STABILISATION AND REHABILITATION OF STEEP SLOPES USING VETIVER SYSTEM TECHNOLOGY

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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
Bahia grass

Vetiver

Vetiver planted at 3 densities
Very steep, 80° 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

Slope length 300m, height: 14 m,

2.5 months

Regular trimmings after 4 month

4 months

Before

12/14/17

THE VETIVER NETWORK INTERNATIONAL 11
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
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
Planting in 2015
Two years after planting, 2017
Two years after planting, 2017
Two years after planting, 2017