STABILISATION AND REHABILITATION OF STEEP SLOPES USING VETIVER SYSTEM TECHNOLOGY

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Vetiver System

The Vetiver System (VS), which is based on the application of Vetiver grass (*Chrysopogon zizanioides L.),* was first developed by the World Bank for soil and water conservation in India in the 1980s.

In addition to its very important application in agricultural lands, scientific research conducted in the last 30 years has clearly demonstrated that VS is also one of the most effective and low cost natural methods of environmental protection.

VETIVER BIOENGINEERING

A technology based on the use of vetiver grass

The following characteristics make vetiver grass highly effective for steep slope stabilization:

- **A deep, penetrating and extensive root system that binds the soil, and reinforces the soil structure which requires extraordinary force to dislodge.**

- **Erect and stiff stems forming a dense hedge which is very effective in retarding water flow and reducing the erosive power of the strong current.**

- **Vetiver is tolerant to drought, saline, sodic and acidic soil conditions.**

These vetiver roots have a tensile strength equivalent to 1/6 mild steel reinforcement

China

Thailand: 1 year 3.3m

Vietnam

Indonesian Institute of Road Engineering (IRE)

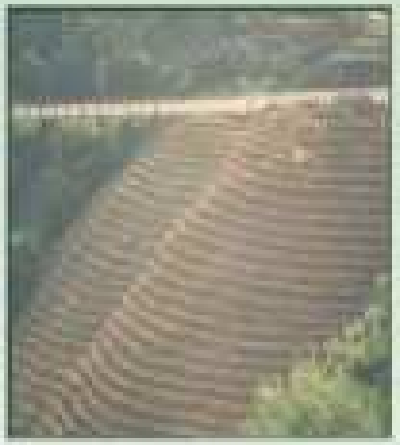
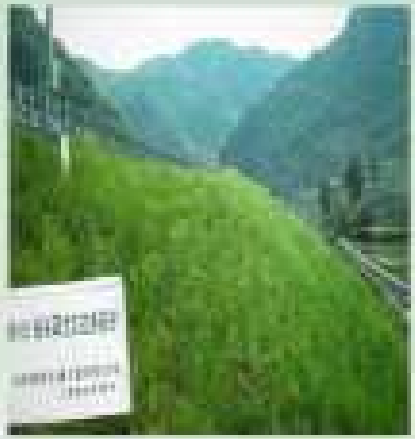
Trial comparing 3 Vetiver planting densities, Bahia grass and bare slope at Nagreg, West Java


Vetiver
Bahia grass


Vetiver planted at 3 densities

Very steep, 80^0 slope on highly erodible red volcanic soil

Based on the above technical data, vetiver system has been used very effectively in stabilising extreme and highly erodible slopes around the world


CHINA : Zhejiang Province (Cheng Zhou)

National Highway 330 on slope area of 10 600m2 to prevent landslides

BRAZIL : Road Batters (Paula Pereira, Deflor)

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INDONESIA : East Java (IRE, 2009 – 2010)

Before

month

2.5 months

4 months

Slope length 300m, height: 14 m,

Regular trimmings after 4 month

MADAGASCAR :
Railway between Tananarive and Tamatave (Yoann Coppin)

25.000 Vetiver were planted in August 2013, total 2.500m in length, with a spacing of 0.60m between the rows.

THAILAND: Central Highlands (Surapol Sanguankaeo)

VENEZUELA: Road Batters (Rafael Luque)

GUATEMALA : Batters on 72 degree slope using 3D geofabrics (Leonel Castro)

Batters on 72 degree slope using 3D geofabrics (Leonel Castro) & Vetiver

May 2012

December 2012

DR CONGO: Road Batters (Roley Noffke)

On 60°-70° vertical slope using Green TerraMesh walls at Selembao Kinshasa and Vetiver .

The Ho Chi Minh Highway, Vietnam

Following the failure of the costly conventional measure in controlling the erosion and landslips along the Highway, the Ministry of Transport adopted VST as a preferred erosion control measure on all new sections of the Highway and on eroded slopes of the completed sections.

One to two month old planting on newly constructed batters

SOME BEFORE AND AFTER VIEWS

SOME BEFORE AND AFTER SCENERY

2014 Some vetiver left but mostly endemic plants

Gizo Island, Solomon Island, 2015

The application of VS to this site was under the technical support of Robinson Vanoh

Unstable, eroding site

Slope slippage with damage to building


Approx 45°
1:1
04/08/2015

Planting in 2015

Two years after planting, 2017

Two years after planting, 2017

Two years after planting, 2017


With Vetiver
No Vetiver