Historical Coastal Environmental Changes: Human Response to Shoreline Erosion

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The origins of coastal erosion as a perceived "problem" can be traced directly to the historical sequence of human settlement on wave-washed shores, a process stimulated by recreational predilections for this dynamic geomorphic environment and its idealized ambience. Concurrent with beachfront urbanization was a change in attitude toward the prevailing physical processes. Initial respect for marine forces prior to the late nineteenth century evolved into complacent acceptance and finally to combat and dominance—an attitude shift facilitated by a displacement of liability from the individual to government. Although the folly of this transition is today being realized, past legislative commitments to protect coastal communities from erosion are hard to undo. In this chapter, the evolution of policy responses to shoreline erosion in the United States will be outlined.

The Seaside Tradition in the United States

Although human attraction to the seashore may have its antecedents in the thallasotherapeutic (seawater therapy) pursuits of the ancient Greeks, the modern history of beach recreation is an outgrowth of the elitist spa phenomenon which swept northwestern Europe during the Middle Ages. The "taking of the waters" at such resorts as Bath, Vichy, Espa, and Baden-Baden gradually became augmented by a "salt" component. The first modern sea bathing is traced to Scarborough, England (circa 1700), where a natural springs emptied out onto the beach. Although sea bathing was initially confined to members of the elite, the Industrial Revolution—characterized by increasing urbanization, increasing wealth, a secularization of "holy days," and a corollary rise in leisure time—increasingly
popularized spa and seaside resort visitation and development throughout England and continental Europe. Diffusion of spas and seaside resorts to the overseas English colonies followed rapidly, and by the late eighteenth century, distinct spa-resort and seaside-resort landscapes had evolved in the new United States.

As the seaside resort became popular in the United States, it was increasingly developed along exceptionally fragile and dynamic coastlines. Unlike in England where much of the coast is cliffed, the coast of the eastern United States—from Cape Cod to the Rio Grande—largely consists of low-elevation sandy beaches, barrier islands, and sand spits, environments that are geologically young and highly dynamic. While shoreline transgression associated with late Holocene and present-day sea-level rise affects all types of coasts, narrow strips of sands are particularly vulnerable to erosion. Furthermore, conditions of equilibrium in barrier environments are easily upset by events such as storms or interference with longshore transport processes.

In terms of human settlement, the dynamic character of sandy shorelines dictated that permanent occupation would be subject to various levels of adversity. In England settlements could be located on bluff tops and removed from the adverse impacts of transgression and storms. In the United States, direct shorefront settlement was very vulnerable to erosion and destruction by wave action. This was recognized by the aboriginal Indians, who did not select wave-exposed shorelines for permanent settlement sites. The first European settlers generally also avoided exposed shorelines, and where they did not (e.g., the Spanish at Pensacola, Florida), severe storms or hurricanes quickly stimulated shifts in settlement location. With few exceptions, America’s coastal cities became established in sheltered locations such as baysides, riversides, or leesides of barrier islands.

The Nineteenth Century: Changes in Attitude

Colonization of seashores for recreational and touristic pursuits in the nineteenth century led to changing attitudes toward coastal environments. Until about the 1870s, America’s “recreational coastal frontier” expanded as recreationists experimented with, learned about, and attempted to adjust to a dynamic Nature that more or less remained in control. By the late nineteenth century, however, as ever more Americans flocked to the coast, the first signs of more brazen attitudes toward shore erosion appeared. Terms such as “stabilize” and even “combat” became more prevalent. With few exceptions, however, human reactions to beachfront losses
were unorganized, and no policies resulted during the nineteenth century.

In the early 1800s, America's seaside resorts—still rather elitist and almost exclusively concentrated in the northeastern states—were mostly linked with the major urban hinterlands. Bostonians frequented Nahant, New Yorkers visited Coney Island and Long Beach, New Jersey, and Philadelphians sojourned at Cape May, New Jersey. Wealthy Southerners—mostly from Virginia and the Carolinas but also planters from the lower Mississippi valley—traveled to northern resorts such as Cape May as well as Newport, Rhode Island, which was more an elitist summer-home colony than a beach resort. Little is known about the impacts of storms and coastal erosion upon these resorts during this period, although the diminishing appeal of Cape May throughout the century has been attributed partly to the gradual disappearance of the sand beach.

The diffusion of seaside resorts to the rest of the United States took place throughout most of the nineteenth century. This "frontier period" of coastal urbanization may be attributed to a complex interplay of cultural, economic, and technologic factors: (1) sea bathing remained extremely popular, and increasing numbers of Americans had sufficient disposable time and money to partake in the "pleasures of the seashore"; (2) technological advancement in transportation, notably the invention of the steam engine, facilitated—and lowered the cost of—travel, initially by steamship and later by railroad, to the popular resorts; (3) the late antebellum social rifting between the North and the South both reduced southern travel to the northern resorts but also propelled Southerners to establish their own resorts; (4) the post-Civil War opening of the West by railroad facilitated resort diffusion to Pacific shores (hence Newport, Oregon—perhaps the oldest seaside resort in the West); and (5) a renewed interest in "thermalism" popularized winter recreation, which was, by the latter 1800s, both reinforced as well as stimulated by the southward extension of rail lines. The settlement histories of both southern California and Florida are integrally linked with resort development.

Throughout the nineteenth century, the interaction of recreationists and dynamic shorefront environments was one of learning, experimenting, and coping. On the Gulf Coast, there was very little construction directly upon exposed shorelines until the late 1800s. Although wave-washed beaches were recreationally desirable, not only for bathing but also for sensory stimulation, the hazards of periodic hurricanes—well known by long-term residents—were acknowledged by early coastal recreationists. On the other hand, lower wave energy shorelines, such as Mississippi's mainland shores of Mississippi Sound and the Eastern Shore of Mobile Bay, were perceived as being safer. Many recreational settlements devel-
oped in such "sheltered" locations, from which excursions to the undeveloped exposed shores were easily made—e.g., Port Isabel to Padre Island in Texas. Also, hotels and cottages were built on higher ground, often a considerable distance from the beach, and only structures such as bathhouses or dance pavilions were built directly along the beach. In locales where suitably high elevations were absent, such as on Grand Isle, Louisiana, structures were raised several feet off the ground to keep ground floors dry during periodic storm-overwash events (Fig. 10-1). Also, driftwood and sand dunes were usually left in place, as their role in retarding beach erosion was recognized. Until the onset of the winter recreation phenomenon, the summer-only tourism season normally ended by September 1, a date popularly regarded as the onset of hurricane season.

Along with the expansion of rail lines, the diffusion of grand resort hotels to southern shores, and the institutionalization of annual southward migrations, the earlier precautions regarding shorefront settlement began to be ignored during the affluent Gilded Age. Sand dunes were mined for fill material, beach debris was removed to aesthetically improve the recreational resource, and hotels were built in previously undeveloped beachfront locations, many of which were known to be unstable by aboriginal and long-term residents. The removal of natural protection from storms, coupled with often-rampant urbanization in the late nineteenth century, set the stage for direct confrontation between coastal residents and nature.

Variations of human response to storm-induced erosion and destruction during this period may be illustrated by case studies of Grand Isle, Louisiana, and Galveston, Texas. Both sites first experienced beachfront urbanization in the 1880s, and both were soon hit by major hurricanes: Grand Isle by the infamous Cheniere Caminada storm of 1893 and Galveston by the even more infamous Hurricane of 1900. In Louisiana, where the entire settlement of Cheniere Caminada (population of circa 2,000) was destroyed, as were the three major hotels on Grand Isle, the response was one of abandonment. Cheniere Caminada was not rebuilt, and the surviving residents moved inland, some to the New Orleans area. Tourism development on Grand Isle was set back four decades. Not until highway access was provided in the 1930s did recreational urbanization recur. The response in Galveston was different, perhaps in part because that city, the largest in Texas at the time, was a major commercial shipping center as well as a seaside resort. Even prior to the 1900 hurricane, beach erosion had been recognized as a problem, and the city had erected bulkheads and groins, and had outlawed the excavation of beach sand. Following the storm, in which an estimated 6,000 inhabitants lost their
lives, a commitment to rebuild meant strengthening the coastal defense system to withstand future hurricanes. The result was one of the greatest coastal engineering projects ever undertaken in the United States. With local bond money, a five-mile-long (now expanded to ten miles), seventeen-foot high seawall was built, and 11,000,000 cubic yards of dredged sand were used to raise the grade of the entire city. By 1911, a "new and improved" Galveston was ready to usher in a new era of shorefront tourism development.

Elsewhere along America's developing shoreline in the late nineteenth century, responses to storms and accelerated erosion fell somewhere in between those of Grand Isle and Galveston. In this pre-Automobile Age period, a general reluctance to build on exposed coasts prevailed. Storm-damaged structures, although occasionally abandoned, were usually rebuilt by individual owners, and isolated efforts at installing shore-protection measures were made. For example, the same 1893 hurricane that temporarily halted tourism on Grand Isle struck the Mississippi coast, causing additional damage and loss of life. Although complaints were voiced, reconstruction was largely left up to individuals. Little evidence of organized resistance or policy response to erosion was noted.
The trend of organized involvement in "combatting encroachment of the seas" pioneered by the City of Galveston became more prevalent along America's shores as beachfront urbanization continued into the twentieth century. The beach became increasingly valued as a natural resource, and as the dollar value of coastal development increased so did the calls for protection from erosion. Because early-twentieth-century demand for protection from erosion was increasingly directed at political bodies ranging from local governments to the U.S. Army Corps of Engineers, a better understanding of coastal processes was necessary. The growing field of coastal engineering needed scientific input from coastal geomorphologists, of which there were few at the time.

At about the same time that coastal populations demanded more knowledge about the coastal environment, coastal process theories began to change. Previous explanations for coastal erosion—and perhaps for the nineteenth-century patterns of caution regarding beachfront structural development as well—relied upon a prevailing theory of land submergence. As the seaward edge of the eastern United States subsided at rates of one to two feet per century, wave action slowly moved landward in response. Thus, coastal erosion was seen as an integral aspect of the forces of nature, and organized political entities were reluctant to assist coastal property owners who had dared to defy nature and lost. However, after having studied several decades worth of sea-level data, Dr. Douglas W. Johnson, geology professor and later author of *Shore Processes and Shoreline Development* (1919), set out to debunk the land-submergence theory. This change in thinking had the effect of giving the public an impression that (1) shorelines should theoretically be stable, (2) beachfront construction should not be as vulnerable to erosional forces as previously thought, and (3) any beach erosion that did occur should be able to be offset by structural or nonstructural countermeasures. In view of Johnson's premature dismissal of the land-submergence theory, the need for more research in coastal morphology and coastal engineering became evident.

The new attitudes toward coastal erosion, coupled with a rapidly expanding beachfront infrastructure, made apparent the need for more organized responses to erosion. First, individual property owners' attempts at structurally modifying the shore zone often were not only ineffective but also counterproductive. Second, highways, rail lines, and utilities were increasingly occupying beach-proximate corridors, and protection of such public and semipublic service infrastructure was considered
implicit. Also, there was strong public support to keep beaches in the public domain. As early as the 1890s seaside communities in New Jersey were buying up private beach properties seaward of new coastal roads or boardwalks.\textsuperscript{25} (The fact that this incipient beach-preservation movement began in response to an intensification of coastal development is somewhat analogous to the beginning of the national park movement at a time of increasing wilderness tourism only a few decades earlier.) When a series of severe storms in New Jersey during the winter of 1913–1914 caused much damage to coastal development, public demand for state involvement quickly increased. The State Board of Commerce and Navigation stressed to the state legislature “the importance of the protection of the the New Jersey beaches, realizing their tremendous value to the state and to the nation at large.”\textsuperscript{26} In Mississippi, petitions for state involvement in coastal protection followed a 1909 hurricane which caused serious damage to the shell road and a new interurban trolley along the rapidly urbanizing mainland coast (Fig. 10-2). After a much more severe hurricane in 1915 destroyed over half of the beach roadway, the state legislature in 1916 passed a law committing itself to protection of the beach highway. Although the law was soon declared unconstitutional, legislative lobbying continued.\textsuperscript{27}

World War I temporarily interrupted trends of both coastal urbaniza-

\textbf{Figure 10-2.} Harrison County, Mississippi, circa 1911, the view looking east from the lighthouse toward Biloxi. (Photo courtesy Murella Hebert Powell, Biloxi Public Library.)
tion and organized efforts to stem shoreline erosion. However, the boom years of the Roaring Twenties witnessed a resumption of both, and for the first time, the federal government became involved. In 1922 the New Jersey legislature appropriated money for a comprehensive study of beach erosion, and an Engineering Advisory Board on Coast Erosion was formed. Numerous federal agencies, including the U.S. Army Corps of Engineers (USACE), were represented on the board in advisory capacities. Although U.S. Army involvement in beach erosion began as a by-product of the military mission to construct coastal fortifications in the 1820s, not until this time was the erosion of privately developed lands seriously investigated. The inclusion of the USACE in the new movement to halt erosion was party rationalized on the basis that navigational improvements—especially jetties—commissioned under the numerous Rivers and Harbors acts of the nineteenth century had resulted in increased erosion of adjacent beaches. In one spectacular case that was not acknowledged until many years later, the resort of Bayocean, Oregon, gradually tumbled into the sea, as the shoreline readjusted to a new equilibrium after the USACE in 1917 constructed only a north jetty to maintain a navigation channel into Tillamook Bay. Studies commissioned by the New Jersey Engineering Advisory Board on Coast Erosion resulted in the release of two technical reports (in 1922 and 1924) which did place the blame for some coastal erosion on nearby jetties constructed to maintain navigation channels. The upshot of the studies was the increased role of the federal government, specifically the USACE, which was viewed as the logical agency to coordinate erosion-control efforts. The USACE formed a Board on Sand Movement and Beach Erosion in the late 1920s, which was replaced by the Beach Erosion Board (BEB) in 1930. The BEB, in turn, was replaced in 1963 by the Coastal Engineering Research Center (CERC), today headquartered in Vicksburg, Mississippi.

Also in the early 1920s, coastal geologist Douglas Johnson was able to form a Committee on Shoreline Studies under the Division of Geology and Geography of the National Research Council. This committee, which included geographers Isaiah Bowman, director of the American Geographical Society, and Nevin Fenneman, professor at the University of Cincinnati, felt that shoreline erosion was a matter of concern because (1) beaches were socially and economically important, (2) the constant attrition of such valuable lands resulted in large economic losses and threatened the existence of many communities, and (3) the scientific basis of shore protection-oriented coastal engineering was inadequate. Among the activities of this committee was a public outreach to representatives of coastal communities and states throughout the country. This, in turn, resulted in the formation of a private organization—composed of coastal
scientists, engineers, and public citizens—known the American Shore and Beach Preservation Association (ASBPA) in Asbury Park, New Jersey, in 1926. Established for the “welfare of shore and beach lands,” the organization’s mission was “to foster sound, far-sighted, and economical development and preservation of these lands.” One of the aims of the ASBPA was to get communities and states to recognize the need for federal involvement in shore protection, and the resultant grass-roots support played a part in the USACE decision to form the Beach Erosion Board. The ASBPA, which publishes the journal Shore and Beach, is still quite active today in shore protection and preservation issues.

Although the events of the mid-1920s were slowly leading to increased federal involvement in shore protection, local governmental responses to erosion still dominated until the early 1930s. Buoyed in part by successful local structural reactions to erosive forces of nature in Galveston as well as in Europe (notably Holland), local governments embarked on both isolated and comprehensive structural engineering projects. In Mississippi, the state legislature formed a Road Protection Commission (a.k.a. the Seawall Commission) in 1924, and with funds derived from a gasoline tax, it authorized a seawall fronting the entire 26.5-mile-long shorefront of Harrison County. Completed in 1927, the concrete seawall was billed as the world’s longest, and similar seawalls subsequently were built fronting the developed portions of the two flanking Mississippi coastal counties. The seawalls, thought to be successful (later to be proved false), afforded a false sense of security which in turn stimulated a tremendous tourism-development boom.

The success stories of the Galveston and Mississippi seawalls notwithstanding, other local efforts at combating beach erosion were often poorly planned and unsuccessful. As in Mississippi, for a brief period individual states took on the financial responsibilities and the USACE provided the technical assistance. Because of lower construction costs, groins and bulkheads became the popularly prescribed structural solutions of the period, and even Miami Beach armored itself with them following the devastating hurricane of 1926. Centrally organized erosion control was deemed essential for successful beach preservation, and the relatively successful groin fields of south Florida were contrasted by the often haphazard responses along the New Jersey coast.

Changes in Federal Policies: From the Flood Control Act to the Coastal Barrier Resources Act

In the aftermath of the Stock Market Crash of 1929 it became apparent that states or local governments could not finance comprehensive ero-
sion control. And although the BEB had been created in 1930 to provide technical expertise and coordinate local erosion control projects, there was strong opposition in Washington to using federal funds to protect private property. By 1934, however, Congress agreed to recognize that shoreline erosion was a public problem. In the aftermath of severe storms during the winter of 1935–1936 which caused extensive flood damage in various interior states, Congress passed the Flood Control Act of 1936, which established that flood control was a proper activity of the federal government and that both public and private property could be protected by federal projects. This policy was extended to shorelines, although "federal interests" had to be proved. The term was not clearly defined, but it has come to be interpreted in terms of public recreational resources, including public beaches even if backed by private property. The Flood Control Act quickly stimulated federal involvement in beach-preservation/shore-protection projects on both coasts, including the creation of many miles of beaches in Southern California. It also led to the first federal acquisition of a beach, in 1937—the Cape Hatteras National Seashore.

The term "federal interests" in the Flood Control Act of 1936 was interpreted differently by the myriad federal agencies created in the economically depressed 1930s. Several "jobless-relief" agencies justified putting people to work on erosion-control projects throughout the United States, including a massive Works Progress Administration (WPA) dune-construction project on North Carolina's Outer Banks. As with the Mississippi seawall, this project imparted a false sense of security which subsequently allowed much private development to take place on these fragile "ribbons of sand." In contrast, the Beach Erosion Board interpreted the 1936 act much more critically and refused to support federal financing of hard structural methods of erosion control throughout the 1940s and 1950s. The emplacement of groins, bulkheads, and jetties remained quite popular at the local level during this period because of their relatively low cost, but the effectiveness of such structures would be increasingly questioned. The USACE did, however, endorse artificial nourishment as a compatible solution to beach erosion, and it completed numerous projects on both coasts. By the early 1950s, the USACE had received authorization to include potential impacts of hurricanes in its benefit-to-cost analyses when evaluating the feasibility of beach-nourishment projects. As a result, beach construction projects flourished, and Mississippi was soon able to boast of "the longest manmade beach in the world" fronting what had become an erosion-threatened seawall in Harrison County.
communities in the construction of seventy-five shore-protection/beach-nourishment projects at total costs of $109 million.\textsuperscript{50}

During the rise of environmental consciousness in the 1960s and 1970s, legislative policies were increasingly perceived as contradictory. While the federal government on one hand tried to ensure a continuance of "public interest" which implied the preservation of nature and public accessibility, on the other hand it encouraged private development through subsidized flood-insurance and disaster-relief funds. Federally subsidized disaster insurance became available in the early 1950s, and federally subsidized flood insurance was made widely available to residents of flood-prone riverine and coastal environments following the National Flood Insurance Act of 1968.\textsuperscript{51} The effect of this was to remove the individual risk in building in erosion-prone coasts, actually stimulating coastal construction and thereby increasing benefit–cost ratios used to justify shore-protection/beach-nourishment projects (Fig. 10-3). For example, the most costly federal shore protection project to date has been the beach nourishment of Miami Beach. In the discussion stage since the late 1950s, a federal commitment was made in the 1960s, and—after various delays, especially over issues of public access—the project was finally completed in 1980 at a total cost of about $80 million, half of which were federal dollars.\textsuperscript{52}

However, the Miami Beach project was destined to be the last of the great federally funded beach-nourishment projects, as legislative policy

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\caption{Atlantic City boardwalk, 1987. (Photo by Klaus J. Meyer-Arendt.)}
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shifted from subsidization of development to preservation. The National Environmental Policy Act (NEPA) of 1969 gave a new Environmental Protection Agency jurisdiction over coastal development to ensure "a balance between population and resource use which will permit high standards of living and a wide sharing of life's amenities." In 1972, the federal Coastal Zone Management Act (CZMA) was passed, and coastal states were given incentives to prepare coastal-management programs which would outline development guidelines and monitor development practices. Also, the National Park Service was given the mission to expand its national seashore program, and by 1972 the remaining nine of the present national seashores had been authorized for preservation. Scientific evidence that sea level was indeed rising—and at accelerated rates—further supported the shift toward a policy of preservation.

Although the various guidelines and legislation were intended to minimize development of coastal areas and to preserve and conserve the natural resources, coastal development has increased substantially since the laws were first enacted. First, the state governmental policies were not very effective due to both loose interpretation and lack of enforcement, and second, the federal flood-insurance program continued to stimulate new and more elaborate beachfront construction. (In spite of constantly changing minimum required ground-floor elevations, claims paid out in the wake of hurricanes continued to increase rapidly.) Various other federal programs were providing direct supports in the form of highway funds, sewer improvement funds, and other infrastructural assistance. By the late 1970s, a loosely organized coalition of coastal scientists, environmentalists, and fiscal conservationists called for more stringent legislation.

In 1982, Congress passed the Coastal Barrier Resources Act (CBRA), which effectively withholds federal monies from any development on designated undeveloped barrier islands and mainland barrier shorelines of the Gulf and Atlantic coasts. A 1985 proposed amendment to the act, adding existing protected land and near-shore water bottoms to the previously designated barriers, was adopted as the Coastal Barrier Improvement Act of 1990. Although the acts preclude the federal government from legally preventing structural development on privately owned land, they could theoretically lower rates of development by withholding federal subsidies and passing on risks and higher costs to the private sector. Preliminary results showed that the CBRA legislation has indeed slowed rates of development at some of the designated CBRA barrier units, but land use is becoming more intensified (e.g., condominiums) as only major developers can afford to take the added financial risks.

Although legislative policies are today reverting back to the "be cau-
tious at the coast” attitudes that prevailed until almost a century ago, a commitment to protect existing coastal communities remains. Construction guidelines have become more stringent, federal flood insurance is still available, and in cases of severe storm damage and other (natural) causes of erosion, shore-protection projects are still completed. Structural methods of shore protection—including groins, breakwaters, and sea walls—have largely been replaced with more “nature-compatible” beach nourishment, including creative uses of dredged spoil. However, there are increasing demands that federal involvement in beach nourishment be lessened. Orrin Pilkey of Duke University’s Program for the Study of Developed Shorelines has argued that money spent on beach nourishment is essentially being flushed into the sea. Although the USACE has not retreated from its mission of coastal “flood control,” the federal government has been slowly decreasing its share of financial commitment and thereby increasingly placing responsibility for costs and risks in the hands of the local communities—as it used to be.

Conclusions: The U.S. Coastal Landscape in the Twenty-first Century

The present coastal landscape of the United States has evolved as a result of both “spontaneous occupation” and also regulatory policies. Until the onset of the twentieth century, coastal development proceeded slowly because of infrastructural hindrances coupled with a certain degree of respect for marine forces. More brazen attitudes toward shoreline erosion, reinforced by successful efforts at “combatting the sea” (such as erecting the Galveston seawall) and subsequent shifts in the science and engineering fields’ attitude on erosion control led to increasing coastal urbanization and shorefront armoring. Although this rampant urbanization stimulated a shift to preservation, and the national seashore program, flood insurance, and infrastructural subsidization by various federal agencies actually permitted coastal construction to proceed at unprecedented rates during the 1970s. By the 1980s, the detrimental effects of tampering with beachfront ecosystems by structural means was realized and even “soft” shore-protection measures such as beach nourishment were being questioned. More importantly, environmentalists joined forces with fiscal conservatives to preclude further rampant urbanization of the country’s shorelines by the withdrawal of federal subsidies.

As we enter the twenty-first century, the impacts of policies will continue to be manifested in the landscape. The historical record has given
indications that the public attraction for the seashore is not diminishing, although rates of visitation and urbanization may fluctuate with the state of the economy. Since this finite resource will have been effectively parceled into preserved coastal segments and developed coastal segments and the latter perhaps subdivided into "grandfathered-in" federally subsidized development and CBRA (nonsubsidized) private development, the real-estate values will rise in response to demand for property. High-value real estate will effectively restrict development to low-density residential construction by the wealthy (again, a reversion to patterns of the past) or to high-density development in the form of high-rise hotels and condominiums. For many, enjoyment of the seashore will take only the form of visitation, as high costs will preclude beachfront vacation residence ownership. These patterns, already found along many segments of the United States coastline, will surely be further intensified in the next century.

Notes

14. Ibid.
15. McComb, *Galveston*.
19. Ibid.
23. Ibid.
24. Ibid.
27. *Proceedings, ASBPA*.
30. Quinn, *History of the Beach Erosion Board*.
32. Quinn, *History of the Beach Erosion Board*.
33. Moore and Moore, "The Corps of Engineers."
34. Ibid. and Quinn, *History of the Beach Erosion Board*.
35. Quinn, *History of the Beach Erosion Board*.
36. *Proceedings, ASBPA*.
37. Ibid.
40. Moore and Moore, "The Corps of Engineers."
41. William J. Herron, "The Influence of Man Upon the Shoreline of South-


43. Moore and Moore, “The Corps of Engineers.”

44. Herron, “The Influence of Man.”


46. Moore and Moore, “The Corps of Engineers.”

47. Ibid.

48. Ibid.


50. Platt, “Congress and the Coast.”


52. Moore and Moore, “The Corps of Engineers.”


60. David R. Godschalk, Impacts of the Coastal Barrier Resources Act: A Pilot Study (Chapel Hill: University of North Carolina Department of City and Regional Planning, 1984) and Godschalk, “The 1982 Coastal Barrier Resources Act.”