Wisconsin Coastal Zone Management Program

FEASIBILITY OF COMPENSATION FOR MAN-INDUCED SHORE EROSION

Part I:

Summary Report

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WISCONSIN COASTAL MANAGEMENT

FEASIBILITY OF COMPENSATION FOR MAN-INDUCED SHORE EROSION:

SUMMARY REPORT

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Preface

This is the first in a series of three reports that consider the feasibility of compensation for man-induced shore erosion on the Wisconsin coast of the Great Lakes.

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The opinions, conclusions or recommendations expressed in this report series do not necessarily reflect the views of the Wisconsin Coastal Management Program.

Feasibility of Compensation for Man-Induced Shore Erosion: Summary Report

I. The General Problem

Millions of dollars in damages from Great Lakes shore erosion occur during years of high water levels. As a result of these losses, shore property owners and officials in Wisconsin and other Great Lakes states are anxious to explore the possibilities of attaining financial relief and other forms of compensation for erosion-related damages. Although shoreline erosion is a natural, ongoing phenomenon, certain man-related activities are known to modify natural coastal processes, thereby changing the characteristics and rates of erosion. At some point, governments and individuals must provide compensation for the costs they impose on others.

Several activities motivated this evaluation of the feasibility of shore erosion compensation. Administrators of the National Flood Insurance Program are considering options for providing federally subsidized insurance to Great Lakes shore property owners in erosion hazard zones. Property owners adjacent to shore protection structures are concerned about accelerated erosion attributable to the placement of these structures. A lawsuit involving the U.S. Army Corps of Engineers and aggrieved shore property owners was brought before a Federal district court in Wisconsin to determine the legality of instituting a new Lake Superior water level regulation plan.[1] Congressman Ruppe (R.-Michigan) has proposed legislation to provide compensation to aggrieved shore property owners as a result of the new water regulation plan.[2] Finally, a Wisconsin study of proposed Great Lakes water level regulation plans recommended that further studies of the feasibility of compensation be undertaken before the regulation plans are permanently modified.[3]

The feasibility of obtaining compensation for shore erosion is one element of a larger set of nonstructural alternatives for either reducing shore erosion damages or mitigating the financial hardships which can accompany erosion damages. This report is an attempt to document, generally, the dimensions of the problem and identify options for the individual and a state in seeking shore erosion compensation.

II. Issues for Analysis

This report addresses two questions: (1) What are the legal and administrative options for compensating property owners for erosion damages, particularly man-induced erosion damages, and (2) can research identify and distinguish man-induced causes of Great Lakes shore erosion? None of the nine options discussed readily provide monetary relief for shore damages. Research even on very selected sites has not yet been able to distinguish between natural and man-induced shore erosion.

The term "compensation" is defined more broadly than the context used in Federal eminent domain law and the 5th Amendment of the Constitution. Several avenues that provide some form of relief from further damage or financial subsidy to the individual shore property owner are considered. Obtaining compensation for man-induced erosion requires proof that the activity caused the erosion and that the original activity was illegal.

The individual's options for obtaining compensation for man-induced damages are privileges (or at least alternatives) as opposed to rights guaranteed by a public body. Article VIII of the Boundary Waters Treaty of 1909 between Canada and the United States authorizes the International Joint Commission (IJC) to "require that suitable and adequate provision, approved by the Commission, be made for the protection and indemnity against injury of any interests on either side of the boundary."[4]

In 1973 the IJC recommended that the governments compensate shore property owners and other interests harmed by instituting a new lake level regulation plan, but the advice has not been heeded.[5] Indeed, in 1976 the U.S. Department of Justice contended that those allegedly suffering damages could seek compensation on a case-by-case basis through the Tort Claims Act or the Tucker Act.[6] The difficulties of obtaining relief through these laws are addressed below. An individual also cannot bring suit for compensation from the IJC because the commission has sovereign immunity. From this perspective the property owner who alleges that human actions have induced erosion damages confronts the range of options presented below.[7]

A. Legal and Administrative Options for Compensation

Nine options are analyzed in this investigation. The first group--flood insurance, tax deductions and disaster relief--are federal and state financial assistance programs designed to alleviate the substantial losses associated with catastrophic events. The second group--certain Army Corps of Engineers projects, the taking theory*, the ultra vires suit, and tort actions** against the federal government--are based on the assumption that the federal government is liable for certain actions that adversely affect the rights and interests of individuals (in this case, shore property owners). The last two options--private tort actions and the Wisconsin Department of Natural Resources permitting procedure

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* "taking" theory refers to the constitutional rights a property owner has against the seizure by the government without compensation.

** A tort is a wrongful act for which a civil suit may be filed. An ultra vires suit usually alleges that a government official has acted unlawfully.

for structures in navigable waters--are concerned with "spillover" effects between adjacent property owners when uses of erosion-prone shorelands conflict.

This is not a legal brief. A particular shore property owner's situation is more complex than the typical setting contemplated here. If substantial legal issues and financial consequences are encountered, the individual should consult with an attorney or an appropriate governmental agency to determine the proper strategy for seeking relief.

Option 1: Flood Insurance. Individuals who own shore property within specifically designated flood hazard zones eventually may qualify for insurance premium subsidies under the National Flood Insurance Program.[8] Because the 1973 act is ambiguous about the types of shore erosion that could be insured against, the program does not yet apply to Great Lakes coastal erosion. The Federal Insurance Administration of the U.S. Department of Housing and Urban Development and a subcommittee of the Great Lakes Basin Commission are exploring ways to apply the Congressional intentions about erosion damage to the Great Lakes. Most Great Lakes shore erosion can be anticipated and results from causes other than flooding; thus, applying insurance concepts to the problem is difficult.

The existing Wisconsin Floodplain Management Program applies to riverine communities inland from the Great Lakes, operating as a cooperative state-local government effort with State guidelines and support and local governmental management and administration.[9] If federally subsidized insurance for Great Lakes shore erosion damages becomes available, individuals, local governments, and the State will be affected by new regulations and responsibilities. Communities bordering the Great Lakes likely would be required to adopt land use controls such as building setbacks from the shoreline in "erosion hazard areas". Most of the baseline data for accurately identifying erosion hazard areas along Great Lakes shores has already been collected.[10] The specific criteria to be established for an insurance program may call for additional or updated shoreline surveys, more staff support, and more public funds. Delineating such hazard zones identifies the property owners eligible for the program, but the Federal government and the Great Lakes states have not yet agreed upon or developed a workable insurance program.

For the property owner, subsidized flood insurance would not eliminate all risks and responsibilities. Each property owner would contract with the designated insurance company (AETNA, in Wisconsin) and pay the difference between the actuarial premium and the Federal subsidy. Owners of property along rivers can insure only structures and their contents, up to a maximum amount; similar restrictions probably would apply to coastal property if the flood insurance becomes available to Great Lakes shore property owners.

Option 2: Tax Deductions. Income tax deductions are available to shore property owners to offset losses from shore erosion under Section 165 of the Internal Revenue Code[11] and to business property owners as a depreciation deduction for the building of shore protection structures.[12] Section 165 of the Internal Revenue Code pertains to "casualty" losses caused by sudden, hostile, or unexpected forces such as fire, storm, theft, or other casualties. Erosion attributable to normal seasonal variations such as rises in lake levels would not be applicable. Casualties can, however, be linked to either natural or man-induced events. The financial losses must be evidenced either by a decline in the market value of property immediately after the event or by the costs incurred in repairing the property. Areas that are declared as "disaster areas" under the Disaster Relief Act of 1974 qualify for casualty loss deductions (see Option 3). The major difficulty in taking a casualty loss is that the property owner must document that the loss is attributable to the casualty. This often entails having an appraisal of the property before and immediately after the event.

Depreciation deductions for shore protection structures are limited to property held for the "production of income" or related to a "trade or business," even though the structure itself is not income-producing. These deductions can only be applied so as to offset taxable income derived from other sources. The individual is advised to consult with the appropriate tax revenue administrators before risking a potentially illegal claim for deductions. Installing structural erosion control measures and thereby reducing the amount of sediment entering the Great Lakes does not qualify as a deduction or depreciable expense. However, farmers can deduct up to 25% of the costs of certain nonstructural soil conservation practices, which could include de-watering the bluff, grading, and planting ground cover.[13] Although shore erosion contributes to Great Lakes sedimentation, Wisconsin pollution control programs have not identified shore erosion as a major problem warranting state attention.

Option 3: Disaster Relief. Two potential sources of funds to repair storm damage along the shore include grants administered by the Federal Disaster Assistance Administration and loans available through the Small Business Administration. In these disaster relief programs, shore erosion and gradual soil erosion are not considered "disasters." If a "flood, high water," or "wind-driven water" damages public property, the local government is eligible for grants (up to 100% of the cost) to repair the structure.[14] The President must declare the event to be a disaster if the local government or private property owner is to obtain assistance.

Individuals or families may obtain up to $5,000 in disaster relief assistance to defray expenses related to the disaster. The state must provide 25% of this grant.[15]

The SBA is authorized to make or guarantee loans to individuals or small businesses where a natural disaster occurs. Property owners may obtain low interest loans (1-3%) to repair damaged property--primarily the victim's residence. Small businesses may qualify for loans or loan guarantees for a wide range of purposes related to recovering from

a natural disaster.[16] If the shore materials are erodible and erosion damage is likely to occur in the future, low-interest loans (1-3%) will not be available. Thus, even if shore erosion occurs during a sudden event which qualifies as a disaster, SBA will not loan funds to rebuild structures if the damage is likely to occur again.

Option 4: U.S. Army Corps of Engineers Projects. Shore property owners can benefit from Corps of Engineers protective works projects under Section 111 of the 1968 Rivers and Harbors Act and Section 333 U.S.C.A. 426 of the Federal Statutes. Section 111 enables the Corps to investigate, study, and construct projects for the prevention or mitigation of shore erosion that is attributable to Federal navigation works. Examples of navigation works that can accelerate shore erosion on adjacent shorelands include the construction of jetties, bulkheads, and other harbor improvements. In such cases, private property owners may appeal directly to the Corps for funds to build beach or bluff protection structures. A maximum allocation of $1 million may be expended on each Section 111 project.

Under Section 33 U.S.C.A. 426, the Corps may undertake beach protection projects, provided that public benefits are clearly evident and that state or local governmental units share the costs. The Federal government will allocate up to 100 percent of the funds for Federal lands, 70 percent for public parks and public recreation areas, and 50 percent for other lands. The total project cost must be less than $1 million unless the Congress approves a greater expenditure. A government agency must initiate the application for a beach protection project. Projects may be undertaken on private shore property, provided that public benefits and uses are planned for the area. A common prerequisite for initiation of a project on private property is the public's free access across the property.

Option 5: Taking Theory. The right to compensation based on the unconstitutional taking of private property is guaranteed under the 5th Amendment of the Constitution. Compensation is pursued in some instances on the basis of an "inverse condemnation suit," which is a claim seeking remuneration from the Federal government for private property already taken (or condemned) by Government actions. One relevant issue related to Great Lakes shore erosion is the regulation by man of Lake Superior water levels. By regulating outflows at the Sault Ste. Marie locks and dams, the Corps of Engineers may have denied shore property owners on Lake Superior a property interest.[17] It is possible that the marginal amount of erosion caused by artificially raising Lake Superior water levels is a compensable action under the taking theory.

The applicable law on taking and inverse condemnation is very complex and often inconsistent. While Federal constitutional law may be used, the courts often defer to state law because of the longstanding state determination of rights in private property.

Several steps are involved in undertaking an inverse condemnation suit against the Federal government. The claimant must establish rightful ownership of the land at the time of taking and demonstrate that a clear line of causation exists, linking the Government's activities with property damage or condemnation. In the lake levels situation, the claimant would have to show that the regulation scheme raises water levels and causes damage to the property in question. The claimant would have to show that the land taken is situated above the normal high-water mark (prior to raising the water level), and that the Government's activities clearly represent an "intrusion" above this boundary that is worthy of compensation. The time of taking also would have to be established to assure that the lapsed time since the taking does not exceed the statute of limitations. There are many examples of successful inverse condemnation suits on shore property, but most of them pertain to flooding of the land by the Government and obvious measures of damage or condemnation.

Claimants who seek compensation for man-induced erosion or inundation under the taking theory should be aware of several physical and technical complications. The delineation of a pre-action high-water mark can be exceedingly complex, both in terms of determining "natural" water level regimes prior to regulation and in following established procedures for delineating the high-water mark on the ground.[18] The quantification of erosion attributable to the regulated water level is also made exceedingly difficult by the lack of data for relating high water to bluff erosion damage on a site specific basis.

Legal and institutional obstacles to the taking theory are also critical. Under the doctrine of "navigational servitude*," the Federal government holds considerable power and latitude in pursuing navigational improvements on the Great Lakes and other navigable waters of the United States.[19] Water level regulation by the Corps of Engineers could be considered as a reasonable exercise under this doctrine because it is partially for the benefit of navigation. Consequential damages to shore property owners as a result of such Federal policies generally are not compensable, especially when the activity is confined to waters and lands at or below the high-water mark. Furthermore, the courts have stated that shore property owners must bear the risks of erosion because they also are entitled to the benefits of natural accretion of the property.[20]

In the instance of the IJC authorizing the raising of Lake Superior water levels, the U.S. Department of Justice recommended that aggrieved property owners might pursue an inverse condemnation suit as authorized by the Tucker Act. This law and its revisions enable the U.S. District Courts and the Court of Claims to rule on claims that Federal actions have "taken" property. The Tucker Act and its revisions are often used to recover damages incurred when navigation is enhanced, but claims are limited to $10,000.[21]

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* Navigational servitude is the dominant or superior authority of the Federal government over the activities of state or local governments or private parties in or on navigable waters of the United States, based on the Commerce and Property clauses of the U.S. Constitution.

Option 6: Ultra Vires Suit. An action of a government employe or corporation that is beyond the scope or in excess of granted legal authority is considered "ultra vires." The ultra vires suit is a different type of erosion compensation option, because the remedy is usually an injunction of the activity rather than financial compensation. Application of this theory in relation to shore erosion and lake level regulation would postulate that officers of the Corps of Engineers at Sault Ste. Marie have duties prescribed and limited by statute, and that the activities required by new water level regulation plans are beyond the scope of their authority. Although this approach is used in the recent case of Soucheray et al. v. Corps of Engineers et al.[22] a recent decision in Edison Sault Electric Co. v. United States held that the Corps of Engineers, in administering the Lake Superior regulation plans of the IJC, was protected from liability because the IJC has sovereign immunity.[23] Because treaties can affect private property and the United States cannot do by treaty what the Constitution forbids, the IJC's authority to recommend that the governments consider compensation offers some protection for the rights of private property owners.

Option 7: Tort Actions Against the Government. Torts are a broad category of "civil wrongs" that reflects the judicial attitudes about proper relationships between members of society. The two tort actions that are relevant to shore erosion compensation are trespass and nuisance. Trespass occurs when one party wrongfully crosses the vertical boundary surrounding a piece of real property possessed by another party. Nuisance actions customarily are defined as conflicts between uses of adjacent properties and are represented by interferences with the use and enjoyment of land. In the case of shore erosion, tort actions against the government would pertain to the activities of Federal officials in regulating lake levels.

Although the U.S. Department of Justice recommended tort actions as a means of seeking compensation for damages caused by lake level regulation, there is little chance of success. The Federal Tort Claims Act places significant restrictions on the right to sue the Federal government and the manner in which suits are handled.[24] The doctrine of navigational servitude largely protects from suits Federal activities occurring at or below the ordinary high-water mark. The problems of showing trespass are similar to those involved in establishing that a taking of property has occurred.

The nuisance theory does not bear the same burden as trespass in showing that an intrusion has occurred, but the government is nevertheless entitled to a reasonable use of its own "property" just as is the shoreland owner. The flowage of water below the high-water mark would usually be considered reasonable. Above the high-water mark it might be an unreasonable nuisance, but in such cases taking and trespass doctrines would also be available remedies.

Option 8: Tort Actions Against Individuals. An adjacent property owner's actions may damage a neighbor's shorefront property. For example, the construction of a shore protection structure might interrupt the littoral drift of sand* and alter the nearshore current patterns. Such an action might deny the natural beach accretion to neighboring shore property and also accelerate erosion processes. Altering surface water runoff on adjacent property may initiate severe gullying or other types of erosion and thereby be grounds for a tort action against an individual. Both nuisance and trespass actions are feasible torts against individuals for man-induced shore erosion.

Wisconsin courts have not dealt directly with complaints of downdrift erosion* caused by shore protection structures. The most likely applicable criteria probably is found in the "reasonable use" doctrine of riparian rights which is recognized in Wisconsin. Under this doctrine, a shore property owner on a navigable water body in Wisconsin may not change or obstruct a watercourse so as to cause damage to the rights of others on that watercourse, including the rights to natural accretions of sand.[25]

Erosion attributable to the diversion of surface water runoff is potentially a cause for a tort action, especially as a result of the recent Wisconsin Supreme Court decision in State v. Deetz.[26] In this case, the court overruled the longstanding "common enemy" doctrine with respect to excess surface water and adopted the "reasonable use" doctrine. Under the new interpretation, a property owner may not dispose of surface water if its "invasion" of adjacent property is unreasonable, negligent, reckless or constituting an "abnormally dangerous condition."[27]

Tort actions against individuals would have to be substantiated by a clear line of causation between the acts of the defendant and injury to the claimant's property. Proof of causation can be a serious problem, depending on the specific setting of the controversy, the magnitude of the claim and the need for detailed quantitative evidence. There is very little law on the necessary proof of causation in Wisconsin; many conflicts are averted by the State's regulation of structures placed in navigable waters (see Option 9).

Option 9: Department of Natural Resources Permitting Procedure. Activities of an adjacent shore property owner, which may be the cause of damage to a claimant's property, may require authorization from the Wisconsin Department of Natural Resources (DNR). Under Chapter 30 of the Wisconsin Statutes, the DNR evaluates proposed shore protection structures and issues permits for their placement on lake or stream beds. A claimant can intervene at several times in the DNR regulatory procedure and essentially pursue a nuisance action against a neighbor. The DNR is obligated to investigate the circumstances when a claimant alleges that a structure has been built without a permit or that an existing permit should be revoked.

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* Littoral drift is the sedimentary material, or the movement of the material, in the littoral (nearshore) zone under the influences of waves and currents.

** Downdrift is the direction of predominant movement of littoral materials.

Three possible situations for claiming relief through the DNR regulatory program may arise: (1) an offending action may be present without the issuance of a permit, (2) a proposed action may be under review for a permit, or (3) a claimant may seek the revocation of an existing permit. Possible results of the claimant's initiative and the DNR investigation include: (1) the DNR may order the structure to be removed or deny a permit for new construction with the alternative of civil and criminal sanctions, (2) a public hearing may be called to present the sides of competing claims and hopefully resolve the matter, or (3) the permit may be issued or reconfirmed, depending on the factual situation and the attitudes of involved parties.

The DNR personnel work within a broad framework of statutory and constitutional constraints that allows them much flexibility and discretion in protecting the public trust in navigable waters. The option of seeking relief from man-induced erosion damage through the DNR permitting procedure would be inexpensive and versatile because no outside legal assistance would be required and there would be no strict rules of evidence governing the use of certain kinds of information. The DNR personnel encourage compensatory agreements solely between the two parties, because the role of the DNR is confined strictly to public trust protection rather than private nuisance settlements.

B. Feasibility of Relating Human Activities to Shore Erosion

Distinguishing natural versus man-induced shore erosion damages is primarily an exercise in description as opposed to measurement. Activities affecting erosion processes and the nature of their impacts are easy to see, but the amount of erosion attributable to specific activities is very difficult to assess. Although the first three options for erosion compensation that were discussed above--insurance, tax deductions and disaster relief--probably do not require a clear distinction between natural and man-induced erosion, the other six options rely on such distinctions in varying degrees.

A survey of research on shore erosion indicates that the proportions of man-induced and natural erosion can not yet be distinguished because several erosion mechanisms operate simultaneously. For example, the wave energy that reaches the base of a bluff is increased during high naturally occurring water regimes and may also be partially related to water level regulation. Normal erosion processes within a bluff such as slumping*, sliding** and earth flows are not only dependent on internal soil properties but also on blufftop loading***, groundwater depths, seepage+, and ice action which can be influenced by human activities.

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* Slumping is a type of landslide involving the downward slipping of a mass of material, moving as a unit, usually with backward rotation with respect to the slope over which movement takes place.

** Sliding is the downward movement of soil which takes place along a definable, relatively plane surface.

*** Bluff loading is the addition of material to either the blufftop or bluff-face, which decreases the stability of the bluff.

\+ Seepage is the slow movement of water through small pores, cracks, or interstices of material out of a groundwater body, often onto the face of a bluff.

Surface water runoff can be diverted and channeled as a result of various cultural activities, thereby accelerating the natural rates of gully erosion. The four major categories of human activities that can affect shore erosion are 1) lake level regulation, 2) placement of shore protection structures, 3) upland management practices and 4) winter lake navigation. Each of these activities are discussed in the following sections.[28]

Lake Level Regulation. At least four of the options for receiving erosion compensation are dependent on the ability to demonstrate that additional erosion occurs when Lake Superior water levels are raised as a result of the regulation plan. Two questions must be answered in assessing the erosive effects of lake level regulation: (1) To what extent have the new regulation plans altered the preexisting lake level regime, and (2) what damages would be associated with a known change in lake level?

The lake level regulation plan, Plan SO-901, which the Lake Superior Board of Control now uses as a guide, is estimated to raise the extremely low water levels of Lake Superior and also increase the frequency of high levels.[25] Critics of the Levels Board's analysis have contended that the data base for this simulation (1900-1973) did not adequately represent the long-term frequencies of extremely high and low water levels. They noted that a major portion of the data base, approximately 1920-1950, was characterized by relatively mild, constant weather patterns which did not represent the climatic variability of the period 1860-1920 and post-1950 years.[29] Using a different period of record would yield other estimates of how much the new regulation plan would affect the lake levels. Despite such problems, simulating lake levels and the effects of regulation is a much more 'exact science' than estimating how much erosion damage is attributable solely to lake level changes.

Methods for assessing damages attributable to changes in water levels are largely inadequate.[30] Most compensatory measures would require a site specific evaluation of erosion damage associated with lake level regulation. As emphasized by the International Great Lakes Levels Board, the methods developed to compare alternative regulation plans can not be used on a site specific basis to estimate the amount of damage attributable to a rise in lake levels. The damage assessment methods developed by the Canadian and United States sections of the Levels Board did not distinguish between the effects of higher lake levels and other causes of erosion.[31]

Shore Protection Structures. The principal causes of erosion resulting from shore protection structures are interference with the littoral drift of sand and magnification of wave energy close to shore. The amount of erosion caused by protective structures depends on the rates of littoral drift and alongshore currents, type of structure, capacity of the structure to block sediments in the alongshore direction, and

capacity of the structure to magnify or retard wave energy reaching the shore. Perpendicular structures and offshore breakwaters intercept the littoral drift of sand, creating a protective beach on the updrift side and starving the beach on the downdrift side. Parallel shore structures protect lands immediately behind the structures at the possible cost of accelerated erosion in front of the structure and on adjacent land.

Various methods can be used to evaluate erosion from large and small structures. A prerequisite for an analysis is adequate pre-construction information on the shore conditions, patterns of the littoral drift, location of the structure, and natural rates of erosion. Unfortunately, significant variations in storm activity and wave energies often occur in pre- and post-construction periods. Comparisons of areas with protective structures to comparable areas without structures are complicated by significant morphological differences in shore features that occur in very short intervals. Only qualitative evaluations of erosion due to structures are now possible.

Upland Management Practices. Erosion from upland management activities has been examined extensively along streams and watersheds. The same activities that accelerate erosion and sedimentation in inland regions also affect lakeshore erosion. Four of the most significant upland practices include bluff loading, alteration of groundwater flow, diversion of surface water runoff, and removal of vegetation. Determining the amount of erosion directly attributable to these practices is often very difficult. As in the other human activities discussed above, the interaction of several agents of erosion complicates the task of separating the effects of individual human activities.

Bluff loading occurs when additional material on the bluff top or face significantly increases the weight that the bluff must support. The construction of large buildings or placement of excessive material on or above the bluff can initiate slope failure or accelerate erosional processes. Although slumping and sliding are known to result from excessive loading, bluff slope failure is a threshold phenomenon. It is impossible to distinguish the relative contribution of loading to such erosion, even with a detailed on-site engineering investigation. Fortunately, erosion resulting from bluff loading will likely be confined to a very narrow reach along the shore.

Alteration of groundwater flow can adversely influence the stability of lakeshore bluffs. Excessive water can fill the pore spaces between soil particles, thereby adding weight to the soil mass and exerting forces against the soil particles which decrease the cohesive strength of particle-to-particle contact. Large scale examples of bluff slumping near Whitefish Bay on Lake Michigan have been linked to cultural modifications of the natural rate of groundwater flow.[32] Drains and pumps often are used to reduce the amount of moisture in the bluff face.

Surface water runoff has a remarkable capacity to transport material and erode coastal landforms. Man can accelerate shore erosion by: (1) diverting excessive surface water into channels, gullies or drainage areas that are undersized for the additional flows, (2) modifying channel characteristics which restrict the capacity for storm water runoff, and (3) using construction practices that increase local surface runoff or divert the runoff onto lands not suited for overland flow. Investigators at the University of Western Ontario determined that gullying accounted for almost one-fourth of all the material eroded from lakeshore bluffs.[33] Examples of severe gully erosion on Lake Superior bluffs that are attributable to surface water diversions from roadside ditches are found on Bark Point in Bayfield County and Madigan Beach in Ashland County.[34] As in other cases of human activities, it would be extremely difficult to distinguish and quantify the net amount of property loss resulting from surface water runoff. The activities and their general impacts, however, are easily seen.

Retention of native vegetation in the midst of shoreland development is an exception rather than the rule. Shorelands are cleared for homesites, agriculture, roads, parking lots, and many other facilities. Slopes and uplands that are devoid of vegetation may begin to erode actively and irreversibly. Plants mitigate shore erosion by intercepting precipitation, retarding surface water runoff, reinforcing soil strength with root systems, and depleting soil moisture. Recognition of these benefits is codified in the mandatory shoreland zoning law in Wisconsin, which restricts the amount of clearing on shorefront property.[35] Measurements of the amount of erosion attributable to vegetation removal, however, have not been completed.

Winter Lake Navigation. Shore property damages could be accelerated by winter navigation through wave and ice action against the shore. The U.S. Army Cold Regions Engineering Research Laboratory and other federal agencies are studying the effects of extending the winter navigation season.[36]

A reduction in the ice accumulation in the connecting channels of Lakes Superior and Michigan-Huron would have inconsequential effects on upstream lake levels. However, ice reduction on the St. Claire River for navigation purposes conceivably could lower Lakes Michigan-Huron by as much as 12 centimeters, thereby reducing shore erosion.[37]

Generally, ice serves as a protective agent for the shore through the formation of nearshore ice ridges, or icefoots* , that shield the shore from damaging wave action. However, damage to structures and shorelines when ice is forced onshore by wind and wave action can be very severe. Structural damage to wharves, pilings and other facilities as a result of free and heaving ice in harbors is probably impossible to predict. However, such impacts presently are being investigated. Icebreaking in narrow channels, such as the St. Mary's River, can affect shore erosion.

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* Icefoots are long, narrow ridges of grounded ice that parallel much of the shoreline of the Great Lakes in winter. They are created by storm waves, overwash, and spray.

If a serious claim from a property owner is submitted, the U.S. Coast Guard will investigate the local ice conditions, path and speed of the vessel, and whether the construction of the damaged structures had been authorized by the Corps of Engineers. Structures that are not authorized by the Corps cannot be considered in such claims.[38]

Catastrophic Versus Continual Erosion. Obtaining compensation through tax deductions, disaster relief, and probably insurance, require documentation of a single catastrophic erosional event. Although property loss after a major storm or landslide often can be measured, there are usually a variety of antecedent environmental factors that encouraged the event. Furthermore, the total impact that a single erosional event has on bluff slope stability in subsequent years or on adjacent bluff areas might not be seen for some period of time. It is the complex interaction of antecedent bluff conditions, multiple agents of erosion, and time lags in the erosion process that creates the continual nature of shoreline erosion. The feasibility of relating human activities to shore erosion damages is limited primarily by this problem.

III. Options for the Individual

Legal, administrative and physical considerations in documenting erosion damages and seeking compensation cannot be reduced to a reference manual for the affected shore property owner. An individual shoreowner's situation probably will be more complex than the "typical" setting contemplated here. A statement that one option is or is not "feasible" for an individual requires certain assumptions about the dynamics of legal institutions and engineering states-of-the-art. The nine options presented in this report series are subject to considerable change. Some of the options for the State of Wisconsin discussed below suggest possible avenues for directing this change.

Subsidies under the National Flood Insurance Program are not yet possible. If and when flood-related shore erosion becomes an insurable loss along the Great Lakes, the individual will be able to get coverage through participating insurance companies. The Wisconsin DNR is the most fully informed state agency as to the status of the program. The Great Lakes states presently are pursuing alternatives for erosion coverage with administrators in the Federal Flood Insurance Administration.

Income tax deductions are presently a feasible option for certain shore property owners and certain types of losses. Since the deductions cannot be considered a rebate, their value depends on the nature of the individual's income and accounting scheme. The feasibility of claiming deductions for "casualty" losses will depend on the ability to document clearly the differences between antecedent and subsequent conditions resulting from a sudden, catastrophic event. Periodic assessments of shore conditions and property value become necessary to document one's claim. The individual is advised to contact the local Internal Revenue Service office to determine whether the damages constitute a casualty loss.

Disaster relief loans and grant programs only have a remote chance of success in the case of predictable Great Lakes shore erosion. There is a precedent, however, in the $25 million disaster relief program for Lake Ontario shore property owners after the March, 1973 storm. Several property owners along Green Bay also obtained loans through the Small Business Administration to repair damages to shore structures caused by flooding in 1973. Only major storm events or other casualties are probable bases for compensation under this program. An individual or small businessman should contact the local SBA office, Federal Disaster Assistance Administration, or the state's Division of Emergency Government in the Department of Local Affairs and Development.

Army Corps of Engineers projects are a feasible source of non-monetary compensatory relief in the limited number of circumstances where they apply. To obtain funds for shore protection works through the Corps, the property owner must work through a local government or the state and meet the requirement that the benefited property will be available for public use. This alternative is often thwarted by the unwillingness of the local government or state to assume the 30-50% of the non-Federal share.[39]

Lawsuits brought under the taking theory are riddled with problems for the claimant. In the case of higher water levels due to the new Lake Superior regulation plan, there are no accepted standards for determining "natural" versus "artificial" water level regimes. Furthermore, no agency or previous research effort has attempted to measure erosion damages caused by lake level regulation on a site specific basis. The defense of the Federal government would be supported by its dominant navigational servitude in navigable waters as well as the protection offered by sovereign immunity in carrying out the orders of the IJC.

An ultra vires suit was brought against the Corps of Engineers for regulating Lake Superior water levels without proper authority. It seems very improbable, however, that claimants would be successful in such a case because of a recent Federal Court of Claims decision which recognized the sovereign immunity of officers of the Corps of Engineers in executing orders of the International Joint Commission.[40]

Tort actions against the Federal government for damages resulting from lake level regulation also would have little chance of success. There are problems in gaining standing to bring suits for government torts. The longstanding doctrine of Federal navigational servitude also provides wide latitude for legitimate Government activities which promote public navigation. Furthermore, the IJC expressly directed that Lake Superior levels remain below their historical maximum of 602 feet.

Although there is little precedent in Wisconsin for tort actions against individuals on account of man-induced shoreline erosion, the "reasonable use" doctrine of riparian rights would seem to support such a claim.* Erosion caused by adjacent structures or upland management practices such as diverting surface water runoff possibly could be considered a nuisance or trespass. Torts against individuals probably would not require a rigorous quantitative assessment of the amount of erosion damages, although such information certainly would be supportive.

The DNR permitting procedure is a feasible and relatively inexpensive avenue for seeking relief from man-induced causes of erosion which are regulated by State law (such as the placement of shore structures), provided that a public nuisance results from the activity. Financial

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* The two relevant tort actions are nuisance and trespass. Applying the reasonable use doctrine would require each shore property owner to deal with erosion in a manner that does not unreasonably injure others.

compensation cannot be awarded to a claimant solely on the basis of an administrative decision by the DNR because the DNR jurisdiction is limited to the resolution of public nuisances. Even if the DNR determines that a public nuisance does not exist, the administrative hearing process can be a useful method of settling disputes between adjacent property owners. Quantitative evidence of erosion damage generally is not required for this option.

IV. Options for a State Relating to Man-Induced Erosion Damages

Although most activities affecting shore property are strictly of private concern, the Great Lakes are a "common property" resource that confers economic and aesthetic benefits to the public at large. There is a need to define the proper relationships between these private and public interests in this unique water resource. The options described in this report series are intended for the individual who seeks erosion compensation and assume no shift in existing law, public policy or priority. Law and public policy, however, are characterized by constant change. A conventional private property issue may affect enough individuals that it becomes a public policy concern. A forward look at the options for reducing shore erosion caused by human activities reveals that policies of the State of Wisconsin can have a direct influence on the prospects for options available to the individual.

Twelve options are briefly outlined below. They are offered only for public consideration and do not represent the policy of any State agency. The first seven options would involve State advocacy for modifications or innovations in Federal programs such as flood insurance subsidies and Corps of Engineers activities. The remaining five options would call for delivery of technical or legal information by State agency representatives to affected property owners, innovations in DNR programs, or revisions in State tax codes.

National Flood Insurance. As emphasized in Option 1 above, federally subsidized flood insurance may never become available to Great Lakes shore property owners. If a flood insurance program applicable to Great Lakes shore erosion is developed, Wisconsin Shoreland and Floodplain Management Programs might be used as guides for State standard-setting and support with local government support and administration. The following sequence of events probably would occur:

1. Erosion hazard areas would be identified by the State or Federal government.

2. Property owners in erosion hazard areas would contract with the insurance company authorized to handle the policies.

3. Concurrently, local governments would have to adopt land use controls which would limit further development in the hazard zones. Model ordinances developed by the State may be necessary.

Developing an insurance program that provides coverage against a largely progressive and predictable phenomenon has proven to be very difficult. The enabling legislation for the National Flood Insurance Program refers to damages caused by "abnormally high lake levels" unless the legislation is amended, most erosion damages probably would not be covered by insurance. The Great Lakes states are working with federal representatives to determine how the flood insurance program might be applied to Great Lakes shore erosion.

Federal Disaster Relief for Erosion. The State could advocate that erosion damage during periods of unusually high water levels (such as the period between 1973 and 1975) be included under the Federal Disaster Relief Act. To minimize the extent to which public funds would reimburse property owners for building in hazard zones, high water level periods probably should be defined according to a level of statistical probability.

Corps of Engineers Beach Protection Projects. The State might assist the Corps of Engineers in undertaking beach protection projects under Section 33 U.S.C.A. 426 of the Federal Statutes. State or local funds could be used to initiate beach protection projects which would have direct or indirect benefits for shore property owners. Criteria for defining "public uses" on private lands could be offered by the State in order to aid both individuals and the Corps in deciding when such beach protection projects are appropriate.

Corps of Engineers Section 111 Projects. The State could seek an expansion of the Corps definition of "shore damages attributable to Federal navigation works" so as to include Lake Superior shore property that eroded because of lake level regulatory policies. The Corps' Section 111 program, which authorizes the Corps to construct projects for the mitigation of shore damages, then could be used to provide compensatory relief to affected Lake Superior residents.

Advocacy for Federal Compensation for Lake Level Regulation. An interim report on Lake Superior water level regulation published by the IJC in 1973 indicated that some Federal action (possibly legislation) would likely be necessary to implement the proposed new regulation plan, SO-901.[43] The State now could encourage federal agencies, such as the State Department, the Office of Management and Budget, and the Corps of Engineers, to include a compensation element in the implementing action. Preliminary discussion took place in 1976 between the State of Wisconsin, the State Department, and the Corps of Engineers in order to advocate for direct involvement by the states in the deliberations on lake level regulation by the IJC.

A bill proposed by Congressman Ruppe of Michigan and others (H.R. 10015) would amend the Coastal Zone Management Act to provide grants or loans to shore property owners for structural or nonstructural beach protection measures and to local units of government for planning and adopting land use controls in areas of erosion hazard. The bill also authorizes an examination of the damages attributable to water level regulation.

New Water Regulatory Works. The State could advocate for construction of an additional channel at the outlet of Lake Erie in order to increase the discharge into the Niagara River during high water periods. The Corps of Engineers is studying the merits of increasing the Chicago River diversion from Lake Michigan during high water level periods. Historically, Wisconsin has opposed this diversion because lower levels are detrimental to navigation. Over the years Canada, New York, and down-river property owners in Illinois also have opposed increasing the diversion.

Technical Shore Erosion Assistance. The State could provide technical assistance to individual shore property owners who seek to build protection structures or seek compensatory relief from erosion damage. A more detailed analysis of historical rates of shore erosion in hazardous areas and specific suggestions for reducing shore erosion damages could help property owners in making better development decisions, aid local units of government in establishing land use controls, and help in defining the "unanticipated, abnormal" erosion events which might be compensable under various Federal and State programs. A series of technical assistance and planning reports on shore erosion and damage reduction alternatives are being produced by the Wisconsin Coastal Management Program.[44]

The state could seek to establish a more precise legal and physical basis for determining the ordinary high-water mark along the coast. This information would assist shore property owners in the resolution of the taking issue, in determining whether accreted* or eroded land affects their property limits, and in determining whether State or Federal permits are required before building a protection structure along the shore. Existing and proposed mechanisms for surveying and mapping this proprietary boundary are detailed in reports published by the Wisconsin Coastal Management Program.[45]

Additional research could be supported by the State to investigate the relationships between changing lake levels, bluff stability and progressive erosion on a site specific basis. Eventually, the detailed data collected from this research could be used to assess the net contribution of individual agents of erosion (such as lake levels or ground water pressure) and the respective amounts of property damage. The University of Wisconsin Sea Grant College Program and the Wisconsin Coastal Management Program presently are sponsoring detailed research at selected sites on Lakes Michigan and Superior.

Real Estate Hazards Disclosure. A requirement could be established, by statute, that a realtor inform a buyer of shore property of the exact nature of the erosion hazard before the sale. The requisite information

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* Accretion is the buildup of shoreland either naturally, by the forces of waves and currents, or artificially, by reason of an act of man such as a groin or breakwater.

to be disclosed by the realtor might include published maps indicating the historical rate of erosion along the particular reach of shore. In 1973, Wisconsin tried to require such a disclosure through Executive Order 67. Subsequently, however, the Attorney General ruled that only a statutory change and not an executive order could mandate such a disclosure requirement.[46]

Revised DNR Permitting Procedures. The procedure for reviewing and permitting structures placed in navigable waters under Chapter 30 of the Wisconsin Statutes could be made more restrictive and explicit so as to protect property owners downdrift. Requirements for giving notice and rights of appeal to adjacent property owners could be extended to include all potentially affected parties. This could be achieved by specifying that notice be given to a certain number of adjacent owners (such as the three property owners immediately downdrift) or by applying standards based on the size of the structure and the importance of the longshore drift of sand in that reach of shore.

A more restrictive modification of the DNR permitting procedure would entail setting standards for placing and constructing protection structures so as to avoid downdrift effects. The application of such standards would be somewhat less flexible than the present approach. However, it would offer more specific information to the permit applicant, give a more uniform standard of review to DNR district staffs, provide courts with a baseline for evaluation in trial proceedings, and perhaps minimize the future impacts of structures on adjacent property.

Expanded Inland Lakes Law. The Inland Lakes Rehabilitation and Protection Law was intended to foster management associations for resolving water quality and related problems on the inland lakes in Wisconsin.[47] The program could be expanded to include erosion management districts along individual reaches of the Great Lakes shore. This would encourage local collective action to study and resolve coastal erosion in an integrated, comprehensive fashion. As a related option, the State could adopt an entirely new program to promote collective action in reducing erosion damages, or simply provide technical assistance to owners that are willing to initiate and manage their own property associations. Such collective action might also encourage local governments to participate in the Corps of Engineers beach protection programs.

V. Conclusions

The problem of man-induced shore erosion was brought into focus in 1973 when water levels were unusually high on the Great Lakes. Ensuing discussion concerned the relative responsibility of man and nature in the subsequent erosion. As damages were observed to be man-induced, either by specific acts of individuals or by general policies of governments, it became necessary to define the point at which those actions were so injurious that legal liability for the damage was appropriate. Some level of "spillover" effects caused by other parties must be accepted by all property owners. At some point, however, governments and individuals must provide compensation for the costs they impose on others. This report series is an attempt to define that line between injuries to be tolerated and those for which legal redress is available.

It is impossible to specify in other than general terms the factual context in which a shore property owner would seek compensatory relief for erosion damage. An individual wishing to pursue one of the options presented here should first consult the particular government agencies involved, and consider hiring an attorney to work out the proper strategy for seeking relief.

There are many overriding problems, however, that may discount some of the options preferred in this report series. Although technical knowledge of the individual agents of erosion is well established, we cannot distinguish these agents quantitatively in evaluating the overall erosion process. Additional research is needed to assess the erosional capacity of a bluff, the mechanics of progressive erosion in the bluff, and the damages associated with specific agents of erosion such as high water levels. Unless individual agents of erosion are measurable on a site specific basis, it is impossible to evaluate damages and show proof of economic loss in pursuing erosion compensation. The active role of the State of Wisconsin or the Federal government in assisting individual property owners is limited by the "private" nature of the erosion problem. In many cases, it is not reasonable for a government agency to offer assistance to a limited group of individuals at the general taxpayers' expense.

The two background reports to this summary contain more detailed information and references on the legal, administrative and physical dimensions of man-induced shore erosion. The series is written from the perspective of the individual who seeks some form of compensation. The options presented here are also for use by policy-makers who may have an influence on the feasibility of erosion compensation and who are seeking information on alternative remedies under existing federal, state, and local policies.

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2. H.R. 10015 to Amend the Coastal Zone Management Act, introduced November 3, 1977.

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5. H.R. 10015, op. cit.

6. Letter to the Speaker of the House of Representatives from the Department of Army, August 27, 1976. With respect to relief from damages, the letter maintains that "existing means of asserting a claim for any such damages may be available pursuant to the Tort Claims Act, 28 U.S.C. 1346(b) and 2671, et seq.; and the Tucker Act, 28 U.S.C. 1346(a) (2) and 1491".

7. For further discussion see Greenwood, Mark, Kent Butler, and David Thomas, Legal and Administrative Options for Compensation, Vol. II of this series.

8. National Flood Insurance Act of 1968 as Amended, PL 91-152; Flood Disaster Protection Act of 1973, PL 93-234; see U.S.C.A. SS 4001-4128.

9. Wis. Stats. Section 87.30 and Wis. Administrative Code NR 116.

10. For further information concerning these reports the reader is advised to contact shore erosion specialist with the Wisconsin Geological and Natural History Survey.

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12. Internal Revenue Code, 26 U.S.C.A. 167, as amended.

13. Internal Revenue Code, 26 U.S.C.A. 175, as amended.

14. Internal Revenue Code, 42 U.S.C.A. 5122.

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36. Personal communication with Mr. Frankenstein, U.S. Army Cold Regions Engineering Research Lab, Hanover, New Hampshire, 1977.

37. Quinn, Frank H., 1973, "Effects of Ice Retardation on Great Lakes Water Levels", Proc. of 16th Conf. on Great Lakes Research, Internat. Assoc. for Great Lakes Research, Ann Arbor, Mich., pp. 549-555.

38. Personal Communication with Lieutenant Hal Henderson, U.S. Coast Guard, 9th District, April 1977.

39. The local and/or state government pays 30% of the costs related to public parks and recreation areas. On privately owned lands whose protection has some public purposes, the non-Federal share is 50%.

40. Edison Sault Electric Co. v. United States, op. cit.

41. Wis. Stats. and Wisconsin Administrative Code NR .

42. National Flood Insurance Act of 1968, op. cit.

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45. Butler and Epstein, op. cit.; Weinberg and Neuman, op. cit.

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