THE VETIVER SYSTEM:
A GLOBAL TECHNOLOGY THAT LINKS VETIVER AND PEOPLE TO STRENGTHEN RURAL COMMUNITIES AND CONSERVE NATURAL RESOURCES

By

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1. INTRODUCTION

1.1 Vetiver System

_ Low-cost, simple technology employing vetiver grass for soil and water conservation, environmental protection (through bioengineering and phytoremediation), and disaster mitigation

_ Previously known as VGT first developed for the agricultural sector by the World Bank for soil and water conservation, commenced in the 1980's

_ Later expanded to cover non-agricultural sector through bioengineering and phytoremediation for environmental protection

- A very practical, inexpensive, low maintenance, and very effective means of soil erosion and sediment controls, water conservation, and land stabilization and rehabilitation
- Vetiver grass does not normally produce seed and stays where it was planted.
- Not affected to any significant extent by pests and diseases, nor does it act as a host for pests or diseases that might attack crop plants
- Being vegetative, it is also environmentally friendly.

1.2 The Advantages of VS

_ Low cost and simple technology

_ Effective method for soil and water conservation

_ Effective method for bioengineering

_ Effective method for phytoremediation

_ Effective method for disaster mitigation

1.3 Linking Vetiver and People

VS is a global technology used worldwide as a means to link vetiver and people.

Two major roles of VS will be discussed:

- ➡ strengthening rural communities
- ➡ conserving natural resources

2. THE ROLE OF VS IN STRENGTHENING RURAL COMMUNITY

2.1 Handicraft Making in Venezuela

Venezuela
Caribbean Sea
Atlantic Ocean
Colombia
Brazil
Guyana
Trinidad and Tobago
Grenada
Curacao (Neth.)
Bonaire (Neth.)
Saint George's
Tobago
Trinidad
Port of Spain
Islas Los Roques
Isla Orchila
La Blanquilla
Isla La Tortuga
Isla de Margarita
Punto Fijo
Golfo de Venezuela
Lago de Maracaibo
Golfo de Paria
Riohacha
Santa Marta
Valledupar
Cabimas
Puerto Cabello
Maiquetía
Caracas
Puerto La Cruz
Güiria
El Tigre
Tigre
Curiapo
Ciudad Guayana
Guasipati
Matthews Ridge
Ciudad Piar
Maripa
La Paragua
El Dorado
Embalse de Guri R
Cuyuni R
Mazaruni R
Peters Mine
Issano
Orinduik
Vila Brasil
Normandia
Bonfim
Boa Vista
Uraricoera R
Novo Paraiso
Branco R
Cúcuta
Bucaramanga
El Amparo
Arauca
Elorza
Puerto Carreño
San Juan de Manapiare
Paz de Río
Tunja
Bogatá
Villavicencio
Cucui
Tocuyo R
Manapire R
Suata R
Orinoco R
Apure R
Arauca R
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_ 6,000 poor people in 8 states in Venezuela involved in the PFVP in 2004
17 9 2001

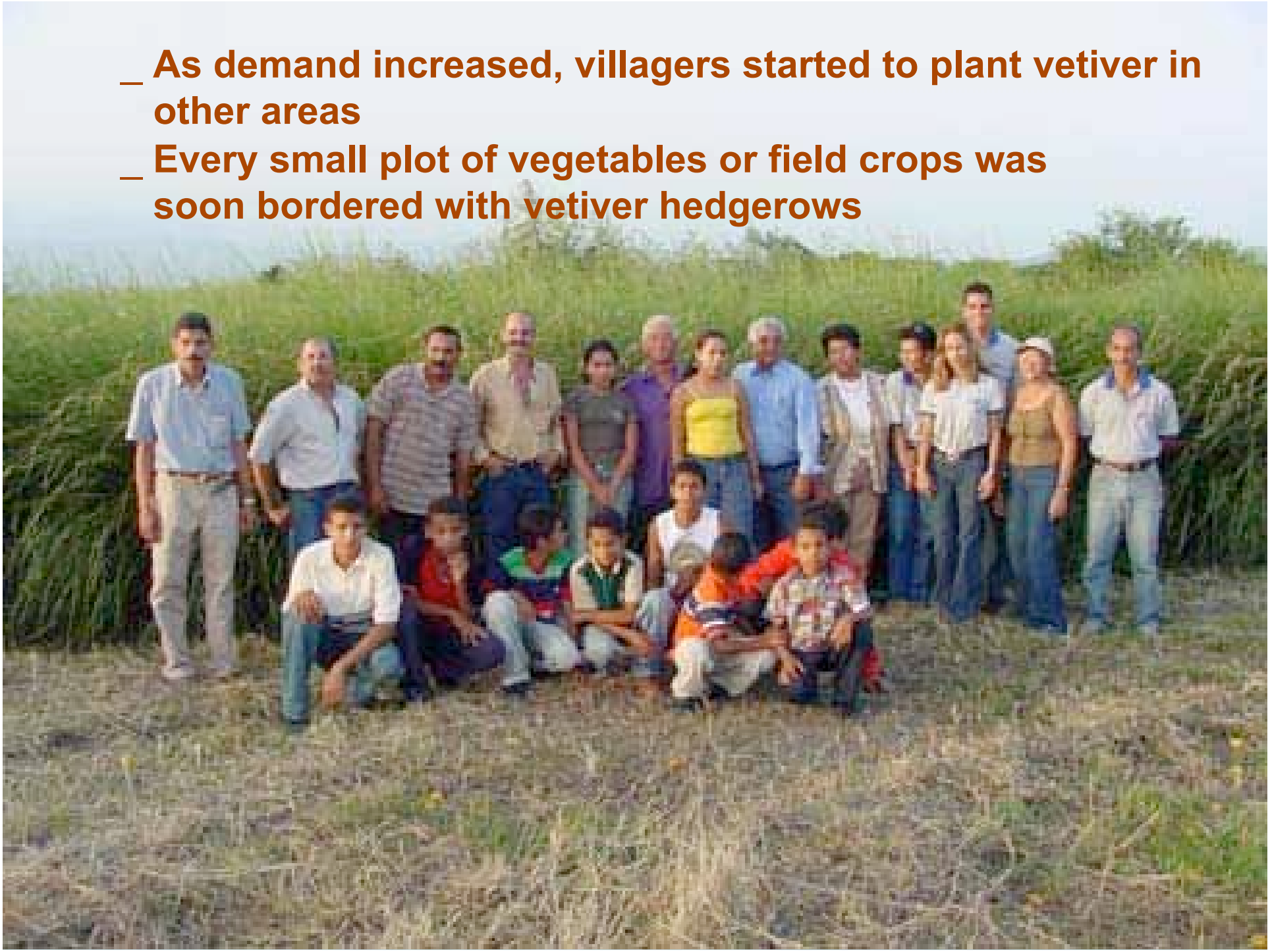

_ Aim to generate economic interest through development of handicrafts and markets.


Deliver vetiver leaves to villagers trained to make handicraft items


Sold these items in the cooperative stores and during exhibitions

_ As demand increased, villagers started to plant vetiver in other areas

_ Every small plot of vegetables or field crops was soon bordered with vetiver hedgerows



- Villagers trained to properly harvest the leafy materials for handicraft making

- Social activities that were incorporated were singing songs, short readings on the topics related the self-esteem and motivation for community integration.
- Poor people earn extra income, united in their mutual activity in the community.
- More vetiver planted in the farmlands and elsewhere.
- Contrast with conventional approach which ends up with little or no planting at all.

2.2 Railway Rehabilitation in Madagascar

_ In 2000, two cyclones hit Madagascar and created a severe damage with more than 280 landslides

_ The cause of landslide was mainly slash-and-burn farming practice

Two Thai vetiver specialists recruited to rehabilitate this railway

- VS was used along the railway track.
- Technical supports provided in removing soil and restoring drainage infrastructures.
- Community-based intervention was used to help the community and stop erosion and landslides

_ VS

- ➡Provided sustainable agriculture alternative to slash-and-burn farming
- ➡Enhanced soil fertility
- ➡ Increased farmers' income

_ Poor people living along the railway can:

- ➡Produce crops protected by vetiver hedgerows
- ➡Transport the produces by train for sale in the nearby city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2.3 Poverty Eradication in Indonesia

- EBPP launched in 1998 to help 2,500 poor families in 15 villages in East Bali

- The first community school established in 1999 on donated wasteland Vetiver planted to rehabilitate 20km dirt roads

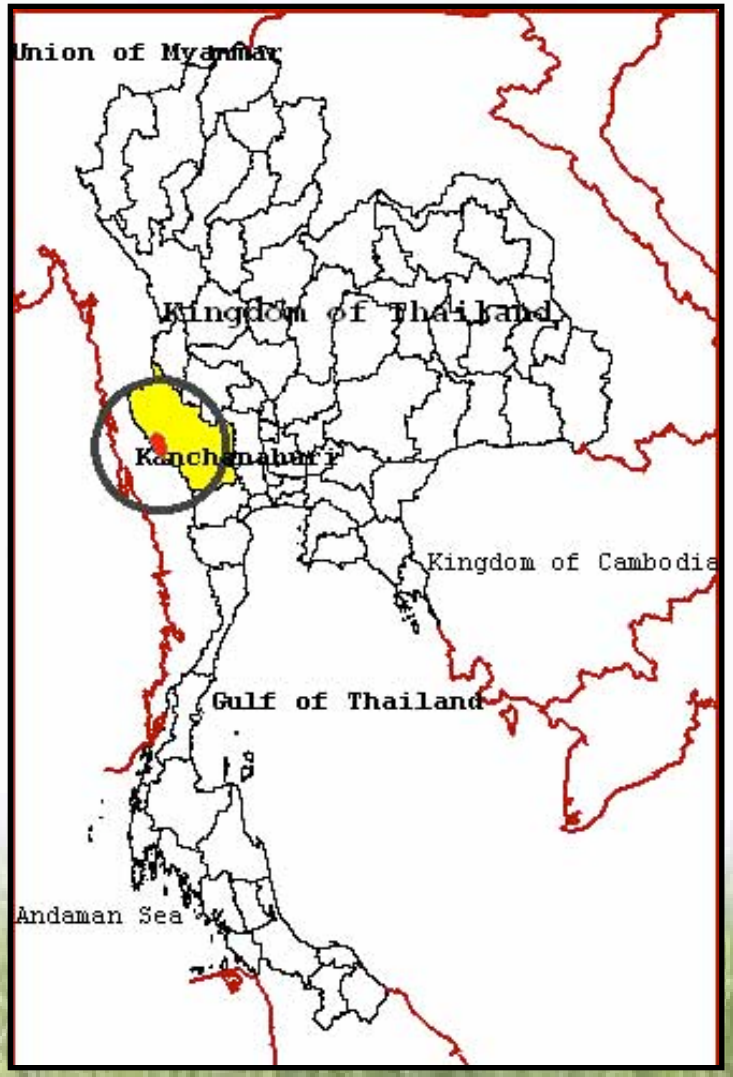
⇒ 500 children in 5 EBPP schools learnt how to stabilize terraces on steep mountain slopes for organic vegetable gardens

Vetiver used in creative art classes, painting, handicrafts and roof thatching competitions

- Vetiver information disseminated throughout the whole village
- Cassava farmers improve barren farmland by planting vetiver to stabilize terraces
- Vetiver's ability to stabilize dirt roads has encouraged hundreds of steep-hillside farmers to protect their homes with vetiver
- Added advantage of beautifying their dry environments
- VS helped thousands of Indonesian farmers in other regions to conserve soil and water

2.4 Strengthen Community through People Participation in Thailand

- In 1972, people moved from flooded area during the construction of a reservoir to a highland of Huai Khayeng Sub-district having poor soil fertility.



- PTT introduced VS with emphasis on people participation, motivation, encouragement and outward orientation

- A stepwise operation plan was implemented in four phases, namely:

  - ➡ A controlled vetiver experiment within the community
  - ➡ Vetiver planted on the land of volunteer farmers.
  - ➡ A quarter of all the households planted vetiver
  - ➡ Vetiver planted in half of the areas in the community, and in appropriate public lands.


Phase 1: A controlled vetiver experiment within the community


Phase 2: Vetiver planted on the land of volunteer farmers.

Phase 3: A quarter of all the households planted vetiver

Phase 4: Vetiver planted in half of the areas in the community, and in appropriate public lands.

_ **Benefits:**

- ➡ Prevent surface soil erosion, and improve soil fertility
- ➡ Learn how to make use of vetiver to save cost of input
- ➡ Improve cultivating area as soil contains more moisture and is more fertile
- ➡ Decrease cost of production through:
  (a) saving on fertilizer cost (b) less watering
  (c) saving on animal feed (d) overall increase in crop yield

_ Originated from people participation in considering and making a decision Environmental condition of Huai Khayeng is sustainable and most of the villagers have a better life.

2.5 Riverbank and Dike Protection in Vietnam

- Riverbanks and dikes in Mekong Delta damaged by wave erosion


An expensive way of reducing erosion
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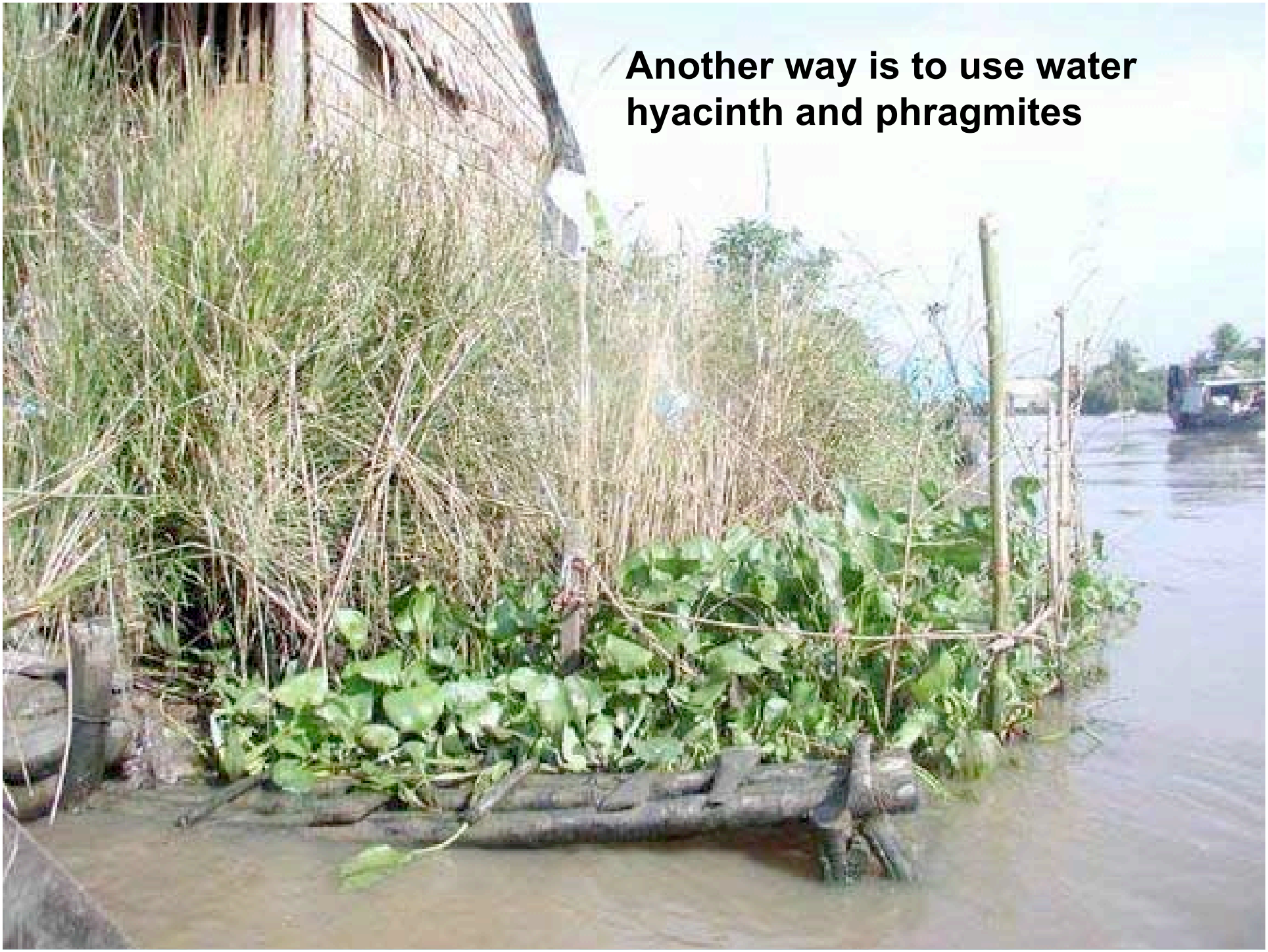

Another way is to use water
hyacinth and phragmites

Or vetiver planting, a more effective and sustainable method

Two months after planting


Five months after planting

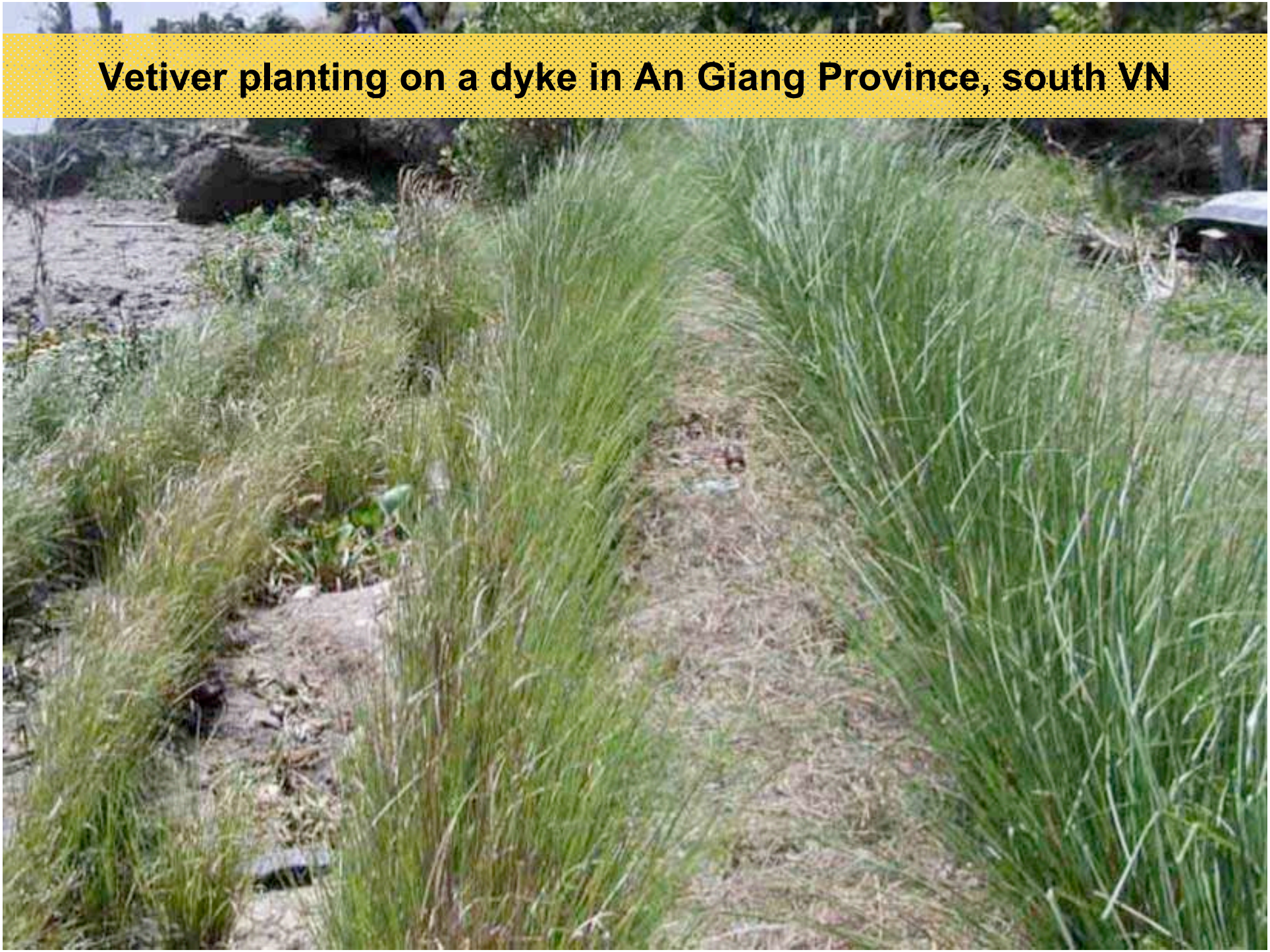

Ten months after planting

- When VS was employed, it provided effective erosion control
- Farmers and local communities realized the value of vetiver as they can also use it for animal feed.
- Many other uses have also been discovered
- VS has great socio-economic impacts on rural people and economy of local community
- In An Giang province alone, VS is planned to be used on 20 dikes (61km), using 1.8 million slips of vetiver.

Examples: Trial of Vetiver grass for protecting sand dunes in Quang Binh. One month after planting.

People queuing up for their share of this new grass.

Vetiver planting on a dyke in An Giang Province, south VN



3. THE ROLE OF VS IN CONSERVING NATURAL RESOURCES

3.1 Watershed Management of the Dabie Mountains in China

- Dabie Mountains rank one of the poorest regions of China
- Soil erosion caused by water force - the main factor for agricultural development
- “Vetiver for Sustainable Watershed Management in the Dabie Mountains Project” launched in 2004 by CVN

- Field trials conducted in:
  - Yuexi County of Anhui Province
  - Huanggang Prefecture of Hubei Province
- Vetiver grew very well and helped to conserve soil and stabilize slope
- Able to control erosion caused by flash flood during the rainy season
- Protect natural resources

3.2 Toogoolawah Vetiver Wetland System in Australia

- Esk Shire Council installed the Toogalawah sewage treatment plant
- Employ vetiver wetland systems to treat sewage effluent
- Passage of effluent through a vetiver wetland
- Contours of land allowed good contact between vetiver and effluent
- Vetiver absorbed water and filtered it
- Successful in restoring ecosystem of local creek that feeds into Wivenhoe Dam.


Clear the land

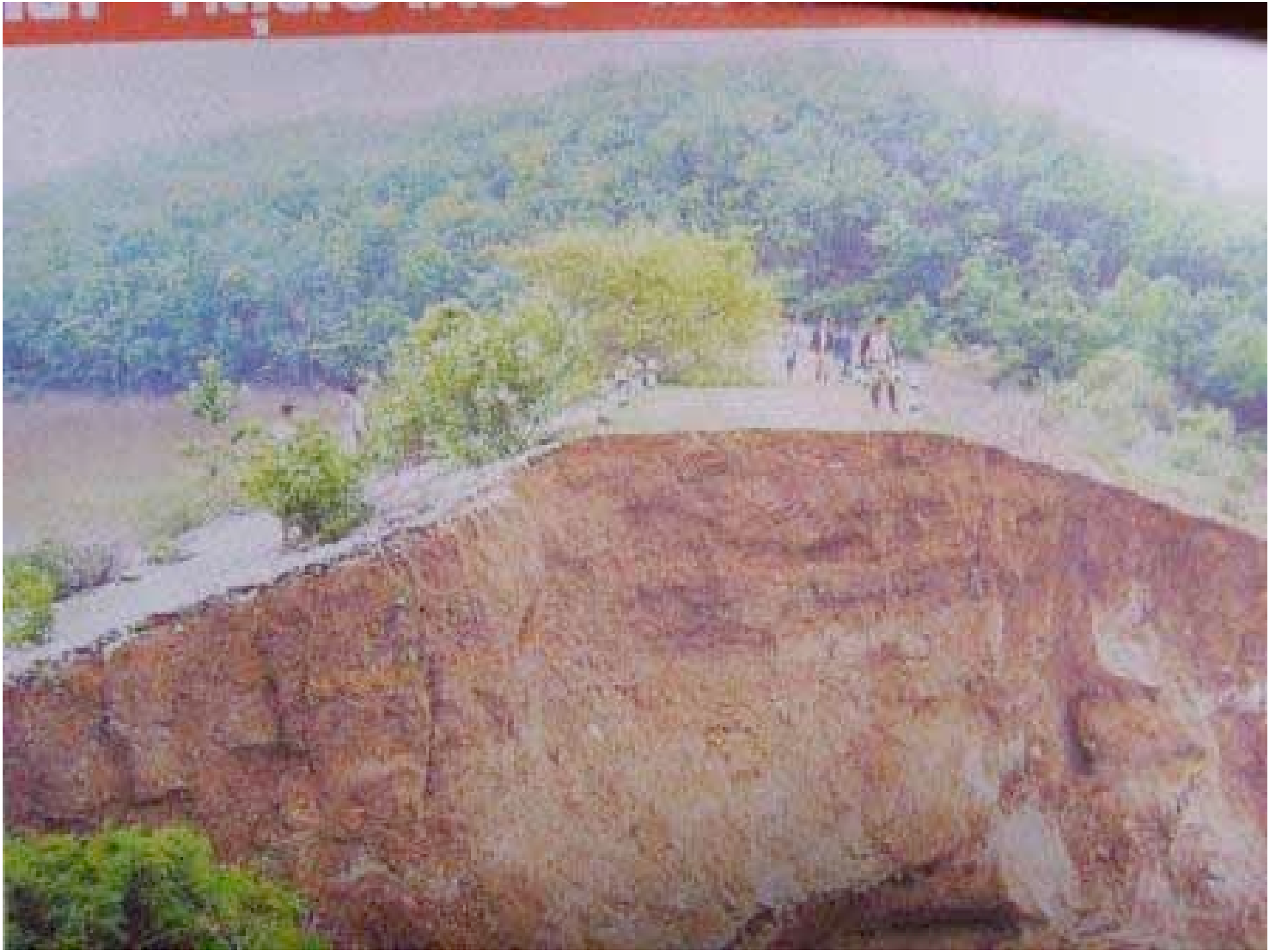
Planting vetiver grass


The effluent spreads out along the rows of vetiver grass

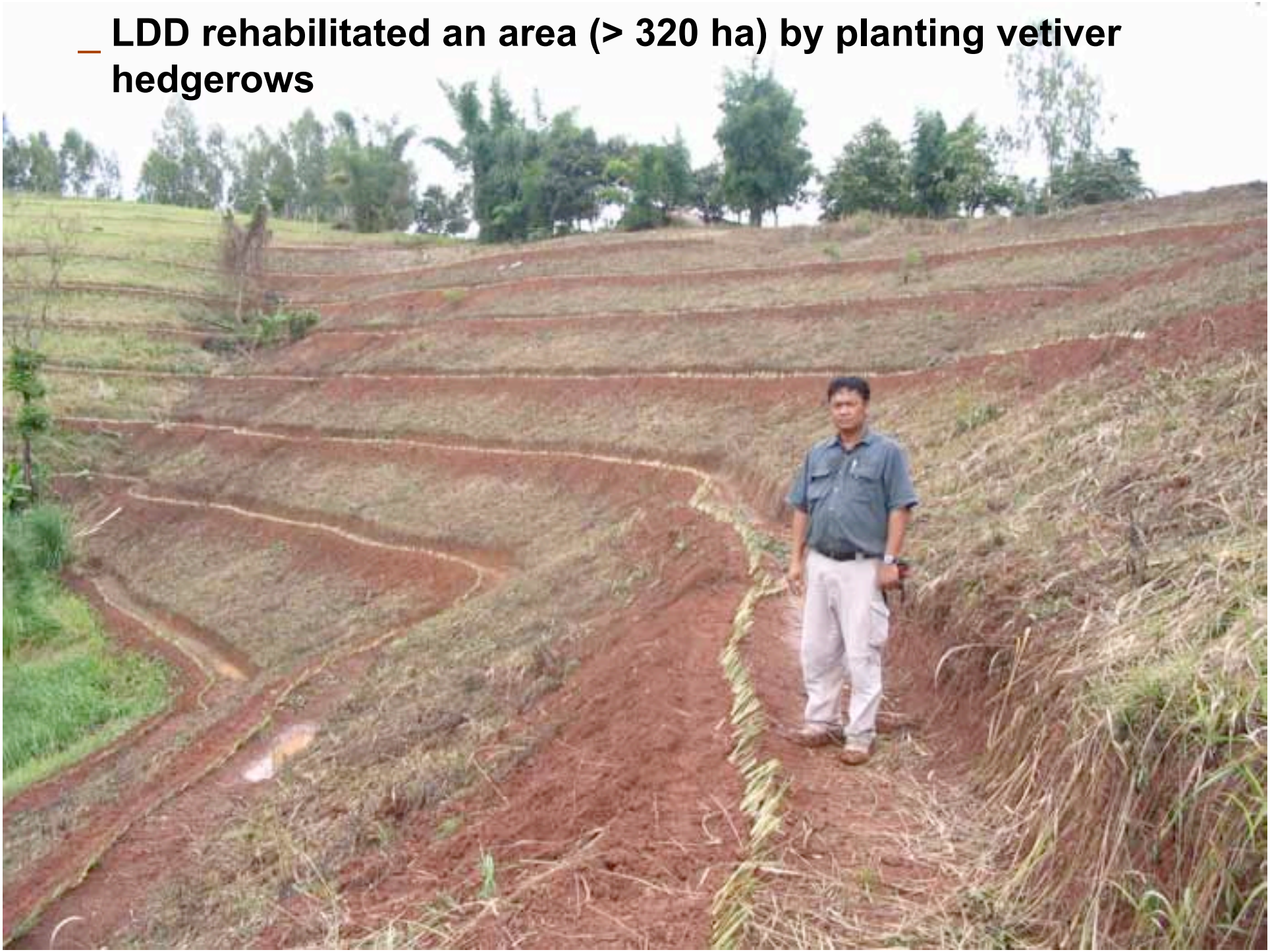
The vetiver grass's growth after two months

3.3 Mudslide Disaster Mitigation in Thailand

- In 2004, steep-slope villages in Khao Kho area suffered from mudslides
- The areas (16,000 ha) deforested to plant cabbages
- 0.8-3.2 tons/ha/annum of soil washed away



- LDD rehabilitated an area (> 320 ha) by planting vetiver hedgerows



Areas in between hedgerows planted with upland rice and field crops


Land consolidation made by LDD
Farmers attained a good status in their livelihood


The area is now well protected from further mudslides

3.4 Environmental Protection of Open-Cut Bauxite Mine in Venezuela

- VS was used to stabilize slope of open-cut bauxite mine in Los Pijiguaos
- Sandy bags, stone rows or wooden stacks installed as perennial vetiver barriers
- VS - stabilized slopes, gullies and border drains
  - protected infrastructures of soil-concrete interface
  - reinforced lagoon dikes
  - filtered water drained into lagoons.
- Successful in developing VS for land rehabilitation and environmental protection
- Restored open-cut bauxite mining site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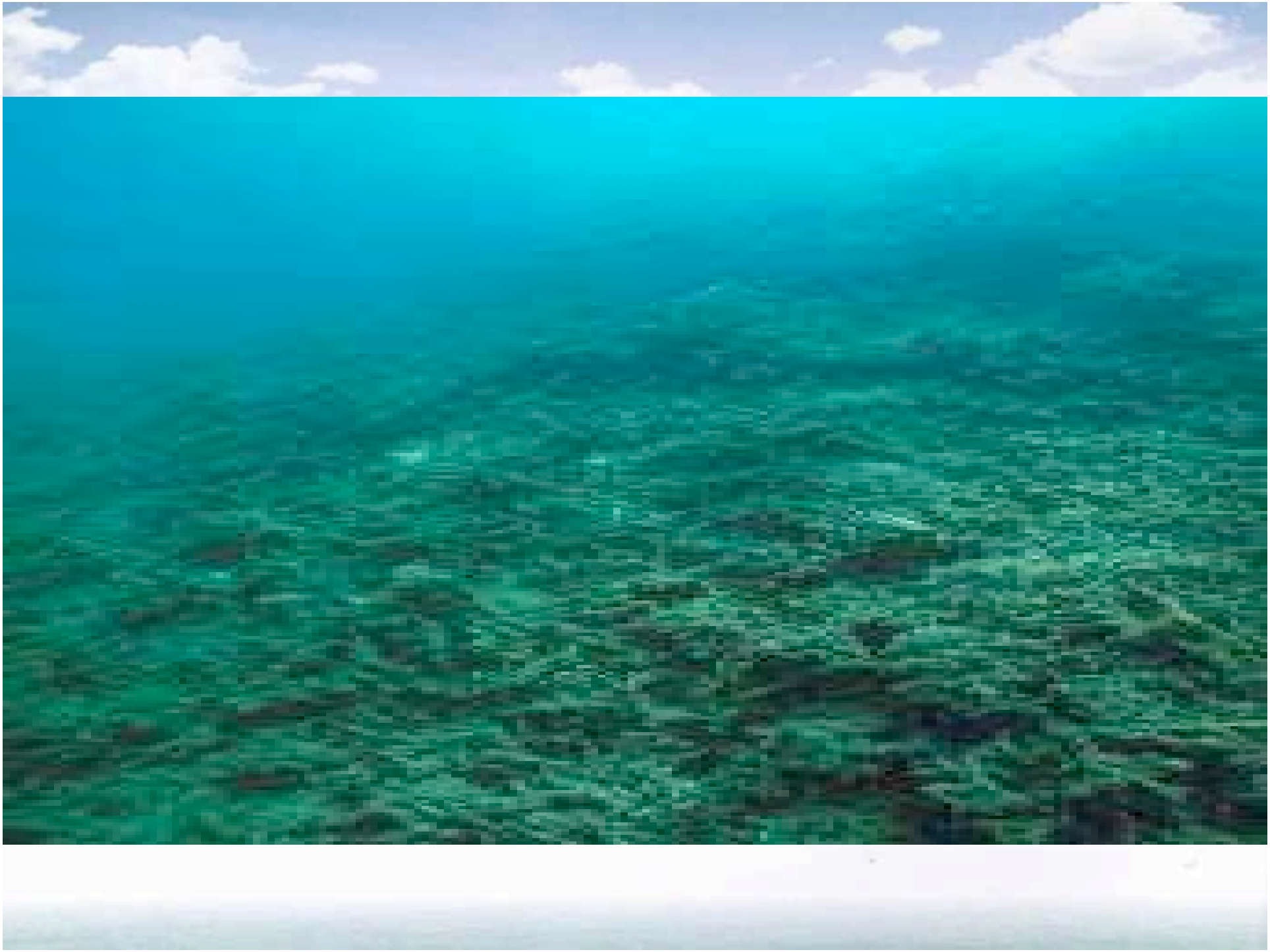
3.5 Reduction of Watershed Sediment in Guam

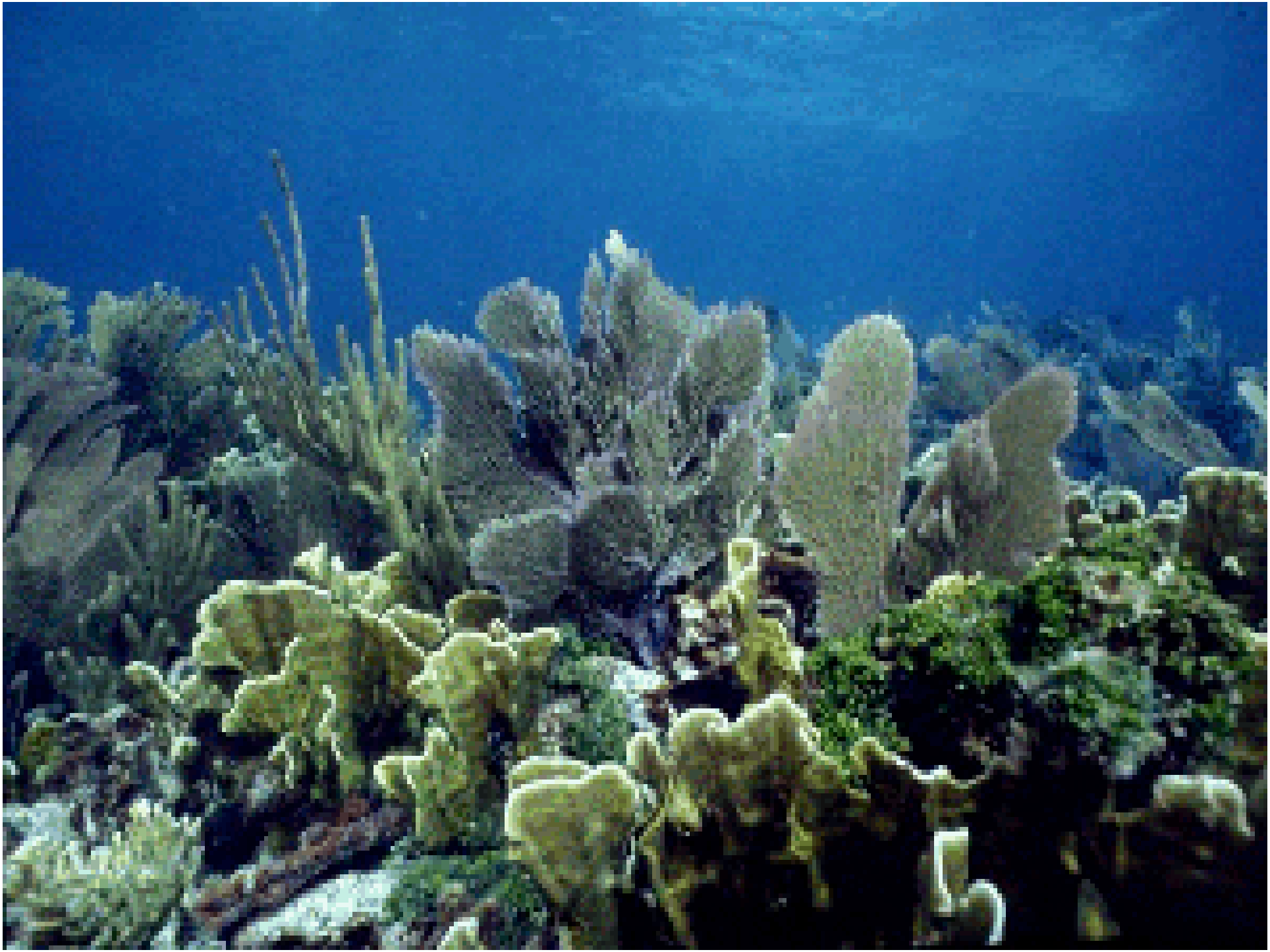
_ Forest burning
- major cause of land degradation
- resulted in sediment loss due to erosion

_ Sedimentation is the major cause of water pollution
- threatens the coral reef (tourist attraction)
- reduces the water storage capacity of reservoirs and canals
- increases flooding



_ VS used as a watershed management technique
- mitigate sedimentation and improve water quality
- found to be effective in erosion control

_ Results:
- quality of runoff water downstream greatly improved
- reduction of sediment in near-shore waters
- coral reef protected from storm runoff



4. DISCUSSION

4.1 A Global Technology

- > 70 countries in tropical and subtropical regions in 5 continents employed VS
- Originally VS was used for soil and water conservation in agricultural areas
- Extended to other applications in non-agricultural areas:
  - environmental protection
  - phytoremediation
  - wastewater treatment
  - disaster mitigation

- VS - unique role in strengthening rural communities while at the same time conserving natural resources
- Intimately linked to the people living in the communities and the environment
- VS
  - improve living condition and earning capacity of the communities
  - provide better environment through environmental protection, bioengineering, phytoremediation and disaster mitigation

4.2 A Feasible Technology

_ VS is a feasible technology:

- practical
- inexpensive
- low maintenance
- low-level technology
- green technology and environmental friendly

4.3 An Effective Technology

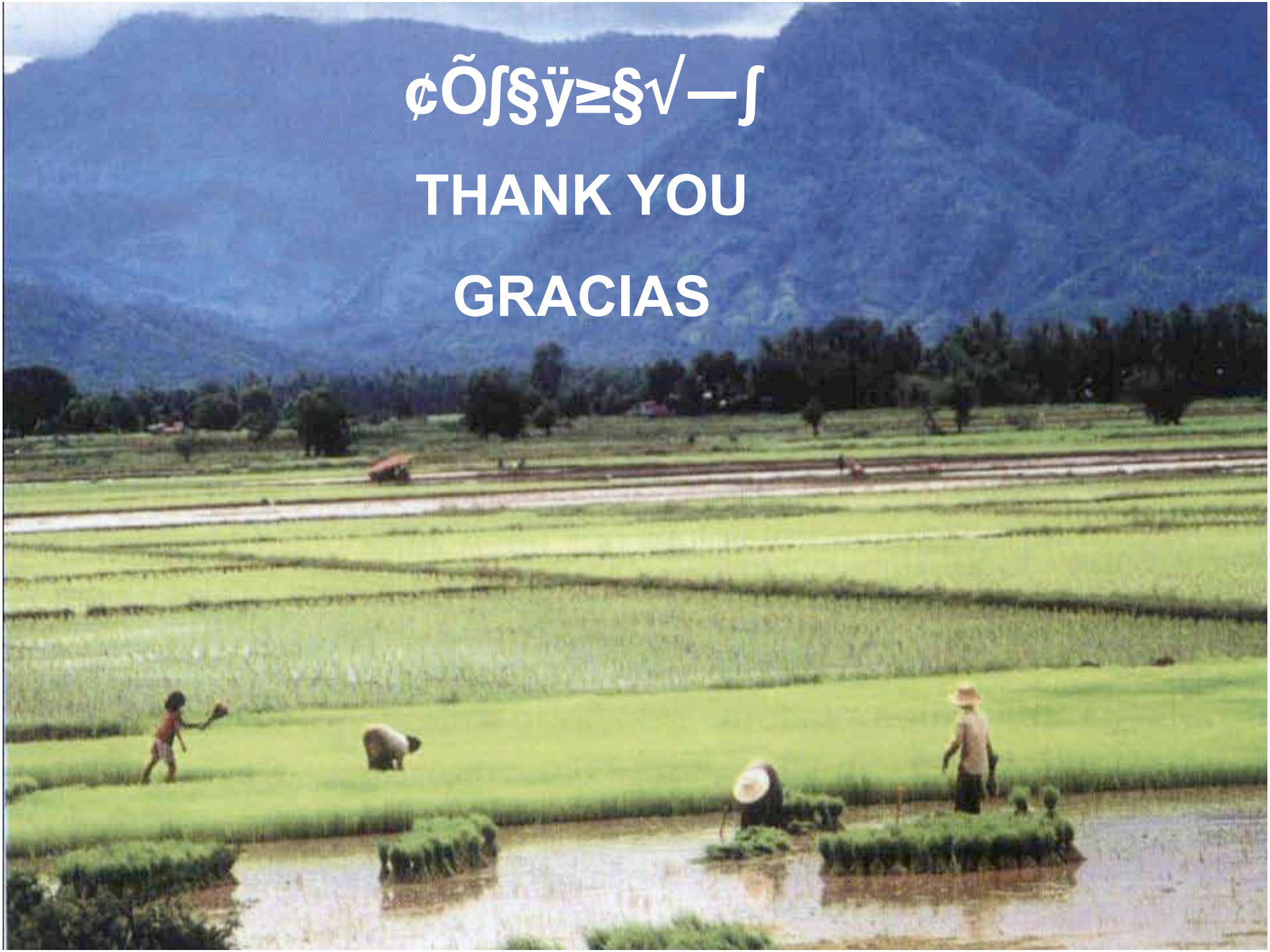
_ VS - effective technology in all applications, through:

Environmental Protection:

- ***Bioengineering*** **: prevention of environmental degradation, such as in slope and embankment stabilization, pollution control**

- ***Phytoremediation*** **- curing environmental problems through:**
  - reclamation of wastelands or deserts, and
  - rehabilitation of contaminated or intoxicated soil and water through heavy metal absorption, wastewater treatment, water purification, etc.

Disaster Mitigation: Stabilize landslides, mudslides, and shifting sand dunes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