

REVIEW OF THE BOOK *THE CORPS AND THE SHORE* BY O. PILKEY AND K. DIXON

By

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The book *The Corps and the Shore*¹ by Orrin Pilkey and Katherine Dixon harkens back to those good old days of yesteryear when heroes wore white hats and were always good and completely right and villains wore black hats and were always bad and completely wrong. The book's heroes are coastal geologists, scientists, foreign engineers, and environmentalists (if they disagree with the Corps of Engineers) and the villains are the Corps of Engineers, American engineers, and environmentalists (if they agree with the Corps). Since the world presented is always black and white, the book quickly becomes tedious in its predictability. Further, the book's insistence on villains always being villains leads to many obvious inconsistencies. For example, the book presents five case studies of Corps' projects. If the Corps' solution for a case study was a structure (Sargent Beach), it should have been beach nourishment. If the solution was beach nourishment (Folly Beach), it should have been to do nothing. If the solution was to do nothing (Camp Ellis), it should have been to do something. The Corps is always wrong no matter what it does. It is illustrative to review the book's first three case studies and compare inconsistencies in the criticisms.

CASE STUDIES

Folly Beach, South Carolina, is the first of the book's case studies (Pilkey and Dixon explain that the name comes from an old English word meaning a tree-crested dune ridge). The book strongly criticizes the Corps' beach-nourishment project constructed in 1993, arguing that Folly Beach should have moved buildings rather than nourished its beach. Folly Beach residents had funded a study that concluded the Charleston jetties built by the Corps in 1896 were responsible for their beach's erosion problems, and, therefore, the Corps should pay the majority of nourishment costs. The book dismisses

Folly Beach's complaint as ". . . a grand effort to persuade everyone of Folly Beach's status as the victim of a Corps' navigation project . . ." ¹ Yet the book presents nothing supporting its sweeping conclusion that the study lacked merit.

After blasting the Corps for nourishing the beach at Folly, the book notes the project was authorized and funds appropriated through a "congressionally added project." ¹ "Congressionally added" means the Corps did not recommend the project, but Congress authorized it, appropriated funding, and inserted the project into the Corps' program (with the President signing relevant bills). This is an important point because the book often vilifies the Corps for basically following the law. Obviously, Federal agencies are required to follow the laws of the land and Administration policies. We would not have a democratic society if they were not. In this case the Corps comes under blistering attack in the book for basically obeying the law.

The book also criticizes the project's performance: "What we view as a spectacularly unsuccessful beach is said by the Corps to be working as expected." ¹ One month after fill completion, Orrin Pilkey was quoted as saying, "It's still disappearing . . . They're still pumping as we speak, and when they're finished, there will be no beach. This is the worst case I've ever seen." ² However, the Corps' Coastal Engineering Research Center (CERC) documented an average beach width of 40 meters (about 130 feet) along the Folly Beach fill one year after construction - close to the 44-meter width the Corps predicted (prior to fill placement) as the one-year width. ³ The book says, "We are puzzled by the reported average 130-foot beach width, given our own observations and the accounts of local residents." ¹ CERC's account of beach width is based on detailed measurements, published in the peer-reviewed literature ³, and publicly available. The book also says that two years after fill placement (1995) there is ". . . little dry beach remaining and the storm berm largely gone . . ." ¹ "At the time of writing, two years post-replenishment . . . Looking to the north and south from the eighth floor of the Holiday Inn, the view is much as it was pre-replenishment." ¹ However, a published series of 16 photographs covering the length of the Folly Beach nourishment show remarkable differences between the beach before nourishment and 2 years after nourishment (August 1995). The photographs show in August 1995 ". . . wide beaches and extensive dunes along almost the complete fill length." ⁴ This condition of the beach differs completely from the book's description of Folly Beach pre-nourishment as ". . . nothing but long lines of rock and rubble revetments, seawalls, and groins as far as the eye could see. Some were large, some small, most were dilapidated, and all were ugly. The beaches were largely gone except for narrow slivers of sand in a few places at low tide." ¹ Unless the Corps with its published ground surveys

of beach width and photographs covering the fill's length is conducting a rather elaborate hoax (akin to the Apollo moon-landing "hoax" claimed by flat-earth proponents), the book is simply wrong (As an example of the photographs, see Photographs 1-3. Photograph 1 shows pre-fill conditions, Photograph 2 is 2 1/2 years after fill placement and 6 months after the book says the beach looked similar to the pre-fill beach, and Photograph 3 is 3 1/2 years after fill placement in July, 1996, just after Hurricane Bertha).

Camp Ellis, Maine, is a case study very similar to Folly Beach, but the book takes a completely different (and inconsistent) position. As with Folly Beach, residents blame erosion problems on jetties built in the 1800's. The book says jetties were built in 1867 and 1891, erosion problems started in 1905 to 1910, and the shoreline was back to pre-jetty times by 1934. This is 43 to 67 years after construction of the jetties. A series of Corps' reports starting in 1920 concluded that the jetties were not responsible for local erosion. It would seem that the book would take the same position for Camp Ellis as it did for Folly Beach. That is, it would question claims that the jetties were a cause of Camp Ellis' erosion, and the Corps would be admonished to have no involvement in the problem - just let nature take its course and the town move its buildings. However, unlike Folly Beach, the book is sympathetic to resident claims that the jetties caused erosion (although it can cite no study supporting this position), and when the Corps ultimately decides to do nothing at Camp Ellis, the book criticizes the Corps and sympathizes with the plight of local residents. The chapter ends with the exchange, "'Is that it? Is that the end of the whole study?' queried a citizen from the back row. 'That's about it,' replied the New England Division (of the Corps) representative."¹

The book notes CERC used an hydraulic model to study Camp Ellis and says that using it, "The CERC had come up with a solution that was prohibited by Maine's beach preservation law. Instead of working within the Maine system and evaluating the nourishment, jetty alteration, and building relocation alternatives that were within the law, the Corps' research center suggested additional armoring . . . "¹ This is not true. CERC used the model to work within the Maine system, studying the area's coastal processes and a range of potential "soft" erosion solutions including beach nourishment, depositing a protective dredged-material berm offshore, and removal of the entire existing north jetty.⁵ CERC did not use the model to study jetty modifications until near the end of the model's life when Camp Ellis residents asked for tests, and the Maine Department of Environmental Protection (MDEP) agreed. The MDEP sent a letter telling the Corps, "Alterations to the jetties, including any expansion, are not expressly prohibited by state regulation . . . "⁶ and, "It does seem that testing this scenario in the

model may provide some useful data that will not be available once the model has been destroyed."⁶ CERC tested a wide range of options for the erosion problem at Camp Ellis, but none had a benefit-cost ratio greater than one. Therefore, the Corps recommended the same do-nothing option Pilkey and Dixon recommends for all other case studies in their book. But when the Corps recommends to do nothing, it is wrong once again.

Residents of Sargent Beach, Texas, join the Corps as villains in the next case study. The chapter starts, "If there is ever a contest to determine which American beach community looks the ugliest, Sargent Beach, Texas, will certainly be a top contender." "The town is little more than a few dozen fishing shacks and cottages perched atop dredged-spoil mounds that line both sides of the Gulf Intracoastal Waterway (GIWW)"¹ Apparently, these residents are modern day squatters with the book noting, "Since most of Sargent Beach's fishing shacks and cottages are built on the spoil mounds, ownership in a practical sense, is indeterminate."¹ The "beach" is described as having little sand and being " . . . strewn with a wide variety of flotsam and jetsam including hard hats, plastic milk cartons, and children's toys."¹

After basically describing Sargent Beach as the beach from hell, the book notes that the issue was not threatened houses or the rapidly eroding shoreline, but protection of the GIWW against breaching by the sea. Sargent Beach has a rapidly eroding coastline (40 to 60 feet per year) with little sand and an exposed marsh mud that erodes rapidly. Once the Sargent Beach land buffer between the GIWW and ocean is eroded, this section of the GIWW would be open ocean.

So what should be done? The book first proposes "Let Nature take its course." "We doubt that loss of the waterway along Sergeant Beach would hamper shipping to a significant degree."¹ No studies are cited to support this contention. Texas proponents of action to prevent breaching of the GIWW contended that a breach would have heavy economic consequences to the State of Texas and the Nation. Since the State favored action, the Corps was required by law and Administration policy to perform studies to determine if there were solutions to the problem with benefit-cost ratios greater than one. The low-cost solution consistent with environmental laws was a revetment that was ultimately built. Had the Corps wanted to do nothing and let Nature take its course, laws and Administration policies governing the Corps would not have permitted this course. The book seems to recognize this: "In the end, the coalition expended a lot of effort . . . to push a project that the Corps was obligated to do anyway under its mandate to maintain the intracoastal waterway."¹ Again, even when the authors recognize the Corps has no option but to follow the laws and Administration policies that rule its actions, the Corps is still the villain.

The book says that a preferable option to a revetment would have been to route the GIWW through the San Bernard National Wildlife Refuge wetlands. The book admits this would lead to the ". . . eventual loss of many acres of wetlands."¹ The Fish and Wildlife Service joins the Corps as a villain at this point: ". . . the Service narrowly focused on saving a piece of its wetland as it exists today, with little if any consideration for surrounding natural areas or the potential long-term consequences."¹ Villains in the book are often named. In this case, a specific Fish and Wildlife Service scientist who cannot respond is criticized in the book for having sent the Corps a letter stating his belief that a revetment would have a ". . . positive environmental benefit by serving as a point of attachment for sedentary organisms, that, in turn, would provide a good source for mobile organisms."¹ The book criticizes the "U.S. Fish and Wildlife Service's inflexible, no-wetland-change requirement" and "the National Environmental Protection Act (NEPA) requirement that a new wetland of equivalent area and type be established," since these requirements made the cost of relocating the GIWW through the Wildlife Refuge wetlands greater than the revetment cost.¹ One suspects that if at this point the Corps rather than the book were criticizing the U.S. Fish and Wildlife and NEPA, Pilkey and Dixon would be roasting the Corps.

The book at first agrees with the Corps' conclusion that a beach-nourishment option would be too costly: ". . . the replenished beach's erosion rate would exceed 40 feet annually, making the cost of repeated sand pumping virtually out of the question."¹ However, the book says there is an ". . . alternative for Sargent Beach akin to beach replenishment. Taking sand from the Brazos delta . . . and putting it into the longshore transport system of the local beaches would increase the sand supply to Sargent Beach."¹ The Brazos delta is 30 miles from Sargent Beach. How can placing sand directly on Sargent Beach (or Folly Beach) be economically hopeless as the book suggests, but putting it in the littoral system 30 miles from a beach eroding 40 to 60 feet annually be effective and economically viable?

The book sees a future Sargent Beach where the revetment makes beach access increasingly restricted, and "The popular Texan pastime of driving on the beach will no longer be possible at Sargent Beach."¹ The book is worth reading just to learn that Orrin Pilkey is concerned about the plight of Texans who will not be able to drive on beaches. However, "A lot of money will have been made by Sargent Beach property owners . . ." with the sprouting of "Large, expensive buildings next to and behind the wall . . ."¹ It is hard to imagine large, expensive buildings sprouting on "spoil mounds" of "indeterminate" ownership next to a junkyard beach on which Texans cannot even drive.

MORE INCONSISTENCIES

The book continues its inconsistencies in another chapter by praising Dutch coastal engineers while criticizing U.S. coastal engineers. Pilkey and Dixon do not grasp the irony of praising engineers of the world's most highly-engineered coastal zone, where rather than retreat from the sea's advance (the solution touted in the book), the Dutch have successfully advanced their land at the sea's expense. The praise is centered around Dutch coastal engineers not (according to the book) using mathematical models in their beach-nourishment designs. Actually, Dutch coastal engineers have been among the world's more active in developing complex coastal-processes mathematical models. They do not use them much for beach-nourishment design because they do not have to perform extensive economic analyses such as those required in the U.S. by Administration policy. Instead, the Dutch are committed to a national policy of holding their shoreline in place through annual placement of 8-million cubic yards of sand. This is more than twice the 3.8-million cubic yards placed annually in Corps' projects from 1950-1993.⁷ The Dutch believe it practical, economic, and environmentally responsible to use beach nourishment to indefinitely hold the position of their North Sea coast⁸ (which has a wave climate at least as severe as U.S. coasts). The Dutch approach is at odds with the book's philosophy that says of beach nourishment, "The practice, always expensive and always temporary, has met with mixed success and is of questionable merit as a long-term coastal management strategy."¹ Since Dutch engineers have been successful battling the North Sea for centuries, it is hard to argue that their beach-nourishment strategy is not a good long-term coastal-management strategy.

Despite the fact that most Corps' spending on shore protection since 1960 has been for beach nourishment rather than structures⁷, the book continues its inconsistencies by implying the Corps' still builds many coastal structures. After railing against the Corps for building structures, the book references a photograph of a seawall at Folly Beach - clearly implying that the Corps built the structure (it did not). This is reminiscent of the video, *The Beaches are Moving*, where Orrin Pilkey stands before the Monmouth, New Jersey, seawall criticizing the Corps for building seawalls, and implying the seawall at his back was built by the Corps (it was not). The book seems to accept the hard-to-argue fact that the Corps spends little on shore-protection structures. "At the national level, the Corps may have refocused its emphasis from seawalls to beach replenishment as the environmentally preferable erosion response."¹ However, the book claims "... most coastal district offices are still working to fortify the nation's beaches."¹ "... the structural 'solution' is the one proposed more often

than not by Corps district offices."¹ Apparently these District offices have not been very successful in pushing most of these structural solutions, since only about 10% of Corps spending on shore protection since the 1970 has been for structures.⁷

THE ULTIMATE INCONSISTENCY - BEACH NOURISHMENT

Much of the remainder of the book is previously-published material attacking beach nourishment and related issues such as the equilibrium-profile and closure-depth concepts and numerical modeling of coastal processes. A previous review of the book noted that many of the book's arguments in these sections ". . . come across as a latter-day Luddite attack on technology."⁹ The book basically argues that the only long-term coastal-management solution (regardless of circumstances) is to retreat because ultimately Nature always has the winning hand. An analogous argument would have us discard the practice of medicine because ultimately Nature wins, and we all die. A do-nothing approach is fine for undeveloped beaches. However, since Administration policy requires storm-damage reduction to be the primary benefit, Federal beach-nourishment projects are in developed areas. The book admits that beach nourishment reduces storm damage: "There is no question that replenished beaches do reduce storm damage to buildings in beachfront communities."¹ Further, it recognizes the undesirable consequences of doing nothing: "Without beach replenishment most United States East Coast hot spots - Atlantic City, New Jersey; Coney Island, New York; Ocean City, Maryland; Virginia Beach, Virginia; and Jacksonville Beach and Miami Beach, Florida - would be beachless, concrete fortresses."¹ Still, to the puzzlement of the reader, beach nourishment is one of the book's villains. A previous review reflects this puzzlement: "Nourishment represents the 'natural' approach to coastal protection, restoring the sand to the beach where it can dissipate the wave energy. This approach is now used throughout the world, with demonstrable success. So it is difficult to understand why Pilkey continues to attack this approach with such fervor."⁹

This book by Pilkey and Dixon was published the year after the National Research Council (NRC) performed a study and published an authoritative book on beach nourishment.¹⁰ Ironically, Orrin Pilkey was one of the NRC report authors (CERC recommended that he be a panel member on the NRC study). The NRC report concluded that beach nourishment is a viable long-term approach to erosion problems and favorably discussed many of the things strongly criticized by Pilkey and Dixon in their book (equilibrium profiles, closure depth, models such as GENESIS). Apparently, Dr. Pilkey was not able to convince the eminent panel of his peers that his viewpoints were valid since the "latter-day Luddite" viewpoint is no where to be found in the NRC report.

What could not muster peer-review support in the NRC study is instead published in *The Corps and the Shore*.

AVERSION TO ANYTHING QUANTITATIVE

The book's neo-Luddite view of technology is nowhere stronger than in its criticism of numerical models, where its aversion to technology actually appears to extend to anything quantitative including field data! The chief expressed concern in the book is the use, by coastal engineers, of computational models to predict the behavior of beach-nourishment projects, profile change during storms, and equilibrium beach profiles. The book's argument that such models cannot possibly represent nature exactly is appreciated and shared by most coastal engineers applying the models. These engineers recognize the need to question whether model results are reasonable and put models through their paces to determine the degree of confidence warranted. The value as a learning structure of making predictions prior to project construction, subsequently monitoring the project, then later comparing predictions with monitoring results appears to go unrecognized in the book. Engineers are criticized as not taking into consideration the complexities of nature, yet it appears contradictory that the book does not present data refuting the use of such models. This is surprising since data exist and are available to Pilkey and Dixon for evaluation and comparison, for example for the Folly Beach nourishment project. The book relies instead on anecdotal information from individuals sharing the authors' views. In reading the entire book, this pattern of data avoidance is so prevalent that one must question if it is not purposeful, thereby leaving the authors full latitude to express their preconceived views without being constrained by facts. The book's claim that computational models simply do not work is completely understandable given that the two major equations presented in the book are either incorrect or incorrectly interpreted. The equation representing the equilibrium beach profile (Page 68) has the depth interpreted as the distance offshore and vice versa for the distance offshore, while the equation representing the longshore sediment transport (Page 57) is incorrect. If these are the equations the book contends do not represent nature, we must wholeheartedly agree!

LACK OF BALANCE

The book focuses on making the case that Corps' Districts do not present complete results and Corps' researchers are guilty of a lack of balance and of practicing "Client Science," i.e., the scientific results of a study are either bent or selectively accepted to fit the client's desires and needs. The engineer is thus the captive of his or her client.

The irony is that the book itself is replete with a lack of balance extending from the case studies and misstatements on performance by the Corps in particular, and engineers in general, to the views of particular individuals quoted on specific projects. For example, no mention is made of dozens of successful nourishment and other coastal engineering projects, and the demonstrated capabilities to predict their performance at least to some degree. As examples, the Delray Beach nourishment project was first constructed in 1973 to replace a sloping seawall that had proven ineffective, and as a result of this initial nourishment and three renourishments over the 23-year span, the beach has been widened by about 80-180 feet within the project area, and substantial widening has occurred both north and south of the project area.¹¹ A second case is the sand bypassing plant at Hillsboro Inlet, Florida. This facility has been quietly and effectively doing its job of transferring sand from the updrift side to the downdrift side of this small-craft navigational entrance for approximately 30 years. The book finds no middle ground, no matter of degree in the capability to represent nature and design effectively. In this manner, the book closes off the avenue of establishing present capabilities, identifying the weak links, and directing research efforts to improving capabilities. In doing this, Pilkey and Dixon could be considered as serving a different clientele, which results in "Press Science" where there is a need to speak in absolutisms: "the project failed, the project will wash away in the first storm, the design was a tragedy," etc., and it is essential that the comments be critical and expressible as sound bites. In this scenario, the authors' clients are the Press with a reward of public exposure and a platform to continue espousing their views. The price of becoming the captive of the Press is the need to, on demand, continue the litany of strident unbalanced criticism without conveying to the Public the two sides of these important issues and the almost certain greater loss of the capability of seeing and weighing both sides of issues. Certainly, the coastal-engineering successes cited above of Delray Beach and Hillsboro Inlet would not provide good Press fodder!

CONCLUSION

The Corps and the Shore is a partisan book with an almost religious fervor not often seen outside debates on creationism versus evolution. The Corps would seem to be a large enough target for the book to spare a little even handedness. However, in the book you can be assured that the Corps of Engineers is always the villain, and the book will seemingly take completely inconsistent positions from chapter to chapter to ensure villains remain villains. After a couple of hundred pages of strident criticism, part of the final chapter ". . . discusses several recommendations . . . that we (the authors) believe

would help the Corps in its current role as steward of the nation's beaches."¹ If dialogue is the destination, the authors have taken a curious path.

The majority of U.S. coastal engineers and scientists concur that coastal zone management is a serious issue for the Nation due to the population concentration along the coastline, the effects of sea-level rise, and the associated concentration of hazards. Thus there is the need to contribute to a rational National approach to address these complex technical and social problems. Appropriate management cannot be "one solution fits all," but in order to be viable, each solution must be tailored to the particular circumstances of the area of concern. Also, coastal hazards should be considered within the broader framework of the many hazards to which our society is exposed. The book has taken on an important subject in need of improved methods and policy, a subject which deserves a sincere and balanced approach. Some of the book's factual history recounting backgrounds of particular case studies was quite interesting and provided an essential element of an effective treatment of the subject. Similarly, some of the early history of the Corps' involvement in coastal issues as well as the recommendations of an improved Corps working structure merit consideration. However, in aggregate, the book by Pilkey and Dixon, unfortunately presents an extremely unbalanced view of coastal engineering and the Corps' role in coastal-zone management, and thus provides little assistance to the Public that can be used for decision making and formulation of a rational, acceptable, and defensible coastal-zone policy for the Nation's future.

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Figure 1



Figure 2



Figure 3

