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Foreword

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FOREWORD

A. DAN TARLOCK* AND STUART L. DEUTSCH**

I. INTRODUCTION: GREAT LAKES GROUNDWATER— THE NEGLECTED RESOURCE

Legal scholars are increasingly turning to the use of imagination to develop new law and legal institutions. Imagination expressed in narrative is usually invoked by groups excluded from full participation in society to change the law,¹ but it is equally relevant to the less emotionally charged subject of this symposium, The Protection of Groundwater in the Great Lakes Region. In the last decade, while groundwater management and protection have emerged as major environmental priorities among legislators and government agencies,² in reality the responses to the problem by key policymakers at all levels of government have been marginal. This is especially true in the Great Lakes region,³ which contains about twenty percent of the world's fresh water supply.⁴

Groundwater quality protection has played a minor role in the long history of domestic and binational efforts to control pollution that threatens the integrity of the Great Lakes.⁵ There is increasing recognition of the need to protect the region's groundwater resources as more information about contamination threats is collected and disseminated. The accumulating evidence has a clear lesson: the effective conservation and protection of the region's abundant groundwater reserves will require fundamental changes in the use of the resource. These changes will involve both the direct use of aquifers and the use of the overlying land, but

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1. See, e.g., *Legal Storytelling*, 87 MICH. L. REV. 2073 (1989).

2. The debates about different existing and proposed approaches to quality and quantity aquifer allocation are summarized in Murphy, *The Potential for Legislative Choice Concerning Groundwater and Aquifers*, 4 J. LAND USE & ENVTL. L. 23 (1989).

3. T. COLBORN, A. DAVIDSON, S. GREEN, R.A. HODGE, C.I. JACKSON & R. LIROFF, GREAT LAKES, GREAT LEGACY? 1-2 (1990) [hereinafter GREAT LAKES, GREAT LEGACY?].

4. WATER SCI. & TECH. BOARD, GREAT LAKES WATER LEVELS: SHORELINE DILEMMAS 13 (1989).

5. NATIONAL COUNCIL AND ROYAL SOCIETY OF CANADA, THE GREAT LAKES WATER QUALITY AGREEMENT: AN EVOLVING INSTRUMENT FOR ECOSYSTEM MANAGEMENT (1985).

how this can best be accomplished remains unclear. Either new institutions will have to be created or existing ones will have to be restructured.

Groundwater protection is perhaps the most difficult environmental issue to address. Initially, the resource was the stepchild of the environmental movement because the problem was literally out of sight and little incentive existed to develop the necessary subsurface flow models *until* federal environmental legislation required them. Groundwater protection was slighted in the initial concern with surface water pollution, air shed degradation and the restriction of pesticides that posed cancer risks. The discovery of abandoned hazardous waste sites and the pollution of rural water supplies focused the public's attention on groundwater quality, but the prevention of future contamination and the remediation of existing polluted supplies have proved very difficult. Many federal programs deal with an aspect of groundwater, but the sum of the specific federal and state programs does not add up to a coordinated and effective protection strategy. The conclusion of an important 1984 Office of Technology Assessment Report remains true today: "The programs vary in their approaches to protection of groundwater quality and generally do not take into account the potential of the sources to contribute to groundwater contamination."⁶

All environmental problems of the Great Lakes region present especially formidable challenges because of the size of the region and because of the complex structures of governance that exist within it. The use of the Great Lakes and associated resources is governed by four layers of government. Ownership and sovereignty are shared by two sovereigns, Canada and the United States. Within each jurisdiction, authority is divided between a central government and provincial or state governments. Finally, these units have delegated considerable power, especially over land use, to local authorities. All these levels of government have a role to play in the prevention of groundwater contamination, but there is no consensus about the balance among these levels.

The need for fresh thinking about groundwater resources is acute in the Great Lakes region because this region's groundwater has been historically treated by all users as an inexhaustible free good. Consumption for municipal, industrial, and agricultural uses has been virtually unlimited as has the use of aquifers as disposal sinks. The Great Lakes states and provinces have been fortunate, in the sense that they have not faced an acute crisis that has required the alteration of the status quo, unlike

6. OFFICE OF TECHNOLOGY ASSESSMENT, PROTECTING THE NATION'S GROUNDWATER FROM CONTAMINATION 7 (1984).

the coastal and western states. States as diverse as Arizona, Colorado, Florida, New Mexico, and New York have had to devise conservation strategies to avoid the premature exhaustion of comparatively limited fresh water supplies from mining and salt water intrusion.⁷ Indeed, because of the abundance of the resources in the region, many crucial hydrologic questions still remain unanswered and the extent of contamination problems remains unknown. Both contamination and mining are occurring, but the sheer volume and distribution of the resource and the diffuse nature of the users make it difficult to focus the necessary attention on the issue because there is generally a long temporal and spatial lag between a use of the resource and its adverse consequences.

The papers in this binational symposium were originally presented in September, 1989 at a workshop sponsored by the Program in Energy and Environmental Law of Chicago-Kent College of Law and funded by the Joyce Foundation of Chicago.⁸ Focusing on the neglected groundwater problem, this symposium is the first attempt to survey the laws and institutional experience with groundwater protection at all levels of government. A distinguished group of Canadian and United States scholars, lawyers and administrators have presented a state of the art summary of the hydrologic issues and the institutions now in place to address groundwater contamination. More importantly, they have identified the issues which all jurisdictional levels of Great Lakes governance will face in the near future. Together the papers seek to inform the policy debate about this important component of the Great Lakes commons.

Three broad themes run through the papers in this symposium. Each of the papers explicitly or implicitly raises questions about (1) the need to redefine property rights to conserve the resource from both mining and degradation, (2) the merits of adapting existing regulatory institutions to address the problem versus the merits of creating new ones, and (3) the correct context in which to address specific media contamination problems. The experts sharply debate these issues. For example, economists generally advocate the creation of more clearly defined property rights in groundwater resources to promote their efficient allocation and use, while many environmental lawyers seek to further blur the security of groundwater use rules by subjecting them to an environmental public trust doctrine.⁹ A tendency exists to equate new problems with

7. See D. TARLOCK, *LAW OF WATER RIGHTS AND RESOURCES*, chs. 4 & 6 (1989).

8. We would like to thank the Joyce Foundation of Chicago for providing the funding for this symposium as part of its support for the Program in Energy and Environmental Law.

9. E.g., Johnson, *Water Pollution and the Public Trust Doctrine*, 19 ENVTL. L. 485 (1989). See

new institutions, but others counsel that in this area, there is no need to devise new institutions¹⁰ so much as there is a need to infuse existing ones with a new perspective and mission. There is more agreement on the general principle that all media are linked, but again there is no consensus on how best to integrate a cross-media environmental problem strategy.¹¹

II. THE RESOURCE AND ITS THREATS

Much groundwater in the Great Lakes region flows in shallow aquifers, and thus contamination is much more likely to reach surface flows compared to water in deep aquifers. Hydrologists have a good understanding of deep aquifers, but the behavior of shallow aquifers is much less well understood because the rate of flow is unsteady.¹² Tony Hodge, a leading Canadian water policy analyst, has performed a major service for policymakers and scholars by drawing together what is known about groundwater use and contamination in a single paper, which both summarizes existing knowledge and suggests the policy consequences of the hydrology of the region. "There can be no avoiding the conclusion that the preferable course of action for ensuring groundwater protection is preventative strategies based on control of the pollution at source."¹³

Alfred Duda, Director of the Great Lakes Regional Office of the International Joint Commission, extends Mr. Hodge's analysis by suggesting that the problem may be worse than previously assumed.¹⁴ Dr. Duda identifies two major barriers to an accurate estimate of the problem. First, substantial data gaps exist because of years of relative institutional neglect and the patchwork of regulatory programs on both sides of the border.¹⁵ Second, in the United States almost all resources have been focused on the limited problem of Superfund cleanups to the exclusion of other contamination problems. Still, he concludes that enough fragmentary evidence exists to conclude that both nations must place equal em-

generally Rose, *Crystals and Mud in Property Law*, 40 STAN. L. REV. 577 (1988). Professor Rose distinguishes between clear and open-ended rules and observes that we call for the latter "after things have gone awry." *Id.* at 603.

10. See GREAT LAKES, GREAT LEGACY?, *supra* note 3, at xxii.

11. See Guruswamy, *Integrating Thoughtways: Re-Opening of the Environmental Mind?*, 1989 WIS. L. REV. 463.

12. WATER SCIENCE & TECHNOLOGY BD. COMMITTEE ON GROUND WATER MODELING ASSESSMENT, GROUND WATER MODELS: SCIENTIFIC AND REGULATORY APPLICATIONS 91 (1990).

13. Hodge, *Groundwater in the Great Lakes Basin: The Natural System, Use and Abuse, Policy Implications*, 65 CHI.-KENT L. REV. 439, 463 (1989).

14. Duda, *Groundwater Contamination in the Great Lakes Basin: Implications for Multimedia Remedial Action*, 65 CHI.-KENT L. REV. 465 (1989).

15. *Id.* at 470-72.

phasis on source control and down-gradient remediation. This recommendation carries great weight, but the problem of remediation requires careful consideration. Care must be taken to avoid the pitfalls of the current Superfund program, which mandates the expenditure of resources far in excess of any reasonable calculation of groundwater contamination prevention benefits.¹⁶

III. REGULATORY INSTITUTIONS

A. Binational

Canada and the United States have long cooperated to manage Great Lakes resources and to control sources of pollution through the International Joint Commission. Traditional studies of jurisdictional competence and political influence do much to explain the performance of these efforts to date, but they are not an accurate guide to future performance. Social scientists are increasingly applying new, more dynamic theories to understand regional resource management institutions. They have rejected static theories of inter-jurisdictional coordination and have tried to understand the interaction between centralized and decentralized institutions. One useful technique for understanding institutional behavior is the concept of actor system dynamics. This concept encompasses the public and private actors that have a stake in the resource, the interactions among the actors, and the laws that regulate these interactions.¹⁷ This technique allows the formulation of more coherent theories about how a general goal can be implemented in the complex institutional milieu of the Great Lakes. Professor George Francis of the University of Waterloo, Ontario is one of the leading students of binational pollution control institutions. He has pioneered the application of "socioecological principles" to the Great Lakes.¹⁸ The basic idea is the adoption of the overall goal of ecosystem redevelopment for the basin in order to convince the various actors "what society 'ought to avoid,' if it is to become and remain ecologically sustainable Socioecological principles would presumably guide discrete actor systems in such a way that they

16. No comprehensive accounting of Superfund exists, but existing studies are either critical of the administration of the program to date, e.g., J. ACTON, UNDERSTANDING SUPERFUND: A PROGRESS REPORT (1989), or cast doubt on the relationship between mandated remedies and the protection of public health and environmental values. See Lyons, *Deep Pockets and CERCLA: Should Superfund Liability Be Abolished?*, 6 STAN. ENVTL. L. J. 271 (1986-87). For a discussion and criticism of these studies see OFFICE OF TECHNOLOGY ASSESSMENT, COMING CLEAN: SUPERFUND PROBLEMS CAN BE SOLVED 25-26 (1989).

17. T. Burns, T. Baumgartner and P. Deville, *Man, Decision, Society: The Theory of Actor Systems Dynamics for Social Scientists*, 10 STUD. IN CYBERNETICS (1985).

18. See GREAT LAKES, GREAT LEGACY?, *supra* note 3, at 198.

become self-governing users of ecosystems that practice good 'husbandry' consistent with ecologically sustainable redevelopment."¹⁹

There has been a large number of binational environmental agreements relating to the Great Lakes resources. Many of these agreements were designed to serve the short-term political objectives of elected officials in the two nations rather than to develop innovative and effective government institutions. As Professor Francis earlier observed, "[f]rom an ecosystem perspective the governance for the Great Lakes is still inadequate. It remains fragmented and incomplete It also remains ineffective in achieving the 'virtual elimination of persistent toxic substances in the Great Lakes system'" ²⁰ However, a complex web of public and private institutions is developing in the region which push, however weakly, in the direction of a more pro-active ecosystems approach to the lakes. In his article Professor Francis focuses on the chief pollution agreement, the 1978 Great Lakes Water Quality Agreement, and its subsequent history.

Professor Edith Brown Weiss of Georgetown University asks the inevitable lawyer's question: How is the principle of ecosystem redevelopment to be implemented in light of the inevitable binational conflicts? There is a long history of the resolution of Canadian-United States water allocation disputes, but the experience with pollution is much more limited. Pollution is a much harder problem because it inevitably involves the surrender of national sovereignty over land use activities, which have traditionally been considered an exclusive sovereign prerogative. The International Joint Commission is the chief binational voice on pollution matters, but it has not been terribly effective in the past ten years because of neglect by both countries. Dispute resolution will not be easy for a reenergized IJC. The Boundary Waters Treaty of 1909 contains two cumbersome dispute resolution procedures that are unlikely to be used for water pollution disputes. Nonetheless, the binational pollution control efforts are pushing the International Joint Commission into examining the link between land use regulation and Great Lakes water quality. To address the disputes that will necessarily follow, Professor Brown Weiss extends Professor Francis' analysis by examining the range of existing and possible binational dispute resolution mechanisms.²¹

19. Francis, *Institutions and Ecosystem Redevelopment in Great Lakes America With Reference to Baltic Europe*, 17 *AMBIO: A JOURNAL OF THE HUMAN ENVIRONMENT* 106, 110 (1988).

20. Francis, *Flexible Governance*, discussion paper for the Workshop on Ecosystem Integrity, Great Lakes Science Advisory Board International Joint Commission and Board of Technical Experts Great Lakes Fishery Commission, 8 (Burlington, Ontario, June 14-16, 1988).

21. Brown Weiss, *New Directions for the Great Lakes Water Quality Agreement: A Commentary*, 65 *CHI.-KENT L. REV.* 375 (1989).

Professor Weiss draws on her extensive international law experience to survey the possible formal and informal methods now in use. In the past decade there has been a great deal of interest in the use of alternative dispute resolutions to resolve multi-party disputes.²² She suggests several methods to tap the pool of expertise in governmental and semi-governmental organizations in the two countries to mediate disputes after a relatively neutral fact-finding process. These procedures could be folded into formal dispute resolution procedures such as a Commission of Inquiry, into existing administrative or judicial tribunals,²³ or into arbitration proceedings. Finally, she suggests a binational ombudsman located within the International Joint Commission.

B. National

Groundwater regulation presents some problems in federalism theory. Over the past thirty years, responsibility for environmental quality has shifted from local units of government and from the states to the federal government. Federal legislation is premised on the assumption that environmental degradation is nationwide in scope and that nonuniform regulation would create competitive disadvantages among states. Whatever the case for uniform air and surface water standards is, the case for uniform groundwater standards is much weaker. Nondegradation came late to air and water pollution, and many environmentalists argue that this mistake should not be repeated with respect to groundwater. The problem is that nondegradation would economically be a highly irrational strategy. For this reason, unlike air, surface water pollution as well as hazardous waste treatment and disposal, as yet there is no national regulatory program for groundwater contamination. Instead we have, as many authors in this symposium document, a patchwork of statutes that deal with specific visible sources of contamination or specify the quality of public drinking water supplies. For the past five years, there has been a lively debate in Congress and in government agencies about the best approach to groundwater contamination. There is a widespread appreciation of the fact that the great differences in the nature of groundwater in different regions of the country precludes a simple technology-forcing solution modeled on the Clean Air and Water Acts. Beyond acceptance of this principle, there is a wide divergence of opinion about the appropriate balance between federal and state regulation.

22. G. BINGHAM, *RESOLVING ENVIRONMENTAL DISPUTES: A DECADE OF EXPERIENCE* (1986).

23. *E.g.*, *Her Majesty, The Queen in Right of the Province of Ontario v. City of Detroit*, 874 F.2d 332 (6th Cir. 1989).

Professor David Getches of the University of Colorado surveys the debates and outlines the different federal legislative solutions that have been proposed.²⁴ He brings a dual perspective to this issue as he is both a distinguished natural resources scholar and a former Director of the Colorado Department of Natural Resources. He recommends a national policy premised on the recognition that groundwater conservation is best determined at the state level. Professor Getches adapts the current theory of uniform federal standards by advocating that the federal government adopt a uniform but flexible national nondegradation goal as opposed to an inflexible binding standard. Under existing federal environmental laws, states are generally free to enact higher standards²⁵ but must accept federal standards as floors.

In contrast, under Professor Getches' proposal, groundwater use would not be frozen by the existing quality of the aquifer. States could deviate from nondegradation to implement a quantity or quality conservation program under conditions that do not offend federal law.²⁶ This strategy involves some risk because states might set relatively low margins of safety, and thus conservation experiments which produce unacceptable levels of contamination will be difficult to reverse. To minimize this risk, Professor Getches urges that the federal government finance both state research and regulatory programs. As states begin to address pollution caused by pesticide and fertilizer use, states will have to experiment with techniques such as effluent charges, land retirement, and water transfers. Federal financial assistance will make it easier for the states to deal with groundwater contamination as a land use problem.

Professor Getches' suggestions for a new federal-state program continue the traditional search for the optimum jurisdictional balance. In response, Professor Eric Freyfogle of the University of Illinois, Champaign-Urbana, breaks with this tradition and suggests that we abandon this search in favor of a more grass roots common-law and multi-jurisdictional attack on the problem that stresses local rather than state responses.²⁷ He concedes, however, that federal action will be necessary to reduce the products that cause contamination and to develop a new consumption ethic.

Professor Freyfogle's plea is typical of the frustration that many ob-

24. Getches, *Groundwater Quality Protection: Setting a National Goal for State and Federal Programs*, 65 CHI.-KENT L. REV. 387 (1989).

25. *E.g.*, Clean Air Act § 116, 42 U.S.C. 7416 (1982). *See Her Majesty, The Queen in Right*, 874 F.2d at 332.

26. Getches, *supra* note 24, at 421-22.

27. Freyfogle, *Allocating the Groundwater Pollution Tasks: A Comment*, 65 CHI.-KENT L. REV. 429 (1989).

servers feel after more than two decades of attempts at the rational management of environmental problems.²⁸ His comment reminds us of a point that is often lost in the technical and economic debates: resource use choices are fundamentally ethical problems.²⁹ This does not support the proposition that any action is better than no action; it merely underlines the dilemma that the environmental movement faces: science is necessary to inform resource choices, but it cannot dictate them.

Regulation of groundwater is even more complex in Canada. Andrew J. Roman of the Toronto Bar has contributed to a comprehensive survey of the hodgepodge of common-law precedents, federal and provincial legislation, and administrative guidance that make up the Canadian law of groundwater quality regulation. It is difficult for Canada to address an issue such as groundwater contamination because the provinces have a much greater autonomy over their natural resources than do the states of the United States.³⁰ In the United States, the commerce clause is a complete source of federal power to preempt state resource management power,³¹ whereas federal power in Canada is circumscribed. Canadian federalism *is* one of limited federal authority, so it is not surprising that Canada has no national groundwater contamination policy.

Canadian administrative law, despite its common British heritage, is difficult for Americans to understand because legislative directives and prohibitions are much more general. The distrust in the United States of administrative agencies, which has produced very specific statutory standards and regulatory deadlines, is much less evident in Canadian administrative law.

Faith in effective administration has costs as well as benefits, and Canada has begun to reassess its long reliance on enlightened discretion. Mr. Roman briefly reviews how the debate between general and specific regulation and weighs in on the side of greater specificity, in large part because the role of Crown corporations and municipal governments leaves "public servants vulnerable to a great deal of political and legal pressure from both public and private sector proponents of major projects."³² However, general directives can also be a benefit. In the

28. See S. HAYS & B. HAYS, *BEAUTY, HEALTH AND PERMANENCE: ENVIRONMENTAL POLITICS IN THE UNITED STATES 1955-85* (1987).

29. For a recent survey of the state of environmental ethics see *Developing an Environmental Ethos: Christopher Stone and Earth and Other Ethics*, 56 TENN. L. REV. 1 (1988).

30. The best introduction to Canadian water resource federalism issues is P.H. PEARSE, F. BERTRAND & J.W. MACLAREN, *CURRENTS OF CHANGE, FINAL REPORT, INQUIRY ON FEDERAL WATER POLICY 67-82* (1985).

31. *Hodel v. Virginia Surface Mining & Reclamation Ass'n, Inc.*, 452 U.S. 264, 275-83 (1981).

32. Roman & Ferris, *Regulation of Groundwater Contamination in Canada*, 65 CHI.-KENT L. REV. 519, 549 (1989).

United States, federal pesticide law is directed at denying access to the markets for pesticides that pose low level cancer risks. Much less attention is paid to the amount of "safe" pesticides applied to crops and lawns. Canada faces similar problems, but it does have a legal structure which seems to allow the provinces to address the issue of the amount of pesticide use under a general anti-pollution directive.

IV. CONTAMINATION AND COMMON-LAW PROPERTY RULES

Groundwater regulation occurs against a background of common-law property and liability rules. The broad objective of regulation must be to conserve the resource, and property rules should support this objective. Conservation has many meanings ranging from the strict economic determination of the optimum rate of depletion³³ to the ethical question of intergenerational obligations.³⁴ Given the limited state of conservation in the Great Lakes region, conservation need only be weakly defined as the limitation of the present use of the resource to preserve future options.

Conservation regulation generally involves the restriction of private choice. In the eastern United States, the right to use groundwater is tied to land ownership. Until recently, there were virtually no restraints on direct and indirect groundwater withdrawals or on the use of aquifers as sinks. Groundwater use was subject both to the reasonable use rule,³⁵ which imposed no effective limits on use, and to the common-law prohibition against the maintenance of a nuisance.³⁶ The Wisconsin Supreme Court went so far as to hold that groundwater could be pumped for malicious purposes.³⁷ The net result is that both groundwater quantity and quality have been, to varying degrees, allocated by capture rules. The first person to possess the resource obtains the right to consume or degrade the resource. Only recently have pollution control laws made it more difficult to use groundwater resources as sinks.

Capture rules are sensible rules for abundant resources but are wrong for scarce resources. Capture rules penalize conservation and un-

33. See generally, Williams, *Running Out: The Problem of Exhaustible Resources*, 7 J. LEGAL STUD. 165 (1978).

34. See E. BROWN WEISS, *FAIRNESS TO FUTURE GENERATIONS: INTERNATIONAL LAW, COMMON PATRIMONY, AND INTERGENERATIONAL EQUITY* (1989).

35. See Tarlock, *Supplemental Groundwater Irrigation Law: From Capture to Sharing*, 73 KY. L. J. 695 (1985).

36. E.g., *Wayne County v. Tennessee Solid Waste Disposal Control Bd.*, 756 S.W.2d 274, 283-84 (Tenn. Ct. App. 1988). See generally D. SELMI & K. MANASTER, *STATE ENVIRONMENTAL LAW*, ch. 3 (1989).

37. *Huber v. Merkel*, 117 Wis. 355, 94 N.W. 354 (1903). *Contra Gagnon v. French Lick Springs Hotel Co.*, 163 Ind. 687, 72 N.E. 849 (1904).

duly subordinate community interests to individual ones. Groundwater resources are common pool resources and rights must necessarily be correlative.³⁸ Rights can never be exclusive and the right to use is a function of the effect of the use on other users and society generally. Thus, ultimately, the right to exploit a resource for any purpose must be divorced from land ownership. During the conservation era, courts began to recognize that all common pool resources must be fairly shared among competing claimants and that the state can constitutionally limit exploitation.³⁹ However, historically, the Great Lakes states had little reason to take advantage of this power. In recent years both courts and legislatures have modified the common law. Michigan,⁴⁰ Ohio,⁴¹ and Wisconsin⁴² have adopted the Restatement (Second) of Torts section 858, which restricts the privilege of large pumpers to dewater smaller ones. Illinois has statutorily adopted the surface water reasonable use rule⁴³ and Minnesota has an extensive permit program.⁴⁴ Only Indiana has rejected section 858.⁴⁵

These cases should have a positive effect on the future of groundwater use control in the region because they provide the common-law support for the constitutionality of conservation legislation. They establish that groundwater is a shared resource; it is both shared among similarly situated property owners and between these owners and the state, which has an interest in the level of its use. Thus, the state may exercise its police power to define how the resource is to be shared both among private right holders and the public. The case for the constitutionality of regulatory legislation in the Great Lakes is an easy one because private users have not built up strong expectations of unlimited use compared to the expectations of users in some western states which are supported by decades of state refusals to conserve.⁴⁶

38. *See* *Ohio Oil Co. v. Indiana* (No. 1), 177 U.S. 190 (1900).

39. *Id.* at 190; *Lindsley v. Natural Carbonic Gas Co.*, 220 U.S. 61 (1911).

40. *Maerz v. United States Steel Corp.*, 116 Mich. App. 710, 323 N.W.2d 524 (1982).

41. *Cline v. American Aggregates Corp.*, 15 Ohio St. 3d 384, 474 N.E.2d 324 (1984).

42. *State v. Michels Pipeline Constr.*, 63 Wis. 2d 278, 217 N.W.2d 339 (1974).

43. ILL. REV. STAT. ch. 5, § 1606 (1987). *See* *Bridgman v. Sanitary Dist. of Decatur*, 164 Ill. App. 3d 287, 517 N.E.2d 309 (1987).

44. MINN. STAT. ANN. § 105.416 (West, 1990).

45. *Wiggins v. Brazil Coal and Clay Corp.*, 440 N.E.2d 495 (Ind. Ct. App. 1982), *vacated*, 452 N.E.2d 958 (Ind. 1983).

46. Claimants will find it difficult to claim the legitimate investment backed expectations necessary to support a taking claim. *Keystone Bituminous Coal Co. v. DeBenedictus*, 480 U.S. 470 (1987). *See generally* Laitos, *Water Rights, Clean Water Act Section 404 Permitting, and the Takings Clause*, 60 U. COLO. L. REV. 901 (1989); Tarlock, *supra* note 35, at 721.

V. GROUNDWATER CONTAMINATION PREVENTION = LAND USE CONTROLS

Many sources of groundwater contamination come from land use activities such as agricultural operations, construction, and storm runoff from urban areas. Contaminants leach into the soils. Since 1972, federal and state water pollution control programs have recognized this source of pollution by trying to avoid it. The Clean Water Act divides pollutants into point and nonpoint sources. Point sources are subject to technology-forcing requirements. Conversely, nonpoint sources are subjected to a best management practices standard implemented by formalistic state planning programs and the numerous varied state and local land use and drainage control laws.⁴⁷

Professor Daniel R. Mandelker, Stampler Professor of Law, Washington University and the foremost American expert on land use controls, examines the question "Controlling Nonpoint Source Water Pollution: Can It Be Done?"⁴⁸ The answer is not encouraging because the jurisdiction with the authority to regulate has the least incentive to regulate. As he notes, few local governments are likely to exercise their powers to regulate nonpoint sources because "nonpoint pollution is a classic environmental externality that a local government can export outside its jurisdiction."⁴⁹ Congress has, for sound reasons, consistently refused to preempt local land use authority, but Professor Mandelker concludes that Congress has not found the right balance between federal incentives and federal coercion to achieve an effective response to the problem.⁵⁰

Nonpoint sources of pollution can rationally be divided between agricultural and urban because the regulatory institutions are often different. Pollution caused by agricultural drainage is finally emerging as a major environmental issue.⁵¹ Professor John Davidson of the University of South Dakota School of Law brings a different perspective to the problem of agricultural nonpoint source control pollution. As Professor Davidson observes, much of this pollution is not the result of hundreds of

47. See Davidson, *Thinking About Nonpoint Sources of Water Pollution and South Dakota Agriculture*, 34 S.D.L. REV. 20 (1989) for a discussion of the difference between point and nonpoint source controls.

48. Mandelker, *Controlling Nonpoint Source Water Pollution: Can It Be Done?*, 65 CHI.-KENT L. REV. 479 (1989).

49. *Id.* at 489.

50. *Id.* at 501.

51. See NATIONAL RESEARCH COUNCIL, COMMITTEE ON IRRIGATION-INDUCED WATER QUALITY PROBLEMS, WATER SCIENCE AND TECHNOLOGY BD., COMMISSION ON PHYSICAL SCIENCES, MATHEMATICS, AND RESOURCES, IRRIGATION-INDUCED WATER QUALITY PROBLEMS: WHAT CAN BE LEARNED FROM THE SAN JOAQUIN VALLEY EXPERIENCE (1989).

discharges from individual farms, but has been collected by water management districts. All states have a maze of special purpose water soil and water conservation districts which have been authorized to promote land and water development. The mission of these districts must be re-oriented to include pollution control. Professor Davidson argues that, in the Midwest, soil conservation districts are the logical choice for the new role.

VI. POSTSCRIPT: A WORD OF THANKS

Any cutting edge discussion of environmental and natural resources issues must draw its participants from those with first hand knowledge of both the problems and the current state of scientific research and policy thinking. This condition poses special problems for a law review staff accustomed to the more well-defined world of cases, statutes, law reviews and treatises. Many of the references in this symposium are to sources not easily found in either law libraries or general purpose university libraries. Editor-in-Chief Donna Lach and her extremely hard working and dedicated staff devoted a great deal of time to ensuring the accuracy of all the sources cited. However, in some cases it was impossible to obtain complete copies of all references. The symposium authors are responsible for the accuracy of all nonstandard references and specific queries should be addressed to the individual authors.

