

# *The Billion Bottle Barrier*

## *A citizen-science project for mitigating coastal erosion*

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### Introduction

Using sand-filled glass bottles contained in polymer mesh bags and connected with nylon rope, heavy erosion-resistant barriers can be placed to protect eroding marsh lands by allowing natural colonization by aquatic vegetation and marine animals. These linear connected barriers would also allow for sediments to be trapped behind them and the opportunity for reestablishing natural marshlands in a less turbid environment where sediments could collect.

These barriers would have the advantage of being flexible structures that would soak up some of the energy of current and wave impact, and just as with asphalt paving, while they may deform they would tend to remain intact.

### Purpose

One of the reasons for the rapid advance of coastal erosion is that oyster banks were dredged off the Louisiana coast to provide foundation materials for coastal structures. Without strong structural elements, shellfish have a difficult time in reestablishing protective barriers on loose substrates. This need has been partly met by returning oyster shells to coastal waters, but in places where land-sourced shell sources are scarce and quarry rock is expensive, glass bottles which otherwise might be thrown in landfills and salvaged polymer fruit bags may be used to construct nearly chemically inert synthetic barriers that can be engineered to direct sediment where it would be most useful.

### Methods

Bottles would be filled with sand and temporally sealed shut with waste paper toweling or other non-printed paper, collected in polymer bags, linked together with nylon rope and placed in an interlocking position and sunk in front of the wetland that is to be protected. The natural irregularities of the bottles' shapes and any embossing would aid vegetation and shellfish attachment to this synthetic substrate. Sediments would also accumulate that would serve to help consolidate the barrier. Almost immediately, small fish and crustaceans would be attracted to this area where the many open spaces between the bottles and their open necks, once the paper rotted, would allow breeding and egg-laying areas for many species.

This unproven technology needs to be tested. It will be started as a Kickstarter project to encourage citizen scientists from around the world to initiate pilot projects in a variety of fresh, salt and brackish-water environments on private land to determine how long it took these bottle barriers to be colonized by vegetation and how effective they were at trapping sediment. Information from these projects is to be combined into a single database to provide a resource for scientific study and ultimately, state and national approvals for its world-wide implementation.

### Tools



### Execution

Once approvals are obtained, school children could bring their washed and sand-filled bottles to a collection spot for transport to distribution sites for placement in critical areas. This way every citizen could have a personal involvement in protecting their nations' vital coastal environments.

Emplacement of bottle barrier projects may not be practical in areas where the bottles might be salvaged for resale. However, using waste, inert materials in interconnected containers has merit, even if the use of high-end liquor bottles is an outlandish, although scientifically plausible, example to provide useful information on aquatic life colonization on glass substrates in different environments.

### Expected Results

Many research opportunities in materials, life sciences and engineering would exist while testing and emplacing flexible barriers of inert salvaged materials in different environments.

### Partners Wanted

NGOs, graduate students and corporate sponsors are being solicited to advance this project to establishing a central database and publish a quarterly newsletter.

For additional information on how to participate write or E-mail:

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