THE ROLE OF THE SHOREFACE IN PROVIDING BENEFICIAL EFFECTS FROM WASHOVERS, INLET BREACHES (AS LITTLE PIKE'S INLET) AND BARRIER ISLAND PRESERVATION THROUGH MIGRATION.

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Overview

Most of the recent erosion along the seaside of the barrier islands of L.I. have been attributed to the periodic storms and the sand starvation created by groin fields and stabilized inlets. Various studies recommend the widening of our narrowing barrier islands by offshore dredging, and the maintenance of the islands by inlet stabilization and sand bypassing, and the artificial closure of any new inlets. This study provides some additional evidence for an offshore sand source in the shoreface environment. It is based on the pattern of landward sand transfer at Little Pike's Inlet on Westhampton Beach. It demonstrates that beach and dune erosion, overwash, inlet breaches, and mainland flooding after storms do not produce natural destruction - only destruction of "permanent" features placed on migrating sand environments. But this cycle of landward sand migration, along with the migration of the shoreface environment, will also produce new beaches, dunes, bays and salt marshes (i.e. as recently observed at Little Pike's Inlet) slightly landward of the old ones. The present coastal policy that attempts to maintain a "balance" between coastal processes and urbanization and tourism implies a stable coastline, but some of it gets destroyed after every storm. We need a policy that begins to address and accept the problems of coastal submergence and sand migration by adopting strategies that include abandonment, structural depreciation allowances, and relocation, when considering coastal revitalization and redevelopment for future tourism and marine recreation.

Introduction

During the winter northeasters of Dec. 12-13, 1992 and March 14-15, 1993, newspapers reported the "punching" of a breach through Fire Island at Westhampton Beach; the destruction of many dunes (and 60 homes) along the barrier island, and the loss of several stretches of beach. This "gloom and doom" also included the opening of a new (Pike's and Little Pike's) inlet, which led to an increase in mainland flooding and the "destruction" of the ecology in Moriches Bay.

The point of all this was to again convey a message to the public as to how destructive nature is to coastal environments, and how the natural processes tend to destroy barrier islands. This concept was also recently emphasized in the June '93 Long Island Coastal Conference publication (Schubel and Larocca) under the scenario theme "Mother Knows Best." "The charges wrought by Mother Nature over the past 27 years have not treated Long Island..... kindly, and have resulted in a drastic upheaval of our

socioeconomic system" (p.73).

This report will demonstrate that none of the accusations made over the "destructive nature" of the natural processes is actually true (Wolff, 1993). After 50 years of not accepting and adjusting to the rhythm and spikes of the natural processes, we do have a drastic upheaval in our socioeconomic system, and will continue this way until we adapt to and accept the changes brought about by coastal storms. The periodic maintenance of coastal beaches or inlets to sustain a "balance with nature", and the restoration of public and private property is not the way nature works. As with forest fires, after growth and evolution, there is periodic large scale "destruction", and from this apparent destruction comes a new forest as growth and evolution continues.

History of beach erosion and inlets at Westhampton Beach

The sand starvation at Westhampton Beach dates back to the 1940's; the erosion has been periodically emphasized in the national media. The problem is attributed to the groin field (16 groins) emplaced by the U.S. Army Corps of Engineers in 1962-63. What is not emphasized is the reason for the request of groins. The beach/dunes already saw 20 years of erosion, culminating with the dune breaching, flooding and washovers from the March '62 Ash Wednesday storm. Also not emphasized is that the thin strip of sand between Shinnecock and Moriches Inlet has had a long history of inlet openings and closings (Tansky and Bokuniewicz, 1989). The rate of erosion east of Westhampton Beach quadrupled from 1.5 to 6.0 ft./year once Shinnecock Inlet was opened and stabilized in 1942 (McCormick, 1973). Thus the initial erosion is not related to the groins, but to the stabilization of Shinnecock Inlet. The recent opening of two new inlets during the Dec. '92 northeaster only offers additional conflicts between people and nature.

Purpose of Study

The aerial photos ('92-'93-'94) of Westhampton Beach were made available by N.Y. State D.E.C., for which I am grateful. The use of the field observations and these photos were to demonstrate that what is often depicted as coastal destruction is actually beneficial sand migration. This can be demonstrated with a $12 million experiment at Westhampton Beach. If the groin field has prevented the longshore sand transfer to the downdrift beaches, the beaches will starve, and any new inlets will remain open. Yet, beyond Westhampton, the beaches survive and sand has accumulated inside (the new) Little Pike's Inlet while it remained open. This indicates that besides a longshore source for sand, there must be an offshore source as well.

Overwash and Inlets

The Long Island barrier islands are transgressive micro-tidal islands with frequent washovers and infrequent inlets (Leatherman, 1988). Both of these features promote landward sand migration, but also create seaside beach and dune erosion. While washovers persist at Westhampton, management policy is to bulldoze the sand

back beneath the beachfront houses - only to be washed away by the next storm. People still perceive barrier islands as wide stable platforms now being destroyed by sea level rise, storms and beach erosion. They refuse to accept the consequences of these islands as narrow, unstable features, periodically being "maintained" by landward sand migration during storms - whether developed or not.

Now comes the Dec. '92 northeaster -- a storm which opened two new inlets and washed away 62 houses over a 4-day period (Figure 1)

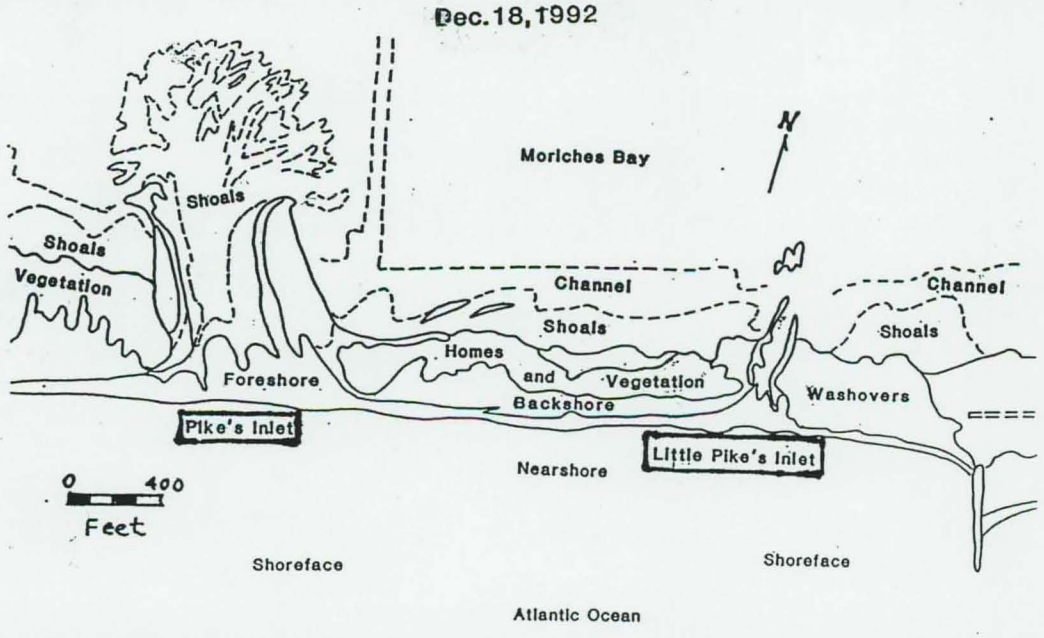

Figure 1. Depositional environments at Westhampton Beach after the Dec. '92 opening of two new inlets.

By. Jan. '93 Pike's Inlet (on public land) was sealed, but Little Pike's (on private land) could not receive authorization, and began to enlarge at a rate of 20-30 feet/day. The delay in closing the breach led to an increase in mainland flooding and bayside salinity, but neither was of damaging ecological consequence, though it was of some concern to homeowners.

The location for these new inlets could have been predicted 20 years ago. They formed in embayed areas on the bayside of Fire Island, places not backed by salt marshes, overwash lobes, or sand flats (Figure 2). Contrary to popular belief, the washovers don't create inlets, they prevent them; and inlet breaches don't permanently destroy the natural environments of barrier islands, they create the bayside sand deposits needed to create the base or foundation for the future migration of the dune and barrier island sand to their new location over these bayside sediments. But at Westhampton Beach the groin field, meant to solve the problem of the original beach erosion, also prevents the closure of the new inlet. How can this new inlet close naturally?

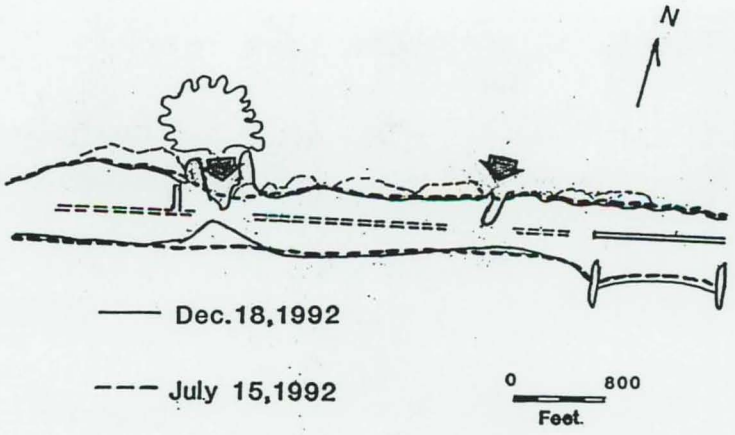

Figure 2. Location of inlet breaches in areas lacking overwash lobes and sand flats at Westhampton Beach.

The Shoreface

Consider first a slow but natural solution to an inlet breach. On Fire Island the gentle offshore slope that persists beyond the nearshore sand bars out to a depth of 30 feet is the shoreface (Figure 3). This zone is 10x wider than the beach, and also is the

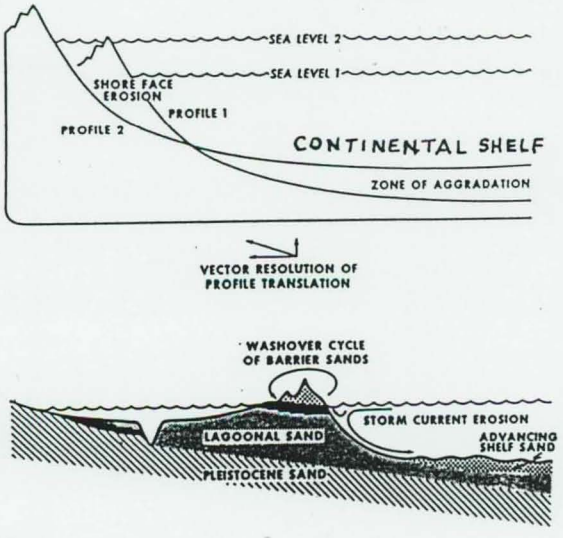

Figure 3. Landward migrational response of the beach and shoreface to sea level change (long-term) to demonstrate the Bruun Rule. (A short-turn application occurs with every major coastal storm) - modified from Swift (1976).

area most directly involved with the onshore-offshore sand movement. It determines whether a beach will gradually be eroding or accreting (Pilkey, 1990). Yet, it remains a complex zone that includes both local wave-driven and regional wind-driven forces (Swift, 1976). During fair-weather conditions on the inner shoreface the offshore winds can produce an overturn current that creates upwelling and onshore movement of sand lost during a prior

storm (i.e. the shoreface becomes a sand source for the beach). During storms, the onshore wind setup (as with northeasters and hurricanes) raises the offshore sea surface to produce a downwelling coastal jet (Figure 3). This results in beach and dune erosion, but also some overwash deposition. The movement of sand is from the beach back onto the nearshore zone, and the shoreface (i.e. the shoreface becomes a sand sink for two thirds of the sand while one third may be moved landward as overwash or inlet breaches).

Now comes the application of the "Bruun Rule" from coastal engineering (Bruun, 1962). As the sea level rises all the coastal environments (barrier island and mainland) are eroded, and either shift sand landward (overwash and breaches) or seaward (beach and nearshore erosion, shoreface deposition), causing the ocean floor and the bay to build upward (Figure 3). As the shoreface zone gradually migrates landward, its slope rises (i.e. shoreface retreat) keeping a sand supply relatively close to the shoreline.

Changes at Little Pike's Inlet

The significance of the shoreface as a sand source can be observed at Little Pike's Inlet in June, 1993 (Figure 4). Since

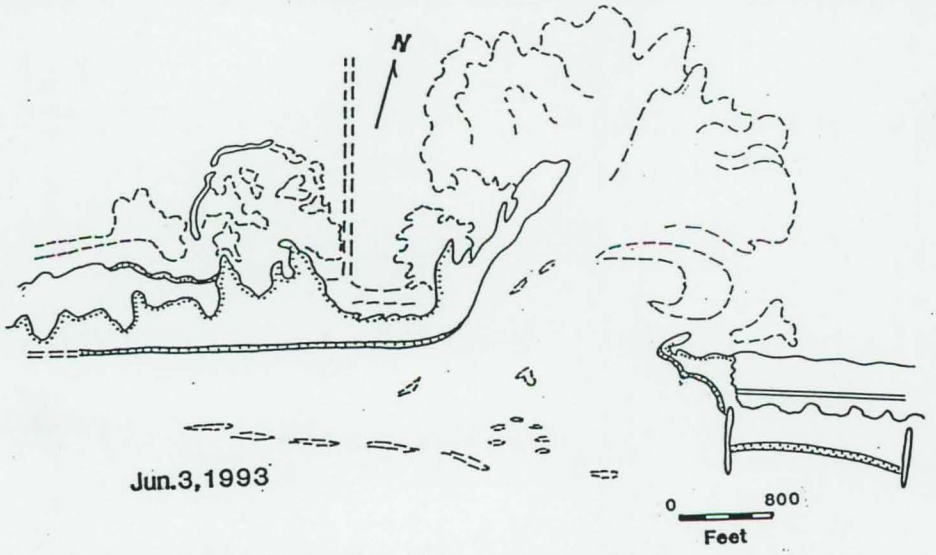

Figure 4. Offset barrier islands, sand spits, and shoals at Little Pike's Inlet before appearance of dredging - inlet closure operation by U.S. Army Corps of Engineers in July 1993.

the groin field has severely restricted the littoral sand drift for 30 years, the inlet would take years to close naturally. The Army Corps of Engineers received emergency funding to dredge and close the inlet because of the concern over mainland flooding and the Moriches Bay ecology. In the meantime, though the inlet widened to 2000 feet and deepened to 20 feet, extensive sand shoals (estimated at 1 million cubic yards) accumulated in the inlet (Figure 4). There is also a large curved sand spit formed by flood tidal

currents on the west side of the inlet. Both of these depositional features indicate that, even under the influence of sand starvation, new inlets can still induce conditions of sand migration - but (because of shoreface retreat) now in a more landward location. The storms of the past 30 years have now shifted the site of natural sand deposition 400 feet landward of its former stabilized groin field location on the east side of the inlet.

By Dec., 1993 the inlet is sealed, not by natural processes but by the burial of interlocking steel sheeting and the dredging of several million cubic yards of offshore sand (Figure 5.)

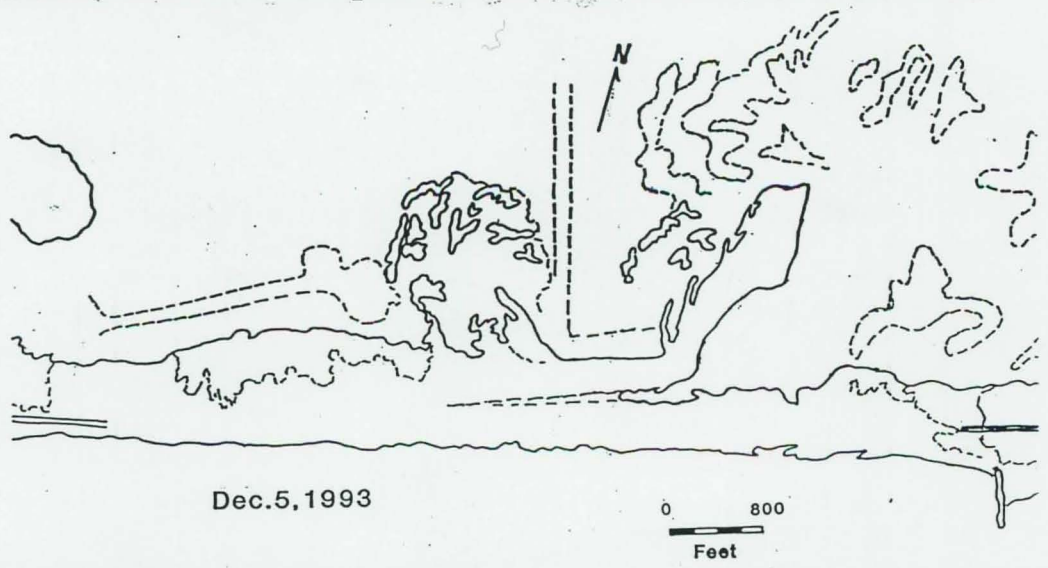

Figure 5. Closure of Little Pike's Inlet with the artificial nourishment of Westhampton Beach and the natural nourishment of the bayside marshes.

Mainland flooding has temporarily been averted, and the lateral continuity of the barrier island has been maintained. The natural benefits from shoreface retreat and inlet breaching have not been acknowledged. Only the importance of maintaining the integrity of the artificial system has been emphasized. The time gap (repair interval) for the renourished beach remains very long, and many expect the return of the inlet within the near future.

The present management strategy of stabilization and sand bypassing at the five current inlets can only lead to further beach and dune erosion and bayside deepening along stretches of beach that presently have no inlets. Through the application of the "Bruun Rule" and the shoreface retreat, each coastal storm will continue to "nibble away" at beaches not near inlets (as now at Cupsogue County Park, Saltaire, and Dunewood).

If management strategy is to allow further narrowing of the barrier islands by nourishment or stabilization and the closure of any new inlets, then the next step is to decide over the next 30

years, how many areas of dune erosion, washovers, and potential inlet breaches are aesthetically and socioeconomically acceptable. Only then will relocation or abandonment become the (only?) possible option - for the landward migration will occur anyway. Wouldn't it have been better, years earlier, to start to accept and adjust our coastal tourist and homeowner economy to the natural patterns of flooding and sand movement by:

1. condeming destroyed private coastal property, and provide homeowners adequate compensation for house and property.
2. develop public land, once the migration is complete and the natural dunes reform, into public parks with ferry access.
3. construct sites on the mainland and back barrier for more ferry docks; dig channels for more ferry routes.
4. build more parking lots on abandoned mainland property; maintain parking lots on islands near areas with parkway and bridge access.
5. accept the progressive loss of Ocean Parkway in areas not near bridges; avoid lateral roadways across inlets elsewhere.
6. construct rental cabins (for overnighters) and wood pavillions (for day trippers) on islands with only ferry access (i.e. as at Watch Hill).
7. in general, convert areas of eroding progressive sand migration on private property into areas of depositional sand relocation on public property.

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