Beach Erosion Control: Public Issues in Beach Stabilization Decisions, Florida

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ABSTRACT


Beach erosion control generates several issues of importance to the public. The origin of these issues include the public nature of the beach, the way decisions are derived for beach erosion, the assumptions behind beach erosion control, the incentives faced in forming a beach erosion control strategy, and the concern for equity in beach decisions. This paper outlines the decision-making system surrounding beach erosion control and concludes that all relevant interests require access to decision-making in order to affect the outcome.

KEY WORDS: Beach erosion, beachfront development, beach stabilization policy, coastal resources management, decision-making process, equity proceedings, sand management.

INTRODUCTION

This essay seeks to develop a rationale for making decisions on beach stabilization via erosion control. Based on experience along the Florida and Gulf coasts, the premise of this report is that all affected groups should be involved in the decision-making process for better results. Beginning with a discussion of the physical attributes of a beach and demonstrating the public nature of beaches, the paper shows that a set of rules are important for sandy beach development and use. Erosion control measures are seen to fall within these rules because of their potentially harmful effects to the beach, both on and off-site. Assumptions behind decisions to stabilize beaches are examined from the point of view that beaches serve a public good. Following this, inter-governmental and private decision-making processes are discussed, as are incentives to participate. Questions of equity and incidence in decision-making are also addressed. Finally, collective approaches are noted in an attempt to suggest ways to foster greater participation in beach decision-making.

Sandy beaches are in a constant state of flux as they respond to wave energy, fluctuations in sea level, changes in sediment supply and human activities (LEATHERMAN, 1982). Regardless of shoreline changes, a strong demand exists for private property fronting the beach. Once such properties are purchased and built upon, a demand is generated to stabilize the beach by "protecting" it from its sources of change (KAUFMAN and PILKEY, 1979). Erosion control is the primary means of stabilizing landward beach movement to protect private property and structures along the shore.

Developers and engineers stabilize beaches to foster continued residential, commercial and other developed uses. The public interest is assumed to be the fulfillment of demand registered by property owners, including those who got to the beach first and those wealthy enough to buy in at a later time. This public interest assumption is questionable as it ignores the physical dynamics of barrier beaches and other uses and users of these beaches, as well as the source of the funds used to bolster beaches.

A beach stabilization policy focuses mainly on the private use of beaches for residences and commercial endeavors. However, beaches are a public resource through an ability to absorb storm impacts and provide recreational opportunity. This occurs without the expenditure of funds, whether public or private (KAUFMAN and PILKEY, 1979).

A stabilization policy to protect private owners
involves the expenditure of public funds for private purposes. Moreover, such a policy can adversely affect owners downdrift and even lead to the loss of the beach itself. The only claim that then can be made is that the decision-making system sanctioned the erosion control expenditure through the local government involved.

It is important that protection of the beach be considered separately from the protection of beachfront development (HARDIN and BADEN, 1977). It would be ironic if a seawall or other erosion control device led to the loss of the beach and subsequently to the loss in value of the development through undermining and increased storm exposure.

Erosion control is accomplished in two ways: structural and non-structural (CORPS of ENGINEERS, 1971). Structural control includes groins, jetties, sea walls and other engineered devices to deflect eroding forces on beaches. The problems associated with structural works are their short design life, their potential loss of beach, and their erosive effects downdrift. Structures cannot permanently withstand the relentless high energy of the sea coupled with sea level fluctuations and storms. The beach all but disappears from the scouring actions of waves acting on the walled shoreline. In addition, sand from the longshore current can be retained on the stabilized site. This robs downdrift beaches of sand.

Non-structural approaches include zoning and beach nourishment. Zoning ordinances can be designed to minimize land uses that require beach stabilization, while beach nourishment replenishes beaches with more sand. However, beach nourishment results are temporary and, depending on the sand source, may not be compatible with the composition of sand already there. Wave energy and sea level fluctuation maintain their erosive forces and the new sand can erode quickly.

Zoning attempts to reduce the problem by planning for vacant lands to front the beach. However, given the high demand for beachfront property and tax revenues associated with private property, an “erosion” of a land use zoning plan can be expected over time.

With fluctuations in sea level, beach erosion continues to occur irrespective of beach stabilization plans (BARTH and TITUS, 1984). This loss of beach affects different groups differently, each of whom respond differently, according to the incentives fostered by the decision-making system surrounding beach property. Much more than a simple failure to enforce setbacks is involved, and solutions quite different from those suggested by a law-and-order strategy are needed (O’CONNELL, 1984). Similarly, much more than a simple failure to allocate sufficient funds to beach protection is involved, and solutions involve quite different concerns than those suggested by an expenditure strategy (FSBPA, 1983). Finally, much more than simple ownership of the sand resource or sediment supply is involved, and solutions quite different than the further extension of private property rights to sediment are needed.

SANDY BEACH ATTRIBUTES

One feature of sandy beaches is their dynamic nature: while durable they are changing in contour, width and location (KOMAR, 1976). This feature enhances the public nature of beaches since they cannot be restricted to static private property boundaries without some loss of beach induced on-site end elsewhere downdrift. Beaches, like highways and bridges, are expected to be durable enough for users to enjoy over time. However, this durability is tied to the recognition of limits upon use. Beaches are natural occurrences which provide the services of storm protection and recreation. Use and development without limit can destroy both these services and the beach itself (KAUFMAN and PILKEY, 1979). Thus, durability of beaches is tied to use and development rules. If some developers updrift or on-site exceed the tolerance of the beach system with regularity, the quality and quantity of a beach and its services will decline sharply. Once a beach is reduced to cobble or inundation, routine maintenance is insufficient to restore it to former levels. Therefore, beach protection is needed.

To protect the dynamic equilibrium of the beach, developers, residents and other users must be able to act collectively during their period of consumption for them to enjoy maximum benefit. Acting separately, individuals have little incentive to keep use or development within common beneficial limits. Without assurance that others also will limit use, an individual gains little from self-restraint. If assurances are given voluntarily, individuals have an incentive to exclude themselves from collective action in order to ride free on the restraint practiced by others (BUCHANAN, 1968; HARDING and BADEN, 1977). Whether an individual assumes cooperation or non-cooperation from others, the incentive is not to join in voluntary self-restraint. Thus, the problem of organizing to ensure joint consumption of beaches becomes a public concern.
Beaches as a Public Good

Sandy beaches, particularly barrier beaches, serve many functions that fall under the definition of public good. In general, a public good is one that is indivisible, jointly consumable and non-exclusive in nature (Buchanan, 1968). Indivisibility refers to the beach being consumed or used as a unit; joint consumption implies simultaneous use of a unit of beach; non-exclusion denotes the infeasibility of excluding users from that unit of beach. Each of these attributes are important in defining whether or not a good is a public good; however, it is recognized that a matter of degree exists in the “publicness” of any good. Few goods can be classified as a “pure” public good since nearly any good has some degree of “privateness” inherent in it. For example, schools can be either publicly or privately supported and still fail because the pattern of use is incompatible with the conditions of supply.

In this same way beaches can be privately or publicly owned and maintained and still be classed, in general, as a public good since they can fulfill, to a large degree, the criteria noted above. Beach erosion control projects can be publicly or privately owned and still be classed as public goods (or bads!) as well. For example, such a project cannot be separated from the unit of beach it abuts (as well as its impacts downdrift); it is consumed jointly by adjacent residents and recreationists (as well as its impacts downdrift); no one can be excluded from its impacts adjacent to the beach (or downdrift).

Thus, the loss of value of a sandy beach can be related to beach erosion control projects. In the extreme case of perfect joint use, users would have no impact on one another so that no loss in value would occur. Examples include sewer lines and street lighting where use is independent of the number and behavior of users. At the other extreme where there is no joint use potential, the good is not public but private. For beaches, joint use can “erode” the quality of use as well as diminish the quantity of beach through crowding on a summer day as well as through on-site and downdrift effects of erosion control structures (Portney, 1982). Therefore, beaches can be seen to occupy the middle ground where both public and private consumption can occur. Since users can crowd one another out and since developers can build erosion control structures that simultaneously enlarge and diminish a section of beach, some set of rules are needed to produce orderly, efficient use for given sections of beach. With limits set on the number and behavior of would-be users and developers, individuals can make joint beneficial use of beaches.

The Need for Governance

Rules governing the use of public goods (or sandy beaches here) serve two goals: to protect the common property from damage which would adversely affect the flow of services demanded and to order uses in such a way so as to reduce conflict among users (Hardin and Baden, 1977). Given the attributes of jointness and non-exclusion of use, the beach is subject to a range of diverse uses and developments. Some uses, such as residences requiring erosion control, potentially are more damaging than others and drive out less damaging uses such as recreation and storm protection. This damage can remove the beach altogether and render it incapable of supporting other highly demanded services. The prospect of a single erosion control project simultaneously destroying a portion of beach for other uses implies a need for collective agreement among uses that are mutually exclusive, wholly or in part.

Rules to retain a durable, naturally dynamic beach depend upon collective agreement and enforcement. Enforcement may be costly since individuals must be coerced into following the rules, and such costs will escalate whenever users do not find established rules agreeable (Hardin and Baden, 1977). Also individual demands of beaches can change over time, rendering existing rules obsolete. Until a new political settlement is negotiated for governing the beaches, the results will be continued loss of the beach.

Finally, since beaches are “fixed” in sediment and supply and thereby unresponsive to consumer demand and since beach erosion control reflects consumption patterns more than supply patterns, beach development and use will tend toward conflict. Thus, sandy beaches and erosion control projects display elements of being public goods which are subject to potential loss as consumption is increased. Here relationships among physical phenomena, users and rule-makers and enforcers are necessary to approach the agreement necessary for beach maintenance (Portney, 1982).
one would be concerned whether the barrier's coastline was accreting or eroding. Chronic erosion would be irrelevant because the barrier island might be simply rolling over itself in response to the natural forces present. Thus, the island would be constantly depleting, replenishing and overwashing as it migrated toward and along the mainland.

In this situation the public loses nothing as the beach responds to these chronic changes. In fact, it could be argued that the public gains by being able to perceive the constant changes being wrought on the barrier beaches. These gains in understanding of beach dynamics could later be translated into anything from enhanced appreciation of nature to loss of political support for beach residential construction and erosion control (KAUFMAN and PILKEY, 1979). Private property lines retard this understanding because the interest in beach dynamics ends at the property line. Only within property boundaries does erosion become evident.

Receding sand movement is classified as erosion when it threatens values represented by property, development and use (KAUFMAN and PILKEY, 1979). Therefore, erosion is a term denoting a potential loss of property, development and use value through a loss of sand whether due to natural or anthropogenic forces, or both. Given this perception, erosion is usually viewed as harmful. One reason for this is that storm-induced erosion may be studied more than chronic erosion (FSBPA, 1983). Concern over erosion contrasts storm-related erosion to the need for complete protection rather than looking at the issue of chronic erosion as a result of sea level fluctuations (BARTH and TITUS, 1984).

Another reason for seeing erosion as harmful is that sandy beaches are viewed as prime development sites. This view implies that protection of development sites takes precedence over other interests (KAUFMAN and PILKEY, 1979). The consequence is that less is known about erosion or sand movement as a physical influence on beach value over time. The enduring physical qualities of a sandy beach are defined by property owners in terms of a perception oriented to the protection of private development, and not to the latent public values inherent in a dynamic natural sandy beach.

Thus, public erosion control is viewed by private beachfront owners as the basic means to providing a sustained yield of an existing beach configuration. In this view physical processes and "limits" are thought to restrict human activity and productivity and thereby diminish beach value. The way to continue human beach activity is to ensure a stable beach, a beach yielding a sustained volume and configuration of sand that is "sacrosanct."

This deceptively simple idea sees an erosion control policy directly linked to the amount of sandy beach lost. Four assumptions underly this seemingly rational approach: (1) stability of the beach resource, (2) scarcity of the beach resource, (3) certainty of beach value, and (4) closed nature of the beach system.

The first hypothesis assumes that a stable flow of beach oriented development is required on into the future where the amount of development ideally regulates the amount of beach. The second hypothesis assumes that the beach is so scarce, relative to labor and capital, that it must be controlled for maximum size. The beach should be at its physical maximum for the greatest amount of value to be derived. The certainty hypothesis states that erosion control techniques and development values are well known so that beach quantity must be predictable, even though no other aspects of the future can be known. The final hypothesis denotes that each beach area must internalize production and consumption of beach development opportunities and ignore the possibilities of development elsewhere, whether on beaches or set back, and alternative uses of beaches, labor and capital. Thus, these four hypotheses operate to promote beach stabilization via erosion control.

This narrow sustained yield approach to discrete beach stabilization does not recognize the physical dynamics from sea level fluctuations, among other forces, impinging on beaches, the dynamic role of beaches in absorbing storms for mainland protection, the instability of demand for beaches, the large number of beaches potentially available, the degree of uncertainty about beaches in the future and the open nature of the economy. All of these factors combine to make unrealistic the policy of continued beach erosion control as a "first principle." In many instances, beach loss, as defined by man-made property boundaries, may prove more valuable to society overall and be preferable to continued beach renourishment requiring more capital and sand loss.

As with all resources, beach supply can only be defined by known technology and economic feasibility. It is unreasonable to assume a static perception of a beach when dynamic physical and social forces continually assign new dimensions and values to the concept of usable beaches (FISCHER et al., 1984). Enamored with the present form of beaches, developers, owners and engineers tend to lose sight of the many dynamic functions beaches serve,
including their status as a public good.

ISSUES IN DECISION-MAKING

Traditionally, federal and state officials have responded to local government requests for beach erosion control measures by funding erosion control projects (CORPS of ENGINEERS, 1971). In effect, federal and state officials reward local government by providing support for projects to arrest or replenish beaches that local governments failed to protect through adequate development rules or controls. It would seem that if these federal and state officials hold out in their support of projects to alleviate erosion, then pressure would increase on local officials to design and enforce adequate setback and other pertinent rules. However, a holdout strategy rarely works because beach erosion affects all users jointly, including public facilities, rather than just the poorly sited developments.

State officials are tempted to abandon the holdout strategy for one of state preemption of local government control (O’CONNELL, 1984). Here the state accepts responsibility for beach erosion through provision of projects as before, but with the added power of permitting private developments along the beachfront seaward of a setback line. In implementing setback regulations the state must be seen to be fair in protecting the beach and in acting selectively among offenders, even if some are of greater concern. In addition, the state works more aggressively with federal officials to solicit their financial assistance of beach erosion control efforts. Again, however, the preemptive approach by the state does not offer a stable resolution to the high demand or beach erosion control projects. The reason is that state officials cannot solve the problem unilaterally (OFFICE of PLANNING and BUDGET, 1980).

State preemption of beach development decisions end to a series of gradually more aggressive development criteria are used which do not correlate well with local development criteria landward of a setback. Failure to proportion beach development demand to beach supply characteristics results in a development pattern fundamentally uncorrelated with inherent erosion patterns. Zoning or setback classes based on incremental land use decisions imply that a single indivisible erosion pattern cuts across divisible beach development classes.

Preemption does not foster any cooperative efforts to protect beaches. Deprived of responsibility for each protection, local governments have little incentive to protect beaches since a higher level of government has the ultimate authority. Additional local action can entail a high political price in confronting local developers and residents without equivalent power. A loss of potential revenues occurs as potential residents seek out places with less enforcement. Frustration also occurs with the knowledge that another arm of the state approves of beach development to foster tourism and the local economy.

The ability of a local jurisdiction to articulate and aggregate a demand for beach erosion control shows that this level of government can contribute effectively to beach management. A failure of local government to respond adequately can be attributed to failure in state policy as well as to short-sighted elements in local planning efforts and pressures from influential developers.

Regardless of state actions, success in arresting beach erosion problems depends upon cooperation from developers, property owners and local governments (ABRAMS, 1982). If cooperation is not forthcoming, the state’s beach problem could continue to grow not simply in spite of, but precisely because of, the state’s best efforts. The state beach erosion control agency finds itself in a game-like relationship with private developers. The greater the state’s erosion control effort, the greater is the incentive of developers to shift beach erosion costs to the state. This is done in two ways: continuing to ignore setback lines or permit conditions and progressively withdrawing from self or cooperative beach maintenance. What is not clear is to what extent a state effort in beach maintenance would supplement private and local government efforts and to what extent it would have only a substitute effect as developers opt for a free-rider strategy in order to induce state expenditures for their particular beach. The more the state does, the bigger the problem may become.

Local Government Response

In general, several reasons may be offered that support local government not establishing and enforcing adequate beach protection plans such as: (1) lack of state beach planning and guidance, (2) unrealistic setbacks proposed by the state, (3) identification with local developers and owners, (4) unregulated manufacture and sale of beach protection measures, (5) state licensing and promotion of beach tourism developments, (6) lack of development criteria for beaches, and (7) lack of participation in beach management.
Without positive inducement to offset these biases facing local governments, the state government can expect that the cost of political enforcement of state rules will militate against adequate beach protection. If enforcement of unilateral state beach development rules could produce better beaches, a powerful inducement would be created; however, a strong enforcement strategy unilaterally developed would result mainly in easing the beach maintenance burden borne by the state rather than helping local government. The amount of any state fines levied could be returned to local governments as a financial incentive to participate on the side of “healthy” beaches.

By declining to establish or enforce setbacks and other coastal construction rules, the local governments keep pressure on the state to upgrade beaches through erosion control projects. Such local non-enforcement shifts part of the costs of beach protection from the local developers to the state in the form of increased protection costs. In effect, the local government elects a “free-rider” position on behalf of local developers. Because the state has preempted the field of beach erosion control the local government has no incentive to take responsibility for protecting beaches. Local governments service residents and users; beaches are the state’s problem.

The State Response

State officials respond to local free-rider strategies with their own variant of a holdout strategy by withholding erosion control projects from beaches. In effect, the state attempts to practice a form of exclusion in relation to local governments. One effect is a hope that beachfront property owners would bring pressure to bear on local governments to establish and enforce beach protection measures. However, at the same time, the state does not encourage self-maintenance of beaches by local government because their attempts, if any, are generally suboptimal. In the end, a holdout strategy cannot be sustained because exclusion of a project for a beach affects all users jointly, rather than offending developers and property owners selectively. Thus, such state sanctions against local communities do not prove to be politically feasible in the long run.

The Private Response

The decision of a property owner whether to attempt beach erosion control is based on: (1) the value and extent of property owned, (2) the value of the erosion control project to the property, (3) offers of joint-beach maintenance from other owners, and (4) ease of obtaining erosion control funds from government. Beach erosion control could be undertaken independently if it is viewed as permanently protecting the property; the property is to be held long-term; the funds for such are difficult to obtain politically through government. However, no beach erosion control project is permanent because of chronic erosion as well as storm-induced erosion.

Where developer/owner self-maintenance of beaches occurs, even on a regular basis, the level of erosion control is likely to be suboptimal. The developer measures his control effort against internal criteria which is often insensitive to external effects elsewhere on the beach. The state cannot expect to correct for this suboptimality by simply adding its efforts to a wider beachfront and because developers may choose solutions that are inappropriate.

A Total Response

To encourage beach protection without resorting to suboptimal erosion control efforts requires changes on both the developer side and the government side. To the extent that changes in basic beach protection and/or nourishment are infeasible, the process of proportioning supply and demand will consist of long-term beach renourishment projects supplemented with protection measures where appropriate. This process cannot begin, however, until adjustments are made in beach erosion control policy and organization. Both short-term and continuing adjustments in the flow of beach maintenance services are also needed.

In order for modifications of beach erosion projects to reflect conditions of demand from all relevant users, including non-residents, state and local decision makers demanding these projects must be confronted with all relevant demands. Property owners fronting beaches also must face an effective constraint of paying for what they demand so that levels of project demand take into account the full
costs of such projects. In turn, the state must ensure that it presents a common front toward beaches through all its rules, as well as its rule-making and enforcement. The state cannot license more development and expect the beaches not to be subjected to increasing impact.

**ISSUES IN EQUITY**

Institutional rules provide for ordered decision-making among numerous decision makers and, in general, determine who decides what in relation to whom. Both beaches and beach erosion control projects are public goods, so that the rules governing their allocation should be viewed from the perspective of the total benefits and costs to society, including their distribution. For beach erosion control, it would appear that these rules have become ill-suited through the creation of a perverse set of incentives which effectively precludes decision makers from choosing mutually productive strategies.

Rules cannot fully determine behavior but produce only incentives or disincentives to act in one way or another (Stone, 1982). Each individual exercises discretion subject to constraints from others in exercising their discretion. Decision-making in this context entails a sense of strategy: a calculation based upon the expected calculations of others. The combined choices of all relevant decision makers acting in relation to a set of perceptions on beach erosion issues determine the outcome.

In general, where the beach erosion problem is one of combined overdevelopment and undermaintenance, abutting and downdrift residents bear the principal burden. In other instances, usually involving major erosion projects, where maintenance keeps pace with use, the burden accrues to taxpayers or to those elsewhere whose projects were rejected to compensate for the increased level of expenditure for the major project. Since the projects are paid for by taxpayers and the property owners capture the enhanced property value, the effect is to provide property owners with a direct subsidy. To the extent that the public receives higher property taxes, has full access to the beach, and adequate ancillary public facilities designed to enhance beach use, then the subsidy is offset, and perhaps justifiable. However, one can decrease, and possibly eliminate reliance on beach erosion controls if building is not allowed on or near the beachfront. When a public good, such as an erosion control project, becomes a public bad through generating costs on-site and to downdrift beaches, other beach users lose out (Hardin and Baden, 1977).

State agency strategies in relation to erosion projects designed to protect beach properties may minimize costs to taxpayers, but they do so at the expense of other nearby property owners and state residents elsewhere. For example, recreation space on beaches can be lost through structures being sited too near the active beach so that abutting property owners can deprive access to users. Existing institutional arrangements often do not take this into account.

**Who Gains and Who Pays**

Within a beach community the erosion control problem is basically one of common property management (Hardin and Baden, 1977). The beachfront property owners and developers along with local governments are able to make decisions which impinge significantly upon local residents, state residents and tourists. Collective action to regulate the joint use of beaches must be able to control several variables: (1) the decision of what uses of beaches will be sanctioned, (2) the decision to promote or constrain development adjacent to a beach, (3) the decision of where to place a setback line, (4) the precise location, type and design of public infrastructure, (5) the precise location, type and design of public development, (6) the choice of what kind of beach erosion control measures, if any, will be employed, (7) the decision of who pays for what beach privileges and erosion control measures and who receives any returns from fees or fines, and (8) the relationship of other rules affecting the beach from other jurisdictions.

An assessment of potential social costs to beach and other residents and users must be prominent in the above decisions. This implies that erosion control organizations provide the same set of information to all relevant groups (Corps of Engineers, 1981). The obligations of beach developers and residents depend upon the recognized entitlements of those who are adversely affected. Where there is no invasion of a right, there can be no obligation and thus no assignment of a duty to compensate social costs. For example, calculation of a beach impact tax or fee on beach developments and property owners depends upon a determination of the legal rights and losses of other residents and users. Negotiation of a settlement within a beach community therefore depends upon a prior determination of the rights of the parties.
APPROACHES TO EQUITABLE PARTICIPATION

One forum for an adjudicated settlement can be found in equity proceedings (STONE, 1982). Owners who front on beaches and other owners and users have rights at common law, and can presumably invoke the jurisdiction of a law court to obtain compensation for injury done. It can be argued, however, that beach erosion control presents a special case in which adjudication after the fact fails to provide an adequate remedy and protect the rights of all parties. Beach property owners, including those being injured by them, as well as beach users, have rights to make beneficial uses of beaches. Yet these rights can conflict and must be disentangled before orderly use and development can proceed. An equity court is free to invent physical and other solutions in order to satisfy the joint equities of the parties, promulgate new rules of conduct and enforce its decisions by means of injunctions. However, courts may lean on legal precedent for their decisions to avoid social controversy over the content or substance of the case.

Equity proceedings have been used in some states as an institutional device for resolving common property problems, such as rules for allocating ground water. The use of an equity court does not involve the surrender of individual discretion by relevant decision makers. Here the powers of the court are available to constrain the development of holdout strategies. Negotiations occur with the knowledge that a failure to agree on a set of rules will result in reliance on judicial discretion. This approach allows parties with standing to appear in a formal forum for a thorough hearing of their respective positions.

Another approach used to enhance equity in beach use includes the organization of an erosion control district where the areal extent of its boundaries include all beachfront capable of being impacted upon by the range of projects to be considered. Here beach residents, developers and users combine to tax themselves to fund any desired project, and they could create and implement beach management rules going beyond erosion control projects. This latter emphasis would denote a beach management district.

A less formal device is a beach management committee sanctioned by the state to foster the inclusion of all relevant users of the beach (ABRAMS, 1982). Here in one forum are the representatives of federal, state, local and private interests affected by beach erosion control projects. Such a forum can also go beyond simple erosion control to embrace beach management concerns. The incentive for such to operate effectively is the necessity for all interests to be included and the state to accept rules forthcoming from the committee rather than a subset. Environmental mediation can be used to aid the decision-making process resolve difficult issues.

Finally, the regular court system can be used to appeal any particular concerns of equity. Judicial interests emphasize due process rather than the substance of a case; however, this form of appeal is an important and honored last resort to equity issues.

CONCLUSION

A critical question is whether beach development serves the entire local community. If beachfront developers and owners gain at a net cost to others locally and there is no compensation for losses incurred, then there is a lesser basis for regarding beach development as a contributor to the overall good of the community and the state. The current pattern of development on beaches may be suboptimal in this sense. Proper beach management provides long-term benefits, such as the protection of the beach resource, which, while chronically eroding, remains long after a development has depreciated, provided protection of the development did not take precedence over the protection of the beach. General community well-being is then enhanced through seeing the developments as temporary uses of a permanent though fluctuating beach resource. The connection between private economic advantage and common well-being is not automatic when the beach resource is an eroding public good. The provision for rules and knowledge of incentives in decision-making for all affected parties must then enter the domain of concern. Finally, equity is important to foster through an appropriate organizational base and a recognition of the rights to beach use by those downdrift and those not living adjacent to beaches.

More than a simple increase in levels of beach protection is needed to produce an appropriately protected beach. Changes are also required in the basic pattern of protection, given indivisible consumption patterns associated with beach use. Simply put, it is not always feasible to differentiate beaches by degrees of erosion since to do so inevitably invites development of beaches which in turn accelerates erosion.
Barring a shift to lesser development, a common approach backed by all relevant groups is needed. If the precise location and amount of erosion was totally predictable, then it would be more feasible to determine long-term beach development and protection plans. However, the dynamic nature of physical processes acting upon beaches cannot be totally captured and contained in a static plan based on a hypothesis formed at one time.

Regardless of which approach is used to attempt consensus between parties to foster the recognition and enforcement of the appropriate management stance to eroding beaches, at present the burden of proof rests with those claiming injury from beach development. This mixed group of residents and users is so diffuse and the cumulative damages often so far in the future that their rights in management are not recognized, except perhaps through state preemption. As noted, this strategy cannot result in stable protection unilaterally.

ACKNOWLEDGEMENTS

The author appreciates the comments of Martin Belsky and Maynard Silva. While they helped to enhance readability and reduce error, any remaining difficulties are the author's alone.

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