

# **DEMO PROJECTS**

## D-1-Rapidly Deployable Pre-cast Sediment Retention Barrier

## Rapidly Deployable Pre-cast Sediment Retention Barrier

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The difficulty and expense of constructing dikes on soft sediments are major obstacles to the routine use of dredged sediments to rebuild the marshes of coastal Louisiana. Further, dikes inhibit the natural exchange of water into and out of the newly created marsh, limiting the rate of colonization of desirable plant and animal species. Weirs and dike breaches allow only limited tidal interchange, especially for the small lunar tides along the Louisiana coast. In addition, earthen levees do not provide slope appropriate for fisheries use of the created wetland.

This project would demonstrate the use of specially designed pre-cast concrete barriers as retention structures for dredged sediments and marsh creation (see Figure 1). With a typical

width of 2 to 4 ft and a typical height of 4 to 8 ft, these Sediment Retention Barriers can be constructed to any length compatible with their delivery and deployment. The barriers are strengthened by solid concrete columns on each end and on 5 to 10 ft centers along the length. Parallel baffles stretch between the columns. The baffles are lowest on the sediment side, rising toward the open water side at an angle of 30° to 60°. The baffles are separated vertically by 0.5 to 1.5 ft as necessary to retain sediment while allowing appropriate water and biotic interchange.

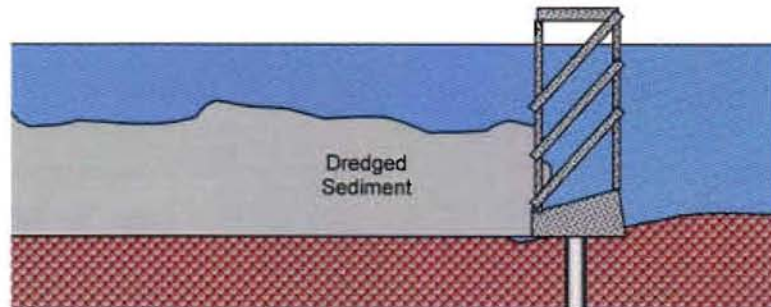


Figure 1. Side view of precast Rapidly Deployable Sediment Retention Structure; angled baffles retain dredged sediment while allowing bi-directional water flow.

The Sediment Retention Barriers are constructed such that their ground pressure is less than the strength of the soft sediments, allowing the barriers to “float” on the sediment surface. The barriers are held in place by I-beam pilings cast into the concrete columns and extending below the barrier 5 to 15 ft. The number, width, and length of these pilings depend upon the lateral force that must be withstood to remain stable during storm events.

The Sediment Retention Barriers are precast in the proper design and delivered to the site on a shallow-draft barge. The precast construction of the barriers allows them to be deployed rapidly. They may also be removed after the marsh is sufficiently mature to remain stable without the barriers. Removed barriers could be reused for similar projects in the area. The barriers would be placed using a crane capable of reaching to the placement location either from a shallow-draft barge or land feature. The barriers would be pressed onto the sediment with the pilings down to

provide stability. Barriers would be placed end-to-end to provide a continuous sediment retention structure.

Ideally, the Sediment Retention Barriers would be demonstrated as part of a marsh restoration project where an earthen dike structure is planned. A series of barriers would be used in lieu of the earthen dike over a length sufficient to demonstrate their application and advantages. This approach would allow a direct comparison of costs and performance of the Sediment Retention Barriers with earthen dike structures.

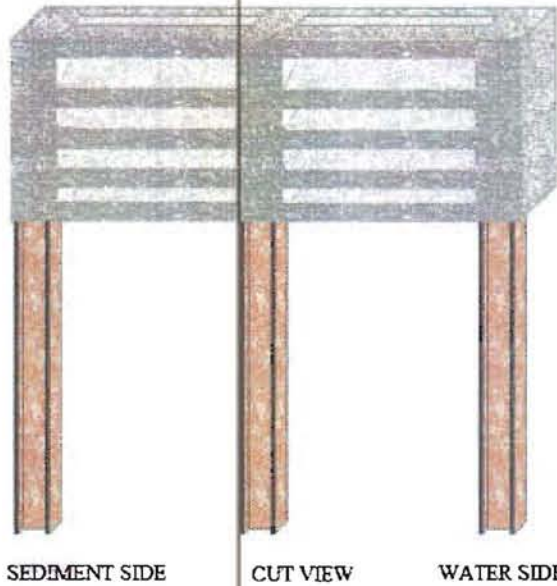


Figure 2. Sediment side view of pre-cast Rapidly Deployable Sediment Retention Structure; pilings provide stability while slanted panels holds sediment on one side and allow bi-directional water flow.

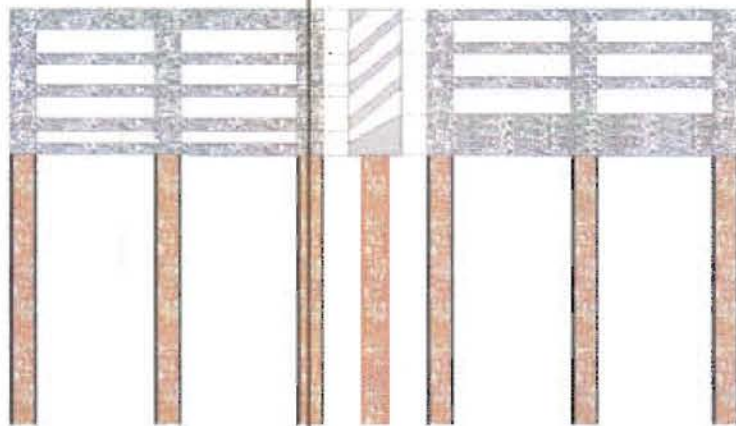


Figure 3. Other views of pre-cast Rapidly Deployable Sediment Retention Structure

D-2-Establishing Sediment Vegetation Ribbons  
to Enhance Dredged Sediment Retention and  
Reduce Storm Surge

**Establishing Sediment and Vegetation Ribbons to  
Enhance Dredged Sediment Retention and Reduce Storm Surge**

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A synergistic opportunity exists to utilize current funding to construct a series of sediment ridges to retain future maintenance dredging sediments and reduce storm surge energy in the marshes of coastal Louisiana. This project will demonstrate the construction of these sediment ridges, the growth of woody and herbaceous vegetation on the ridges, and the ability of the ridges to retain dredged sediments discharged behind them.

The proposed demonstration will be conducted in conjunction with a planned dredging project in a channel that requires routine maintenance dredging and has large areas of marsh in need of restoration or nourishment within pumping distance. Suitable dredged sediments will be placed in a series of tubular-shaped geobags. The size and height of the bags depends upon water depth and sediment



strength in the area. The bags will be placed in a manner as to allow tidal interchange between them, but minimize sediment flow. The sediment ridges will be constructed in a manner convenient for the discharge of dredged sediment from future maintenance dredging projects. After the filled geobags have stabilized, woody and herbaceous vegetation will be planted in the tops of the bags at appropriate spacings. Holes will be cut along the top ridge to provide openings large enough to allow the planting to occur and to accommodate growth. If necessary, openings will be enlarged annually to accommodate growth. Vegetation selection will be based upon salinity and other environmental factors, species appropriateness, and ability to reduce storm surge. Dredged sediment from subsequent maintenance dredging projects can be placed in areas protected by the vegetated ridges to enhance and restore degraded marshes.

The purpose of this demonstration is to show the potential value of using coastal restoration funds to create vegetated sediment ridges throughout Louisiana coastal marshes. Many opportunities for using dredged sediments for marsh restoration exist. However, funding and time are often not available to construct retention structures for routine maintenance dredging projects. Thus, sediment is either placed elsewhere or unconfined disposal is used, resulting in low sediment retention efficiencies.

The existing of pre-placed ridges would facilitate long-term coastal restoration efforts. The primary purpose for these ridges would be to serve as retention structures for the placement of sediment from future maintenance dredging projects. Additionally, woody and herbaceous vegetation grown on these ridges could reduce storm surge in adjacent areas during tropical storms and hurricanes.

## D-3-Ecosystems Wave Attenuator for Shoreline Protection

Demo #3

## PPL19 DEMONSTRATION NOMINEE FACT SHEET

January 27, 2009

**Demonstration Project Name:**

EcoSystems Wave Attenuator for Shoreline Protection Demo Project

**Coast 2050 Strategy(ies):**

Maintenance of Bay and lake Shoreline Integrity

**Potential Demonstration Project Location(s):**

Gulf, bay, or lake shorelines; specific site to be determined later. Applicable Statewide

**Problem:**

Coastal Louisiana consists of areas with unstable soil conditions, subsurface obstructions, accessibility limitations, etc. which limit the types of shoreline protection suitable to provide adequate relief of shoreline erosion. Traditional methods that have shown the most success are through the use of rock riprap. The major advantages of rock are the effectiveness and durability of protection that is provided. The disadvantages are the cost, supply, and site specific problems with placement and handling of material. However, the same problems are also associated with other "non-rock" alternatives that have been tried as substitutes to provide equivalent protection against shoreline erosion.

**Goals:**

The primary goal of this demonstration is to manufacture, deploy and test an alternative method of shoreline protection equivalent to traditional methods in areas where site conditions limit or preclude traditional methods.

**Proposed Solution:**

Walter Marine has developed a method of protection against shoreline erosion using the EcoSystems Wave Attenuator. This product is a unit of EcoSystems discs mounted on piling with an innovative anchoring system, which dissipates wave action. The EcoSystems Wave Attenuator could be applicable for use as a shoreline protection or in place of a channel plug. The intent of this demonstration project is to place the EcoSystems Wave Attenuator in an area where traditional restoration strategies would have used a cock plug or sheetpile for a channel closure. The project will evaluate the effectiveness of reducing wave energy and shoreline erosion.

**Project Benefits:**

If successful the project benefits include: 1) reduction in shoreline erosion associated with wave energy; 2) information regarding deployment and installation of EcoSystems Wave Attenuator; 3) information obtained would allow a comparison with riprap structures; 4) identification of other applications of EcoSystems Wave Attenuators.

**Total Project Costs +25%:** \$1.5M

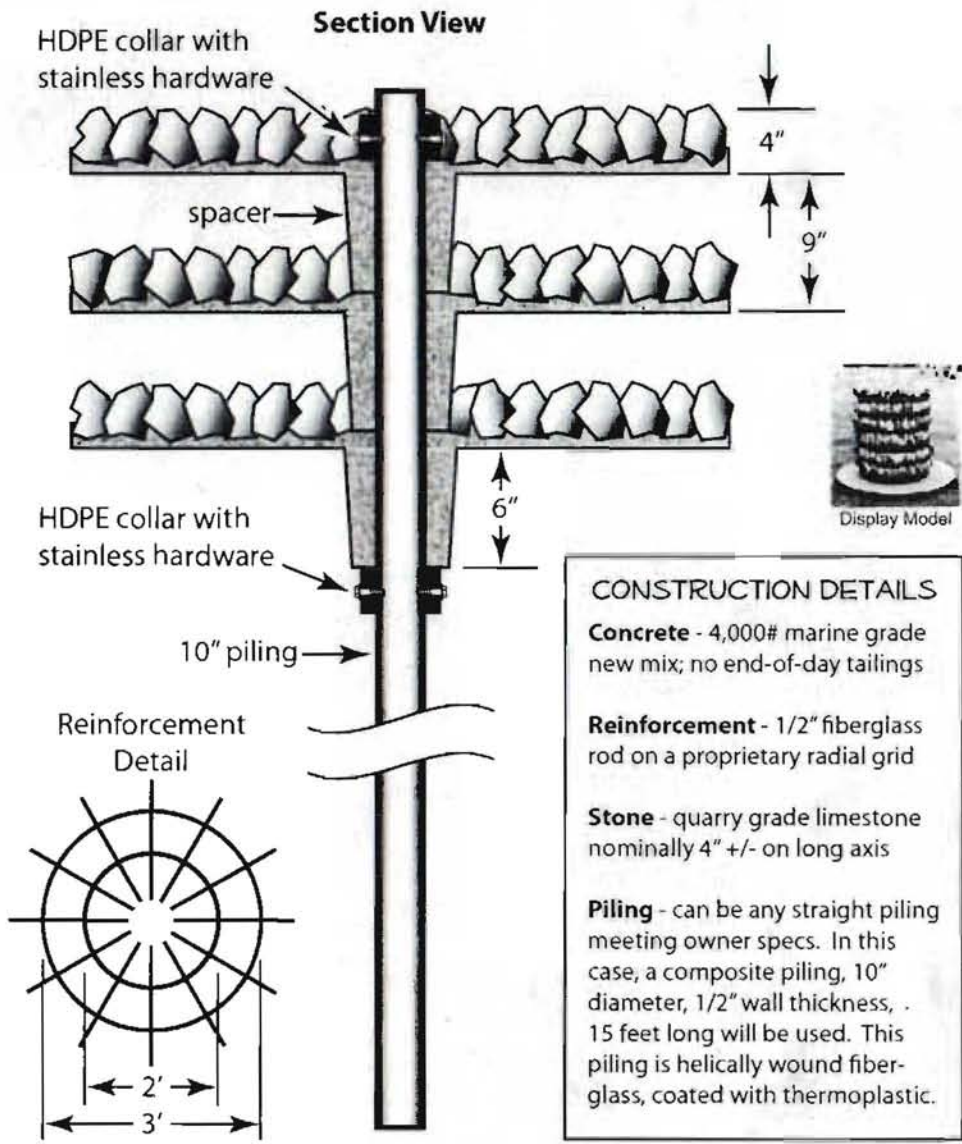
**Preparer of Fact Sheet:**

John D. Foret, Ph.D., NOAA Fisheries Service, (337) 291-2107, [john.foret@noaa.gov](mailto:john.foret@noaa.gov).



# ECOSYSTEMS® WAVE ATTENUATION SYSTEM

Not to Scale



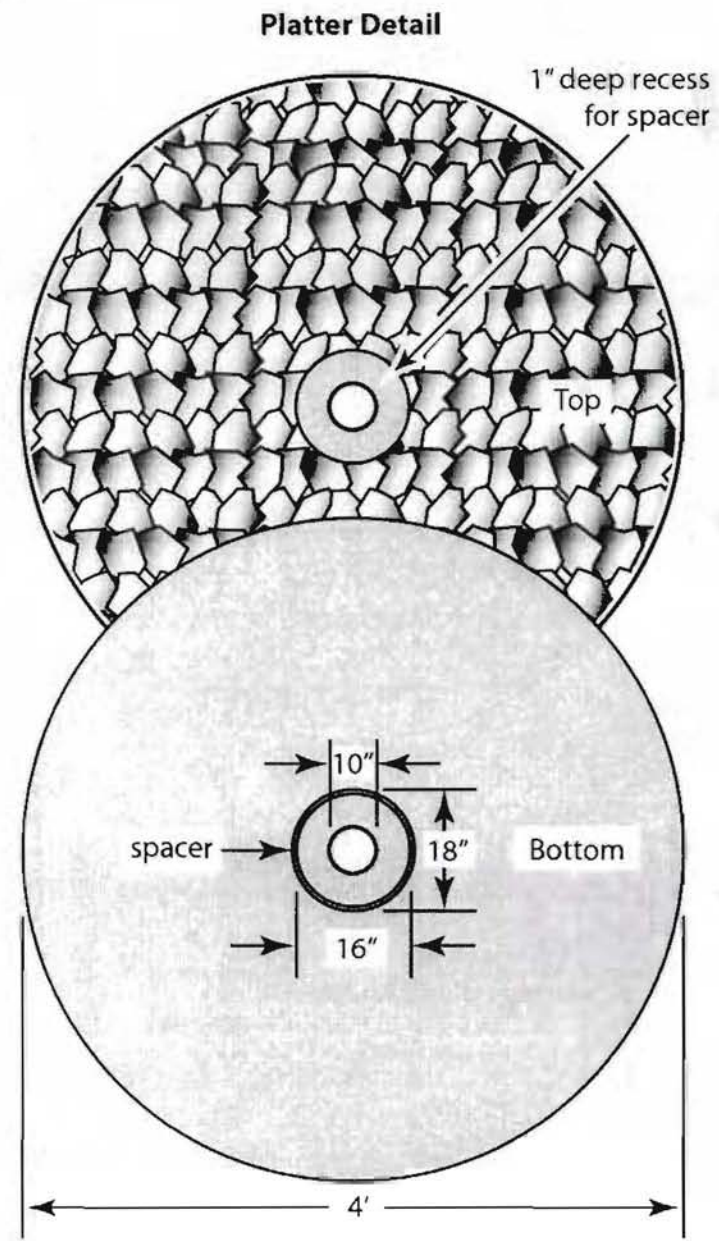
**CONSTRUCTION DETAILS**

**Concrete** - 4,000# marine grade new mix; no end-of-day tailings

**Reinforcement** - 1/2" fiberglass rod on a proprietary radial grid

**Stone** - quarry grade limestone nominally 4" +/- on long axis

**Piling** - can be any straight piling meeting owner specs. In this case, a composite piling, 10" diameter, 1/2" wall thickness, 15 feet long will be used. This piling is helically wound fiberglass, coated with thermoplastic.



D-4-Bayou Backer Demo

Demo #4

## PPL19 DEMONSTRATION NOMINEE FACT SHEET

January 27, 2009

### Demonstration Project Name:

Bayou Backer Demo

### Coast 2050 Strategy(ies):

Maintenance of Bay and lake Shoreline Integrity

### Potential Demonstration Project Location(s):

Vermilion Bay, Rockefeller Refuge, or Grand Isle shoreline

### Problem:

Bayou Backer is a long lasting wave energy reducer that is suited for wetlands protection and re-vegetation. Plugs are dispensed from rolls of 3" to 6" wide corn oil based (bio-degradable) plastic strip. In very loose ground plugs up to 38' long are pushed 16' deep. This leaves two 3' long blades above the surface. Below the surface, a 16' long loop forms the anchor. The product is a low cost alternative to rock, dirt, and vegetative plantings, as it can be easily transported and installed compared with these other methods. It is expected to last several years in our waters, and assist in abating shoreline erosion to allow plants recovery and establishment time. Wave pool testing was recently performed at Louisiana State University and can be seen in photos and videos at <http://www.grastic.com/backer>

### Goals:

- (1) Test the effectiveness of the bio-grass to reduce shoreline erosion
- (2) Determine the applicability of the bio-grass in coastal Louisiana shores.
- (3) Test two spacing design for evaluation of shoreline protection versus cost effectiveness.

### Proposed Solution:

Install 8 rows of plugs, 1 foot spacing, or 6,000 plugs, along approximately 750 linear feet of shoreline (8 rows at 1' OC = 8 plugs/ LF of shoreline \* 750 LF of shoreline = 6,000 plugs). Each plug will be inserted to a 16 ft depth. A second, equivalent, section of shoreline, 5 rows of plugs will be spaced 3' OC (5 rows at 3' OC = 8 plugs/3 LF of shoreline \* 750 LF of shoreline = 2,000 plugs).

### Project Benefits:

If successful the product could be a low cost option in shoreline protection, for initial terrace or marsh creation erosion control until vegetation establishes, direct creation of habitat in shallow waters where turbidity could be decreased, and used as an addition to both interior lake and exposed coastal bay shorelines and open bay waters.

### Project Costs:

\$390,290

### Preparer of Fact Sheet:

John D. Foret, Ph.D., NOAA Fisheries Service, (337) 291-2107, [john.foret@noaa.gov](mailto:john.foret@noaa.gov).

Proposed wave test  
for Bayou Backer  
erosion control.

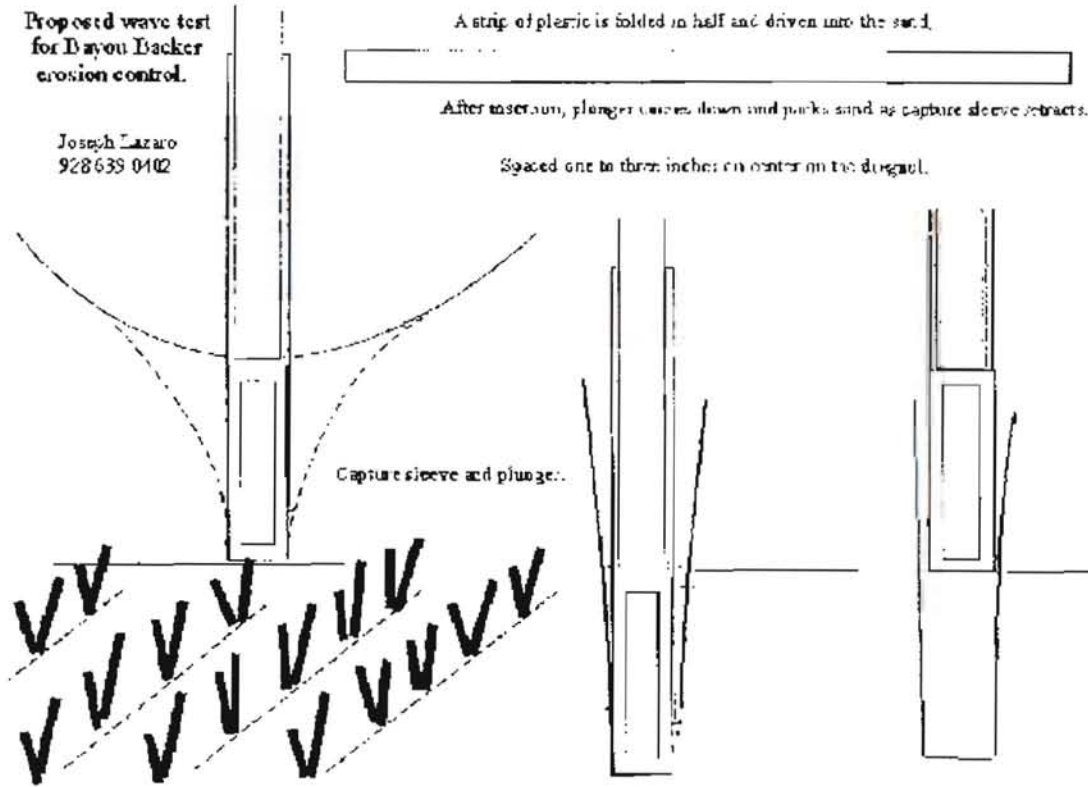
Joseph Lazaro  
928 639 0402

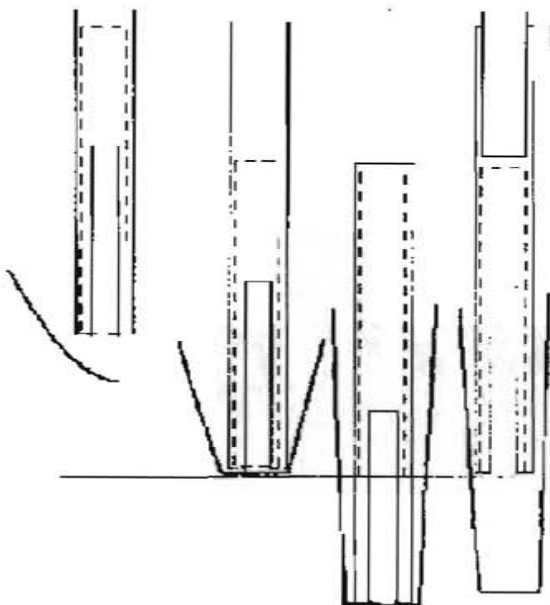
A strip of plastic is folded in half and driven into the soil.



After insertion, plunger forces down and packs sand as capture sleeve retracts.

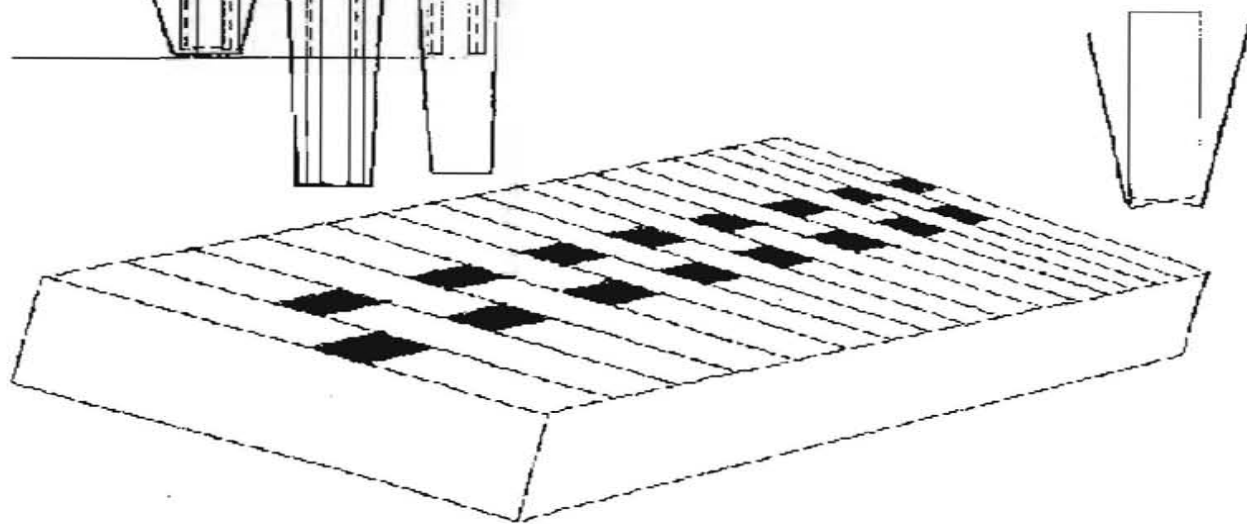
Spaced one to three inches on center on the dike/gulch.





Dr. Gregory Stone, Director Coastal Studies.1 225 578 2520  
From: Joe Lazaro 928 639 0402

With this system I can install 1200 Bayou Backer scale model plugs a day. Inch wide strip, ribbon or banding as material stand-in. 24" long, 6" deep and 2 to 3 inches on center. Two 6" blades.



D-5-Floating Island Environmental Solutions  
BioHaven©

# Floating Island Environmental Solutions

## What is BioHaven® floating island

BioHaven is a man-made ecosystem that mimics natural occurring wetlands. The result is a highly efficient natural way to improve water quality by filtering pollutants and breaking down, removing, using or retaining nutrients and organic waste.

BioHaven islands are created from buoyant mats made from a matrix of fibers derived from 100% recycled plastic and bonded together with foam to provide buoyancy. The mats are planted with sod, garden plants or wetland vegetation appropriate to their environment and launched into a body of water as a fully formed BioHaven floating island.

Over three thousand BioHavens® have successfully deployed in many diverse waterways—in public and private, domestic and internationally.

### Wastewater and Water Remediation:

Wastewater treatment, Wiconisco, PA  
Lower Seletar Reservoir in Singapore  
Hamilton Lake, New Zealand  
Zoo Montana, Billings, MT  
Bronx Botanical Gardens, Bronx, NY\*  
Pixie Woods Lake, Stockton, CA\*

### Habitat Restoration and Aesthetics:

Eagle Rock Golf Course, Billings, MT  
Loon habitat, Big Sky, MT  
Garden in the Woods, Framingham, MA  
Lake Sinclair (Fish and Game), Milledgeville, GA  
Citizens for Conservation wetland restoration, Barrington, IL  
Turtle habitat, Toronto Zoo, Canada  
Sam Livingston Hatchery floating fen, Calgary, Canada

\* In progress, deployment Q3 2008

### For information contact:

### Floating Island Environmental Solutions, LLC

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Toll Free: 1-866-821-0226  
Fax: 225-923-2528

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Baton Rouge, Louisiana 70808

[information@floatingislandes.com](mailto:information@floatingislandes.com)  
<http://www.floatingislandes.com>

“improving the environment,  
one island at a time”

# cleansing

BioHaven® floating islands restore water to its natural pristine state

BioHaven floating island is an example of Biomimetics, the science of adapting designs from nature to solve modern problems.

BioHavens use natural microbial processes to cleanse water. The matrix and plant roots that grow through it provide essential surface area for microbes to reproduce. Microbes (bacteria), occurring naturally in water, evolve quickly to remove contaminants of all kinds—

nutrients caused by fertilizer run off, organic waste, nitrates, phosphates, ammonia and heavy metals from the water.

The effectiveness of BioHavens come from the expanded matrix base, an efficient surface area for microbes to grow, for example, a 250 sq ft island is the equivalent of 1 acre of wetland surface area. This extensive surface area allows microbes to create a concentrated

wetland effect that makes BioHaven many times more effective than nature.



# nurturing

BioHaven® floating islands create essential habitat for many species large and small

BioHavens are truly havens for all kinds of wildlife. Biohaven islands provide an abundant surface area where microbes proliferate starting off the food chain and supporting the diverse wildlife that come to inhabit the islands.

The islands are designed and planted to attract specific kinds of birds and fish. Ducks love the islands for brooding and roosting, loons nest on them and the roots that grow through the protective core of the island provide a food source for fish.



# enhancing

BioHaven® floating islands have many uses and many benefits



**Zoo Montana**  
BioHavens have made life more fun for two river otters while cleaning their water.



**Citizens for Conservation**  
A new wetland has been created in the suburbs of Chicago using BioHavens.



**Garden in the Woods**  
BioHavens in the shape of lily pads were a highlight of an art project.



**Wiconisco Water Treatment**  
BioHavens flourish while cleansing the water of excess nutrients at a wastewater facility.



# FLOATING ISLAND ENVIRONMENTAL SOLUTIONS



## BioHaven® Floating Islands

### Water Quality Improvement

Floating islands are concentrated wetlands – they provide a huge surface area for microbes which remove harmful pollutants from the water. A 266 sq ft island provides over an acre of wetland surface area.

Microbes help remove nitrates, phosphates, ammonia and heavy metals, which enter our waterways through fertilizers and waste product from other human activity.

### Water Treatment Wetlands

Effluent ponds, storm water ponds, farm ponds..... water in these ponds is typically nutrient-rich and often in violation of federal and local environmental regulations. Engineered solutions are typically beyond the reach of many small communities or landowners. With a floating island, you can afford to treat your water.

### Habitat Restoration

Fish find shelter and shade, ducks and geese roost on them, and a myriad small life forms burrow in their fibers..... and make a wonderful food source for the above.

### Gardens and Parks

Floating islands make an innovative and dramatic display in parks, gardens, and zoos while benefitting the water. Golf course ponds are full of nutrients which a floating island can remove naturally.

### Beautiful Living Walkways

People always love to walk on water! Whether it be a bridge, a jetty or a pier make it a living system. These custom made floating docks and walkways add to the beauty of the environment.

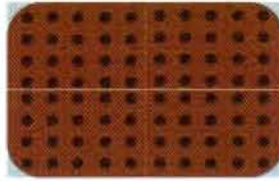


We have the right size island for you. Choose from our ready built islands below, or specify a modular solution for large projects.

## STANDARD ISLAND SHAPES AND SIZES



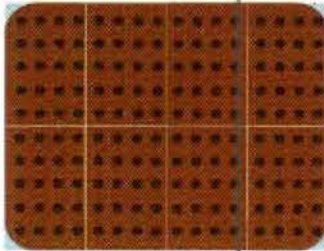
**105 ft<sup>2</sup>**  
(16.0 ft x 10.0 ft)



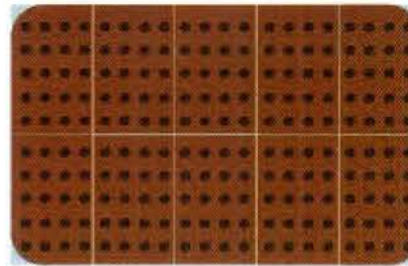
**160 ft<sup>2</sup>**  
(16.0 ft x 10.0 ft)



**266 ft<sup>2</sup>**  
(16.0 ft x 20.0 ft)



**322 ft<sup>2</sup>**  
(16.0 ft x 20.0 ft)



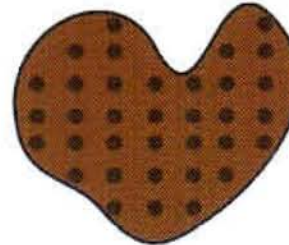
**403 ft<sup>2</sup>**  
(16.0 ft x 25.0 ft)



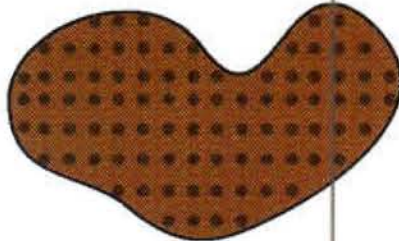
**28 ft<sup>2</sup>**  
(8.0 ft x 5.0 ft)



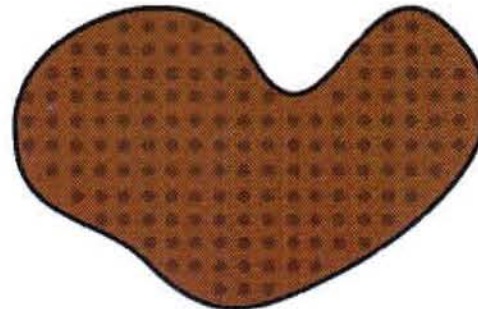
**65 ft<sup>2</sup>**  
(8.0 ft x 10.0 ft)



**112 ft<sup>2</sup>**  
(12.0 ft x 10.0 ft)



**215 ft<sup>2</sup>**  
(20.0 ft x 12.0 ft)



**300 ft<sup>2</sup>**  
(25.0 ft x 16.0 ft)

Please contact Floating Island Environmental Solutions for pricing.  
Quantity discounts are available.

Please visit our website for more information

[www.floatingislandes.com](http://www.floatingislandes.com)

**Floating Island Environmental Solutions**

3185 Balis Dr. Suite 113 Baton Rouge, La 70808

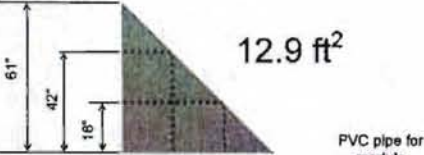
Office: 225-923-2194 Toll Free: 1-866-821-0226 Fax: 225-923-2528

### ISLAND INFORMATION:

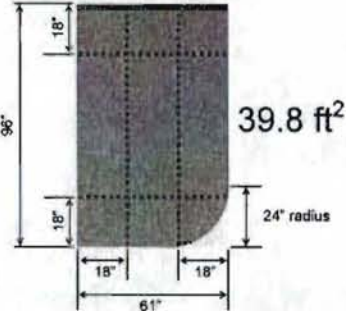
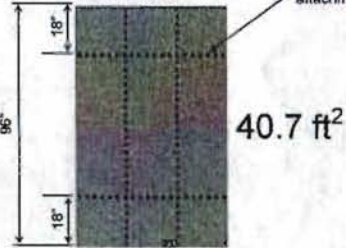
- Islands can be custom-built to any size and any shape upon request.
- Buoyancy can be adjusted to support different weights.
- Wicking channels come in standard 2 1/2" and 4" diameters.
- Standard island thickness is 8" and will not support any weight other than plant life.
- Custom walkways and decks can be built upon request.

Images depicted are for illustration purposes only, and the amount of wicking channels are not exact per island illustrated above. Dimensions in the longest length by the longest width do not reflect the square footage per island illustrated above.

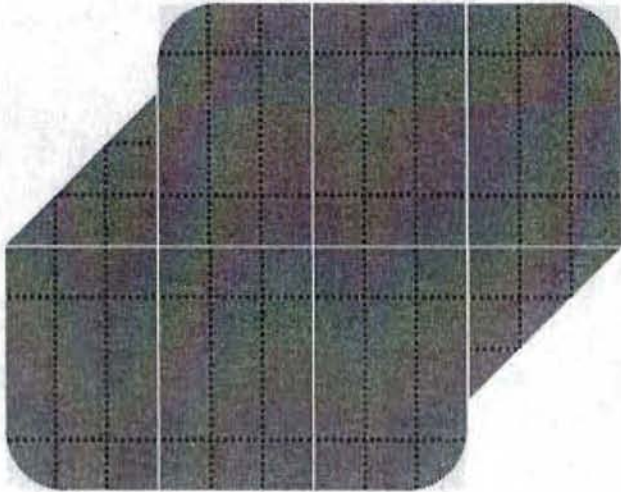
# Island Designs Using Modules



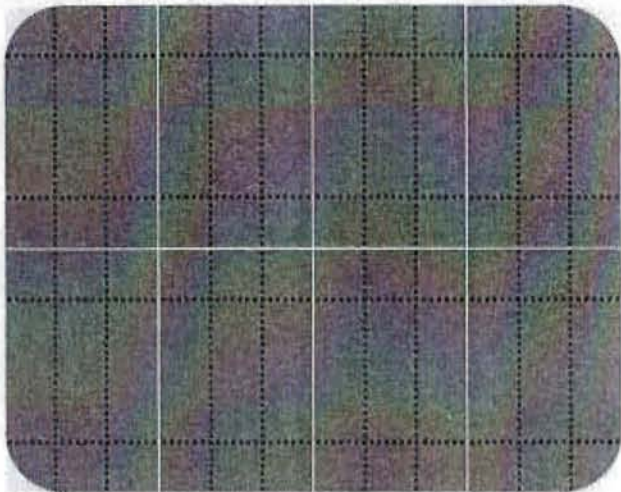
PVC pipe for module attachment



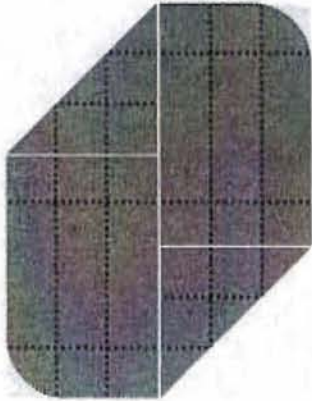
266.4 ft<sup>2</sup>



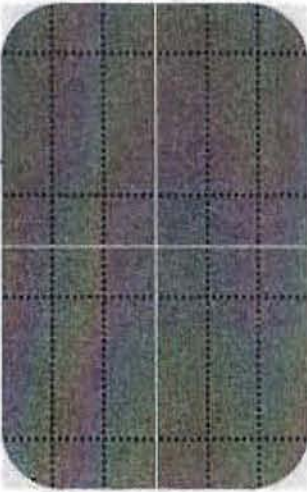
322 ft<sup>2</sup>



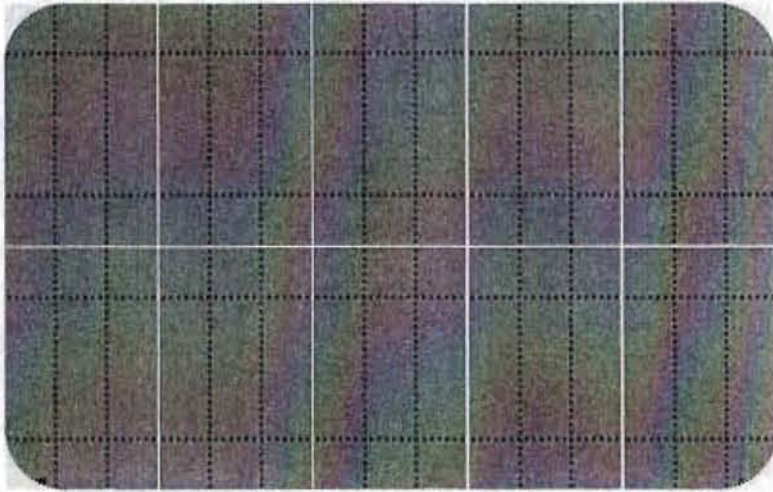
105.4 ft<sup>2</sup>



159.2 ft<sup>2</sup>



403.4 ft<sup>2</sup>





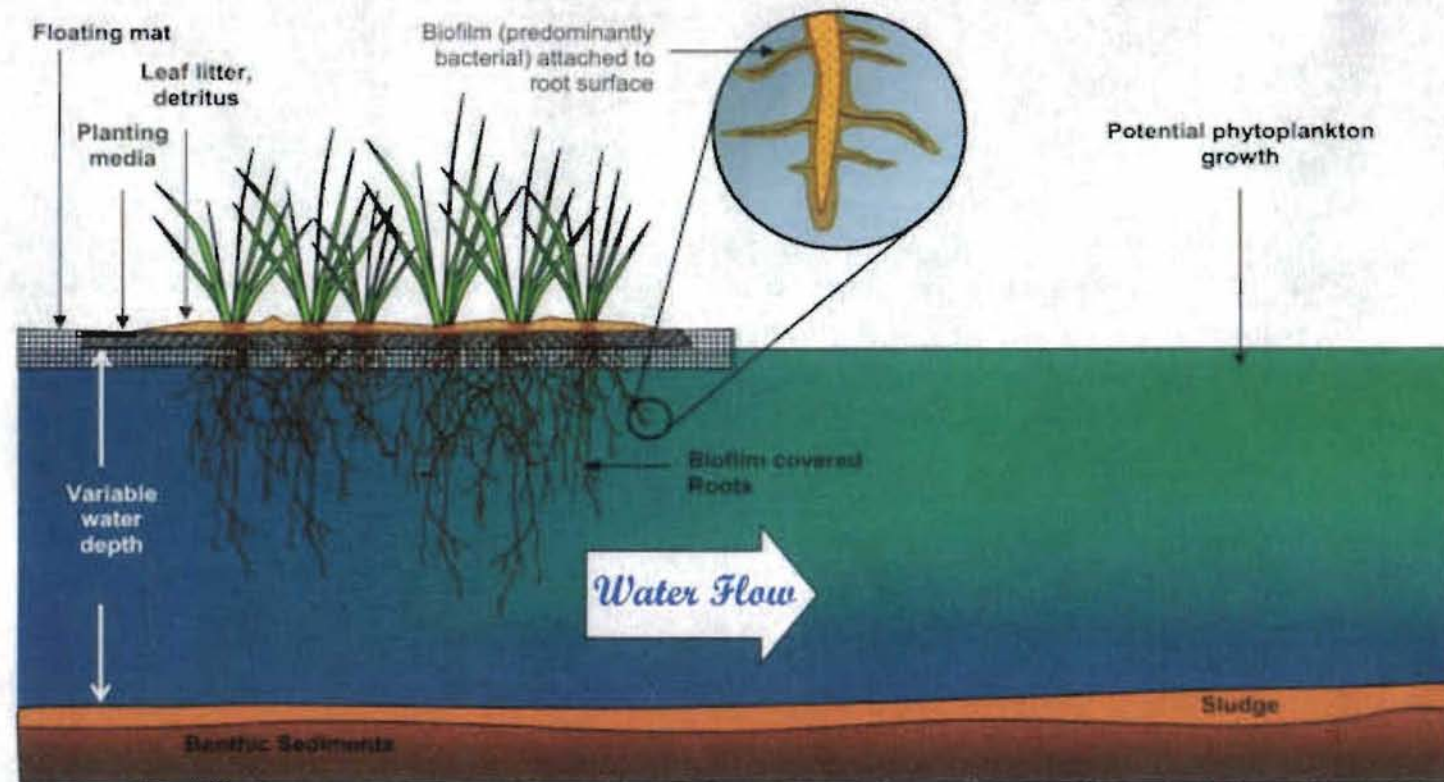
*Improving the environment one island at a time*

# Nature's Model – a natural floating island



Floating Island  
Environmental Solutions

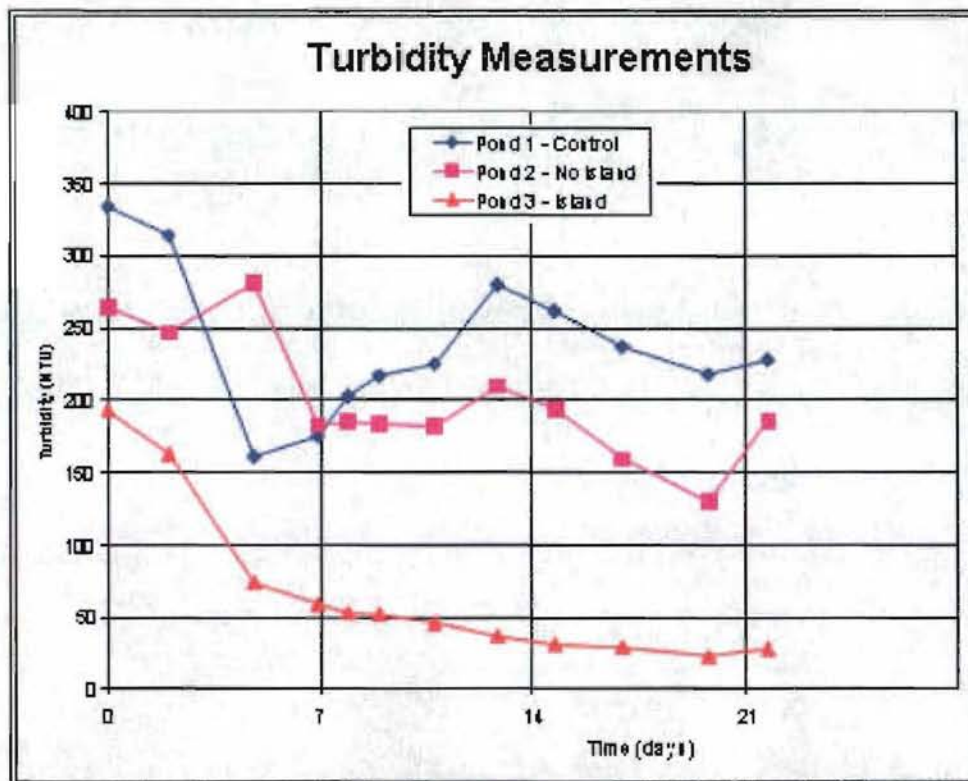
# Cross Section of a Floating Treatment Wetland



Schematic courtesy of NIWA

# Montana Board of Research & Commercialization Grant

**BioHaven® Floating Islands remove  
suspended solids from the water column**



**Nutrient uptake by  
floating islands**

- **Nitrate 10,600 mg/(ft<sup>2</sup>\*day)**
- **Phosphate 429 mg/(ft<sup>2</sup>\*day)**
- **Ammonia 759 mg/(ft<sup>2</sup>\*day)**

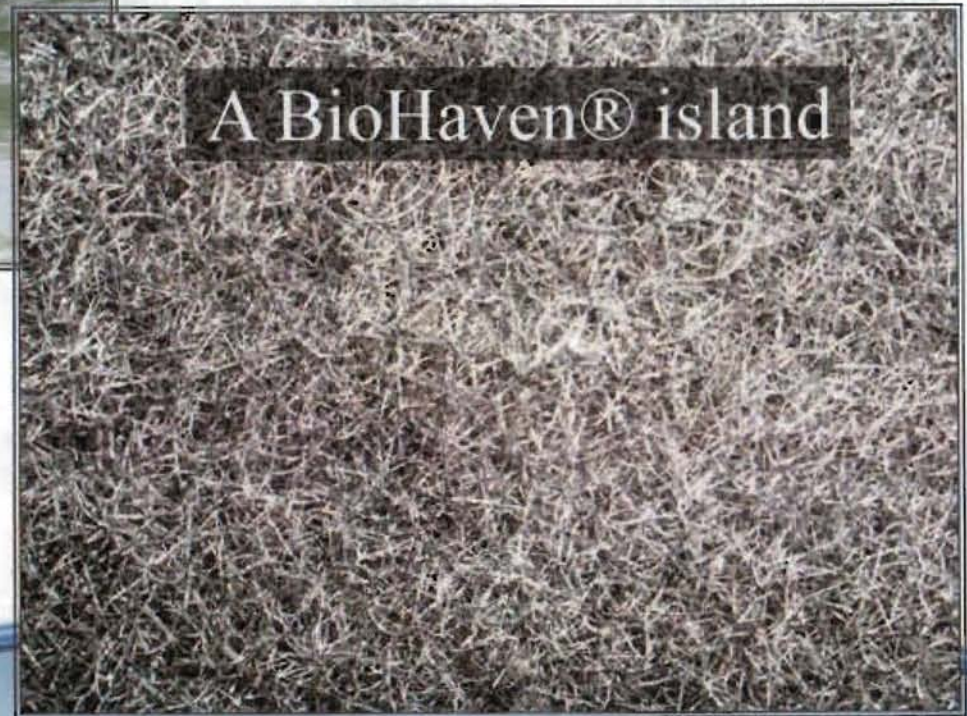
# Nature vs. BioHaven®



**A natural island**

One square foot =  
198 ft<sup>2</sup> of surface area

Made from recycled  
plastic



**A BioHaven® island**

**Floating Island**  
**Environmental Solutions**



# Concentrated Wetland Effect

- Expanded surface area from root growth
- Enhanced plant growth and microbial activity

“Of the total root surface area, root hairs can contribute up to 67 %.”



# Levee Stabilization Samples

4 inch modules can be secured to the levee above and below the water with earth anchoring systems



# Pilot Projects – Barrington, Illinois



**Wetland Restoration**



**Floating Island**  
**Environmental Solutions**

# Summary of BioHavens®

- **CLEANSE & IMPROVE WATER QUALITY** by removing nitrates, phosphates, ammonia and other harmful pollutants
- **NURTURE CRITICAL RIPARIAN-EDGE HABITAT** for fish, waterfowl, and other wildlife
- **RESTORE WETLANDS AND REDUCE WATER & WAVE EROSION**
- **ENHANCE A WATERSCAPE**
- **OFFER A COST-EFFECTIVE, VIRTUALLY MAINTENANCE-FREE ALTERNATIVE** to structural solutions

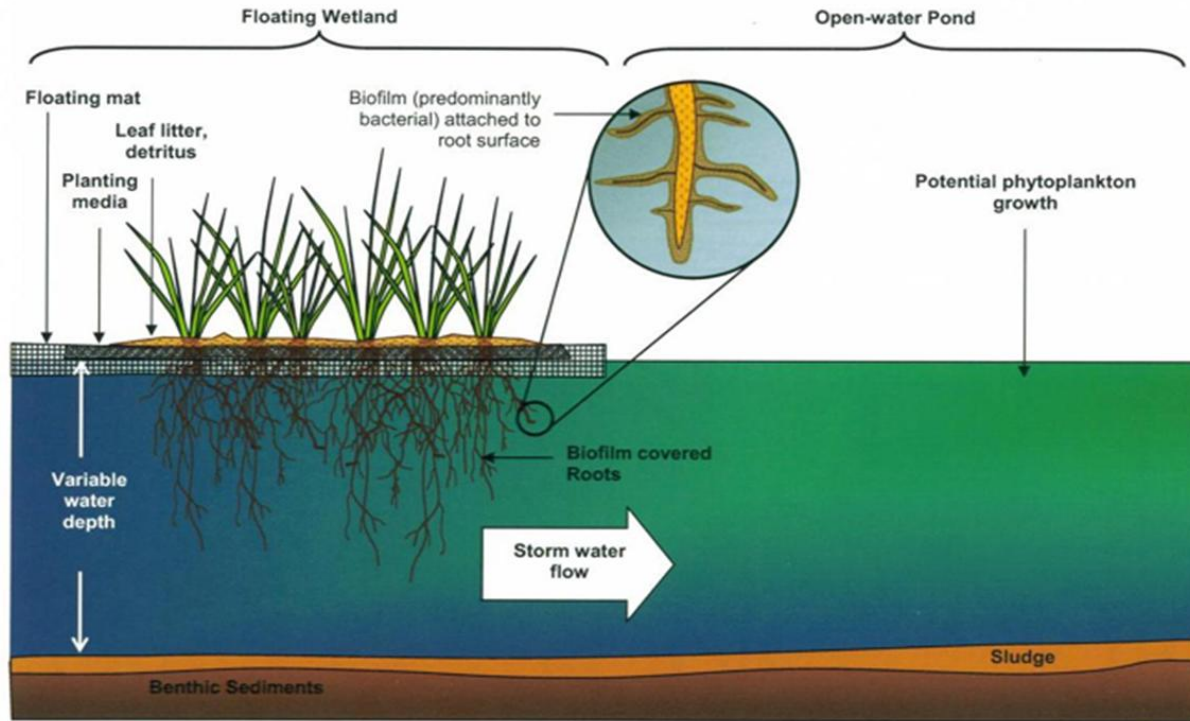


ating Island Environmental Solution

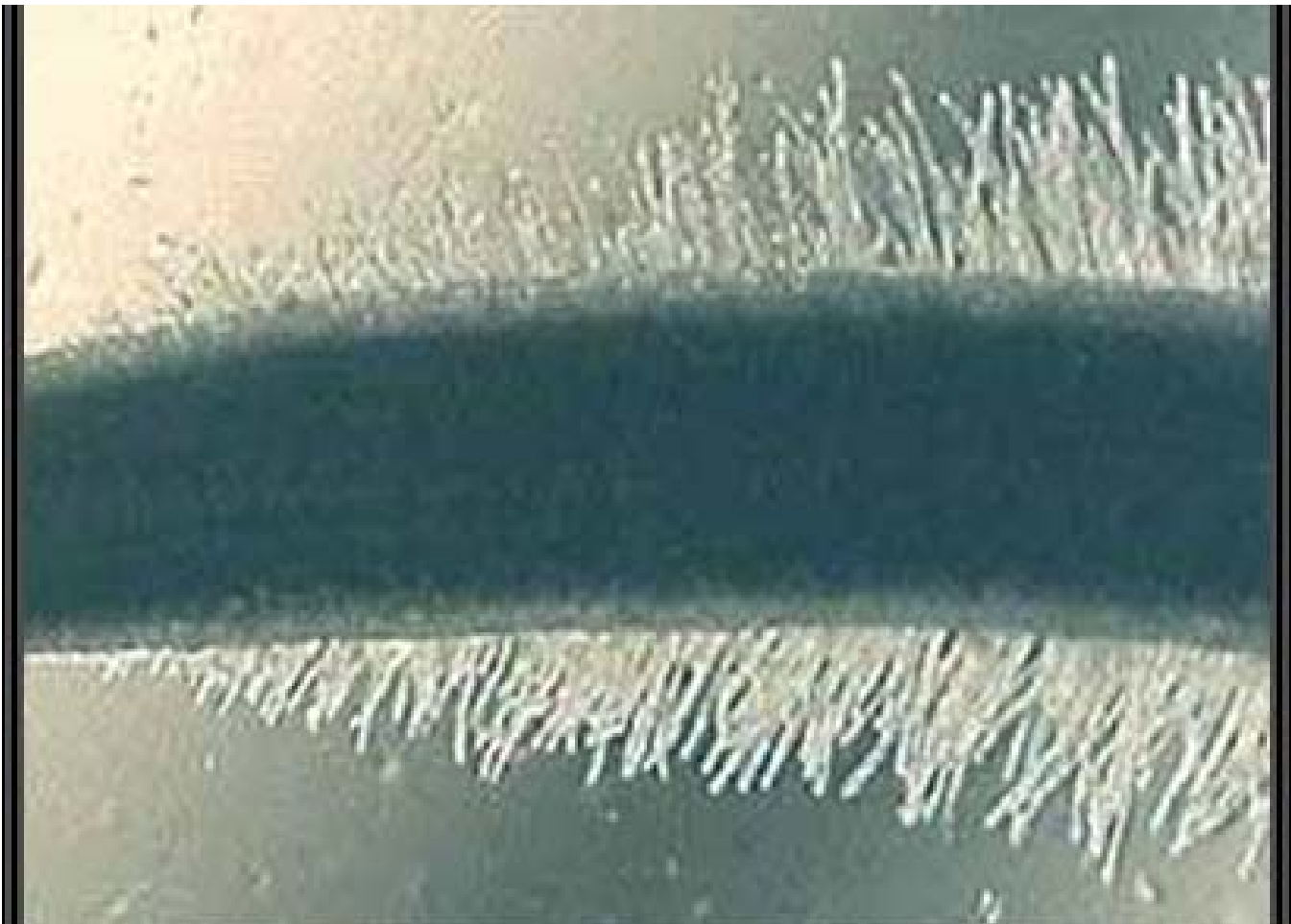
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Figure 20.  
Cross-section of a typical floating treatment wetland and pond showing main structural elements.











## D-6-Viperwall Demo

# Viper-Wall

Patents Pending

[www.viperwall.com](http://www.viperwall.com)

## Cost Effective Technology For A Sustainable Coast



### Viper Wall is a wave breaking sediment collection system

- Absorbs & deflects wave energy
- Provides for gradual dissipation & controls backwash
- Protects vegetation without disturbing estuary gradient
- Allows ingress & egress of aquatic species
- Collects sediment while still allowing natural tidal exchange
- Aerates the water as it goes thru the system
- Supports its own weight allowing deployment in soft soils as well as over any obstacles such as pipeline crossings
- Adjustable in elevation and pitch at any time
- Removable and reusable over and over

### The Technology Is Basic Scientific Knowledge

- **Stepped Shapes**- reduce wave run up and minimize scour
- **Sloping Shapes**- provide gradual dissipation and reduce scour
- **Terracing**- breaks up one long slope into a number of short ones allowing sediment time to settle while still allowing for the discharge of water at a controlled rate.

**The system is designed to be environmentally neutral while being cost effective & overcoming deployment obstacles currently faced by traditional restoration techniques.**

## D-7-Free-Flow Power Hydrokinetic Electricity Generation Improvements

Demo #7

PPL19 DEMONSTRATION PROJECT NOMINEE FACT SHEET  
January 29, 2009 RPT Meeting

**Project Name:** Free Flow Power Hydrokinetic Electricity Generation Improvements

**Coast 2050 Strategy:**

- Transferable Across Coast
  - Diversions
  - Siphons
  - Storm water Drainage
  - Pumped Sediment
- New Concept, Never Before Deployed
- Clean, Renewable, Cost-Effective Energy Generation
- Increase Sediment and Freshwater Delivery for Restoration Projects
- Automate Siphon Operations, Expand Operation Time and Efficiency

**Project Location:** Coastwide, completely dispatchable wherever moving water can be utilized.

**Problem:** Many coastal areas are in remote areas where electricity and operation access is limited or difficult to dispatch. Siphons that utilize the Mississippi River's head environment are not currently maximized for sediment and freshwater delivery due to operation limitations. Additionally, most coastal Parishes are at the end of the electricity distribution grid and are in need of additional electricity generation sources.

**Goals:**

1. Generate electricity from flowing water in CWPPRA projects.
2. Increase effectiveness of Coastal Restoration.
3. Demonstrate technology.

**Solution:** An increase in Siphon capabilities would include electricity for priming pumps and automated activation of Siphon operations when the River's stage reaches appropriate levels. This would significantly expand operation times and capabilities.

**Preliminary Project Benefits:** Clean, renewable energy produced in a synergistic relationship with CWPPRA projects. Increase restoration impact of siphons and other projects.

**Preparer of Fact Sheet:**

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## D-8-Polders for Marshland Creation



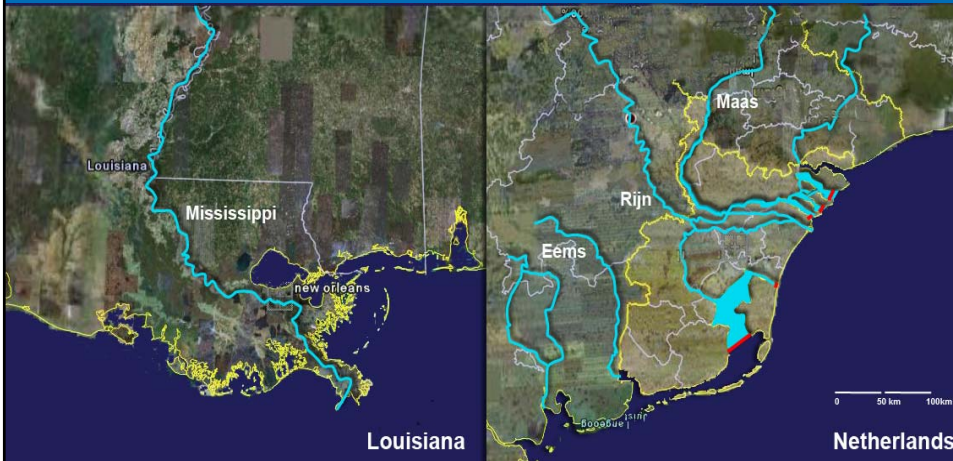
# Polders for Marshland Creation

## Pilot and Demonstration Project

New Orleans,  
January 2009



# A Dutch Perspective



## Preferred Strategy

Consultancy and Engineering



## A Dutch Perspective

Consultancy and Engineering



### Pilot Projects

- Levee construction and stability pilot projects
- Marshland stabilization pilot projects
- Marshland creation pilot projects

Gateway to solutions



## A Dutch Perspective

### Marsh Creation Pilot Projects

- Accelerated natural freshwater marshland creation
- Natural salt or brackish water marshland development
- Accelerated saltwater marshland development

## Polders for Marshland

### Concept

- Enclose shallow open-water area with dikes
- Lower water table within
- Succession of vegetation builds up organic rich sediments
- Increase water table and introduce fine sediments
- Reinstate open connections with surroundings



## Polders for Marshland

### Advantages

- Less expensive
- Less sediment
- Fast
- Managed

## Polders for Marshland

### Objectives

- Best construction method for low, stable, affordable soft dikes
- Optimal mix of water discharge, sediment input, and flooding to maximize accretion rates
- Provide for free movement of fisheries while manipulating water levels

## Polders for Marshland

### Phases

- Phase 1 – Definition and Conception (6 months)
- Phase 2 – Detailed Design and Permitting (6 months)
- Phase 3a – Construction (12 months)
- Phase 3b – Monitoring and Research
- Phase 4a – Operational Management (60 months)
- Phase 4b – Monitoring and Research
- Phase 5 - Evaluation

## Polders for Marshland

### Funding Required

- Phase 1 – \$ 200,000
- Phase 2 – \$ 800,000
- Phase 3a – \$ 2,000,000 – 5,000,000
- Phase 3b – \$ 500,000
- Phase 4a – \$500,000
- Phase 4b – \$ 1,500,000
- Phase 5 - \$ 500,000

## Polders for Marshland

### Phase 1 Definition and Conception

- (1) Management and Organization
- (2) Research and Monitoring
- (3) Design and Realization

## Polders for Marshland

### DHV Group

- Dutch Consultancy and Engineering
- Founded in 1917
- Independent and employee owned
- Current Staff 5,000
- Europe, Asia, Africa and North America
- Leading in Land and Water
- [www.DHV.com](http://www.DHV.com)

## Polders for Marshland

Consultancy and Engineering



### Deltares

- Independent Institute for Delta Technology
- The Netherlands, since 1927
- Specialized Consultancy and Research
- Delft Hydraulics / GeoDelft / TNO / RWS
- Current Staff 800
- [www.deltares.nl](http://www.deltares.nl)

Gateway to solutions

## Polders for Marshland

Consultancy and Engineering



### Imares

- Institute for Marine Resources and Ecosystem Studies, Wageningen University
- The Netherlands, established 2006
- Field studies, real-life scale experiments, data management and modeling
- Current Staff 120
- Leading in Marine Ecological Research
- [www.imares.nl](http://www.imares.nl)

Gateway to solutions



# Thank You

