B. Lovejoy and Harry R. Potter	48
Economic Forces Affecting Farmers' Actions to Reduce Erosion	
Lawrence W. Libby	59
Policy and Program Considerations for "A National Program for Soil and Water Conservation--The 1988-1997 Update"	
James A. Maetzold	78
North Central Regional Committee 149	97

Contributors

Richard T. Clark, Associate Professor
Department of Agricultural Economics, University of Nebraska,
North Platte, Nebraska

Eckhart Dersch, Professor
Department of Resource Development, Michigan State University,
East Lansing, Michigan

J. Dixon Esseks, Associate Professor
Center for Governmental Studies, Northern Illinois University,
DeKalb, Illinois

Steven E. Kraft, Associate Professor
Department of Agribusiness Economics, Southern Illinois University,
Carbondale, Illinois

Lawrence J. Libby, Professor and Chair
Food and Resource Economics Department, University of Florida,
Gainesville, Florida

Stephen B. Lovejoy, Associate Professor
Department of Agricultural Economics, Purdue University,
West Lafayette, Indiana

Yao-chi Lu, Agricultural Economist
Agricultural Research Service, U.S. Department of Agriculture
Beltsville, Maryland

James A. Maetzold, Program Analyst
Soil Conservation Service, U.S. Department of Agriculture,
Washington, D.C.

Harry R. Potter, Associate Professor
Department of Sociology, Purdue University,
West Lafayette, Indiana

Research Issues in the Arena of Soil and Water
Conservation Policy

J.D. Esseks and Steven Kraft*

The use of natural resources such as soil and water and the policy environment surrounding this use are informed by concepts derived from economic theory, extant technology, past uses, common law, statutory regulations, and descriptive ethics influenced by past and present social mores and the structure of society. As such, the agricultural use of soil and water resources tend to reflect where society has been rather than where it is going.

Increasingly within a market economy such as the United States, the legal environment regulating decisions regarding the use of soil and water resources agriculturally contains contradictions that can adversely affect the efficiency of allocative decision making and the equity of policy interventions. on the one hand, users of resources are urged to find the highest and best use of their resources and are supported by accepted business practices and legal precedent, while on the other, statutes based on alternative preferences or ethics increasingly prohibit certain uses of soil and water resources agriculturally. Given recent changes in the policy environment surrounding the use of soil and water resources, we explore in this paper what we believe to be the salient research issues that must be addressed.

*Senior authorship is not assigned. Research partially supported by a grant from the Joyce Foundation.

Recent changes included the regulations to reduce soil erosion found in Title XII of the 1985 Food Security Act (22), the 1987 Amendments to the Clean Water Act (63), pending legislation dealing with groundwater contamination from agricultural sources (24), the emergence of the Public Trust Doctrine in setting legal precedent (14), precedent concerning what constitutes a "taking" in land use regulations well as other changes (10,12). In other words, the externalities generated by agricultural activities are now more than ever on the agenda of government. Agriculture has lost its relatively protected position vis-a-vis environmental policy. These changes in the political/legal environment facing farmers mean that social science researchers must consider making changes in their foci, conceptual frameworks and research designs.

Title XII of the 1985 Food Security Act (P.L. 99-198) contains a number of provisions that generate research issues for rural sociologists, agricultural economists, and political scientists. While we will not address all of the provisions, we will address some research issues pertaining to the Conservation Compliance Conservation Reserve Program and to a lesser extent the Sodbusting and Swampbusting provisions. Conservation Compliance deals with farm operators requesting a conservation plan for their highly erodible land by 31 Dec. 1989 and implementing the plan by 21 Dec. 1993. The rules for Conservation compliance published in the Federal Register 29 June and 17 Sept. 1987 (4, 5) raise a number of important research questions. Particularly, the development of standard procedures to use in assessing the economic impacts and feasibility of conservation systems and plans. For example, what criteria will be established to assess economic feasibility? Will the same standards be applied nationally? This is especially important given that input costs, yields, and prices vary spatially well as temporally. In the same vein, what procedures will be

established to assess the economic impact of conservation plans on marginal farmland? Specifically, if given the land's edaphic characteristics it is of marginal productivity, then almost any conservation program might render continual agricultural production on the land uneconomical. Under such circumstances does the owner/operator still have the option to argue that the conservation plan developed for cross compliance is inappropriate? As researchers, we should aid in the identification of areas in which such problems can occur as well as indicate for which particular land uses such problems are likely to occur. Additionally, we can assist in the development of meaningful criteria to use in assessing "economic impacts and feasibility." For many implementing the provisions of economic feasibility, it might not be obvious what "costs and benefits" to include in such assessments.

Similarly, we are in a position to design research to evaluate how the above assessments of economic impacts will vary across Soil and Water Conservation Districts, farm type, and state administrative units. Given that the field office technical manuals are the basic guides for determining if cross compliance has been achieved and the variation in the guides across administrative jurisdictions, social scientists could develop pilot studies to assess the extent and degree of variation. Such work would be extremely useful in evaluating the rules and their implementation in light of potential legal challenges.

The ongoing implementation of the Conservation Reserve Program raises a number of research questions that should be addressed. First, legislative activity is spawning a set of differential eligibility criteria to be used in assessing the eligibility of a parcel of land for the Conservation Reserve. Differential criteria have been suggested for stream banks, land for tree planting, and

the establishment of wildlife habitat. As researchers, we are in a position to set up a framework assessing the impacts of these proposed changes to the Conservation Reserve's goals and the reserve's implementation. Given data already existing about bidding activity, we are in the position to develop preliminary forecasts of the potential impact such changes might have on bidding activity.

Second, while members of Congress are contemplating differential eligibility criteria, members of the agricultural research community should begin to address the potential uses for land in the Conservation Reserve at the end of the ten year contract period. Specifically, are there lessons that can be learned from the post-program use of the land entered into the Soil Bank? Also, how much of the land enrolled in the CRP will be subject to the constraints of Conservation Compliance? And for the land under those constraints, what alternative, economically viable uses will there be at the end of the contract period? These land-use projections will of course vary according to likely scenarios for the agricultural sector, overall rural economy in the regions affected, and the nature of federal commodity programs. The relationship of agriculture to other sectors may be profoundly affected by the land-use changes caused by the CRP and also Cross Compliance. To assess this, the research community needs to acquire a broadened understanding of how the agricultural economy and the rural economy are integrated and how this integration is affected by extensive changes in land use patterns. Given the projected changes in land use outlined in its in The Second RCA Appraisal (25), it is particularly important that post-CRP use of reserve land be studied.

What happens to the land in the CRP at the end of the ten year contract period might well be a function of how existing

governmental commodity programs are used for transferring income to farmers. If the commodity programs are still fundamentally land-based, with farmers having to set-aside acres to qualify for program benefits, much of the CRP land will probably return to being rotated in its use between the production of program crops and being entered as set-aside acres in accordance with program requirements. Such activity could well reduce the environmental benefits derived from entering the land in the CRP initially, as well as reduce the production reductions won through it.

Consequently, social scientists should be addressing alternatives mechanisms for income transfers in agriculture and their implications for land use patterns, soil and water degradation, and the post-contact use of Conservation Reserve land. Additionally, researchers need to assess the acceptability of alternative forms of transferring income to the agricultural community.

Three other areas should also be addressed: first, as the Conservation Reserve Program is evaluated during future appropriation cycles, can social scientists develop an evaluative framework for assessing the program against its multiple goals? According to the 1985 Food Security Act, the goals of the Conservation Reserve Program are to reduce water and wind erosion, protect our national capacity to produce food and fiber, reduce sedimentation and improve water quality; create improved wildlife habitat, reduce the production of surplus commodities, and provide needed income support for farmers. These multiple goods require an evaluative framework able to handle their diversity. Ideally, we ought to be presently establishing this evaluative framework. Second, given the ongoing international trade negotiations, research effort should be directed toward how the Conservation Reserve and the other provisions of title XII are viewed internationally, i.e., are they seen as forms of subsidy or as

basically environmental programs allowing U.S. agriculture to shift to a new productive form? Third, in the short life of the Conservation Reserve there have been a number of program changes that have "altered" the rules of the program in mid-stream, e.g., the corn bonus, liberalizing eligibility rules. Answers are needed also to the question of how farmers and landowners have reacted to the program changes. For example do they feel that they have been subject to the "policy yo-yo"? Furthermore are such changes in the CRP affecting farmers' views of how forcefully Conservation Compliance, Swampbusting, and Sodbusting will be implemented?

The passage of the 1985 Food Security Act ushered in a new era in the formulation of conservation policy vis-a-vis agriculture. A significant "actor" in the policy process was the Conservation Coalition, a loose alliance of conservation groups coordinating their efforts to secure their objectives of reduced environmental degradation from agricultural activities. Among the coalition members have been groups such as the Wildlife Management Institute, Environmental Defense Fund, Sierra Club, National Audubon Society, American Farmland Trust, and National Resource Defense Fund among other. The presence of such a group also raises a number of research questions that should be addressed in the 1990s. For example, social scientists should analyze the effectiveness of such lobby groups as they attempt to influence the post-legislative phase of policy making. That is, to what extent do these groups remain active once a program has been authorized? Are the groups engaged in the process of rule formulation and the monitoring of program implementation? Does the funding cycle of such groups force them to shift from one success to another issue to such an extent that they are unable to "protect" their initial gains from amendments that change the original intent of the legislation they fought for? For example at the Conservation Reserve's very

beginning, this Coalition was able to persuade the USDA to target the CRP at land eroding at more than 3T rather than the 2T rate that the Department initially chose. Moreover, in 1986 one of the Coalition's most active member organizations, the American Farm Trust, commissioned a sample survey of farmland owners in 22 states so as to monitor the CRP's early stages of implementation. If such groups outside the traditional agricultural interest groups continue to have a significant impact on policy formulation and implementation, then we as social scientist should start to study them in greater depth.

The 1987 Amendments to the Clean Water Act (23) present a different research agenda for social scientists. Section 316 of the amendments changes section 319 of the Clean Water Act to expand the identification of sources of nonpoint pollution as well as develop regulatory and nonregulatory programs to achieve the implementation of recognized Best Management Practices (BMPs) to reduce the nonpoint pollution to the maximum extent possible. Part of this expansion is directed toward agricultural sources of nonpoint pollution. Since the 1972 Amendments to the Clean Water Act (6), specifically section 208 dealing with nonpoint pollution, the role of BMPs has been expanded and to some extent changed. Implicitly, under section 208, BMPs became standards that if followed were recognized as assuring compliance with the provisions of the statute. However, given the decision of Northwest Indian Cemetery Protection Association v Peterson (15), BMPs are now not seen implicitly as standards assuring compliance but merely a means to achieve compliance. Consequently, users of BMPs must be able to demonstrate that the BMPs result in attaining the set standards. "Adherence to BMPs does not automatically ensure that applicable state standards are being met." (15, p. 589). In a very real sense as pointed out by Wilkinson (27), BMPs are not longer static

but have become dynamic--changing as standards and/or technology change.

Given the 1987 Amendments and the changed status of BMPs, a number of salient research issues emerge. First, social scientists in cooperation with biological-physical scientists could be working on the identification of agriculturally related sources of nonpoint pollution as well as on the delineation of BMPs acceptable for achieving the maximum reduction in pollution. Going hand in hand with these activities is setting up a framework to assess the socio-economic aspects of the BMPs at the farm level and within the rural community as a whole. Additionally, work could be carried out related to factors affecting the successful acceptance and implementation of BMPs across a heterogeneous group of farm operations. Thirdly, researchers could use the experience with section 208 initiatives and Title XII--induced conservation practices of the Food Security Act to identify strategies for the effective implementation of BMPs directed toward agriculture. Finally, if indeed BMPs are dynamic, then researchers should be setting up an evaluative framework to assess BMPs as standards and/or technology change. As standards, technology, and the socio-economic environment change, the acceptability of various BMPs will also change. Consequently, social scientists should be designing a framework within which such dynamics can be evaluated and the results fed back to the participants in the regulatory process.

The existence of a number of bills in congress typified by Senator Durenburger's bill S. 1419 (24), dealing with groundwater contamination points to another set of research issues dealing with soil and water resources for the 1990s. A basic concern revolves around the interrelationship between techniques to conserve soil, i.e., methods of no-till and minimum tillage, and the contamination

of surface and ground water with pesticides used in the above techniques. A parallel concern is the degradation of groundwater resulting from the intensive use of fertilizers, pesticides and manure that leach down to aquifers. While these interrelationships exist and the extent of groundwater contamination is being assessed, statutory efforts by various states and at the federal level are being taken to regulate the incidence of contamination and assess culpability along with the associated liability.

Given these statutory initiatives, there are a number of research efforts that could be undertaken. First what kinds of regulatory models from other industries are transferrable to agriculture? What are the implications of these models for agricultural production, production efficiency, and the spatial location of production? Are there feasible nonregulatory approaches that could be used in agriculture that will achieve the same level of protection without an intrusive regulatory structure? What is the relationship between concerns with groundwater contamination and the conservation provisions of the 1985 Food Security Act? Given the water quality provisions within Title XII of the act, what are the effects of groundwater concerns on conservation compliance and the development of alternative eligibility criteria for Conservation Reserve land? An additional area is an evaluation of how receptive the agricultural community will be to different forms of regulatory and nonregulatory intervention to control groundwater contamination. If one way to limit such contamination is to develop new, "sustainable" productive systems that are less chemically dependent, social scientists can play a major role in the identification of such systems and the evaluation of their economic and social feasibility.

Lurking behind the issues raised concerning the provisions of Title XII, the 1987 Clean Water Amendments, and the concern with groundwater contamination coupled with the ongoing restructuring of agriculture is a research focus on implicit land settlement policy and land use policy in the U.S. The changes inherent in the above issues point to subtle and not so subtle changes in where agricultural activaters are located, the technological nature of those activities, population densities, etc. The potential for these changes present a research agenda tied to soil and water conservation that we should start to address.

Outside of agriculture during the 1970s and the early 1980s, there was increasing interest directed toward the Public Trust Doctrine (7, 16, 17, 18, 28) and its use as a tool for environmental protection. In *National Audubon Society et al. v Superior Court of Alpine County* (14), the Public Trust Doctrine was interpreted by the court to include the guardianship of public rights to complex ecological environmental resources even though the resources were held as private property. Public Trust can be traced back to Roman law and its use in England. In Roman times, such resources as the seas, seashores, air, running water were regarded as things common to all. When Roman law was reintroduced to England, the Roman concept of guardianship in terms of public rights to tidelands and navigable waters was adopted. Within the United States, the doctrine has developed to include not only the obligation of the state to protect the peoples' common heritage in streams and navigable waters but to include as well the expectation that the state will protect various environmental and ecological resources for use by the public (16, pp. 556-65). The doctrine goes so far as indicating that individuals acquiring rights in trust property hold those rights subject to the public trust and

can assert no vested rights to use the property in a manner harmful to that trust (7, pp. 504 and 14).

If the state is the public guardian of unique and irreplaceable natural resources under the Public Trust Doctrine, it seems clear that judicial techniques developed in traditional public trust cases involving water need not be limited to these conventional issues. Sax suggests that such techniques would be applicable and appropriate in controversies involving pesticide contamination, wetland fillings on private lands, degradation of agricultural land and other complex ecological environmental resources in which the public has an interest (16). To date there has not been any attempt to look at the problems of soil and water conservation from the perspective of Public Trust. Given that the courts are increasingly becoming a battle ground for environmental issues, a ripe research area is the development of an analytical framework grounded on the legal precedents of Public Trust and informed by socio-economic data. Such a framework would be extremely useful in informing issues of soil conservation, water quality, groundwater contamination and overdraft, and other agriculturally related environmental concerns.

Related to the legal issue of Public Trust are two allied areas in which social scientists can develop a useful research thrust from the perspective of conservation and use of soil and water resources. One of these is what constitutes a "taking" when private uses of natural resources are circumscribed by concerns for public welfare. The second deals with liability for environmental contamination resulting from agricultural productive practices. From an agricultural perspective, there have been a number of cases about what constitutes a taking under the 5th and 14th amendments to the U.S. Constitution. For example in *Woodbury County Soil Conservation District v Ortner* (29), an Iowa statute requiring

landowners to take actions to prevent soil erosion was upheld indicating that at least in Iowa, landowners are limited in their rights to use land if those uses result in excessive on-site or off-site damages. In a recent U.S. Supreme Court case, *Keystone Bituminous Coal Associate v DeBenedictis* (10), the court held that the state has a right to limit the extent to which a natural resource is utilized in order to protect the public's health and welfare. Drawing on a 1887 ruling, *Mugler v Kansas*, the court argued that "long ago it was recognized that all property in this country is held under the implied obligation that the owner's use of it shall not be injurious to the community" (13, p. 665). In the *Keystone* case involving limitations on the extent to which coal companies could mine coal in the face of surface subsidence, the high court ruled that the public's health and welfare had to be protected; consequently, the limitations imposed by a state statute did not result in a taking. Recently *McGinley* (12) reviewed the divergent legal interpretations surrounding what constitutes a taking. The interpretations are changing as statutes designed to "protect" the environment and the public's interest in it are being passed at both the state and federal levels. Consequently, an important research area is the evaluation of legal precedent from the perspective of emerging policy dealing with soil and water resources. A framework through which both economic and sociological data could be presented in terms of evaluating potential takings is lacking and should be developed.

A second related area of liability has started to bedevil farm operators. Recently, the State Department of Environmental Protection of Connecticut through the Connecticut Portable Water Act of 1981, using an interpretation of strict liability, brought legal action against ten farmers and chemical companies for polluting groundwater with agricultural chemicals. Under strict

liability, the polluter is held responsible for damages irrespective of whether wrongdoing was intended (11, p. 1 and 21, p. 19-21). As indicated earlier, policy surrounding groundwater contamination is in a state of rapid development. Along with that development is a call for research designed to assess the potential impact of the emerging public policy as well as suggest alternative mechanisms for handling the implied liability of farming using potentially hazardous technologies.

Many of us social scientists as we approach research concerning conservation implicitly adopt a paradigm grounded in preferences operationalized through the concept of utility and norm of profit maximization. The result is models of behavior derived from variants of neoclassical theory. However, the literature on environmental preferences and preferences in general indicate the high probability that individual have pluralistic preferences that complement or contradict each other (see 8, 9, 19, 20). Kellert (9) for example identifies seven distinct environmental values or preferences that the same individual might possess. For example, Kellert identifies ecological, aesthetic, utilitarian, and moralistic among others. Many of these preferences are not necessarily captured by market processes used to "measure" the benefits and costs inherent in environmental policies. In terms of soil and water conservation, if we accept the possibility of pluralistic preferences existing within individuals and affecting their reactions to policy alternatives, then we as social scientists should explore ways to identify and measure these preferences. At the same time, we should develop an analytical framework enabling us to factor in pluralistic preferences and their possible conflicts when evaluating policy alternatives or gauging the reactions of divergent publics to different policy prescriptions.

Finally, from the perspective of policy analysis a number of other research issues appear. Some social scientists argue that agricultural economists and to a lesser extent rural sociologists have not come to grips with the collapse of the mechanistic worldview derived from Newtonian physics and the rise of a paradigm resting on Heisenberg's principle of uncertainty or indeterminacy (see 1 and 26). As outlined by Bochenski, parallel with the collapse of the mechanistic world view was the elaboration of phenomenology and hermeneutics applied to the social arena. In terms of policy analysis one of the few successful attempts to apply these concepts to management has been the work on soft systems analysis by Checkland and others at the University of Lancaster (3). Premised on the assumption that human systems are "messy" and lacking in clearly defined goals, the soft systems approach uses a methodology analogous to the hermeneutic cycle (see 2, 3) to reveal the problems inherent in the system under study and to design strategies for improving the system in the eyes of the participants. While the soft systems approach has not been widely recognized by agriculturally related social scientists, given the heterogeneity of the agricultural population and the diversity of environmental problems impinging on rural communities, an unbiased evaluation of its efficacy is called for.

Similarly, the policy process per se as related to the formulation, legislation, implementation, and adjudication of soil and water conservation policy is poorly defined and understood. A rich area of research activity would be the comparative analysis of conservation policies as they go through the policy process to determine how they evolve through time as well as how local implementation differs from legislative intent and why. Given the range of policy initiatives from the provisions of title XII to proposals to guarantee the safety of drinking water from

agricultural contaminants, a thorough appreciation of the policy process is required. Such an understanding is essential for researchers studying the agricultural environment as well as for agriculturalists who are affected by policy activity. The reality is that the process departs from the model presented in civics textbooks. Such revelation also provides the foundation for policy evaluation.

In the paper, we have presented a number of salient research issues in the arena of soil and water conservation. We have tried to look toward the future of the 1990s while not being hobbled by existing research agenda and theoretical paradigms. In considering many of the issues raised, researchers will have to confront the necessity to develop alternative research designs and explanatory frameworks. In a large part, the future success of soil and water conservation policy will be determined by the extent to which we as researchers can provide participants in the policy process with information and assessments derived from the research issues presented above.

References

1. Bochanski, I. M. 1956. Contemporary European Philosophy. Berkeley, Calif.: University of California Press
2. Burrell, Gibson and Gareth Morgan. 1979. Sociological Paradigms and Organizational Analysis. London: Heinemann
3. Checkland, Peter. 1981. Systems Thinking, Systems Practice. Chichester, U.K.: John Wiley and Sons.
4. Federal Register. 29 June 1987. "Highly Erodible Land and Wetland Conservation; Request for Comments," Federal Register 52(124):24132-24133.
5. _____. 17 Sept. 1987. "Highly Erodible Land and Wetland Conservation," Federal Register 52(180):35194-35208.
6. Federal Water Pollution Control Act Amendments of 1972. United States Code 33 section 1251.
7. Gordon, B. P. 1984. "The Emergence of the Public Trust Doctrine as a Public Right to Environmental Preservation in South Dakota," South Dakota Law Review, 29:496-510.
8. Jeffrey, R. C. 1984. "Preferences among Preferences," The Journal of Philosophy, 71:377-91.
9. Kellert, S. R. 1984. "Assessing Wildlife and Environmental Values in Cost Benefit Analysis," Journal of Environmental Management, 18:355-63.
10. "Keystone Bituminous Coal Association v. DeBenedictis" (107 US(1987)No. 85-1092, The United State Law Week, 55:4326-40.
11. Libov, C. 1986. "Well Meaning Acts Haunting Farmers," New York Times, XXIII(9 March):1.
12. McGinley, Patrick C. 1987. "Regulatory 'Takings': The Remarkable Resurrection of Economic Substantive Due Process Analysis in Constitutional Law," Environmental Law Reporter 17:10369-10376.
13. "Mugler v. Kansas," 1887. 123 US 623.

14. "National Audubon Society v. Superior Court of Alpine County," 1985 658 P. 2d 709.
15. "Northwest Indian Cemetery Protective Association v. Peterson," 1985, 764 F2d. 581.
16. Sax, J. L., 1970. "The Public Trust Doctrine in National Resource Law: Effective Judicial Intervention," Michigan Law Review, 68:471-566.
17. _____, 1980. "Liberating the Public Trust Doctrine from its Historical Shackles," U.C. Davis Law Review, 1980:185-194.
18. Selvin, M. 1980. "The Public Trust Doctrine in American Law and Economic Policy, 1789-1920," Wisconsin Law Review, 1980:1403-42.
19. Sen, A. K. 1977. "Rational Fools: A Critique of the Behavioral Foundations of Economic Theory," Philosophy and Public Affairs 6:317-44.
20. Sessions, G. 1981. "Shallow and Deep Ecology: A Review of the Philosophical Literature," in Schultz, R. C. and Hughes, J. D. (Eds.), Ecological Consciousness: Essays from the Earthday X Colloquium University of Denver, April 21-24, 1980, Washington: University Press of America, pp. 391-462.
21. Urbain, C. D. 1987. "The Groundswell for Clean Groundwater," Farm Journal, 111(No. 8):19-21.
22. U.S. Congress, House. 1985. Food Security Act of 1985 The Committee of Conference, Conference Report to accompany H. R. 2100. 99th Congress 1st Session; Report 99-447.
23. U. S. Congress, House. 1986. Conference Report: Amending the Clean Water Act, U.S. House of Representatives 99th Cong. 2d Session. Rpt 99-1004.
24. U.S. Congress, Senate. 1987. S. 1419 a Bill: To Prevent Ground Water Contamination by Pesticides. 100th Congress 1st Session.
25. U.S Dept of Agriculture. 1987 The Second RCA Appraisal: Soil, Water and Related Resources on Nonfederal Land in the United States, Analysis of Conditions and Trends--Review Draft, Washington: US Dept of Agriculture.

26. Weisskopf, Walter A. 1979 "The Method Is the Ideology: From a Newtonian to a Heisenbergian Paradigm in Economics," Journal of Economics Issues 13:870-874.
27. Wilkinson, Charles F. "Soil Conservation and the Law: Will 1987 Prove to Be the Year of Decision?" Tenth Annual H. Wayne Pritchard Lecture presented to the 42nd Annual Meetings of the Soil Conservation Society of America, 3 Aug. 1987. Billings, Montana.
28. Wilson, S. E. 1984 "Private Property and the Public Trust: A Theory for Preserving the Coastal Zone," UCLA Journal of Environmental Law and Policy, 4:57-91.
29. "Woodbury County Soil Conservation District v. Ortner," 1979, 279 NW 2d. 276.