

An Alternative to Sea Walls

Sea walls have been constructed to protect areas of human habitation from the action of tides and waves. But are sea walls the most efficient way to protect shorelines from soil erosion?

Hi, my name is Pranav from Spruce Creek high. I would like to give you an alternate solution using Living Shorelines.

My solution is to use grass called Vetiver.

What is vetiver?

Vetiver, also known as *Chrysopogon zizanioides* is a fast growing, perennial, tufted grass with a vast interlinked root system.

Why is Vetiver ideal for coastal erosion?

1. Above ground, the dense, tough, up to 900mm wide vetiver hedge can withstand heavy wave action, taking the power out of the wave erosion.
2. Below ground the deep, dense root network has high root tensile strength. This combines with the earth to stop erosion.
3. A hydrophyte, vetiver can snorkel air from its above water parts. Should it become submerged vetiver can survive for many weeks underwater.
4. Vetiver does not mind living in polluted areas. It is tolerant of saline (salt) conditions on its roots.
5. A permanent solution. Not only is vetiver known to live over 200 years it can self-adjust to changing environments as time goes by. Vetiver usually requires no maintenance.
6. Constructed, man-made solutions such as wood or brick are expensive, time consuming to install and often environmentally toxic. In the end static, man-made solutions often end up failing against the dynamic forces of nature and can leave us with environmental issues. The Vetiver System has a natural dynamic and is designed to work with nature.
7. Vetiver is relatively easy to install and it is aesthetically pleasing.

Living shorelines are a newer approach to addressing shoreline erosion; however, are they effective?

Vetiver can act as a living filter and nail reinforcement system. The dense, deep and strong root structure of Vetiver grass has a tensile strength of 75Mpa (1/6th of mild steel) and grows to vertical depths of 5+ metres, serving to bind and reinforce soil sheer strength by up to 45%. Vetiver thrives in a variety of soils; sandy, saline, water logged, acidic, alkaline and toxic. A resilient and adaptable grass, Vetiver is disease and pest resistant, can recover after fires, and withstands prolonged periods of flooding.

Its effectiveness as "Living filter" prevents contaminants entering water system, and let life thrive near the shore. It can become home for many small fish and organisms that live in the shore line.

Whereas concrete structures cannot support these small fish and Organisms. Unlike most grasses, the roots grow vertical not horizontal 7-13ft, which are deeper than most tree roots. Vetiver binds to loose soil and compacts it preventing erosion by 90 percent.

Are sea walls the most economical way to protect from the tide and are they detrimental to the environment?

* Hardened structures may protect against erosion, but ironically, they also cause high rates of erosion on the shoreward side of the structure. These structures wall off estuaries crucial for fish larvae, which seek refuge in shallow water to survive through their juvenile stage. When a bulkhead or other hardened structure is installed it increases wave reflection, which can push sand in front of the structure, wiping out shallow water habitat.

"Environmentally ,living shorelines are preferable over a seawall or bulkhead, "They're maintaining the habitat that marine organisms depend upon and in many cases restoring some habitat that is being used by marine organisms." Dr. Gittman, a doctoral student at the University of North Carolina at Chapel Hill, Gittman conducted a multi-year study sampling sites where bulkheads and living shorelines were built. The study examined sites before and after the installation of living shorelines.

"We were able to essentially show that fish utilized these constructed living shorelines more than bulkheads," Gittman said. "There were more fish and more species of fish using those restored shorelines." Living shorelines where there is planting and, ideally, oyster restoration, enhance fish habitat locally, she said.

* They also are likely to play a vital role in protecting waterfront properties as sea levels rise.

* Cleans the run-off water from land as it enters the waterway,

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Cost Comparison!!

Cost comparison for 50ft of coverage

Vetiver	2.3x10=23\$
Sea Wall	100x50=5000\$

Vetiver is a low cost low maintenance plant, which makes it just the cost of buying it. On the other hand, Florida says the cost of building a seawall is 100-130 per linear foot. Vetiver is 69\$ with free shipping for thirty live plants. Vetiver grows amount 5 feet tall and wide.

For about 50 feet it is 5000 dollars for a seawall. For vetiver it is 23 dollars!!!!!!!!!!!!!!Vetiver grows five feet so if you space it out by 5 feet each it is 10 plants. Vetiver is 2.30 for a plant with free shipping. It also provides benefits like purifying water, being a natural fish habitat, and protecting soil. Sea walls are made of concrete and they do not have all those properties.

Has Vetiver been used in US?

In 1989 Fort Polk in Louisiana was having a problem with erosion. Three streams joined on the military base, tanks and military equipment was ripping up the land and causing soil and silt to fill up the natural waterways. Mike Materne, the U.S. Soil Conservation Service agent, brought in vetiver plants and planted them in the slopes above the dams that held the water. Even though Louisiana has very acidic rocky soil the vetiver grew about 2.5 meters. Dirt went behind it and the ponds and streams became

clear. Vetiver also tolerates high levels of nitrates, phosphates, heavy metals and agricultural chemicals. Can seawalls do that?

Has Vetiver been used outside of US?

Yes. Vetiver has been successfully used in India, Guyana, Philippines, Australia etc.

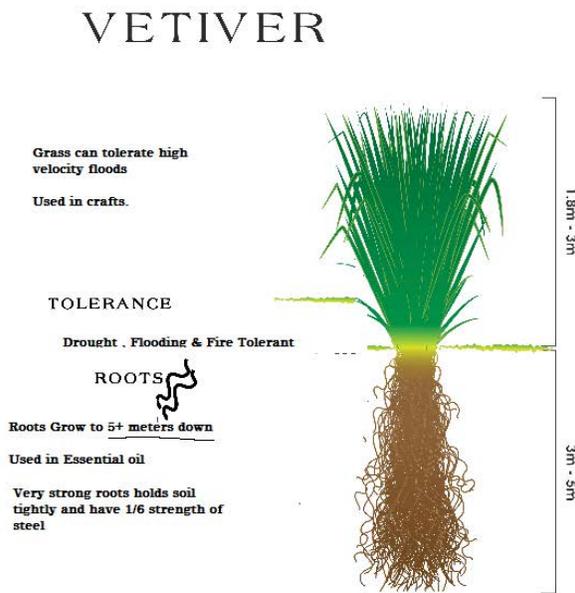
References:

<http://wgbis.ces.iisc.ernet.in/biodiversity/pubs/ETR/ETR34/chapter3.htm>

(Please scroll thru' the page, for pictures of Vetiver cultivated on dunes)

Here is our vetiver.

Since we had extra time for stem project we shipped some Vetiver from Texas and tested it out. When we got the vetiver shipped, it was just .5ft with roots trimmed. In Florida sunshine, it grew stronger and gave out new shoots.



In conclusion Vetiver is a cost effective, low maintenance solution that is natural. We can protect the shoreline! Time is now! Thank you ponce inlet for the opportunity to present my solution.