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Robert I. Reis

University at Buffalo School of Law

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Geographic Information Systems and Analysis: *The Future of the Public Trust Doctrine*

By Robert I. Reis

Introduction

The future of the Public Trust Doctrine in natural resource law lies in the enhanced data made available through the information and analysis capabilities provided by Geographic Information Systems ("GIS"). The Public Trust Doctrine is a common law judicial construct predicated on the relationship between the sovereign state as trustee and the citizen public as beneficiary regarding natural resources held by the state in its sovereign capacity.¹ Its intended function is to ensure the proper protection and management of environmental values fundamental to society and future generations.²

The natural resources comprising the subject matter of the Public Trust are inherently spatial and are referenced by location on the earth's surface. These resources have both physical and substantive parameters. Both sets of parameters determine the spatial boundaries of the trust and its location on the earth's surface. Of fundamental note is that the Public Trust Doctrine is both conceptually flexible and while referenced spatially, is not spatially limited. The corpus of the Public Trust is substantively defined by the relationship of the sovereign to the public beneficiaries. Both Public Trust resources and boundaries are continually redefined as the relationship between the sovereign and the beneficiary public changes.³ The Public Trust includes navigable waters, non-navigable tributaries and adjacent land areas within the spatial parameters of public trust areas.⁴ The conceptual boundaries of the Public Trust Doctrine in American

jurisprudence need to be distinguished from those prevalent in other resource trusts, such as those designating the Adirondack Park, school or park areas which have fixed boundaries associated with their creation, enlargement, management and administration under constitutional or legislative enactments.⁵

The societal interests which form a part of the conceptual parameters of the Public Trust Doctrine are distinct from the spatially identifiable components of public trust physical resources. Increasingly, the Public Trust Doctrine has become defined by resources determined doctrinally to be necessary to the sovereign responsibility of the state to the beneficiary public.⁶ The application of the Public Trust Doctrine depends upon known data about both the geographic area and special characteristics associated therewith.

GIS utilize spatial data that has historically been preserved in the form of maps, cartographic drawings and detailed surveys. The geographic recording imperative has been reflected in the surveys of the United States during the process of acquiring additional territories, as well as the refinement of the hydrographic and topographic maps of the United State Coast and Geodetic Survey and the remote data collections undertaken in the mid-twentieth century as new interests and technological capabilities presented themselves. The result is a new synergy between the need for information and information fueling additional quests for knowledge.⁷

Technology in data gathering, storage and retrieval has created an information resource similar in proportions to the growth in and public awareness of the Public Trust Doctrine. A computer based digital map with the capacity to receive, record, store and retrieve spatially referenced data permits data analysis of revolutionary proportion. Relationships heretofore not imagined in breadth and detail will be the subject of future reference and analysis.

Robert I. Reis is a Professor of Law at the State University of New York at Buffalo and a co-leader of the NCGIA Research Initiative on Law, Information Policy, and Spatial Databases. This research is an outgrowth of Research Initiative #16, "Law, Information Policy and Spatial Databases", of the National Center for Geographic Information and Analysis, supported by a grant from the National Science Foundation (SBR 88-10971). Support by NSF is gratefully acknowledged. This article is part of a larger work in progress regarding the public trust doctrine and geographic information systems. A special note of acknowledgement is due Dean Barry Boyer for his continuing contribution to the development of these ideas.

GIS represent tools of information acquisition, storage and retrieval. It has been estimated that somewhere between seventy and ninety percent of government and private sector information and decision making has a geographic or spatial point of reference.⁸ Spatial data associated with points on the earth's surface which have been recorded historically as maps can now be digitalized as part of a Geographic Information System structured to facilitate extended analysis. Maps have historically been the geographic information foundations basis for evolving spatial data and decision making but have permitted limited analysis because of the inherent limitations on thematic and non-geographic data that could be indexed or reflected therein.⁹

The potential of the development of the Public Trust Doctrine and the advent of the GIS lies in the synergy of the two. That is to say, the Public Trust Doctrine and GIS have a relationship that feeds one upon the other – the Public Trust Doctrine is dependent on and requires basic resource information, and a GIS has the capacity to record and retrieve information concerning the subject matter of the public trust. As the public trust secures information in breadth and detail, the scope of the Public Trust Doctrine and the duties of the sovereign state will expand accordingly. Likewise, as the ability of the beneficiary public to monitor the sovereign's public trust activities increases, the sovereign's duties under the Public Trust Doctrine will indicate the necessity for state support of data bases specifically for Public Trust Doctrine purposes. Thus, the synergy – the more information available for the public trust, the greater the duty and responsibility for decision making the state will have to the public beneficiaries, the more the Public Trust Doctrine will grow and the greater the likelihood that GIS data bases will be driven by users of the Public Trust Doctrine.

This article highlights the relationship of the Public Trust Doctrine to the information potential of a maturing GIS. The premise of this article is that such enhanced information will cause changes in the basic definition and application of the Public Trust Doctrine and generate a demand for even further information to fulfill newly conceived obligations and opportunities under the Public Trust Doctrine.¹⁰

Geographic Information Systems and Analysis

A GIS is a spatial record of the Earth's surface and features in a digital format which permits the entry of both spatial and non-spatial data that can be referenced to physical coordinates on the Earth's surface.¹¹ It is this ability to record geographic and spatial data in a digital form that is the catalyst for a quantitative and qualitative revolution in information storage, retrieval and analysis.¹¹ Graphic data has been defined as follows:

Graphic data are computerized descriptions of map features and may include coordinates, symbols, lines or points that define specific cartographic elements on a map. A GIS uses graphic data to display a map or cartographic picture on a computer screen. Graphic data employs six types of graphic elements to depict map features and annotations: points, lines, areas, grid cells, pixels and symbols.¹²

Thus, a GIS permits spatial data recording of observable earth features and the physical relationship of these features to one another. The collection of spatial data is dependent on present and future technological developments. As technology enhances the ability to acquire data, as well as the resolution and accuracy of such data, the use of GIS will grow accordingly.¹³

The spatial attributes of the GIS are the foundation upon which layers of additional spatial and non-spatial data can be and are referenced in the Geographic Information Systems data base. Non-graphic data is linked to geographic locations as layers or overlays. Non-spatial or non-graphic data has been described as follows:

Non-graphic data describe the characteristics of the graphic images or other qualities and relationships that occur at specific geographic locations. Non-graphic data is often called textual or attribute data. This data is linked to geographic locations through a system of identifiers and is often managed and stored separately from graphic data due to their differing characteristics. A GIS data base has four types of non-graphic data: attributes, geographically referenced data, geographic indexes and spatial relationships.¹²

Thematic data can be related to unique legal, economic, political and technical issues. Spatial thematic data can consist of public infrastructure information, such as roads, sewers, water supplies, ecosystems and natural features of forest areas,¹⁴ wetlands, rivers, watersheds¹⁵ and environmental features of toxic and

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hazardous activity¹⁶ or storage areas.¹⁷ Non-spatial data addressing spatially related land use and social issues including, but not limited to, Urban Growth and Land Use Planning,¹⁸ Conservation Districts,¹⁹ Taxation and Assessment, Departments of Health, Adirondack Park, Transportation, Parks and Recreation, Offices of Emergency Management and so forth.²⁰

The inclusion of spatial and thematic references in a unified data base forms a geographic reference upon which to further construct and access an almost unlimited variety of non-spatial digital data capable of being keyed or indexed to a geographic fixed location. A wide range of social and economic potential for GIS becomes apparent. A rudimentary and partial illustration of spatial and non-spatial data that can be referenced in a GIS includes, but is not limited to the following:

- (a) Conventional Coordinates and Map Data
- (b) Elevations
- (c) Spatial Features
 - (1) Hydrographic
 - (2) Topographic
- (d) Thematic Features
 - (1) Natural Resource Features:
 - (a) Vegetation and Forest
 - (b) Soil Classification
 - (c) Background Environmental Inventory
 - (d) Wildlife Inventory
 - (e) Water Quality (Actual and Classification)
 - (f) Air Quality (Actual and Classification)
 - (g) Watershed
 - (h) Prevailing Wind Speeds and Direction
 - (2) Non-Resource Features:
 - (a) Transportation
 - (b) Land Use
 - (c) Taxation and Valuation
 - (d) Domestic and Commercial Water Use
 - (e) Domestic and Commercial Waste Generation
 - (f) Site Specific Commercial and Residential
 - (g) Agriculture
 - (1) Pesticides
 - (2) Fertilizer
 - (3) Spatial Designation of Functional Relationships
 - (a) Traffic Movement
 - (b) Population Recreational Demands
 - (c) Wildlife Migratory or Use Patterns

- (d) Fisheries Spawning Areas
 - (e) Natural Resources and Population Risk Assessment
 - (f) Cumulative Impact Data and Classifications
 - (g) Land Acquisition
 - (h) Conservation Districts
 - (i) Recreation and Special Uses
- (4) Non-spatial data with relationships to and which can be keyed to spatial data

The Public Trust Doctrine Continuum

The Public Trust has been defined by reference to water related resources adjacent to tidal and navigable waters. This is most likely because under English Common Law navigable waters were "common highways for the public."²¹ The public trust cases in America continued to expand the doctrine to reflect the needs of preserving America's "common highways" for transportation, as well as fishing and land reclamation.²² American cases have thus held that title to lands underlying tidal and/or navigable waters and the use of said waters are held by the State in its sovereign capacity as trustee for the benefit of the citizens of the State who have the right to use the waters and adjacent lands for navigation and to "fish, hunt, or bathe"²³ The public's right to the use of tidelands has not been limited to the tidelands underlying navigable waters, but has included lands treated as part of the trust commons where the tidewaters have been navigable in fact, as well as in law.²⁴

The Public Trust Doctrine's continued expansion based on generalized notions of sovereign responsibility, including natural resources beyond those associated with tidal or navigable waters,²⁵ clearly demonstrates that the public trust concept is not static²⁶ but is dynamic and subject to change.²⁷ The breadth of both the spatial and conceptual parameters of the Public Trust Doctrine are expanding.²⁸ The public trust includes the natural, scenic, historic and aesthetic value of the environment.²⁹ The court in *State v. Sorensen*,³⁰ noted that the Public Trust Doctrine has drastically evolved. The Doctrine has

"emerged from the watery depths [of navigable waterways] to embrace the dry sand area of a beach, rural parklands, a historic battlefield, wildlife, archaeological remains, and even a downtown area."³¹

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It is this critical capacity for change that has led to the judicial recognition of the public trust as having vitality and flexibility.³²

The Public Trust Doctrine not only grows to include additional resources and interests as a part of the corpus of the Public Trust,³³ but also acts as a limitation on permitted government action and encroachment regarding public trust resources.³⁴ The fundamental premise underlying this dual dynamic lies in the definition of the Public Trust Doctrine as it applies to “. . . things too important to be owned.”³⁵

Much of the above can be seen in the broad historical line and range³⁶ of interests and resources included within the Public Trust Doctrine. That progression can be partially outlined as follows:

- (a) Tidal
- (b) Navigable
 - (1) Non-navigable tributaries
 - (2) Ground Water Contiguous to Public Trust Doctrine covered by Public Trust Doctrine
- (c) Shoreline and Altered Uplands
 - (1) Accretion
 - (2) Reclaimed Land
 - (3) Beach
 - (4) Access
 - (5) Fisheries
 - (6) Minerals
 - (7) Forests, Trees and Vegetation
 - (8) Shell Fisheries
 - (9) Dredged Materials (sand and gravel)
 - (10) Watersheds and Waterbodies
 - Lake or Waterfill Lands
 - (11) Groundwater
 - (12) Wildlife and Natural Resources
 - (13) Wilderness Area
 - (14) State water resources (appropriation doctrine)
 - (a) Drinking Water
 - (b) Appropriation
 - (15) Wilderness, Habitat and Ecological Areas
 - (16) Water Quality Pollution Control
 - (a) Pollution Claims and Duty
 - (b) Pollution Expanded to New Waters
 - (17) Aquaculture
 - (18) Archeological Sites and Fossil Beds
 - (19) Park Lands and Pubic Lands

- (20) Air Quality
- (21) General Environmental Issues
- (22) All Natural Resources
- (23) Fresh Water Wetlands
- (24) Wetlands

The functional breadth of the Public Trust Doctrine and the potential relationship of GIS to Public Trust decision making lies in categories specifically reflecting political, environmental, social and economic function, such as those historically developed to include:

- (a) Recreational Use of Beaches and Foreshore
- (b) Recreational Use of Waters
- (c) Ancillary Support
- (d) Flood Control
- (e) Mixed Use - Public/Private
 - (1) Management and Regulation
 - (a) Reserved Power to Revoke
 - (b) Comprehensive Resource Management
 - (c) Choice Between Competing Uses
 - (2) Short and Long Term Planning
 - (3) Scarcity of Remaining Resources
 - (4) Long Range Implications of Short Range Decisions
 - (5) Policy of Flexibility - Moratorium

The Juxtaposition - GIS and Analysis - The Public Trust Doctrine - A Glimpse of the Future

Would the availability of data in a GIS have impacted historical definitions of the Public Trust and will such data availability affect the future course of developments in the public trust arena? Some historically perceived limitations on Public Trust Doctrinal development and application were based on natural resource, social and economic values of the time. The availability of data in a format permitting appropriate analysis certainly affected initial classification subject to the Public Trust. Subsequent analysis and decision making regarding issues of management, regulation under the police power and the ultimate disposition of Public Trust lands and interests by alienation in the public interest were likewise affected. Clearly, the existing state of data impacted the legislative decisions in many notorious cases, such as *Illinois* and *Steeplechase*.³⁷ Would the legislature have permitted the alienation of these interests had they been capable of making a judgement informed by the

relationships and facts capable of recovery under a GIS? How would contemporary physical boundaries of Public Trust Doctrine resources appear had the ambulatory boundary of tidelands or the location of the high water, low water or MHWL been identified?

The spatial parameter of the Public Trust Doctrine, the nature and kind of included interests, the designation of beneficiaries and beneficial interest, and the appropriate sovereign control of these interests depend on information and analysis. Within this context, it may be seen that the Public Trust Doctrine is data dependant and requires:

- (a) Knowledge of Physical Boundaries
- (b) Knowledge of Physical Characteristics of Resources within Public Trust Doctrine Bounds
- (c) Knowledge and Understanding of Relationships between or among Public Trust Doctrine resources and competing uses, beneficiaries, and resources:
 - (1) Benefits
 - (2) Burdens
 - (3) Uses
 - (4) Demands
 - (5) Competition
 - (6) Incidental Resources
 - (7) Environment
 - (8) Water and Air Quality
 - (9) Population Growth
 - (10) Wildlife Inventories
 - (11) Movement and Sources of Contaminants (i.e., Leaching and toxic materials)

Data dependency also extends to other functions required of the sovereign's trust duties. The GIS will provide a data framework for State Management and Regulation of Public Trust Doctrine resources as follows:

- (a) Management - identification of interests and resources subject to the Public Trust Doctrine
- (b) Regulation - identification and justification of regulatory parameters for resources which impact public trust interests, as well as providing a basis for differentiation between Public Trust Doctrine management and regulation as follows:
 - (1) Optimization of the extent to which judicial review is greater regarding Public Trust Doctrine issues, as distinguished from regulation and administrative law issues;

- (2) Appreciation of the delegation differentiation between Public Trust Doctrine powers and duties, as distinguished from regulatory and administrative law powers;
- (3) Factoring the difference between Public Trust Doctrine relationships to constitutional takings questions, as distinguished from regulatory and police power limitations under traditional constitutional analysis;
- (4) Judicial modification of the fiduciary responsibility of the state when subject to standards imposed by data accessibility, as well as modification of the standing for individual beneficiary challenge to trustee actions.

GIS and analysis can enhance governmental ability to set short and long term goals and objectives. It may also help establish decision making patterns and criteria consistent with evolving goals and objectives necessary to address developmental pressures such as competing public and private demands for direct or indirect use of or impact on the resources (remember: effluent is the externalization of a process of production, distribution, consumption, disposal of some good, service or value in society).

As previously noted, much of this data has some limited availability, albeit imprecise and static, in the traditional map and thematic or non-geographic data.³⁸ It is the changed ability to understand these "geo-doctrinal" relationships and synergies that impacts state jurisdiction, fiduciary duties, services and beneficiaries.

The Future - Selected and Threshold Observations

GIS will permit a review of doctrinal categories further adding to the historical flexibility of the Public Trust Doctrine. Future cases will further demonstrate that the Public Trust Doctrine is not static as the doctrine expands to include new resources, geographic areas and uses. Likewise, the required and available information will affect management, regulation and analytical judgments regarding constitutional and legislative expansion of the Public Trust Doctrine. This has the potential of leading to a codification of limitations of legislative and administrative ability to modify or undermine Public Trust Doctrine duties and coverage.

GIS and analysis will permit continuing review of present and historic acts of alienation and commitment of Public Trust resource uses. This can obtain significance in the context of continuing judicial jurisdiction over public trust resources where precedent supports the inalienability of the underlying public interest in resources impressed with the Public Trust. Thus, many states have clearly held that the public interest in trust resources are not extinguished by historical conveyances, but are subject to the jurisdiction of the courts and challenge.³⁹ More specifically, GIS permit judicial determinations regarding the impairment of the public interest as a measure of the limitation on sovereign authority for alienation of public trust resources.⁴⁰

GIS and analysis will greatly enhance public interest access to the necessary facts and data to secure judicial review. GIS will provide both facts and data to permit detailed judicial review of legislative and administrative judgement regarding public trust resources. Included will be the ability under a GIS to demonstrate actual or probable impacts and relationships regarding public trust or other public and private interests. Certainly, to the extent standing is accorded private individual beneficiaries, the availability of information regarding the public trust will permit reasonable third party (beneficiary) access to the courts.

New enforcement patterns will emerge regarding the Public Trust Doctrine. In New Jersey, for example, the legislature established the Office of Public Advocate, distinct from the State's Attorney General, to oversee Public Trust resources. At issue before the court was whether the Public Advocate had standing regarding the public beneficiaries interest in Public Trust resources, even though the Attorney General was also a party to the case. Did the Public Advocate represent a different and distinct interest from that of the Attorney General?⁴¹ In the answer to this question lies direction for the future of the Public Trust Doctrine in America.

In the final analysis, there will be a growing recognition that GIS and analysis is a sophisticated tool to facilitate continued conceptual development of the Public Trust Doctrine into the next century mandating state support for GIS as part of the sovereign's fiduciary responsibility to the public beneficiaries.

References

1. See generally Joseph L. Sax, *The Public Trust Doctrine in Natural Resources Law, Effective Judicial Intervention*, 68 MICH. L. REV. 471 (1970); Patrick Deveney, *Jus Publicum and the Public Trust: An Historical Analysis*, 1 SEA GRANT L.J. 13 (1976); Sanford N. Berland, *Toward the True Meaning of the Public Trust*, 1 SEA GRANT L. J. 83 (1976). See also Illinois Cent. R.R. v. Illinois, 146 U.S. 387 (1892); *Coxe v. State*, 39 N.E. 400 (N.Y. 1895); *People v. Adirondack Ry. Co.*, 54 N.E. 689, 692 (N.Y. 1899) in which the New York State Court of Appeals stated:

The . . . police power and the power of eminent domain, underlie the Constitution and rest upon necessity, because there can be no effective government without them. They are not conferred by the Constitution, but exist because the state exists, and they are essential to its existence. They are not rights reserved, but rights inherent in the state as sovereign. While they may be limited and regulated by the Constitution, they exist independently of it, as a necessary attribute of sovereignty. They belong to the state because it is sovereign, and they are a necessity of government. The state cannot surrender them, because it cannot surrender a sovereign power. It cannot be a state without them. They are as enduring and indestructible as the state itself.

2. See, e.g., Sax *supra* note 1. This is more particularly indicated by limitations on the right of the sovereign to alienate trust lands and property: *McDowell v. Alaska*, 785 P.2d 1 (Alaska 1989).

3. When the predominant commons were the vast reserves of the tidal and navigable waters of the oceans and inland seas, the public trust focused on the geographic expanse bounded by the shorelines of the seas. The unique circumstances in America caused a shift in the focus of American public trust jurisprudence including resources and spatial interests not previously perceived as part of the public trust in civil or common law jurisdictions. See Berland, *supra* note 1, at 83.

4. See generally *Phillips Petroleum Co. v. Mississippi*, 484 U.S. 469 (1988).

5. Regarding the nature of the "fixed" boundaries of the Constitutionally protected trust in the Adirondack Park, see N.Y. ENVTL. CONSERV. LAW § 9-0101 (1984). For judicial and scholarly interpretation of the meaning of the Adirondack trust, see generally, *People v. Adirondack Ry. Co.*, 54 N.E. 689 (N.Y. 1899); *Association for Protection of Adirondacks v. MacDonald*, 170 N.E. 902 (N.Y. 1930); Arthur V. Savage and Joseph Sierchio, *The Adirondack Park Agency Act: A Regional Land Use Land Confronts "The Taking Issue,"* 40 ALB. L. REV. 447 (1976).

6. See, e.g., Sax, *supra* note 1.

7. See generally Symposium, *Law and Information Policy for Spatial Databases*, 35 JURIMETRICS J. 377 (1995).

8. See, e.g., Ron J. Aschenbach, *Geographic Information Systems as a Decision Making Tool*, 52 OHIO ST. L.J. 351 (1991).

9. See, e.g., Aschenbach *supra* note 8; California, *Report of the Geographic Information Task Force* (April 1993); Christine M. Hilla, *The Revolution of Geographic Information Systems in Land Use and Environmental Planning in New York State*, 6 ENVTL. L. IN NEW YORK 3 (Matthew Bender, March 1995).

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10. There are implicit questions inherent in these materials concerning the implications of the Freedom of Information Act (FOIA) and increased public access to information. An vast amount of spatial data will be made available for public consumption after decades of military and governmental demographic and resource information gathering. Likewise, there are significant questions beyond those casually noted regarding the relationship of the judiciary in the definition as well as enforcement of the Public Trust against the Sovereign state. The courts have continued to exert an independent role in permitting enforcement of the Public Trust against the Sovereign State as trustee for the beneficiary public. One premise of this paper is that enforcement or review of the public's beneficial interest by the courts is based on the breadth, depth and availability of information contained in Geographic Information Systems and the potential for analysis thereunder. *See generally* Symposium, *supra* note 7.
11. *See generally* Harlan J. Onsrud and Robert I. Reis, *Law and Information Policy for Spatial Databases: A Research Agenda*, 35 JURIMETRICS J. 377-393 (1995). *See also*, Hilla, *supra* note 9, at 41.
12. Hilla, *supra* note 9, at 41.
13. *See, e.g.*, Joanne I. Gabrynowicz, *The Global Land 1-KM AVHRR Project: An Emerging Model for Earth Observations Institutions*, 61 PHOTOGRAMMETRIC ENGINEERING AND REMOTE SENSING 153 (Feb. 1995).
14. V. Alaric Sample, *Forest Service Planning: Assessing Cumulative Environmental Impacts: The Case of National Forest Planning*, 21 ENVTL. L. 839 (1991).
15. NATURAL RESOURCES LAW CENTER, UNIVERSITY OF COLORADO SCHOOL OF LAW, *Point/Counterpoint: Long's Peak Report: Reforming National Water Policy: America's Waters: A New Era of Sustainability Report of the Long's Peak Working Group on National Water Policy*, 24 ENVTL. L. 125 (1994).
16. Charles J. Walsh and Phillip A. Bramson, *Symposium: ECRA: Triggering the Internalization of the Social Costs of Hazardous Wastes*, 1990 COLUM. BUS. L. REV. 415 (1990); Bradford C. Mank, *Preventing Bhopal: "Dead Zones" and Toxic Death Risk Index Taxes.*, 53 OHIO ST. L.J. 761 (1992).
17. Rodolfo Mata, *Hazardous Waste Facilities and Environmental Equity: A Proposed Siting Model*, 13 VA. ENVTL. L.J. 375 (1994).
18. *See, e.g.*, Keith W. Dearborn and Ann M. Gygi, *Planner's Panacea or Pandora's Box: A Realistic Assessment of the Role of Urban Growth Areas in Achieving Growth Management Goals*, 16 U. PUGET SOUND L. REV. 975 (1993); Nancy E. Anderson, *Notes From the Front Line*, 21 FORDHAM URB. L.J. 757 (1994).
19. Madalyn Purcell, *Residential Use of Hawaii's Conservation District*, 14 HAWAII L. REV. 633 (1992).
20. Hilla, *supra* note 9 at 41-43; Robert G. Boehmer, *Mortgage Discrimination: Paperwork and Prohibitions Prove Insufficient-Is it time for Simplification and Incentives?*, 21 HOFSTRA L. REV. 603 (1993).
21. Phillips Petroleum Co. v. Mississippi, 484 U.S. 469, 486 (1988) (O'Connor, J., Dissenting). "The public trust doctrine has its roots in English common law. Traditionally, all navigable waterways in England were by law common highways for the public." *Id.*
22. *Id.* at 487-88.
23. Phillips Petroleum Co., 484 U.S. at 484.
24. *Id.* at 483.
25. *See West Indian Co. v. Virgin Islands*, 643 F. Supp. 869, 875 (D. V.I.1986).
26. *See Cinque Bambini Pshp. v. State*, 491 So. 2d 508 (Miss. 1986).
27. *See Kootenai Envtl. Alliance v. Panhandle Yacht Club, Inc.*, 671 P.2d 1085 (Idaho 1983); *People ex rel. Scott v. Chicago Park Dist.*, 360 N.E.2d 773 (Ill. 1976).
28. *See Franco-American Charolaise v. Oklahoma Water Resources Bd.*, 855 P.2d 568 (Okla. 1990).
29. *See Commonwealth v. National Gettysburg Battlefield Tower, Inc.*, 311 A.2d 588 (Pa. 1973).
30. *State v. Sorensen*, 436 N.W.2d 358 (Iowa 1989).
31. *Id.* at 361 (quoting Richard J. Lazarus, *Changing Conceptions of Property and Sovereignty in Natural Resources: Questioning the Public Trust Doctrine*, 71 IOWA L. REV. 631, 649 (1986)).
32. *See State v. Central Vermont Ry.*, 571 A.2d 1128 (Vt. 1989) *cert. denied*, 495 U.S. 931 (1990).
33. *See National Audubon Soc'y. v. Superior Court of Alpine County*, 658 P.2d 709 (Cal. 1983) *cert. denied sub nom. City of Los Angeles Dept. of Water and Power v. National Audubon Soc'y*, 464 U.S. 977 (1983). *McDowell v. State*, 785 P.2d 1 (Alaska 1989).
34. *See Kootenai Envtl. Alliance, supra* note 27.
35. *See Sierra Club v. Kiawah Resort Assocs.*, 456 S.E.2d 397, 402 (S.C. 1995).
36. *In re Am. Waste & Pollution Control Co.*, 642 So. 2d 1258 (La. 1994).
37. *Illinois Cent. R.R. Co. v. Illinois*, 146 U.S. 387 (1892); *People v. Steeplechase Park Co.*, 113 N.E. 521 (N.Y. 1916).
38. Leonard R. Jaffe, Note, *State Citizen Rights Respecting Greatwater Resource Allocation: From Rome to New Jersey*, 25 RUTGERS L. REV. 571 (1971); George Sanford Parsons, *Public and Private Rights in the Foreshore*, 22 COLUM. L. REV. 706 (1922).
39. *See generally* Michael P. Conzen, *The Inherent Power in Mapping Ownership: The Cadastral Map in the Service of the State: A History of Property Mapping*, 92 MICH. L. REV. 1637 (1994).
40. *See, e.g.*, *Illinois Cent. R.R. Co. v. Illinois*, 146 U.S. 387 (1892) (conveyance of a major portion of the Chicago waterfront); *Coxe v. State of New York*, 39 N.E. 400 (N.Y. 1895); *Long Sault Dev. Corp. v. Kennedy*, 105 N.E. 849 (N.Y. 1914) (attempt to give control over navigation on the Saint Lawrence to a private corporation); *Marba Sea Bay Corp. v. Clinton Realty Corp.*, 5 N.E.2d 824 (N.Y. 1936) (considering the grant of eleven miles of foreshore which constitutes entire ocean-front of Queens, New York).
41. *Van Ness v. Borough of Deal*, 352 A.2d 599, 605 (N.J. Sup. Ct. Ch. Div. 1975) (holding that the Public Advocate position is not duplicative of the Attorney General position and is therefore constitutional), *rev'd on other grounds*, 367 A. 2d 1191 (N.J. Super. Ct. App. Div. 1976), *rev'd on other grounds*, 393 A.2d 571 (N.J. 1978).