Vetiver Highlights # 4 - Vetiver for the Mitigation of Disaster Impacts from Storm Events.

Although I referred to this topic in an earlier Vetiver Highlights (#2), I just have to come back to it in the light of current events.

"Catastrophic floods and landslides occurred throughout the region. When it was over, some 9,200 people had died; almost 270,000 homes were lost; 21,325 miles of roads and 335 bridges were destroyed. Immediately after the storm, some 2,000,000 people were pushed out of their homes. Economic losses were estimated at US$ 6 billion".

Except for the lower fatalities this sounds like the impact of the notorious December 2004 tsunami. It was not - it was 1998's Hurricane MITCH – a bad one

Tsunamis are relatively rare, cyclones/typhoons/hurricanes and other major rainfall storms are not. These heavy and intense rainfall occurrences cause significant and costly damage to land, water, infrastructure and people. They are nearly always catastrophic, and become more so as population and landuse pressures increase. Unlike tsunamis damage from such storms is not just confined to the near sea shore areas, but also far inland where the heavy rain damages watersheds and infrastructure, and concentrated water flows pour down into lower catchments and eventually the sea bringing damage and powerful water and sediment flows. There are many measures that can be used to mitigate such damage in advance, however the Vetiver System, based on the use of vetiver grass hedgerows, is an increasingly important and documented technology that is well suited for the purpose.

To reduce future damage from extreme flooding planners and administrators should give special attention to: (i) ensuring proper design and construction of transportation infrastructure; (ii) ensuring the adequate protection and proper maintenance of key roads and access points; (iii) assisting rural households to adequately protect their production systems and housing sites and (iv) in coastal and low lying areas of countries such as India and Bangladesh stabilize and protect flood embankments and irrigation and drainage systems from extreme flooding events. Vetiver grass technology could be applied to all of the above including:

(i)   stabilizing soil and slopes. vetiver's root system is excellent for stabilizing soils. Because of its huge deeply penetrating root mass (particularly in the first meter) and high root tensile strength (1/6 the strength of mild steel – 75Mpa) greatly increases soil shear strength (by as much as 40%). Vetiver has the added advantage of light weight and low wind profile thus avoiding problems associated with greater stress loading on an unstable slope;

Vetiver grass root from Vietnam, 3 meters long, showing bulk of root in first meter. Photo by Vietnam Vetiver Network

(ii)   trapping sediments – evidence from many countries all concur on the effectiveness of vetiver hedges to trap sediments. Recent studies in Honduras showed that traditional slash-and-burn sites average 92 tons/ha/year of soil loss compared to 43 tons/ha/yr with crop residues and a "green mulch" cover crop compared to 0.9 tons/ha/year on sites with vetiver grass barriers and the crop residue/mulch. In Colombia soil loss was reduced from 143 tons per ha on bare land to 1.3 tons when protected by vetiver;

Vetiver hedgerows have ability to trap sediment and other trash under flood conditions. Darling Downs, Australia. Photo by Paul Truong

(iii)   reducing runoff velocities - flume studies in the USA and Australia have shown vetiver hedges to be very effective at reducing total head (flow depth and velocity) of water flows. The hedge's effectiveness at doing so increases with hedge thickness (maturity). It appears that mature hedges can be quite effective at reducing runoff velocities of flows less than 20cm in depth, moderately effective with flows up to 35 or 40 cm, and have some impact on flows up to possibly 60 to 80cm; and

**Vetiver hedgerows planted to protect a spillway of a
reservoir in Zimbabwe. Photo by Dick Grimshaw**

(iv)   protecting hard structure/soil interface interfaces - experience has shown that vetiver hedges are excellent at protecting the often vulnerable interface between soil and hard structures. It is here that runoff is concentrated, causing soil to be scoured away. Oftentimes, this is how structures begin to be undermined, leading to the eventual failure of the structure (e.g., gabions along stream channels, bridge footings and 'wings' of approaches, concrete drainage channels along roads, etc.).

**A 2 meter flow of flood water passed over this "Irish Crossing' on a farm in Australia. Vetiver hedgerows were
planted upstream and adjacent to the crossing, and as a result the high velocity flood water was unable to
undercut and break up the concrete (in previous floods, without vetiver protection the crossing was destroyed
and had to be rebuilt. Photo by Paul Truong**

Although vetiver has been termed by some as a 'miracle grass' it will not save or protect a bad design, and it has to be applied correctly or it will not work. In the latter case the design of layout and purpose of use has to be carefully considered and applied. Because of vetiver's many different applications over a wide range of uses we now refer to the combined applications as the Vetiver System.

Following Hurricane Mitch the Vetiver System has been used extensively in Central America for infrastructure and farm land rehabilitation. It is also being used in many

other countries including the US – southern California - for the stabilization of slipping slopes.

Protection of mudslide area in southern California using vetiver grass – photo by Jerry Coyle

It has also been used for disaster mitigation in many other countries where extreme storm events occur including: Bangladesh, China, Madagascar, Philippines, and Vietnam

The above and more related information is documented at http://www.vetiver.org. My next article, I promise, will be pure erosion control – how vetiver can be used to protect the tropical black cotton soils.

Dick Grimshaw