

# **Vetiver Victorious :**

## **the Systematic Use of Vetiver to Save Madagascar's FCE Railway**

**A presentation of the FCE Railway Rehabilitation Project  
To the 3rd International Conference on Vetiver  
Guangzhou, China**

**6 October, 2003**



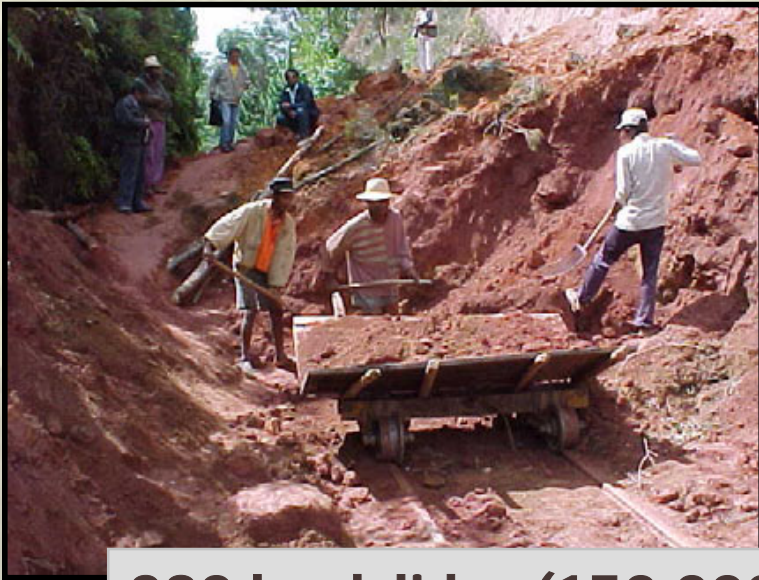
# The FCE Railway, Madagascar

The third steepest rail line in the world

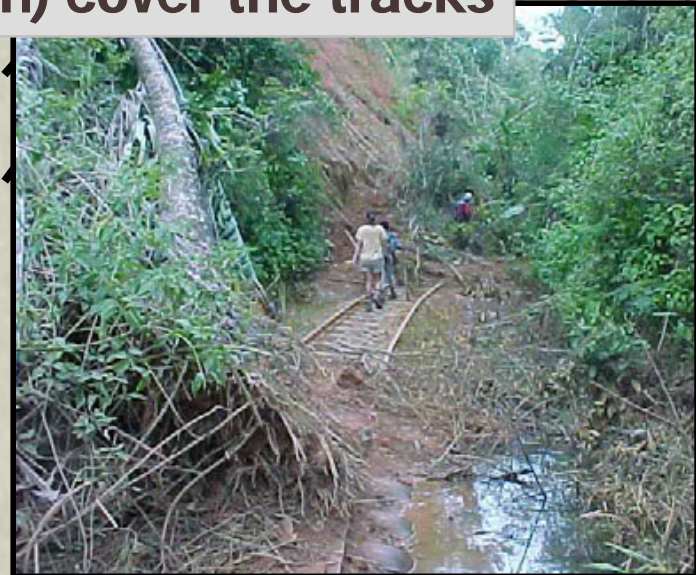




# Disaster strikes : 2 cyclones hit Fianarantsoa province over a 2-week period in early 2000



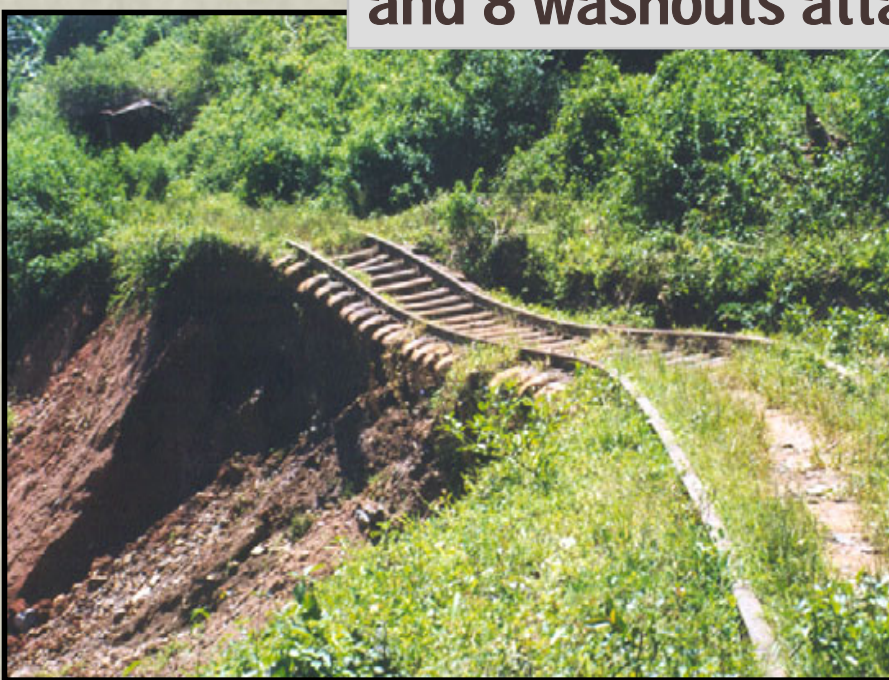
**280 landslides (150,000 m<sup>3</sup> of earth) cover the tracks**





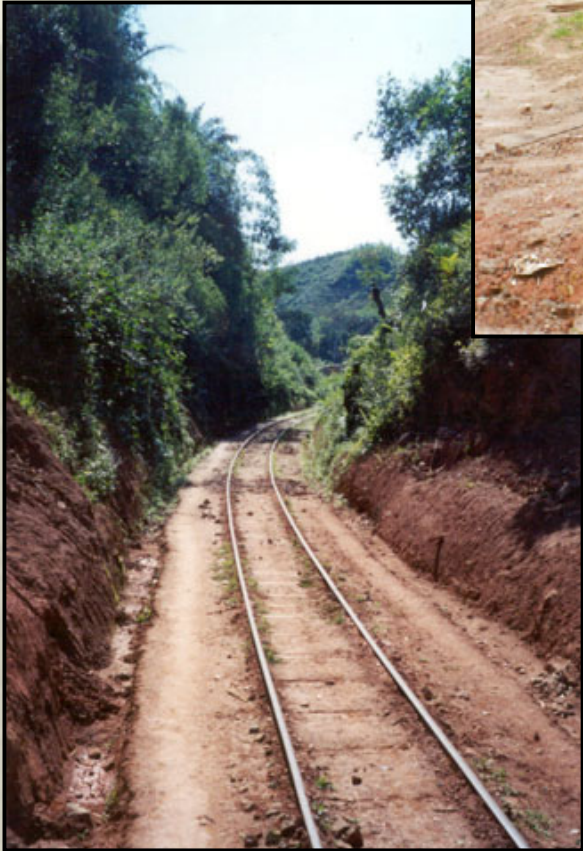


and 8 washouts attack the FCE platform





Immediate emergency interventions were carried out to reopen the line





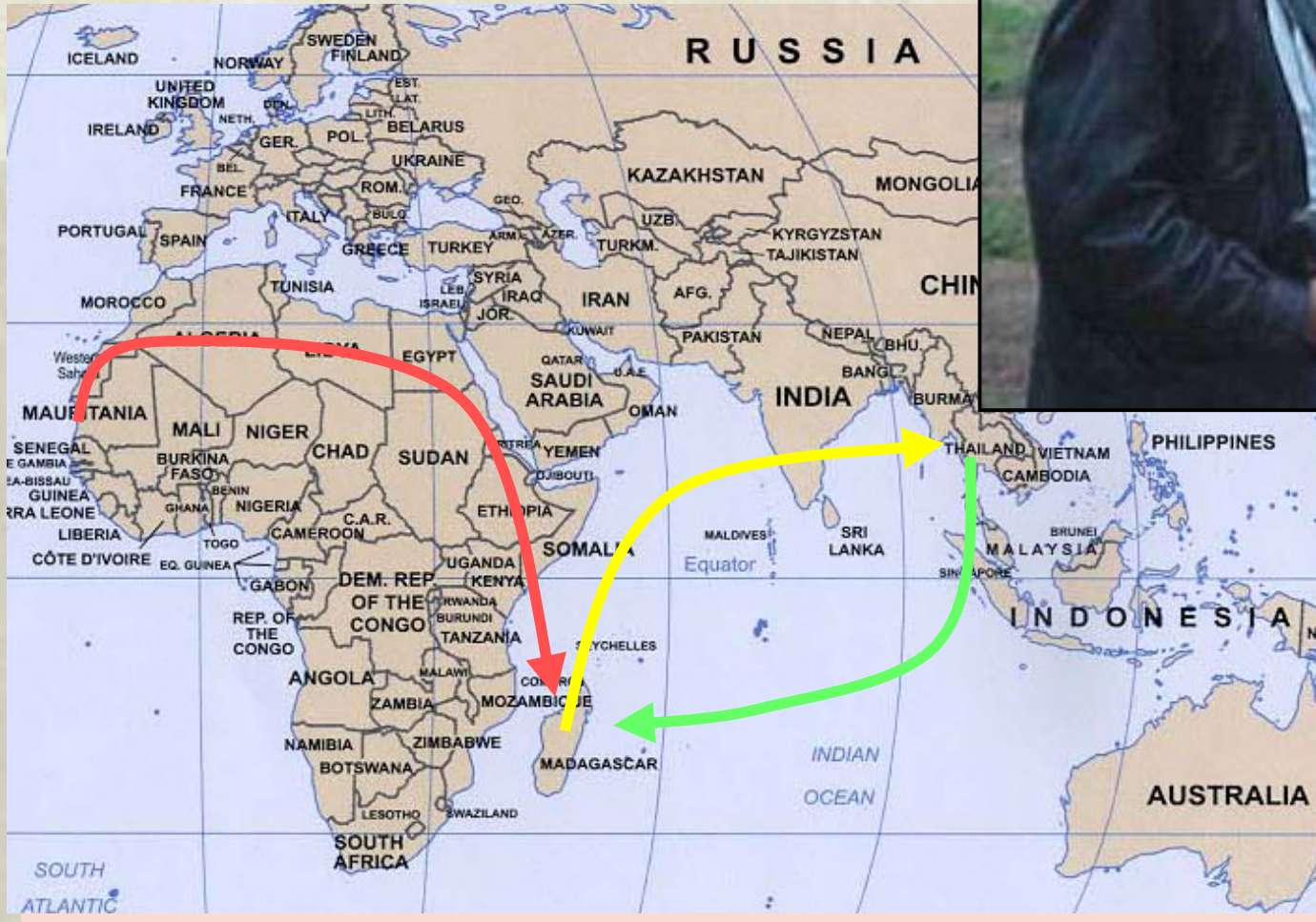
But there still remained serious issues :

1. How to stabilize the many still unprotected slopes?
2. How to reduce FCE vulnerability to future cyclone damage?





“This is a job for vetiver”





The Thai specialists and their partners in Madagascar devised a 2-pronged strategy :

1. Systematically use vetiver to Stabilize all *points noirs* and drainage systems



2. Institute a vetiver based system to reduce erosion and landslides along steep farmed hill-slopes



The background features a stylized, muted landscape. In the upper half, there are several mountain peaks rendered in shades of light green and yellow. In the lower right corner, a dark brown branch of a willow tree hangs down, adorned with numerous small, dark, round buds. The overall aesthetic is soft and naturalistic.

# **I. Technical Approach to Protecting the Rail Slopes**



Planting of perennial crops  
instead of upland rice or manioc (tapioca)

Farmers' land or forest

Detail " A "

mortared riprap

300 mm  
150 mm

Railway right of way  
50 m approx

Interceptor drain or catch ditch  
See detail " A "

Vetiver grass( *Vetiveria zizanioides* )  
at 1.0 m vertical interval

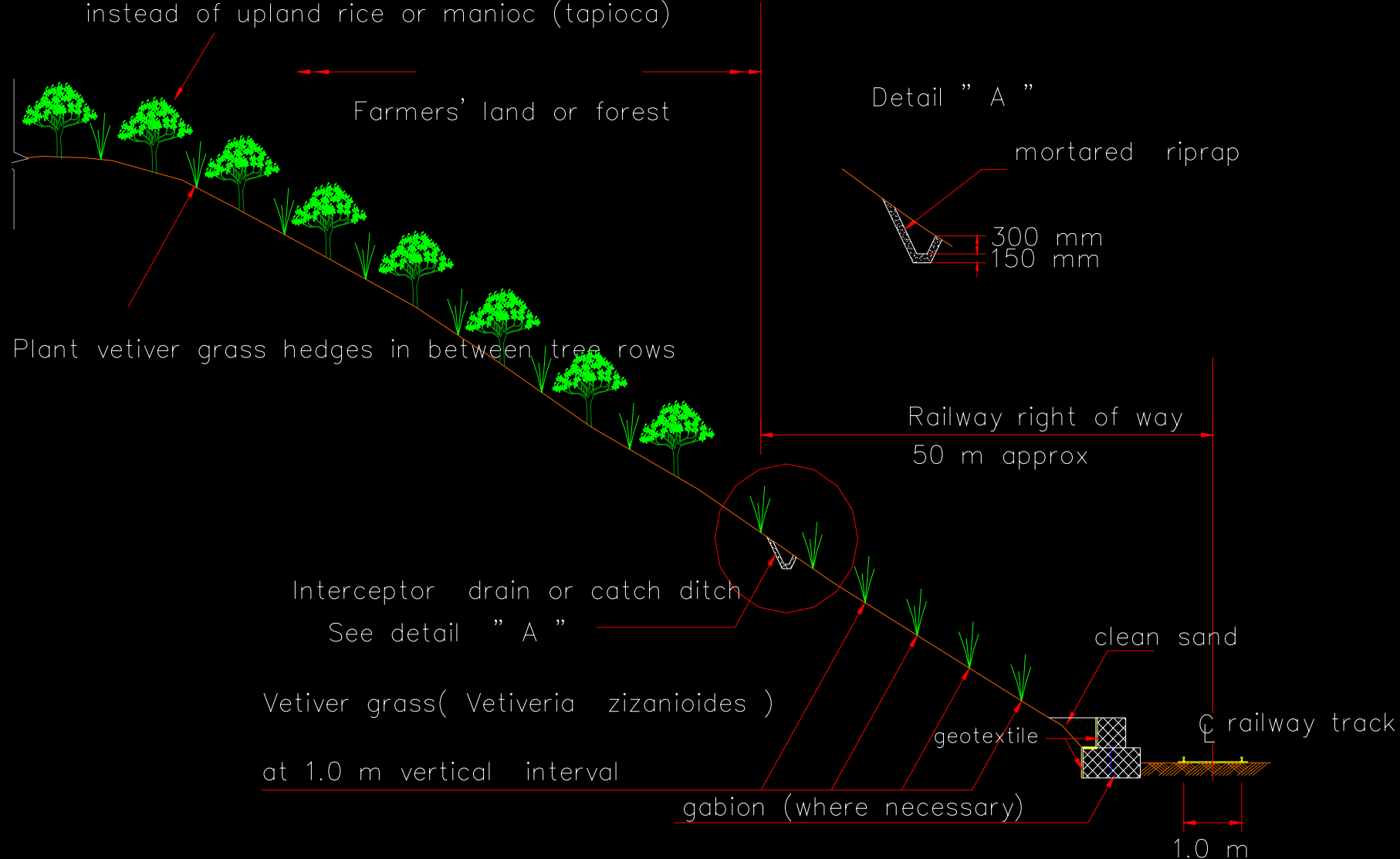
clean sand

geotextile

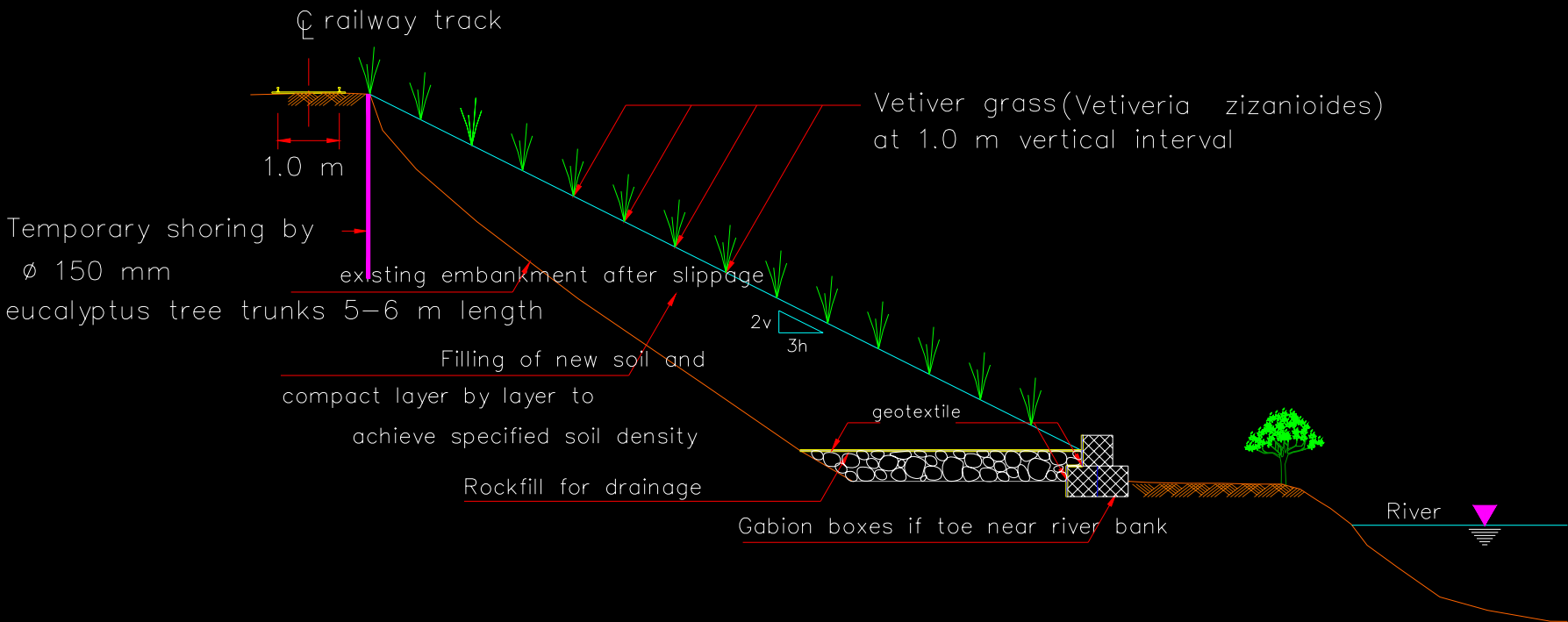
⊕ railway track

gabion (where necessary)

1.0 m









**(1) Slope stabilization : gabion where needed at the base of slope, rows of vetiver on contours at 1 m vertical distance**











Vetiver w/ gabion by riverbank



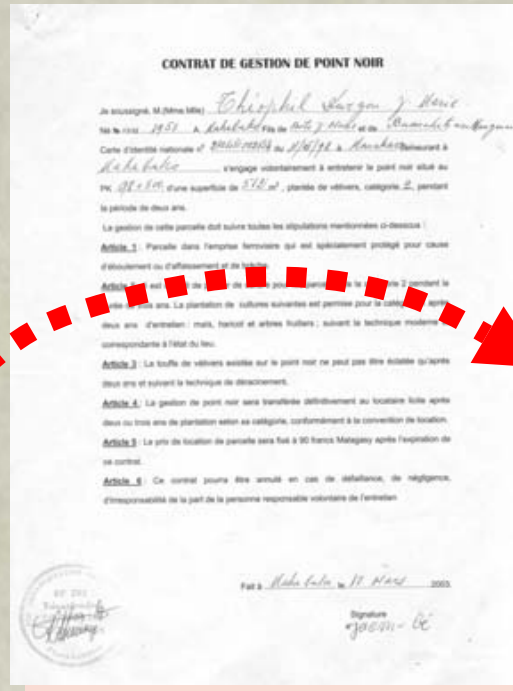
## and (2) drainage protection





Result : 13 *points noirs* and 31 drainage infrastructures protected by vetiver.

Each of these “technical intervention” points is now under contract with a neighbor responsible for its maintenance in exchange for access to the pruned vetiver for thatch or handicrafts





The background features a stylized, muted landscape. In the upper half, there are several overlapping mountain peaks in shades of light green and yellow. In the lower right corner, a willow tree is depicted with thin, dark branches and clusters of small, dark, round buds or leaves. The overall aesthetic is soft and naturalistic.

## **II. Farmer Intervention to Protect the Rail Embankments**

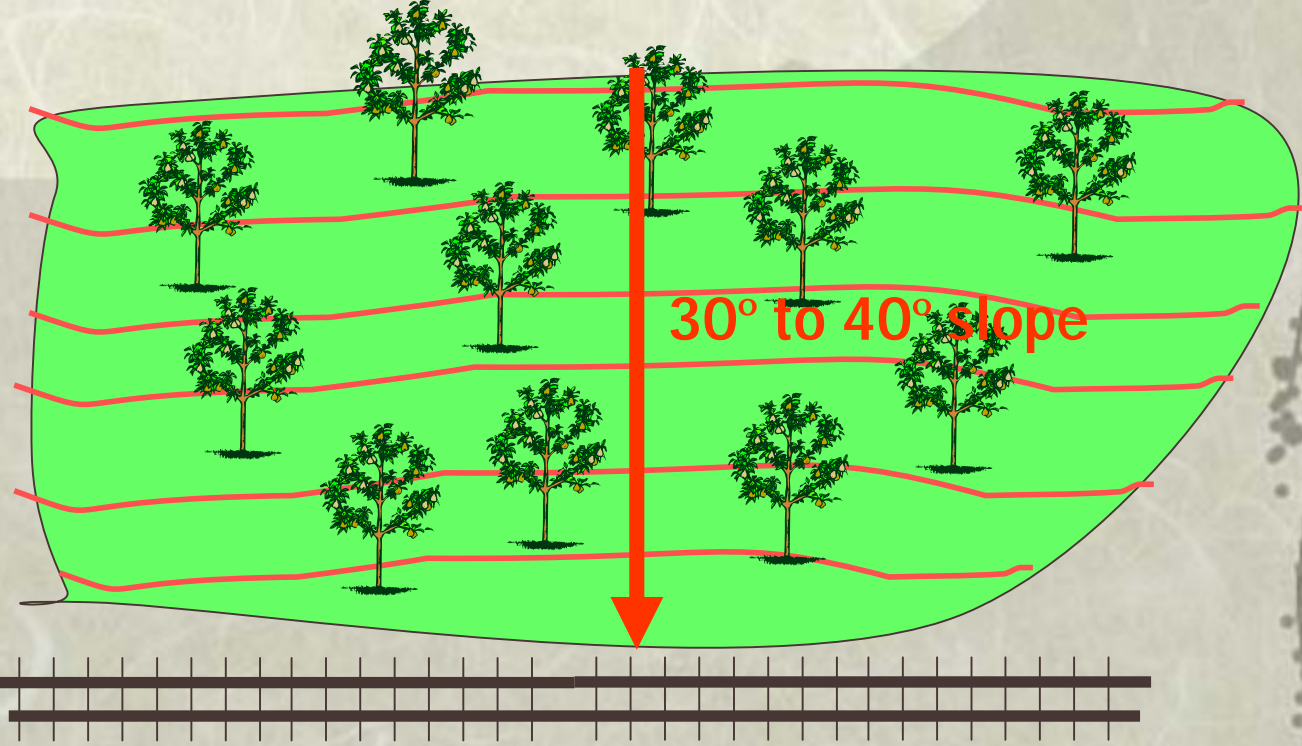
**The problem : hundreds of farmers cultivating steep slopes along the railway with erosion inducing crops (e.g. rice and cassava) that are harvested just before the rainy season**



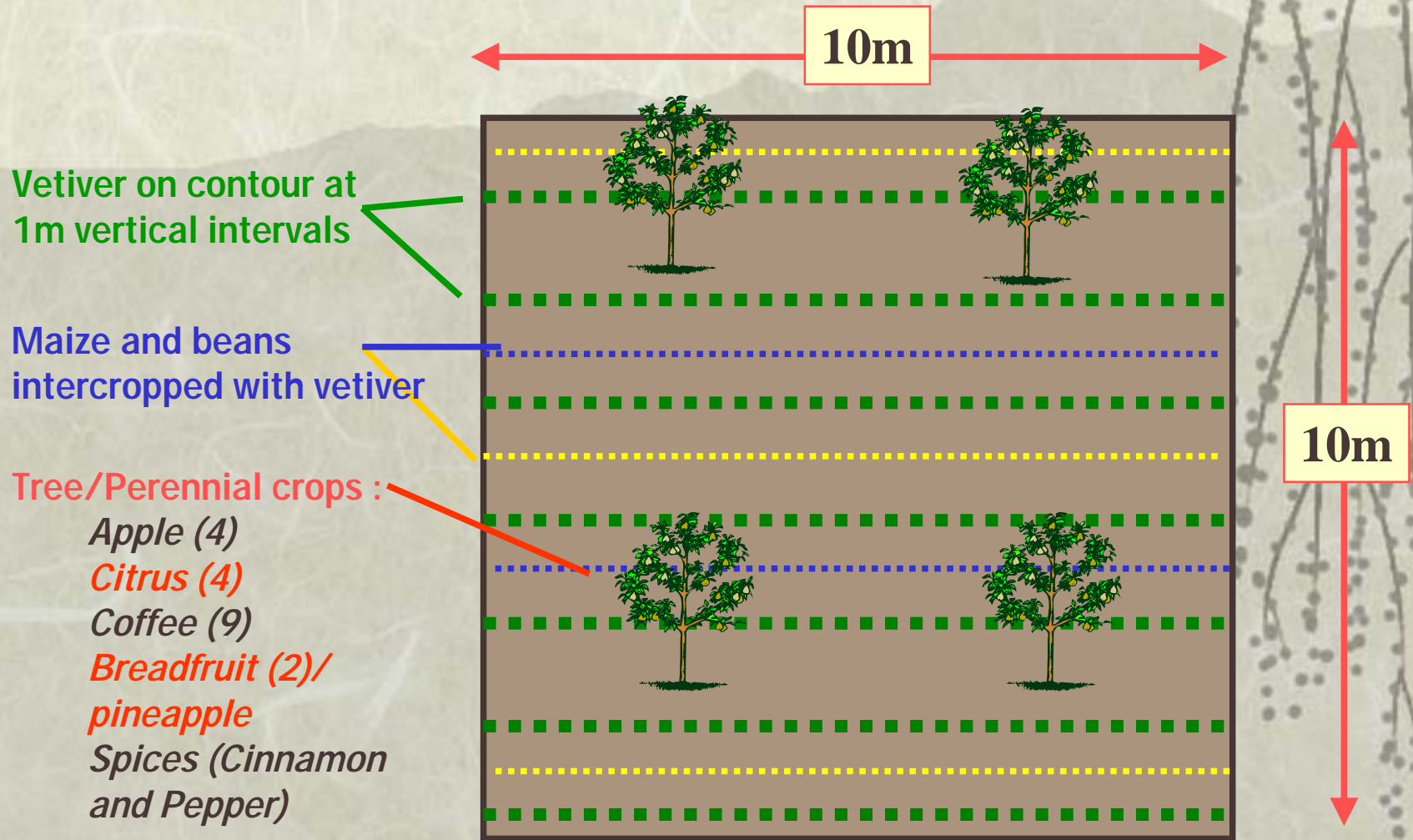
**The solution : work with farmers to replace erosion inducing annual crop systems with a vetiver based, sustainable crop system that protects and stabilizes vulnerable embankments**



**Overall Goal :** stabilize steep hill-slopes adjacent to the line with vetiver and fruit trees

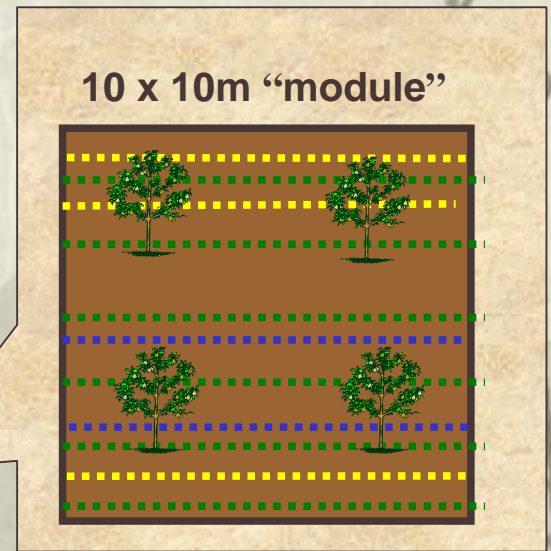
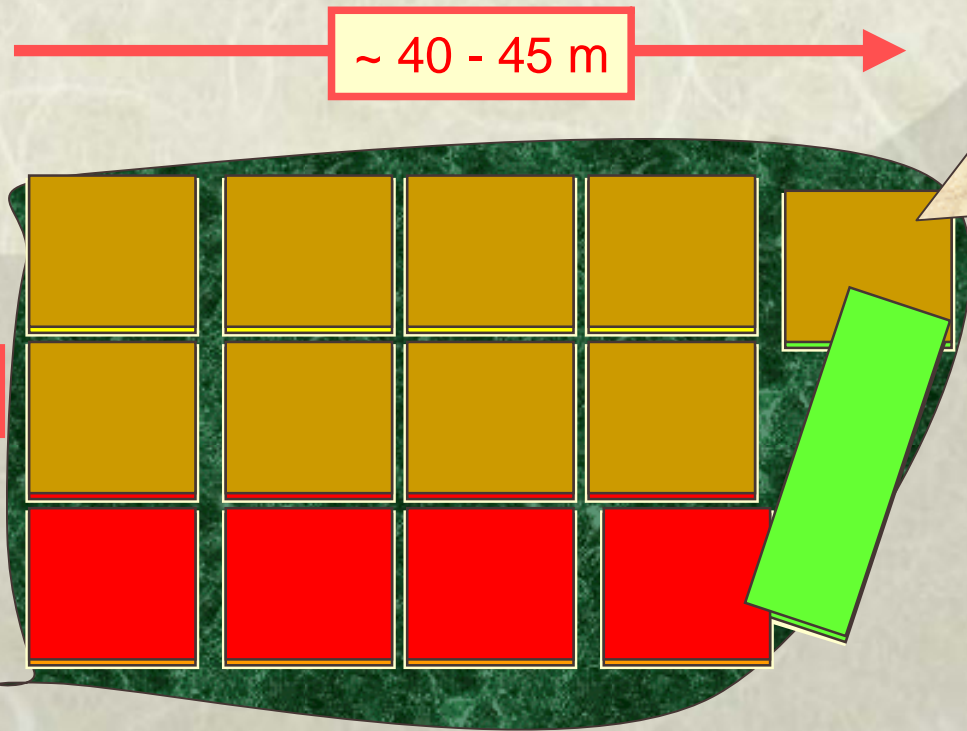


**Modular Approach** : use of 10x10m modules that allow each farmer to customize his/her intervention according to individual needs and preferences





The Modular Approach allows rapid dissemination without sacrificing farmer choice



Farmer A :

4 spice, 4 citrus, 4 apple, 2 breadfruit

Farmer B :

9 coffee, 1 breadfruit, 4 apple

# The Vetiver-for-Vetiver Loan Scheme

**Problem :** the cost of vetiver was very high at the beginning because few supplies available locally

**Solution :** the project lends the farmer the vetiver in the first season

The farmer reimburses the vetiver in the 2nd season, passing the vetiver on to a new farmer who is joining the program ... who will in turn reimburse the vetiver to another farmer the following season

Plant 1 slip every 10 cm



> one year, slip becomes a tuft of 20

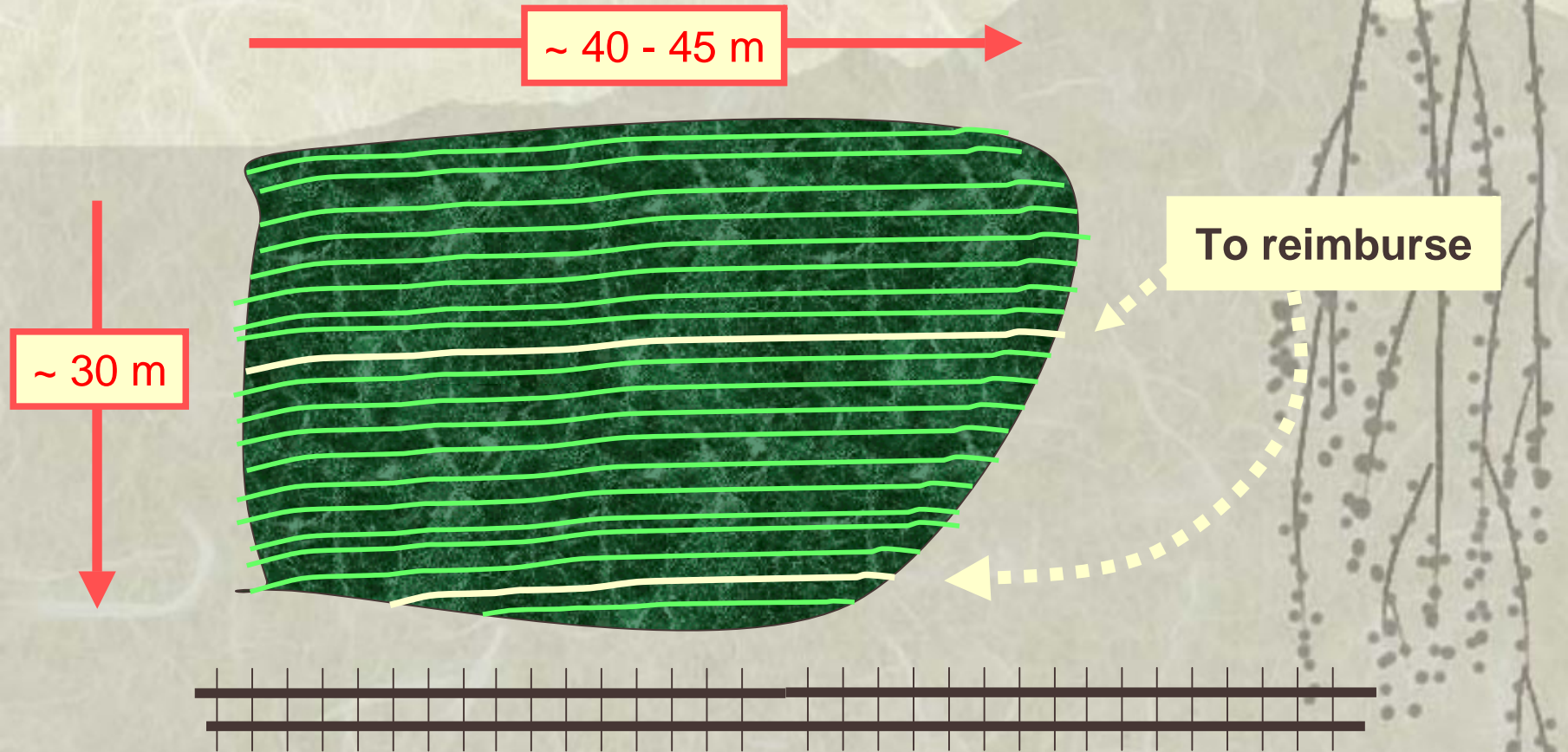


Lift the tuft of 20, reimburse 19 and replant 1 ... until loan has been fully reimbursed



**Example :**

**Farmer borrows 9,800 vetiver slips; will reimburse ~ 490 tufts  
= 1 to 1½ lines**

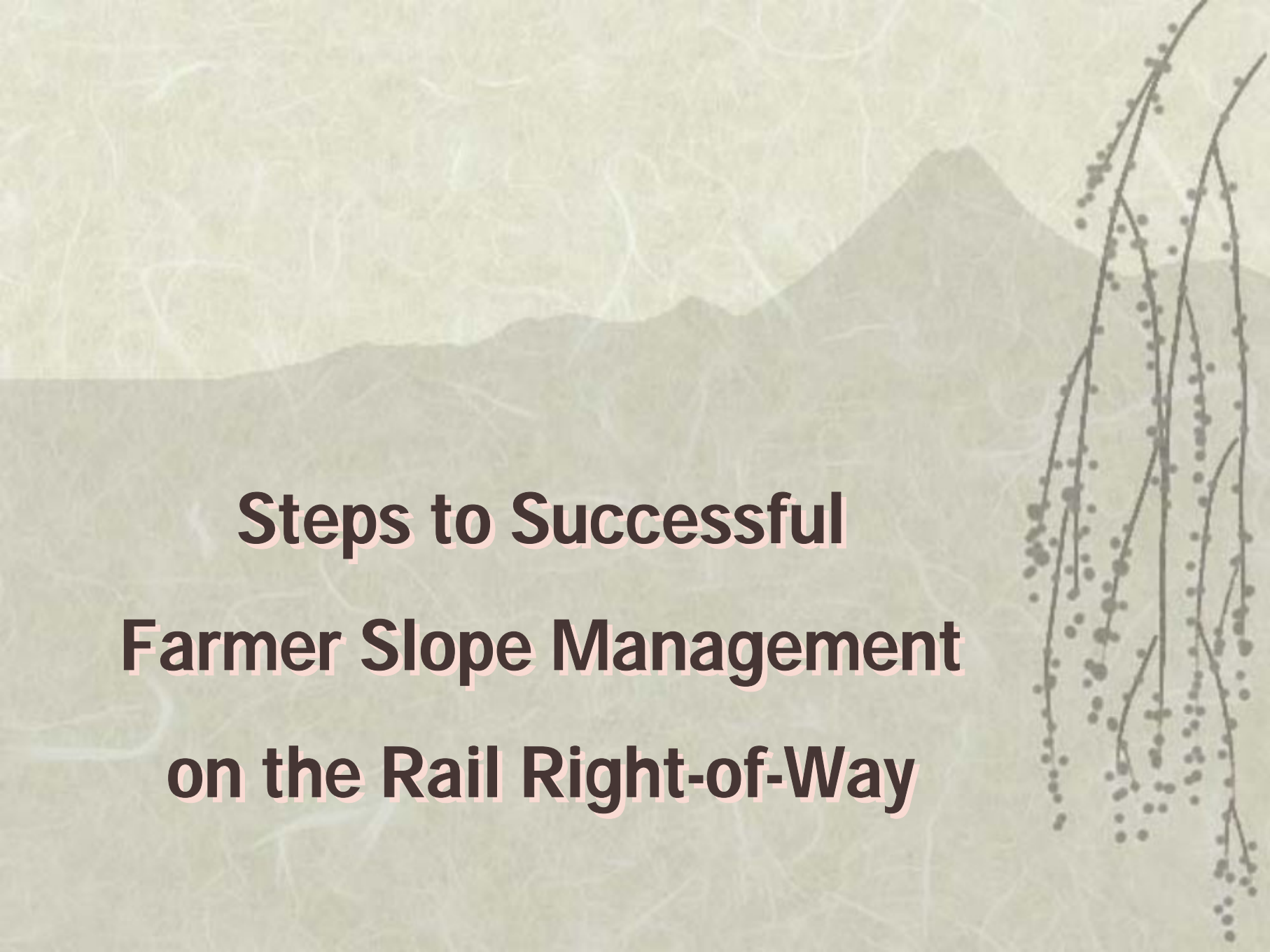


## Result :

- Project has few, if any, costs to purchase vetiver after the first year
- Farmers understand that they can “vetiverize” their own fields away from the train line, or help others in the village, at low cost





The background features a stylized, muted green and brown landscape with a mountain range. On the right side, there is a detailed illustration of a willow tree branch with small, dark, round buds or leaves hanging down.

**Steps to Successful  
Farmer Slope Management  
on the Rail Right-of-Way**

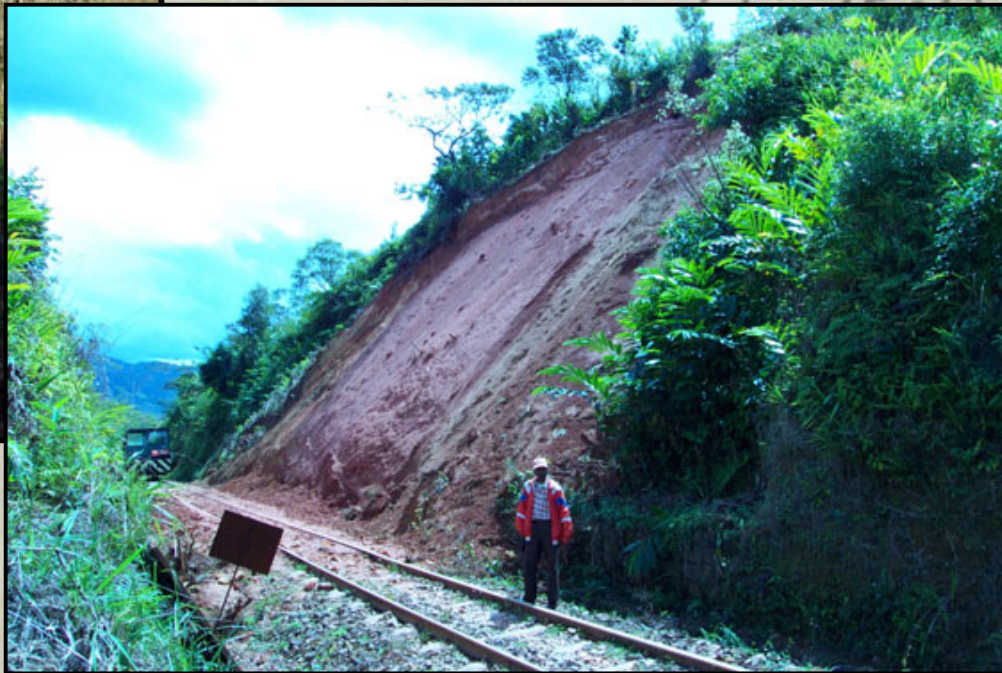
**Step 1 : Inform the farmers of the relationship between farming activities and landslides on the line and explain the proposed vetiver intervention**

*NB : Careful economic analysis to determine that the farmer would gain at least the same level of revenues from a vetiverized field as she or he had before joining the intervention*





**Step 2 : Fields to be stabilized are identified with farmers (priority given to those that are most erosion prone and where rice or manioc was planted the previous year)**





**Step 3 : Farmer obtains 10-year use rights to field from FCE train line (all land belongs to the 50 m railway right-of-way), with clearly defined rights and responsibilities of the farmer and the FCE.**





Step 4 : With the village agent, farmer measures field, determines how many modules s/he can use, and selects modules according to personal choice (subject to certain technical constraints)



FICHE D'AMENAGEMENT  
(Tolongoïna)

P: Razanatsoa, Jeannette Village:                      PK 67+400

Dimension de la parcelle : Longueur 40 (m) hauteur 20 (m) superficie 800 (m<sup>2</sup>) modules 08



2 citrus

2 apple

2 coffee

2 spice

Besoins en plantes :  
Vétivers : 08 modules x 700 pots/mod. 5600 vetiver

|                 |      |              |  |           |              |
|-----------------|------|--------------|--|-----------|--------------|
| Modules agrumes | 02 x | 1 thomson    |  | 30 m maïs | 20 m haricot |
|                 |      | 1 Valencia   |  |           |              |
|                 |      | 1 Clementine |  |           |              |
|                 |      | 1 Dancy      |  |           |              |

|                |   |           |  |           |              |
|----------------|---|-----------|--|-----------|--------------|
| Modules pommes | x | 2 Anna    |  | 20 m maïs | 30 m haricot |
|                |   | 2 Dorsett |  |           |              |

|              |      |            |  |     |     |              |
|--------------|------|------------|--|-----|-----|--------------|
| Modules café | 02 x | 12 Robusta |  | XXX | XXX | 30 m haricot |
|              |      | 1 Ombrage  |  |     |     |              |

|                       |      |            |  |           |              |
|-----------------------|------|------------|--|-----------|--------------|
| Modules Fruits à pain | 02 x | 12 Robusta |  | 30 m maïs | 30 m haricot |
|                       |      | 1 Ombrage  |  |           |              |

|                |      |                   |  |           |              |
|----------------|------|-------------------|--|-----------|--------------|
| Modules épices | 02 x | 5 cannelles       |  | 20 m maïs | 20 m haricot |
|                |      | 10 poivres        |  |           |              |
|                |      | 5 tuteurs poivres |  |           |              |

Total maïs \_\_\_\_\_ m  
kg

Total maïs \_\_\_\_\_ m  
kg

Le paysan veut emprunter les graines de maïs   H O H    
Le paysan veut emprunter les graines de haricots   H O H

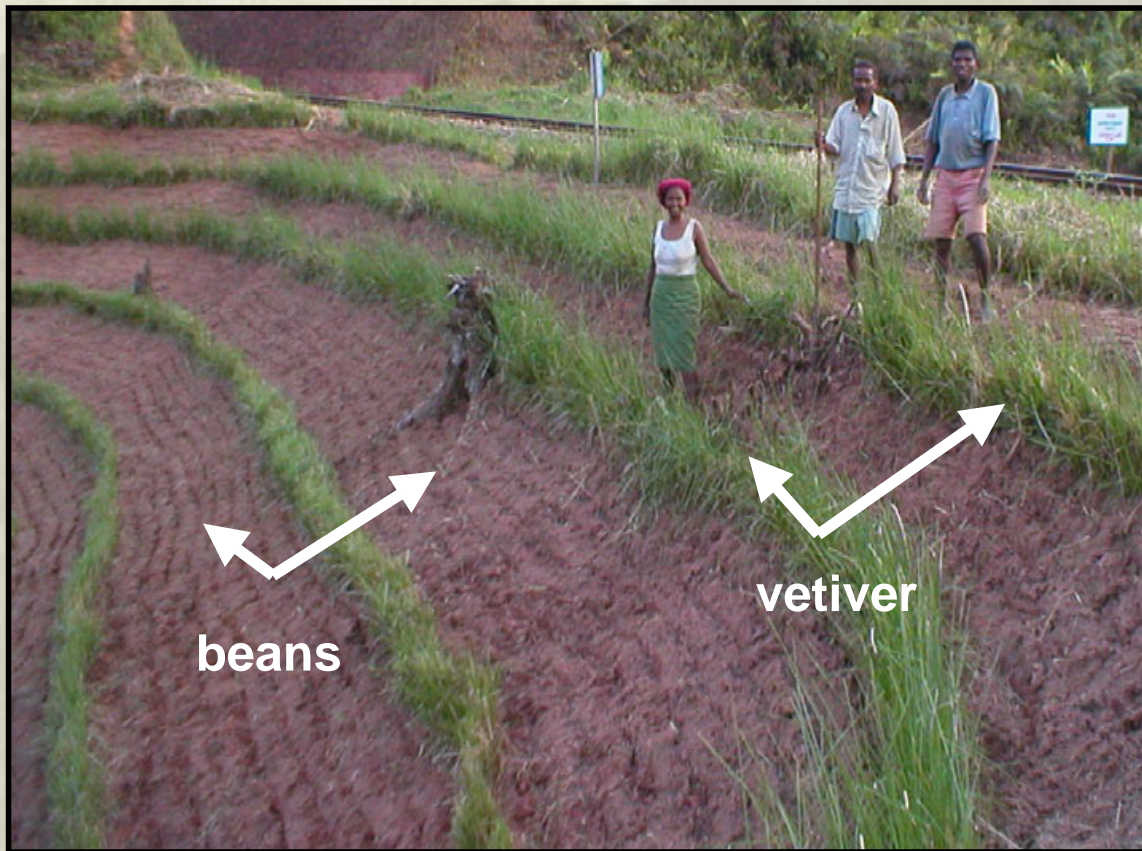


**Step 5 : Farmer clears field and plants vetiver (received as a loan from the project) on contour lines at 1-meter vertical intervals**



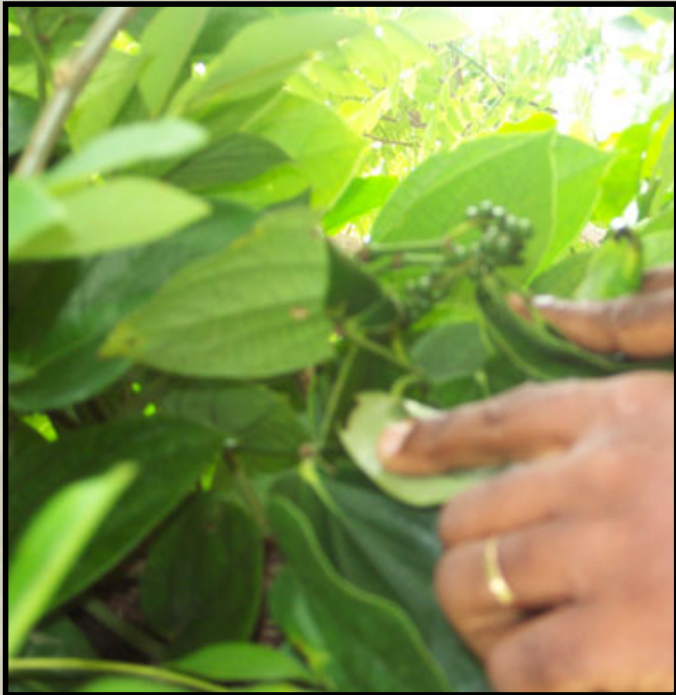


Step 5 : Farmer inter-plants annual crops and perennial tree crops between the vetiver rows according to module “map”






Follow-up : Farmer reimburses (and replants) vetiver in second season, keeps vetiver well pruned, correctly maintains tree and spice crops



*Well trimmed vetiver hedgerow*



The background features a textured, light beige paper surface. In the center, there is a silhouette of a mountain range with several peaks. On the right side, there are several dark, thin branches of a willow tree, each adorned with numerous small, dark, round buds or leaves. The overall aesthetic is minimalist and naturalistic.

# **The Results**



PK 75+900



# The Results

627 farmers now participating in intervention (with waiting list)

- 2.6 million vetiver slips planted in 3 ½ years

- Farmers away from the line now beginning to adopt techniques on slopes away from the railway

- Each stabilized field along the line now serves as vetiver nursery” if the railway or other projects need to buy vetiver (farmers can sell their vetiver after reimbursing the loan as long as they replant a slip for every tuft removed)

- The price of vetiver in the province has dropped from approx US \$4 (400 cents) per tuft of 25 slips to ~ 30 cents/tuft.

**Last year, despite torrential rains, the FCE had *no landslides* that closed the line for > 1 day.**

## *Farmer Jaonary Ralaivao before :*

- deep poverty, no cattle, food insecure for several months a year
- erosion on field meant annual landslips with loss of crops

## *Farmer Jaonary after :*

- ✓ family is food secure
- ✓ has sold vetiver to buy a cow; his wife now sells milk in the village
- ✓ has had no landslips or loss of crops since the field was vetiverized
- ✓ has on his own initiative vetiverized a cassava field away from the train line
- ✓ has become a respected local farmer due to his leadership in vetiver





Thanks to vetiver,  
the FCE railway and the 100,000 people who depend on it for  
their livelihoods no longer dread the next cyclone season



*With special thanks from the FCER project and the people of Madagascar  
to His Majesty the King of Thailand and the Royal Development Projects Board*





Misaotra !

Merci !

谢谢 !