Mine & Associated Rehabilitation Projects in Africa & the Indian Ocean Islands

by

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&

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International Erosion Control Association

hydromulch (PTY) LTD
Planting the Seed of Environmental Success

The Vetiver Network International
Proven & green environmental solutions

Introduction

Mining and associated rehabilitation projects in Africa and the Indian Ocean Islands have been successfully implemented jointly under the guidance and auspices of "The Vetiver Network International (TVNI) and the International Erosion Control Association (IECA) as a result of the interaction that has developed between the two organisations in Africa and on the Indian Ocean Islands.

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Planting the Seed of Environmental Success

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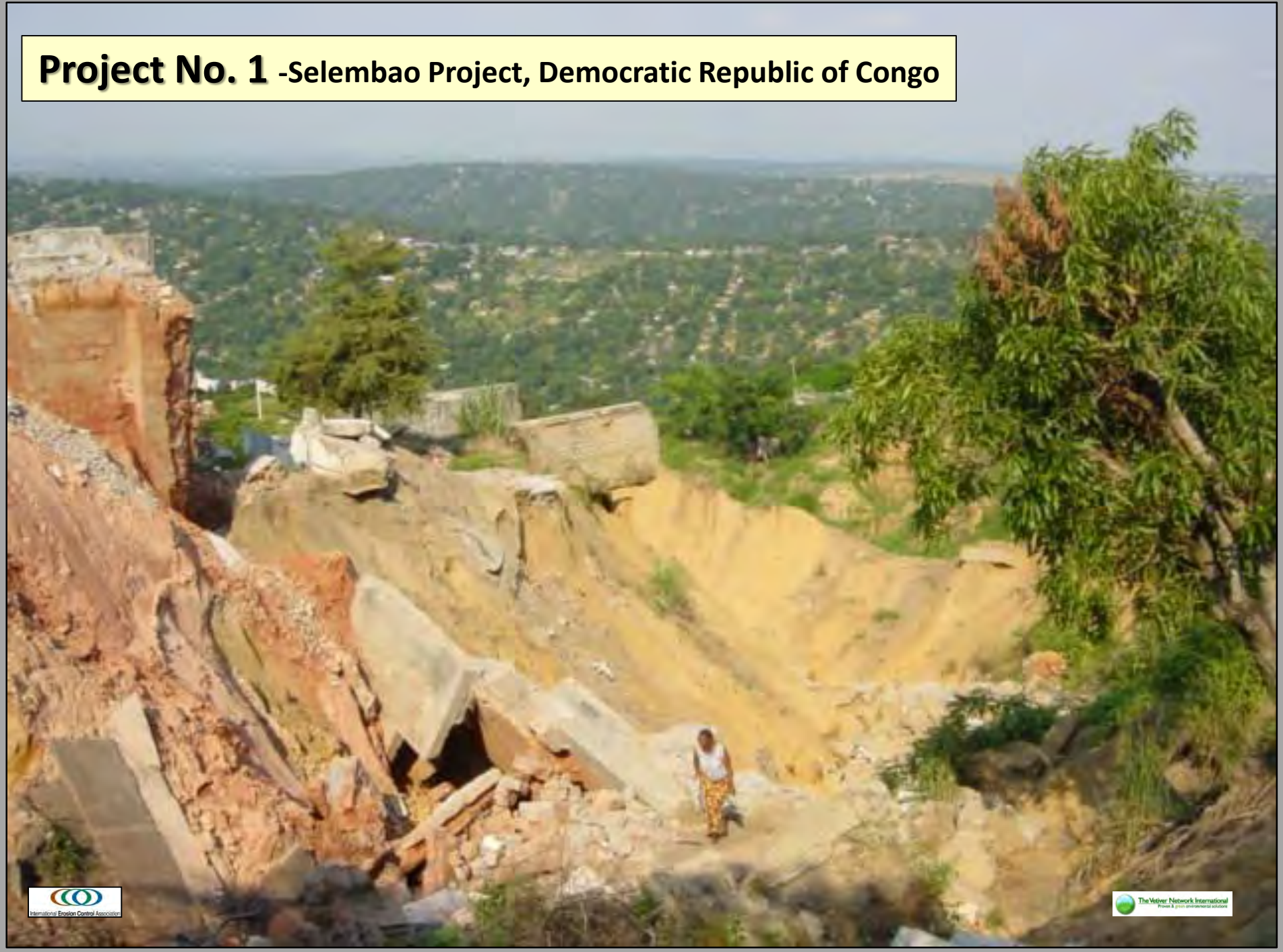
It is recorded that practically 95% of the 53 countries on the entire African continent (including Islands) has successfully implemented the Vetiver System for soil & water conservation during the past 200 years.

A short overview of projects in the following countries will be given, illustrating current activities using the Vetiver system:

1. Democratic Republic of Congo
2. Ethiopia
3. Congo- Brazzaville
4. Congo- Pointe Noire/Brazzaville
5. Guinea
6. Gabon
7. Madagascar A & B
8. South Africa.

The presentation will reflect the major strides that have been achieved in erosion & sediment control, bio-engineering & vegetation restoration and the participation of local communities in general.

Project No. 1 -Selembao Project, Democratic Republic of Congo



Collapsed bridges and urban roads preventing access to properties

Abandoned homes & properties

A world Bank financed project for the rehabilitation of the erosion gully in the district of Selembao, Kinshasa, DRC

Construction commenced in 2004

The Selembao Construction Site - 2006

Construction was carried out by a Congolese company Matla Forrest. Extensive Delays resulted in the Vetiver planting taking place during the dry season with limited available water. Financial constraints limited the planting of Vetiver hedge rows at spacings closer than 4 metre intervals along contours.


A total of 11.5 hectares was planted to Vetiver and thereafter hydroseeded using locally harvested and commercial seed.
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Excessive erosion of the drain in the primary catchment area as a result of under-designed collector drains silting up and displacing storm water directly onto the unprotected side slopes

Silted Drains – Cause of excessive surface water runoff down side slopes

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Sand Bags inter-planted with Vetiver was used to repair the extensive erosion caused by surface water runoff
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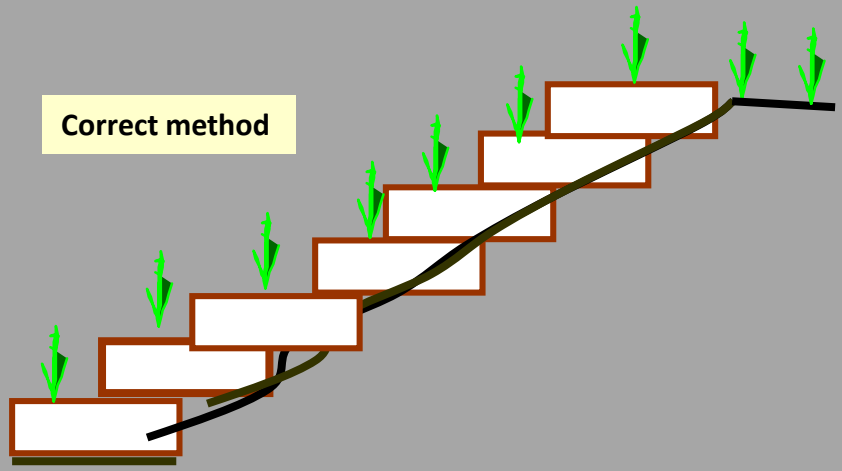
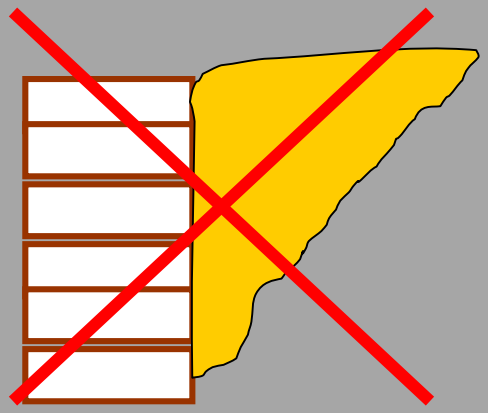
The Vetiver Network International

Installation of Sand Bags

Correct method



Incorrect method



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Sand Bag Reinforced & Stabilised Gully

80,000 Sand Bags were used for the stabilisation of the erosion gullies. Vetiver grass was planted into the Sand Bags.

The project where TVNI & Hydromulch formed a established working relationship

- **Dr. Paul Truong**
- **Dr. Dale Rachmeler**
- **Eng Alain Ndona**
- **Roley Noffke**

Sporadic Veld Fires during the dry season

Project No. 2 - Vetiver System Applications, Ethiopia

SLUF
Debela Dinka Guda
251 91 186 6766
August 2013

Since the establishment of the Ethiopian Vetiver Network (ETVN) in 2009, the VS technology is considered as one of the best biological conservation inputs by government (MoA & ERA) & non-government organizations, farmers & private investors for sustainable land management (SLM) programme.

NATIONAL WORKSHOP ORGANIZED BY SLUF & TVNI, ADDIS ABABA, ETHIOPIA, 2009

NATIONAL WORKSHOP
WORKING COMMITTEE
ADDIS ABABA
ETHIOPIA, 2009

NATIONAL WORKSHOP
DELEGATES
ADDIS ABABA
ETHIOPIA, 2009

Vetiver Applications in Community Farming Projects in Ethiopia

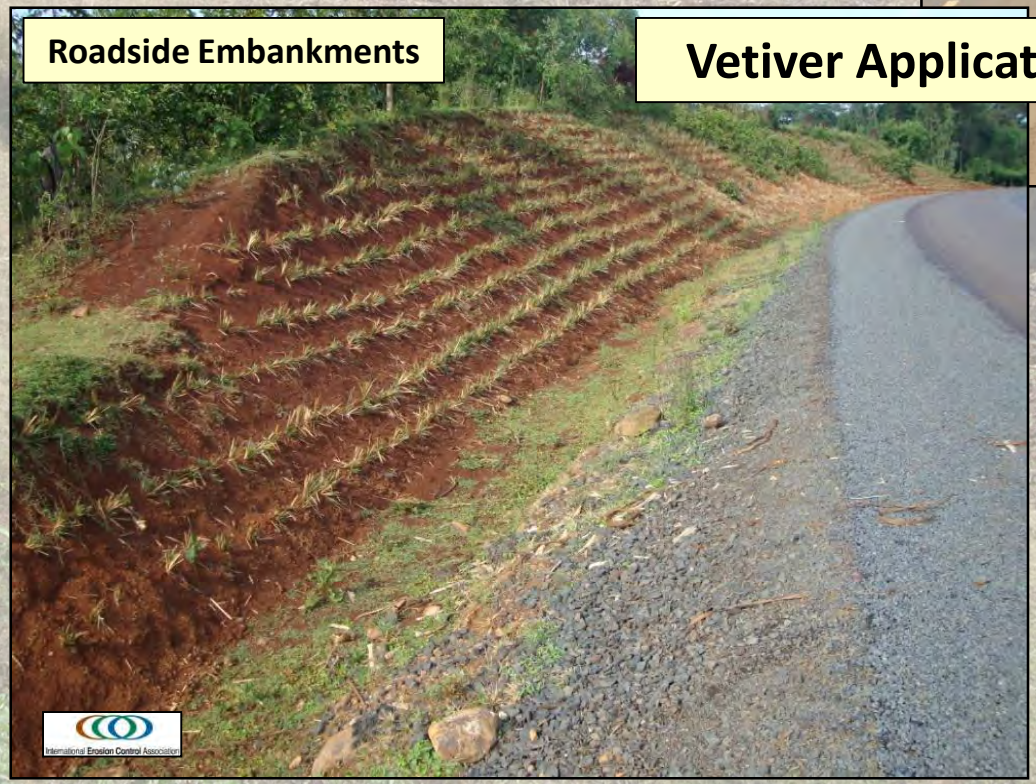
Vetiver System in Maize Fields

Vetiver Applications

Handicrafts

Urban Areas

Roadside Embankments



Canals

Training of Ethiopian Road Authority Engineers organized by SLUF & TVNI

National & International Co-Operation

Ethiopian Ministry of Agriculture has taken the VS as part of its sustainable land management programs

Ethiopian Roads Authority (ERA) has included the VS for the rehabilitation of all road contracts

Policy Dialogue
The Ethiopian President, EEPCO, ERA & MoA

Ethiopia's way forward:

1. **Extensive promotion of the VS for wider uses throughout the country.**
2. **Exploring the use of VG for various uses e.g. handicrafts, perfume, etc.**
3. **Promoting the VS in schools and higher education institutions.**
4. **Engaging in National and International Networking.**

Vetiver is a Proven GREEN Solution!

USE IT!!

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The Vetiver Network International

Project No.3 - Boukeni Erosion Gully Project, Brazzaville, Congo

Collapsed infrastructures on Roads & Drainage channels resulting in formation of extensive gullies

Construction is by a Brazilian Company-ANDRADE Gutierez SA.
The consultant Engineers for the project -EGIS-INTERNATIONAL.
Environmental & Bio-Engineering design, supervision and implementation - Engineer Alain NDONA (TVNI).

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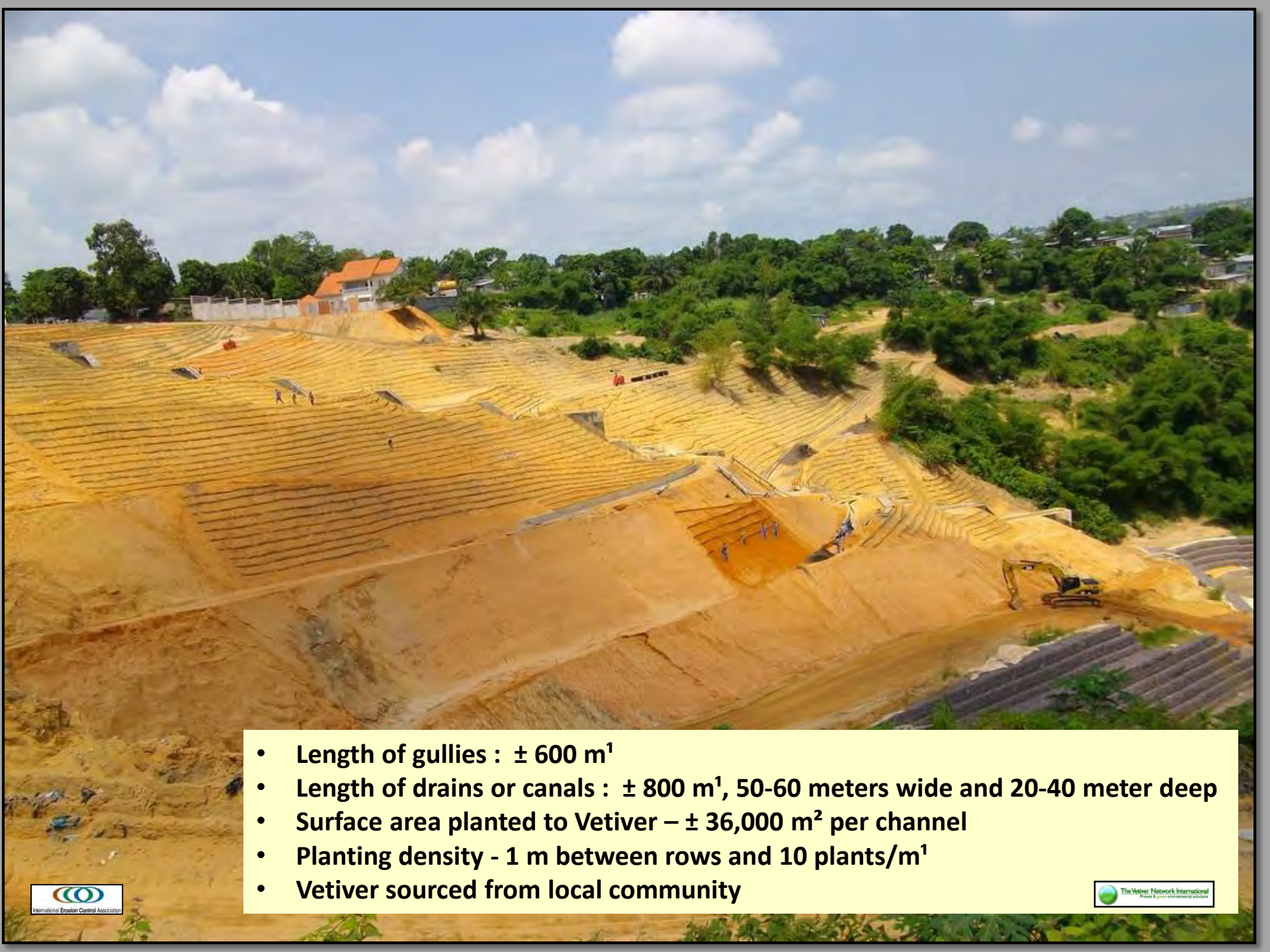
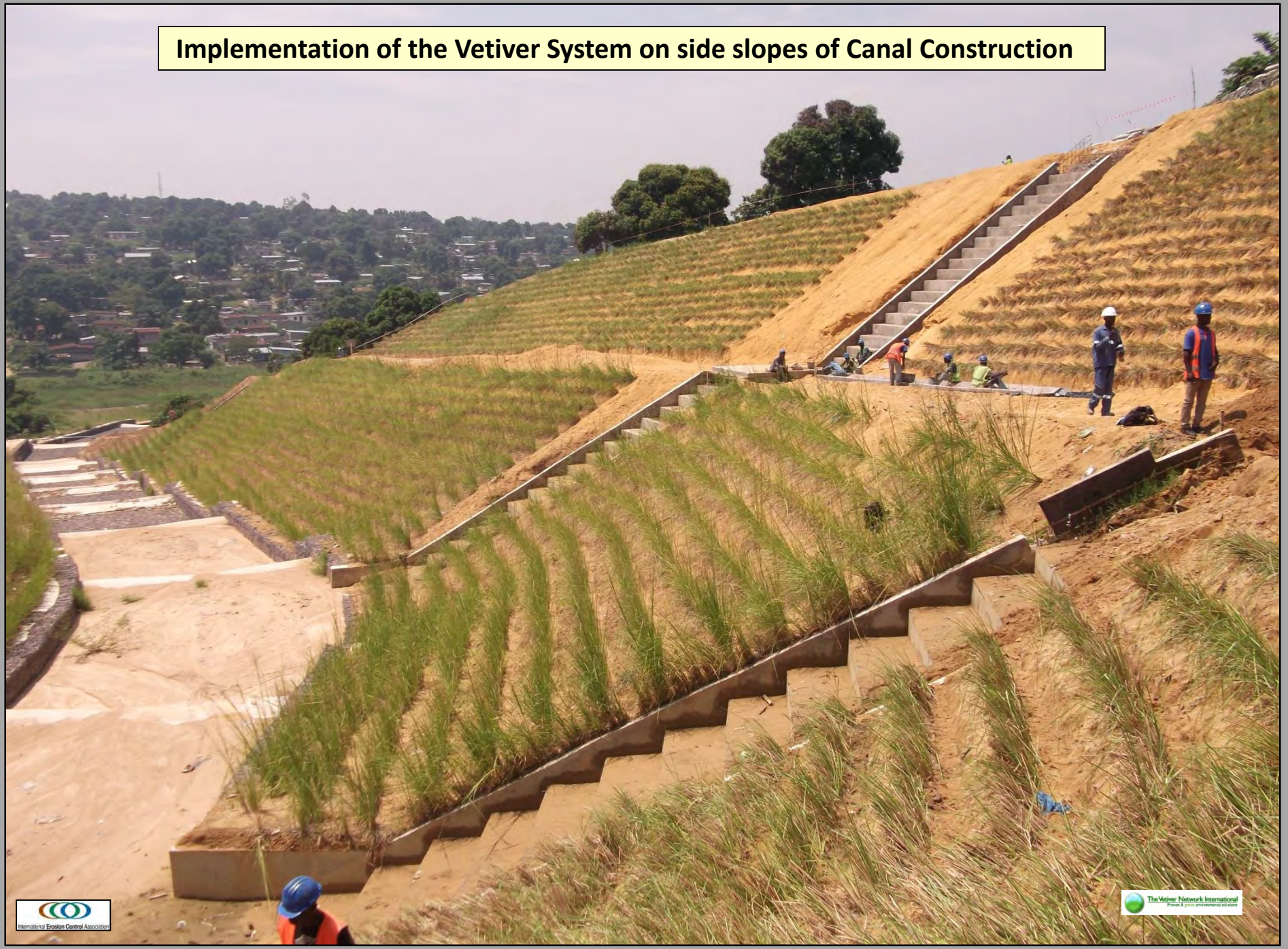
Construction activities and finishing off of side slopes in progress on newly constructed drainage system



- Length of gullies : ± 600 m^1
- Length of drains or canals : ± 800 m^1, 50-60 meters wide and 20-40 meter deep
- Surface area planted to Vetiver – ± 36,000 m^2 per channel
- Planting density - 1 m between rows and 10 plants/m^1
- Vetiver sourced from local community

Implementation of the Vetiver System on side slopes of Canal Construction



Vegetated Side Slopes of Concrete Drainage Channel

Engineer Alain NDONA (TVNI)

Project No. 4 - The Pointe Noire to Brazzaville Highway, Congo

Total length of road: ± 600 km

Planned to plant 120 million Vetiver, slips sourced mainly from CHINA.

On site nursery constructed: 5ha.


Side Slope Rehabilitation in progress
45° slope angle with benching at 10 m intervals on average.
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The Vetiver Network International

Highly dispersive and erodible side slope material

Construction by a Chinese company - China State Construction Engineering Corporation LTD (CSCEC).
The consultant Engineers for the project- EGIS-INTERNATIONAL.
Environmental & Bio-Engineering design and supervision - Engineer Alain NDONA.

Setting out & Planting of vetiver hedge rows

1 m^1 between rows and 10 plants/m^1


Stable Side Slope Established with Vetiver System
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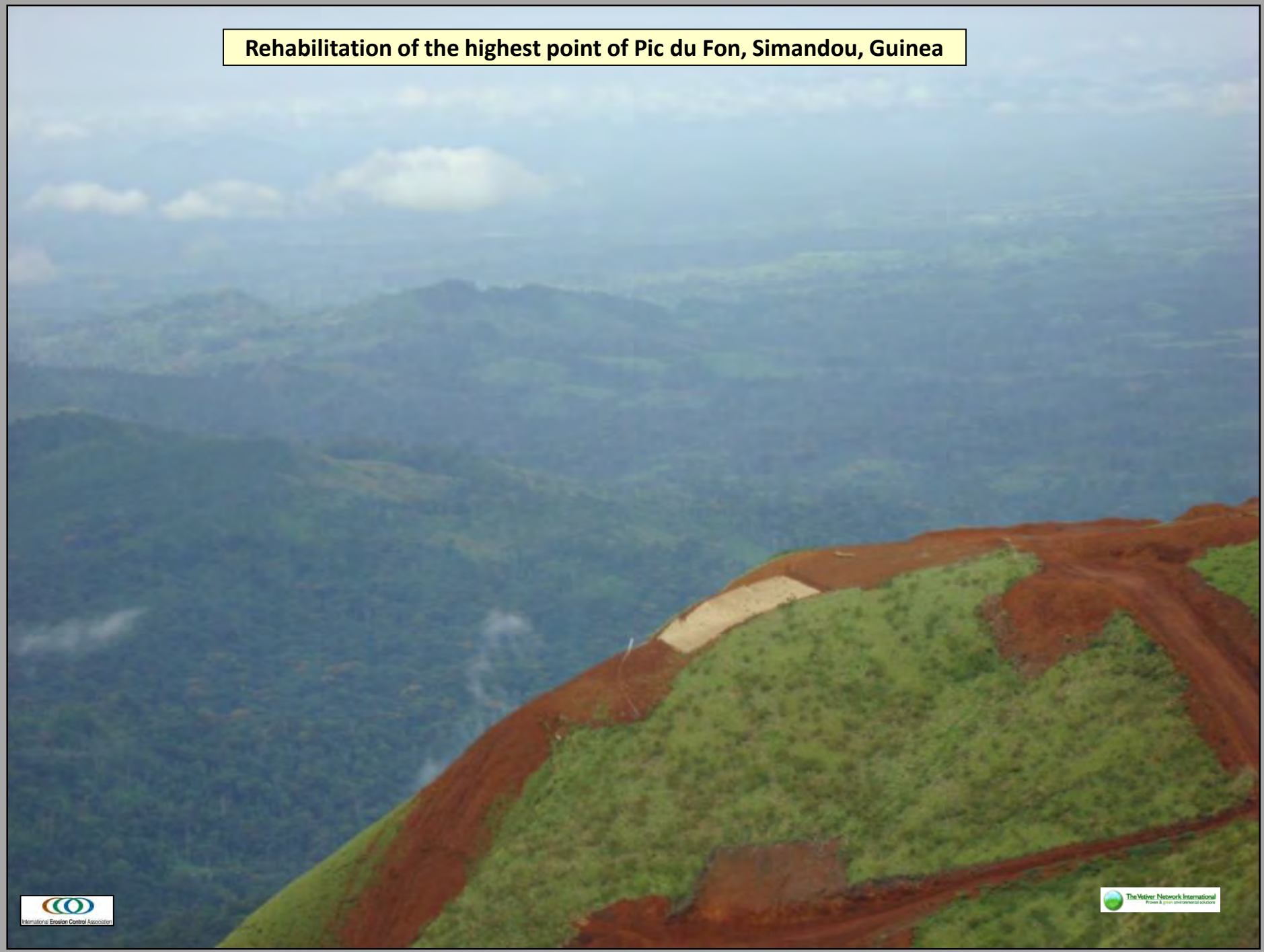
Stable Side Slope Established with Vetiver System

Vetiver Planted to date: 50,000 m[1].

45° slope angle with benching at 10 m intervals on average.

Project No. 5 - The Rio Tinto Project- Simandou, Guinea

Rehabilitation of the highest point of Pic du Fon, Simandou, Guinea



Installation of Bio-Engineering Techniques & Hydroseeding on Exploration Site for protection of chimpanzee habitat


Iveco 6x6 HydroSeeder on Site
IVECO

Placing of Bio-Jute on steep side slopes around Drill Pads


Bio-Jute Preparation
EVERGREEN

Bio-Jute Installation and Vetiver planting on Cut Slope Embankments


Established Vetiver & Hydroseeded Slope
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On-Going Stabilisation work on Access Roads along the Montane area


Anglo Ashanti Gold mine in Guinea where the VS is starting up
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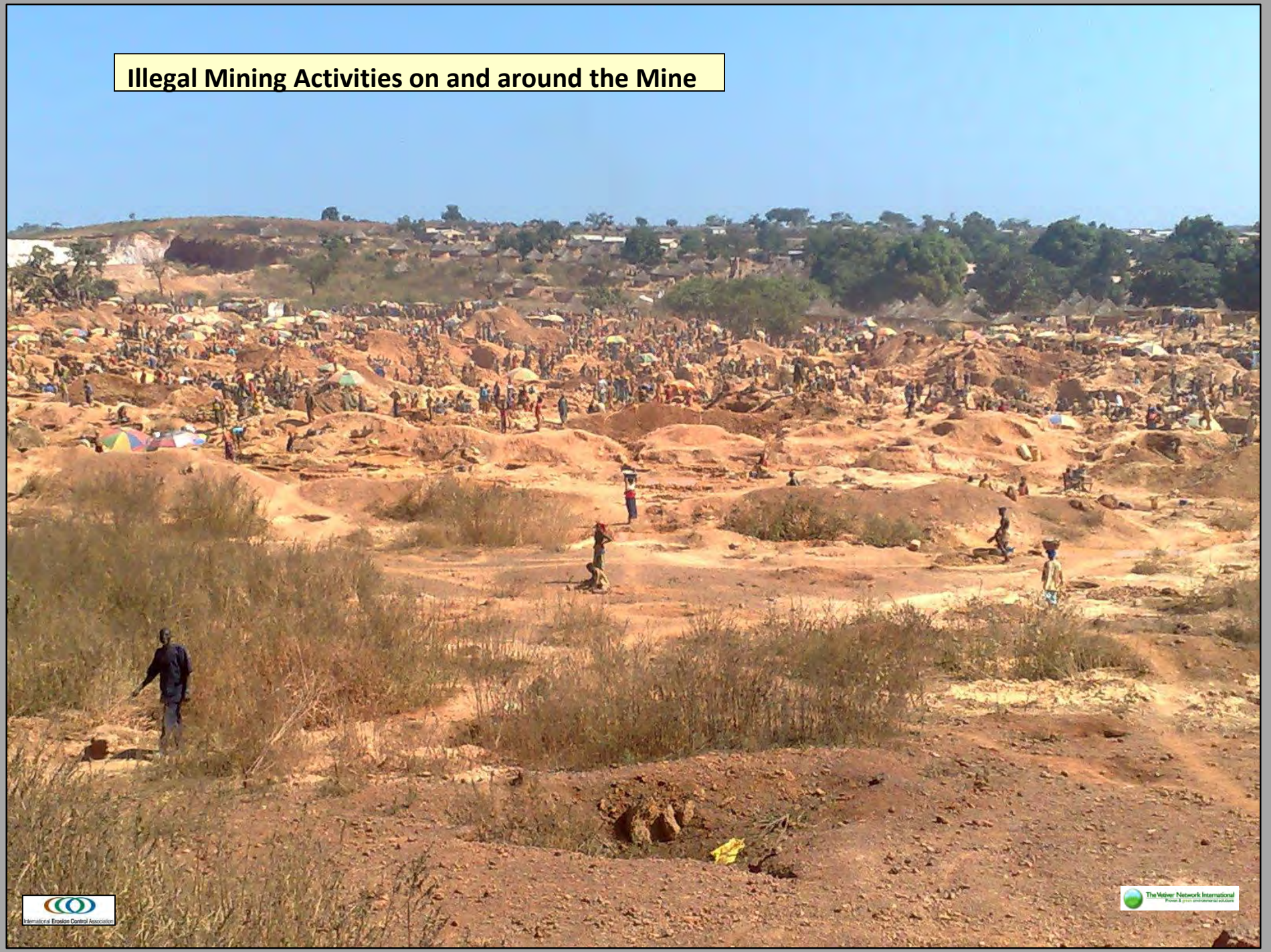
Illegal Mining Activities on and around the Mine



Delivery of Vetiver Grass from Mine Nursery

Vetiver Grass Slips planted in well constructed furrows or rows at Anglo Ashanti Gold

Project No. 6 - OLAM Gabon Special Economic Zone, Nkok, Gabon

GSEZ Nkok, Gabon

540 ha of tropical jungle situated on the Equator removed in one operation for industrial development resulting in a civil and environmental disaster with only 20 ha side slopes rehabilitated in Phase 1

Work Undertaken

- **30,000 m^1 vetiver grass hedge rows**
- **Bio-Jute – 10,000 m^2**
- **Silt fences - 3,600 m^1**
- **Sand Bags – 2,500 m^1**
- **Hydroseeding -200,000 m^2**

Climatic Conditions

Annual rainfall + 3700mm
2 Rainy seasons – September to December & May to July

The Impact of 750 mm rain in 24 hours

Excessive Erosion caused by surface water runoff

Before & After pictures of the VS for slope stabilisation – Reasonable cover attained on lower slope

Progressive stages of slope stabilisation using Vetiver (VS), Sand bags, Silt fences & Hydroseeding


Effective use of Silt fences to protect Vetiver (VS) in early stages of growth
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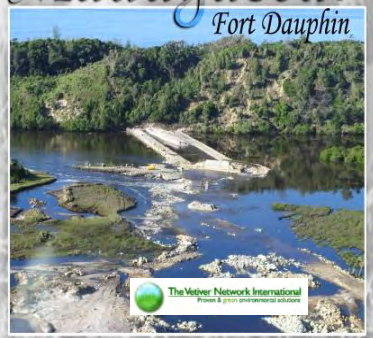
Established Side Slopes using Vetiver (VS) & Hydroseeding

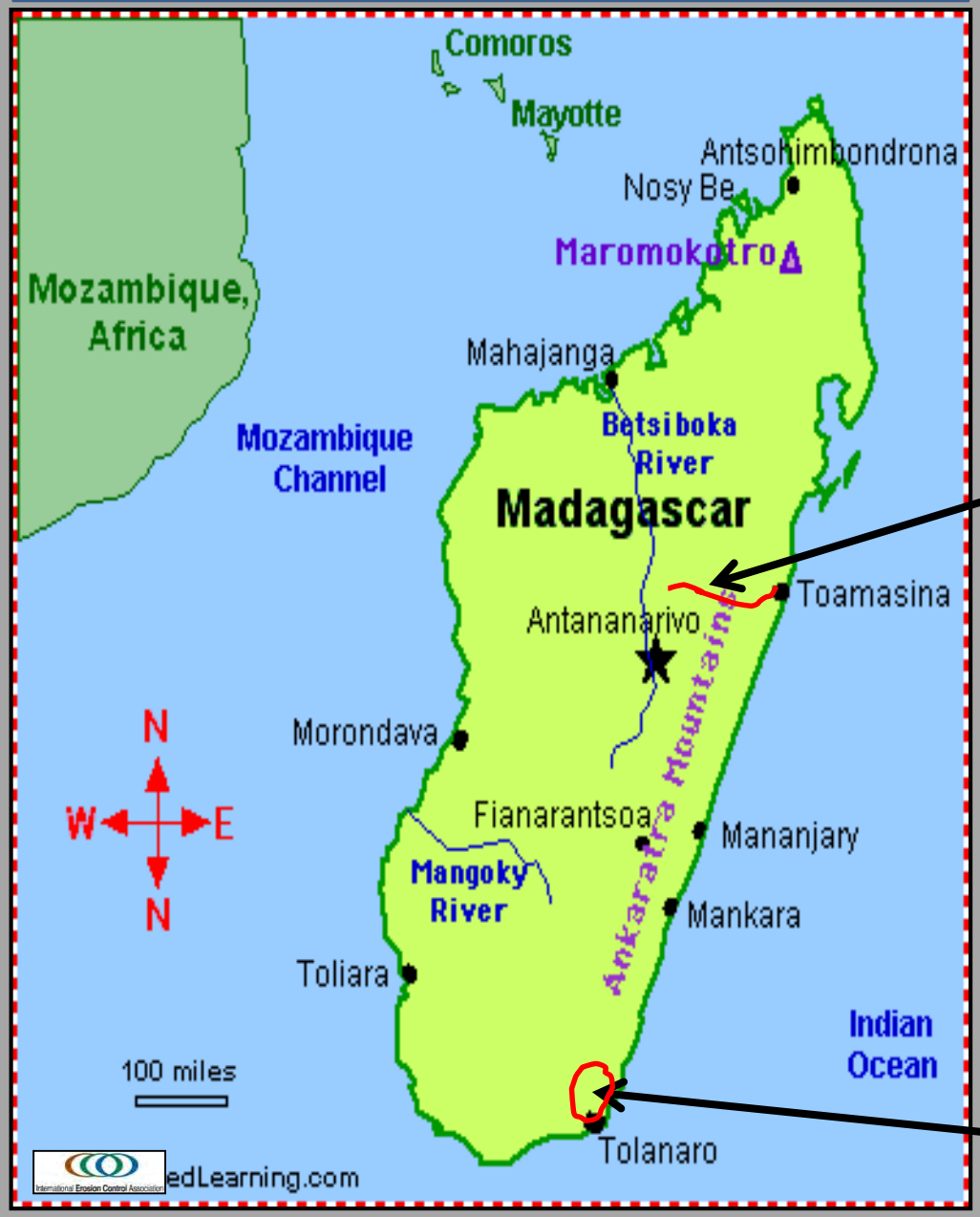
Madagascar- Projects

Projects 7 A – Rio Tinto/QMM Ilmenite Mine

Projects 7 B – Sherritt Mining Ambatovy Pipeline



Location of Rio Tinto & Sherritt Mining Project in Madagascar



Sherritt Mining Ambatovy Project

Rio Tinto Ilmenite Project


Local Malagasy Community


Typical Malagasy Mode of Transport
PEUGEOT
International Erosion Control Association
The Vetiver Network International

Project No. 7 A - Ilmenite Project, Madagascar

Vetiver Sources

- **Vetiver plant material was sourced from surrounding areas within a 50 km radius.**
- **No planting material was imported or introduced from outside areas.**

Local Villagers

Vetiver Purchases from Villagers

Community Vetiver Propagation


Andre & Auguste Mahalogny family from the Mangaiky Village.
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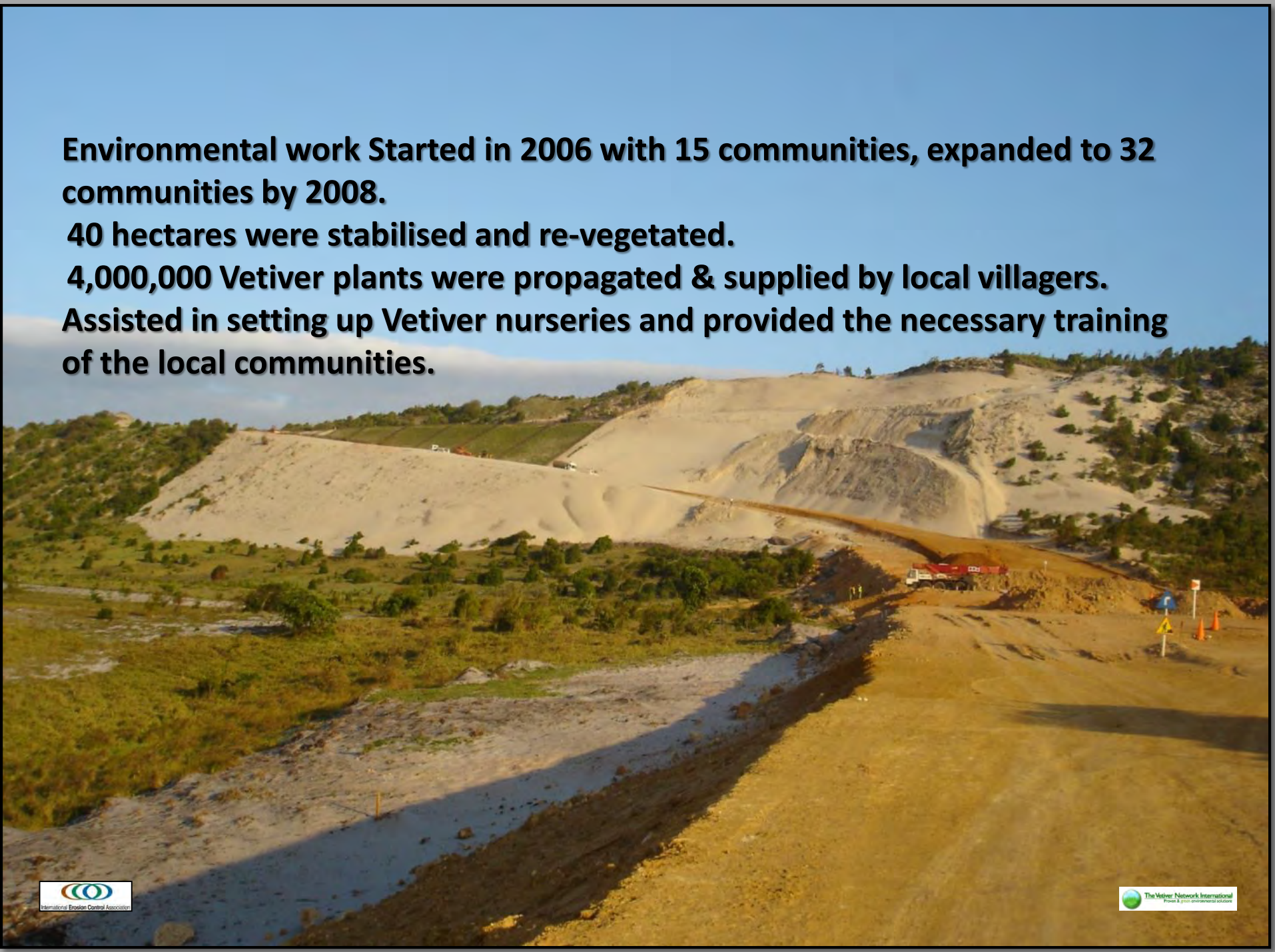
Maria Agnes family Operation


Environmental work Started in 2006 with 15 communities, expanded to 32 communities by 2008.
40 hectares were stabilised and re-vegetated.
4,000,000 Vetiver plants were propagated & supplied by local villagers.
Assisted in setting up Vetiver nurseries and provided the necessary training of the local communities.
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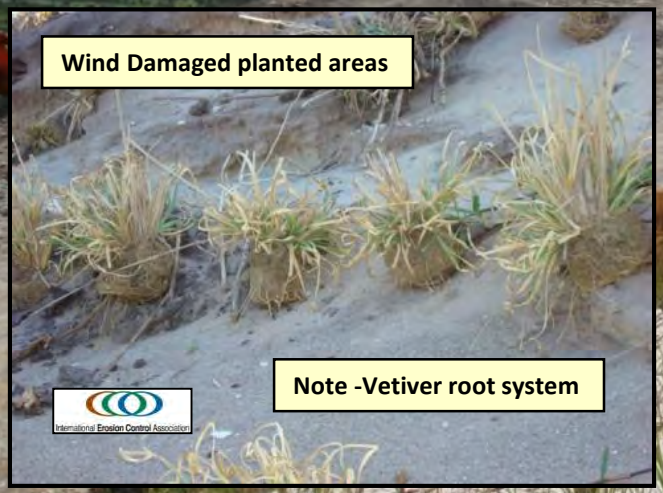
Planting of Vetiver Grass Hedge Rows on the Ehoala Dune


Locally trained supervisors implementing “Coastal Dune Sand Migration” Control
Local Fishing Village
International Erosion Control Association
The Vetiver Network International

Impact of Prevailing Winds - Primary Dune

Prevailing wind direction
(In excess of 35 days with intense gusting up to 45 knots at times)




Surface Water Runoff control with Vetiver Hedge Rows
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Established & Stable Ehoala Dune – 9 ha in extent
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The Vetiver Network International

Project No. 7 B – Ambatovy Project, Moramanga to Tamatave, Madagascar


Installed Erosion Control Structures & Hydroseeding
International Erosion Control Association
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Progressive Rehabilitation of Pipeline ROW (Right of Way)

- Length of ROW: 220 Kilometres
- Area rehabilitated – 550 hectares
- Rehabilitation period: 3 years
- Vetiver plants & fascines sourced from local communities

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Functional Erosion Control Structures & Established HydroSeeding

Rehabilitation of extremely difficult rock sections through mountain terrain - ROW (Right of Way)

- Accessible only via access roads
- Often inaccessible for up to 2 months due to weather conditions
- Unstable cut slopes rehabilitated by Vetiver plants & fascines sourced from local communities

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Rehabilitated fill side slopes & stabilised shoulder break point
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Project No. 8 - Donga Rehabilitation, South Africa

In Association with the Department of Agriculture, Limpopo Province, South Africa


Tubatse Class – February 2012
International Erosion Control Association
The Vetiver Network International


Donated Vetiver Plants – Feb 2012
International Erosion Control Association
The Vetiver Network International

Tubatse Class – February 2012

In-Field Training on soil conservation techniques on degraded area in Tubatse, Limpopo Province, RSA

Community training in setting out of contours and Vetiver planting techniques – Feb 2012

Pre-grown Vetiver plants were supplied for the training program

The Vetiver Network International

Established Vetiver plants grazed & damaged by domestic animals – July 2012


Established Vetiver plants grazed by domestic animals – May 2013
International Erosion Control Association
The Vetiver Network International

Vetiver planting techniques in Gullies– Feb 2012


Gully established with Vetiver grass– May2013
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Malomanye Village – August 2012
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Malomanye Village On Site Training – August 2012

Preparation of Vetiver Slips

Malomanye Village On-Site Training in soil Conservation Techniques – August 2012

Malomanye Village On-Site Training – August 2012

Vegetated Dongas at Malomanye Village– May 2013


Moutse Village Community Training at Hydromulch Training Centre– April 2013
International Erosion Control Association
The Vetiver Network International

Moutse Village Community Field Training – April 2013

Moutse Village Community Field Training – April 2013

Moutse Village Donga Rehabilitation– April 2013


Moutse Village Donga Rehabilitation– April 2013
International Erosion Control Association
The Vetiver Network International

Moutse Village Donga Rehabilitation Maintenance – May 2013

In Conclusion

TVNI and the IECA are strategically positioned to provide the international platform through which degraded areas can be restored such that Sustainable Land Management can be achieved over time.

We always seem to have a

PLAN B

but we forget that there is

"No"

PLANET B

The correct application of soil conservation and bio-diversity principles & techniques remains fundamental to our survival.

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

Thank you

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