Vetiver Highlights #2

The Vetiver System – Land Stabilization and Energy Production

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Late this summer two events are impressed on my mind – the series of catastrophic hurricanes that have severely damaged many Caribbean islands and some of the Gulf states of the USA, and the high price of oil. Both phenomena appear to stay. There are many small tropical nations, particularly island nations, whose infrastructure and social fabric will be severely affected by future storms and floods; and whose economies will be imperiled by high energy costs. The Vetiver System could be used to mitigate against both of these problems.

Severe tropical storms and hurricanes destroy infrastructure, induce landslides and other mass sediment flows; resulting in human misery, soil loss, water pollution and damage to coastal marine life. The Vetiver System has proven its ability to significantly lessen tropical storm impact. The most telling evidence was recorded in El Salvador, at the time of Hurricane Mitch (1998), where hundreds of kilometers of roads protected by the Vetiver System were undamaged, and in Honduras vetiver protected farmland survived with minimum soil loss. Since that time most Central American countries are starting to protect their infrastructure and farm lands using the Vetiver System. Relevant papers can be found at: http://www.vetiver.com/LAVN_disaster.htm and http://www.vetiver.com/HON_mitch1.htm.

Elsewhere in Thailand, south China, Philippines, Madagascar (see http://news.nationalgeographic.com/news/2004/08/0831_040831_supergrass.html) and Malaysia, where hurricanes (typhoons) and tropical storms are a fairly frequent occurrence, major infrastructure has been very effectively protected, and at low cost, by the Vetiver System. This is because vetiver grass increases the shear strength of soil. Research by Diti Hengchaovanich and others demonstrates a mean vetiver root tensile strength of 75 Mpa (equivalent to 1/6 of the tensile strength of mild steel), compared to say willow (Salix sp) roots of the same size at 9-36 Mpa. As a result, the shear strength of soil is improved, quote: "Moreover, because of its dense and massive root system, underground, it offers better shear strength increase per unit fibre concentration (i.e. 6 ~19 kPa per kg of root per m3 of soil) compared to 3.2 ~3.7 kPa/kg per m3 of soil for tree roots". I recommend you read "**15 Years Of Bio Engineering In The Wet Tropics"** at: http://www.vetiver.com/ENG_bioengineeringmal.htm for further information relating to the impact of vetiver grass on slope stabilization.

The high cost of crude oil, currently near US$50 per barrel, is likely to have a profound impact on small nations. The "poor" are likely to accelerate the removal of trees and shrubs

for fuel purposes unless some alternative energy source can be created. In the hot wet tropics vetiver grass biomass production is extremely high. Yields of 80 –100 tons /ha of dry matter per year have been recorded. Research in Queensland, Australia supports this potential yield data. See "Modelling Monto Vetiver Growth and Nutrient Uptake for Effluent Irrigation Schemes" by Alison Vieritz, Paul Truong, Ted Gardner, and Cameron Smeal at www.vetiver.com/ICV3-Proceedings/AUS_MEDLI.pdf. Vetiver grass, a C4, has a high Radiation Use Efficiency in the order of 18Kg/ha per MJ/m^2. This is comparable to that of sugar cane, and is four times higher than C3 grasses such as Bermuda grass.

The calorific value of fuel oil is about 43 GJ per tonne, four times that of vetiver grass. The energy from an average of 70 tonnes of vetiver dry matter/ha/year would be equivalent to 17.5 tons of crude oil, at US$40 per barrel (6.3 barrels per tonne) the per ha value would be $4410 - - Certainly worth investigating. The technology for biomass conversion to electrical energy is well known.

Many of the worlds degenerated land areas, particularly saline areas caused by bad irrigation and drainage practices could be used for vetiver production, thus not only could vetiver produce energy, but it could also be used for land reclamation (desalinization). Note that because of vetiver's massive root system it could take advantage of the high water tables often associated with salinization and would also be able to tap, at depth, nutrients that are generally not available to shallower rooted plants. Finally the vetiver root mass is an ideal CO2 sink and any large "vetiver for energy program" might be able to take advantage of current "Carbon exchange schemes". See The Global Hub for Carbon Commerce at http://www.co2e.com/trading/MarketHistory.asp.

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