

# PROGRESS REPORT

## **Pilot Demonstration Activity (PDA) in Indonesia Applying the Vetiver System For Slope Stabilization and Water Pollution Control in the Citarum River Basin**

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# 1. BACKGROUND AND INTRODUCTION

Two Pilot Demonstration Activities PDA projects for the improvement of the Citarum River Basin in Java, Indonesia, were implemented between 2008 & 2010 by East Bali Poverty Project (EBPP) – Indonesian Vetiver Network (IDVN) & funded by the Asian Development Bank (ADB) meant to demonstrate the properties of Vetiver Grass (*Chrysopogon zizanioides*) as a means for controlling erosion and water pollution problems in the Citarum River Basin. In order to assess the progress of these two PDA projects, a site visit was conducted in March 2011 showing great signs of success for one pilot project and mismanagement and rejection by the community for the other.

The purpose of the visit on March 26<sup>th</sup> 2011, led by Ardika Adinata from IDVN senior EBPP/IDVN field coordinator from the beginning and accompanied by Ms Maria Calderon (representing Dr Paul Truong of Brisbane-based “Veticon Consulting”, Director of TVNI and the expert Vetiver System [VS] consultant for the project), was to evaluate the outcome and results of the Vetiver System (VS) in the two project sites of (a) Upper Citarum Basin and (b) the community septic tank site on the main river bank. The detailed location of the visited projects is:

- Upper Citarum River Basin, Kampung Jirihieun, Desa Pangauban, Kec.Pacet
- Septic Tank Site on the Bank of the Citarum River at Desa Rancamanyar, Kec. Bale Endah

The following is a timeline showing the tasks completed by EBPP/IDVN staff and Dr. Paul Truong in 2009, which focused on designing the projects, hosting Vetiver awareness presentations and constructing the PDA projects:

## 10-13 March 2009

- David Booth and Ardika Adinata survey upper Citarum site and make preliminary design for sustainable VS project in accordance with proposal approved by ADB in February 2008;
- Give comprehensive PowerPoint Presentation and explanation of vetiver grass (accompanied by examples of vetiver slips and roots) on VS to the stakeholder community groups, local government, Citarum River Basin Water authority & and local partner NGO Warga Peduli Lingkungan (WPL). Attendance 40-50 people.
- Meeting with WPL Chairman, Yoga Sunardie and his field team to discuss the community participation programmes (PRA) for the PDA (Pilot Demonstration Action) project.

## 1-4 April 2009

- David and Ardika to Bandung to introduce the VS Citarum Basin ADB PDA Project in the field to arrange a beneficial partnership with Mr Yoga and his WPL NGO to ensure optimum benefits;
- Discuss the MOU between EBPP/IDVN and WPL;
- Planning the community involvement and planting of the 100,000 Vetiver slips which will be divided as 60,000 in the Upper Citarum and 40,000 at the septic tank river site.
- Planting of a trial 100 Vetiver slips at each location to introduce the vetiver system to the communities and for them to have the sense of ownership.

## 20-25 April 2009

- Dr Paul Truong joins David & Ardika to visit the Citarum Basin Pilot project sites, evaluate EBPP/IDVN design, advised on planting techniques for both locations and gave the final

comprehensive design with the goal that this small pilot project could be upscaled & replicated in all polluted river basins in Indonesia;

- To control and evaluate the successful extraction of nutrients at the septic tank site, Dr Truong recommended that the next phase of the project, 6 months after planting vetiver grass, six monitoring bores be installed between the vetiver and the river itself.
- Dr Truong gives formal presentation to local & Regional Government, local stakeholder and the local NGO. Attendance 60+ people.
- Dr Truong & IDVN team go to both pilot sites to initiate planting with the local stakeholders and teach the key aspects of Vetiver planting techniques. Planting of the 60,000 and 40,000 vetiver slips continues.

### **10-13 May 2009**

- Ardika Adinata (IDVN) visits site to monitor vetiver growth: great results with almost zero mortality

### **19 June 2009**

- David Booth, Scott Younger (EBPP/IDVN), Chris Morris (ADB PDA Project Consultant) and Dr Donny Azdan (Director of Indonesian Govt Planning Department [BAPPENAS] responsible for Water & Irrigation Projects) meet with the local NGO, WPL & community stakeholders to evaluate the impact of the VS at lower Citarum Septic Tank PDA project site.

### **26 March 2011**

- Ardika Adinata, Maria Calderon and Tantan Rustandi (IDVN partner with large vetiver nurseries in W. Java & supplier of vetiver grass for Citarum ADB PDA project) visit Upper Citarum Site and Septic tank site on Citarum River bank.

## **1.1. PDA Projects Background**

### **Upper Citarum Farmland PDA Project:**

With the goal of promoting sustainable farming systems that could be replicated throughout the Basin, the Vetiver System was introduced for erosion control in rice terraces. This helped address the main problem, which “has been deforestation of the Basin’s upper slopes over the last 20 or so years to accommodate planting of potatoes, carrots and other vegetables, precipitating severe erosion and chemical fertilizers and pesticides washing down to the Citarum River, key contributors to the to the high Citarum river pollution levels” (Booth & Truong, 2010). IDVN and Dr Paul Truong were the key designers for this PDA project where they planted 60,000 vetiver slips between 2008 and 2010 at the head farmer’s land, which previously suffered from erosion.

### **Septic Tank at bank of Citarum River PDA project:**

This site is located at the outlet of the community septic tank, serving over 150 families, on the south bank of the river. The effluent from the septic tank was either discharged directly to the river or diverted to irrigate the vegetable crops growing on the bank. The planting site was fully farmed but was later cleared of all crops and vegetation before planting Vetiver grass. In 2009 IDVN/EBPP and Dr Truong gave information to the community about the importance of the Vetiver grass for water pollution control at the Citarum river and as part of the pilot project planted 40,000 slips in the area.

## 1.2. PDA Projects Pictures – former site visits

### Upper Citarum Farmland



**April 2009:** Upper Citarum Site before planting



**April 2009:** Dr Paul Truong teaching farmers about ideal planting techniques at Upper Citarum



**April 2009:** David Booth and Pak Tua, head farmer



**April 2009:** Upland site after planting



**April 2009:** After one weeks growth



**May 2009:** One month after planting

**Septic Tank at Citarum River Bed**



**April 2009:** The effluent is partly discharged directly to the river and partly to irrigate the vegetable crop



**April 2009:** Site is cleared and planted with 40,000 vetiver slips



April 2009: Front view of recently planted site



**May 2009:** Successful Vetiver growth



Proposed location of three Monitoring bores

To control and evaluate the successful extraction of nutrients at the septic tank site, Dr Truong recommended that the next phase of the project, 6 months after planting vetiver grass, six monitoring bores be installed between the vetiver and the river itself.

Dr Truong gives formal presentation to local & Regional Government, local stakeholder and the local NGO. Attendance by more than 60 people.

Dr Truong & IDVN team go to both pilot sites to initiate planting with the local stakeholders and teach the key aspects of Vetiver planting techniques. Planting of the 60,000 and 40,000 vetiver slips continues.

## **2. PROGRESS REPORT - MARCH 26<sup>TH</sup> 2011 VISIT**

### **2.1. Upper Citarum River Site**

**Interview with PDA Pilot Project Stakeholder:** While interviewing the head stakeholder farmer, Pak Tua, he explained that the Vetiver System applied on his own land had succeeded in stabilizing his terraces and in igniting community interest in Vetiver. Additionally, he was visited by the Environmental Department of the West Java Province and gave them information about the success of the project, saying that his land can be used as an example for other projects.

Pak Tua explained that during the hot season, in one of the two sites where Vetiver was planted, the clumps rotted and they had to be removed due to lack of maintenance and trimming. However this is most unlikely as hot weather per se does not kill vetiver in the wet tropical climate, but over shading reduced its growth and then rotting set in. He did succeed however, in salvaging the Vetiver in the second trial site, which has become his main showcase for vetiver systems [VS] applications.

A different farmer was managing a Vetiver nursery which was going to provide grass for interested farmers. However, appropriate maintenance was not given to the nursery causing the Vetiver to die. Fortunately before this happened, some farmers who were interested in the grass took it to their own farms and planted it there for stabilization after they had learned from Pak Tua the benefits of using the grass for erosion control.

After the meeting, Pak Tua took us for a tour around his farm where he proudly showed us his many and varied applications of Vetiver.

**Organic Garden Beds at the School for Pak Tua's community:** After the suggestions given by Ardika and David in 2009, Pak Tua & his stakeholder team developed a school vegetable garden bed in front of the local school and planted vetiver around the borders to stabilize the raised beds and conserve soil & water, after which the children planted long beans and learned about the benefits of using VS.



Maria & Ardika Interviewing Pilot Project Stakeholder Pak Tua (head farmer)



Pak Tua explaining how Vetiver holds back school garden bed



Vetiver stabilizes paths & terraces



Adjacent farmland without Vetiver stabilization with eroded terrace

**Vetiver System for Integrated Pest Management:** During discussions, when looking at the vetiver hedges planted on the edge of the terraces, the Pak Tua had explained that he found a lot of insects/pest on the vetiver leaves when they grew tall. He therefore kept the leaves trimmed very short, about 3-5cm, in order to keep the Vetiver green and prevent it from rotting (in his perception). Although the vetiver still managed to hold back erosion, Ardika explained that ideally the leaves should be trimmed to a height of no shorter than 40-60 cm.

Studies show that it is possible that the Vetiver in this case is actually functioning as a pest management barrier, attracting the insects & borers to nest in the grass and preventing them from spreading to the crops (Van den Berg, 2009).



Farmers cut Vetiver very short as they believe it prevents insects/borers from nesting in the vetiver and later spreading into crops. IDVN/EBPP opinion: it should be kept longer so that the borers stay in the Vetiver and don't spread to crops

**Vetiver for preserving farmland soil:** Pak Tua had been using his farmland to showcase the use of vetiver for preventing erosion. On this visit it appeared that the terrace had raised on top of the original vetiver hedges. It is hypothesized that the soil level increased as runoff with high sediment loads from farms upland was deposited on the terraces and held back by Vetiver hedges as shown on the top two diagrams below. Also, the batter of the terraces was incrementally shed off by the farmer in order to remove weeds and this debris and soil was deposited into the terrace beds below.

In addition, the March 2011 photo below shows a hedge in an awkward position about 15-25 cm from the top of the terraces, it appears that the vetiver hedge migrated to the middle of the terrace. However it is most unlikely. The reason for it to be there is that for long slopes it was recommended another row in the middle of the batter to increase its stability. In this case it stays there and worked. There should be another row on the top of the batter, but it was washed out and erosion has cut back to the edge of the crop, as shown on the third diagram

Therefore the top hedge should not be planted too close to the edge as shown here but on this site there was very little choice so that what has happened



**April 2009:** Vetiver was first planted at the edge



**March 2011:** Possible soil buildup on top of the Vetiver hedge ???



**April 2009:** David showed Pak Tua how to plant a middle row to prevent erosion in steep batter

In addition, it was also noted that Pak Tua has taken our advice for not planting cassava on the top hedges to reduce severe erosion caused by this crop.



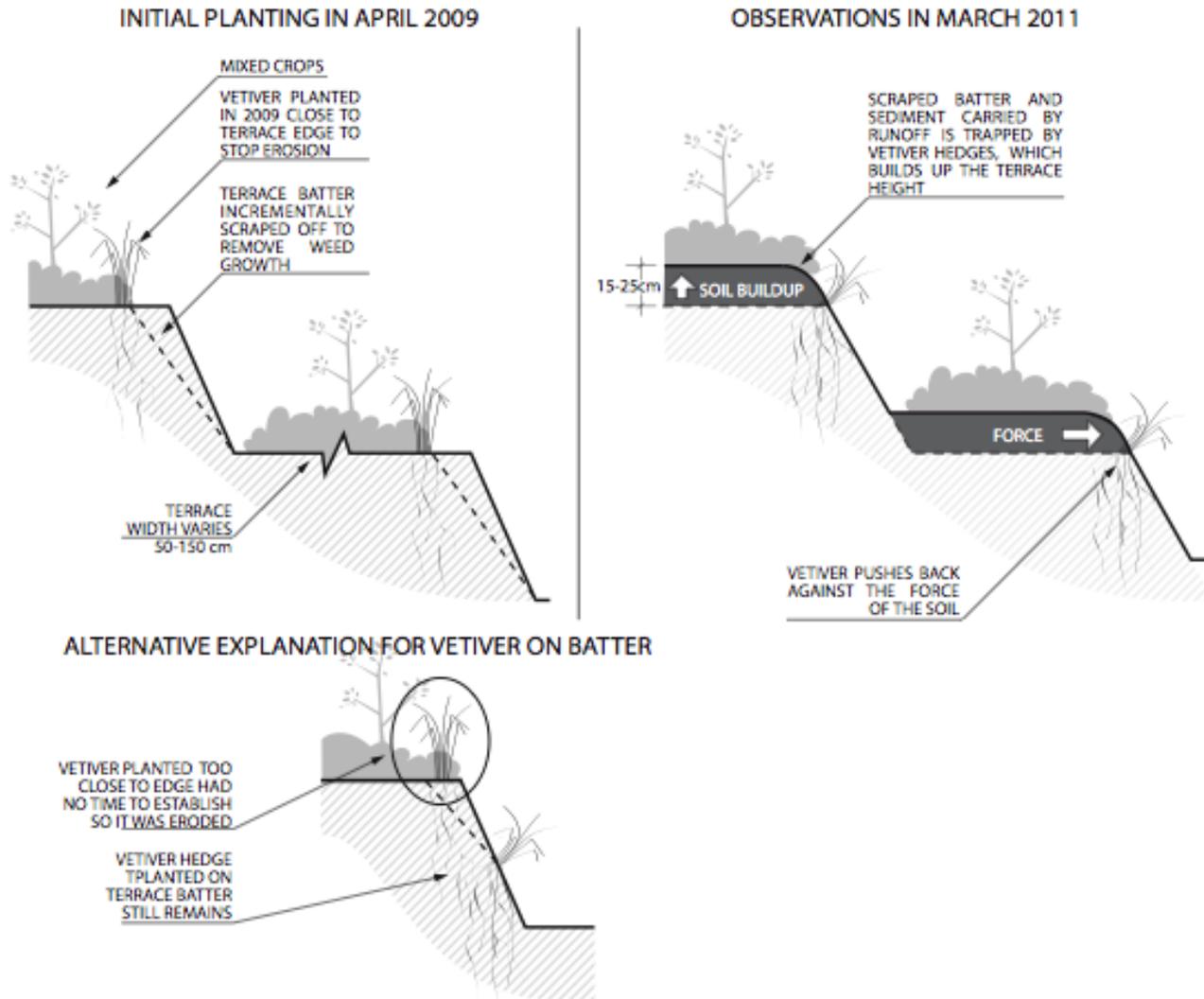
**April 2009:** Cassava planting on edge of terrace



**March 2011:** No Cassava

## Diagrams show how Vetiver has held back terrace erosion:

Typical example of Pilot Demonstration Action (PDA) in upland Citarum River



## 2.2. Septic Tank Site on the Bank of the Lower Citarum River

**March 2011 Site Visit Observations:** During the site visit in March 2011, we found that the local community who jointly benefitted from the septic tank had recently pulled out the Vetiver Grass because it was not providing a direct cash benefit. IDVN was in fact advised by Mr Yoga Sunardie, head of the local partner NGO, WPL, that the community leader and representatives who had learnt with Dr Paul Truong, David Booth & Ardika Adinata in 2009 had recently been replaced and these new people DID NOT UNDERSTAND the benefits of the Vetiver System. The community had already completely replaced the Vetiver grass with cash crops: cassava and corn, the crops growing there before the start of the PDA & planting of vetiver in 2009. At the back of the site in a dump area, a few recently dug out Vetiver plants were found, many already starting to rot! Effluent from the septic tank was not used to water the crops and instead was flowing straight into the Citarum River – a situation worse than in March 2009, when the local farmers then did partly channel the septic tank sludge runoff to their crops as they did realize that was benefitting their cash crops growth!

It is clear from this visit that the local partner NGO, that had built the septic tank and had a long term relationship with the local community, did not succeed in making it a long term sustainable project, informing the new community leaders of the nutrient removal abilities of Vetiver and its potential economic benefits of its foliage for forage and handicrafts. Once the funds provided by ADB PDA funds ran out for giving maintenance to the project, it is likely that they abandoned the project and the land was cleared of Vetiver by the newly appointed local leaders who found it more beneficial to plant crops.



IDVN staff Standing on Septic Tank: the pilot site originally covered with Vetiver is now planted with cassava and Corn.



Septic wastewater running straight into Citarum River



Recently dug out Vetiver we found in waste dump



Vetiver recently cleared off and soil was prepared planting cash crops

### 3. CONCLUSION

From this progress report it becomes clear that the sustainability of this kind of pilot project is completely dependent on the leadership of the stakeholders *and* their complete understanding and interest in the many benefits of the Vetiver System. However, a one-time introduction will not ensure sustainability. EBPP/IDVN have shown through their success with introduction of the VS was largely as

a result of regular awareness and education programmes, in the knowledge that key people who were enthusiastic and led this kind of programme at the outset often left and/or were replaced and if the new members are not fully informed and their enthusiasm depletes, then success cannot be assured.

Regarding the upland project, it is clear that introducing and applying the multiple benefits of the Vetiver System for stabilizing farmland terraces has proven to be a beneficial model for reducing upland runoff and erosion throughout the Citarum river basin, and it has been integrated with the farming system that the Pilot Project stakeholders are already used to.

Regarding the Lower Citarum River Septic Tank Project, replacement of the current farming practice along the edge of the river with Vetiver needs to be coupled with another added-on benefit in order to really gain the support of the community. Whilst David Booth and Ardika's presentation and on-site training did focus on the long term benefits of the vetiver grass for animal fodder, mulch, roofing thatch, vetiver handicrafts and improved crop production, the project allowed by ADB was far too short to enable the training of stakeholders to create local businesses from harvested vetiver grass and associated products for improving the local economy.

#### **4. REFERENCES**

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