

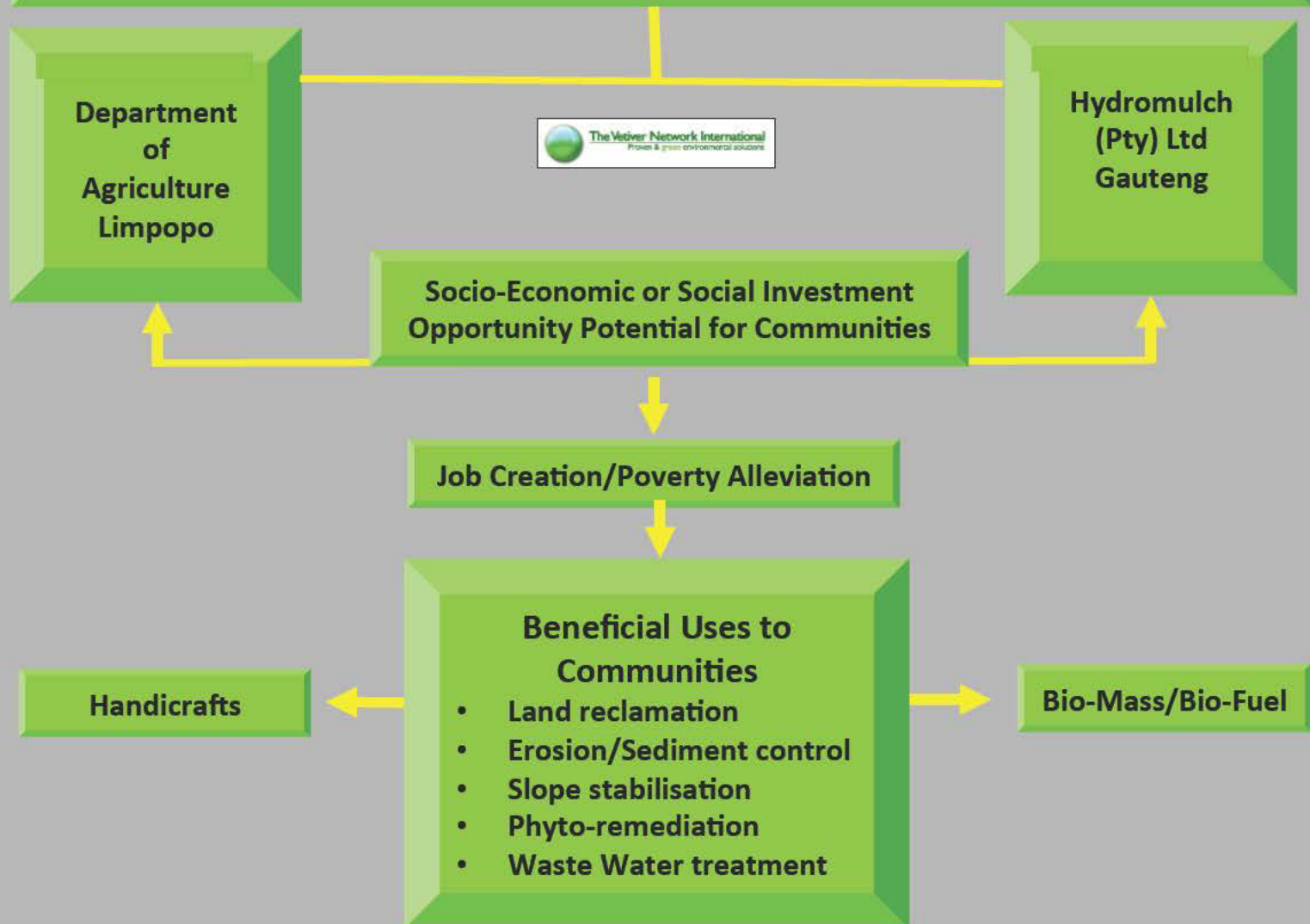
# A Social Investment Opportunity for Rural Communities in

## Improving Land Degradation using the Vetiver System



By  
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# Concept of Introducing the Vetiver System to Rural Communities for Improving Land Degradation in South Africa



## Reference is made to “*Vetiveria nigritana*” found in Ngamiland (Okavango swamps), Botswana and in the Grootfontein district of Namibia



The flattened base of the plant distinguishes it from *C. aucheri* Stapf, a species probably occurring in Bechuanaland.

### 144. VETIVERIA Bory

Robust perennials with strong, thick rhizomes; culms simple, compressed in the lower part; leaf-sheaths glabrous, smooth, compressed, especially the sharply keeled lower ones, these elongated, glossy, straw-coloured or yellowish; blades folded at first, later expanded, at least in the upper part, sharply scabrid on the margins and sometimes the midrib, usually glabrous, more rarely hairy on the upper surface towards the base; inflorescence a panicle of numerous slender racemes in whorls on a central axis; spikelets in pairs, one sessile, the other pedicelled, those of each pair more or less alike in shape and size, different in sex, 2-flowered, lower floret reduced to a lemma, upper bisexual in the sessile, male in the pedicelled spikelet; glumes armed with short, tubercle-based spines; lemmas awnless or the upper of the sessile spikelet awned, often inconspicuously; palea minute.

2 species, 1 of them introduced:

Spikelets 5.5—7 mm. long, the sessile, or most of them, awned; sessile spikelet bearded at the base on the callus with a ring of light or bright brown hairs about 1 mm. long; root of plant not scented.  
1. *V. nigritana*.

Spikelets 4—4.5 mm. long, awnless; callus of sessile spikelet usually quite glabrous; root of plant aromatic. . . 2. *V. zizanioides*.

### 1. *V. nigritana* (Benth.) Stapf, FIG. 385.

An erect, tufted perennial with stout culms up to 300 cm. high; leaf-blades with cutting, saw-like margins; panicle 15—40 cm. long, usually contracted, more rarely with spreading branches, these up to 16 cm. long, filiform, numerous, in 6—10 whorls, not bearing spikelets right from the base; spikelets 5.5—7 mm. long, the pedicelled usually slightly shorter than the sessile, both dark purple, or purple tinged with light brown; glumes, or one of them, often shortly awned; upper lemma of sessile spikelet awned from between 2 acute lobes, awn 2—12 mm. long, straight or slightly bent and twisted. From Ngamiland, Bechuanaland and the Grootfontein district of S.W. Africa. Grows in



**Reference to Vetiver grass grown in Ventersdorp, South Africa as far back as 1892 – used by the “Pioneers” to scent their wooden chests/containers during their journeys into the Interior**



FIG. 385.—*Vetiveria nigritana*. Plant,  $\times \frac{1}{3}$ ; inflorescence,  $\times \frac{1}{3}$ ; spikelet pair,  $\times 5$ .

water or in wet, usually swampy ground, especially on black turf soil.

A species indigenous to Africa, abundant and sometimes dominant in marshes.

2. *V. zizanioides* (L.) Nash

Much like *V. nigritana*, the chief differences

being those in the key. Indigenous to tropical Asia; cultivated to a limited extent in S. Africa.

The species does not, apparently, flower regularly under cultivation. The coarse tufts of leaves, straw-coloured, glossy, strongly flattened and flabellate at the base, and the rough, saw-like margins and sometimes midrib of the otherwise smooth blades, are characteristic of the genus. Vegetatively, the two species are much alike, except that *V. nigritana* lacks the attractively scented root of *V. zizanioides*. The scent is not strong when the root is fresh, increasing as it dries.

Among European peoples, this well-known grass is familiar as “Vetiver” or “Khas Khas”. The roots are the source of Vetiver oil, used chiefly in perfumery. In the East, they are woven into coarse mats and hung in front of doors, moistened to cool and scent the air blowing through them.

It is not known when Vetiver was first brought to S. Africa from the East. The grass has been known in the Transvaal for at least sixty-five years, and was grown at Ventersdorp by a Mrs. J. J. Frean in 1892. According to her son, it was brought from the Cape by a Voortrekker family, and was used for scenting kists (coffers).

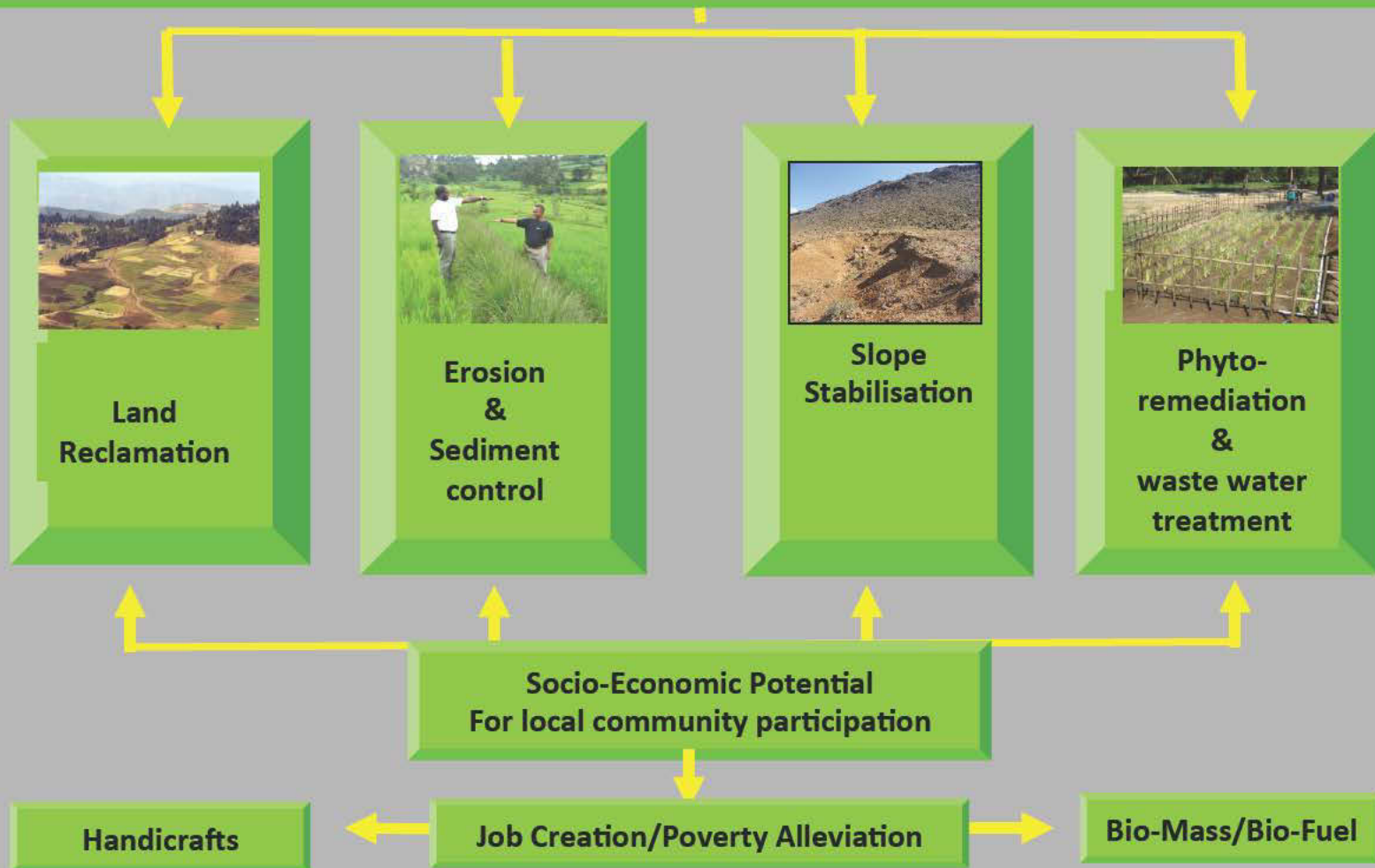
145. SACCHARUM L. FIGS. 386—390.

Robust, erect, tufted perennials; leaf-blades various, sometimes reduced to the stout midrib; inflorescence a panicle, usually large, showy, silkily hairy and plume-like; spikelets in pairs, one sessile, the other pedicelled, all alike, usually awnless, rarely awned, each with a ring of long, silky hairs from the callus, 2-flowered, lower floret reduced to a lemma, upper bisexual; glumes somewhat hardened, the lemmas thinner, upper sometimes absent, when present, awnless or more rarely with a terminal, usually straight awn; palea small.

To this genus belongs sugar cane, the source of approximately two thirds of the world's commercial sugar.

*Saccharum* comprises more than twelve species, all of them native to tropical and subtropical regions, none of them indigenous to S. Africa. The type species, *S. officinarum* L., is used in breeding work throughout the world. It is the so-called Noble cane, known

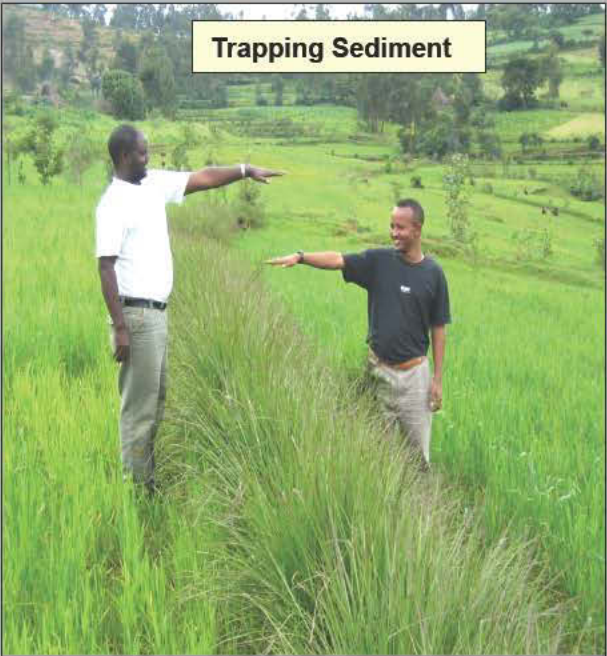
# Socio-Economic Potential & Beneficial Uses of the Vetiver system's vegetative Bio-Engineering application techniques for local community participation





# Land Reclamation

Trapping Sediment

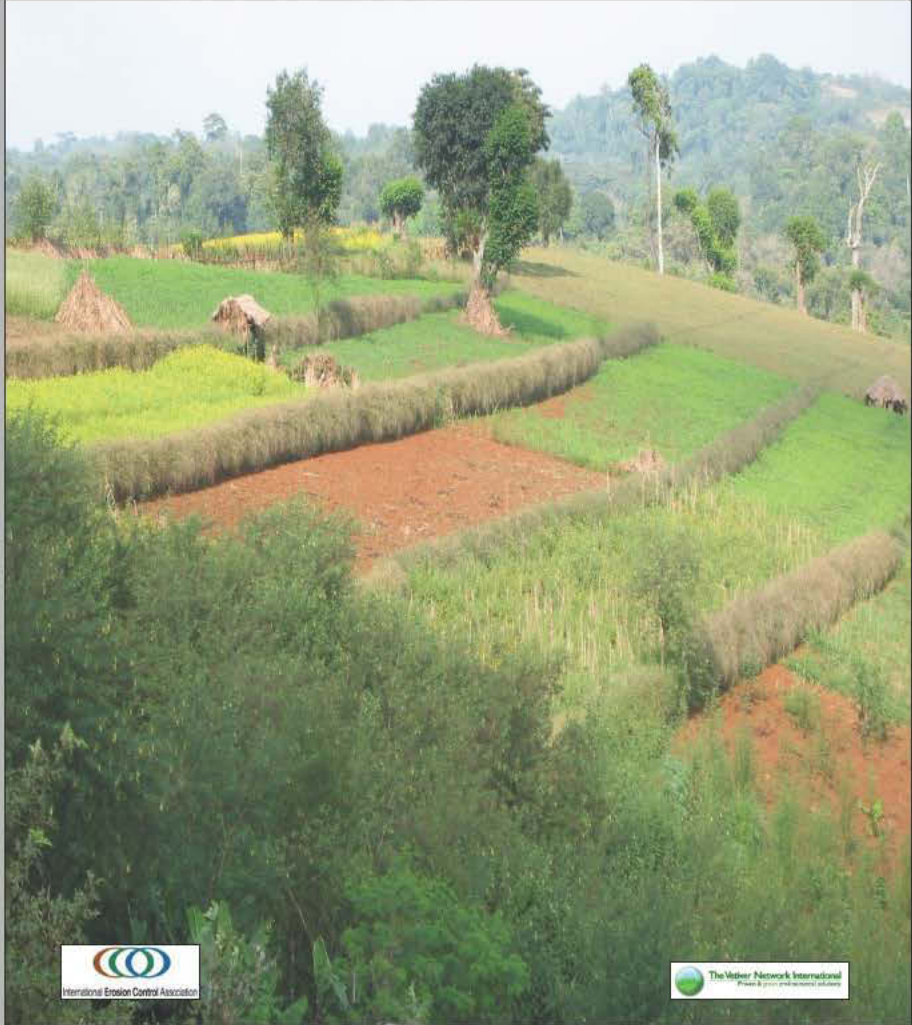


Ethiopia- Rehabilitation of Degraded Land and environmental Applications Vetiver hedges planted on contour contributed to ground water "re-charge" increasing soil moisture capacity

Fodder Crops



Spreading surface water runoff and increasing soil moisture capacity



Reducing surface flow velocities & increasing ground water penetration



June 2005



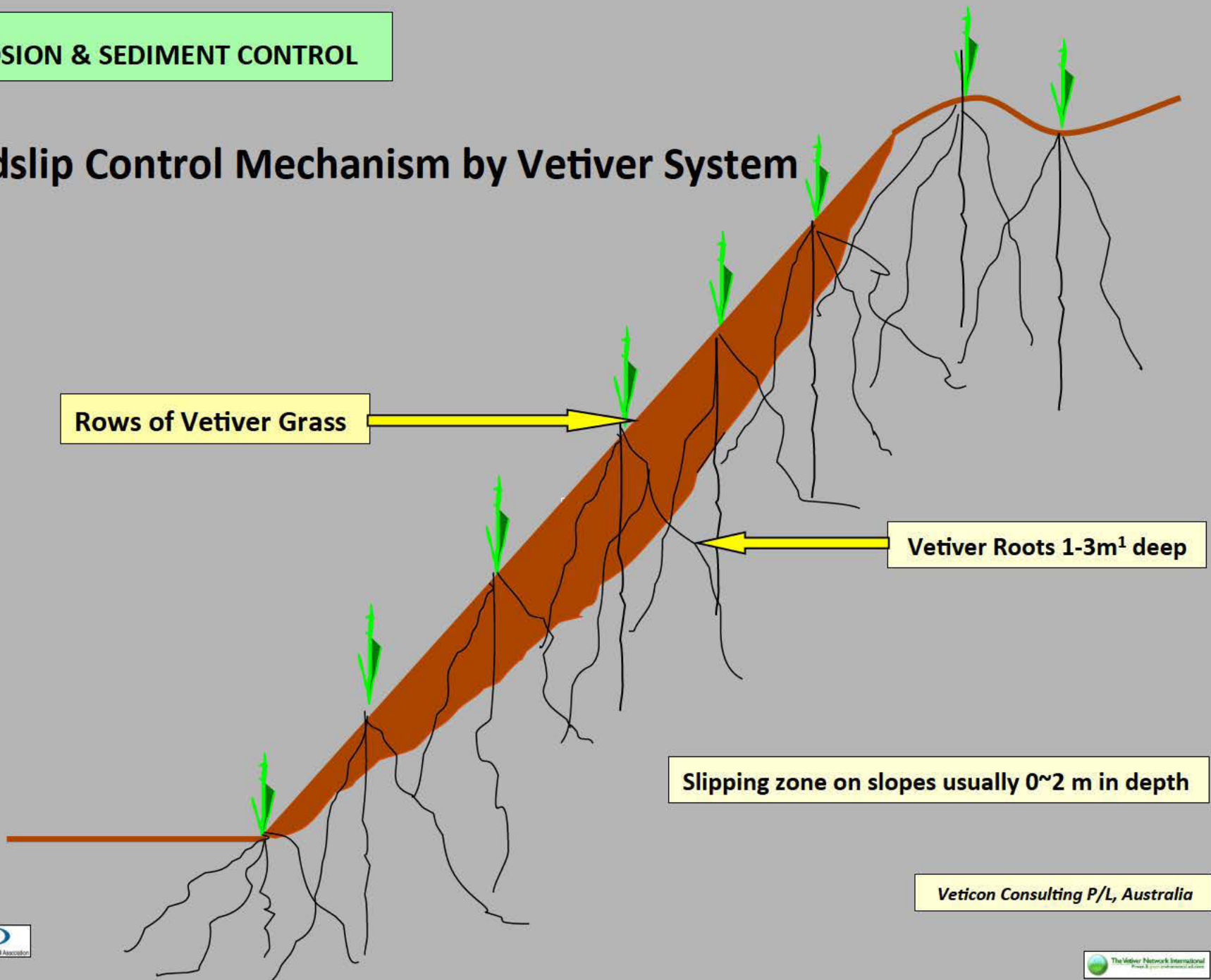
Oct 2005



## **Erosion & Sediment control**



# Landslip Control Mechanism by Vetiver System



Veticon Consulting P/L, Australia

**Road Embankment Rehabilitation  
Gabions-Coir Logs-Wire mesh**



# Bio-Jute/Vetiver grass - Installation on Cut Slope Embankments. Rio Tinto-Simandou, Guinea



**Established Bio-Jute/Vetiver/Hydroseeding Slope**



# Eroded side slope repairs with Sandbags & Vetiver



**Donga & Gully Repairs with Sandbags & Vetiver**





## Slope Stabilisation

## Slope stabilisation

### Rio Tinto Project– Fort Dauphin, Madagascar

40 hectares were stabilised and re-vegetated.

4,000,000 Vetiver plants were propagated & supplied by 168 local villagers over a 3 year period.



# Ehoala Dune, Fort Dauphin, Madagascar - Environmental work started in 2006 and completed by late 2008



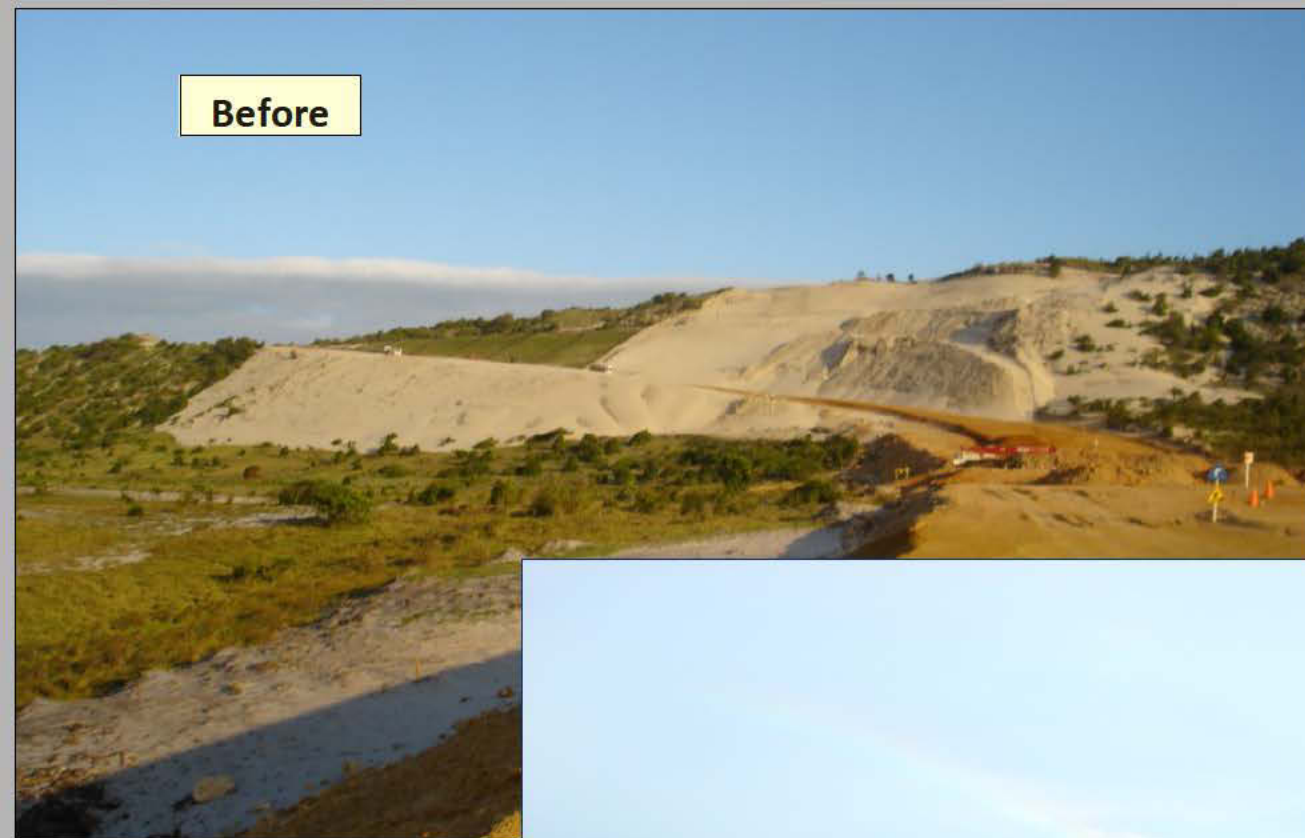
# Surface Water Runoff control with Vetiver Grass Hedge Rows



**Before**

**Restoration  
Project  
Rio Tinto  
Madagascar**

**After**





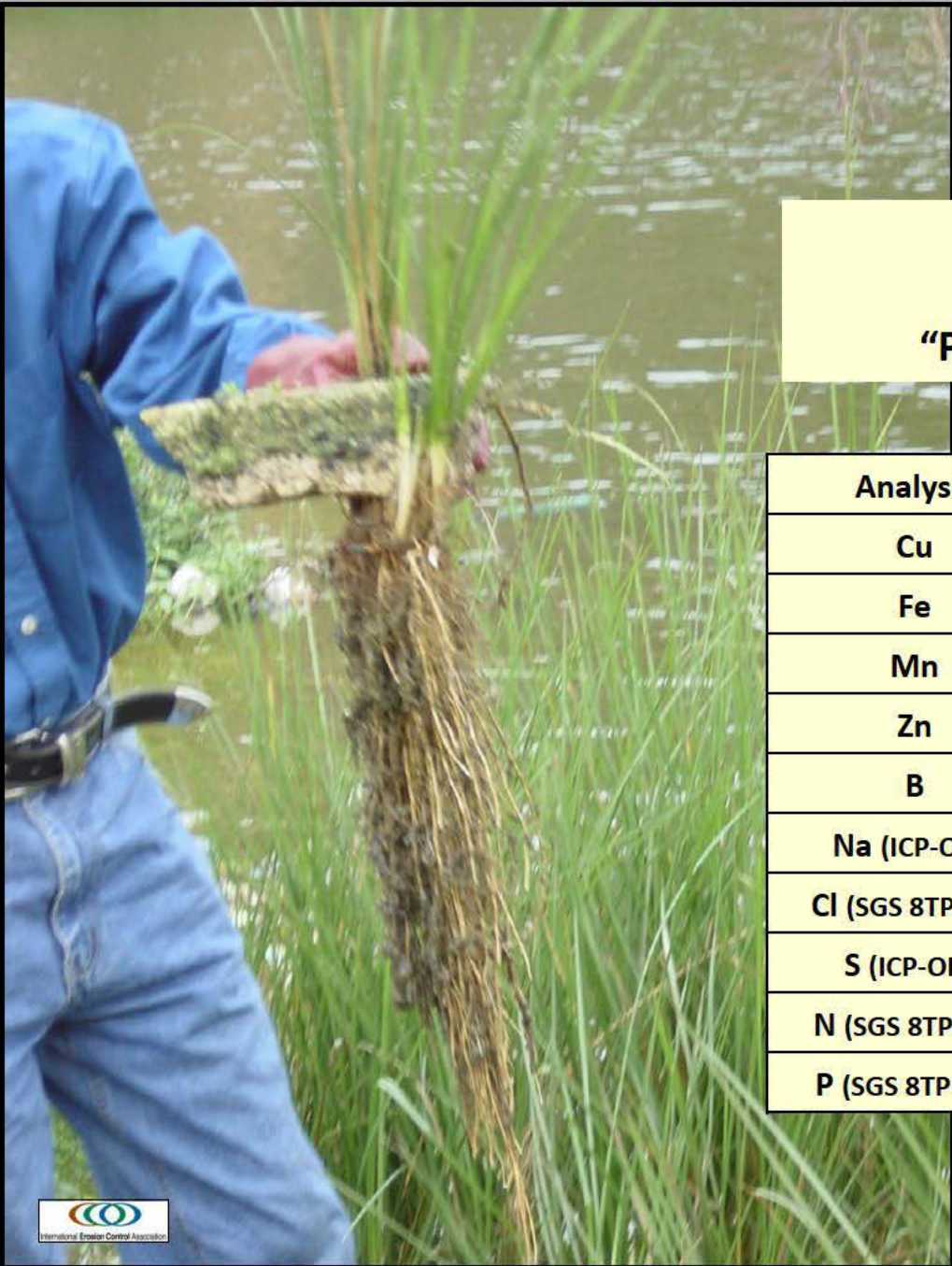
**Phyto-remediation  
&  
Waste Water treatment**

## Cleaning of Discharge Water – Phytoremediation



Vetiver Pontoon – 12 Weeks later





## Chemical Analyses of “Pontoon” floated Vetiver plant

Analysis	Leaf	Root
Cu	3 mg/kg	12 mg/kg
Fe	360 mg/kg	676 mg/kg
Mn	170 mg/kg	621 mg/kg
Zn	22 mg/kg	57.08 mg/kg
B	14 mg/kg	10 mg/kg
Na (ICP-OES)	0.01 %	0.04 %
Cl (SGS 8TP:033)	0.41 %	0.26 %
S (ICP-OES)	0.12 %	1.31 %
N (SGS 8TP:022)	1.31 %	3.50 %
P (SGS 8TP:022)	0.07 %	0.24 %

# Waste Water Treatment

## Refilwe Community Project-Lanseria

**REFILWE COMMUNITY PROJECT - MAY 2007**

This facility was made possible by the generous support given by the donors of the Globalgiving Community U.S.A. the participating Jewelers of The Private Collection of South African Diamonds Programme U.S.A. Sanix (Pty) Ltd., Enviro Outlets (Pty) Ltd. South Africa and The Bryan La Trobe Foundation.

globalgiving

WATER OUTLET

Breaking the cycle of poverty...



## Vetiver Buffer Area



# Vetiver Buffer Zone-Refilwe Community Project-Lanseria



**Buffer or Catchment Zone**





**Socio-Economic Potential**  
**Job Creation/Poverty Alleviation**  
**Handicrafts & Bio-Mass**

**Vetiver propagation – Fort Dauphin, Madagascar**



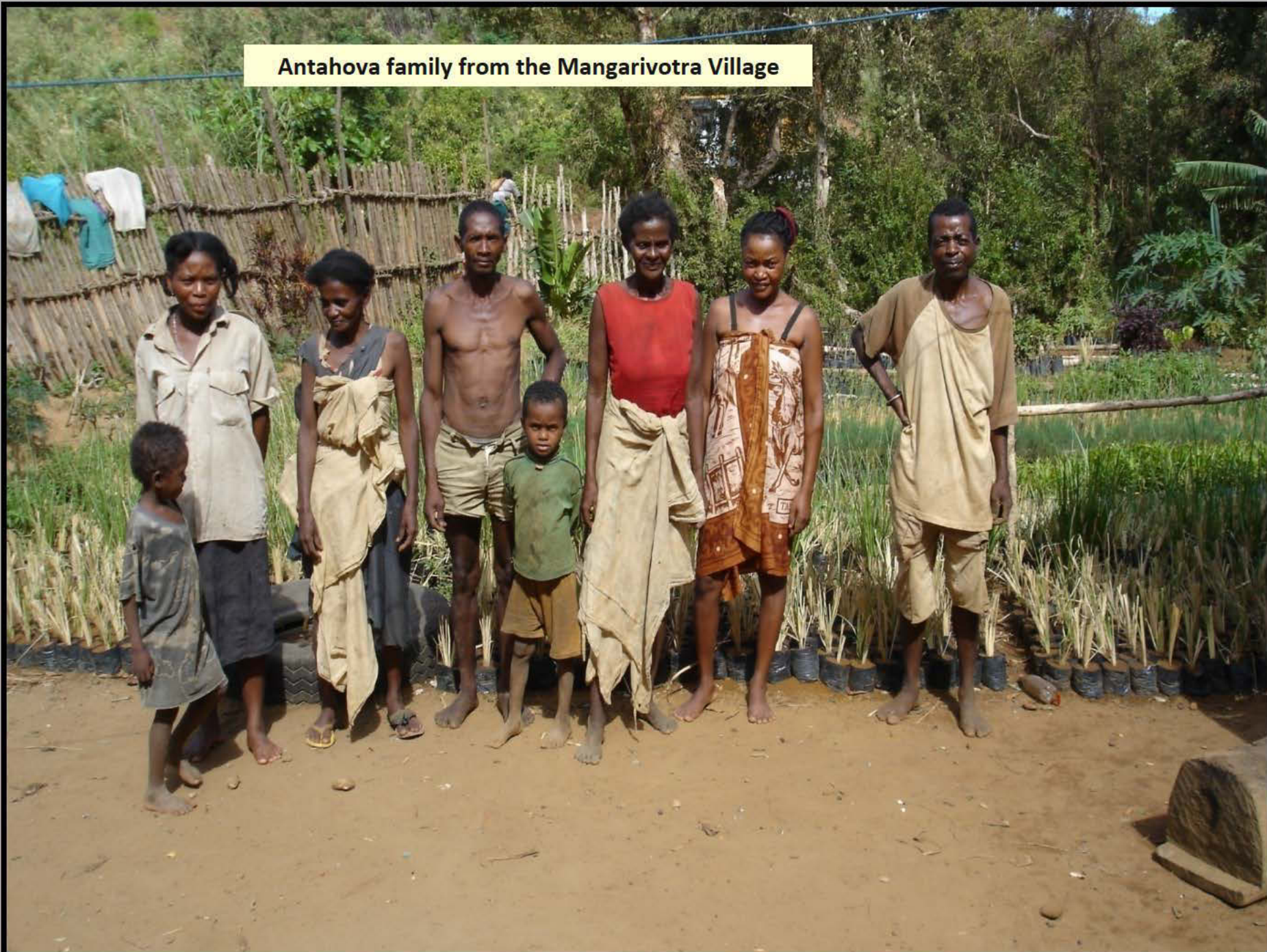
**Vetiver Rastafarian**

## Empowerment of Local Communities for Vetiver propagation



Started with 15 communities in 2006 & expanded to 32 communities by 2008

Antahova family from the Mangarivotra Village



Utilisation of all available space for vetiver propagation



**Donga Rehabilitation Limpopo Province South Africa**  
Initiated by the Department of Agriculture, Limpopo Province.





**VETIVER PROPAGATION COURSE  
FOR  
SOIL CONSERVATION & EROSION CONTROL**

**Initiated by:**

**Department of Agriculture, Limpopo Province  
Republic of South Africa in association with Hydromulch (Pty) Ltd**

**Hydromulch Premises, Bapsfontein Farm,  
Ekurhuleni, Gauteng or at Community Halls**

**By**

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**Republic of South Africa**

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**Under the auspices of:**

**The Vetiver Network International (TVNI)**

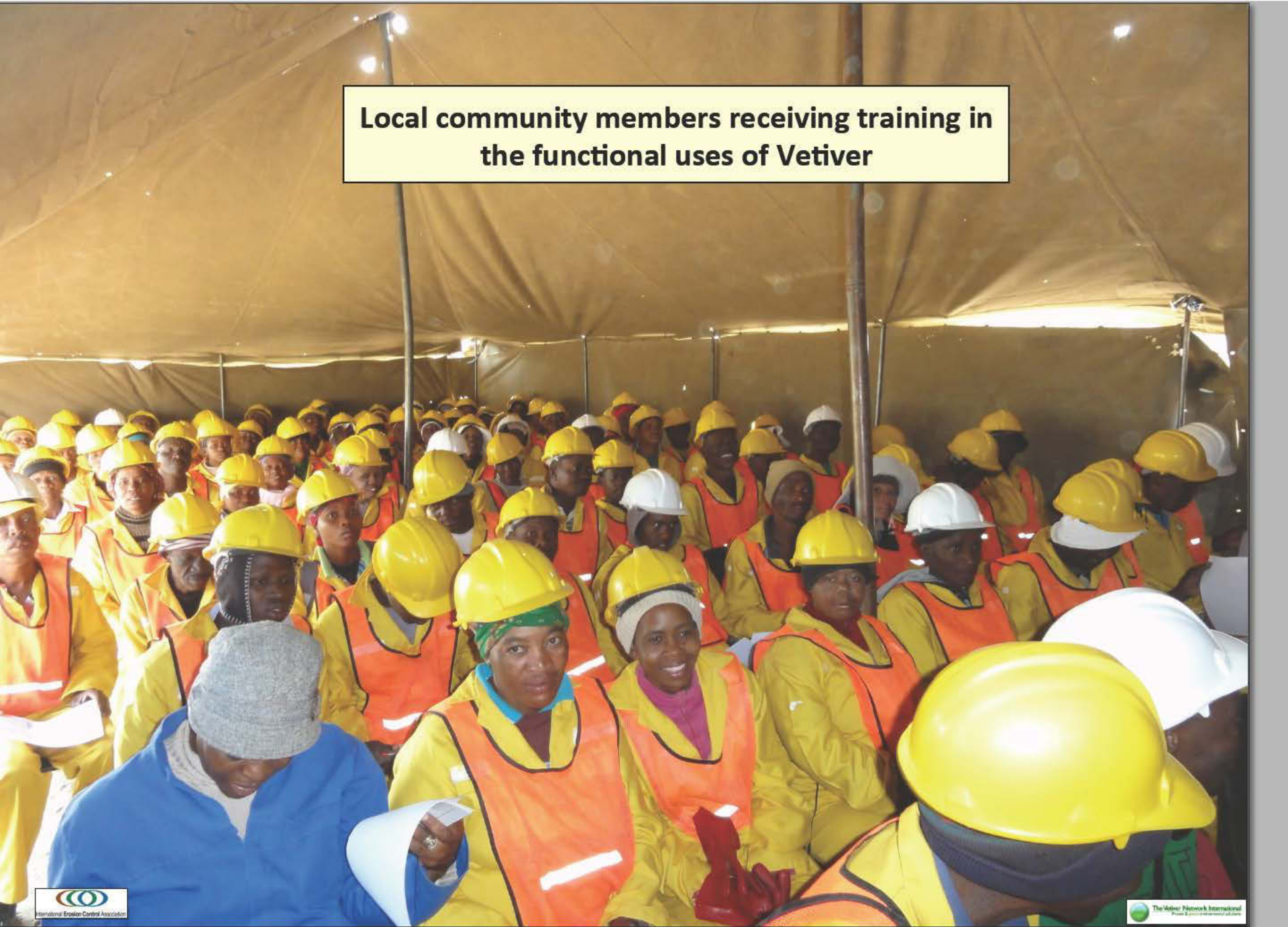
**&**

**The International Erosion Control Association (IECA)**

**A two day basic theoretical & practical introductory course offered  
to selected participants from local communities.**



**Local community members receiving training in the functional uses of Vetiver**



# Tubatse Class – Vetiver slip preparation February 2012





**In-Field Training on soil preparation techniques of degraded area in Tubatse, Limpopo Province, RSA**



**Community training - Setting out of contours and Vetiver planting techniques**



**Pre-grown Vetiver plants were supplied for the training program**

# In-Field Training - Dongas Rehabilitation at Malomanye Village



## Vetiver slip preparation for mature plants





**In-Field Training on soil preparation techniques of degraded area in Malomanye, Limpopo Province, RSA**

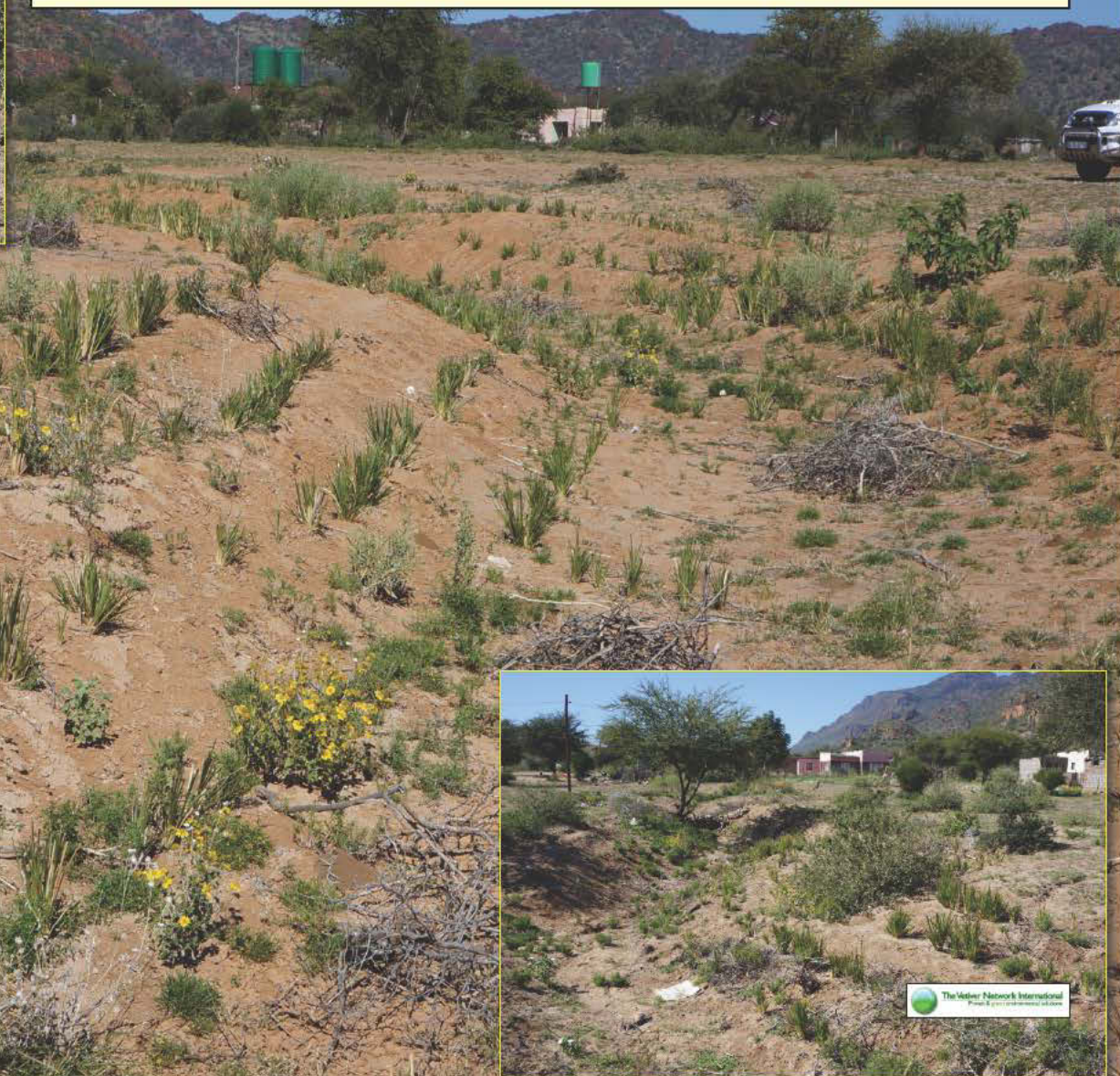




# In-Field Training on soil & vetiver planting techniques - Malomanye, Limpopo Province, RSA



**Vegetated Dongas at Malomanye Village overgrazed by local domestic animals – important to note that NO erosion has occurred and that native grass species are starting to creep in**



**More Community Field Training in progress**



# Status of Rehabilitation Donga





# HYDROMULCH (Pty) Ltd Certificate of Attendance

is hereby granted to:

.....  
to certify that he has successfully completed

*Vetiver Propagation for Soil Conservation*

*&*

*Erosion Control Workshop*

*at .....on .....20.....*

Dated: .....

.....  
R. Selemela  
Department of Agriculture  
Limpopo, Republic of South Africa

.....  
R.E. Nöffke  
Hydromulch (Pty) Ltd



## Potential to make Vetiver Handicrafts





**Vetiver  
Bio Mass  
Options  
for  
BioFuel**

# Bio-Mass for Bio-Fuel Production

The use of Vetiver grass as a source of bio-mass to be used in the production of bio-fuel (ethanol) or as palletized fuel has enormous potential.





## **Some Interesting Facts supporting the Use of Vetiver grass**

- **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.**
- **Perennial plant only requiring to be planted once with a lifespan running into many decades.**
- **It is a C4 plant and has a “Net Calorific value” of 14.01 MJ/kg and a “Gross Calorific value” of 15.18 MJ/kg.**
- **Potential fermentable sugars found in Vetiver is approximately 57% by weight.**

## **In conclusion**

**Various physical, chemical and hydrological approaches are being developed and used to control soil erosion, soil salinity and land degradation. These practices are however very expensive and often beyond the reach of rural communities.**

**The Vetiver system (VS) has the potential to contribute to reversing land degradation if applied systematically and to set down guidelines. It also has many other interesting aspects about it which can be utilised by local communities in and around the household.**

**Vetiver needs to be incorporated in rural development initiatives while involving all the stakeholders including government organisations, extension service agencies, researchers, NGO'S and educational institutions.**

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**We always seem to have a  
PLAN B  
but we forget that there is  
“No”  
PLANET B**

**It is our responsibility to preserve and protect the  
environment we live in.**

**Thank you**