

# A Social Investment Opportunity for Rural Communities In Improving Land Degradation using the Vetiver System

By

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## INTRODUCTION

The concept of introducing the Vetiver system to local communities was initiated by the Department of Agriculture, Limpopo Province and Hydromulch (Pty) Ltd acting under the auspices of the Vetiver Network International (TVNI) & The International Erosion Control Association – (IECA) Region 2, for the training of rural communities in various soil conservation measures.

Vetiver grass (*Chrysopogon zizanioides*), is a major component of many vegetation-based bioengineering and conservation programmes worldwide. The Vetiver system is affordable and effective in erosion control and water conservation, soil stabilization, pollution control, waste water treatment, storm damage mitigation and prevention, and many other applications.

Originating in the south of India and today widely cultivated in the tropical and sub-tropical regions of the world was introduced into developing countries by the World Bank and is now used in over 70 countries.



### South African History

In South Africa it was used by the pioneers (Voortrekkers) to scent the kists and was grown in Ventersdorp, as far back as 1892.

Vetiver is also very suitable for use in the tropics, subtropics and other biomes. The plant is sterile (does not produce fertile seeds) and is propagated by small offsets/slips, is non-invasive and easily controlled. However, fertile genotypes (*Chrysopogon nigritana*) indigenous to Africa can become invasive. It is found in Ngamiland, Botswana, the Grootfontein district of Namibia, Central and West Africa and is not recommended for use outside its domain in the above-mentioned applications.

There are many wonderful applications which could be of tremendous benefit to rural communities not only as a source of income, but also as a source of material for handicrafts. Its ability to clean water, react against insect pests and nematodes, ability to recharge ground water, erosion and sediment control are to be noted.

## CHARACTERISTICS AND ADVANTAGES

- \* It is an ecological climax species that outlasts its neighbours and can survive for decades without any aggressiveness or tendency to colonise new areas.
- \* It is vigorous with a high biomass production potential in terms of roots and above-ground material.

- \* Unlike most grasses, which have horizontally spreading, mat-like root systems, Vetiver's strong roots can grow downward to a depth of up to 4m.
- \* It propagates only vegetatively, hence an extremely low to zero invasive potential.
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- \* It is one plant on the planet with the highest photosynthetic activity (given sufficient sunlight, water and nutrients produces the most dry biomass per unit in time).
- \* Produces up to 70-80 dry tons per hectare of cellulosic biomass with adequate water & nutrients.
- \* A perennial plant only requiring to be planted once with a lifespan running into many decades.
- \* A C4 plant in which the CO<sub>2</sub> is first fixed into a compound containing 4 carbon atoms before entering the Calvin cycle of photosynthesis.



#### **The Vetiver Plant**

It withstands both drought and flooding and tolerates high levels of pesticides, herbicides and a wide range of toxic and heavy metals.

It survives temperature variation from  $-14^{\circ}\text{C}$  to  $55^{\circ}\text{C}$  and grows in soils with a pH ranging from 3,0 to 10,5.

It has a high tolerance to saline soil, sodic soil and acid sulphate soil.



#### **Vetiver Root System**

Vetiver is extremely valuable in erosion prevention and control, engineers likening the roots to "living soil nails". The roots, with an average tensile strength of 75MPa, improve the shear strength of soil by between 30% and 40%.

Vetiver grass has neither stolon's nor rhizomes. Its massive finely structured growing system can, under ideal conditions, grow rapidly downwards to 2m in the first year and as far down as 4m within 3 to 4 years, making Vetiver extremely drought and frost tolerant and difficult to dislodge by strongly flowing water.

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- \* New shoots developing from the underground crown afford a resistance to fire, frost, traffic and heavy grazing pressure.
- \* When plants are established close together, Vetiver forms a dense hedge that acts as a very effective sediment filter and water flow diffuser.
- \* New roots grow from nodes buried by trapped sediment. Vetiver will continue to grow up with the deposited silt eventually forming terraces where the trapped sediment is not removed.
- \* The plant is palatable in the early stages of growth and has shown to substantially reduce stomach parasites in cattle and other domestic animals.
- \* Research by the University of the North West, has also shown that the plant exhibits all the characteristics of an ideal trap crop for stem borer moth (*Chilo partellus*) and also root knot (meloidogyne) nematode damage in vegetable crops. Vetiver has the potential of becoming an important biological pesticide/herbicide in crop production.

The Vetiver Network International (TVNI) and the International Erosion Control Association (IECA) has in association with Hydromulch (Pty) Ltd, a leading South African environmental restoration company embarked in numerous poverty alleviation and social upliftment programs with rural communities locally and in developing countries over the past years. It was found that in many rural villages the women and children were the greatest beneficiaries of the projects.

### **CASE STUDIES**

Case studies of projects in Madagascar, Guinea and South Africa in association with the various mining entities and government departments where educating and training rural communities in the use of Vetiver from propagation to implementation on mining, agricultural, environmental and donga restoration sites was carried out.

#### **Rio Tinto – Madagascar and Guinea.**

Local communities were trained in the selection and propagation of Vetiver grass for re-sale to the mine for environmental restoration operations. These communities were supplied with all the necessary “working” tools and logistic support such that they could produce the required number of plants that were required by the Rio Tinto mine for erosion and sediment control.



A total of 168 families were involved in the propagation of 4 million Vetiver plants over a 3 year period with many still providing plant material to the mine.

#### **Sherritt Mining – Madagascar**

Local communities were trained in Fascine and Vetiver propagation along the full extent of the 220 km pipeline running from Moramanga to Tamatave, Madagascar over a 3 year period.

Financial assistance in the form of consumables (potting bags, Vetiver slips and fertiliser) and all working tools (spades, rakes, watering cans, wheel barrows etc) had to be given to all to start their operations.



A suitable water source and good potting soil was the requirements from the villagers. Payment for produce (established Vetiver plants) was made in 3 payments to assist them with their “cash flow”.

#### **Department of Agriculture – Limpopo Province**

Programs were initiated between the Department of Agriculture (DAFF), Limpopo Province, South Africa and Hydromulch (Pty) Ltd under the auspices of the Vetiver Network International (TVNI) & The Erosion Control Association – (IECA) Region2, for the training of rural communities in various soil conservation measures in Malomanye, Moutse and Tubatse villages and the setting up of a Vetiver growing facility in Moroke, Limpopo. In all over 200 villagers were trained in Vetiver propagation and in basic soil conservation practices for donga rehabilitation.



Research carried out in 2008 by Simeon Materechera of the North West University – Faculty of Agriculture at Danville, Mafikeng has shown that Vetiver grass has an ameliorative effect on soil quality under semi-arid conditions of South Africa. It not only increases the soil organic matter in the surface soil, but also improved the physical and biological properties which are important for crop production and the environment in general.

The potential of using vetiver grass as a source of bio-mass production to be used in the production of bio-fuel (ethanol) or as palletised fuel in stoves is to be investigated as this could become an essential and important component to local communities.

Vetiver is one plant on the planet with the highest photosynthetic activity and produces up to 70-80 dry tons per hectare of cellulosic bio-mass with adequate water & nutrients.

Providing Vetiver leaf waste for briquette production could be an alternative to the dependence on charcoal sources.



The Vetiver Network International (TVNI) as well as the International Erosion Control Association (IECA) has been proactive in promoting the functional uses of Vetiver for agricultural, commercial and social applications worldwide. Additional information is available on:

The Vetiver Network: [www.vetiver.org](http://www.vetiver.org)  
IECA: [www.ieca.org](http://www.ieca.org)  
Hydromulch (Pty) Ltd: [www.Hydromulch.co.za](http://www.Hydromulch.co.za)

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