A PUBLIC TRUST ALERT:
IMPLICATIONS OF CLIMATE CHANGE AT THE WATER'S EDGE

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One of the most legally complicated and contentious locations on earth is the place where land and water meet. The reason is that it presents the intersection of important public and private rights along an unstable boundary. This has long been a contentious area on the ocean shores, the Gulf of Mexico and the Great Lakes. All the evidence indicates that climate change is going to intensify the moving boundary problem in dramatic form.

On the Great Lakes, the prospect is for declining water levels as a result of generally hotter and drier weather, though presumably that change will take place within the existing pattern of irregular decades-long periods of higher and lower water levels. On the sea coast, conversely, ocean levels are expected to rise quite dramatically as a result of melting ice. The sea has risen about 6 inches in the past 80 years, and may rise another 18 to 24 inches in the coming century. The U.S. EPA recently estimated a 50% chance that the sea will rise

1 foot by 2050 and 2 feet by 2100.[1] A rough calculation (though of course it depends on the nature of the shore area) is that one would lose 100 to 200 feet of horizontal beach for every foot of sea level rise. Most waterfront homes are within that distance of the existing high water mark. Where structures are built on bluffs above the water, rising waters as well as the threat of more intense storm activity operates to create erosive forces that undermine the cliffs and threaten the buildings atop them.

Without getting into technical legal issues about boundary location, the basic point for both the Great Lakes and the oceans is that we are facing long term movement of the land/water boundary, and with it some potentially massive loss of both private and public benefits unless we act promptly and decisively. The private issues are obvious: submergence of structures where waters are rising, and stranding of water-based facilities where waters are falling. The public values at stake have received less attention. The most prominent issues are loss of wetlands, and loss of public access along the shoreline as shoreland owners increasingly seek to armor the coast

[1] **57 Md LR @ 1304.**

both against storm damage and to hold back rising sea levels (I use the term “armoring” to describe the various structures, such as seawalls, bulkheads and revetments, that effectively wall off the land from the water. I do not mean to include groins or other activities designed to maintain or nourish beaches).

My own work has focused primarily on the Pacific Coast, and I can best illustrate both the nature of the problem, and pose some suggestions about how to address it, using the ocean shore as my illustrative case. As the sea level rises, the ocean will migrate inland. If that process were left to occur without human intervention, coastal wetlands and beaches would migrate inland as well. But ocean-shore land is some of the most valuable real estate in the country, and in some areas is already extensively developed with homes and other important structures. So of course people are not going to stand aside and simply watch such ‘natural’ migration happen, as those who have experienced periods of high lake levels here in the Great Lakes region can attest. We are going to see what can generically be called a massive increase in armoring the coast. If that happens, we will experience a very considerable loss of coastal wetlands (both

those that are now in the public domain, being seaward of the mean high tide line, and those on private land); and a loss of public recreational space, both because the sea will eventually rise to the seawall. eliminating any beach between high and low tide, which area is a public right-of-way, and because armoring of the coast intensifies wave action and operates to accelerate the loss of shore land.

On the Great Lakes, insofar as lake levels decline as a result of hotter, drier weather, one can expect the argument to be made that the littoral owner's property line should migrate water-ward, following the declining lake level. That view is already familiar in litigation in the Great Lakes states, but it might gain strength insofar as the movement is seen as being effectively permanently water-ward. Insofar as such a view prevails, littoral owners can be expected to occupy the newly exposed lands, and to armor them against both anticipated periodic high water times, and against water intrusion and erosion.

Insofar as any such development would fail to take account of future episodes of substantial rise and fall of the lakes that presumably will continue to occur within the context of generally declining lake levels, it presages a loss of pre-existing public rights along the beach. The problem is that unless constraints are imposed on littoral owners in armoring the coast during times of decline, there will be a loss of beach during subsequent higher-water-level periods when the lake rises all the way to the seawall, leaving no beach area.

As I shall explain as I turn to the ocean coastline, we now have the opportunity to assure that future coastal armoring does not impair traditional public rights of use along former beach shorelines. As a related matter, insofar as declining lake levels will call for the relocation of shoreline industrial and recreational facilities, the opportunity will be presented to assure the inclusion of public access along the new shoreline, rather than cutting it off, as has often been the case in the past. Insofar as dropping lake levels mean a loss of wetlands, a challenge is presented to assure the establishment and/or safeguarding of substitute wetlands in new shoreline areas.

Turning now to the oceans, the most obvious matter in the minds of most people is protection of existing development from submergence and erosion-generated de-stabilization, and for protection of land threatened by rising seas that is as yet undeveloped, but has development value. But there are also crucial public interests at stake. These interests are inextricably intertwined with the fate of private coastal lands. The strip of land that most people think of, roughly accurately, as the wet beach between the low tide and high tide[2]--comprises a public right-of-way that is important for public use. Some wetlands are water-ward of mean high tide, in what is known as the inter-tidal zone: these wetlands are also public property. Moreover, the shore area, both above and below mean high tide, has value as habitat for shore birds and marine mammals, and their protection is a public responsibility.

Putting all these impacts together, we are confronted with a knotty problem: Protection of private values in shore-lands (by preventing inland migration of the sea, and intensifying shore erosion) brings

[2] **Technically, the mean high tide line is not where high tide is on a given day, but is an elevation that represents an average measure of high tide elevations over an 18.6 year lunar cycle and is the point where that elevation intersects the shore. It cannot be determined visually. The height of tides is determined dominantly by the gravitational relationship between the earth and the moon.**

with it not only a loss of beach to the shore-land owner, but a loss of public property valuable not only for recreational use, but with important ecological values in the form of wetlands and wildlife habitat.

The basic challenge is to find a strategy that protects both private and public rights; and to begin its implementation while we still have time to do so at reasonable cost, and before we begin to see Katrina-type disaster-level losses.

Some things can be done quite easily and inexpensively if they are done early enough. For example, when seawalls are constructed to protect uplands, some form of boardwalk built on the top of the seawall will substitute for the wet beach lost both by the rising sea elevation and by the seawall's impact itself in speeding up erosion of the beach seaward of it. Where public access along a seawall is impractical, other measures can, at least for a time, mitigate public shore land losses, such as beach nourishment programs, groins that capture sand and re-build beaches, and actions that diffuse erosive

wave action, such as the implantation of hardy plants along shore areas.

Where public wetland or habitat is lost by walling off private lands, it seems appropriate to impose a charge reflecting replacement cost on the landowner. The proceeds can be used to acquire a public easement elsewhere, in order to allow the sea to migrate landward and try to prevent loss of wetlands. How much wetland should be saved or restored, and where, is a matter that must be decided independently. Whatever the precise inventory adopted, some easements will have to be acquired across what are now private lands to allow wetlands to migrate inland, and/or to allow new wetlands to be established in what are now private upland areas. The sooner the desired land is identified, the less it will cost.

A case could be made that landowners have no legal right to protect themselves against natural forces, such as a rising sea, or to stop the movement of the public property line inland; and that the state could insist that owners of land above existing wetlands simply retreat before the invading sea, and allow what might be called “natural

migration" to take place. Such a policy would place the entire cost of preserving desired existing public benefits on those coastal landowners who currently front on valuable habitat.

The legality of a somewhat similar policy has been the source of litigation and controversy in Texas which has an open beaches law and a very liberal view of the scope of a public recreational easements across sand beaches.[3]

While such a policy seems reasonable when it is limited to owners who have transgressed reasonable setback restrictions, I have serious doubts about it as applied to very large areas of upland, and to sea level rises anticipated over long periods of years. It is one thing to impose a charge on landowners who have, by building seawalls to

[3] **See Severance v. Patterson, 485 F.Supp.2d 793 (S.D. Tex. 2007). The leading exponent of the rolling easement, and the most prominent writer on land use issues relating to sea level rise, James G. Titus, of the U.S. E.P.A., makes a strong case for the rolling easement as the best strategy for undeveloped coastal lands, and points out that the State of Texas, where Gulf Coast erosion has been a serious problem, has utilized the rolling easement successfully to maintain beaches and prevent the loss of wetlands.**

I greatly admire Titus' work, as well as his recognition of the importance of sea level rise more than 20 years ago, long before most others began to attend to it.[3] The rolling easement technique is attractive in that it imposes no legal restrictions on the landowner, instead leaving on him/her the burden of retreating as the rising sea threatens. The idea is that it will generate appropriate levels of dis-investment as time goes on, e.g. avoiding improvements on existing structures, and shifting from owner occupancy to decreasing-cost rental occupancy; or shifting from such uses to less intensive land uses like parking lots, agriculture, or recreation.

According to Titus, at 57 Md L Rev 1375, n 398, Texas common law holds that there is no property right to stop the inland migration of tidelands; and Texas has a law that houses must be torn down as the shore approaches, if they encroach upon or interfere with an area of the beach to which the public has acquired an easement through prescription, dedication or continuous use, and that means public can have unrestricted access between mean low water and the vegetation line. TX Nat Res Code Ann sec 61.011©, cited at Titus n 138, p 1313., and at fn 414,415 at p 1378

save their own investments, destroyed or at the least speeded up the loss of public wetlands and public access along the shore. It is quite another to force landowners to retreat in the face of rising waters generated by climate change, where they are getting no benefit in exchange, and are losing whatever value their former uplands had.

A more desirable alternative is for the government to acquire, and pay for, an easement on those lands where it wants to preserve wetlands via migration. In such a case, the government would buy the right to keep landowners from armoring the coast, and oblige them to retreat as the sea rose. Such an arrangement—a form of migratory easement tied to the inland movement of the sea—would permit the landowner to make economic use of the land up to the time that rising waters forced a retreat. Such an arrangement keeps the cost of easements down, and maximizes private use of the land so long as such use is in harmony with public policy. Insofar as the sea rose less than experts had estimated, the landowner would benefit and the state would have effectively overpaid for its easement. If the sea rose more or more quickly than was estimated, the public will have got a

bargain. But in any event, the bargain will have been a fair one, with an evenhanded risk.

While the idea of the moving easement is a good one, how effectively landowners will be able to effectively dis-invest, or amortize their investments in such lands, remains to be seen. One alternative is for the public to buy the potentially threatened land in fee, land and then lease it back for specified periods and for specified low-capital-investment uses, so as to keep the lessees from over-developing the land through excessive optimism about the future.

I recognize that some landowners will resist selling easements, or sale-and-leaseback arrangements, and will resist even more vigorously compelled sales (eminent domain). But without some version of the rolling easement on land that is valuable for preservation as wetland habitat, we face massive loss of our coastal wetlands.

On lands that are undeveloped, and that have not been deemed necessary for the preservation of wetlands, a quite different problem

arises. With such lands, the concern is that over-development will occur despite the not-too-distant prospect of inundation; that if and when inundation is imminent, the occupants will find themselves economically unable to afford adequate protection; and that they will turn to the government to rescue them from their own imprudence. This is the sort of problem we have seen with imprudent developments on floodplains, but enlarged to a Katrina-type scale that is fated to generate demand for a publicly-financed rescue.

One alternative is to impose extensive set-back restrictions, or to zone such land for limited development (non-structural uses, like agriculture), but in light of the uncertainties about sea-level rise, and the long time periods involved before some lands would be threatened, such restrictions are both likely to be strongly resisted by landowners, and even if implemented, to err on the side of significant under-utilization.

On the other side, long experience has shown that over-utilization—and the ultimate casting of its costs on the taxpayer—is a real hazard. Developers do build in hazard-prone areas. And people do buy in

those areas, hope for the best (or be unaware of the worst), and remain unprepared to cope with the harm that awaits them. An individual homeowner or merchant is usually poorly situated to implement a plan of retreat or gradual amortization. Imagine an individual owning and occupying a home built 20 years ago, seemingly a safe distance inland, that is now predicted to be seven or ten years from the danger zone. Who will buy it? Who will insure it? What will it cost to move it? And the problem is magnified insofar as we are talking about the ocean shore, where effective seawalls can be very expensive.

We need an alternative to the conventional “do nothing and then pay out of the public treasury” approach to these problems, encouraging what economists call “moral hazard” and what psychologists call a “felt lack of responsibility for personal protection”. (Of course, there are some disasters, such as the 9-11 terrorist attack where losses are properly borne by the public, and not left on the victims).

But for matters like land development in known hazard areas, I suggest what might be called a “show me the money” strategy. It

works like this: You want to develop land that has a substantial prospect of loss from sea-level rise in the coming decades. We, as taxpayers, are legitimately concerned that you will ask us to pay to rescue you from imprudent investments in this hazardous land. You must therefore, as a condition to development, provide insurance to cover potential losses from rising sea level. As the insufficiencies of the National Flood Insurance Program has demonstrated, for a variety of reasons conventional insurance won't work: too much certainty of claims, difficulty in keeping policies in force, excessive optimism on the part of homeowners about the future,[4] and the difficulties of estimating disaster risks, as the catastrophic 1992 Hurricane Andrew demonstrated.[5]

There are some alternative approaches that should work. Even if the risk of inundation is considered to be more or less inevitable, but is far off in time—30 to 50 years or more—`insurance protection could

[4] **See Facing Hazards and Disasters (National Research Council, 2006), at 111-112. Though that program has been said to be "generally viewed as a colossal public policy failure" because it has not been run in a financially responsible way Pidot, infra, at 14. For a discussion of the status of flood insurance, and the debate over whether the private market can meet the needs of coastal communities, see Justin R. Pidot, Coastal Disaster Insurance in the Era of Global Warming (Georgetown Environmental Law & Policy Center, 2007). The study does not discuss insurance for inundation damage from rising sea-levels.**

[5] **See Daniel A. Farber & Jim Chen, Disasters and the Law Katrina and Beyond (Aspen Publishers, 2006), at 167-168 (article by Robert L. Rabin & Suzanne A. Bratis). Insurers paid out about 10 times what they had collected in premiums, some became insolvent and many others indicated they were withdrawing from the Florida market.**

be required, but in the form of an annuity, or a life insurance policy, rather than conventional hazard insurance like fire or theft. Where the projected harm is decades away, the annuity/life insurance model affords time to be commercially viable for an insurer. And at some specified future date, the insured would be guaranteed payment of the accumulated earnings, whether or not the harm occurred.

Another alternative is an annual charge imposed on valuable structural development, designed to sustain a disaster fund. Or, owners might be obliged to provide a showing of financial security for construction of a seawall, perhaps in the form of a bond to cover such construction costs.

There are other methods that might be adopted to address the issue. My purpose here is not to advocate any one solution. Rather, it is to pose the issues that sea level rise poses for coastal land management, which are basically two: First, how can we as members of the public assure that our private investments and public assets in the coast can be protected in the face of rising sea levels; and second, how should people owning coastal land—with their own

money and well-being at stake—manage their lands in the hazard zone to avoid putting an undue burden on the public?

What we need is a set of public policies responsive to these two questions.

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