Coastal Projects

Harbors & Eroded Shorelines

History of Beach Erosion
Review Booklet
2005

Prepared By
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US Patented Undercurrent Stabilizers
ALTERNATIVE TO TRADITIONAL WAYS OF TREATING SHORELINE EROSION

Dick Holmberg

ABSTRACT

In the United States national attention by major media has focused on America's "Threatened Coastlines". Misdirected engineering methods and efforts to control erosion of beaches have been proven to be wrong and counterproductive. "Armoring" the shore with structures such as sea walls or riprap is unavailing and unsightly. Expensive and temporary beach dredged nourishment is coming under increased attack for causing and increasing erosional damage. Corrective action requires a sound analysis of the ecology of natural beach formation. Man's alteration of shorelines have created unnatural water currents, often remotely situated, which now divert the inbound littoral supply of sediment away from shore. Normally this sand would ensure a positive balance among factors preserving natural beach configurations.

Manmade artificial structures such as jetties also create disruptive currents. Proven environmentaly and ecologically harmonious methods for controlling shoreline and bluff erosion and for restoring the natural environment are now available. Successful restoration of beaches and dune lands has resulted from patented low profile "Undercurrent Stabilizer" filtration systems in installations designed for specific sites. All countries with shoreline erosion need to review their present policies and make administrative changes to encourage such innovation via large scale planning and objectively monitored demonstration projects. Those who dictate policies of retreating from our coasts and express such views as letting nature take its' course are wrong. Nature is not the enemy and abandoning the seashore should never be considered as an option. In the United States and some other countries, streamlining permit procedures and a review of jurisdictional overlap is advocated to ensure a timely response to solving the current crisis.
UNDERCURRENT STABILIZERS

Patented Undercurrent Stabilizers are lowprofile bottom structures which extend at right angles to the shore and are designed to artificially shallow the nearshore bottom. They help to dissipate and reduce energy of sediment laden waves and currents during storm periods allowing some of the sediment to deposit while the remaining continues on its' course of flow. The design also directs energy away from the bottom as it flows over the system protecting nearshore bottoms from downcutting and scour. At this time stabilizers are being employed as anti-scouring protection for nearshore areas or to mitigate damages caused by federal harbors or other such public work projects.

SAUGATUCK/DOUGLAS MICHIGAN STATE ROAD PROJECT

BEFORE

AFTER
Coastal Project Frankfort
July 1993

Frankfort Harbor

Work in Progress 1986

South of Harbor near Grace Rd

Funded by
Raymond Gage   Nelson Diebel   Marion Beuregard-Bezou
Richard H Blackwell

Marge Beaver
Coastal Project Frankfort

1986

Work in Progress

Oct. 2000

14 Years Later

Photos by DLHolmberg
Coastal Project Frankfort

Raymond Gage 1st Installation

Oct. 2004
18 Years Later

Coastal Project Frankfort

Slope work in progress 86 to 89

10-5-2004
Coastal Project Frankfort

1987

Funded By Nelson Diebel & Beuregard-Bezou

Oct. 2004
18 years after initial Work

Photos by DL Holmberg

Coastal Project Frankfort

1986
18 years after initial Work
Photos by DL Holmberg
Coastal Project Leland
Oct. 2000

^ South  DLH Photos By Marge Beaver

1986

Work in Progress
Photo by DL Holmberg
Coastal Project Leland

1986

Property owners John Meade & Marjory Mather

June 2000

14 Years Later

Photos by DL Holmberg
Onekama Project

State Funded  
July 1993

Property Owner Michael Beaver

Sept. 1987

Trees & land lost to erosion

DLH Photos By Marge Beaver
Shore Protection and Coastal Change on the Lake Michigan Shore: Duck Lake, Orchard Beach State Park, and Onekama, Michigan

David Barnes                                 Michael S. Kovacich                 Santos Limesz
Western Michigan University       GEORANS, Ann Arbor               Consultant, St. Joseph

ABSTRACT

A high-resolution beach profile change-monitoring program was conducted during generally high water in the 1990s at three sites along the eastern shore of Lake Michigan in a variety of coastal geological settings to evaluate an experimental shore protection technology called the Undercurrent Stabilizer System™. Shore protection structures at all three sites produced minimal negative impact at and immediately adjacent to the study sites and generally resulted in significant net accretion of near-shore sediment in and around the structures during the study period compared to control sites. Local complexities and variations in coastal processes and conditions (especially local long shore transport, coastal substrates and geological setting, and other existent engineered structures) play a critical role in the specific performance characteristics of these small (property owner) scale shore protection structures in the Great Lakes region. A fundamental factor in the evaluation of coastal change associated with shore protection on eastern Lake Michigan (as well as many other areas of the Great Lakes) is that net transport of sand is offshore, especially during periods of prolonged high water levels. Maintenance of long-term sediment budgets through input of beach-grade sand is dependent on the erosion of upland (bluff dune materials) or nourishment. The use of coastal monitoring results for coastal planning, development, and permitting decisions requires careful consideration of several factors: the intent of the monitoring project in terms of spatial scale and time frame of influence of the structures that are monitored and the appropriateness of extrapolating monitoring results to other areas with substantially different coastal setting. Although the overall results of the study indicate that no substantial negative impact occurs within the experimental structure study sites compared to control sites, we believe that the isolation and protection of back-shore coastal sediments from wave action through the use of any shore protection technology will ultimately result in increasing offshore loss of near-shore sand throughout the eastern Lake Michigan coastal system.

INTRODUCTION AND PURPOSE

Hard shore protection is considered with increasing skepticism by coastal management community in the U.S. Permits for shore protection are very critically reviewed by state and federal coastal managers in Michigan, especially shore-perpendicular structures projecting on to "state owned bottom land." Much of lower Michigan Great Lakes shoreline comprise erodible coastal substrates. Periodically high water levels in the recent past have resulted in accelerated bluff/dune recession rates, and future high water level periods will undoubtedly result in a public outcry for "protection."

This paper presents the final results of coastal change monitoring studies of small scale experimental shore protection technology marketed as the Undercurrent Stabilizer System™. The studies were conducted in three study areas along the eastern Lake Michigan shore: near Duck Lake State Park north of Muskegon, near Orchard Beach State Park north of Manistee, and North of Onekama, MI (Figure 1). Coastal change monitoring was conducted from 1991 through 1998 (see time line, Table 1). The purpose of these studies is to document the overall impact of the experimental shore protection structures and assess the effectiveness of this approach to Great Lakes coastal engineering practices relative to other shore protection alternatives, including no action.
Mike Beaver Property Owner

I wanted to drop you a note to help keep you informed as to the progress of the Undercurrent Stabilizer System on my families property in Manistee County, Michigan."

"It's obvious if you are diligent in observation, that making measurements in other then a daily basis, would provide misleading results. It is also very apparent that the impact of your system is far beyond the immediate span of the installation itself, in fact, the system seems to act as a means for feeding the down drift zones, but not at the expense of our property in the other direction. We are fortunate in that we have property in both directions to monitor. The constant building and migration of offshore sand formations to the shore is a wonderful natural way to not only load up the system, but also disperse wave energy before it hit's the beach, and provides our family with a wonderful offshore wave zone to 'play in'. Prior to the install of your system, the waves used to be very big and would break almost on the beach, but now we have several break points at any given time before the remaining wave energy reaches shore. The waves offshore are big at first and then smaller with each subsequent break point. The waves reaching shore are far smaller then before, even under storm event conditions.

The performance of your system is so obvious to us that we are frustrated by reports of experts' discounting the technology without a valid and scientific study. I can only assume those 'experts' are influenced by other then 'what's good for nature' causes.

I just want you to know that when my family is on the beach enjoying one of nature's true wonders, I often think back to how grim the property looked a few short years ago, and thanks to your hard work and determination, we now enjoy a spectacular recreational environment with plants growing everywhere on the bluff, a beautiful beach for those warm summer night fires, and a place where my family can escape the fast paced day to day grind to 'recharge our batteries'."

Mike Beaver
Grand Haven, MI
(author, see references).
Onekama Project
State Funded
Oct. 1995

Site cleared of Tree Debris
June 2003
Property Owner Michael Beaver  8 Years Later

Photos by DL Holmberg

Onekama Project

State Funded  1995

Shortly After Completion

June 2003

8 Years Later
ABSTRACT

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A complete discussion of general study background is presented in Duck Lake Outlet Demonstration Project Undercurrent Stabilizer System™ Shore-Stabilization/Accretion Program Find Report of 1991-1996 Surveys (Barnes 1998; available from the author, see references).
Manistee Project

State Funded

July 1993

July 2005

DLH Photos By Marge Beaver

Years Later

Aug. 1999

6 Years Later

Photo by DL Holmberg

DL Holmb
Manistee Project

State Funded

Sept. 1993

May 2005

12 Years Later

Photos by DL Holmberg
Manistee Project
State Funded
Nov. 1993

Orchard Beach State Park
June 2003

10 years Later

Photo by DL Holmberg