BEACH EROSION AND THE REMEDIATION OF OUR BEACH AT GNB

As most all of you will remember, due to the long term erosion/deterioration of our most important asset, our front beach, the GNBA Asset Management Committee recommended at the August 2010 meeting of the GNBA that our association allocate funds to contract with Docko, Inc. to:

- apply for and secure a permit from the Department of Environmental Protection (DEP) for harvesting sand for beach remediation
- design a plan for controlling the erosion undergirding the Giant's Neck Road causeway and wall at the point of the lower pond outflow conduits.

Your affirmative vote also allocated funds to complete the first year of this ongoing project.

Your Board of Governors has appointed a task force, namely The Beach Erosion & Restoration Task Force (BERTF), to administer this project.

It should be noted here that BERTF was not involved with the selection of Docko, Inc., nor did it provide Docko with the specifics of the project. BERTF was, in fact, established after the letting of the contract to Docko. We state this fact at this point, not to disparage Docko in any way, but rather to establish timing of the process. In fact, we have found Keith Neilson and the entire Docko, Inc. staff to be very professional and a pleasure to work with. BERTF was formed to accomplish the plan for beach remediation and wall protection you voted for last August.

Before we report where we are presently with this project, we thought that it would be worthwhile to help you understand just what has happened to our beach. The following several paragraphs are from Against the Tide, The Battle for America's Beaches, by Cornelia Dean, 1999, and give a good overview as to the dynamics of never-ending beach movement:

> *Sea level determines where the waves will break. But, to a great degree, the sun determines how they break, because it is the sun that warms the air to generate the winds that power them. In effect, breaking waves transfer the solar energy to the coastline. The size of the waves depends on how fast, how long, and over what distance -- or fetch -- the wind has blown. The harder, longer, and farther the wind blows, the bigger the waves.*
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> *The closer they are to the wind that made them, the choppier waves are. As they spread out and calm down, they become more regular and are known as swells. When waves move into shallow water, water at the surface moves faster than water caught up in the friction of the bottom. The waves steepen and become unstable. When the water is only a little deeper than the height of the wave, the wave breaks, releasing much of its energy to the beach.*
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> *Meanwhile, water moving over sediment-like sand sets its grains in motion, picking some of them up and carrying them along. Some of this sand moves along the bed in ripples that form in mysterious ways in the oscillation of the water on the bottom. But much of it moves in the water itself. The faster the water moves the more sediment it can carry. When the water slows, the sediment drops out, or precipitates. This process helps explain how breaking waves can pick up sand in the turbulence of the surf zone and drop it on the beach when they run out of steam. It also explains how storm waves can have so much energy that they bounce off a beach, carrying sand away with them only to drop it in deeper water offshore. In deep water, sediment at the bottom rarely feels the movement of the waves at the surface. It takes a big wave to move sediment under thirty feet of water.*

If waves broke exactly parallel to the shoreline, the life of a grain of sand would be a simple one. It would come ashore in mild weather and go off again in storms. But waves do not come in square. Depending on many factors, notably the predominant direction and strength of the wind, the waves hit land at a slight angle, often so slight as to be invisible to sunbathers on the beach. But it is enough to set up alongshore (or long shore) currents that move a veritable river of sand in one direction or another as winds shift along the coast, especially in storms.

The sum of all this movement of sand, usually measured over a year's time, is the beach's net littoral drift, and in some places it is enormous. On the Outer Banks of North Carolina, where waves are as energetic as they are anywhere on the East Coast, geologists estimate that as much as seven hundred thousand cubic yards of sand may move from north to south along any given stretch of beach each year. On the far reaches of Cape Cod, a heavy flow of sand from south to north has built miles of new beach, called Province-lands, where the Cape's forearm bends at the wrist. In other places, shifting winds may produce a net drift so small that a single episode of unusually severe weather can alter the beach for decades.

Our main beach at Giant's Neck, protected from extreme wave action by Griswold Island, several offshore ledges, Black Point and the jetty off the point, sustains a relatively mild littoral drift from east to west. This resulting slow movement of sand is further distorted by the flow of water from the lower pond which tends to carry sand out into our bay adjacent to the Beebe property. It has, because of this minimal littoral drift, taken many years to modify our beach to its present condition of a relatively broad sandy beach (in front of and adjacent to the Chris and Glory Lena property) tapering to a very narrow and rockier strip at the east end (in front of the Tramontozzi's home).

Under the current proposed plan approved and funded by vote of the GNBA at its August 2010 meeting, this displaced sand will be harvested *from the sand bar* in front of the west end of the beach and be dispersed along the entire length of the beach above the high tide line. With the sand placed there, the action of wind, rain, and storm driven tides, as well as human activity, will reshape the beach to its natural slope. This harvesting will be executed in coordination with the *current* 10-year permit which authorizes the GNBA to relocate sand *from the west end of our beach above the high tide line* and spread it over the length of the beach as well. It may take several years of work performed under both of these permits to rebuild the beach to a condition similar to when many of you were children.

In ***Control of Erosion, Inundation, and Salinity Intrusion Caused by Sea Level Rise*, a report by** Robert M. Sorensen, Richard N. Weisman, and Gerard P. Lennon, they state

Eroding shorelines can be stabilized by the placement of suitable [adequate particle size and shape] sand, usually a large initial fill followed by periodic renourishment to make for [annual] loses. To be feasible, a good source of sand located near the nourishment area is required. Typical sources included offshore deposits, deposits at the ebb and flood deltas of a tidal inlet, and occasionally, if adequate quantities can be found, onshore or in nearshore embayments.*

**Sand harvested from the sand accumulated at the west end of our beach is by definition the perfect replacement sand for our use -- same in size with naturally softened corners. Sand mined elsewhere would typically be of different sized grain structure and would be sharp cornered, hence unnatural in feel and uncomfortable to walk on.*

BERTF would, therefore suggest, in the interest of fiscal responsibility, renourishing our beach for a *minimum* of two cycles and then evaluating measurable gains before deciding to commit further funding toward this program.

Sorensen, Weisman, and Lennon further articulate,

> *Projections of sea-level rise for the twenty-first century vary widely, ranging from several centimeters to more than a meter. Rising sea level can inundate low areas and increase flooding, coastal erosion, provide wetland loss, and saltwater intrusion into estuaries and freshwater aquifers. [note: the average slope of our beach at GNBA is 5:1 and all other things being equal, we will lose 5 inches of beach width for every inch of sea level rise.* [Elevating our beach with the addition of sand will be key in offsetting this potential beach loss]
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> *Preparing for sea-level rise can be justified in many cases, because the cost of preparing now is small compared to the cost of reacting later. Nevertheless, preparing for sea-level rise has been the exception rather than the rule. Most coastal institutions were based on the implicit assumption that sea level and shorelines are stable.*
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> *The prospect of accelerated sea-level rise and increased vulnerability in coastal regions underscores the immediate need for improving our scientific understanding of and ability to predict the effects of sea- level rise on natural systems and society. These actions, combined with development of decision support tools for taking adaptive actions and an effective public education program, can lessen the economic and environmental impacts of sea-level rise.*

As the task force overseeing this major project, we can report that the tedious and demanding permitting process with the DEP is nearing completion with receipt of the actual permit expected sometime by late June/early July. We have made preliminary contact with potential contractors who have the experience to complete the harvesting process within the strict guidelines of the DEP permit. We will seek a few more. The task force can only solicit quotations once the permit has been awarded. When all solicited quotations have been reviewed, a contractor will be selected, a timeline established and all information will be presented to the board of governors for their review and final approval. Docko, in concert with the DEP, strongly suggests that we harvest sand in February or March and allow nature to shape the beach to a natural slope and shape.

For those of us who may share environmental concerns caused by this project, I offer the following except from a DEP application in part for beach renourishment at and near the mouth of the Connecticut River, July 2009:

> ***Applicant:*** *Connecticut Department of Environmental Protection*
> ***Project Coordinator:*** *Greg Chasko, CT DEP Wildlife Division*
> ***Project Title:*** *Tidal Wetland Restoration in the lower CT River RAMSAR site*
> ***Site Location:*** *Wetlands on the CT River in the towns of Chester, East Haddam, Essex, Haddam, Lyme, Old Lyme, and Old Saybrook.*
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> *Intertidal Beaches and Shores and associated coastal communities are one of the 13 most imperiled ecosystems in Connecticut (Metzler and Wagner 1998). Beach nourishment projects for flood control, beach stabilization, and wildlife habitat enhancement are increasingly being implemented throughout the U.S. (ASMFC 2002). Detrimental environmental effects of nourishment are often considered temporary (U.S. Army Corps of Engineers 2001). In a long-term study of a nourishment project in New Jersey, impacts of beach nourishment to intertidal and nearshore fauna, larval and juvenile fish assemblages, and fish food habits were minor and short-term.*

Assuming that the scheduled harvesting and beach renourishment will grow our beach over the next 2 - 5 years, we can then address the possibility of adding either grasses or rip-rap along the base of the wall to further battle the inevitable erosion of our beach. (The beach needs to be wider for us to consider such further remediation).

Meanwhile, we are also looking into solutions to control erosion specific to the lower pond outflow which, while contributing to the dispersion of sand from our beach out into the bay, is also eroding the wall and road foundation to the point of eventual and certain wall and road collapse. It is imperative this condition be corrected in the very near future. Several possible solutions have been considered including rerouting pond outflow to deeper water via several alternate routes as well as the installation of two articulated concrete mats positioned directly below pond outflow. These 10,000 lbs. mats would prevent scouring of sand from beneath the wall footings at its most vulnerable location. They would be buried at a 1:4 pitch and would typically be only partially revealed in immediate proximity to the conduits (see attached sketch). A more extensive installation of this same mat system has been in place adjacent to the Rocky Hill Ferry landing for appromately 5 years. It has proved extremely durable in providing protection from the abrasion of ice flows on the river. If we were to lose the wall and, subsequently, the road, GNBA would face a major and expensive reconstruction project under the watchful and discerning eye of the DEP. Financially, our current project would pale in comparison.

We will keep you abreast of our progress and will schedule completion of the projects so as not to interfere with either your enjoyment or your children's safety on the beach.

... and even though the slow littoral drift will continue as it has over the millennia, our beach can be remediated to a condition which will enhance our seaside enjoyment while helping to protect our assets and maintain their values. Restoration of our beach will take patience, for its success cannot happen overnight. Further, its permanence cannot be guaranteed as its very survival will be based on the impulses of nature and our appetite for continued remediation over the anticipated long term. Throughout this process, this task force promises to sustain fiscal responsibly.

Wick Mallory
for The Beach Erosion & Restoration Task Force
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... and the great shroud of the sea rolled on as it rolled five thousand years ago.
----Herman Melville, Moby Dick